

**INVITATION TO BID**  
**REQUEST FOR BID DESCRIPTION:**  
**SUPPLY AND INSTALLATION OF FIRE DETECTION, ALARM SYSTEM &**  
**EMERGENCY VOICE EVACUATION + GAS SUPPRESSION SYSTEMS AT ARMSCOR**  
**HEAD OFFICE-A Compulsory bidders briefing will be held in Armscor Head Office**  
**on 26 May 2022 at 10h00**

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**NOTE:**

**Kindly register on the National Treasury's Central Supplier Database (CSD) via [www.csd.gov.za](http://www.csd.gov.za)**

***Bids must ONLY be submitted in hard copy; electronic bid submissions are NOT acceptable.***

## RETURNABLE DOCUMENTS CHECKLIST

Bidders are required to develop a returnable schedule annexure in accordance with the following table of contents

|     | List of documents required.                                                                                                              | Submitted<br>[Yes or No] |                          |
|-----|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
|     |                                                                                                                                          | Yes                      | No                       |
| 1.  | Central Supplier database (CSD) registration report or Unique Registration Reference Number                                              | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.  | Valid Tax Clearance Certificate (s) and or proof of application endorsed by SARS and / or SARS issued verification pin code.             | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.  | Copies of bidders CIPC Company registration documents listing all members with percentage, See bidding structure for required documents. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.  | Copy of the Joint Venture / Consortium Agreement duly signed by all parties                                                              | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.  | Copy of the Sub-Contracting Agreement duly signed by all parties                                                                         | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.  | Valid proof of BBBEE status for the bidder and its sub-contractor(s)                                                                     | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.  | Designated sectors: Local production and content. <b>(Where applicable)</b>                                                              | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.  | Originally certified copy of Identity Document for the Company representative                                                            | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.  | Copy of latest audited financial statements                                                                                              | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. | Bid conditions acceptance form on KD17 (Mandatory)                                                                                       | <input type="checkbox"/> | <input type="checkbox"/> |

# ARMAMENTS CORPORATION OF SOUTH AFRICA SOC LTD (ARMSCOR)

Company registration: 1968/008611/06    Vat registration: 4500101169

## REQUEST FOR BID: EFAC/2022/04

### 1. INSTRUCTIONS ON SUBMISSION OF BIDS

- 1.1 Bid Closing at **11:00 am on 13 June 2022 (SOUTH AFRICAN TIME)**
- 1.2 Bids must be submitted in a sealed envelope marked with this bid reference number.
- 1.3 The sealed envelope must be deposited in the bid box at Armscor Head Office, Visitors Entrance (Block) 8 before the bid closing date and time addressed to:

The Manager:                      Supply Chain Management Department  
Armscor SOC Ltd

Postal address:                      Armscor SOC Ltd  
Private Bag X337  
Pretoria  
0001

Delivery address:                      Armscor Head Office  
370 Nossob Street  
Erasmuskloof Ext 4  
Pretoria

- 1.4 Bids dispatched by the courier service Company must be marked with bid reference number on the delivery note / packaging and the courier must ensure that the bid document is deposited in the bid box before the closing date and time. **Armscor will not be held responsible for any delays where bid documents are handed to the Armscor Reception.**
- 1.5 Bid proposals received after the closing time and date will not be considered.

### 2. ENQUIRIES

- 2.1 All queries regarding this bid must be addressed in writing to SCM Department on [aopts@armscor.co.za](mailto:aopts@armscor.co.za). Questions/enquiries relating to this RFB should be received three working days prior to the closing date. Queries received after this period will not be entertained.

### 3. BID VALIDITY PERIOD

Bid proposals to remain valid for acceptance for a period of **ONE HUNDRED AND TWENTY** days counted from the closing date.

**NOTE:** Bids for the supply of the goods and/or services described in the attached documents are invited in accordance with the provisions of the General Conditions of Contract (A-STD-0020) Issue 4 dated 14 February 2020 and the Rules of Procedure for Offerors (A-STD-0010) Issue 2 dated 21 April 2014, as well as any special condition contained in these documents. Copies of the General Conditions of Contract and the Rules of Procedure are available on Armscor's website at [www.armscor.co.za](http://www.armscor.co.za).

**BIDDING STRUCTURE**

| Indicate the type of bidding structure by marking with an 'X' in an appropriate box. |  |
|--------------------------------------------------------------------------------------|--|
| Individual Bidder                                                                    |  |
| Joint Venture                                                                        |  |
| Consortium                                                                           |  |
| Using Sub-contractors                                                                |  |
| Other                                                                                |  |

**Only fill the relevant category:**

| If individual bidder, indicate the following:                                                                                                     |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Name of Bidder                                                                                                                                    |  |
| Company / Close Corporation<br>Registration Number                                                                                                |  |
| VAT Registration Number                                                                                                                           |  |
| National Treasury Supplier Number                                                                                                                 |  |
| Unique Registration Reference<br>Number                                                                                                           |  |
| Contact Person                                                                                                                                    |  |
| Telephone Number                                                                                                                                  |  |
| Fax Number                                                                                                                                        |  |
| Email Address                                                                                                                                     |  |
| Postal Address                                                                                                                                    |  |
| Physical Address                                                                                                                                  |  |
| <b>NB: Submit with the bid the following documents:</b>                                                                                           |  |
| Copies of the bidder's CIPC company registration documents listing all members with percentages, in case of a CC                                  |  |
| In case of Individual Bidder supply ID document for local and if foreigner supply passport number or identification as applicable in that country |  |
| Latest copies of all share certificates, in case of a company or any other form of a legal entity                                                 |  |
| Shareholding breakdown per race, gender and percentage shareholding with shareholders of the bidding entity                                       |  |

**If Joint Venture or Consortium, indicate the following: (To be completed for each JV/Consortium member)**

|                                                    |  |
|----------------------------------------------------|--|
| Name of Joint Venture / Consortium                 |  |
| Company / Close Corporation<br>Registration Number |  |
| VAT Registration Number                            |  |
| National Treasury Supplier Number                  |  |
| Unique Registration Reference Number               |  |
| Contact Person                                     |  |
| Telephone Number                                   |  |
| Fax Number                                         |  |
| Email Address                                      |  |
| Postal Address                                     |  |
| Physical Address                                   |  |

**NB: Submit with the bid the following documents:**

Copies of the bidder's CIPC company registration documents listing all members with percentages, in case of a CC.

In case of Individual Bidder supply ID document for local and if foreigner supply passport number or identification as applicable in that country

Latest copies of all share certificates, in case of a company or any other form of a legal entity.

Shareholding breakdown per race, gender and percentage shareholding with shareholders of the bidding entity.

**If Joint Venture or Consortium, indicate the following:**

|                                                    |  |
|----------------------------------------------------|--|
| Name of Prime Contractor                           |  |
| Company / Close Corporation<br>Registration Number |  |
| VAT Registration Number                            |  |
| National Treasury Supplier Number                  |  |
| Unique Registration Reference<br>Number            |  |
| Contact Person                                     |  |
| Telephone Number                                   |  |
| Fax Number                                         |  |
| Email Address                                      |  |
| Postal Address                                     |  |
| Physical Address                                   |  |

**NB: Submit with the bid the following documents:**

Copies of the bidder's CIPC company registration documents listing all members with percentages, in case of a CC.

In case of Individual Bidder supply ID document for local and if foreigner supply passport number or identification as applicable in that country

Latest copies of all share certificates, in case of a company or any other form of a legal entity.

Shareholding breakdown per race, gender and percentage shareholding with shareholders of the bidding entity.

|                                                                                                                                                   |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>If using subcontractors, indicate the following:</b>                                                                                           |  |
| Name of Prime -Contractor                                                                                                                         |  |
| Percentage Value to be subcontracted                                                                                                              |  |
| Company / Close Corporation<br>Registration Number                                                                                                |  |
| VAT Registration Number                                                                                                                           |  |
| National Treasury Supplier Number                                                                                                                 |  |
| Unique Registration Reference<br>Number                                                                                                           |  |
| Contact Person                                                                                                                                    |  |
| Telephone Number                                                                                                                                  |  |
| Fax Number                                                                                                                                        |  |
| Email Address                                                                                                                                     |  |
| Postal Address                                                                                                                                    |  |
| Physical Address                                                                                                                                  |  |
| <b>Subcontractor Details:</b>                                                                                                                     |  |
| Name of Subcontractor                                                                                                                             |  |
| Company / Close Corporation<br>Registration Number                                                                                                |  |
| VAT Registration Number                                                                                                                           |  |
| National Treasury Supplier Number                                                                                                                 |  |
| Unique Registration Reference<br>Number                                                                                                           |  |
| Contact Person                                                                                                                                    |  |
| Telephone Number                                                                                                                                  |  |
| Fax Number                                                                                                                                        |  |
| Email Address                                                                                                                                     |  |
| Postal Address                                                                                                                                    |  |
| Physical Address                                                                                                                                  |  |
| <b>NB: Submit with the bid the following documents for both Prime and Sub-Contractors:</b>                                                        |  |
| Copies of the bidder's CIPC company registration documents listing all members with percentages, in case of a CC.                                 |  |
| In case of Individual Bidder supply ID document for local and if foreigner supply passport number or identification as applicable in that country |  |
| Latest copies of all share certificates, in case of a company or any other form of a legal entity                                                 |  |
| Shareholding breakdown per race, gender and percentage shareholding with shareholders of the bidding entity                                       |  |

|                                                                                                                                                   |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Other:</b>                                                                                                                                     |  |
| Name of Bidder                                                                                                                                    |  |
| Company / Close Corporation<br>Registration Number                                                                                                |  |
| VAT Registration Number                                                                                                                           |  |
| National Treasury Supplier Number                                                                                                                 |  |
| Unique Registration Reference<br>Number                                                                                                           |  |
| Contact Person                                                                                                                                    |  |
| Telephone Number                                                                                                                                  |  |
| Fax Number                                                                                                                                        |  |
| Email Address                                                                                                                                     |  |
| Postal Address                                                                                                                                    |  |
| Physical Address                                                                                                                                  |  |
| <b>NB: Submit with the bid the following documents:</b>                                                                                           |  |
| Copies of the bidder's CIPC company registration documents listing all members with percentages, in case of a CC.                                 |  |
| In case of Individual Bidder supply ID document for local and if foreigner supply passport number or identification as applicable in that country |  |
| Latest copies of all share certificates, in case of a company or any other form of a legal entity.                                                |  |
| Shareholding breakdown per race, gender and percentage shareholding with shareholders of the bidding entity.                                      |  |

**Declaration:**

I, as the duly authorized representative of the bidder hereby authorize Armscor to request, investigate and process company information including tax compliance via the SARS website.

.....  
Name

.....  
ID number

**BID CONDITIONS ACCEPTANCE FORM****Bidders shall complete and sign this bid conditions acceptance form**

I/We hereby offer to supply all or some of the supplies and/or services described in the Pricing Schedule and /or attached documents on the terms and conditions and in accordance with the conditions set out in A-STD-0010 Issue 2 dated 21 April 2014 and A-STD-0020 Issue 4 dated 14 February 2020 (and I/we acknowledge that I/we am/are acquainted therewith) at the price and on the terms of delivery/execution inserted by me/us.

I/We agree -

1. that this bid shall remain binding on me/us and open for acceptance for the period stipulated above;
2. that if my/our bids is accepted, the acceptance will be communicated to me/us by letter or order through the post, and such acceptance shall constitute a contract between me/us and Armscor, subject to the terms and conditions set out in Armscor's General Conditions of Contract (A-STD-0020), Issue 4 dated 14 February 2020, the contents of which I/we acknowledge ourselves to be acquainted with.

I/We choose as domicilium citandi et executandi in the Republic

.....

.....

(no post box or private bag)

IN BLOCK LETTERS ON BEHALF OF -

Complete registered:

Name of bidder:.....

**AUTHORISED SIGNATURE**

..... Date: .....

Name in block letters: .....

Capacity: .....

**NB: FAILURE TO COMPLETE AND SIGN THIS PAGE SHALL INVALIDATE THE BID AND WILL BE DISQUALIFIED FROM FURTHER EVALUATION.**

**SUPPLIER REGISTRATION**

- 1.1 Bidders must register on the National Treasury Central Supplier Database (CSD) in terms of National Treasury Instruction Note 3 of 2016/17.
- 1.2 Bidders must electronically register for Security on Armscor website to be considered for orders which are administered by Armscor SOC Ltd on Behalf of clients.

For more information on security registration contact:-

**The Security Registration**

**Private Bag X337**

**PRETORIA**

**0001**

**E-mail:- register@armscor.co.za**

**ALL BIDDERS SHALL COMPLY WITH THE FOLLOWING:**

1. Bidders should check the numbers of the pages correspond with the table of contents as no liability arising from claims owing to the omission or duplication of pages will be recognised by Armscor. The appendices mentioned in these pages form part of the bids.
2. **All bidders shall -**
  - 2.1. insert their name at the top of each price schedule form used (a rubber stamp may be used);
  - 2.2. insert the information in the spaces provided in the price schedules by writing or typing on the dotted lines only (additional information should be contained in a separate annexure);
  - 2.3. if they wish to make more than one bid against an item, as an alternative, apply for additional copies of the bid documents or photocopy one or more pages, and not retype or redraft any of the forms used;
  - 2.4. indicate the prices quoted in the units shown and quote them per item;
  - 2.5. indicate in respect of each item whether the goods/services quoted comply strictly with the specified requirements, and furnish particulars of deviations if this is not so;
  - 2.6. complete all appendices.
3. **Value-added tax, customs duties, *ad valorem* customs duties and surcharges:**
  - 3.1. Value added tax levied by the Receiver of Revenue must not be included in the prices quoted but be shown as a separate line item.
  - 3.2. Where supplies are quoted which are subject to levying of any customs duty, *ad valorem* customs or excise duty or surcharge by the Department of Customs and Excise, such charges must not be included by the bidder in the prices quoted. The applicable customs duty, *ad valorem* customs or excise duty or surcharge must, however, be indicated separately where provided for on Armscor's Questionnaire
4. **Security:**
  - 4.1. Classified bids are to be handled in the manner set out in Armscor's Security Instruction, document number A-WI-014, copies of which are obtainable on request from the Contractor Security Section, P O Box 411, Pretoria, 0001.
  - 4.2. Attention is drawn particularly to the procedure set out in chapter 4 of the manual, which is to be complied with when forwarding classified documents.

**5. Broad-Based Black Economic Empowerment Compliance:**

- 5.1 In terms of the Defence Sector Codes, contracts for goods and services shall only be awarded to a bidder that has Black Equity Ownership of at least 25% in year 1 (12 April 2019 to 31 March 2020), 30% in year 2 (01 April 2020 to 31 March 2021) and 35% in year 3 (01 April 2021) onwards, where applicable.
- 5.2 Failure to comply with the **B-BBEE Mandatory and Compulsory requirements** as stated in the KD24 will lead to disqualification.

**6. Advance payments:**

Bidders shall furnish the price without advance payment. (Consult paragraph 8 of A-STD-0010).

**7. Performance Guarantee:**

Armcor reserves the right to request the successful bidder to submit a performance guarantee for the proposed contract. Bidders must submit prices without provision for the performance guarantee as well as prices including the cost of such a guarantee.

**8. Commissions:**

If any commission is payable by yourself to any person(s) or body as a result of any order which may arise from this Request for Proposal, you must submit full details of the applicable person(s) or body and the amount payable, with this bid.

**9. Tax Compliance Requirements**

**It is a condition of bid that the successful bidder MUST be tax compliant, or that satisfactory arrangements have been made with the South African Revenue Service (SARS) to meet the bidder's tax obligations. FOREIGN COMPANIES ARE REQUIRED TO COMPLETE QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS OF ANNEXURE 1 TO KD 25**

- 9.1 In order to meet this requirement the bidder is required to access SARS e-filing and complete the SARS ONLINE "SARS tax compliance status" under tax status. Tax compliance requirements are also applicable to individuals who wish to submit bids.
- 9.2 SARS will then furnish the bidder with a Tax compliance PIN code that will be valid for a period of 1 (one) year from the date of approval.
- 9.3 The Tax compliance PIN letter shall be submitted with the bid, with an authorisation letter for Armcor to use the PIN code for verification of tax compliance status of the supplier.
- 9.4 In bids where Consortia /Joint Ventures / are involved, each party must submit a separate tax compliance PIN with authorisation letter.
- 9.5 In the event of subcontracting, tax compliance PIN letter and authorisation letter for the subcontractor must also be submitted with the bid.

- 9.6 Tax compliance is done via e-filing on the SARS website [www.sars.gov.za](http://www.sars.gov.za).
- 9.7 Original valid tax clearance certificates issued before 18 April 2016 are still valid until the expiry date or on replacement with SARS tax compliance PIN.

**NOTE: Armscor Suppliers /Bidders and Subcontractors must remain tax compliant for the duration of their contracts.**

**10. Awarding of Bids**

The awarding of bids will be in terms of the Preferential Procurement Policy Framework Act, 2000.  
The applicable points are:

**Price: (Pp) 80 Points**

**Broad-Based Black Economic Empowerment: 20 Points**

**Total: 100 Points**

The following formula will be used to calculate the points in respect of a bid up to a rand value of R50 000 000, 00 (all applicable taxes included).  
(Armscor may also apply this formula to price quotations with a value of less than R30 000, if and when appropriate):

$P_s = P_p$

Provided that  $\sum (P_{pa}) = 80$

Where:

|       |                                                 |
|-------|-------------------------------------------------|
| $P_s$ | = points scored for bid/bid under consideration |
| $P_p$ | = points scored for price                       |
| $a$   | = allocated                                     |

The points scored for price ( $P_p$ ) =  $P_{pa} * (1 - \frac{(P_t - P_m)}{P_m})$

Where:  $P_{pa}$  = points allocated for price

$P_t$  = comparative price of bid/bid under consideration

$P_m$  = comparative price of lowest acceptable bid/bid

**11. Targeted Procurement**

11.1 In terms of the Defence Sector Codes, Armscor may reserve a percentage of procurement exclusively for certain categories of enterprises. A contract may be awarded to a bidder that did not score the highest points only in accordance with section 2f of the Act. If Armscor intends on applying objective criteria in terms of the section 2f of the Act, this will be stated in the bid document.

**12. Mandatory local production and content for designated sectors**

- 12.1 When applicable, bids not meeting the mandatory local production and content for designated sectors will not be considered for further evaluation.
- 12.2 A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.
- 12.3 If there is no designated sector, Armscor will include as a specific condition of the bid, that only locally produced services or goods or locally manufactured goods with a stipulated minimum threshold for local production and content, will be considered.

RESTRICTED

KD17

BID NUMBER : EFAC/2022/04

CLOSING AT 11:00 ON : 13 June 2022

VALIDITY PERIOD: 120 DAYS

NAME OF BIDDER :

| ITEM NO | DESCRIPTION                                                                                                                                                                                                             | QTY | UNIT PRICE IN FOREIGN CURRENCY | UNIT PRICE IN S.A. CURRENCY | SUBTOTAL |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------|-----------------------------|----------|
| 1       | Appointment of contractor for the supply and installation of fire detection, alarm system & emergency voice evacuation + gas suppression systems at Armscor head quarters<br><b>Annexure B (BOQ)</b>                    | LOT |                                |                             |          |
| 2       | <b>Annexure D (Schedule of Drawings)</b> Actual drawing will be issued at the bidders briefing                                                                                                                          |     |                                |                             |          |
| 3       |                                                                                                                                                                                                                         |     |                                |                             |          |
| 4       |                                                                                                                                                                                                                         |     |                                |                             |          |
|         | <b>Notes:</b> <ul style="list-style-type: none"> <li>• Mandatory Black Equity Ownership April 2021/22 onwards – Minimum 35% - applicable</li> <li>• Subcontracting 30% of the requirement value - applicable</li> </ul> |     |                                |                             |          |
|         | TOTAL (excluding VAT)                                                                                                                                                                                                   |     |                                |                             |          |
|         | VAT                                                                                                                                                                                                                     |     |                                |                             |          |
|         | TOTAL (including VAT)                                                                                                                                                                                                   |     |                                |                             |          |

1. Delivery address: Armscor Head Office, 370 Nossob street Erasmuskloof, Pretoria East .....
  2. \* Period required for commencement of delivery, after receipt of order:.....
  3. \* Rate of delivery: .....
  4. \* Period required for completion of order, after receipt thereof: .....
- \* Must be completed by Bidder if not completed by Armscor.

Customer Focus : Care and Respect for Others : Excellence : Integrity : Leading by Example : Results Driven : Teamwork

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**BID SPECIFICATION**

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**APPOINTMENT OF CONTRACTOR FOR THE SUPPLY AND INSTALLATION OF FIRE  
DETECTION, ALARM SYSTEM & EMERGENCY VOICE EVACUATION + GAS  
SUPPRESSION SYSTEMS AT ARMSCOR HEAD QUARTERS**

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**MAY 2022**

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**ARMSCOR considers this Request for Proposal (RFP) document and all related information, either written or verbal, which is provided to the bidder, to be proprietary of ARMSCOR. It shall be kept confidential by the bidder, officers, employees, agents and representatives. The bidder shall not disclose, publish, or advertise this specification or related information to any third-party without the prior written consent of ARMSCOR.**

**APPOINTMENT OF CONTRACTOR FOR THE SUPPLY AND INSTALLATION OF FIRE  
DETECTION, ALARM SYSTEM & EMERGENCY VOICE EVACUATION + GAS  
SUPPRESSION SYSTEMS AT ARMSCOR HEAD QUARTERS**

**1. ACRONYMS**

|         |                                                                                  |
|---------|----------------------------------------------------------------------------------|
| ARMSCOR | Armaments Corporation of South Africa SOC Ltd                                    |
| B-BBEE  | Broad Based Black Economic Empowerment                                           |
| BOQ     | Bill of Quantities                                                               |
| CIPC    | Companies Intellectual Property Commission                                       |
| EME     | Exempted Micro Enterprise                                                        |
| MOD     | Minister of Defence                                                              |
| QSE     | Qualifying Small Enterprise                                                      |
| RFB     | Request for Bid                                                                  |
| PPPFA   | Preferential Procurement Policy Framework Act 5 of 2000<br>(PPPFA)               |
| SACPCMP | South African Council for the Project and Construction<br>Management Professions |

**2. BACKGROUND**

Armcor seeks to appoint a contractor to replace the fire detection system, gas suppression system and voice evacuation system at HQ facility. The replacement of these fire management systems is a statutory requirement and therefore must be carried out in accordance with the applicable SANAS regulation. As such, Armcor appointed Plantech Consulting Engineers to lead the design and specification development process. The design and development has been completed and the technical specification including drawings were made available to the Bid Specification Committee for review and these documents formed the basis of the development of the value system and bid specification.

**3. AIM OF THE RFB**

The aim of the RFB is to appoint a fire system contractor who is registered with SAQCC, a statutory fire management professional body.

**4. DELIVERY PERIOD**

Once off supply, installation and commissioning of specified items.

**5. GENERAL INSTRUCTIONS FOR THE COMPLETION OF THE BID**

**1.1 Completeness of documentation**

The Bidder is required to ensure that the bid pages and appendices are complete, correct and consistent.

**1.2 Number of Bid copies**

The Bidder is required to submit one (1) original document to Armcor. The original document must be clearly marked with the bid number, bid closing date and name of the bidder.

## 6 **BID EVALUATION PROCESS**

The evaluation criteria will be in line with the Preferential Procurement Policy Framework Act No 5 of 2000 and A-PROC-9053. Bids will be evaluated on a Four-stage evaluation process.

The requirements of any given stage shall be complied with prior to progression to the next evaluation stage.

**A 4-staged approach will be used to evaluate a bid as follows:**

|                |                                                        |
|----------------|--------------------------------------------------------|
| <b>STAGE 1</b> | Mandatory Black Equity Ownership (Defence Sector Code) |
| <b>STAGE 2</b> | Sub-Contracting                                        |
| <b>STAGE 3</b> | Critical Criteria                                      |
| <b>STAGE 4</b> | Preference Point System                                |

### 6.1 **Stage 1: Mandatory Black Equity Ownership**

No contract for goods and services shall be awarded to any bidder unless such bidder has Black Equity Ownership of at least 35% as per the Defence Sector Code as Gazzeted.

#### **Evidence required:**

The bidder shall submit a valid proof of B-BBEE status (CIPC B-BBEE certificate or B-BBEE affidavit duly sworn and commissioned or B-BBEE certificate issued by SANAS accredited verification agency). If the bidder is a Joint Venture (JV) or Consortium, the bidder shall submit with the bid, a consolidated proof of B-BBEE status.

### 6.2 **Stage 2: Sub-Contracting**

In terms of paragraph 16.4.4.1.2 of the Defence Sector Codes, Armscor shall be entitled to require that the bidder should sub-contract a minimum of 30% of the contract value to any of the following entities that are at least 51% black owned:

- I. EMEs or QSEs owned by Black people
- II. EMEs or QSEs owned by female(s)
- III. EMEs or QSEs owned by military veterans
- IV. EMEs or QSEs owned by female(s) EMEs or QSEs owned by youth
- V. EMEs or QSEs owned by people living with disabilities

#### **Evidence required:**

The bidder shall submit a valid proof of B-BBEE status (CIPC B-BBEE certificate or B-BBEE affidavit duly sworn and commissioned or B-BBEE certificate issued by SANAS accredited verification agency) of the subcontractor. The bidders shall also complete the relevant KD forms with respect to its subcontractor.

### 6.3 **Stage 3: Critical Criteria**

Critical Criteria are those criteria that determine whether the bidder complies with certain crucial requirements to perform a task. Failure by the bidder to comply with any criterion will result in the bid being excluded from further evaluation. Kindly refer to Table 1 for Critical Criteria.

### 6.4 **Stage 4: Preference Point System**

The 80/20 or 90/10 preference point system is applicable to this proposal. Should the value of the development cost be above R50 million, then the 90/10 preference point system will be applied. 80 or 90 points shall be allocated for Price & 20 or 10 points will be allocated for B-BBEE

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**Table 1: Critical Criteria**

| No. | Criteria Description                                                                                                                                          | Compliance Evidence                                                                                                                                                                                                          |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | The bidder shall attend a compulsory bidder's briefing session which include site inspection                                                                  | The representative from the bidder shall complete details required in the bidders briefing attendance register on the day of the briefing                                                                                    |
| 2.  | The bidder shall be registered with CIDB grading Grade 6SF as a minimum                                                                                       | The bidder shall submit a valid CIDB certificate.                                                                                                                                                                            |
| 3.  | The bidder shall be in good standing with the Compensation Commissioner in terms of the Compensation of Occupational Injuries and Disability Act (COIDA)      | The bidder shall submit a valid COIDA certificate issued by the Department of Employment and Labor or any other agency accredited by the Department of Employment and Labor.                                                 |
| 4.  | The Bidder shall allocate a Fire detection Designer with valid SAQCC registrations in Fire Detection Designer                                                 | The bidder shall submit valid SAQCC registration card/letter in Fire Detection Designer of the allocated Fire Detection, which clearly indicate the registration code.                                                       |
| 5.  | Bidder shall allocate a SAQCC-registered Fire Detection Commissioner                                                                                          | Bidder shall submit a valid SAQCC registration card/ letter of the allocated Fire Detection Commissioner, which clearly indicated the registration code.                                                                     |
| 7.  | Bidder shall allocate a SAQCC-registered Gas Suppression Designer                                                                                             | Bidder shall submit a valid SAQCC registration card/letter of the allocated Gas Suppression Designer, which clearly indicate registration code                                                                               |
| 8.  | Bidder shall allocate a SAQCC-registered Gas Suppression Commissioner                                                                                         | Bidder shall submit a valid SAQCC registration card/letter for the allocated Gas Suppression Commissioner, which clearly indicate the registration code.                                                                     |
| 9.  | The bidder or allocated resource shall be an accredited/certified agent of the OEM (original equipment manufacturer) for the proposed Fire Detection system   | The Bidder Shall submit a valid training certificate or accreditation certificate or letter from the OEM of the system confirming that the bidder or allocated resource is an agent for the proposed Fire Detection system   |
| 10. | The bidder or allocated resource shall be an accredited/certified agent of the OEM (original equipment manufacturer) for the proposed Gas Suppression system  | The Bidder Shall submit a valid training certificate or accreditation certificate or letter from the OEM of the system confirming that the bidder or allocated resource is an agent for the proposed Gas Suppression system  |
| 11. | The bidder or allocated resource shall be an accredited/certified agent of the OEM (original equipment manufacturer) for the proposed Voice Evacuation system | The Bidder Shall submit a valid training certificate or accreditation certificate or letter from the OEM of the system confirming that the bidder or allocated resource is an agent for the proposed Voice Evacuation system |
| 12. | The bidder shall allocate a SAQCC registered installer for fire detection system                                                                              | Bidder must submit a valid SAQCC registration card/letter for the allocated installer which clearly indicate the registration code                                                                                           |
| 13  | The bidder shall demonstrate previous experience in installation of the following fire management systems:                                                    | The bidder shall submit at least one (1) client reference letter on the client letterhead indicating                                                                                                                         |

RESTRICTED

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| No. | Criteria Description                                                                                                                              | Compliance Evidence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | <ul style="list-style-type: none"> <li>• Fire Detection system</li> <li>• Gas suppression system</li> <li>• Emergency Voice Evacuation</li> </ul> | <p>installation of the following fire management systems i.e.</p> <ul style="list-style-type: none"> <li>• fire detection,</li> <li>• gas suppression</li> <li>• emergency voice evacuation</li> </ul> <p>OR</p> <p>Submit a completion certificate issued by Client or Principal Agent or Main Contractor indicating installation of any of the following fire management systems i.e.</p> <ul style="list-style-type: none"> <li>• fire detection,</li> <li>• gas suppression</li> <li>• emergency voice evacuation</li> </ul> <p><i>Note 1: Should the completion certificate not indicate the installation of any of the systems indicated above, then additional supporting documents confirming installation of any of the above systems, issued by the Client or Principal Agent or Main Contractor shall be submitted.</i></p> <p><i>Note 2: if the systems were installed at different client the multiple reference letters must be submitted</i></p> |
| 14  | The bidder shall allocate a competent project manager with 5 years minimum experience in fire system projects                                     | <p>The bidder shall submit a CV of allocated project manager clearly indicating years of experience in managing fire system projects, with contactable references</p> <p><i>Note: Armscor reserves the right to verify the authenticity of the information included in the CV</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 15  | The bidder shall fully comply with the Technical Requirements detailed in Annexure A of the RFB                                                   | The bidder shall complete and sign the Bid Condition Acceptance Form on page 7 of the KD17 of the RFB and submit with the Bid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Note:**

- a) A sub-contractor of the bidder shall not be evaluated in terms of the critical criteria.
- b) Bidders may allocate one person for more than one functions provided all compliance evidences required are submitted.

**7 COMPULSORY BIDDER'S BRIEFING**

ARMSCOR will hold a compulsory bidders briefing session:

| VENUE               | ADDRESS                                                                   | DATE        | TIME  |
|---------------------|---------------------------------------------------------------------------|-------------|-------|
| Armscor Head Office | Armscor Head Office<br>370 Nossob Street<br>Erasmuskloof<br>Pretoria East | 26 May 2022 | 10:00 |

## **8 ADDITIONAL CONDITIONS**

The bidder must submit the following documents with the Bid

- 8.1** Schedules of technical information and equipment offered, consisting of:
- Schedule of Information - Annexure A
  - Bill of Quantities – Annexure B
  - Responsibility Matrix -- Annexure C
  - Drawing Schedule – Annexure D
  - Technical Specification – Annexure E
- 8.2** All other information which will assist in completion of this RFB is attached as per the technical requirement document attached as Annexure A which needs to be fully complied with by the bidder.
- 8.3** The Bidder Shall complete in full the Bill of Quantities (BOQ) as detailed in Annexure B and transfer the Totals to KD17 Pricing Schedule page

## **9 SPECIAL REQUIREMENTS**

**Special requirements are negotiated technical or project management stipulations that will become contractually binding on the successful Bidder. These requirements are specific to an order and are over-and-above those prescribed in the KD documentation. The following special requirements are applicable to this RFB:**

- 9.1** The preferred bidder shall be required to provide proof of public liability cover to the minimum value of R6 Million. The successful bidder will be given 14 days from date of notice to submit the proof of professional liability cover.
- 9.2** The preferred bidder shall allocate an SACPCMP registered Construction Health and Safety Officer (CHSO) fulltime for the duration of the project.

## **10 SPECIAL CONDITIONS**

**In addition to the General Conditions of Contract, A-STD-0020, the following special conditions will be applicable:**

- 10.1** The security classification of this project is "Secret" and therefore; the preferred bidder will be subjected to security assessment and the appointment will only be confirmed upon receipt of positive assessment results. Before the commencement of the project, all the personnel that will be involved in the project must complete and submit the personnel security clearance forms (DD1057) to Armscor Vetting Division

## **RESTRICTED**

and subject themselves for Personnel Evaluation Security Interviews (PESI) and sign NDA forms.

- 10.2** The employees of the bidder allocated to the project shall have South African citizenship (no employees or subcontractors with dual citizenship will be acceptable) and they must obtain and maintain the required level of security clearance, Personnel Evaluation Security Interview (PESI) through Armscor. If the staff or contractors of the bidder cannot obtain or retain the required security clearance, the bidder shall immediately remove the employees or subcontractors concerned from the premises. Armscor will have no liability towards the bidder, his employees or subcontractors and will compensate the bidder only for services provided up until the moment the bidder is notified of the security deviation.
- 10.3** Armscor's division responsible for security clearances will handle all security clearances and the costs of the first clearances will be paid by Armscor. The clearance for this project is Secret the bidder is responsible for the cost of the security clearances (PESI) of replacements. The cost for the clearance is not more than R22701.00
- 10.4** The bidder shall ensure that new appointments are in compliance with PESI standards issued by Armscor's Personnel Evaluation Division (APED) before the new appointees are allowed onto the Armscor premise. New appointments can only be made after confirmation with the Armscor's security division and APED. If confirmation is given, Armscor accepts no liability with respect to the outcome of the security clearance (PESI).

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**ARMAMENTS CORPORATION OF SOUTH AFRICA SOC LTD  
(ARMSCOR)**

**QUESTIONNAIRE**

**REPLIES**

- 1 What is the request for bid number? .....
- 2 If applicable: Price basis of bid  
(if not delivered into store) .....
- 3 Indicate which of the following applies:
- 3.1 The prices are fixed. ☐
- 3.2 The prices are not fixed (NB: See par 9 of A-Std-0010). ☐
- 4 Is the delivery period (commencement after receipt of order) fixed? Y/N

.....  
.....

**WHERE SUPPLIES OFFERED ARE TO BE IMPORTED, THE QUESTIONS BELOW MUST BE ANSWERED.**

- 5 Foreign content:
- 5.1 What amount in foreign currency must be remitted overseas? .....
- 5.2 What is the rate of exchange used in converting the amount into ZAR1, 00=.....  
SA Rand and the date on which this is based? Date .....
- 6 Statutory costs:
- 6.1 Are the goods quoted on subject to customs duty,  
ad valorem customs or surcharge? .....
- 6.2 If so, what is the amount payable in respect of
- a) Customs duty? .....
- b) Ad valorem customs duty? .....

## PRICE BREAKDOWN

7. The following particulars must be furnished, failure of which may invalidate the bids.

|              |                                                   | AMOUNT | % OF TOTAL PRICE |
|--------------|---------------------------------------------------|--------|------------------|
| 7.1          | FOB/FCA cost of item                              |        |                  |
| 7.2          | Sea/Air freight                                   |        |                  |
| 7.3          | Insurance charges                                 |        |                  |
| 7.4          | Clearance charges                                 |        |                  |
| 7.5          | Customs duties                                    |        |                  |
| 7.6          | Ad valorem customs duties                         |        |                  |
| 7.7          | Delivery costs from port/airport to your premises |        |                  |
| 7.8          | Local content (excluding (10.10)                  |        |                  |
| 7.9          | Delivery costs from your premises into store      |        |                  |
| 7.10         | Balance (detail to be submitted)                  |        |                  |
| <b>TOTAL</b> |                                                   |        |                  |

## BROAD-BASED BLACK ECONOMIC EMPOWERMENT

### ACRONYMS AND ABBREVIATIONS

|        |                                                |
|--------|------------------------------------------------|
| B-BBEE | Broad-Based Black Economic Empowerment         |
| CIPC   | Companies and Intellectual Property Commission |
| COTS   | Commercial Off The Shelf                       |
| EME    | Exempted Micro Enterprises                     |
| MOTS   | Military Off The Shelf                         |
| QSE    | Qualifying Small Enterprises                   |
| SANAS  | South African National Accreditations Systems  |

#### 1. MANDATORY B-BBEE REQUIREMENT:

- 1.1 In terms of the Defence Sector Codes, contracts for goods and services shall only be awarded to a bidder that has Black Equity Ownership of at least 25% in year 1 (12 April 2019 to 31 March 2020), 30% in year 2 (01 April 2020 to 31 March 2021) and 35% in year 3 (01 April 2021) onwards, where applicable.
- 1.2 EMEs are exempted from compliance with the mandatory B-BBEE requirement.

#### 2. B-BBEE REQUIREMENTSSub-Contracting

- a) In terms of paragraph 16.4.4.1.2 of the Defence Sector Codes, Armscor shall be entitled to require that the bidder should sub-contract a minimum of 30% of the contract value to any of the following entities that are at least 51% black owned:
- i. EMEs or QSEs
  - ii. EMEs or QSEs owned by female(s)
  - iii. EMEs or QSEs owned by military veterans
  - iv. EMEs or QSEs owned by youth
  - v. EMEs or QSEs owned by people living with disabilities

**NB: Failure by the bidder to comply with the B-BBEE Mandatory and Compulsory Requirements as stated herein above will lead to disqualification.**

### 3. PREFERENCE POINTS FOR BROAD-BASED BLACK ECONOMIC EMPOWERMENT

- 3.1 The B-BBEE preference points will be awarded in terms of the Preferential Procurement Policy Framework Act, 2000pre.
- 3.2 The 80/20 preference point system is applicable to all bids with a Rand value of up to R50 000 000,00 (all applicable taxes included)
- 3.3 Preference points for this bid shall be awarded for:
- |                                                   |     |
|---------------------------------------------------|-----|
| PRICE                                             | 80  |
| B-BBEE STATUS                                     | 20  |
| Total points for Price and B-BBEE must not exceed | 100 |
- 3.4 Bidders who do not submit a valid proof of B-BBEE status will score zero (0) for preference points.

### 4. ALLOCATION OF B-BBEE POINTS

- 4.1 The B-BBEE points are to be claimed and allocated according to the table below for acquisition of services, works or goods with a value of up to R50 000 000, 00 and must be substantiated by means of a valid proof of B-BBEE.

| B-BBEE status level | Points Allocated |
|---------------------|------------------|
| Level 1             | 20               |
| Level 2             | 18               |
| Level 3             | 14               |
| Level 4             | 12               |
| Level 5             | 8                |
| Level 6             | 6                |
| Level 7             | 4                |
| Level 8             | 2                |
| Non-compliant       | 0                |

- 4.2 The Armscor BBE Division reserves the right to require a bidder and/or its sub-contractor(s) to substantiate any claim at any stage in the bidding process to verify and confirm the B-BBEE status of the bidder and/or its sub-contractor(s).

**5. PRINCIPLES****5.1 Valid proof of B-BBEE status is either of the following:****5.1.1 A B-BBEE Sworn Affidavit fully completed and**

- 5.1.1.1 Deposed and signed in the presence of the Commissioner of Oaths
- 5.1.1.2 Does not contradict itself (% black ownership matches compliance level)
- 5.1.1.3 Commissioner of Oaths credentials and signature are reflected.

**5.1.2 A B-BBEE Certificate issued by either the CIPC or a SANAS Accredited Verification Agency****5.1.3 An unincorporated Joint Venture / Consortium must submit a Consolidated B-BBEE Certificate in the name of the Joint Venture / Consortium issued by a SANAS accredited Verification Agency.****5.1.4 B-BBEE status must be based on the latest financial year-end information, otherwise it is invalid and unacceptable.****5.2 Sub-Contracting more than 25% of the value of the contract****5.2.1 A bidder awarded a contract may not sub-contract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBEE status level than the bidder concerned, unless the contract is sub-contracted to an EME that has the capability and ability to execute the sub-contract.****5.2.2 A bidder awarded a contract must obtain the approval of Armscor prior to any changes in the subcontracting arrangement.**

**B-BBEE DECLARATION****1. Confirmation of the Bidder's Turnover**

|                                                   |   |                                |  |
|---------------------------------------------------|---|--------------------------------|--|
| Name of the Bidder                                |   |                                |  |
| Registration Number                               |   |                                |  |
| Financial Year End                                |   |                                |  |
| Turnover<br>(As at the latest financial year end) | R | Starting<br>(Day, Month, Year) |  |
|                                                   |   | Ending<br>(Day, Month, Year)   |  |

**2. Confirmation of Subcontractors involved in the execution of the order:**

| Bidder         | % Black Ownership | B-BBEE Status | % Value to be Contracted |
|----------------|-------------------|---------------|--------------------------|
| 1.             |                   |               |                          |
| Subcontractors | % Black Ownership | B-BBEE Status | % Value to be Contracted |
| 1.             |                   |               |                          |
| 2.             |                   |               |                          |
| 3.             |                   |               |                          |

**3. Confirmation of Suppliers involved in the execution of the order:**

| Supplier's name | % Black Ownership | B-BBEE status | % Value to be Supplied |
|-----------------|-------------------|---------------|------------------------|
| 1.              |                   |               |                        |
| 2.              |                   |               |                        |
| 3.              |                   |               |                        |
| 4.              |                   |               |                        |
| 5.              |                   |               |                        |

I, the undersigned, am duly authorised to certify on behalf of the abovementioned entity that the information contained herein above is true and correct.

**AUTHORISED SIGNATURE** : ..... Date: .....

Name in block letters : .....

Capacity : .....

## BIDDER'S DISCLOSURE

### 1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

### 2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest<sup>1</sup> in the enterprise, employed by the state? **YES/NO**

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

| Full Name | Identity Number | Name of State institution |
|-----------|-----------------|---------------------------|
|           |                 |                           |
|           |                 |                           |
|           |                 |                           |
|           |                 |                           |
|           |                 |                           |
|           |                 |                           |
|           |                 |                           |
|           |                 |                           |
|           |                 |                           |

2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES/NO**

2.2.1 If so, furnish particulars:

.....  
.....

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES/NO**

<sup>1</sup> the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

2.3.1 If so, furnish particulars:

.....  
.....

**3 DECLARATION**

I, the undersigned, (name)..... in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

- 3.1 I have read and I understand the contents of this disclosure;
- 3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;
- 3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium<sup>2</sup> will not be construed as collusive bidding.
- 3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.
- 3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
- 3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.
- 3.6 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.  
I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....  
Signature

.....  
Date

.....  
Position

.....  
Name of bidder

<sup>2</sup> Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

**DEFENCE SECTOR BBBEE SWORN AFFIDAVIT – EXEMPTED MICRO ENTERPRISE**

I, the undersigned,

|                     |  |
|---------------------|--|
| Full name & Surname |  |
| Identity number     |  |

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.

2. I am a Member / Director / Owner of the following enterprise and am duly authorised to act on its behalf:

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Enterprise Name:</b>                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Trading Name (If Applicable):</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Registration Number:</b>                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Type of Entity (CC, (Pty) Ltd, Sole Prop etc.):</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Nature of Business:</b>                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Definition of "Black People"</b>                    | <p>As per the Broad-Based Black Economic Empowerment Act 53 of 2003 as Amended by Act No 46 of 2013 "Black People" is a generic term which means Africans, Coloureds and Indians –</p> <p>(a) who are citizens of the Republic of South Africa by birth or descent; or</p> <p>(b) who became citizens of the Republic of South Africa by naturalisation-</p> <p>i. before 27 April 1994; or</p> <p>ii. on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalization prior to that date;"</p>                                                                                                                                                                      |
| <b>Definition of "Black Designated Groups"</b>         | <p>"Black Designated Groups means:</p> <p>(a) unemployed black people not attending and not required by law to attend an educational institution and not awaiting admission to an educational institution;</p> <p>(b) Black people who are youth as defined in the National Youth Commission Act of 1996;</p> <p>(c) Black people who are persons with disabilities as defined in the Code of Good Practice on employment of people with disabilities issued under the Employment Equity Act;</p> <p>(d) Black people living in rural and under developed areas;</p> <p>(e) Black military veterans who qualifies to be called a military veteran in terms of the Military Veterans Act 18 of 2011;"</p> |

# ANNEXURE 1 TO KD24

3. I hereby declare under Oath that:

- The Enterprise has \_\_\_\_\_% Black Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise has \_\_\_\_\_% Black Female Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise has \_\_\_\_\_% Black Designated Group Beneficiaries as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- Black Designated Group Owned % Breakdown as per the definition stated above:
  - Black Youth % = \_\_\_\_\_%
  - Black people living with disabilities % = \_\_\_\_\_%
  - Black Unemployed % = \_\_\_\_\_%
  - Black People living in Rural areas % = \_\_\_\_\_%
  - Black Military Veterans % = \_\_\_\_\_%
- Based on the Financial Statements/Management Accounts and other information available on the latest financial year-end of \_\_\_\_\_, the annual Total Revenue was R5,000,000.00 (Five Million Rands) or less
- Please confirm on the table below the B-BBEE level contributor, **by ticking the applicable box.**

|                           |                                                         |  |
|---------------------------|---------------------------------------------------------|--|
| 100% Black Owned          | <b>Level One</b> (135% B-BBEE procurement recognition)  |  |
| At Least 51% Black Owned  | <b>Level Two</b> (125% B-BBEE procurement recognition)  |  |
| Less than 51% Black Owned | <b>Level Four</b> (100% B-BBEE procurement recognition) |  |

4. I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the owners of the enterprise which I represent in this matter.
5. The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

| Commissioner of Oaths            | Deponent         |
|----------------------------------|------------------|
| <b>Credentials and Signature</b> |                  |
|                                  | <b>Signature</b> |
| <b>Date</b>                      | <b>Date</b>      |

## ANNEXURE 2 TO KD24

## DEFENCE SECTOR BBBEE SWORN AFFIDAVIT – QUALIFYING SMALL ENTERPRISE

I, the undersigned,

|                     |  |
|---------------------|--|
| Full name & Surname |  |
| Identity number     |  |

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.
2. I am a Member / Director / Owner of the following enterprise and am duly authorised to act on its behalf:

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Enterprise Name:</b>                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Trading Name (If Applicable):</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Registration Number:</b>                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Type of Entity (CC, (Pty) Ltd, Sole Prop etc.):</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Nature of Business:</b>                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Definition of "Black People"</b>                    | <p>As per the Broad-Based Black Economic Empowerment Act 53 of 2003 as Amended by Act No 46 of 2013 "Black People" is a generic term which means Africans, Coloureds and Indians –</p> <p>(a) who are citizens of the Republic of South Africa by birth or descent; or</p> <p>(b) who became citizens of the Republic of South Africa by naturalisation-</p> <p>i. before 27 April 1994; or</p> <p>ii. on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalization prior to that date;"</p>                                                                                                                                                                      |
| <b>Definition of "Black Designated Groups"</b>         | <p>"Black Designated Groups means:</p> <p>(a) unemployed black people not attending and not required by law to attend an educational institution and not awaiting admission to an educational institution;</p> <p>(b) Black people who are youth as defined in the National Youth Commission Act of 1996;</p> <p>(c) Black people who are persons with disabilities as defined in the Code of Good Practice on employment of people with disabilities issued under the Employment Equity Act;</p> <p>(d) Black people living in rural and under developed areas;</p> <p>(e) Black military veterans who qualifies to be called a military veteran in terms of the Military Veterans Act 18 of 2011;"</p> |

Issued in terms of the Defence Sector Code (Gazette 42391 - 12 April 2019)

3. I hereby declare under Oath that:

- The Enterprise has \_\_\_\_\_% Black Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise has \_\_\_\_\_% Black Female Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise has \_\_\_\_\_% Black Designated Group Beneficiaries as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- Black Designated Group Owned % Breakdown as per the definition stated above:
  - Black Youth % = \_\_\_\_\_%
  - Black people living with disabilities % = \_\_\_\_\_%
  - Black Unemployed % = \_\_\_\_\_%
  - Black People living in Rural areas % = \_\_\_\_\_%
  - Black Military Veterans % = \_\_\_\_\_%
- Based on the Financial Statements/Management Accounts and other information available on the latest financial year-end of \_\_\_\_\_, the annual Total Revenue was between R5,000,000.00 (Five Million Rands) to R50,000,000.00 (Fifty Million Rands)
- Please confirm on the table below the B-BBEE level contributor, by ticking the applicable box.

|                          |                                                        |  |
|--------------------------|--------------------------------------------------------|--|
| 100% Black Owned         | <b>Level One</b> (135% B-BBEE procurement recognition) |  |
| At Least 51% Black Owned | <b>Level Two</b> (125% B-BBEE procurement recognition) |  |

4. I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the owners of the enterprise which I represent in this matter.

5. The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

| Commissioner of Oaths     | Deponent  |
|---------------------------|-----------|
| Credentials and Signature |           |
|                           | Signature |
| Date                      | Date      |

**ANNEXURE 1 TO KD25**

|                                                                                                                                                                                                                            |                                                                                      |               |                                                                          |                                                          |                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF ARMSCOR</b>                                                                                                                                                           |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| BID NUMBER:                                                                                                                                                                                                                |                                                                                      | CLOSING DATE: |                                                                          | CLOSING TIME:                                            |                                                                                       |
| DESCRIPTION                                                                                                                                                                                                                |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| <b>BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT :</b>                                                                                                                                                |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| <b>ARMSCOR BID BOX VISITORS ENTRANCE (BLOCK 8),<br/>370 NOSSOB STREET,</b>                                                                                                                                                 |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| <b>BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO</b>                                                                                                                                                                      |                                                                                      |               | <b>TECHNICAL ENQUIRIES MAY BE DIRECTED TO:</b>                           |                                                          |                                                                                       |
| CONTACT PERSON                                                                                                                                                                                                             | Mr. A.L Mmbengwa                                                                     |               | CONTACT PERSON                                                           | Mr. A.L Mmbengwa                                         |                                                                                       |
| TELEPHONE NUMBER                                                                                                                                                                                                           | 012 428 3610                                                                         |               | TELEPHONE NUMBER                                                         | 012 428 3610                                             |                                                                                       |
| FACSIMILE NUMBER                                                                                                                                                                                                           | N/A                                                                                  |               | FACSIMILE NUMBER                                                         | N/A                                                      |                                                                                       |
| E-MAIL ADDRESS                                                                                                                                                                                                             | scmbids@armscor.co.za                                                                |               | E-MAIL ADDRESS                                                           | scmbids@armscor.co.za                                    |                                                                                       |
| <b>SUPPLIER INFORMATION</b>                                                                                                                                                                                                |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| NAME OF BIDDER                                                                                                                                                                                                             |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| POSTAL ADDRESS                                                                                                                                                                                                             |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| STREET ADDRESS                                                                                                                                                                                                             |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| TELEPHONE NUMBER                                                                                                                                                                                                           | CODE                                                                                 |               | NUMBER                                                                   |                                                          |                                                                                       |
| CELLPHONE NUMBER                                                                                                                                                                                                           |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| FACSIMILE NUMBER                                                                                                                                                                                                           | CODE                                                                                 |               | NUMBER                                                                   |                                                          |                                                                                       |
| E-MAIL ADDRESS                                                                                                                                                                                                             |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| VAT REGISTRATION NUMBER                                                                                                                                                                                                    |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| SUPPLIER COMPLIANCE STATUS                                                                                                                                                                                                 | TAX COMPLIANCE SYSTEM PIN:                                                           |               | OR                                                                       | CENTRAL SUPPLIER DATABASE No:                            | MAAA                                                                                  |
| B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE                                                                                                                                                                               | TICK APPLICABLE BOX]<br><br><input type="checkbox"/> Yes <input type="checkbox"/> No |               | B-BBEE STATUS LEVEL SWORN AFFIDAVIT                                      |                                                          | [TICK APPLICABLE BOX]<br><br><input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/ SWORN AFFIDAVIT (FOR EMES &amp; QSEs) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]</b>                                                      |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?                                                                                                                              | <input type="checkbox"/> Yes <input type="checkbox"/> No<br>[IF YES ENCLOSE PROOF]   |               | ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES /WORKS OFFERED? |                                                          | <input type="checkbox"/> Yes <input type="checkbox"/> No                              |
| <b>QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS</b>                                                                                                                                                                          |                                                                                      |               |                                                                          |                                                          |                                                                                       |
| IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?                                                                                                                                                            |                                                                                      |               |                                                                          | <input type="checkbox"/> YES <input type="checkbox"/> NO |                                                                                       |
| DOES THE ENTITY HAVE A BRANCH IN THE RSA?                                                                                                                                                                                  |                                                                                      |               |                                                                          | <input type="checkbox"/> YES <input type="checkbox"/> NO |                                                                                       |
| DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?                                                                                                                                                                 |                                                                                      |               |                                                                          | <input type="checkbox"/> YES <input type="checkbox"/> NO |                                                                                       |
| DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?                                                                                                                                                                      |                                                                                      |               |                                                                          | <input type="checkbox"/> YES <input type="checkbox"/> NO |                                                                                       |
| IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?                                                                                                                                                                  |                                                                                      |               |                                                                          | <input type="checkbox"/> YES <input type="checkbox"/> NO |                                                                                       |
| <b>IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 BELOW.</b> |                                                                                      |               |                                                                          |                                                          |                                                                                       |

## ANNEXURE 1 TO KD25

|                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. BID SUBMISSION:</b>                                                                                                                                                                                               |
| 1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.                                                                                            |
| 1.2. ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED-(NOT TO BE RE-TYPED) OR IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.                                                                                    |
| 1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.                             |
| <b>2. TAX COMPLIANCE REQUIREMENTS</b>                                                                                                                                                                                   |
| 2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.                                                                                                                                                          |
| 2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.                                       |
| 2.3 APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.                                                                                                  |
| 2.4 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.                                                                                                                                            |
| 2.5 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.                                                                      |
| 2.6 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.                                                                                       |
| 2.7 NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE." |

**NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.**

SIGNATURE OF BIDDER:

.....

CAPACITY UNDER WHICH THIS BID IS SIGNED:

.....

(Proof of authority must be submitted e.g. company resolution)

DATE:

.....

**ARMAMENTS CORPORATION OF SOUTH AFRICA LIMITED  
(ARMSCOR)**

**INTELLECTUAL PROPERTY REQUIREMENTS**

**1 INTRODUCTION**

**1.1 What is Intellectual Property?**

Intellectual Property (or “IP”) means the result or outcome of human creative effort as typically, but not exclusively, manifested and embodied in or taking the form of data items or documents.

IP typically includes design and mental activities, e.g.:

- Bills of Material (BOM's)
- Instructions,
- Reports,
- Specifications,
- Interface designs,
- Manufacturing processes,
- Material Specifications,
- Processes,
- Product designs,
- Re-engineering (maintenance/obsolescence),
- Software,
- Algorithms,
- Source Codes,
- System/integration designs,
- Test and Evaluation Methods, etc.

IP typically excludes Project Management activities and Hardware created/built according to a design or following a “recipe”.

**1.2 How is IP manifested?**

IP is typically manifested and embodied in Data Items or Documents.

“Data items or Documents” means any recorded information, however recorded, including but not limited to books, manuscripts, reports, studies, algorithms, computer software, invention descriptions, registered patents, drawings, designs, plans, analyses, calculations, standards, data packs, process documents, instructions, specifications, mathematical or simulation models, compositions, photographs, video recordings, audio recordings, reports, holographic recordings, trademarks, graphical images, etc.

**NOTE:**

- ☐ The document itself is not IP
- ☐ The contents of a document represent IP
- ☐ The document becomes the tangible and recordable carrier of IP

**1.3 What is Background IP?**

For definition, refer to A-STD-0020 “Armcor General Conditions of Contract”.

“Background IP” belongs to a contractor because he fully paid for the generation thereof or had bought it at his own cost, which may be used or serve as a basis from which to develop new Foreground IP.

#### 1.4 What is Historic IP?

"Historic IP" is existing IP which was created previously, and which may serve as a basis from which to develop new Foreground IP.

#### 1.5 What is Foreground IP?

For definition, refer to A-STD-0020 "Armcor General Conditions of Contract".

"Foreground IP" is new intellectual property that is created during the execution of the order.

#### 1.6 When is IP Shared or Jointly Owned or Co-owned?

For the definition, refer to A-STD-0020 "Armcor General Conditions of Contract".

"Shared" or "Jointly Owned" or "Co-owned" IP is IP which belongs to both the DOD and a contractor, because both contributed to the cost of generation thereof. Ownership is typically (and preferably) proportional to contribution.

Historic and Foreground IP may be either

1. Wholly owned by the DOD; or
2. Shared or Jointly Owned or Co-owned between DOD or the contractor

### 2. IP RECORDAL REQUIREMENTS

It is a requirement that prospective suppliers provide all information about applicable Intellectual Property (IP) to the bid. Armcor will record the information on their IP System that will generate a Statement of IP which will be appended to the order. The Statement of IP will serve as a contractual agreement between Armcor and the contractor in so far as IP related matters are concerned.

The recordal requirements are further described herein and broken down to an appropriate level, as follows:

#### 2.1 Background IP Utilised

For each Background IP Item that will be modified or utilised to generate Foreground IP in the execution of the quoted scope of work, provide the following details:

- Short IP description
- Original Supplier
- Cost of Establishment (If available)

#### 2.2 Historic IP Utilised

For each Historical IP item that will be modified or is required as a prerequisite in the execution of the quoted scope of work, provide the following details:

- Armcor IP Number (if available)
- Short IP description
- The next information is to be provided **per order**, on which Historic IP was established:
  - Order Number on which Historic IP was generated
  - Master record index (MRI) reference
  - Original Supplier
  - Cost of Establishment
  - Percentage Ownership (DOD)
  - Associated Milestone / Linc item on the order under which the IP was established

## 2.3 Foreground IP to be generated

For each new Foreground IP item that will be generated in the execution of the quoted scope of work, provide the following details:

- IP number of Historic IP, if IP is enhanced (modified/improved/upgraded).
- Short IP description
- Master record index (MRI) reference with version and date
- Original Supplier
- Cost of Establishment
- Percentage Ownership (DOD)
- Associated Milestone / Line item on the order under which the IP will be established.

**Note 1:** The cost of establishment has always been included in item/milestone prices of order, and will continue to be so included, but will in future become visible by being shown separately in the Statement of IP appended to orders in order to properly manage such IP;

**Note 2:** To facilitate the easy and correct recording of IP, bidders and contractors will be required to utilise the specially constructed spread sheet from Armscor's web site.

After completion, the spreadsheet must be printed and attached to the bid, which will thus form an integral part of the bid.

## 3. SAFEGUARDING OF IP

### 3.1 IP Agreement

The IP agreement which will be embodied in the Statement of IP will be concluded with the main contractor in the name of the main contractor and will apply to the creating sub-contractor(s), who will remain the design authority for his particular IP.

### 3.2 Management and Safeguarding of IP

The main contractor will be responsible for the management of IP he generated during the execution of the order, as well as the management of IP generated by his sub-contractors. Upon completion of the project or order, the relevant IP will be formally transferred to the main contractor, who will then be responsible for the continued management of such IP.

The main contractor will be responsible for proper safeguarding and configuration control of IP, including off-site back-ups, as further described in various other Armscor documents, e.g. A-STD-0020 "Armscor General Conditions of Contract, K-STD-61 "Armscor Standard for Technical Contract Conditions", A-WI-014 "Armscor Security Instruction" and other documents that may be applicable.

### 3.3 IP Delivery

Notwithstanding 3.2 above, upon completion of the order, the main contractor will deliver all data items or documents relating to the IP generated during the execution of the order to Armscor ADAC Department.

### 3.4 IP Audits

Armscor is by law required to conduct an IP or intangible asset audit of all existing DOD IP every financial year. The main contractor will cooperate with Armscor's Intellectual Property Management Division and the Auditor General during the audit period and will make available all relevant information required to conduct the audit.

## 4. COMPLETION OF THE IP INFORMATION BY MEANS OF THE ELECTRONIC FORM

### 4.1 Background

The electronic form of the KD27 IP Information.xlsx is available as a Microsoft Excel workbook on the Armscor website ([www.armscor.co.za/Downloads/Download.asp](http://www.armscor.co.za/Downloads/Download.asp)) and must be used as template to provide the relevant IP information.

The workbook consists of the following three spreadsheets:

- “Background IP” provides a form to capture all background IP information
- “Historic IP” provides a form to capture all historic IP information.
- “Foreground IP” provides a form to capture all foreground IP information.

### 4.2 Electronic Form Definitions

The column definitions as provided in the forms are as follows:

|                           |                                                                                                                             |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| IP Name                   | A short descriptive name to identify the IP item.                                                                           |
| IP Number                 | Armscor Number provided to Historic IP.                                                                                     |
| IP Description            | An abridged description of the IP Item.                                                                                     |
| Original Supplier         | The name of the supplier at which the IP item exists or was established.                                                    |
| Establishment Cost        | The amount paid by Armscor to establish the IP Item (including VAT).                                                        |
| MRI Reference             | The Master Record Index (MRI) or other document reference that uniquely describe the IP.                                    |
| DOD Shareholding          | The percentage of the IP that belongs to the DOD through Armscor                                                            |
| Associated Milestone/Item | The contractual milestone or item, which when completed, will define the point in time at which the IP will be established. |

## 5. INTELLECTUAL PROPERTY QUESTIONNAIRE

I/We, the undersigned, who warrant that I/we am/are duly authorised to do so on behalf of the firm certify that the following information is correct and complete in terms of Intellectual Property relevant to the offered scope of work. (Please circle the relevant answer)

Will Background IP be applicable during the execution of the quoted scope of work? Yes No

If yes, state particulars by completing the 'Background IP' worksheet. Indicate each IP item as a separate line.

Will Historic IP be utilised and/or is it required as a prerequisite to execute the quoted scope of work? Yes No

If yes, state particulars by completing the 'Historic IP' worksheet for each IP item. Indicate each IP item as a separate line;

Will any of these Historic IP items be enhanced during the execution of the quoted scope of work? Yes No

If yes, also complete the 'Foreground IP' worksheet for those IP items

Will new Foreground IP be generated during the execution of the quoted scope of work? Yes No

If yes, state particulars by completing the 'Foreground IP' worksheet for each IP item. Indicate each IP item as a separate line.

**This completed form, along with all additional information, as requested above where relevant, populated on the KD27 Spreadsheet, have to be attached to the bid.**

WITNESSES:

1 \_\_\_\_\_

2 \_\_\_\_\_

SIGNATURES OF BIDDER(S)

DATE:

ADDRESS:

## ANNEXTURE A

### SCHEDULE OF INFORMATION

#### 1 SCHEDULE OF RATES

All schedules, which accompany the tender notice form an integral part of it and shall be duly completed in every detail; failing which, the tender in question may be rendered ineligible for consideration.

Under no circumstances will the following statements be accepted as answers:

- "See attached pamphlets"
- "Refer to catalogue"
- "Data to follow", etc.
- "To be advised", etc.

Whenever an alternative, or equal make or type of equipment is offered at the tendering stage, the Engineer shall on acceptance of the tender inform the Contractor in writing as to the make and/or type if equipment accepted.

**Note:** The use of the words "or equal" is discouraged and could lead to the disqualification of the tender.

The Contractor shall complete in this schedule the required information of proposed suppliers of equipment and materials. The selection of equipment shall be reviewed by the Engineer, only equipment meeting the specified standards shall be approved. Equipment indicated in the schedules shall comply in all respect with the subcontract documents. If it appears that the offered equipment does not comply, then the Contractor shall be responsible for replacing of such equipment at his own cost.

Final approval of equipment and materials will be subject to full submission of required information at equipment submission stage to check conformance with the performance specification and design concept.

Omission or ambiguity in the data submitted may invalidate this tender.

The following information is required to enable the Engineer to determine the costs of variations.

#### o **MATERIALS / EQUIPMENT**

# PLANTECH

The rates shall be calculated on the following basis:

- Net costs of equipment/materials supplied, hoisted, rigged and installed on site.
- Including profit, overheads, financing, insurance and guarantee costs.
- Including engineering, management and quality control.
- Excluding Value Added Tax and Builder's Discount.

## o LABOUR

Rate per hour including travelling time and travelling costs. The rates do include:

- profit, overheads finance, insurance and guarantee costs
- engineering, management and quality control.

They exclude Value Added Tax only.

| Description                      | Labourer | Fitter | Supervisor |
|----------------------------------|----------|--------|------------|
| Normal Time                      |          |        |            |
| Evening Time<br>(During<br>Week) |          |        |            |
| Saturday                         |          |        |            |
| Sunday                           |          |        |            |
| Public<br>Holiday                |          |        |            |

## o MATERIALS

The mark up on proven costs of material must include all costs involved:

- delivery on site, hoisting, rigging.
- profit, overheads, financing, insurance and guarantee costs
- engineering, management and quality control.

The mark up excludes Value Added Tax only.

The mark up rate is ..... %.

o **CONTRACTORS**

The mark up on proven costs of material must include all costs involved:

- delivery on site, hoisting, rigging.
- profit, overheads, financing, insurance and guarantee costs
- engineering, management and quality control.

The mark up excludes Value Added Tax only.

The mark up rate is ..... %.

• **SCHEDULE OF INFORMATION OF COMPONENTS AND EQUIPMENT**

The Contractor shall complete in this schedule the required information of proposed suppliers of equipment and materials. The selection of equipment will be reviewed by the Engineer, only equipment meeting the specified standards will be approved for this contract. Equipment indicated in the schedules shall comply in all respect with the subcontract documents. If it appears that the offered equipment does not comply, then the Contractor shall be responsible for replacing of such equipment at his own cost.

Final approval of equipment and materials will be subject to full submission of required information at equipment submission stage to check conformance with the performance specification and design concept.

Omission or ambiguity in the data submitted may invalidate this tender.

o **ANALOGUE ADDRESSABLE 4 LOOP DETECTION CONTROL PANEL**

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

o **ADDRESSABLE REPEATER PANEL**

# PLANTECH

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

o **SMS COMMUNICATOR / MODULE**

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

o **EMERGENCY POWER SUPPLIES**

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Capacity :
6. Describe in detail any deviation from the contract document :

o **ADDESSABLE MANUAL CALL POINT**

1. Make :
2. Name of supplier :

3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

o **COMBINATION SIREN/STROBE (120DB)**

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

o **FIRE RESISTANT CABLE**

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Type of approval :
6. Testing authority's name :
7. Describe in detail any deviation from :

**1.1 4 LOOP ADDRESSABLE FIRE DETECTION CONTROL PANEL (GAS ROOMS)**

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :

5. Describe in detail any deviation from the contract document :

## 1.2 HIGH SENSITIVITY FIRE DETECTION SYSTEM (HSSD)

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

## 1.3 CONTROL / GAS DISCHARGE PANEL

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

## 1.4 CONTROL / GAS DISCHARGE STATUS UNIT

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :

5. Describe in detail any deviation from the contract document :

## 1.5 CONTROL / GAS INTERFACE RELAY

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

## 1.6 POWER SUPPLIES – HSSS AND GAS RELEASE STATUS PANEL

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

## 1.7 BELL

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :

5. Describe in detail any deviation from the contract document :

## **1.8 COMBINATION SIREN/STROBE**

1. Make :
2. Name of supplier :
3. Model and type :
4. Country of origin :
5. Describe in detail any deviation from the contract document :

## **1.9 FIRE RESISTANT CABLE – PH120 ONLY**

1. Make :
2. Name of supplier :
3. Country of origin :
4. Type of approval :
5. Testing authority's name :

## 1.10 GASEOUS EXTINGUISHING AGENT

1. Make 
2. Name of supplier 
3. Country of origin :
4. Type of approval 
5. Testing authority's name 
6. Describe in detail any deviation from the contract document :

## 1.11 FIRE EXTINGUISHERS

1. Make 
2. Name of supplier :
3. Country of origin 
4. Type of approval 
5. Testing authority's name :
6. Describe in detail any deviation from the contract document 

## 1.12 PHOTO LUMINISCENT EMERGENCY EXIT SIGNS

1. Name of supplier :
2. Type of approval :
3. Describe in detail any deviation from

Datasheets of all priced detection and emergency voice evacuation equipment must accompany the tender submission.

|                                            |     | <b>Voice Alarm System</b>                                                                                                                                                                     |
|--------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product                                    | QTY | <p>The voice alarm system shall satisfy the above descriptions.</p> <p>A system tested and certified according to EN54 is required.</p> <p>The system to be approved as below or similar.</p> |
|                                            |     | Inhere the VM-3000 series voice alarm system is specified. Please supply same or similarly if approved.                                                                                       |
| Voice Evacuation Frame 8SS for the VX-3000 |     |                                                                                                                                                                                               |
| Voice Evacuation Frame 4AB for the VX-3000 |     |                                                                                                                                                                                               |
| VA System Amplifier 500W EN54-certified    |     |                                                                                                                                                                                               |

|                                           |  |  |
|-------------------------------------------|--|--|
| Remote Paging Microphone                  |  |  |
| Remote Paging Microphone Extension Keypad |  |  |
| VA Emergency Power Supply EN54-certified  |  |  |

# PLANTECH

|                                                                                                   |                 |  |
|---------------------------------------------------------------------------------------------------|-----------------|--|
| 12 VOLT 100 A/H<br>BATTERY (Special<br>sealed battery<br>certified for use<br>with<br>VA systems) | <i>in pairs</i> |  |
| Ceiling Speaker<br>PC-2360EN<br>certified to<br>BS5839-8<br>EN54-24                               |                 |  |
| BS-678BSW<br>Wall Speaker<br>94/150 certified to<br>EN54-24                                       |                 |  |
| SC-615BS Horn<br>speaker 109/150<br>EN-certified and<br>BS-compliant                              |                 |  |
| Speaker Cable<br>___1.5___mm <sup>2</sup>                                                         |                 |  |

|                                                  |  |  |
|--------------------------------------------------|--|--|
| Rack 22HU 19"<br>wide 800mm<br>deep              |  |  |
| Rack<br>Building/Wiring<br>Termination<br>Blocks |  |  |

o **SCHEDULE OF RATES**

Please supply rates (including labour, commissioning etc.) for the supply and installation of the following:

| Description                                                 | Unit   | Supply | Install |
|-------------------------------------------------------------|--------|--------|---------|
| Addressable Detection Control Panel – 4 Loop                | Per ea | R      | R       |
| Addressable Repeater Control Panel                          | Per ea | R      | R       |
| Emergency Power Supply                                      | Per ea | R      | R       |
| SMS Communicator Module                                     | Per ea | R      | R       |
| Addressable High Sensitivity Optical Smoke Detectors        | Per ea | R      | R       |
| Addressable Optical Smoke Detectors                         | Per ea | R      | R       |
| Addressable Rise of Heat Detectors                          |        |        |         |
| Detector Bases - Addressable                                | Per ea | R      | R       |
| Addressable Manual Call Point                               | Per ea | R      | R       |
| High Output Sounder with red Strobe                         | Per ea | R      | R       |
| Potential Free Interface Units                              | Per ea | R      | R       |
| Addressable Interface Relay - Inputs                        | Per ea | R      | R       |
| Addressable Interface Relay - Outputs                       | Per ea | R      | R       |
| Fire Retardant Cable – 2 core, 1mm <sup>2</sup> dia. PH30   | Per m  | R      | R       |
| Fire Retardant Cable – 2 core, 1.5mm <sup>2</sup> dia. PH30 | Per m  | R      | R       |
| P2000 Steel Trunking                                        | Per m  | R      | R       |
| Steel conduit (incl. Couplings) – 20 mm                     | Per m  | R      | R       |

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| Description                             | Unit   | Supply | Install |
|-----------------------------------------|--------|--------|---------|
| Steel conduit (incl. Couplings) – 25 mm | Per m  | R      | R       |
| Steel conduit (incl. Couplings) – 32 mm | Per m  | R      | R       |
| Surface Box for interface relays        | Per ea | R      | R       |

|                                                                               |        |   |   |
|-------------------------------------------------------------------------------|--------|---|---|
| Addressable Fire Detection Control Panel                                      | Per ea | R | R |
| Gas Release Control Panel                                                     | Per ea | R | R |
| Gas Discharge Status Unit                                                     | Per ea | R | R |
| HSSD System – 1 Pipe                                                          | Per ea | R | R |
| HSSD System – 2 Pipe                                                          | Per ea | R | R |
| HSSD System – 3 Pipe                                                          | Per ea | R | R |
| HSSD System – 4 Pipe                                                          | Per ea | R | R |
| 24V DC Power Supply with back-up Batteries – HSSD and Gas Release Status Unit | Per ea | R | R |
| Fire Warning Bells                                                            | Per ea | R | R |
| Siren/Strobe Combination - Conventional                                       | Per ea | R | R |
| Potential Free Interface Units                                                | Per ea | R | R |
| Addressable Interface Relay - Inputs                                          | Per ea | R | R |
| Addressable Interface Relay - Outputs                                         | Per ea | R | R |

|                                                            |        |   |   |
|------------------------------------------------------------|--------|---|---|
| Gas Discharge Interface Relay                              | Per ea | R | R |
| Fire Retardant Cable – 2 core, 1mm <sup>2</sup> dia. PH120 | Per m  | R | R |
| Over and under voltage protection unit                     | Per ea | R | R |
| <b>CONDUIT AND RELATED EQUIPMENT</b>                       |        |   |   |
| P2000 Steel Trunking                                       | Per m  | R | R |
| Steel conduit (incl. Couplings) – 25 mm                    | Per m  | R | R |
| Steel conduit (incl. Couplings) – 32 mm                    | Per m  | R | R |
| Heavy duty flexible steel conduit                          | Per m  | R | R |
| Surface Box for interface relays                           | Per ea | R | R |
| <b>GAS SUPPRESSION EQUIPMENT</b>                           |        |   |   |
| 200 Bar Pyroshield Cylinder 80L                            | Per ea | R | R |
| Pilot Cylinder                                             | Per ea | R | R |
| Manifold – 1 way                                           | Per ea | R | R |
| Manifold – 2 way                                           | Per ea | R | R |
| Manifold – 3 way                                           | Per ea | R | R |
| Manifold – 5 way                                           | Per ea | R | R |
| Manifold – 7 way                                           | Per ea | R | R |
| Manifold – 8 way                                           | Per ea | R | R |

## 2. IMPORTED CONTENT

### 2.1 VALUE OF IMPORTED CONTENT

Value of imported content subject to rate of exchange fluctuations:

R Nil – Fixed Price Tender

### 2.2 RATE OF EXCHANGE

Rate of exchange applicable to imported content:

- Rand to the American Dollar :
- Rand to the Euro :
- Rand to the British Pound :

- **DEVIATIONS**

Describe below in detail any deviation from the contract document:

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- **GENERAL SCHEDULE**

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The tenders shall complete the following schedule. Failure to complete this schedule could lead to disqualification of the tender.

|                                                                                                                                                                                                                                                  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Has the Contractor visited the site and is he fully conversant with the local conditions and the extent of the work?                                                                                                                             |  |
| Is special temperature and / or humidity control required for the respective batteries of the system offered?                                                                                                                                    |  |
| Is the system offered an analogue addressable system?                                                                                                                                                                                            |  |
| With which of the specified standards does the offered system comply (state standard(s))?                                                                                                                                                        |  |
| Have all the necessary strobes and horns as required for evacuation been allowed for in the tender price?                                                                                                                                        |  |
| Will the panel recognize the following conditions of the field devices connected thereto: <ul style="list-style-type: none"> <li>• Normal Condition</li> <li>• Maintenance Alarm</li> <li>• Fire condition</li> <li>• Fault condition</li> </ul> |  |
| Are surge protection provided on the detector lines?                                                                                                                                                                                             |  |
| Are all lines and loops lighting protected?                                                                                                                                                                                                      |  |
| Are back-up batteries provided as specified?                                                                                                                                                                                                     |  |
| Are the respective line devices approved by: <ul style="list-style-type: none"> <li>• UL</li> <li>• VDS</li> <li>• BS / EN</li> <li>• ULC</li> </ul>                                                                                             |  |
| Is the Contractor fully competent in the design, supply and installation of detection, voice evacuation and emergency voice communication systems (as required to complete the project)?                                                         |  |

|                                                                                                                                                                                                                                                |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Has allowance been made for third party certification on all installations covered in this scope (FDIA or similar)?                                                                                                                            |  |
| Has allowance been made for the networking of all Addressable Control panels?                                                                                                                                                                  |  |
| Has allowance been made to interface to the main detection panel with the client's BMS system?                                                                                                                                                 |  |
| Has full allowance been made for the training of the end user in the operation of the smoke detection system (numerous training sessions will be required)?                                                                                    |  |
| Has full allowance been made for the provision of operational and maintenance manuals complete with as-built drawings, as specified?                                                                                                           |  |
| Is the Contractor satisfied with the working conditions on site and has full allowance been made therefore?                                                                                                                                    |  |
| Will the Contractor employ sub-contractors for the execution of any specialized installation works as specified in this specification that falls outside their scope of expertise?                                                             |  |
| Has the Contractor completed works similar to this specification and to the same value?                                                                                                                                                        |  |
| Is the Contractor accredited by a Quality Management System such as ISO?                                                                                                                                                                       |  |
| Is the fire cable fire rated and not FR 20?                                                                                                                                                                                                    |  |
| Has the Contractor completed supplier training on the detection equipment covered in the scope and are competent in the programming of the detection control panels?                                                                           |  |
| Has the Contractor completed supplier training on the emergency voice communication system covered in the scope and are competent in the programming of the relevant head-end equipment as well as the interfacing with the detection systems? |  |
| Are all the employees of the Contractor registered as competent persons with SAQCC – Fire Detection?                                                                                                                                           |  |

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- **EXCLUSIONS AND ADDITIONAL ITEMS**

List below any exclusions to your offer, as well as any additional items which may not be specified above in order to successfully complete this project:

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## ANNEXURE B

### BILL OF QUANTITIES

#### 1.1 INTRODUCTION

This preamble to the Schedule of Quantities provides the tender with guidelines and requirements with regard to the completion of the Schedule of Quantities. The Schedule has to be completed in black ink and the tenderer is referred to the Notice to Tenderers in regard to the correction of errors.

The Schedule of Quantities shall be read with all the documents, which form part of this Contract.

The following words shall have the meanings hereby assigned to them:

|           |                                                                                                                                                              |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit:     | The unit of measurement for each item of work in terms of the General and Special conditions of Contract, the Specifications and the Project Specifications. |
| Quantity: | The number of units of work for each item.                                                                                                                   |
| Rate:     | The payment of quantity and the rate tendered for an item.                                                                                                   |
| Amount:   | The product of the quantity and the rate tendered for an item.                                                                                               |

**Lump Sum:** An amount tendered for in item, the extent of which is described in the Schedule of Quantities, the Specifications and the Project Specifications, but the quantity of work of which is not measured in any units.

Reference shall be made to the General and Special Conditions of Contract regarding Provisional and Prime Costs Sums.

The abbreviated descriptions of the payment items given the Schedule of Quantities are only for the purpose of identifying the items and providing specific details. Reference shall be made, *inter alia*, to the Drawings, Specifications, Project Specifications, General Conditions of Contract and Special Conditions of Contract for the more detailed information regarding the extend of the work entailed under each item.

The item numbers appearing in the Schedule of Quantities refer to the corresponding item numbers in the specifications and in the Project Specifications.

The units of measurement indicated in the Schedule of Quantities are metric units.

The following abbreviations are used in the pay items of the Schedule of Quantities:

|                     |   |                   |
|---------------------|---|-------------------|
| mm                  | = | millimetre        |
| m                   | = | metre             |
| km                  | = | kilometre         |
| km-pass             | = | kilometre pass    |
| m <sup>2</sup>      | = | square metre      |
| m <sup>2</sup> pass | = | square metre pass |

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|                     |   |                           |
|---------------------|---|---------------------------|
| ha                  | = | hectare                   |
| m <sup>3</sup>      | = | cubic metre               |
| m <sup>3</sup> - km | = | = cubic metre – kilometre |
| l                   | = | litre                     |
| kl                  | = | kilolitre                 |
| h                   | = | hour                      |
| r-day               | = | roller – day              |
| kg                  | = | kilogram                  |
| t                   | = | ton (1 000 kg)            |
| No                  | = | number                    |
| MN                  | = | meganewton                |
| MN-m                | = | meganewton-metre          |
| %                   | = | percent                   |
| V                   | = | volt                      |
| W                   | = | watt                      |
| KW                  | = | kilowatt                  |
| u/mth               | = | unit per month            |
| kPa                 | = | kilopascal                |
| PC Sum              | = | prime cost sum            |
| prov sum            | = | provisional sum           |

## 1.2 RATES

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The tenderer must fill in a rate for each item in the Schedule of Quantities, even where no quantities are given. Items against which no rate is entered or where a word or phrase such "included" or "provided elsewhere" has been entered, will be accepted as a rate of nil (R 0.00) having been entered against such item.

Any work executed to which such a pay item applies, shall be measured under the appropriate items in the Schedule of Quantities and valued at a rate of nil (R0.00). The rate of nil shall be valid irrespective of any change in the quantities during the execution of the contract.

The tenderer shall fill in a rate against all items where the words "rate only" appears in the amount column. The intention is that, although no work is foreseen under such item and no quantities are consequently given in the quantity column, the tendered rate shall apply should work under this item be actually required.

The tenderer shall not group together a number of items and tender one rate for such group of items.

All rates and sums of money quoted in the Schedule of Quantities shall be in Rand

## 1.3 METHOD OF MEASUREMENT

The work shall be measured in accordance with the Standard System of Measuring Builders Work in South Africa and the methods described in the documents which form part of this Contract. Attention is directed to the provisions of the Specifications and Project Specifications regarding the measurement of quantities.

Unless otherwise stated, items are measured nett in accordance with the Drawings, Specifications and Project Specifications and no allowance is made for waste or work in excess of that specified.

## 1.4 COSTING THE BILL

Unless a separate rate for the supply and installation of any item is specifically called for, the supply and installation costs of any item shall be fully included in the unit price.

Variations in the scope and extent of the work as ordered by the Engineer to meet the Client's requirements shall be measured and costed at rates entered in the Bills and shall form an addition to or deduction from the total of the Bills. Any items or variation for which rates have not been included in the Bills shall be agreed and priced as non-scheduled items in accordance with the provisions of the Contract. For this purpose a separate schedule of rates is provided under Labour and Material.

Variations to the planning before the work has been executed shall be priced on Bill rates. Alterations to work already executed may not necessarily be price on Bill rates and must be reviewed on its merits.

The Contractor and the Employer or his Agent may agree that the total of the Bills, including any variations by way of additions thereto or deductions therefrom, represents a fair and accurate quantification of the quantities of work executed on site and the parties may agree final payment on that basis. In the event of any dispute as to the quantities, then the disputed item or items shall be adjusted on agreement where necessary.

All items described as "Provisional" shall be measured as executed and paid for according to prices in the Bills of Quantities.

Items which are not specifically priced in the Bills of Quantities shall be allowed for as follows:

|           |   |                                                          |
|-----------|---|----------------------------------------------------------|
| Materials | - | on proven cost basis with percentage mark-up             |
| Labour    | - | based on labour rates for normal and/or after hours work |

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A detailed breakdown of the costs will be provided, for approval by the Engineer.

Any **unexpended** amounts shall be deducted from the amount of the Sub-contract sum. No work, for which "Provisional" items are provided shall commence without written instructions from the Engineer.

The quantities in these Bills of Quantities are not to be used for ordering materials.

Although the quantities reflected in the Bill is indicative of the scope of work, any portion can be re-measured and re-quantified by the Engineer. Withstanding anything specified elsewhere to the contrary in this document the, "ADD" rate values as provided by the contractor elsewhere in this document will be used to adjust the Bill up or down.

By submitting prices for the works as depicted the contractor agrees that he has allowed for all works pertaining the intent of the specification and scope of works. No variations will be entertained without additional works being added by the Client and or Engineer.

An item not mentioned or defined in this document but **required** for the installation to operate intended should be declared under BOQ items "OTHER" and priced for. If not priced for in this way it will be regarded as automatically included in the price of other items.

## 1.5 GENERAL NOTES

These bills of quantities form part of and must be read in conjunction with the Specifications, which contain the full descriptions of the work to be done and material and equipment to be used. Unless otherwise described in these bills of quantities,

reference should **be** made to the Specifications for the full meaning of descriptions of work to be done and materials and equipment to be used in this service.

These bills of quantities contain pages numbered as indexes. The tenderer shall check the numbers of the pages and should **any be missing or duplicated, or the reproduction be indistinct, or these bills of quantities contain any obvious errors, the** tenderer shall notify the Engineer at once for rectification. No liability whatsoever will be admitted by the Engineer in respect of errors in any tender due to the abovementioned causes.

The bills priced in detail shall be submitted with the tender. The bills shall have all items properly priced and extended. If any items in the bills are not priced it shall be deemed that either no costs are involved or the costs are covered elsewhere.

The total tender price in the Tender Form shall constitute the contract price of the successful tenderer. Tenderers are advised to check their item extensions and total additions, as no claim for arithmetical errors will be considered.

No alteration, erasure or addition in the text of the bills of quantities will be recognised and as such the original wording of **these bills of quantities will be adhered to.**

**The priced bills of quantities of the successful tenderer** will be checked. The Engineer or Quantity Surveyor reserves the right to call for adjustments to any individual price and to rectify any discrepancy whilst the total tender price, as submitted, remains unaltered.

The responsibility for the accuracy of the quantities written into the Bills remains with the person who prepared the Bills. The **Tenderer shall be relieved of responsibility of measuring quantities at the tender stage, and the tender sum submitted shall be** in respect of the quantities set out in the Bills. The tenderer will however be required to make his assessment of items such as brackets, **fixing**, supports, flanges, nipples, sockets, unions, insulation, reducers, sealants, pockets, instrumentation etc. from

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details stated in the Bills and shall include in the item prices for such small installation materials as are required for the complete installation in accordance with the Specification and drawings.

It is a requirement of this Contract that the work shall be carried out in the manner which is most economical on materials and labour.

No orders shall be placed on the basis of the quantities in the Bills, but shall be verified on site.

Preliminary amounts and contingency sums are budgetary costs for use by the Engineer at his discretion and may be omitted in total without any compensation to the Contractor whatsoever.

The description of each item shall, unless otherwise stated herein, include making, conveying and delivering, unloading, storing, unpacking, hoisting, setting, fitting and fixing in position, cutting and waste, patterns, models and templates, plant, temporary works, return of packings, establishment charges, and all other obligations arising out of Conditions of the Contract.

Final payment to the Contractor will be based on actual installed nett quantities.

## CORRECTION OF ENTRIES MADE BY TENDERER

Any entry by Tenderer in the Schedule of Quantities, forms, etc., which the Tenderer desires to change, shall not be erased or painted out. A line shall be drawn through the incorrect entry and the correct entry shall be written above in black ink and the full signature of the Tenderer shall be placed next to the correction.

## PART 1 - PRELIMINARIES & GENERAL

| PRELIMINARIES & GENERAL |                                                                                                |      |     |      |        |
|-------------------------|------------------------------------------------------------------------------------------------|------|-----|------|--------|
| ARMSCOR OFFICE BUILDING |                                                                                                |      |     |      |        |
|                         | DESCRIPTION                                                                                    | UNIT | QTY | RATE | AMOUNT |
| 1,1                     | <b>CONTRACTUAL ITEMS</b>                                                                       |      |     |      |        |
| 1.1.1                   | Fixed-charge and Value-related items.                                                          |      |     |      |        |
| a                       | Contractual requirements                                                                       | Sum  | 1   |      |        |
| b                       | Erection of facilities on site                                                                 | Sum  | 1   |      |        |
| c                       | Removal of facilities from site                                                                | Sum  | 1   |      |        |
| 1.1.2                   | Time-related Items                                                                             |      |     |      |        |
| a                       | Contractual requirements                                                                       | Sum  | 1   |      |        |
| b                       | Usage and maintenance of facilities on site                                                    | Sum  | 1   |      |        |
| c                       | Supervision                                                                                    | Sum  | 1   |      |        |
| e                       | Company and Head Office overhead costs                                                         | Sum  | 1   |      |        |
| 1,2                     | <b>NOTICE BOARD</b>                                                                            |      |     |      |        |
| a                       | Erection and removal of notice board.                                                          | Sum  | 1   |      |        |
| 1,3                     | <b>OHS ACT REQUIREMENTS</b>                                                                    |      |     |      |        |
|                         | All conditions pertaining to the OHS Act, including but not limited to the items listed below: |      |     |      |        |

|                  |                                                                                                      |     |   |  |  |
|------------------|------------------------------------------------------------------------------------------------------|-----|---|--|--|
| a                | Provision of a SAFETY plan                                                                           | Sum | 1 |  |  |
| b                | Provision of a medical aid kit on site                                                               | Sum | 1 |  |  |
| c                | Appointment of an ACCREDITED safety person on site                                                   | Sum | 1 |  |  |
| d                | Supply and provision of safety clothing to all workers on site                                       | Sum | 1 |  |  |
| e                | Adherence to and Compliance with the OSH Act                                                         | Sum | 1 |  |  |
| 1.4              | WORKS ITEMS                                                                                          |     |   |  |  |
| 1.4.1            | Setting out of work                                                                                  | Sum | 1 |  |  |
| 1.4.2            | Additional items that the tenderer wishes to detail in order to complete the contract in good order: |     |   |  |  |
| a                |                                                                                                      |     |   |  |  |
| b                |                                                                                                      |     |   |  |  |
| c                |                                                                                                      |     |   |  |  |
|                  | NOTE:                                                                                                |     |   |  |  |
| TOTAL TO SUMMARY |                                                                                                      |     |   |  |  |

## PART 2 – BLOCK 1-5

### ARMSCOR FIRE DETECTION AND EMERGENCY VOICE EVACUATION SYSTEM TENDER SPECIFICATION BOQ

#### BLOCK 1-5

| Item                     | Description                                                                                                                                                             | Unit | Qty | Supply Rate | Install Rate | Amount |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|-------------|--------------|--------|
| <b>BILL 1: P&amp;G's</b> |                                                                                                                                                                         |      |     |             |              |        |
| 1                        | P&G (see attached detail Preliminaries & Generals bill for pricing)                                                                                                     | Item | Sum |             |              | R -    |
| <b>BILL 2: GENERAL</b>   |                                                                                                                                                                         |      |     |             |              |        |
| 1                        | <b>Materials</b>                                                                                                                                                        |      |     |             |              |        |
|                          | Allow for only approved materials and components                                                                                                                        | Item | Sum |             |              | R -    |
| 2                        | <b>Approvals</b>                                                                                                                                                        |      |     |             |              |        |
|                          | Allow for only approved systems and equipment                                                                                                                           | Item | Sum |             |              | R -    |
| 3                        | <b>Compatibility</b>                                                                                                                                                    |      |     |             |              |        |
|                          | Only compatible components and materials to be used                                                                                                                     | Item | Sum |             |              | R -    |
| 4                        | <b>Labelling</b>                                                                                                                                                        |      |     |             |              |        |
|                          | All devices and components to be clearly labelled                                                                                                                       | Item | Sum |             |              | R -    |
| 5                        | <b>Training</b>                                                                                                                                                         |      |     |             |              |        |
|                          | Allow for the training of staff in the use of system on completion of work                                                                                              | Item | Sum |             |              | R -    |
| 6                        | <b>Certification</b>                                                                                                                                                    |      |     |             |              |        |
|                          | Certification of system and components on completion of work in terms of SANS 10139 and EN Codes                                                                        | Item | Sum |             |              | R -    |
| 7                        | <b>Equipment Selection</b>                                                                                                                                              |      |     |             |              |        |
|                          | Submission of battery and loop calculation sheets;<br>Provision of sample equipment for approval;<br>Use of only equipment and components approved by the fire engineer | Item | Sum |             |              | R -    |
| 8                        | <b>Scaffolding and Lifting Equipment</b>                                                                                                                                |      |     |             |              |        |



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| Provide zone diagram and associated signage, laminated and framed behind glass |                                                                                                                                                                              | No   | 34   | R |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|---|
| <b>6</b>                                                                       | <b>Logbook</b>                                                                                                                                                               |      |      |   |
|                                                                                | A logbook to be installed in a holder and installed adjacent to master fire panel                                                                                            | Sum  | 11   | R |
| <b>7</b>                                                                       | <b>Networking and BACnet/MODbus integration</b>                                                                                                                              |      |      |   |
|                                                                                | Provide for Network Protocol Communication BACnet / MODbus integration with BMS system                                                                                       | Item | Sum  | R |
|                                                                                | Provide provision for a backbone network fibre optic cable with necessary splices, junction boxes etc.                                                                       | m    | 1000 | R |
|                                                                                | Provide provision for any components required for networking FACP e.g. switches, converter etc.                                                                              | Item | Sum  | R |
| <b>a</b>                                                                       |                                                                                                                                                                              |      |      |   |
| <b>b</b>                                                                       |                                                                                                                                                                              |      |      |   |
| <b>c</b>                                                                       |                                                                                                                                                                              |      |      |   |
| <b>8</b>                                                                       | <b>Any item Not Listed (Specify)</b>                                                                                                                                         |      |      |   |
|                                                                                |                                                                                                                                                                              |      |      |   |
|                                                                                | <b>Total</b>                                                                                                                                                                 |      |      | R |
|                                                                                |                                                                                                                                                                              |      |      |   |
| <b>BILL 4: CONDUIT AND CABLING - DETECTION</b>                                 |                                                                                                                                                                              |      |      |   |
| <b>1</b>                                                                       | <b>Fire Resistant Cabling - PH120</b>                                                                                                                                        |      |      |   |
|                                                                                | Allow for adequate PH120 cabling of appropriate diameter for the wiring of emergency evacuation system to specification. (PH-120 only – 1.0mm <sup>2</sup> minimum - 2 core) |      |      |   |
|                                                                                | LEVEL -2                                                                                                                                                                     | m    | 680  | R |
|                                                                                | LEVEL -1                                                                                                                                                                     | m    | 4400 | R |
|                                                                                | LEVEL 0                                                                                                                                                                      | m    | 3320 | R |
|                                                                                | LEVEL 1                                                                                                                                                                      | m    | 3320 | R |
|                                                                                | LEVEL 2                                                                                                                                                                      | m    | 3550 | R |
|                                                                                | LEVEL 3                                                                                                                                                                      | m    | 3250 | R |
|                                                                                | LEVEL 4                                                                                                                                                                      | m    | 2860 | R |
|                                                                                | LEVEL 5                                                                                                                                                                      | m    | 2040 | R |
|                                                                                | LEVEL 6                                                                                                                                                                      | m    | 2150 | R |
|                                                                                | LEVEL 7                                                                                                                                                                      | m    | 2150 | R |
| <b>2</b>                                                                       | <b>Conduit and Couplings</b>                                                                                                                                                 |      |      |   |

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|                          |                                                                                                                                                                                                                                                          |      |       |  |  |  |          |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|--|--|--|----------|
|                          | Allow for the procurement and installation of 25mm PVC conduit complete with necessary couplings, junction boxes, steel saddles etc. in terms of the specifications. Include for all drilling, fixing and making good of same; painting by others        | m    | 11088 |  |  |  | R        |
|                          | Allow for the procurement and installation of 25mm Galvanised conduit complete with necessary couplings, junction boxes, steel saddles etc. in terms of the specifications. Include for all drilling, fixing and making good of same; painting by others | m    | 1500  |  |  |  | R        |
|                          |                                                                                                                                                                                                                                                          |      |       |  |  |  |          |
|                          | <b>Total</b>                                                                                                                                                                                                                                             |      |       |  |  |  | <b>R</b> |
| <b>BILL 5: DETECTION</b> |                                                                                                                                                                                                                                                          |      |       |  |  |  |          |
| <b>1</b>                 | <b>Analogue Addressable Optical Smoke Detectors</b>                                                                                                                                                                                                      |      |       |  |  |  |          |
|                          | Allow for the procurement, installation, testing and commissioning of an analogue addressable optical smoke detectors to specification. (inclusive of bases)                                                                                             |      |       |  |  |  |          |
|                          | LEVEL -2                                                                                                                                                                                                                                                 | Item | 80    |  |  |  | R        |
|                          | LEVEL -1                                                                                                                                                                                                                                                 | Item | 523   |  |  |  | R        |
|                          | LEVEL 0                                                                                                                                                                                                                                                  | Item | 434   |  |  |  | R        |
|                          | LEVEL 1                                                                                                                                                                                                                                                  | Item | 416   |  |  |  | R        |
|                          | LEVEL 2                                                                                                                                                                                                                                                  | Item | 497   |  |  |  | R        |
|                          | LEVEL 3                                                                                                                                                                                                                                                  | Item | 443   |  |  |  | R        |
|                          | LEVEL 4                                                                                                                                                                                                                                                  | Item | 324   |  |  |  | R        |
|                          | LEVEL 5                                                                                                                                                                                                                                                  | Item | 228   |  |  |  | R        |
|                          | LEVEL 6                                                                                                                                                                                                                                                  | Item | 198   |  |  |  | R        |
|                          | LEVEL 7                                                                                                                                                                                                                                                  | Item | 195   |  |  |  | R        |
|                          | Void Detector LED and accessories                                                                                                                                                                                                                        | Item | 580   |  |  |  | R        |
|                          | <b>Any Item Not Listed (Specify)</b>                                                                                                                                                                                                                     |      |       |  |  |  |          |
|                          | Sundries/Consumable Installation                                                                                                                                                                                                                         | Item | Sum   |  |  |  | R        |

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|          |                                                                                                                                                          |  |      |     |  |  |   |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--|------|-----|--|--|---|
|          | LEVEL 5                                                                                                                                                  |  | Item | 7   |  |  | R |
|          | LEVEL 6                                                                                                                                                  |  | Item | 6   |  |  | R |
|          | LEVEL 7                                                                                                                                                  |  | Item | 7   |  |  | R |
|          | <b>Any Item Not Listed (Specify)</b>                                                                                                                     |  | Item |     |  |  | R |
|          | Sundries/Consumable Installation                                                                                                                         |  | Item | Sum |  |  | R |
|          | <b>Sub Total</b>                                                                                                                                         |  |      |     |  |  | R |
| <b>2</b> | <b>Analogue Addressable Combination Rise of Heat with Beacon</b>                                                                                         |  |      |     |  |  |   |
|          | Allow for the procurement, installation, testing and commissioning of an analogue addressable rise of heat to specification. <b>(Inclusive of bases)</b> |  |      |     |  |  |   |
|          | LEVEL -1                                                                                                                                                 |  | Item | 16  |  |  | R |
|          | <b>Any Item Not Listed (Specify)</b>                                                                                                                     |  | Item |     |  |  | R |
|          | Sundries/Consumable Installation                                                                                                                         |  | Item | Sum |  |  | R |
|          | <b>Sub Total</b>                                                                                                                                         |  |      |     |  |  | R |
| <b>4</b> | <b>Analogue Addressable Manual Fire Alarm Points Complete with Bases, Flaps and Integral Isolator</b>                                                    |  |      |     |  |  |   |
|          | Allow for the procurement, installation, testing and commissioning of analogue addressable manual fire alarm call points to specification                |  |      |     |  |  |   |
|          | LEVEL -2                                                                                                                                                 |  | Item | 7   |  |  | R |
|          | LEVEL -1                                                                                                                                                 |  | Item | 28  |  |  | R |
|          | LEVEL 0                                                                                                                                                  |  | Item | 18  |  |  | R |
|          | LEVEL 1                                                                                                                                                  |  | Item | 17  |  |  | R |
|          | LEVEL 2                                                                                                                                                  |  | Item | 21  |  |  | R |
|          | LEVEL 3                                                                                                                                                  |  | Item | 14  |  |  | R |
|          | LEVEL 4                                                                                                                                                  |  | Item | 11  |  |  | R |
|          | LEVEL 5                                                                                                                                                  |  | Item | 11  |  |  | R |
|          | LEVEL 6                                                                                                                                                  |  | Item | 10  |  |  | R |
|          | LEVEL 7                                                                                                                                                  |  | Item | 9   |  |  | R |

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|          | Any Item Not Listed (Specify)                                                                                                                                                                                                                | Item | Sum |  | R        |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|--|----------|
|          | Sundries/Consumable Installation                                                                                                                                                                                                             | Item |     |  | R        |
|          |                                                                                                                                                                                                                                              |      |     |  |          |
|          | <b>Sub Total</b>                                                                                                                                                                                                                             |      |     |  |          |
|          |                                                                                                                                                                                                                                              |      |     |  | <b>R</b> |
|          |                                                                                                                                                                                                                                              |      |     |  |          |
| <b>5</b> | <b>ZENER BARRIERS</b>                                                                                                                                                                                                                        |      |     |  |          |
|          | Allow for the procurement, installation, testing and commissioning of Intrinsically Safe Optical Smoke Detectors as indicated on plans to specification                                                                                      |      |     |  |          |
|          | Level -1                                                                                                                                                                                                                                     | No   | 4   |  | R        |
|          | <b>Any Item Not Listed (Specify)</b>                                                                                                                                                                                                         | Item |     |  | R        |
|          | Sundries/Consumable Installation                                                                                                                                                                                                             | Item | Sum |  | R        |
|          |                                                                                                                                                                                                                                              |      |     |  |          |
|          | <b>Sub Total</b>                                                                                                                                                                                                                             |      |     |  |          |
|          |                                                                                                                                                                                                                                              |      |     |  | <b>R</b> |
|          |                                                                                                                                                                                                                                              |      |     |  |          |
| <b>6</b> | <b>High Sensitivity Smoke Detector - HSSD (Pro-Point Plus or Similar Approved) 3 Pipe HSSD Scanner with Scatter Chamber Technology</b>                                                                                                       |      |     |  |          |
|          | Allow for the detailed design, procurement, installation, testing and commissioning of HSSD detectors as indicated on plans to specification and all other equipment necessary to provide a complete, functional and compliant installation. |      |     |  |          |
|          | LEVEL -1                                                                                                                                                                                                                                     |      |     |  |          |
|          | Power Supply 24V 5A                                                                                                                                                                                                                          | No   | 3   |  | R        |
|          | 25mm RED Sampling PIPE 3m Length                                                                                                                                                                                                             | m    | 160 |  | R        |
|          | Pipe Clip (RED)                                                                                                                                                                                                                              | Sum  | 25  |  | R        |
|          | 90 Degree Elbow Slow Bend (RED)                                                                                                                                                                                                              | Sum  | 12  |  | R        |
|          | End Cap (RED)                                                                                                                                                                                                                                | Sum  | 12  |  | R        |
|          | 25mm Pipe RED Socket                                                                                                                                                                                                                         | Sum  | 16  |  | R        |
|          | Labels - Smoke Detection Sampling Pipes                                                                                                                                                                                                      | Sum  | 15  |  | R        |
|          | 3,0mm Hole ID                                                                                                                                                                                                                                | Sum  | 16  |  | R        |
|          | Inline Filter – Triple Stage Filter For all HSSD                                                                                                                                                                                             | Sum  | 4   |  | R        |
|          | Capillary Tubes and Ceiling Mounted Sampling Points                                                                                                                                                                                          | Sum  | 20  |  | R        |
|          | <b>Any Item Not Listed (Specify)</b>                                                                                                                                                                                                         | Item |     |  | R        |
|          | Sundries/Consumable Installation                                                                                                                                                                                                             | Item | Sum |  | R        |



|                                                                                                                                                                              |  |      |    |  |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------|----|--|---|
| LEVEL 5                                                                                                                                                                      |  | Item | 9  |  | R |
| LEVEL 6                                                                                                                                                                      |  | Item | 9  |  | R |
| LEVEL 7                                                                                                                                                                      |  | Item | 10 |  | R |
| <b>Power Supply for Door Hold Open Devices &amp; Auxiliaries</b>                                                                                                             |  |      |    |  |   |
| Allow for the procurement, installation, testing and commissioning of Power Supply 24VDC-1A with battery 12V 7.2Ah minimum, interface relay unit & other related auxiliaries |  |      |    |  |   |
| LEVEL -2                                                                                                                                                                     |  | Item | 1  |  | R |
| LEVEL -1                                                                                                                                                                     |  | Item | 12 |  | R |
| LEVEL 0                                                                                                                                                                      |  | Item | 9  |  | R |
| LEVEL 1                                                                                                                                                                      |  | Item | 7  |  | R |
| LEVEL 2                                                                                                                                                                      |  | Item | 14 |  | R |
| LEVEL 3                                                                                                                                                                      |  | Item | 8  |  | R |
| LEVEL 4                                                                                                                                                                      |  | Item | 6  |  | R |
| LEVEL 5                                                                                                                                                                      |  | Item | 3  |  | R |
| LEVEL 6                                                                                                                                                                      |  | Item | 3  |  | R |
| LEVEL 7                                                                                                                                                                      |  | Item | 3  |  | R |
| <b>Any Item Not Listed (Specify)</b>                                                                                                                                         |  |      |    |  |   |
| Sundries/Consume Installation                                                                                                                                                |  |      |    |  |   |
| <b>Sub Total</b>                                                                                                                                                             |  |      |    |  |   |
|                                                                                                                                                                              |  |      |    |  |   |
| <b>2 Surface Boxes</b>                                                                                                                                                       |  |      |    |  |   |
| Provide for procurement and installation, of surface boxes to accommodate all interface relay units etc.                                                                     |  |      |    |  |   |
| <b>Any Item Not Listed (Specify)</b>                                                                                                                                         |  |      |    |  |   |
| Sundries/Consume Installation                                                                                                                                                |  |      |    |  |   |
| <b>Sub Total</b>                                                                                                                                                             |  |      |    |  |   |
|                                                                                                                                                                              |  |      |    |  |   |
| <b>Total</b>                                                                                                                                                                 |  |      |    |  |   |
|                                                                                                                                                                              |  |      |    |  |   |

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| <b>BILL 7: EMERGENCY VOICE COMMUNICATION SYSTEM</b> |                                                                                                                      |      |   |     |   |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------|---|-----|---|
| <b>1</b>                                            | <b>Emergency Voice Communication System</b>                                                                          |      |   |     |   |
|                                                     | Allow for the testing of functionality and correct operation for the existing installed system                       |      |   | Sum |   |
|                                                     | <b>Any Item Not Listed (Specify)</b>                                                                                 |      |   |     | R |
|                                                     | Sundries/Consumable Installation                                                                                     |      |   | Sum | R |
|                                                     |                                                                                                                      |      |   |     | R |
|                                                     | <b>Total</b>                                                                                                         |      |   |     | R |
| <b>BILL 8: EMERGENCY VOICE ALARM SYSTEM</b>         |                                                                                                                      |      |   |     |   |
| <b>1</b>                                            | <b>HEAD END EQUIPMENT</b>                                                                                            |      |   |     |   |
|                                                     | Allow for the procurement, installation, testing and commissioning of EN 54 compliant head-end equipment as follows: |      |   |     |   |
|                                                     | <b>Block 1</b>                                                                                                       |      |   |     |   |
|                                                     | Voice Evacuation Frame 8SS for the VX-3000                                                                           | No   | 1 |     | R |
|                                                     | Voice Evacuation Frame 4AB for the VX 3000                                                                           | No   | 1 |     | R |
|                                                     | Digital Power Amplifier Module 500W                                                                                  | No   | 4 |     | R |
|                                                     | Emergency Power Supply for the VX-3000                                                                               | No   | 1 |     | R |
|                                                     | 12V 100A/H Battery (Special sealed battery certified for use with VA system)                                         | No   | 2 |     | R |
|                                                     | 22U Equipment Rack Complete                                                                                          | No   | 1 |     | R |
|                                                     | Programming/Setup                                                                                                    | Item | 1 |     | R |
|                                                     | <b>Block 2</b>                                                                                                       |      |   |     |   |
|                                                     | Voice Evacuation Frame 8SS for the VX-3000                                                                           | No   | 1 |     | R |
|                                                     | Digital Power Amplifier Module 500W                                                                                  | No   | 3 |     | R |
|                                                     | Emergency Power Supply for the VX-3000                                                                               | No   | 1 |     | R |
|                                                     | 12V 65A/H Battery (Special sealed battery certified for use with VA system)                                          | No   | 2 |     | R |
|                                                     | 16U Equipment Rack Complete                                                                                          | No   | 1 |     | R |
|                                                     | Programming/Setup                                                                                                    | Item | 1 |     | R |
|                                                     | <b>Block 3</b>                                                                                                       |      |   |     |   |
|                                                     | Voice Evacuation Frame 8SS for the VX-3000                                                                           | No   | 1 |     | R |
|                                                     | Digital Power Amplifier Module 500W                                                                                  | No   | 3 |     | R |
|                                                     | Emergency Power Supply for the VX-3000                                                                               | No   | 1 |     | R |
|                                                     | 12V 65A/H Battery (Special sealed battery certified for use with VA system)                                          | No   | 2 |     | R |
|                                                     | 16U Equipment Rack Complete                                                                                          | No   | 1 |     | R |
|                                                     | Programming/Setup                                                                                                    | Item | 1 |     | R |
|                                                     | <b>Block 3</b>                                                                                                       |      |   |     |   |
|                                                     | Voice Evacuation Frame 8SS for the VX-3000                                                                           | No   | 1 |     | R |
|                                                     | Digital Power Amplifier Module 500W                                                                                  | No   | 3 |     | R |
|                                                     | Emergency Power Supply for the VX-3000                                                                               | No   | 1 |     | R |
|                                                     | 12V 65A/H Battery (Special sealed battery certified for use with VA system)                                          | No   | 2 |     | R |

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|  |                                                                                                        |      |      |  |   |
|--|--------------------------------------------------------------------------------------------------------|------|------|--|---|
|  | 16U Equipment Rack Complete                                                                            | No   | 1    |  | R |
|  | Programming/Setup                                                                                      | Item | 1    |  | R |
|  | <b>Block 4</b>                                                                                         |      |      |  |   |
|  | Voice Evacuation Frame 8SS for the VX-3000                                                             | No   | 1    |  | R |
|  | Voice Evacuation Frame 4AB for the VX 3000                                                             | No   | 1    |  | R |
|  | Digital Power Amplifier Module 500W                                                                    | No   | 4    |  | R |
|  | Emergency Power Supply for the VX-3000                                                                 | No   | 1    |  | R |
|  | 12V 100A/H Battery (Special sealed battery certified for use with VA system)                           | No   | 2    |  | R |
|  | 22U Equipment Rack Complete                                                                            | No   | 1    |  | R |
|  | Programming/Setup                                                                                      | Item | 1    |  | R |
|  | <b>Block 5</b>                                                                                         |      |      |  |   |
|  | Voice Evacuation Frame 4AB for the VX 3000                                                             | No   | 1    |  | R |
|  | Digital Power Amplifier Module 150W                                                                    | No   | 4    |  | R |
|  | Emergency Power Supply for the VX-3000                                                                 | No   | 1    |  | R |
|  | 12V 100A/H Battery (Special sealed battery certified for use with VA system)                           | No   | 2    |  | R |
|  | 22U Equipment Rack Complete                                                                            | No   | 1    |  | R |
|  | Programming/Setup                                                                                      | Item | 1    |  | R |
|  | <b>Control Room Fireman's Microphone</b>                                                               |      |      |  |   |
|  | Fireman's Microphone for SX-2000 and VX-3000 Series                                                    | Item | 1    |  | R |
|  | Fireman's Microphones Extension for RM-300MF                                                           | Item | 2    |  | R |
|  | <b>Speakers</b>                                                                                        |      |      |  |   |
|  | Ceiling Speakers 6inch 6W, EN54                                                                        | No   | 820  |  | R |
|  | Wall Speaker White - Certified BS & Amp EN54 24                                                        | No   | 148  |  | R |
|  | Horn Speaker - Certified BS & EN54-24                                                                  | No   | 55   |  | R |
|  | Bidirectional Speaker                                                                                  | No   | 15   |  | R |
|  | <b>7 Networking and BACnet/MODbus Integration</b>                                                      |      |      |  |   |
|  | Provide provision for a backbone network fibre optic cable with necessary splices, junction boxes etc. | m    | 1000 |  | R |
|  | Provide provision for any components required for networking FACP e.g. switches, converter etc.        | Item | Sum  |  | R |
|  | <b>Sub Total</b>                                                                                       | No   |      |  | R |



## PART 3 – BLOCK 7

### ARMSCOR FIRE DETECTION AND EMERGENCY VOICE EVACUATION SYSTEM TENDER SPECIFICATION BOQ

#### BLOCK 7

| Item                                                               | Description                                                                                                                                                                                                                                                     | Unit | Qty | Supply Rate | Install Rate | Amount |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|-------------|--------------|--------|
| <b>BILL 2: FIRE DETECTION CONTROL EQUIPMENT AND POWER SUPPLIES</b> |                                                                                                                                                                                                                                                                 |      |     |             |              |        |
| <b>1</b>                                                           | <b>4 Loop Analogue Addressable Fire Alarm Panel (Complete) Net Ready</b>                                                                                                                                                                                        |      |     |             |              |        |
|                                                                    | Allow for the detailed design, programming, procurement, delivery, installation, connection, networking, testing and commissioning of analogue addressable fire detection and alarm system control panel as per specification, including the items listed below | No   | 1   |             |              | R      |
| <b>2</b>                                                           | <b>Addressable Repeater Fire Detection Control Panel</b>                                                                                                                                                                                                        |      |     |             |              |        |
|                                                                    | Allow for the detailed design, programming, procurement, delivery, installation, connection, testing and commissioning of an advanced Addressable Repeater Fire Detection Control Panel to tender specification.                                                | No   | 1   |             |              | R      |
| <b>3</b>                                                           | <b>Emergency Power Supply</b>                                                                                                                                                                                                                                   |      |     |             |              |        |
|                                                                    | Provide emergency batteries as per calculation sheet for the relevant addressable fire detection control panel                                                                                                                                                  | No   | 1   |             |              |        |
| <b>4</b>                                                           | <b>Ordinary Power Supply</b>                                                                                                                                                                                                                                    |      |     |             |              |        |
|                                                                    | Provision of ordinary power supply to fire detection control panel and any other. Allow for procurement, delivery, installation, connection, testing and commissioning.                                                                                         |      |     |             |              |        |
|                                                                    | 20A Single Pole Circuit breakers                                                                                                                                                                                                                                | No   | 3   |             |              | R      |
|                                                                    | 20A Double Pole Surface Mount Isolators                                                                                                                                                                                                                         | No   | 3   |             |              | R      |
|                                                                    | 100 x 50mm Galvanized Wall Boxes (Surface Mount)                                                                                                                                                                                                                | No   | 3   |             |              | R      |
|                                                                    | 2.5mm <sup>2</sup> 600/1000V grade PVC insulated stranded copper conductor and termination terminals                                                                                                                                                            | m    | 300 |             |              | R      |
|                                                                    | Sundries/Consumable Installation                                                                                                                                                                                                                                | Item | Sum |             |              | R      |
| <b>5</b>                                                           | <b>Signage and Block Plans</b>                                                                                                                                                                                                                                  |      |     |             |              |        |
|                                                                    | Provide zone diagram and associated signage, laminated and framed behind glass                                                                                                                                                                                  | No   | 5   |             |              | R      |
| <b>6</b>                                                           | <b>Logbook</b>                                                                                                                                                                                                                                                  |      |     |             |              |        |

| A logbook to be installed in a holder and installed adjacent to master fire panel |                                                                                                                                                                                                                                                                           | No   | 1    |  | R |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--|---|
| 7                                                                                 | <b>BACnet/Modbus Integration</b>                                                                                                                                                                                                                                          |      |      |  |   |
|                                                                                   | Provide for BACnet / MODbus integration with BMS system                                                                                                                                                                                                                   | Item | Sum  |  | R |
| 8                                                                                 | <b>Any Item Not Listed (Specify)</b>                                                                                                                                                                                                                                      |      |      |  |   |
|                                                                                   |                                                                                                                                                                                                                                                                           |      |      |  |   |
|                                                                                   | <b>Total</b>                                                                                                                                                                                                                                                              |      |      |  | R |
| <b>BILL 3: CONDUIT AND CABLING - DETECTION</b>                                    |                                                                                                                                                                                                                                                                           |      |      |  |   |
| 1                                                                                 | <b>Fire Resistant Cabling - PH30</b>                                                                                                                                                                                                                                      |      |      |  |   |
|                                                                                   | Allow for adequate PH30 cabling of appropriate diameter for the wiring of emergency evacuation system to specification. (PH-30 only – 1.0mm <sup>2</sup> minimum - 2 core)                                                                                                |      |      |  |   |
|                                                                                   | LEVEL - FIRST FLOOR                                                                                                                                                                                                                                                       | m    | 200  |  | R |
|                                                                                   | LEVEL - MEZZANINE FLOOR                                                                                                                                                                                                                                                   | m    | 500  |  | R |
|                                                                                   | LEVEL - GROUND FLOOR                                                                                                                                                                                                                                                      | m    | 500  |  | R |
|                                                                                   | LEVEL - LOWER GROUND FLOOR                                                                                                                                                                                                                                                | m    | 500  |  | R |
| 2                                                                                 | <b>Conduit and Couplings</b>                                                                                                                                                                                                                                              |      |      |  |   |
|                                                                                   | Allow for the detailed design, procurement and installation of 25mm galvanised conduit complete with necessary couplings, junction boxes, steel saddles etc. in terms of the specifications. Include for all drilling, fixing and making good of same; painting by others | m    | 1700 |  |   |
| 3                                                                                 | <b>Any Item Not Listed (Specify)</b>                                                                                                                                                                                                                                      | Item | Sum  |  | R |
|                                                                                   | Sundries/Consume Installation                                                                                                                                                                                                                                             | Item | Sum  |  | R |
|                                                                                   |                                                                                                                                                                                                                                                                           |      |      |  |   |
|                                                                                   | <b>Total</b>                                                                                                                                                                                                                                                              |      |      |  | R |
| <b>BILL 4: DETECTION</b>                                                          |                                                                                                                                                                                                                                                                           |      |      |  |   |
| 1                                                                                 | <b>Analogue Addressable Optical Smoke Detectors</b>                                                                                                                                                                                                                       |      |      |  |   |
|                                                                                   | Allow for the procurement, installation, testing and commissioning of an analogue addressable optical smoke detectors to specification. <b>(Inclusive of bases)</b>                                                                                                       |      |      |  |   |

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|   |                                                                                                                                                                     |      |     |  |  |   |   |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|--|--|---|---|
|   | LEVEL - FIRST FLOOR                                                                                                                                                 | No   | 13  |  |  | R | - |
|   | LEVEL - MEZZANINE FLOOR                                                                                                                                             | No   |     |  |  | R | - |
|   | LEVEL - GROUND FLOOR                                                                                                                                                | No   | 28  |  |  | R | - |
|   | LEVEL - LOWER GROUND FLOOR                                                                                                                                          | No   | 40  |  |  | R | - |
| 2 | <b>Any Item Not Listed (Specify)</b>                                                                                                                                | Item | Sum |  |  | R | - |
|   | Sundries/Consumable Installation                                                                                                                                    | Item | Sum |  |  | R | - |
|   | <b>Sub Total</b>                                                                                                                                                    |      |     |  |  | R | - |
| 3 | <b>Analogue Addressable Combination Optical Smoke Detectors with Beacon</b>                                                                                         |      |     |  |  |   |   |
|   | Allow for the procurement, installation, testing and commissioning of an analogue addressable optical smoke detectors to specification. <b>(inclusive of bases)</b> |      |     |  |  |   |   |
|   | LEVEL - FIRST FLOOR                                                                                                                                                 | No   | 2   |  |  | R | - |
|   | LEVEL - MEZZANINE FLOOR                                                                                                                                             | No   |     |  |  | R | - |
|   | LEVEL - GROUND FLOOR                                                                                                                                                | No   |     |  |  | R | - |
|   | LEVEL - LOWER GROUND FLOOR                                                                                                                                          | No   |     |  |  | R | - |
| 4 | <b>Any Item Not Listed (Specify)</b>                                                                                                                                | Item | Sum |  |  | R | - |
|   | Sundries/Consumable Installation                                                                                                                                    | Item | Sum |  |  | R | - |
|   | <b>Sub Total</b>                                                                                                                                                    |      |     |  |  | R | - |
| 5 | <b>Analogue Addressable Heat Detectors</b>                                                                                                                          |      |     |  |  |   |   |
|   | Allow for the procurement, installation, testing and commissioning of an analogue addressable heat detectors to specification. <b>(inclusive of bases)</b>          |      |     |  |  |   |   |
|   | LEVEL - FIRST FLOOR                                                                                                                                                 | No   | 2   |  |  | R | - |
|   | LEVEL - MEZZANINE FLOOR                                                                                                                                             | No   |     |  |  |   |   |
|   | LEVEL - GROUND FLOOR                                                                                                                                                | No   | 6   |  |  | R | - |
|   | LEVEL - LOWER GROUND FLOOR                                                                                                                                          | No   | 6   |  |  | R | - |
| 6 | <b>Any Item Not Listed (Specify)</b>                                                                                                                                | Item | Sum |  |  | R | - |
|   | Sundries/Consumable Installation                                                                                                                                    | Item | Sum |  |  | R | - |



|                                              |                                                                                                                                                                           |      |     |  |  |  |  |   |   |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|--|--|--|--|---|---|
| <b>9</b>                                     | <b>ZENER BARRIERS</b>                                                                                                                                                     |      |     |  |  |  |  |   |   |
|                                              | Allow for the procurement, installation, testing and commissioning of Intrinsically Safe Optical Smoke Detectors as indicated on plans to specification                   |      |     |  |  |  |  |   |   |
|                                              | <b>Any Item Not Listed (Specify)</b>                                                                                                                                      | Item | 2   |  |  |  |  | R | - |
|                                              | <b>Sub Total</b>                                                                                                                                                          |      |     |  |  |  |  |   |   |
| <b>10</b>                                    | <b>Analogue Addressable Loop Powered Beacon</b>                                                                                                                           |      |     |  |  |  |  | R | - |
|                                              | Allow for the procurement, installation, testing and commissioning of an analogue addressable loop powered sounder / beacon to specification. <b>(inclusive of bases)</b> |      |     |  |  |  |  |   |   |
|                                              | LEVEL - FIRST FLOOR                                                                                                                                                       | Item | 1   |  |  |  |  | R | - |
|                                              | LEVEL - MEZZANINE FLOOR                                                                                                                                                   | Item |     |  |  |  |  | R | - |
|                                              | LEVEL - GROUND FLOOR                                                                                                                                                      | Item | 2   |  |  |  |  | R | - |
|                                              | LEVEL - LOWER GROUND FLOOR                                                                                                                                                | Item | 3   |  |  |  |  | R | - |
|                                              | <b>Any Item Not Listed (Specify)</b>                                                                                                                                      | Item | Sum |  |  |  |  | R | - |
|                                              | <b>Sub Total</b>                                                                                                                                                          |      |     |  |  |  |  | R | - |
|                                              | <b>Total</b>                                                                                                                                                              |      |     |  |  |  |  | R | - |
|                                              |                                                                                                                                                                           |      |     |  |  |  |  |   |   |
| <b>BILL 5: AUXILIARY DETECTION EQUIPMENT</b> |                                                                                                                                                                           |      |     |  |  |  |  |   |   |
| <b>1</b>                                     | <b>Interface Relay Units</b>                                                                                                                                              |      |     |  |  |  |  |   |   |
|                                              | Provide for wiring and programmable addressable relay units to control interfaces as follows:                                                                             |      |     |  |  |  |  |   |   |
|                                              | - Doors/Turnstiles/Access Control                                                                                                                                         | No   | 5   |  |  |  |  | R | - |
|                                              | - HVAC/Smoke Ventilation/Pressurisation                                                                                                                                   | No   | 2   |  |  |  |  | R | - |
|                                              | - EVAC System                                                                                                                                                             | No   | 1   |  |  |  |  | R | - |
|                                              | -OSID beam detectors                                                                                                                                                      | No   | 3   |  |  |  |  | R | - |
|                                              | <b>Sub Total</b>                                                                                                                                                          |      |     |  |  |  |  | R | - |
| <b>2</b>                                     | <b>Surface Boxes</b>                                                                                                                                                      |      |     |  |  |  |  |   |   |
|                                              | Provide for procurement and installation, of surface boxes to accommodate all interface relay units etc.                                                                  | No   | 11  |  |  |  |  | R | - |

|                                                     |                                                                                                                                    |      |     |   |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------|-----|---|
| 3                                                   | Any Item Not Listed (Specify)                                                                                                      | Item | Sum | R |
|                                                     | Sub Total                                                                                                                          |      |     | R |
|                                                     | Total                                                                                                                              |      |     | R |
| <b>BILL 6: EMERGENCY VOICE COMMUNICATION SYSTEM</b> |                                                                                                                                    |      |     |   |
| 1                                                   | Emergency Voice Communication System                                                                                               |      |     |   |
|                                                     | Allow for the testing of functionality and correct operation for the entire existing installed system as indicated in the drawings | Item | Sum | R |
|                                                     | Any Item Not Listed (Specify)                                                                                                      | Item | Sum | R |
|                                                     | Total                                                                                                                              |      |     | R |
| <b>BILL 7: EMERGENCY VOICE ALARM SYSTEM</b>         |                                                                                                                                    |      |     |   |
| 1                                                   | HEAD END EQUIPMENT                                                                                                                 |      |     |   |
|                                                     | Allow for the procurement, installation, testing and commissioning of EN 54 compliant head-end equipment as follows:               |      |     |   |
|                                                     | Block 1                                                                                                                            |      |     |   |
|                                                     | Voice Evacuation Frame 4AB                                                                                                         | No   | 1   | R |
|                                                     | Digital Power Amplifier Module 150W                                                                                                | No   | 4   | R |
|                                                     | Emergency Power Supply for the VX-3000                                                                                             | No   | 1   | R |
|                                                     | 12V 65A/H Battery (Special sealed battery certified for use with VA system)                                                        | No   | 2   | R |
|                                                     | 16 Equipment Rack Complete                                                                                                         | No   | 1   | R |
|                                                     | Programming/Setup                                                                                                                  | Item | 1   | R |
|                                                     | Speakers                                                                                                                           |      |     |   |
|                                                     | Ceiling Speakers 6inch 6W, EN54                                                                                                    | No   | 18  | R |
|                                                     | Wall Speaker White - Certified BS & Amp EN54 24                                                                                    | No   | 18  | R |
|                                                     | Horn Speaker - Certified BS & EN54-24                                                                                              | No   | 6   | R |
|                                                     | Sub Total                                                                                                                          |      |     | R |
| 2                                                   | Fire Resistant Cabling - PH30                                                                                                      |      |     |   |

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|          |                                                                                                                                                                                                                                                                           |      |      |  |  |          |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--|--|----------|
|          | Allow for adequate PH30 cabling of appropriate diameter for the wiring of emergency evacuation system to specification. (PH-30 only – 1.0mm <sup>2</sup> minimum - 2 core)                                                                                                |      |      |  |  |          |
|          | LEVEL - FIRST FLOOR                                                                                                                                                                                                                                                       | Item | 300  |  |  | R        |
|          | LEVEL - MEZZANINE FLOOR                                                                                                                                                                                                                                                   | Item | 600  |  |  | R        |
|          | LEVEL - GROUND FLOOR                                                                                                                                                                                                                                                      | Item | 600  |  |  | R        |
|          | LEVEL - LOWER GROUND FLOOR                                                                                                                                                                                                                                                | Item | 600  |  |  | R        |
|          | <b>Sub Total</b>                                                                                                                                                                                                                                                          |      |      |  |  |          |
| <b>3</b> | <b>Conduit and Couplings</b>                                                                                                                                                                                                                                              |      |      |  |  |          |
|          | Allow for the detailed design, procurement and installation of 25mm PVC conduit complete with necessary couplings, junction boxes, steel saddles etc. in terms of the specifications. Include for all drilling, fixing and making good of same; painting by others        | m    | 800  |  |  | R        |
|          | Allow for the detailed design, procurement and installation of 25mm galvanised conduit complete with necessary couplings, junction boxes, steel saddles etc. in terms of the specifications. Include for all drilling, fixing and making good of same; painting by others | m    | 3500 |  |  | R        |
|          | <b>Total</b>                                                                                                                                                                                                                                                              |      |      |  |  | <b>R</b> |

## PART 4 – GAS ROOMS

| ARMSCOR FIRE DETECTION AND GAS SUPPRESSION |                                                                                                                                                                                                                |      |     |      |        |  |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|------|--------|--|
| GAS ROOMS                                  |                                                                                                                                                                                                                |      |     |      |        |  |
| Item                                       | Description                                                                                                                                                                                                    | Unit | Qty | Rate | Amount |  |
| <b>BILL 2: GENERAL</b>                     |                                                                                                                                                                                                                |      |     |      |        |  |
| <b>1 MATERIALS</b>                         |                                                                                                                                                                                                                |      |     |      |        |  |
|                                            | Allow for only approved materials and components.                                                                                                                                                              | Item | Sum |      | R      |  |
| <b>2 APPROVALS</b>                         |                                                                                                                                                                                                                |      |     |      |        |  |
|                                            | Allow for only approved systems and equipment.                                                                                                                                                                 | Item | Sum |      | R      |  |
| <b>3 COMPATIBILITY</b>                     |                                                                                                                                                                                                                |      |     |      |        |  |
|                                            | Only compatible components and materials to be used.                                                                                                                                                           | Item | Sum |      | R      |  |
| <b>4 LABELLING</b>                         |                                                                                                                                                                                                                |      |     |      |        |  |
|                                            | All devices and components to be clearly labelled as per relevant SANS code of practice and recommendations                                                                                                    | Item | Sum |      | R      |  |
| <b>5 TRAINING</b>                          |                                                                                                                                                                                                                |      |     |      |        |  |
|                                            | Allow for the training of staff in the use of system on completion of work.                                                                                                                                    | Item | Sum |      | R      |  |
| <b>6 CERTIFICATION</b>                     |                                                                                                                                                                                                                |      |     |      |        |  |
|                                            | Certification of system and components on completion of work in terms of SANS 10139 and EN Codes.                                                                                                              | Item | Sum |      | R      |  |
| <b>7 EQUIPMENT SELECTION</b>               |                                                                                                                                                                                                                |      |     |      |        |  |
|                                            | Provision of sample equipment for approval                                                                                                                                                                     | Item | Sum |      | R      |  |
|                                            | Use of only equipment and components approved by the Engineer.                                                                                                                                                 |      |     |      |        |  |
| <b>8 SCAFFOLDING AND LIFTING EQUIPMENT</b> |                                                                                                                                                                                                                |      |     |      |        |  |
|                                            | Allow for the provision, erection, use, dismantling and transportation of scaffolding and or lifting equipment in accordance with the requirements of the Occupational Health and Safety Act (Act 85 of 1993). | Item | Sum |      | R      |  |
|                                            | <b>Note:</b> No scaffolding will be provided by others; please allow for all scaffolding and or lifting equipment needs here                                                                                   |      |     |      |        |  |

|           |                                                                                                                                                                                                                                   |    |     |  |  |   |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|--|--|---|
| <b>9</b>  | <b>TRAVELLING AND ACCOMMODATION</b>                                                                                                                                                                                               |    |     |  |  |   |
|           | Allow for all travelling and accommodation expenses to all sites as covered in this scope.                                                                                                                                        |    | Sum |  |  | R |
| <b>10</b> | <b>SITE ACCESS</b>                                                                                                                                                                                                                |    |     |  |  |   |
|           | Allowance shall be made by the tenderer for site access in order to meet with the client's access to site requirements and access cards etc.                                                                                      |    | Sum |  |  | R |
| <b>11</b> | Any item not listed (Specify)                                                                                                                                                                                                     |    |     |  |  |   |
|           |                                                                                                                                                                                                                                   |    |     |  |  |   |
|           | <b>BILL 3: FIRE DETECTION CONTROL EQUIPMENT AND POWER SUPPLIES</b>                                                                                                                                                                |    |     |  |  |   |
| <b>1</b>  | <b>COMBINATION 3 ZONE DETECTION AND GAS RELEASE CONTROL PANEL – TECHNOSWITCH TC3001 OR SIMILAR APPROVED</b>                                                                                                                       |    |     |  |  |   |
|           | Allow for the procurement, delivery, installation, connection, testing and commissioning of an Advanced combination 3 Zone Detection and Gas Release Control Panel (Technoswitch TC3001 or similar approved)                      | No | 7   |  |  | R |
| <b>2</b>  | <b>COMBINATION 3 ZONE DETECTION AND GAS RELEASE STATUS CONTROL PANEL – TECHNOSWITCH TC3002</b>                                                                                                                                    |    |     |  |  |   |
|           | Allow for the procurement, delivery, installation, connection, testing, programming and commissioning of an advanced combination 3 Zone Detection and Gas Release Status Control Panel. (Technoswitch TC3001 or similar approved) | No | 1   |  |  | R |
| <b>3</b>  | <b>EMERGENCY POWER SUPPLY</b>                                                                                                                                                                                                     |    |     |  |  |   |
|           | Provide emergency batteries as per calculation sheet – Gas release control panels and addressable control panel.                                                                                                                  | No | 18  |  |  | R |
| <b>4</b>  | <b>4 LOOP ADDRESSABLE FIRE DETECTION CONTROL PANEL</b>                                                                                                                                                                            |    |     |  |  |   |
|           | Allow for the procurement, delivery, installation, connection, testing, programming, and commissioning of an addressable fire detection control panel to specification.                                                           | No | 1   |  |  | R |
| <b>5</b>  | <b>SIGNAGE AND BLOCK PLANS</b>                                                                                                                                                                                                    |    |     |  |  |   |
|           | Provide zone diagram or block plans and associated mandatory signage.                                                                                                                                                             | No | 10  |  |  | R |

|                                                                    |                                                                                                                                                                                                                                                                                                                                     |      |      |  |   |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--|---|
| 6                                                                  | <b>BLUE GINGER 24V DC POWER SUPPLY COMPLETE WITH BACK-UP BATTERIES AND CHARGER OR SIMILAR APPROVED</b>                                                                                                                                                                                                                              |      |      |  |   |
|                                                                    | Provide for the supply of a Blue Ginger or similar approved 24 DC Power Supply complete with back-up Batteries and Charger to the Aspiring Detectors and Gas Release Status Unit                                                                                                                                                    | No   | 12   |  | R |
| 7                                                                  | <b>OVER AND UNDER VOLTAGE PROTECTION</b>                                                                                                                                                                                                                                                                                            |      |      |  |   |
|                                                                    | Supply and installation of over/under voltage protection unit to control panels, and HSSD Detectors. This should be installed between the isolator switch and mains connection terminals on the relevant devices and or control panels.                                                                                             | No   | 20   |  | R |
| 8                                                                  | <b>ORDINARY POWER SUPPLY</b>                                                                                                                                                                                                                                                                                                        |      |      |  |   |
|                                                                    | Provision of ordinary power supply to all detection and gas release control panels and Power Supplies to HSSD Detectors and installation of a 15A Isolator switch complete with all fitting and couplings installed at high level and with markings as required by SANS 10139. This should be fed from a separate circuit breakers. | Item | Sum  |  | R |
| <b>BILL 4: CONDUIT AND CABLING - DETECTION AND GAS SUPPRESSION</b> |                                                                                                                                                                                                                                                                                                                                     |      |      |  |   |
|                                                                    | <b>FIRE RESISTANT CABLING - PH120</b>                                                                                                                                                                                                                                                                                               |      |      |  |   |
| 1                                                                  | Allow for adequate cabling for the wiring of the fire detection system to specification.                                                                                                                                                                                                                                            |      |      |  |   |
|                                                                    | (PH-120 only - 1mm <sup>2</sup> minimum - 2 core)                                                                                                                                                                                                                                                                                   |      |      |  |   |
|                                                                    | • Server Room                                                                                                                                                                                                                                                                                                                       | m    | 750  |  | R |
|                                                                    | • Tele Dist. Room                                                                                                                                                                                                                                                                                                                   | m    | 750  |  | R |
|                                                                    | • UPS Room                                                                                                                                                                                                                                                                                                                          | m    | 500  |  | R |
|                                                                    | • Battery Room                                                                                                                                                                                                                                                                                                                      | m    | 500  |  | R |
|                                                                    | • Archive Room #1                                                                                                                                                                                                                                                                                                                   | m    | 500  |  | R |
|                                                                    | • Archive Room #2                                                                                                                                                                                                                                                                                                                   | m    | 1000 |  | R |
|                                                                    | • Archive Room #3                                                                                                                                                                                                                                                                                                                   | m    | 500  |  | R |
|                                                                    | • Cable for networking to main addressable panel                                                                                                                                                                                                                                                                                    | m    | 2500 |  | R |
| 2                                                                  | <b>CONDUIT AND COUPLINGS</b>                                                                                                                                                                                                                                                                                                        |      |      |  |   |

|                          |                                                                                                                                                                                                                                                                                            |      |     |  |   |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|--|---|
|                          | Procurement and installation of 25mm dia. Bosal conduit (with necessary couplings, saddles, junction boxes, etc.) for all detection and electrical reticulation in terms of the specifications. Include for all drilling, fixing and making good of same; painting by successful tenderer. |      |     |  |   |
|                          | • Server Room                                                                                                                                                                                                                                                                              | m    | 200 |  | R |
|                          | • Tele Dist. Room                                                                                                                                                                                                                                                                          | m    | 200 |  | R |
|                          | • UPS Room                                                                                                                                                                                                                                                                                 | m    | 150 |  | R |
|                          | • Battery Room                                                                                                                                                                                                                                                                             | m    | 150 |  | R |
|                          | • Archive Room #1                                                                                                                                                                                                                                                                          | m    | 250 |  | R |
|                          | • Archive Room #2                                                                                                                                                                                                                                                                          | m    | 350 |  | R |
|                          | • Archive Room #3                                                                                                                                                                                                                                                                          | m    | 150 |  | R |
|                          | • Conduit for networking to main addressable panel                                                                                                                                                                                                                                         | m    | 500 |  | R |
| <b>3</b>                 | <b>P2000 GALVANIZED TRUNKING AND ACCESSORIES</b>                                                                                                                                                                                                                                           |      |     |  |   |
|                          | Allow for the procurement and installation of P2000 trunking (with necessary couplings, junction boxes, accessories etc.) in terms of the specifications.                                                                                                                                  | m    | 100 |  | R |
| <b>4</b>                 | <b>FLEXIBLE GALVANIZED STEEL CONDUIT WITH IP 40 RATING INCLUDING STEEL COUPLINGS</b>                                                                                                                                                                                                       |      |     |  |   |
|                          | Provide for the supply and installation of flexible galvanized steel conduit with steel couplings to be used between cylinder actuators and gas and test interface units as well as between other devices where a flexible connection would be required.                                   | Item | Sum |  | R |
| <b>5</b>                 | Any item not listed (Specify)                                                                                                                                                                                                                                                              | Item | Sum |  | R |
| <b>BILL 5: DETECTION</b> |                                                                                                                                                                                                                                                                                            |      |     |  |   |
| <b>1</b>                 | <b>HIGH SENSITIVITY SMOKE DETECTOR (HSSD) - 4 PIPE HSSD SCANNER COMPLETE WITH COLOUR TOUCH SCREEN (CIRRUS HYBRID OR SIMILAR)</b>                                                                                                                                                           |      |     |  |   |

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|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|--|--|---|---|
|          | Allow for the detailed design, procurement, installation, testing, programming, and commissioning of HSSD detectors as indicated on plans and to specification and all other equipment, including sampling pipes, elbows, pipe supports, end caps, dirt traps and all other equipment necessary to provide a complete, functional and compliant installation. | No | 2  |  |  | R | - |
|          | • Server Room                                                                                                                                                                                                                                                                                                                                                 | No | 2  |  |  | R | - |
|          | • Tele Dist. Room                                                                                                                                                                                                                                                                                                                                             | No | 2  |  |  | R | - |
|          | • UPS Room                                                                                                                                                                                                                                                                                                                                                    | No | 1  |  |  | R | - |
|          | • Battery Room                                                                                                                                                                                                                                                                                                                                                | No | 1  |  |  | R | - |
|          | • Archive Room #1                                                                                                                                                                                                                                                                                                                                             | No | 2  |  |  | R | - |
|          | • Archive Room #2                                                                                                                                                                                                                                                                                                                                             | No | 2  |  |  | R | - |
|          | • Archive Room #3                                                                                                                                                                                                                                                                                                                                             | No | 2  |  |  | R | - |
| <b>2</b> | <b>CAPILARY TUBES AND CELING MOUNTED SAMPLING POINTS</b>                                                                                                                                                                                                                                                                                                      |    |    |  |  |   |   |
|          | Allow for the detailed design, procurement, installation, testing and commissioning of capillary tubes and ceiling mounted sampling points as per manufacturer's specifications.                                                                                                                                                                              |    |    |  |  |   |   |
|          | • Server Room                                                                                                                                                                                                                                                                                                                                                 | No | 8  |  |  | R | - |
|          | • Tele Dist. Room                                                                                                                                                                                                                                                                                                                                             | No | 14 |  |  | R | - |
|          | • Archive Room #2                                                                                                                                                                                                                                                                                                                                             | No | 8  |  |  | R | - |
|          | • Archive Room #3                                                                                                                                                                                                                                                                                                                                             | No | 8  |  |  | R | - |
| <b>3</b> | <b>INLINE FILTER – TRIPLE STAGE FILTER FOR ALL HSSD's</b>                                                                                                                                                                                                                                                                                                     |    |    |  |  |   |   |
|          | Allow for the procurement, installation, testing and commissioning of triple stage filters to all HSSD as per manufacturer's specifications.                                                                                                                                                                                                                  |    |    |  |  |   |   |
|          | • Server Room                                                                                                                                                                                                                                                                                                                                                 | No | 8  |  |  | R | - |
|          | • Tele Dist. Room                                                                                                                                                                                                                                                                                                                                             | No | 8  |  |  | R | - |
|          | • UPS Room                                                                                                                                                                                                                                                                                                                                                    | No | 4  |  |  | R | - |
|          | • Battery Room                                                                                                                                                                                                                                                                                                                                                | No | 4  |  |  | R | - |
|          | • Archive Room #1                                                                                                                                                                                                                                                                                                                                             | No | 8  |  |  | R | - |
|          | • Archive Room #2                                                                                                                                                                                                                                                                                                                                             | No | 8  |  |  | R | - |
|          | • Archive Room #3                                                                                                                                                                                                                                                                                                                                             | No | 8  |  |  | R | - |
| <b>4</b> | <b>CONVENTIONAL SIREN / STROBE -</b>                                                                                                                                                                                                                                                                                                                          |    |    |  |  |   |   |

|          |                                                                                                                                     |      |     |  |   |   |
|----------|-------------------------------------------------------------------------------------------------------------------------------------|------|-----|--|---|---|
|          | Allow for the procurement, installation, testing and commissioning of 100dB(A) Astrobe or similar approved combination siren/strobe | No   | 2   |  | R | - |
|          | • Server Room                                                                                                                       | No   | 2   |  | R | - |
|          | • Tele Dist. Room                                                                                                                   | No   | 2   |  | R | - |
|          | • UPS Room                                                                                                                          | No   | 2   |  | R | - |
|          | • Battery Room                                                                                                                      | No   | 2   |  | R | - |
|          | • Archive Room #1                                                                                                                   | No   | 2   |  | R | - |
|          | • Archive Room #2                                                                                                                   | No   | 2   |  | R | - |
|          | • Archive Room #2                                                                                                                   | No   | 2   |  | R | - |
| <b>5</b> | <b>FIRE BELL</b>                                                                                                                    |      |     |  |   |   |
|          | Allow for the procurement, installation, testing and commissioning of a fire alarm Bell to specification.                           |      |     |  |   |   |
|          | • Server Room                                                                                                                       | No   | 1   |  | R | - |
|          | • Tele Dist. Room                                                                                                                   | No   | 1   |  | R | - |
|          | • UPS Room                                                                                                                          | No   | 1   |  | R | - |
|          | • Battery Room                                                                                                                      | No   | 1   |  | R | - |
|          | • Archive Room #1                                                                                                                   | No   | 1   |  | R | - |
|          | • Archive Room #2                                                                                                                   | No   | 1   |  | R | - |
|          | • Archive Room #3                                                                                                                   | No   | 1   |  | R | - |
| <b>6</b> | Any item not listed (Specify)                                                                                                       | Item | Sum |  | R | - |
|          |                                                                                                                                     |      |     |  |   |   |
|          | <b>BILL 6: AUXILIARY EQUIPMENT</b>                                                                                                  |      |     |  |   |   |
| <b>1</b> | <b>INTERFACES WITH OTHER SYSTEMS</b>                                                                                                |      |     |  |   |   |
|          | Provide for connection to interfaces with the following systems and programming of relay outputs:                                   |      |     |  |   |   |
|          | Fresh air supply units shutdown                                                                                                     | No   | 15  |  | R | - |
|          | Closing of fire dampers                                                                                                             | No   | 15  |  | R | - |
|          | Interfaces for the monitoring of fire signals as per schedule                                                                       | No   | 180 |  | R | - |
|          | HVAC                                                                                                                                | No   | 6   |  | R | - |
|          | Pilot Cylinder Pressure Gauge Monitoring                                                                                            | No   | 6   |  | R | - |
| <b>2</b> | <b>SURFACE BOXES</b>                                                                                                                |      |     |  |   |   |

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                   |      |     |  |   |   |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|--|---|---|
|                                                                     | Provide for procurement and installation, of surface boxes to accommodate all interface relay units                                                                                                                                                                                                                                                               | No   | 80  |  | R | - |
| <b>3</b>                                                            | <b>GAS DISCHARGE INTERFACE RELAY UNIT</b>                                                                                                                                                                                                                                                                                                                         |      |     |  |   |   |
|                                                                     | Provide for procurement, installation, setup and programming of Gas Release Interface Relays from Gas Release Panel to all Suppression Cylinder Actuators.                                                                                                                                                                                                        | No   | 10  |  | R | - |
| <b>4</b>                                                            | <b>ADDRESSABLE INTERFACE RELAY UNIT</b>                                                                                                                                                                                                                                                                                                                           |      |     |  |   |   |
|                                                                     | Provide for the detailed design, procurement, installation, setup and programming of Addressable Interface Relays to all HSSD devices, Gas Release control Panels and other fire detection monitoring equipment.                                                                                                                                                  | No   | 100 |  | R | - |
| <b>5</b>                                                            | <b>24V DC CONTACTOR SWITCH</b>                                                                                                                                                                                                                                                                                                                                    |      |     |  |   |   |
|                                                                     | Provide for procurement, installation, setup and programming of 24V DC Contactor Switch to Interface and shut-down of electrical HVAC Plant                                                                                                                                                                                                                       | No   | 6   |  | R | - |
| <b>6</b>                                                            | Any item not listed (Specify)                                                                                                                                                                                                                                                                                                                                     | Item | Sum |  | R | - |
| <b>BILL 7: GAS SUPPRESSION EQUIPMENT - 200 BAR IG 55 PYROSHIELD</b> |                                                                                                                                                                                                                                                                                                                                                                   |      |     |  |   |   |
| <b>1</b>                                                            | <b>200 BAR 80 LITRE PYROSHIELD</b>                                                                                                                                                                                                                                                                                                                                |      |     |  |   |   |
|                                                                     | <b>(IG-55) CYLINDERS SYSTEM COMPLETE</b>                                                                                                                                                                                                                                                                                                                          |      |     |  |   |   |
|                                                                     | Allow for the detailed design, procurement, installation, testing and commissioning of 200 Bar 80 Litre Pyroshield IG-55 systems to specification, complete with manifold, pilot cylinder, actuation lines, discharge hose, non-return valves, racking, labels & nozzles, orifice unit required to provide a complete system as per manufacturer's specification: |      |     |  |   |   |
|                                                                     | • Server Room                                                                                                                                                                                                                                                                                                                                                     | No.  | 10  |  | R | - |
|                                                                     | • Tele Dist. Room                                                                                                                                                                                                                                                                                                                                                 | No   | 12  |  | R | - |
|                                                                     | • UPS Room                                                                                                                                                                                                                                                                                                                                                        | No   | 8   |  | R | - |
|                                                                     | • Battery Room                                                                                                                                                                                                                                                                                                                                                    | No   | 8   |  | R | - |
|                                                                     | • Archive Room #1                                                                                                                                                                                                                                                                                                                                                 | No   | 14  |  | R | - |
|                                                                     | • Archive Room #2                                                                                                                                                                                                                                                                                                                                                 | No   | 22  |  | R | - |

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|   |                                                                                                                                                                                                                                                                                                                                              |      |     |   |   |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|---|---|
| 2 | <ul style="list-style-type: none"> <li>Archive Room #3</li> </ul>                                                                                                                                                                                                                                                                            | No   | 16  | R | - |
|   | <b>GAS DISTRIBUTION PIPEWORK</b>                                                                                                                                                                                                                                                                                                             |      |     |   |   |
|   | Allow for the detailed design, procurement, installation, testing and commissioning of Pyroshield IG-55 pipework to specification (including all elbows, tees, supports, paining and ancillary equipment). All pipework to be ASTM A 106 Grade B Seamless and all fittings to be 3000lb and as specified in the relevant part of SANS 14520. |      |     |   |   |
|   | • Server Room                                                                                                                                                                                                                                                                                                                                | Item | Sum | R | - |
|   | • Tele Dist. Room                                                                                                                                                                                                                                                                                                                            | Item | Sum | R | - |
|   | • UPS Room                                                                                                                                                                                                                                                                                                                                   | Item | Sum | R | - |
|   | • Battery Room                                                                                                                                                                                                                                                                                                                               | Item | Sum | R | - |
|   | • Archive Room #1                                                                                                                                                                                                                                                                                                                            | Item | Sum | R | - |
|   | • Archive Room #2                                                                                                                                                                                                                                                                                                                            | Item | Sum | R | - |
|   | • Archive Room #3                                                                                                                                                                                                                                                                                                                            | Item | Sum | R | - |
| 3 | <b>GAS DISCHARGE NOZZLES</b>                                                                                                                                                                                                                                                                                                                 |      |     |   |   |
|   | Allow for the detailed design, procurement, installation, testing and commissioning of IG55 gas discharge nozzles to specification.                                                                                                                                                                                                          |      |     |   |   |
|   | • Server Room                                                                                                                                                                                                                                                                                                                                | No.  | 4   | R | - |
|   | • Tele Dist. Room                                                                                                                                                                                                                                                                                                                            | No.  | 6   | R | - |
|   | • UPS Room                                                                                                                                                                                                                                                                                                                                   | No.  | 2   | R | - |
|   | • Battery Room                                                                                                                                                                                                                                                                                                                               | No.  | 2   | R | - |
|   | • Archive Room #1                                                                                                                                                                                                                                                                                                                            | No.  | 3   | R | - |
|   | • Archive Room #2                                                                                                                                                                                                                                                                                                                            | No.  | 9   | R | - |
|   | • Archive Room #3                                                                                                                                                                                                                                                                                                                            | No.  | 6   | R | - |
| 4 | <b>SILENCER GAS DISCHARGE NOZZLES</b>                                                                                                                                                                                                                                                                                                        |      |     |   |   |
|   | Allow for the detailed design, procurement, installation, testing and commissioning of silencer nozzles to specification with silencer / whisp air nozzle attachment to specification. Room Void Space.                                                                                                                                      |      |     |   |   |
|   | • Server Room                                                                                                                                                                                                                                                                                                                                | No.  | 2   | R | - |
| 5 | <b>ROOM INTEGRITY TEST</b>                                                                                                                                                                                                                                                                                                                   |      |     |   |   |

## ANNEXURE C

### RESPONSIBILITY MATRIX

| No | PROJECT TEAM                                                                                                                                                                                                                                                                       | QTY (MIN) | DURATION REQUIRED        |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------------------------|
| 1  | The bidder shall allocate a registered SAQCC Fire Detection Designer                                                                                                                                                                                                               | 1         | Until Project Completion |
| 2  | The bidder shall allocate a registered SAQCC Fire Detection Commissioner                                                                                                                                                                                                           | 1         | Until Project Completion |
| 3  | The bidder shall allocate a registered SAQCC Gas Suppression Designer                                                                                                                                                                                                              | 1         | Until Project Completion |
| 4  | The bidder shall allocate a registered SAQCC Gas Suppression Commissioner                                                                                                                                                                                                          | 1         | Until Project Completion |
| 5  | The bidder shall allocate person(s) registered as SAQCC Installer                                                                                                                                                                                                                  | 1         | Until Project Completion |
| 6  | The bidder or allocated SAQCC Fire Detection Commissioner/Designer must have completed training with the proposed product supplier on how to install, test, program and commission the FACP (Fire Alarm Control Panel) with system loop devices for all detection and alarm zones. | 1         | Until Project Completion |
| 7  | The bidder or allocated SAQCC Fire Detection Commissioner/Designer must have completed training with the product supplier on how to install, test, program and commission the EVAC (Emergency Voice Evacuation Alarm Communication) system.                                        | 1         | Until Project Completion |

## SCHEDULE OF INFORMATION OF CONTRACTOR

The Contractor shall complete in this schedule the required information of assessing the ability and capacity of the company to complete the works as specified for this project.

The following details regarding the staff to be involved in this project is required:

| Function                                         | Name | Experience | Qualification |
|--------------------------------------------------|------|------------|---------------|
| Project Engineer / Manager                       |      |            |               |
| Site Supervisor / Inspector                      |      |            |               |
| Registered Fire Detection Designer (SAQCC)       |      |            |               |
| Registered Fire Detection Commissioner           |      |            |               |
| Registered Fire Gas Suppression Designer (SAQCC) |      |            |               |

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| Function                                     | Name | Experience | Qualification |
|----------------------------------------------|------|------------|---------------|
| Registered Fire Gas Suppression Commissioner |      |            |               |
| Registered as SAQCC Installer                |      |            |               |

## ANNEXURE D

### DRAWING SCHEDULE

| Drawing Number<br>(Numbering Description in<br>Bold & Underlined) | Description                                    | Size | Scale |
|-------------------------------------------------------------------|------------------------------------------------|------|-------|
| <b><u>A2003-FB-BL-XX-500 RX</u></b>                               | <b><u>FIRE DETECTION LAYOUTS</u></b>           |      |       |
| A2078-FB-BL--2-500 R0                                             | BLOCKS 1-5 LEVEL -2 FIRE DETECTION LAYOUT      | A0   | 1:100 |
| A2078-FB-BL--1-501 R0                                             | BLOCKS 1-5 LEVEL -1 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-00-502 R0                                             | BLOCKS 1-5 LEVEL 00 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-01-503 R0                                             | BLOCKS 1-5 LEVEL 01 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-02-504 R0                                             | BLOCKS 1-5 LEVEL 02 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-03-505 R0                                             | BLOCKS 1-5 LEVEL 03 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-04-506 R0                                             | BLOCKS 1-5 LEVEL 04 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-05-507 R0                                             | BLOCKS 1-5 LEVEL 05 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-06-508 R0                                             | BLOCKS 1-5 LEVEL 06 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-07-509 R0                                             | BLOCKS 1-5 LEVEL 07 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-B7--2-510 R0                                             | BLOCK 7 LEVEL -2 (L.G.F) FIRE DETECTION LAYOUT | A0   | 1:100 |
| A2078-FB-B7--1-511 R0                                             | BLOCK 7 LEVEL -1 (MEZZ) FIRE DETECTION LAYOUT  | A0   | 1:100 |
| A2078-FB-B7-00-512 R0                                             | BLOCK 7 LEVEL 00 (G.F) FIRE DETECTION LAYOUT   | A0   | 1:100 |
| A2078-FB-B7-01-513 R0                                             | BLOCK 7 LEVEL 01 (MEZZ) FIRE DETECTION LAYOUT  | A0   | 1:100 |
|                                                                   |                                                |      |       |
| <b><u>A2003-FB-BL-XX-800 RX</u></b>                               | <b><u>FIRE GAS SUPPRESSION LAYOUTS</u></b>     |      |       |
| A2078-FB-BL--1-2-800 R0                                           | BLOCKS 1-5 LEVEL -2 FIRE DETECTION LAYOUT      | A0   | 1:100 |
| A2078-FB-BL--1-2-801 R0                                           | BLOCKS 1-5 LEVEL -1 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL--1-2-802 R0                                           | BLOCKS 1-5 LEVEL 00 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL--1-2-803 R0                                           | BLOCKS 1-5 LEVEL 01 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL--1-2-804 R0                                           | BLOCKS 1-5 LEVEL 02 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL--1-2-805 R0                                           | BLOCKS 1-5 LEVEL 03 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL--1-2-806 R0                                           | BLOCKS 1-5 LEVEL 04 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL--1-2-807 R0                                           | BLOCKS 1-5 LEVEL 05 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL--1-2-808 R0                                           | BLOCKS 1-5 LEVEL 06 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL--1-2-809 R0                                           | BLOCKS 1-5 LEVEL 07 FIRE DETECTION LAYOUT      | A0   | 1:250 |
|                                                                   |                                                |      |       |
| <b><u>A2003-FB-BL-XX-900 RX</u></b>                               | <b><u>ZONE DETECTION AREAS</u></b>             |      |       |
| A2078-FB-BL--2-900 R0                                             | BLOCKS 1-5 LEVEL -2 FIRE DETECTION LAYOUT      | A0   | 1:100 |
| A2078-FB-BL--1-901 R0                                             | BLOCKS 1-5 LEVEL -1 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-00-902 R0                                             | BLOCKS 1-5 LEVEL 00 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-01-903 R0                                             | BLOCKS 1-5 LEVEL 01 FIRE DETECTION LAYOUT      | A0   | 1:250 |
| A2078-FB-BL-02-904 R0                                             | BLOCKS 1-5 LEVEL 02 FIRE DETECTION LAYOUT      | A0   | 1:250 |

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|                              |                                           |    |       |
|------------------------------|-------------------------------------------|----|-------|
| A2078-FB-BL-03-905 R0        | BLOCKS 1-5 LEVEL 03 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-04-906 R0        | BLOCKS 1-5 LEVEL 04 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-05-907 R0        | BLOCKS 1-5 LEVEL 05 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-06-908 R0        | BLOCKS 1-5 LEVEL 06 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-07-509 R0        | BLOCKS 1-5 LEVEL 07 FIRE DETECTION LAYOUT | A0 | 1:250 |
|                              |                                           |    |       |
|                              |                                           |    |       |
| <b>A2003-FB-BL-XX-950 RX</b> | <b>ALARM ZONE LEVELS</b>                  |    |       |
| A2078-FB-BL-2-950 R0         | BLOCKS 1-5 LEVEL -2 FIRE DETECTION LAYOUT | A0 | 1:100 |
| A2078-FB-BL-1-951 R0         | BLOCKS 1-5 LEVEL -1 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-00-952 R0        | BLOCKS 1-5 LEVEL 00 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-01-953 R0        | BLOCKS 1-5 LEVEL 01 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-02-954 R0        | BLOCKS 1-5 LEVEL 02 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-03-955 R0        | BLOCKS 1-5 LEVEL 03 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-04-956 R0        | BLOCKS 1-5 LEVEL 04 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-05-957 R0        | BLOCKS 1-5 LEVEL 05 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-06-958 R0        | BLOCKS 1-5 LEVEL 06 FIRE DETECTION LAYOUT | A0 | 1:250 |
| A2078-FB-BL-07-959 R0        | BLOCKS 1-5 LEVEL 07 FIRE DETECTION LAYOUT | A0 | 1:250 |
|                              |                                           |    |       |

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**DETAILED TENDER SPECIFICATION FOR FIRE DETECTION  
AND EMERGENCY VOICE EVACUATION SYSTEMS**

at the

**ARMSCOR HEAD OFFICE**

in

**PRETORIA**

**GAUTENG PROVINCE**

2022/04

**DOCUMENT REVISION HISTORY:**

| Revision | Revision Date | Revision Comments | Originator | Reviewed by | Admin check |
|----------|---------------|-------------------|------------|-------------|-------------|
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| 2        | 2022/04       | Tender Issue      | AM         | JP          | AV          |
|          |               |                   |            |             |             |
|          |               |                   |            |             |             |
|          |               |                   |            |             |             |

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| <b>Signed:</b>        |                       |

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\\srv1\Projects\Plantech\2 - Active\A-2078 ARMSCOR HQ FIRE DETECTION\A-2078-72\SPECIFICATIONS

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## PART I: PRELIMINARIES AND GENERAL

### 1 DEFINITIONS AND ABBREVIATIONS

#### 1.1 DEFINITIONS

The following terms shall, unless the context otherwise requires, have the meanings hereunder assigned to them:

**acceptable, adequate** : acceptable, adequate, satisfactory or suitable in the opinion of the authority having jurisdiction

**Act** : The National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977) as amended.

**addressable system** : a system in which signals from each detector or call point (or both) are individually identified at the control panel.

**analogue** : in the case of an initiating device is one which transmits a signal indicating varying degrees of condition.

**Authority Having Jurisdiction (AHJ)** : for the purposes of this sub-contract, the Authority Having Jurisdiction (AHJ) shall be:  
- Plantech (Pty) Ltd;  
- the relevant Fire Department;  
- South African Bureau of Standards  
as the case may be as determined appropriate by the engineer.

**automatic / manual switch:** means of converting the system from automatic to manual action.

Note: this may be in the form of a manual switch on the control panel or other units, or a personnel door interlock. In all cases, this changes the actuation mode of the system from automatic and manual to manual only or vice versa.

**automatic installation** : installation or part of an installation that, when activated, performs a predetermined function, such as issuing a fire alarm, without manual intervention.

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**Class of Fire** : The letters A, AC, B, BC, ABC and D denoting the class of fire.

## Class A

Fires involving solid combustible (mainly carbonaceous) materials, such as coal, paper, straw, wood, cloth, rubber and many plastics, in which combustion normally takes place with the formation of glowing embers.

## Class AC

Fires involving materials of a type similar to those involved in a Class A fire and occurring in the presence of a live electrical power source such as electric cables, generators, transformers and switchboards.

## Class B

Fires involving flammable liquids such as greases, oils, tars, oil-base paints, lacquers, flammable gases and liquids formed from liquefiable solids.

## Class BC

Fires involving materials of a type similar to those involved in a Class B fire and occurring in the presence of a live electrical power source such as electric cables, generators, transformers and switchboards.

## Class ABC

Fires involving materials of a type similar to those involved in Class A and Class B fires but occurring in the presence of a live electrical power source such as electric cables, generators, transformers and switchboards.

## Class D

Fires involving metals such as magnesium, aluminium, titanium, zirconium, sodium, lithium and potassium, that burn at a high temperature and require a special type of extinguisher and extinguishing medium.

**Note:** The letter C in any combination of letters denotes a fire in the presence of a live electrical power source.

**clearance** : air gap between equipment, including piping and nozzles and unenclosed or insulated live electrical components at other than ground potential

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**competent person** : a person who is a registered person in terms of Section 1 of the Engineering Profession of South Africa Act, 1990 (Act 114 of 1990)

**commissioning** : work necessary to place the installation and work covered by this specification into normal operating condition.

**concealed** : embedded in masonry or other construction, installed in spaces within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.

**condition** : condition of control equipment.

Note : the control equipment may be in the normal condition, the fault condition, the alarm condition, etc.

**conventional** : with regards initiating devices means one which can only indicate an on/off condition.

**design** : the planning of an installation by reasoning and calculation in accordance with generally acceptable engineering and scientific principles, and in accordance with the provisions of a standard.

**design concentration** : Concentration of extinguishant, including a safety factor, required for system design purpose.

**detector** : device that responds automatically to predetermined conditions and is classified in terms of its output.

Note 1 : a detector is part of an automatic fire detection system that contains at least one sensor that constantly or at frequent intervals monitors a suitable physical or chemical phenomenon (or both) associated with fire, and that provides at least one corresponding signal to the control and indicating equipment.

Note 2 : the decision to give the fire alarm or to operate automatic fire protection equipment may be made at the detector or at another part of the system, for example at the control and indicating equipment.

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**engineered system** : System in which the supply of extinguishant stored centrally is discharged through a system of pipe and nozzles in which the size of each section of pipe and nozzle orifice has been calculated in accordance with relevant parts of ISO 14520

Note: The design flow rates from nozzles may vary according to the design requirements of the hazard.

**expellant** : The agent or agents contained in an extinguisher and providing internal pressure to expel the extinguishing medium, the pressure being either stored pressure or obtained by chemical reaction or by the release of auxiliary gas.

**exposed** : Not installed underground or concealed as defined above.

**extinguishant** : Electrically non-conducting gaseous fire extinguishant that does not leave a residue upon evaporation

**extinguishing concentration** : Minimum concentration of extinguishant required to extinguish fire involving particular fuel under define experimental conditions excluding any safety factor.

**exposed** : not installed underground or concealed as defined above.

**extinguishing medium** : The product or products that cause/causes the fire to be extinguished.

**fire load** : the sum of the heat energy values of all combustible materials, including combustible partitions and other exposed combustible elements, contained in a component or a division.

Note: The fire load is expressed either as a timber equivalent (in kilograms per square metre), or as a heat energy value (in mega joules per square metre).

**fill density** : Mass of extinguishant per unit volume of container.

**fire resistance** : the ability of a building element or component to satisfy, for a stated period of time, the appropriate

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criteria specified for stability, integrity and insulation in the presence of fire.

|                                  |                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>flooding quantity</b>         | : Mass of volume of extinguishant required to achieve the design concentration within the protected volume within the specified discharge time.                                                                                                                                                                                                                                            |
| <b>gas cartridge</b>             | : A cylindrical container that fits into or is attached to the extinguisher and that contains either inert, compressed or liquefied gas.                                                                                                                                                                                                                                                   |
| <b>halon</b>                     | : A halogenated hydrocarbon used as an extinguishing medium in the form of a vaporising liquid.                                                                                                                                                                                                                                                                                            |
| <b>hold time</b>                 | : Period of time during which a concentration of extinguishant greater than the fire extinguishing concentration surrounds the hazards.                                                                                                                                                                                                                                                    |
| <b>install</b>                   | : to erect, mount and connect complete with all related accessories.                                                                                                                                                                                                                                                                                                                       |
| <b>liquefied gas</b>             | : Gas or gas mixture (normally a halocarbon) which is liquid at the container pressurization level at room temperature (20°C)                                                                                                                                                                                                                                                              |
| <b>listed</b>                    | : equipment, materials, or services included in a list published by an organisation acceptable to the authority having jurisdiction and concerned with evaluation of products or services whose listing either that the equipment, material or service meets identified standards or has been tested and found suitable for a specified purpose.                                           |
| <b>lock-off device</b>           | : Manual shut-off valve installed into the discharge piping downstream of the agent containers; or another type of device that mechanically prevents agent container actuation.<br><br>Note 1: The action of this device provides an indication of system isolation.<br>Note 2: The intent is to prevent the discharge of agent into the hazard area when the lock-off device is activated |
| <b>LOAEL<br/>(Lowest Observe</b> | : Lowest concentration at which an adverse toxicological or physiological effect has been                                                                                                                                                                                                                                                                                                  |

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**Adverse Effect Level)**

observed.

**manual call point**

: also referred to as a break glass alarm point, shall mean a manually operated device used to initiate an alarm signal.

**maximum concentration**

: Concentration achieved from the actual extinguishant quantity at the maximum ambient temperature in the protected area

**maximum working pressure**

: Equilibrium pressure within a container at the maximum working temperature

**Note 1:** For liquefied gases this is at the maximum fill density and may include super pressurization.

**Note 2:** The equilibrium pressure for a container in transit can differ from that in storage within a building.

**mimic diagram**

: topographic representation of the protected premises and their subdivisions, with indicating devices for each subdivision such that the indications of the fire alarm system can be rapidly related to the layout of the premises.

**monitored wiring**

: wiring in which a failure, whether to open circuit or to short circuit, will result in a fault warning and not a fire alarm.

**NOAEL  
(No Observe Adverse  
Effect Level)**

: Highest concentration at which no adverse toxicological or physiological effect has been observed.

**non-liquefied gas**

: Gas or gas mixture (normally an inert gas), which, under service pressure and allowable service temperature conditions, is always present in the gaseous form.

**normally unoccupied area**

: area not normally occupied by people but which may be entered occasionally for brief periods.

**occupancy class**

: the particular use or the type of use to which a building or portion thereof is normally put or intended to be put.

**operating temperature**

: the temperature at which a component, a fitting or

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an installation functions when in normal use.

**owner of the building** : person having control of the premises, whether as occupier or otherwise, or any person delegated by the person having control of the premises to be responsible for the fire alarm system and the fire procedures.

**pre-engineered systems** : System consisting of a supply of extinguishant of specified capacity coupled to pipework with a balanced nozzle arrangement up to a maximum permitted design.

**Note:** No deviation is permitted from the limits specified by the manufacturer or authority

**protection** : - presence of

- a) one or more detector(s) able to initiate actions needed to ensure the safety of life or property in the event of a fire
- b) mechanical devices to prevent damage to system components from impact, abrasion, rodent attack, etc.

provision of

- a) fire resistance to prevent damage to system components from fire in their vicinity
- b) electrical protection to prevent temporary or permanent disruption of the system owing to over-voltage, excessive current, or high transient or radio-frequency interference (or a combination of these)

**provide** : to supply, install and connect up complete and ready for safe operation.

**Recharging** : The replacement of the extinguishing medium and, when relevant, of the expellant of an extinguisher.

**Reconditioning** : Prescribed measures (see SABS 1475) taken by an approved reconditioning organization at prescribed intervals to restore the extinguisher to full operational readiness, and that include a minor service, or a major service and pressure test, as relevant.

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**search distance** : distance that has to be travelled by a searcher within a zone in order to determine visually the position of a fire.

**sector** : subdivision of the protected premises normally containing several zones

Note: A sector may cover more than one building.

**selector valve** : Valve installed in the discharge piping downstream of the agent containers, to direct the agent to the appropriate hazard enclosure.

Note: It is used where one or more agent containers are arranged to selectively discharge agent to any of several separate hazard enclosures.

**shall** : indicates a mandatory requirement and must be complied with.

**should** : indicates a recommendation or that which is advised but not required.

**similar** : of approved manufacture equal as regards to materials, weight, size and efficiency of performance to product specified by name.

**smoke** : particulate products of combustion generated by fire, whether the fire is of the smouldering or open-flame type

Note: in general the particle diameters range from 1 nm (invisible smoke) to 10 µm (visible smoke).

**supply** : to purchase, procure, acquire and deliver complete with all related accessories.

**smoke alarm** : device that contains within one housing all the components, except possibly the energy source, necessary for detecting fire and giving an audible alarm

**standby supply** : electricity supply, commonly from a rechargeable battery, that is automatically connected to the fire alarm system when the normal supply fails.

**state** : outputs of a detector

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**suitable for use** : equipment or components that are deemed in the opinion of the authority that has jurisdiction to be acceptable within their predetermined tested parameters for a particular application in a system or, in relation to any document issued by such authority, in the opinion of such authority

Note: components that have been tested and approved and bear the mark of one of the following testing authorities will normally be deemed to be suitable for fire detection:

- a) Loss Prevention Council (LPC);
- b) Factory Mutual (FM);
- c) South African Bureau of Standards (SABS);
- d) Underwriters Laboratory (UL); or
- e) British Approvals Service for Electrical Equipment in flammable atmospheres (BESEefa).

**superpressurization** : Addition of a gas to the extinguishant container, where necessary, to achieve the required pressure for proper system operation

**testing** : work and checks necessary to determine qualitative and quantitative performance of equipment, installation and workmanship.

**types of detector** : Detectors classified by the form of their output, as follows:

### Analogue Detector

A detector that gives an output signal representing the value of the sensed phenomenon, for example a truly analogue signal or a digitally coded equivalent of the sensed value. (Note: This detector does not itself make a decision of fire.)

### Aspirating Detector

Detector in which a sample of the atmosphere in the protected space is sucked by a fan or pump into a detector, which may be remote from the protected space.

### Multi-State Detector

Detector that gives one of a limited number (greater than two) of output states relating to normal or fire alarm conditions and other abnormal conditions.

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## Two-State Detector

Detector that gives one of two output states relating to either normal or fire alarm conditions.

## Open-area Smoke Imaging Detection. (OSID)

The beam projected from each Emitter contains a unique sequence of ultraviolet (UV) and infrared (IR) pulses that are synchronised with the Imager and enable the rejection of any unwanted light sources. By using two wavelengths of light to detect particles, the system is able to distinguish between particle sizes. The shorter UV wavelength interacts strongly with both small and large particles while the longer IR wavelength is affected only by larger particles. Dual wavelength path loss measurements therefore enable the detector to provide repeatable smoke obscuration measurements, while rejecting the presence of transient dust particles or solid intruding objects.

- unoccupiable area** : area which cannot be occupied due to dimensional or other physical constraints
- wiring** : conduit, fittings, wiring, junction and outlet boxes, switches, cut-outs and socket outlets and all related items.
- work** : all labour, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation.
- zone** : subdivision of the protected premises such that the occurrence of a fire within it will be indicated by a fire alarm system separate from an indication of fire in any other subdivision

Note : a zone will usually consist of an area protected by several manual call points or detectors (or a combination of these), and is indicated separately to assist in location of the fire, evacuation of the building and fire-fighting.

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## 1.5 ABBREVIATIONS

Abbreviations used in these documents shall mean:

|       |   |                                            |
|-------|---|--------------------------------------------|
| BS    | : | British Standard Specification             |
| BSI   | : | British Standard Institute                 |
| DIN   | : | German Standards Institute                 |
| FDVES | : | Fire Detection & Voice Evacuation System   |
| FDIA  | : | Fire Detection Installers Association      |
| FM    | : | Factory Mutual (American)                  |
| LPC   | : | Loss Prevention Council                    |
| NFPA  | : | National Fire Protection Association (USA) |
| SABS  | : | South African Bureau of Standards          |
| UL    | : | Underwriters Laboratories                  |

## 2 GENERAL/SCOPES OF WORKS

The contract works to be carried out consists of the detailed design, engineering, manufacturing, supply, delivery, offloading, erection, testing and commissioning into service, guarantee and maintenance of a new fire detection system, alarm system, emergency voice evacuation system.

The engineering, quality control and inspections, equipment selection, preparation of shop drawings, testing, commissioning and preparation of operating and maintenance manuals, are to be executed in a systematic manner, once programmed, under the Engineer's general supervision and direction.

Also, the decommissioning and removal of existing fire detection, alarm and emergency voice evacuation systems shall form part of this contract.

## 3 OCCUPATIONAL HEALTH & SAFETY (No 85 OF 1993)

The contractor is to comply in all respects to the Occupational Health & Safety Act (No. 85 of 1993), and to any amendments relating thereto.

Before construction commences, the contractor shall liaise with the employer's appointed health and safety consultant in order that a health and safety plan and specifications are adopted for the project. It shall be incumbent on the contractor to conform to the same.

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#### **4 TEMPORARY SERVICES DURING CONSTRUCTION**

Temporary (construction) electricity and lighting for the Works shall be provided by the Contractor. The Contractor shall connect to the existing electricity supply at approved points and execute the necessary temporary installation.

#### **5 ENGINEER DRAWINGS**

The drawings to be prepared by the Consulting Engineer show general layout of all equipment and distribution systems, complete with schematic arrangements. These, together with the specification, give sufficient information to enable the contractor to estimate the cost and to determine how the system must be installed, tested, inspected, operated, serviced and maintained.

These drawings are not dimensioned shop drawings and cannot be used as shop drawings. Location dimensions shown are only indicative of the routes and zones in which the service must be installed.

Design/selection/construction details and installation arrangements for equipment and/or distribution systems which are available from either the manufacturer/supplier in their officially published literature/documentation, design/application manuals, or other authoritative sources such as SANS, BS, NFPA, etc. shall be used as the basis for shop drawings. The specific source shall be identified at submission stage.

#### **6 SHOP DRAWINGS SUBMISSIONS**

Shop drawings shall indicate all equipment, distribution systems, testing / inspection / instrumentation positions, access requirements and builder's work requirements.

Builder's work requirements shall include all work to be provided by others (holes in concrete and / or masonry walls / floors, etc) as well as the sizes, capacities and positions of service connections.

shop drawings shall be based on the Engineer's design concept shown on the tender drawings, approved equipment selections and samples. The shop drawings shall be checked and passed by the contractor's chief draughtsman and project Engineer/manager. The shop drawings shall be stamped to confirm that co-ordination with architects, structural and other affected Contractor's drawings, has taken place.

Three (3) copies of shop drawings in PDF and DWG (AutoCad) of all parts of the subcontract works shall be submitted to the Engineer for approval within **30 working days of appointment**.

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The contractor may, if he so desires, obtain "electronic / e-mail" copies of the Engineer's drawings for modifications and updating if required. These drawings shall be re-titled in accordance with the contractor's system and shall thereafter be submitted as the sub contractor's shop drawings. **No portion of the sub contractor's works shall be commenced until the shop drawing has been approved by the Engineer.**

**Detail design:** As part of the detail design phase of the project, it is required that the contractor review the Engineer's drawings and make any recommendations to ensure shop drawings are compliant to SANS 10139. The contractor will be responsible for co-signing a SANS 10139 Design certificate as there are various aspects of the design (detection zoning, positioning of loop isolators, device numbering, battery loop calculations etc.) that forms part of the Shop drawing process and which is the responsibility of the contractor.

## 7 DESIGN CALCULATIONS

The successful Contractor shall submit for perusal by the Engineer copies of his detailed design calculations within the time period specified in the specification. These shall include at least the following:

- Loop isolator positions, battery calculations, detection zoning, alarm zoning etc. (all to comply with SANS 10139)

### 7.1 ASPIRATING DETECTION

The installation contractor shall be responsible for the design, supply and commissioning of a fully supervised Aspirating Fire & Smoke Detection System as specified herein and indicated on the relevant drawings.

Where necessary the installation contractor shall employ the services of the relevant supplier to assist with any or all aspects of the system design, supply, commissioning and maintenance to ensure the completed system meets the requirements for the project.

The completed aspirating fire and smoke detection system shall comply fully with all the requirements of:

- (UK) - FIA Code of Practice for Design, Installation, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems – Issue 3 February 2012.
- South African National Standard SANS 10139 - Fire detection and alarm systems for buildings

The proposed sampling system design is generally as described within the FIA Code of Practice for Design, Installation, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems 2012 and as such is defined as:

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- A 'Primary Sampling System' that utilises the airflow created by the air conditioning and ventilation system to carry the sampled air to the sampling point.
- A 'Secondary Sampling System' where the sampling points are sited and spaced as if they are point type smoke detectors.

The installation contractor shall ensure that the proposed air sampling system design for the area(s) to be protected, complies with the recommendations and product approvals, with regard to the maximum number of sample points, maximum lengths of sampling pipes and the maximum area of coverage per sampling point and/or detector.

The sampling pipe network design for each installation must be approved by the fire Engineer. The design details given to the Engineer shall indicate materials of construction, sampling pipe type, size and lengths together with 'Sampling Point' and 'Capillary Sampling Point' hole spacing and size.

Any significant design deviation may alter the operation of the system and therefore any adjustment of the air sampling network design must be approved by the relevant supplier as well as the Engineer.

The installation contractor shall ensure that the aspirating system sampling pipe work configuration is confirmed as acceptable using the applicable supplier's sampling pipe calculation program. The calculation program shall determine the transport times, airflow and balance details for each individual sampling pipe and sampling point.

The maximum 'transport time' must not exceed 120 seconds or 60 seconds (Class A response time) from the furthest sampling point on the pipe work system to the aspirating detector.

Where appropriate the installation contractor shall include within their design / installation sampling pipe 'test points'. These will be installed at the end of each sampling pipe run after the last sampling point. These test points are provided for future system servicing and to test the integrity of the sampling pipe from the furthest point back to the aspirating detector. Test points should be located within accessible and secure areas to prevent tampering by unauthorised personnel. Please note that it is not a requirement for the sampling pipe test point to comply with the maximum transport time of 120 seconds or 60 seconds (Class A response time).

The contractor shall submit a certificate of compliance on his company letterhead stipulating that the system has been installed in accordance with the design and complies with all relevant standards and manufacturers requirements.

## 8 "AS-BUILT" DRAWINGS

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As built" drawings are the shop drawings embodying all modifications made during construction. They shall include floor- and ceiling layout drawings indicating all equipment.

Copies of "as built" drawings shall be submitted to the Engineer for approval in PDF and DWG (AutoCad).

## **9 EQUIPMENT SECTION SUBMISSION**

The contractor shall select equipment which complies with these specifications. These selections shall be submitted to the Engineer for approval.

No equipment shall be installed until the equipment selection submission has been approved by the Engineer if the selected equipment deviates from the design concept and/or deviates from the accepted equipment offered.

## **10 SAMPLE SUBMISSION**

Samples are any samples required by the Engineer. Samples shall be physical examples to illustrate materials, equipment or workmanship, and to establish standards by which the works may be judged. Such samples, after approval, will be retained by the Engineer for a period sufficient to ascertain that the relevant component is actually provided as per such sample, but will then be returned to the contractor for incorporation in the works.

## **11 SUBMISSION PROCEDURES**

Submission for approval will consist of the following activities executed by the contractor and other parties involved:

The contractor shall review, stamp, date and sign to signify his approval and submit in the manner required by the Engineer and with reasonable promptness and in orderly sequence so as to cause no delay in the work, all contractor's drawings, equipment selections and/or samples required by the subcontract documents or subsequently by the Engineer. Contractor's drawings, equipment selections and samples shall be properly identified as specified or as the Engineer may require.

At the time of submission, the contractor shall inform the Engineer in writing of any deviation in the contractor's drawings, equipment selection or samples from the requirements of the subcontract documents.

Each individual equipment selection submission shall be accompanied by a copy of the applicable detailed technical specification. Each clause of this specification shall be marked "complies" or "does not comply", complete with reason stated and countersigned by the contractor's project Engineer/manager.

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The drawings and equipment selections shall be submitted in a number of copies and along the channels agreed.

By submitting drawings, equipment selections and/or samples, the contractor represents that he has determined and verified all site measurements, site instruction criteria, materials, catalogue numbers and similar data, or will do so, and that he has checked and coordinated each contractor's drawing and sample with the requirements of the works and of the subcontract documents.

The Engineer, on behalf of the contractor, will review contractor's drawings, equipment selections and samples with reasonable promptness so as to cause no delay, but only for conformance with the design concept of the subcontract works and with the information given in the subcontract documents. The Engineer's approval of a separate item shall not indicate approval of an assembly in which the item functions.

the contractor shall make any corrections required by the Engineer and shall re-submit the required number of corrected copies of the contractor's drawings, equipment selections or new samples until approved. The contractor shall direct specified attention in writing on resubmitted drawings to revisions other than the corrections required by the Engineer on previous submissions.

## **12 WORK PROVIDED BY OTHERS**

### **12.1 GENERAL**

The following related work to the Detection and Alarm Systems **(DAS)** contract will be provided by others. The Detection and Alarm Systems **(DAS)** Contractor shall be responsible for the detailing, checking and ensuring that the work as listed in the schedules and shown in principle on the drawings is provided as per his detailed builder's work and related services drawings.

Instructions for **DAS** Contractor's exact requirements shall be transmitted to the Contractor timeously in the form of builder's and associated services drawings in accordance with an agreed Contractor's programme. Should these instructions be issued after the completion of the relevant areas, then this work will be carried out at the expense of the **DAS** Contractor.

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## 12.2 ELECTRICIAN AND DAS CONTRACTOR

| Item                                                                                                                                                                                                                                                 | Contract Documents |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|
|                                                                                                                                                                                                                                                      | Electrician        | DAS |
| Provision of single phase 20A<br><br>A power supplies as per plan – must be fed from emergency section in distribution board or a UPS and have its own circuit breaker.                                                                              |                    | X   |
| Supply and installation of conduits, related fittings, elbows and electrical reticulation to all gas control panels, Addressable Control Panels, Beam Detectors and any other detection equipment that would require high voltage electrical supply. |                    | X   |
| Fire detection and alarm system work.                                                                                                                                                                                                                |                    | X   |
| Electrical connections to Distribution Boards and relevant circuit breakers.                                                                                                                                                                         |                    | X   |

## 12.3 HVAC SUBCONTRACTOR AND DAS CONTRACTOR

| Item                                                                                                                       | Contract Documents |     |
|----------------------------------------------------------------------------------------------------------------------------|--------------------|-----|
|                                                                                                                            | HVAC               | DAS |
| Low voltage relay for isolating any fresh air supply units, operating of smoke vents and any other services as per design. |                    | X   |

## 12.4 OTHER SUB-CONTRACTORS AND DAS CONTRACTOR

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| Item                                                            | Contract Documents |     |
|-----------------------------------------------------------------|--------------------|-----|
|                                                                 | Others             | DAS |
| Holes through structure and brickwork – Pressure relief dampers |                    | X   |
| Access routes, holes for equipment                              |                    | X   |
| Maintenance space for equipment                                 |                    | X   |
| Access to shafts                                                |                    | X   |
| Cut openings in plaster board ceiling for devices               |                    | X   |
| Access to outlets and control                                   |                    | X   |

## 13 **COMPLIANCE WITH REGULATIONS AND STANDARDS**

### 13.1 **GENERAL**

The contractor shall comply with all acts of parliament and all regulations and bylaws of local and or other authorities having jurisdiction regarding the execution of the n/s works in particular the following:

- SANS 10142 Code of Practice, as amended, for the Wiring of Premises.
- SANS 10139 Code of Practice, Fire Detection and Alarm Systems for Buildings  
- System Design, Installation and Servicing.

SANS 7240 -16 & 19 Code of Practice, Fire Detection and Alarm Systems for Buildings - System Design, Installation, commissioning and service of sound system for evacuation purposes.

- EN 54 16 Code of Practice.
- National Building Regulations and Building Act (Act 103 of 1977).

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- The contractor is to comply with all requirements of the Occupational Health and Safety Act (Act 85 of 1993) and all subsequent revisions thereof. Further, the contractor undertakes to employ only people who have been duly authorised in terms thereof and who have received sufficient health and safety training to ensure that they can comply therewith. In addition, the Contractor warrants that it shall enforce the terms of this clause on any sub- Contractor employed by the contractor in connection with the contract.
- Government, provincial and local authorities ordinances, regulations, by-laws, rules and other statutory requirements.
- Specifications and codes of practice issued by the South African Bureau of Standards and British Standards Institute. The former shall have precedence over the latter where both bodies have issued conflicting specifications or codes of practice.

### 13.2 AUTOMATIC SYSTEMS

Control and indicating equipment from automatic fire alarm systems shall comply with SANS EN 54 - Part 2.

### 13.3 MANUAL SYSTEM (TYPED M)

Control and indicating equipment from manual fire alarm systems shall comply with SANS EN 54-2 or SANS EN 54-4.

## 14 APPROVALS

The contractor shall, before building starts, submit the following to the consulting Engineer:

- (a) the application for the approval of the design;
- (b) a signed declaration that the installation has been designed in accordance with this specification by a competent person;
- (c) a signed undertaking that the installation will be installed by an approved installer, in accordance with the appropriate plans and drawings, and as specified in this specification and relevant standards.
- (d) appropriate plans, drawings, details and information required in terms of this specification.
- (e) particulars of the power supplies; and
- (f) a statement that the installation will comply with this standard, together with details of any deviation(s), and

The consulting Engineer shall be provided with a summarized schedule that contains all the relevant information relating to the system.

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## 15 PROTECTION AGAINST DAMAGE

Special care shall be taken in transport, delivery, storage on site and installation to ensure that the entire system is in 'as new' condition at start-up.

Packaging material shall be of sufficient strength and/or temporarily reinforced during transport to - and handling on site, until installed in its final position, to ensure that the equipment "packed" retains its structural and dimensional integrity during these phases of the contract.

The contractor shall remain responsible for equipment in 'as new condition' and is not allowed to install equipment in areas or spaces where it can be subjected to damage through weather or trades for which it has not been designed.

## 16 ACCESS TO EQUIPMENT AND SYSTEMS

The contractor shall familiarise himself with the proposed location of the equipment and shall be responsible for ensuring that sufficient access is available on site to allow the largest component parts to be brought into position.

The required unobstructed space shall be left around the equipment for access, maintenance and service of the equipment in accordance with the manufacturer's instructions.

Equipment shall be installed to be readily accessible for testing, operation, maintenance and repair. Minor deviations from drawings may be made to accomplish this, but changes of magnitude or which involve extra costs shall not be made without approval of the Engineer.

## 17 TESTING, COMMISSIONING, OPERATING OF PLANT AND HANDOVER

1. Concurrent with equipment submissions the contractor shall submit full testing and commissioning procedures for each item of equipment.
2. Prior to the pre-start inspection the contractor shall submit and have obtained approval of a fully detailed commissioning programme.  
The programme shall include but may not be limited to the following:
  - checking of earth containing and earth loops impedance to ensure compliance with SANS 10142
  - the alarm devices comply with the requirements,
  - all detectors and manual call points function correctly and initiate the correct operation,
  - any connection to the fire brigade or remote manned centre operates correctly,
  - any radio links have adequate signal strength, and
  - any signals to ancillary equipment are given correctly.

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3. After physical completion of the subcontract works the contractor shall carry out all preliminary tests necessary to satisfy himself that the plant, materials and equipment comply with the provisions of the subcontract and are in a state suitable to satisfy the requirements of the acceptance tests by the Engineer. The preliminary tests shall then be completed satisfactorily before the contractor, through the contractor, requests the Engineer to witness the acceptance tests.
4. The Engineer may request the contractor to replace any portion of the subcontract work which does not conform to the requirements of the subcontract documents.
5. In the event of the installation not conforming to the requirements of the subcontract documents, the employer shall be at liberty to either recover from the contractor or to deduct from the subcontract price all reasonable expenses incurred by himself or his agents attending the repeated test.
6. After physical completion has been reported and all defects made good, "programming" shall take place.
7. Prior to the carrying out of acceptance tests the contractor shall operate the entire system for as long a period as may be required to provide satisfactory performance as specified in this specification and SANS 10139 code of practice at all times for 24 hours a day continuously.

The contractor's operator(s) shall be fully conversant with the plant operation and experienced in running similar installations. The contractor shall train the employer's operator(s) to enable them to be responsible for the capable of operating the plant. Logging of the plant operation (alarm, dirt, etc. History) shall commence once plant has been commissioned and the contractor shall continue logging until the acceptance tests have been carried out and the plant handover.

## **18 GUARANTEE**

The contractor shall guarantee that the systems are installed and commissioned in such a manner that they will function to the true intent and meaning of the sub-contract documents.

## **19 CERTIFICATIONS**

### **19.1 BACKGROUND**

In order to obtain a fire clearance certificate on completion of the project, it will be necessary to prove to the local authority that the systems specified and

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as installed under this contract have been correctly installed and are fully operational.

## **19.2 CERTIFICATION REQUIRED FROM CONTRACTOR**

Upon completion of the installation of an system contained in this document, the contractor shall provide to the Engineer (Plantech) a signed written statement, substantially in form as follows:

*"The undersigned, having installed the Fire Detection and Voice Evacuation System at Armscor Head Office Building, Pretoria confirms that the above-mentioned systems were installed in accordance with the specification, instructions and directions provided to us by the manufacturers."*

In addition, the certificates as prescribed by SANS 10139 Code of Practice must be completed in full with no qualifications or amendments.

## **20 OPERATING AND MAINTENANCE MANUALS**

The contractor shall supply four (4) comprehensively indexed operating and maintenance manuals, bound in loose leaf plastic covers, as well as an identical "soft" cope on CD or flash drive.

The manuals shall be arranged in two parts:

### **20.1 OPERATING AND MAINTENANCE MANUALS**

The contractor shall supply two comprehensively indexed operating and maintenance manuals, bound in loose leaf plastic covers, as well as an identical "soft" cope on CD or flash drive.

The manuals shall be arranged in two parts:

### **20.2 OPERATION MANUAL**

This manual should consist of two parts.

#### Part I - Operation Instruction

Contains information a qualified operator needs

- 1) to start and stop equipment
- 2) to control and monitor the performance of the equipment in normal modes of operation
- 3) to change from one mode of operation to another and
- 4) to operate equipment in emergency situations.

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Operation procedures with proper flow charts for all integrated systems are also required. The system function should be represented pictorially and in writing.

Full trouble analysis procedures shall also be included.

## Part II - Performance Verification Procedures

Contains all the information a qualified operator needs to verify equipment and overall system performance at the. Any design calculations needed for performance verification shall be included in this manual.

## **20.3 MAINTENANCE MANUAL**

This manual should also consist of two parts.

### **20.3.1 Part I – Inventory**

Contains a listing of all systems and pieces of equipment to be maintained as well as all the technical information needed to order spare parts. Manufacturers' catalogues are considered useful adjuncts only.

The full names, addresses and contact details of all suppliers of equipment shall be included.

### **20.3.2 Part II - Maintenance Programme**

Contains the information necessary to perform breakdown, preventative, and predictive maintenance. These programmes include written information regarding when or how often to perform maintenance in the most efficient and economical fashion to satisfy tenant needs.

## **21 ONE YEAR'S MAINTENANCE**

The contractor shall furnish free of charge all maintenance on the entire subcontract works for a period of twelve months after completion of subcontract works. Maintenance shall include systematic examination and adjustment of equipment as set out in the schedules below:

| Description |                                                                              | Daily        | Weekly | Monthly | Three-Monthly | Six- | Annual |
|-------------|------------------------------------------------------------------------------|--------------|--------|---------|---------------|------|--------|
| 1           | Maintained in Accordance to SANS 10139                                       | At All Times |        |         |               |      |        |
| 2           | Clear space of at least 500mm radius below detectors maintained at all times |              |        |         | ✓             |      |        |

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| Description |                                                                                                                                                                                                                                                                                                                                                                                                                  | Daily                        | Weekly | Monthly | Three-Monthly | Six-Monthly | Annual |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------|---------|---------------|-------------|--------|
| 3           | Check that manual call points are accessible and conspicuous                                                                                                                                                                                                                                                                                                                                                     |                              |        |         | ✓             |             |        |
| 4           | Review logbook and automatic alarm log                                                                                                                                                                                                                                                                                                                                                                           |                              |        | ✓       |               |             |        |
| 5           | Repair / reinstate after activation of fire (within 24 hours)                                                                                                                                                                                                                                                                                                                                                    | At All Times                 |        |         |               |             |        |
| 6           | Check that panel is in Normal mode (no faults)                                                                                                                                                                                                                                                                                                                                                                   |                              |        | ✓       |               |             |        |
| 7           | Record any faults in log                                                                                                                                                                                                                                                                                                                                                                                         |                              |        | ✓       |               |             |        |
| 8           | Repair any faults identified                                                                                                                                                                                                                                                                                                                                                                                     | Within 8 Hours of Discovery  |        |         |               |             |        |
| 9           | Test communication with Fire Department                                                                                                                                                                                                                                                                                                                                                                          |                              |        |         | ✓             |             |        |
| 10          | Visual inspection of backup batteries                                                                                                                                                                                                                                                                                                                                                                            |                              |        | ✓       |               |             |        |
| 11          | Full test of backup batteries                                                                                                                                                                                                                                                                                                                                                                                    |                              |        |         | ✓             |             |        |
| 12          | Test each zone of detection system                                                                                                                                                                                                                                                                                                                                                                               |                              |        |         | ✓             |             |        |
| 13          | Test each individual detector                                                                                                                                                                                                                                                                                                                                                                                    |                              |        |         |               |             | ✓      |
| 14          | Visual inspection of cables                                                                                                                                                                                                                                                                                                                                                                                      |                              |        |         |               |             | ✓      |
| 15          | Complete certificate as per SANS 10139 on completion of testing                                                                                                                                                                                                                                                                                                                                                  |                              |        |         |               |             | ✓      |
| 16          | Check the following after a fire: <ul style="list-style-type: none"> <li>o All radioactive detectors are handled as per Occupational Health and Safety Act requirements;</li> <li>o Each detector and break glass unit in fire area is tested;</li> <li>o Visual inspection of all other parts of the system;</li> <li>o Batteries and battery charger; and</li> <li>o Issue certificate as per Annex</li> </ul> | Immediately Following a Fire |        |         |               |             |        |

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| Description |                                                                                                                                                                 | Daily                               | Weekly | Monthly | Three-Monthly | Six- | Annual |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------|---------|---------------|------|--------|
| 17          | After any false alarm check:<br>o Which device caused the false alarm;<br>o If device not faulty, identify cause of device trigger (e.g. Someone smoking, etc.) | Immediately Following a False Alarm |        |         |               |      |        |

The contractor shall in the course of such maintenance or on call during the maintenance period, repair or replace defective parts, and shall use only genuine parts produced by the manufacturer of the original part.

The contractor shall supply all replacement parts, as required at no cost where work is of a routine nature (i.e. not maliciously damaged).

## 22 TRAINING

The contractor will at no additional cost train the staff selected by the client.

The training shall be continued until the contractor is satisfied that the selected staff is capable in the operation and maintenance requirements of the system(s).

## 23 COMPLETION OF SUBCONTRACT WORKS

Completion of the works will occur after the following procedure has been certified by the Engineer as having been carried out in accordance with the specification:

- After the defects are made good and approval of the Engineer is obtained, physical completion has been reported to the Engineer by the contractor and the Engineer has given approval for "start-up".
- "start-up" has taken place.
- Commissioning and testing has taken place as specified and test results have been witnessed (where required), recorded and finally approved by the architect.
- Four copies of Operations and Maintenance Manuals have been received.

## 24 QUALITY

### 24.1 GENERAL

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All aspects of the installation (e.g. setting out, alignment, levels, positions, etc.) must be checked on site and the installation installed correctly within the parameters of the SANS 10139 and EN 54 Codes of Practice.

## 24.2 VISUAL APPEARANCE

The visual appearance of installation is important and the Contractor must ensure that the lines and levels followed by the equipment are correct not only within the tolerances specified but also look aesthetically correct to the satisfaction of the Client and Engineer..

## 24.3 CLAIMS AND CERTIFICATION.

At the end of each month, the Detection contractor will be responsible to provide the Engineer with a claim representing the works performed during the month. The date and format on which this claim is to be provided will be communicate to the successful Contractor after appointment.

That being said, the contractor will ensure that the claims represent the following maximum amounts in terms of percentages, based on the work completed at the time of the claim.

Should at any point the Engineer be of the opinion that the contractor is over claiming, will the Engineer deem the claim to be invalid and will stop certifying any works until the claim has been resolved. If the contractor has any objection to the draw down as stipulated below, it should be brought to the attention of the consulting Engineer as part of the tender submission pack. If not, it will be taken that the contractor is in agreement with the percentages stipulated below.

| Description                                    | % Claimed |
|------------------------------------------------|-----------|
| Shop drawings produced and approved            | 20%       |
| Materials on site in lockable room             | 50%       |
| First fix complete (cabling and containment)   | 75%       |
| Final Fixes installed                          | 85%       |
| System life and Commissioned                   | 95%       |
| Building Tuning Complete and training complete | 98%       |
| Client Acceptance Sign-off                     | 100%      |

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## PART II: GENERAL TECHNICAL SPECIFICATION

### 1. MATERIALS

Only equipment and components specifically designed for the proposed use may be used. To this end, all equipment shall be either listed / approved by an approved testing laboratory / authority. Proof of such compliance shall be provided for each item.

Under normal conditions of use, all materials shall be free from defects, which are liable to cause undue deterioration or failure. Materials shall not shrink, warp or cause mould or odours and shall be resistant to attack by local vermin and destructive pests.

Materials shall be stored in areas allocated by the Employer. Stored materials shall not overload the floor construction beyond design limits.

### 2. COMPATIBILITY

All the components of a fire alarm system shall be mutually compatible.

Compliance of an individual component with any standard or approval does not necessarily guarantee that it will work satisfactorily in conjunction with another component that complies with another standard.

The contractor shall consider the subjects below, and the data provided with each item shall provide the information necessary for the consideration of its compatibility with other items. All specifications and details are to be forwarded to the Engineer for approval.

In relation to a given control and indicating panel, such consideration shall include at least the following:

- a) for all devices:
  - the requirements of the system in order to satisfy electrical safety requirements;
  - any provision for earthing;
  - the earth insulation resistance;
  - the method of adjustment where adjustment is required to ensure compatibility;
  - any preferred method(s) for monitoring line continuity;
  - whether the current taken or delivered has an appreciable reactive component;
  - the characteristics of any signals that pass between components;

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- the ability of the control and indicating equipment to operate in conjunction with the number of devices to which it will be connected;
  - any software provided for programming the system or its components, and the compatibility of other components with the software; and
  - any limitations on the numbers, types, sizes or other parameters (such as impedance) of wires that can be connected.
- b) for fire detectors:
- the form of output;
  - the operating voltage, including tolerances;
  - the quiescent current;
  - the alarm current or maximum permissible alarm current rating;
  - the method of resetting the device after an alarm;
  - the states of the detector that indicate normal conditions, fault conditions and fire conditions;
  - any requirements for indications of operation to be provided in the vicinity of a detector, together with any resultant changes in system conditions, e.g. Reliability or power consumption; and
  - the number of conductors required.
- c) for alarm devices:
- whether polarized connection is required;
  - whether precautions might be required in order to suppress any interference generated by the device;
  - what methods for monitoring the interconnections can be used;
  - whether the power supply arrangements can provide sufficient power;
  - whether a high starting current is required.
- d) for manual call points:
- whether they are of open or closed circuit operation;
  - whether they are of polarized operation;
  - the method of discrimination between alarm and fault conditions;
  - the method of resetting the device after an alarm.
- e) for power supplies:
- the correct voltage for the type of battery used (i.e. Lead-acid or alkaline types);
  - the correct charging characteristics for the type of battery (i.e. Constant current or constant voltage);
  - the relationship between polarity and earth, or whether the potential is earth-free;
  - the current rating in relation to calculated maximum demand;
  - the permissible limits of ripple;

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- the degree of stabilization;
- the formula for power capacity for the system, including the storage capacity of the standby supplies and the required standby duration;
- the permissible range for the supply voltage; and
- whether the standby power supplies are able to provide the necessary current for the specified duration.

### 3 **IDENTIFICATION**

A label shall be provided under each device, detector, relay, controller and panel identifying the equipment controlled and/or performance indication by such items.

The labels shall consist of a non-corroding material with a non-glossy appearance, engraved with black, lettering on a white background.

A battery room or cabinet should be secured against unauthorized admission and should display notices indicating its purpose, the importance of not smoking, and the need to use insulated tools and to remove metallic personal adornment to avoid accidental short-circuits.

In addition to the warning and information labels that should be provided in accordance with SANS 10142, a label should be provided on any isolating protective device that affects the fire alarm system and should read as follows:

*"Warning: this switch also controls the supply to the fire alarm system"*  
*"DO NOT SWITCH OFF"*

### 4 **POWER**

#### 4.1 **GENERAL**

Provision is made for a normal power supply and a standby power supply, each shall be capable of supplying the largest load to be placed on it under normal, fire and fault conditions.

Transition between supplies shall not cause momentary interruptions. Where devices such as fuses are fitted in order to protect power supplies, the operation of a single protective device shall not interrupt both power supplies and cause the system to fail.

The condition of the normal supply shall be indicated by a green pilot light, which lights up when the normal supply is on.

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The largest alarm load is the maximum load imposed by the fire alarm system on a power supply under fire conditions. It will include the power required to operate the sounders, detectors, fault warning devices, the illumination and any ancillary services powered by the fire alarm system etc.

Any power required for a display should be derived from the fire alarm system power supply and should be taken into account when assessing the capacity of the power supply.

The load imposed on the power supply by the simultaneous operation of detectors or manual call point (or both) shall not cause an existing fire alarm to cease. In systems using microprocessors or stored programs, the imposition of the maximum alarm load should not cause incorrect operation.

## 4.2 NORMAL POWER SUPPLY

The normal supply for the fire detection and alarm system shall be derived from the public supply system, transformed or modified as necessary.

## 4.3 STANDBY POWER SUPPLY – SECONDARY BATTERIES

Where secondary batteries with an automatic charger are used they should be of a type that has a life of at least 4 years under the conditions of use likely to be experienced in the fire alarm system. Automotive lead-acid batteries (e.g. the type normally used for starting cars) are not acceptable.

Because the life of the battery frequently depends on its charging conditions, care should be taken that the battery charger satisfies any requirement specified by the battery supplier. Where replacement batteries or battery chargers are used, similar care should be taken to ensure charging compatibility. Replacement cells shall be compatible with the existing cells in both charge and discharge characteristics. The supplier of the system shall specify a method of test that is likely to predict failure of the battery in the interval between routine tests.

The charging rate of the battery shall be such that, having been discharged to its final voltage, the battery can be charged sufficiently to comply with the recommendations after a charging period of 24 hours.

**A battery calculation sheet is to be completed and approved by the Engineer prior to the commencement of installation activities.**

## 5 CIRCUIT DESIGN

### 5.1 GENERAL

**Note:** The tender drawings are intended to show the principle layout of the system. As specified elsewhere in this document, it will be the

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responsibility of the contractor to complete the circuit design in terms of the guidelines provided and the SANS 10139 Code of Practice.

Care should be taken to ensure compatibility of all components that are part of the fire alarm system or connected with it in any way.

Circuits should be so arranged that an indication is given at the control and indicating equipment within 100 seconds of the occurrence of any disconnection, open or short circuit in a cable that would disable one or more detectors or call points (or both), or of a failure of any other interconnection, and this should be done without giving a false alarm.

Even where the wiring of a system is monitored, regular routine testing is important and should be considered during installation.

The contractor shall provide a method of manually testing of circuits.

## 5.2 CIRCUITS THAT CONTAIN FIRE DETECTORS

The wiring arrangement of the system shall be such that:

- a) if separate circuits are used for each zone, a fault or faults on one circuit shall not affect any other circuit,
- b) if any circuit is used for more than one zone, a fault or faults on one circuit shall not affect any other circuit,
- c) if a circuit is used for more than one zone and multiple faults within one fire compartment could remove protection from an area greater than that allowed for a zone, the circuit within that division is suitably protected, and
- d) two simultaneous faults shall not remove protection from an area greater than 10 000 m<sup>2</sup>.

If the system is such that the removal of a detector or call point from the circuit could affect the operation of other detectors or call points

- i. removal of a detector or call point shall cause a 'fault' signal to be generated at the control equipment, indicating the need to replace the missing detector or call point as soon as possible, and
- ii. the operating instructions shall draw the users attention to any adverse effects on the remainder of the system due to the removal of one or more detectors or call points (or a combination of these).

## 5.3 CIRCUITS THAT CONTAIN FIRE ALARM SOUNDERS

If alarm sounders use the same wiring as detectors, no alarm sounder shall be affected by the removal of any detector. Any sounder that is necessary in order to reach the audibility levels recommended shall only be removable by

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the use of a special tool, and removal shall generate a fault warning at the control and indicating equipment.

The wiring of sounder circuits shall be so arranged that, should a short circuit develop in any part of the wiring of sounder circuits during a fire, at least one alarm sounder will continue to sound. This minimum provision shall ensure that a general alarm can be given at the start of a fire and for a significant period thereafter and that, in the event of the fire's burning through a sounder cable, the alarm will be maintained at, at least one point in the building, usually near the control equipment.

## **5.4 RING SYSTEMS**

If devices such as detectors, call points or sounders are connected to control equipment by a ring circuit, then, provided that the devices can receive or send signals in either direction, they will continue to operate even with a single open circuit or high series resistance in the ring. Such faults shall be indicated at the control and indicating equipment within 60 seconds of their occurrence. A simple ring circuit, however, cannot give protection against short-circuit faults and hence such faults have to be indicated, without giving a false fire alarm, within 100 seconds. Where sounders are used on simple ring circuits, the distribution wiring to each sounder circuit should be protected against overload owing to a short circuit by a fuse or similar device.

## **5.5 CIRCUITS PROTECTED AGAINST CABLE FAULTS**

In some ring systems (usually those using computer techniques with addressable devices) short-circuit isolating devices can be provided such that a short circuit will only affect the section between the isolators. The isolators could be independent devices or could be contained within other devices on the circuit. In such a system a single fault, whether to open-circuit or to short-circuit conditions, can affect at most the section of the loop between the nearest isolators. (Other circuit arrangements that have the same general effect are possible). Where the effect of the fault is to reduce to one the number of signal paths to any detector or call point, the control equipment should indicate the fault within 60 seconds of its occurrence and should preferably indicate the position of the fault. It is essential that action be taken to repair such faults since, if a fault is left unprepared, the system has no protection against further faults. However, if, because of redundancy in the circuit design, at least two signal paths to each detector and to each call point remain, it is necessary to ensure the indication of the fault only within 24 hours of its occurrence.

## **5.6 ZONES**

When a signal of fire is given it is vital that there should be no confusion about the zone from which it is received. To facilitate response by people who provide

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assistance, the zone should be small enough for a fire to be located quickly. It is often important that there should be adequate fire separation between the zones; this is particularly so if the initial evacuation procedures in the building usually entail movement from the zone of the fire to one of temporary refuge.

On larger premises in particular, the fire alarm system should therefore be so designed and arranged that it is both fully compatible with the emergency procedures and provides at some central or convenient point, or points, an indication of the zone in which an alarm has originated. In the case of two-stage alarms, clear and unambiguous signals should indicate the emergency procedure to be adopted throughout each zone.

In general the signals used in different zones on the same premises should be the same unless the background noise in one or more zones is such as to require different sounders.

If the system has been installed for purposes of safety of life (type l or m), each zone should be readily accessible from the point(s) where the indication of the location of fire is provided. In general, access to any zone should be by normal circulation routes; however, where small areas of the building are defined as zones for specific purposes (such as the existence of a special risk) it might be permissible for access in the immediate vicinity of that zone to be by another route, for example through another room.

Note: In systems other than addressable systems, signals coming from individual detectors or groups of detectors cannot be separately identified. In these systems, therefore, to allow zone identification, it is usual for each zone to be fed by a separate circuit. It has thus become common for the concepts of 'zones' and 'circuits' to be used interchangeably. In addressable systems, however, several zones (defined as subdivisions of the premises) can be fed from a single circuit while retaining zone identification. It is therefore important that in such systems the concepts of 'zones' and 'circuits' be treated separately.

## 5.7 LOOPS

It shall be possible to connect the following detectors/devices to the control unit addressable loop.

- multisensors – optical / thermal type
- optical smoke sensors – analogue type
- ionization smoke sensors – analogue type
- heat sensors – analogue type
- manual call point "break-glass" units
- open-area smoke imaging detection (OSID)/beam detectors– loop/address interface

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- wireless radio-based analogue multisensors – optical/thermal (with loop interface)
- wireless radio-based analogue sensors – heat type (with loop interface)
- wireless radio – based call points (with loop interface)
- addressable relays i.e. Output devices
- addressable sounders (loop powered)
- sounder circuit controllers
- addressable remote led indicators
- gas discharge control units
- line isolators

Note: Detectors within any area protected by a gaseous suppression system shall be connected to at least two loops.

## **6 CABLES AND CONDUCTORS**

### **6.1 CABLES**

It is essential that connections between detectors or call points and the control equipment should be able to maintain the alarm without a continued signal from the detector or call point, i.e. Destruction of the connection after the initial operation shall not affect the sounding of the alarm.

Where multi-core cable, flexible cable, or flexible cords are used for interconnections in fire alarm circuits, none of the conductors shall be used for circuits other than those of fire alarms.

Electric cables should

- a. be suitable in the opinion of the authority that has jurisdiction for a particular application and comply with approved standards where relevant,
- b. be selected, handled and installed in accordance with SANS 10198-2; SANS 10198-4 and SANS 10198-8,
- c. be protected from direct exposure to fire, and
- d. be appropriately insulated and armoured, be enclosed in appropriate conduit, or be mineral-insulated and copper-sheathed.

Note the following types of cable are normally deemed to be suitable, subject to the restrictions on their use and the recommendations for further protection:

- I. impregnated-paper-insulated metal-sheathed cables that comply with SANS 97;
- II. cables designed for the detection of heat that comply with SANS 529;
- III. polymeric or rubber insulated cables that comply with SANS 1268;

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- wireless radio-based analogue multisensors – optical/thermal (with loop interface)
- wireless radio-based analogue sensors – heat type (with loop interface)
- wireless radio – based call points (with loop interface)
- addressable relays i.e. Output devices
- addressable sounders (loop powered)
- sounder circuit controllers
- addressable remote led indicators
- gas discharge control units
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- b. be selected, handled and installed in accordance with SANS 10198-2; SANS 10198-4 and SANS 10198-8,
- c. be protected from direct exposure to fire, and
- d. be appropriately insulated and armoured, be enclosed in appropriate conduit, or be mineral-insulated and copper-sheathed.

Note the following types of cable are normally deemed to be suitable, subject to the restrictions on their use and the recommendations for further protection:

- I. impregnated-paper-insulated metal-sheathed cables that comply with SANS 97;
- II. cables designed for the detection of heat that comply with SANS 529;
- III. polymeric or rubber insulated cables that comply with SANS 1268;

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- IV. cross-linked polyethylene (XPLE)-insulated electric cables that comply with the requirements of SANS 1339; and
- V. cables with solid dielectric insulation that comply with SANS 1507.

**Note:** FR-20 cable is not considered acceptable.

| Item | Area                                  | Cable Requirements |
|------|---------------------------------------|--------------------|
| 1.   | Block 1 to Block 5 (All floor levels) | PH120              |
| 2.   | Block 7 (All floor levels)            | PH30               |

Cable is to be colour-coded as follows:

- **Red:** Fire detection system;
- **Blue:** Voice evacuation system – loop 1;
- **Green:** Voice evacuation system – loop 2; and
- **Yellow:** Emergency voice communication / fireman's telephone system.

## 6.2 APPLICATIONS

### 6.2.1 General

A wide variety of different cables can be used in various parts of a fire alarm system. However, because of their varying abilities to resist both fire and electrical or mechanical damage, many of these cables might be restricted in their suitability for specific applications. The applications are classified according to the need for fire protection.

#### 6.2.2 Applications in Which Prolonged Operation During A Fire Is Required

Cables used for the interconnection of components of a fire alarm system are required to continue operating after a fire is first discovered (e.g. Sounders, control and indicating equipment and power supplies) unless they are protected against cable failure. Cables used within protected premises for the transmission of the alarm to a remote centre should also be protected against cable failure. In general, it may be assumed that interconnections between sounders, control and indicating equipment and power supplies that can resist fire for at least 0,5 hours will be satisfactory. In special cases, however, longer periods might be required (for example, in buildings with a two-stage alarm system).

#### 6.2.3 Applications in Which Prolonged Operation During A Fire Is Not Required

Cables that are not required to continue operating for appreciable periods after the fire is discovered or after they are attacked by fire will usually be only

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those to detectors or call points but might also include those to ancillary devices (such as door holders), in which case a failure of the cable due to a fire will not lead to a dangerous condition.

#### 6.2.4 Protection from Fire

- i. Applications that do not require prolonged operation during a fire  
Where prolonged operation during a fire is not required, any of the cables listed may be used without additional fire protection.  
Cables designed for the detection of heat, or coaxial cable, may be used for the interconnection of detectors within a zone, provided that the system is such that it gives a fire alarm in response to the occurrence of fire at such a cable.
- ii. Applications requiring prolonged operation during a fire  
Cables that are required to continue operating during exposure to fire should be protected against exposure to the fire by either:
  - a. burial in the structure of the building and protection by the equivalent of at least 12 mm of plaster, or
  - b. separation from any significant fire risk by a wall, partition or floor that will resist a fire for at least 0,5 hours.

Note: the mechanical protection of cables by conduit, ducting or trunking should not be considered as giving protection against fire.
- iii. Reduced protection  
Where possible, cables should be routed through areas of low fire risk. Where cables pass through areas of very low fire risk or where cables are protected by an automatic extinguishing system or sprinkler installation, a reduction in the degree of fire protection recommended might be acceptable following consultation with interested parties.

#### 6.2.5 Protection of Cables From Electrical Or Mechanical Damage

- i. Electrical protection  
Cables designed for the detection of heat should be used within the manufacturer's ratings.
- ii. Mechanical protection  
Some types of cable are not sufficiently robust to withstand the mechanical hazards that they might be exposed to in practice, such as impact, abrasion, or attack by rodents. In order to protect such cables from damage both during and after installation, it will be necessary to provide mechanical protection by installation in conduit, ducting or trunking or by laying the cable in a channel.

Cables should be given mechanical protection when appropriate if

- a. they are not monitored,
- b. they are less than 2,25 m above the floor, or
- c. physical damage or rodent attack is likely.

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The above recommendations for resistance to mechanical damage would be expected to be sufficient for most applications. However, where particularly severe conditions might be experienced (such as impact by forklift trucks), it might be necessary to provide additional protection designed to withstand the expected hazards. Armoured cable should be used where appropriate.

### **6.3 JOINTS**

Unless specifically approved otherwise by the Engineer, all connections shall be made at the devices (so-called loop-in, loop-out arrangement). No other joints shall be allowed.

### **6.4 SEGREGATION OF WIRING**

Conductors that carry fire alarm power or signals should be separated from conductors that are used for other systems. The separation may be by one or more of the following methods:

- a. installation in conduit, ducting, trunking or a channel reserved for fire alarm conductors;
- b. a mechanically strong, rigid and continuous partition of non-combustible material;
- c. mounting at a distance of at least 300 mm from conductors of other systems; or
- d. wiring in mineral-insulated copper-sheathed cable with an insulating sheath or barrier.

If a cable that should be segregated from cables of other services is not enclosed in ducting, trunking or a channel reserved for fire alarm circuits, it should be suitably marked or labelled at intervals not exceeding 2 metres to indicate its function and the need for segregation. Ducting, trunking or a channel reserved for fire alarm circuits should be marked to indicate this reservation. The fire alarm cable should be completely enclosed when the cover of the ducting, trunking or channel is in place, and all covers should be securely fixed.

Segregation of the fire alarm power supply cables need not be applied on the supply side of the isolating protective device. Cables carrying power in excess of extra-low voltage should be separated from other fire alarm cables. In particular, the mains supply cable should not be brought in through the same cable entry as cables carrying extra-low voltage power or signals.

### **6.5 TELECOMMUNICATION CABLES**

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Public telecommunication operator lines used for the transmission of alarms to the fire brigade should be mechanically protected and should be considered as required to give prolonged operation during a fire.

## 6.6 ALTERNATIVE CABLES

Types of cable or cable system other than those described above may be used only if it can be shown that, in the application in which they are to be used

- a. their resistance to heat and fire is suitable for the application,
- b. their resistance to ambient conditions, including resistance to mechanical impact and abrasion, is suitable for the application,
- c. they are not prone to faulty assembly or installation,
- d. their electrical properties under both normal and fault conditions are suitable for the application, and
- e. they are operated within their manufacturers ratings.

Where possible, alternative types of cable should be certified or approved under a recognized certification or approval scheme as satisfactory for their application.

## 6.7 DAMP, CORROSIVE OR UNDERGROUND LOCATIONS

Cables intended for installation in damp, corrosive or underground locations, or in plasters or cements that have corrosive effects on metallic sheathing, should be pvc-sheathed overall. Where the environment can attack pvc, a suitable alternative sheath should be adopted. In some locations further protection might be necessary.

## 6.8 CONDUCTORS

### 6.8.1 General

Conductors should

- a. be suitable in the opinion of the authority that has jurisdiction for a particular application and comply with approved standards, where relevant, and
- b. have an appropriate temperature rating for their intended use.

**Note:** the following are normally deemed to be suitable (depending on the particular application):

- I. heat-resisting wiring cables complying with SANS 529; and
- II. single-core, PVC insulated, annealed copper conductors of 600 V grade in accordance with SANS 1507.

### 6.8.2 Conductor Sizes

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In selecting conductor sizes, physical strength and limitations imposed by voltage drop should be taken into account. Voltage drop in a cable should not be such as to prevent devices from operating within their specification limits, even under minimum supply and maximum load conditions. Consideration should be given to any possible extensions to the system.

Unless otherwise recommended, conductors should be of copper, each with a cross-sectional area of **not less than 1.0mm<sup>2</sup>**.

### 6.8.3 Ambient Temperatures

Care should be taken that the combination of ambient temperature and temperature rise caused by load current does not result in a conductor temperature that exceeds the limit for the insulation.

Subject to any overruling consideration, safety factors and consultation with the relevant authority, the fire alarm system may be so designed that detectors or call points (or both), in addition to giving an alarm and calling the fire brigade, will close or open circuits of ancillary services by means of relays or similar devices.

Note: examples of ancillary services include the

- a. actuation of fixed fire-extinguishing systems,
- b. closing of windows, smoke and fire doors,
- c. control of ventilating systems, and
- d. covering of tanks that contain flammable liquids and controlling their valves to isolate the contents from direct contact with the fire.

Means to temporarily disable an item or items of ancillary equipment for routine servicing or maintenance of that equipment may be provided if it does not affect the operation of the fire alarm system.

If operation of the fire alarm system during servicing or testing can have undesirable effects on ancillary equipment, means should be provided for disabling the automatic operation of the ancillary equipment. The disablement may take the form of a transfer from automatic to manual operation. A visual indication of disablement should be provided.

Power supplies to ancillary services should be such that the power supply to the fire alarm system is not prejudiced. Indications of both the state of ancillary systems and that of ancillary systems that take power only when there is a fire may be operated from the fire alarm supply, but ancillary systems that take power (other than for indicators) in the non-fire state should not be operated from the fire alarm supply. Any additional loads taken by ancillary systems should be taken into account in the calculations of power supply capacity.

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## 6.9 CONDUIT AND TRUNKING

All conduit, trunking, sleeves and associated provisions will be provided by the electrician.

## 7 DEVICES – GENERAL

### 7.1 SYSTEM

#### 7.1.1 Device Address

Each device on line must be uniquely identifiable by the control unit. This must be achieved by pre-setting the address of each device.

Removal of a detector head from its base must extend a fault condition to the control unit.

#### 7.1.2 Device Identification

The identification of each type of address unit and each type of sensor (i.e multi-sensor, ionisation detector, heat detector, sprinkler switch, etc.) must be transmitted to the panel on each polling scan.

#### 7.1.3 Device Status

The condition of each line device, including circuit, calibration and contamination, must be transmitted to the panel on each polling scan.

## 7.2 LOOP DEVICES - GENERAL REQUIREMENTS

Sensors shall have complete electromagnetic and electrostatic protection against externally generated noise and the effects of devices such as fluorescent light fixtures, variable frequency motor controllers, cellular telephones, and electrical surges from other sources. Protection must meet the European directive CE 336/89, and must comply with the following standards:

- a. IEC 801-1 : general surge protection requirements
- b. IEC 801-2 : electrostatic discharge
- c. IEC 801-3 : radiated electro magnetic interference
- d. IEC 801-4 : voltage transients – fast transient bursts
- e. IEC 801-5 : process equipment: surge immunity requirements
- f. in addition, sensors must be fully resistant to RFI interference to a signal strength of 10 V/m over a frequency range of 1mHz to 1000 mHz, and a signal strength of 50 V/m over 50v/m over cellular telephone signal ranges 450-466 mHz, and 890 – 960 mHz.

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An indicator led shall be provided on the detector which illuminates when the detector is in an alarm condition. The indicator shall be operated independently of the detector from the central point panel.

Provision shall be made from an output from the detector suitable for operation of a remote indicator led. The output shall be operated independently of the smoke detector from the central point panel.

The unique address of the detector shall be set by the installer using high integrity sealed dipswitches.

## **8 ADDRESSABLE POINT SENSORS**

Sensors shall have an aesthetically pleasing design and shall be available in black or white (with matching bases) as standard. Painting or spray-painting of sensor exteriors shall not be acceptable.

Sensors shall have complete electromagnetic and electrostatic protection against externally generated noise and the effects of devices such as fluorescent light fixtures, variable frequency motor controllers, cellular telephones, and electrical surges from other sources. All sensors must be CE certified and meet the relevant requirements of the EN61000 standard.

The electronic components must be of the surface-mounted type, and the board assembly must be protected with a conformal coating stable to 100 degrees C. The coating shall be applied to both sides of the board, affording protection against moisture, fungus, and dirt.

The sensor housing shall be manufactured from durable ABS plastic.

Each detector shall incorporate dual LED's which shall allow the detector status to be visible through 360 degrees at ground level. These LED's shall flash GREEN when the detector is healthy every time that it is polled. It shall be possible to disable this flash GREEN on healthy, if required. When a detector is in alarm the LED's shall indicate steady RED.

Sensors must plug into separate mounting bases with a twist-lock action. The bases shall be fitted with corrosion resistant connector springs and terminal screws with captive clamping plates.

All bases shall incorporate a concealed security lock to prevent unauthorised removal or tampering with sensors. It shall be possible to activate the security lock in areas where required. With the security lock activated, it must only be possible to remove a sensor from its base using a special tool.

## **9 LINE ISOLATORS**

It shall be possible to fit loop isolators at a maximum spacing of one per 20 devices. The isolators shall protect against short circuits, and partial short

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circuits, on the loop by isolating that section of the loop where the short circuit occurred, thus maintaining the integrity of the remainder of the system.

## 10 MANUAL CALL POINTS

All manual call points shall include an integral short circuit isolator. Manual call points shall be clearly identifiable and simple to use without the need for instructions regarding their method of operation. The method of operation of all manual call points in an installation shall be identical unless. If necessary, a striker shall be provided adjacent to the call point to facilitate breaking the cover. The delay between operation of a call point and the giving of the general alarm shall therefore not exceed 3 seconds.

Call points shall be fixed at a height of 1.4 metres above the floor, at points as indicated on the drawings. Manual call points shall be sited against a contrasting background to assist in easy recognition. They may be flush mounted in locations where they will be seen readily, but where they will be viewed from the side (e.g. In corridors) they should be surface mounted or semi-recessed in order to present a side-profile area of not less than 750mm.

## 11 INTERFACE WITH OTHER SYSTEMS

The system must be capable of interfacing with other systems via Input / Output units, relays and similar equipment. All relays and equipment beyond the Input / Output units will be provided by others. The systems to be interfaced include:

| System                       | Action                                                                                  |
|------------------------------|-----------------------------------------------------------------------------------------|
| Sprinkler System             | Receive a signal from the sprinkler system flow switch when activated.                  |
| Sprinkler System             | Receive a signal from the monitored valves (3 per Installation Control Valve assembly). |
| Voice Evacuation System      | Initiate voice evacuation procedure.                                                    |
| Lifts                        | To ground the lifts on ground floor.                                                    |
| Stair Ventilation            | To engage pressurisation to stair.                                                      |
| HVAC Fresh Air Supply        | To shut down the fresh air supply.                                                      |
| Windows / Doors / Turnstiles | To open/close                                                                           |

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**Note:** Final connections between the fire detection system and associated equipment to be carried out by the fire detection contractor.

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## PART III: DETAILED SPECIFICATION

### 1 DESCRIPTION OF THE SYSTEM

#### 1.1 THE BUILDING

The project involves the refurbishment of an old office building and associated basement parking level at Armscor Head Office Building, Pretoria

The building is made up of the following occupancy classification in terms of Regulation A20 of the *National Building Regulations and Building Standards Act (Act 103 of 1977)*:

| Class of Occupancy | Occupancy                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| G1                 | <b>Offices</b><br>Occupancy comprising offices, banks, consulting rooms and other similar usage.                                       |
| D4                 | <b>Plant Room</b><br>Occupancy comprising usually unattended mechanical and electrical services necessary for the running of building. |
| J4                 | <b>Parking Garage</b><br>Occupancy used for storing or parking of more than 10 motor vehicles.                                         |

#### 1.2 SCOPE OF CONTRACT

Scopes of works contain detail design, supply, procurement, delivery, erection, testing, commissioning and handover of a complete Fire Detection & Alarm System, Emergency Voice Evacuation System in accordance to SANS 10139, SANS 7240, SANS 10142-1 AND SANS 10400-T operational to the Employer and the guarantee and comprehensive maintenance thereof for a further period of 12 months.

#### 1.3 FIRE PROTECTION BY OTHERS

The following fire protection measures will be provided by others:

- Automatic sprinkler system;
- Hand-held fire equipment, including hydrants, hose reels and fire extinguishers;
- Passive fire protection measures including emergency escape provision, statutory emergency signage, etc.

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### 1.3.1 Classification of System

The fire alarm system shall comply with the requirements for a "L1" type system (with type "M" system included) as defined by SANS 10139 Code of Practice summarised below:

- **Type L1** : systems installed throughout all areas of the building except the following areas;
  - Toilets
  - Toilet Lobbies
  - Any room or cabinet smaller than 1m<sup>2</sup>
  - Ceiling voids smaller than 800mm in depth
- **Type M** : manual alarm system.

## 2 CONTROL PANEL

### 2.1 PANEL DESCRIPTION

The fire alarm panel shall be a 24 volt **analogue addressable unit**, designed to communicate with the sensors and field devices. **The fire alarm panel must be capable to be networked with other fire alarms panels in the facility.** It shall be a microprocessor based unit and shall incorporate all hardware and software to enable it to make decisions based upon information received from sensors, and operate appropriate outputs to initiate required alarms and signals.

The panel shall comply fully with standard EN54: Part 2.

The control unit shall continuously monitor the analogue status of all sensing devices, and initiate action when a fire or smoke condition is present.

The alarm management shall be field configurable from the control panel via a keypad to enable the system to be tailored to suite the protected building, and to permit future changes. This configuration shall be maintained under power failure conditions.

The control unit shall have a front panel comprising of indicating LED's, control keyboard, and LCD display, as described in detail later.

The system will comprise **11** panel having **four** loops. The zones must be fully field programmable to permit sensors to be allocated to any zone. The zoning must be manually configured on system start-up, or on request by an authorised operator.

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The panel must provide facilities for the operator to inspect the zoning configuration, and inhibit, or activate devices. Facilities must be provided for identifying all active and inhibited addressed, and all connected device types.

**Note:** While this specification is based on the preferred **Protec 6500 4 Loop Stand Alone Fire Panel**, there is nothing preventing the Contractor from offering equipment which performs equal to or better than the equipment specified.

## 2.2 NETWORKING

It shall be possible to network multiple panels, each panel shall consist of a network card and shall be a Class A redundant network as per the latest revision of SANS 10139

## 2.3 PANEL OPERATION

Four levels of access into the system menu via the keypad are to be provided.

These are to be as follows:

- Level 1 : Operating (no access code required)
- Level 2 : Maintenance Technician (access code required)
- Level 3 : Commissioning (access code plus key)
- Level 4 : Access Code Changes (access code plus key)

Facilities for "locking-off" controls are to be provided.

The panel is to incorporate a keyboard and push-button with the following functions:

Facilities for "locking-off" controls are to be provided.

The panel is to incorporate a keyboard and push-button with the following functions:

- numeric keyboard
- system reset button
- alarm accept button/silence alarm button
- alarm sound button
- panel buzzer "mute" button
- lamp test function
- control buttons as required for system operation
- menu functions for maintenance and commissioning

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## 2.4 POLLING

The system is to incorporate a polling system which polls each sensors individually and reads information at regular intervals to the control unit. The idle value shall be continuously updated in order to compensate for ageing and atmospheric conditions. The panel shall make decisions based upon the number of devices attached to the loop.

All communication shall be under the control of the panel, which shall sequentially poll each device in turn and authorise communication. No device shall communicate with the control panel without authority.

The control panel must be able to read information from a device or send instructions to a device.

The panel shall monitor each device on every scan, and give a fault signal for any of the following conditions, within 30 seconds:

- a) detector removed
- b) address unit removed
- c) incorrect device type
- d) faulty calibration or sensitivity

## 2.5 CALIBRATION

The system must check the calibration of each analogue line device and record changes caused by environmental contamination.

When maximum calibration adjustment is reached the panel must indicate a "maintenance" signal. This must be a dedicated signal, and must be separate from the pre-alarm" signal.

The build-up of dirt or similar contamination on the optical surface will cause the output signal from the detector to gradually change. The control panel shall be capable of monitoring this slow change in signal and at a predetermined level indicate that the detector is in need of servicing.

## 2.6 PANEL DISPLAY

All display and indicators shall be LCD for text, and LED for lamp indication. The type, calibration, sensitivity and status of each device must be able to be displayed at the control panel.

The control panel shall be able to physically identify the zone in which each sensor or device address resides, and shall give a "configuration-fault" signal if a sensor or device address is located in the incorrect zone.

Fire indication shall be by zone, displayed on LED indicators, and on the LCD text display.

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Fault, maintenance, pre-alarm, and device/zone disabled signals shall be indicated visually by LCD text display, and audibly, in the control unit.

The top portion of the LCD text display shall always show the first alarm received. The lower portion of the LCD text display shall show the last alarm received. It must be possible to manually scroll through all alarms on the lower portion of the screen, using "up" and "down" scroll buttons.

The display must show the total number of alarm events currently in the system.

Fire alarm shall take priority when displaying. However, it must be possible to view all events currently in the system, displayed devices, and other events.

It shall be possible to view the devices, by address, that initiated the alarm on the LCD text display, on manual request. When viewing the device, a 40 character location message specific to each device shall be displayed.

The visual indications must be arranged so that the different warnings are clearly distinguished. (i.e. amber for fault, red for alarm).

The internal audible signal device may be the same for all alarms, but either tone variation or time switching shall be used to differentiate the signals.

Outputs shall be provided for audible alarms, control functions, remote mimics and connection for computers and printers.

The LCD text display must be able to simultaneously display a minimum of the following information in each display mode.

One display mode:

- type of alarm
- 2 zones (first and last)
- alarm count
- total number of alarms
- 40 character zone location message for each zone
- time and date

Device display mode:

- type of alarm
- 2 zones (first and last)
- alarm count
- total number of alarms
- 40 character zone location message for each zone
- time and date

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Device display mode:

- loop number, zone number, detector address
- alarm count
- detector in alarm
- alarm type
- active or accepted
- time and date

The LCD must be at least a 160-character display.

## 2.7 SOFTWARE ALGORITHMS

The data from which sensor must be evaluated by intelligent software algorithms to identify the presence of fire or smoke, and any possible faults present.

The system must support a number of software different algorithms, each tailored to suit the profile of a different hazard or protected area. These algorithms must be specifically matched to provide the optimum protection for each type of area. It must be possible to allocate selected algorithms independently to each sensor in the system. In addition, different algorithms must be automatically allocated to the same sensor at different times.

It must be possible to customise algorithms to take into account special conditions that may exist in certain specific hazards. This customisation should incorporate the features below.

Alarm sensitivity relative to each analogue detector is to be individually adjustable, device by device, by the control panel. Not less than four levels of sensitivity adjustment are required for each device, as follows:

|                 |     |            |
|-----------------|-----|------------|
| - smoke sensors | (1) | 1.5%/m obs |
|                 | (2) | 2.5%/m obs |
|                 | (3) | 3.5%/m obs |
|                 | (4) | 5.0%/m obs |
| - heat sensors  | (1) | 42 °C      |
|                 | (2) | 58 °C      |
|                 | (3) | 70 °C      |
|                 | (4) | 82 °C      |

## 2.8 ALARMS

There shall be no limit to the number of devices which may be in alarm simultaneously.

Every analogue detector must have the facility for verifying the validity of an alarm signal over a 20 second period, before initiating an alarm. This alarm

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verification function must be able to be enable or disable, on a device by device basis, from the control panel.

## **2.8.1 Alarm Outputs**

The panel must incorporate two monitored audible alarm outputs for the switching-on of bells of electronic sounders.

These outputs must be continuously monitored for open and short circuit. Each output must be rated at 0.75 A at 24V dc.

It shall be possible to independently display either of the alarm bell output by means of a control push button.

A test facility shall be provided in order to test each of the alarm bell out outputs. When the test is initiated the selected alarm bell will operate intermittently.

Both the alarm bells will have a delay facility which is selected by controls on the front panel. Manual call points will override this delay.

## **2.8.2 Alarm Contacts**

One voltage free change-over contact must be provided. This must operate on a "fire" condition, and is to remain "on" until the system is reset.

The contacts are to be rated 2 A at 24 V dc.

## **2.8.3 Double-Knock (Coincidence) Operation**

It shall be possible to programme any of the control outputs or addressable relays to operate upon an alarm from any two sensors in the programmed group.

## **2.8.4 Silencing Operation**

It shall be possible to programme any of the control outputs or addressable relays to operate in either "silencing" mode or "non-silencing" mode.

In "silencing" mode the relay or outputs shall de-activate when the "alarm accept" button is pressed, or when the "reset" button is pressed, or when the "reset" button is pressed.

In "non-silencing" mode, the relay or output shall be de-activated only when the "reset" button is pressed.

## **2.9 ACTIVATION DELAY**

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It shall be possible to programme any of the control outputs or addressable relays to activate after a delay period from receipt of the control signal.

This delay shall be 0-16 minutes, in one second increments.

## **2.10 DISCRIMINATION**

The alarm sound shall be distinct from background noise or any other sounders likely to be heard, and in particular should be distinct from the audible fault warning signal given in the control panel. All fire alarm sounders (including high powered sounders) within a building should have similar sound characteristics.

If appointed Contractor cannot obtain high powered sounders with the same characteristics as normal the sounder/strobes, then only the sounder/strobes should be installed as indicated in the construction drawing.

## **2.11 INTERFACING TO DETECTION SYSTEM**

Sounder/strobes shall normally be loop powered and comply with the abovementioned specifications. Where high volume, high powered sounder/strobes are specified, these devices shall be complete with power supply, relay unit for activating the sounder/strobe and shall be red in colour.

## **2.12 SOFTWARE CONTROL**

All the above functions, shall be under software control, and programmed through the panels keyboards or by means of a computer.

It must be possible, as an option, to programme the panel off-line on a computer, and download the programme into the panel.

It must be possible to save the programme to disk for future reference.

## **2.13 REMOTE PANEL OUTPUTS**

An optional serial port shall be provided for connecting to remote panels and computers.

The remote units must have the following display and controls:

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Remote 160 character LCD text display which repeats all events being displayed on the panel display.

- numeric keyboard
- system reset button
- alarm accept button/silence alarm button
- alarm sound button
- panel buzzer "mute" button
- lamp test function
- "help" button
- control buttons as required for system operation
- menu functions for maintenance and commissioning

## 2.14 PROCESSOR MONITORING

The panel must be provided with fault tolerance enabling monitoring and resetting of the microprocessor in the event of microprocessor failure. For diagnostic purposes, a counter must allow the viewing of the incidents that the processor has been reset by the system. This information must be stored in non-volatile memory, enabling it to be viewed even if the panel has been turned off. The counter must only be able to be reset by an authorised Engineer, under a level 3 access code.

The microprocessor must perform full diagnostic tests on all memory devices on start-up, as follows:

|                              |                              |
|------------------------------|------------------------------|
| RAM Test                     | (running data)               |
| EPROM Checksum Verification  | (programme storage)          |
| EEPROM Checksum Verification | (site configuration storage) |

Should any test fail an audible and visual fault indication must be given, and the LCD display must indicate the nature of the fault.

The control unit shall perform periodic checksum tests, at intervals not exceeding 60 minutes, on the RAM, EPROM, EEPROM memories, and give an audible, visual, and LCD text fault indication in the event of a discrepancy.

It must be possible to view the original and current checksums for all memories on the panel LCD display, as a maintenance (Level 2) function.

in the event of a fault condition where the processor will not restart within 20 seconds, the panel must give an audible and visual alarm indication.

## 2.15 SYSTEM MAINTENANCE

The control panel shall keep statistics for each of the system sensors. These statistics shall be able to be displayed on demand by a level 2 operator.

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The following statistics shall be displayed:

- maximum value attained by the sensor as well as the date and time.
- the minimum value attained by the sensor as well as the data and time.
- the average idle value attained by the sensor.
- communication error rate

It shall be possible to put up to 1 Zone (20 detectors) in soak test mode. Sensors in soak test mode will log their conditions in the vent buffer without raising fire alarms. It shall be possible to display or printout the result of the soak-test.

### **3 DETECTOR BASES**

Sensors must plug into separate mounting bases with a twist-lock action. The bases shall be fitted with corrosion resistant connector springs and terminal screws with captive clamping plates.

All bases shall incorporate a concealed security lock to prevent unauthorised removal of tampering with sensors. It shall be possible to activate the security lock in areas where required. With the security lock activated, it must only be possible to remove a sensor from its base using a special tool.

There shall be a facility on the base for attaching a label indicating the address of that detector. A similar facility shall be available on the detector, enabling the fitting of a label indicating its address. When the detector is fitted to its base, both the detector and base address labels shall be visible, and aligned adjacent to each other.

### **4 REPEATER PANELS**

Repeaters shall be available for monitoring the status of the fire panel from another location, like a gate house or entrance of a building. One type of repeater panel shall be available:

- Network Repeater that can be connected to a network of control panels to view multiple panels

It shall be possible to connect the network repeater using the following:

- Dual serial RS422 connection with copper cable.
- Dual TCP-IP connection. The TCP-IP network card shall ideally have on-board Wi-Fi and Bluetooth technology to enhance connectivity.
- Dual fibre-optic connection. The fibre-optic network card shall support both single mode and multi-mode fibre-optic cable.

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The above cards shall be from the same manufacturer as the control panels and repeaters and shall form an integral part of the panel and repeater when installed. Third party type converters shall not be acceptable.

**All panel networking and repeater connections shall be as per manufacturers' recommendations.**

## 5 ANALOGUE ADDRESSABLE DETECTORS

### 5.1 HIGH SENSITIVITY 'OPTICAL' SMOKE DETECTION

High sensitivity LED Optical '**Scatter Chamber Detectors**' (SCD's) shall be provided within the **Pro-Point Plus** detector to each of the connected sampling ports, providing high sensitivity smoke detection per pipe. Each SCD smoke sensor shall identify the visible smoke particles generated as material over-heats.

The optical measurement scale is %obscurtion per meter (%obs/m) and provides the 'Smoke' detection element of the **Pro-Point Plus** detector.

#### 5.1.1 Submittals

Product data and site drawings shall be submitted and shall include pipe layout, operational calculations and performance criteria.

A copy of the manufacturer's installation, operation and maintenance manuals shall be supplied upon completion of the installation.

System commissioning data shall be supplied (in a format recommended by the manufacturer and per the instructions provided by the manufacturer) within 30 days of completion of the installation.

#### 5.1.2 Quality Assurance

##### Qualifications

##### Manufacturer

- The manufacturer shall have a minimum of 15 years production experience in the manufacture and design of high sensitivity air sampling smoke detection systems.
- The manufacturer shall be certified as meeting ISO 9001:2008 for manufacturing.

##### Technology

The Laser Detection Chamber shall be of the mass Light Scattering type and capable of detecting a wide range of smoke particle types of varying size.

A smoke-hours method shall be used for the purpose of monitoring contamination of the filter (dust & dirt etc.) to automatically notify when maintenance is required.

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The Laser Detection Chamber shall incorporate a separate secondary clean air feed from the filter; providing clean air barriers across critical detector optics to eliminate internal detector contamination.

The detector shall not use adaptive algorithms to adjust the sensitivity from that set during commissioning. A learning tool shall be provided to ensure the best selection of appropriate alarm thresholds during the commissioning process.

#### Equipment Supplier

The equipment supplier shall be authorized and trained by the manufacturer to calculate/design, install, test and maintain the air sampling system and shall be able to produce a certificate stating such on request.

### **5.1.3 Detector Assembly**

The Detector, Filter, Aspirator and Relay Outputs shall be housed in a mounting box and shall be arranged in such a way that air is drawn from the fire risk area and a sample passed through the Dual Stage Filter and Detector by the Aspirator.

The Detector shall be laser-based type and shall have an obscuration sensitivity range of 0.0025-20% obs/m.

The Detector shall have four independent field programmable smoke alarm thresholds across its sensitivity range with adjustable time delays for each threshold between 0-60 seconds.

The detector shall also incorporate the facility to transmit a fault either via a relay.

The detector shall have a single pipe inlet that must contain an ultrasonic flow sensor. High flow fault (urgent and non-urgent) and low flow fault (urgent and non-urgent) can be reported.

The filter must be a two-stage disposable filter cartridge. The first stage shall be capable of filtering particles in excess of 20 microns from the air sample. The second stage shall be ultra-fine, removing more than 99% of contaminant particles of 0.3 microns or larger, to provide a clean air barrier around the detector's optics to prevent contamination and increase service life.

The aspirator shall be a purpose-designed aspirator assembly.

When using pre-engineered sampling pipe networks shall be capable of supporting combined sampling pipe length up to 100m with a transport time per applicable local codes. Custom sampling pipe network designs shall be supported using calculation software.

The assembly must contain relays for basic alarm and fault conditions. The relays shall be software programmable (latching or non-latching). The relays must be rated at 1A at 30 VDC.

The assembly shall have built-in event and smoke logging. It shall have separate event log storage for smoke levels, alarm conditions, operator actions and faults.

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The date and time of each event shall be recorded. Each detector (zone) shall be capable of storing up to 128 events on a First In First out (FIFO) basis.

#### 5.1.4 Displays

- The detector will be provided with LED indicators and Touchscreen display.
- Each Detector shall provide the following features at a minimum:
  - Alert, Action, Fire 1 and Fire 2 corresponding to the alarm thresholds of the detector.
  - Circular Smoke Dial display to represent the level of smoke present in protected area.
  - Fault indicator.
  - Power indicator.
  - Disabled indicator.
  - Buttons supporting the following features shall be accessible to authorized personnel:
    - Reset – (press and release) un-latches all latched alarm and faults.
    - Disable – (press and release) disables the fire relay outputs from actuating and indicates a fault.
    - Test – (press and release) simulates a Fire 1 condition.

#### 5.1.5 Digital Communication Port

- An RS485 compatible serial port will be provided on the detector for configuration, status monitoring, command input, event log extraction and software upgrades. It shall comply with EIA RS485 Protocol.
- The unit shall support an Open Detector Control Protocol (ODCP) for connection to 3<sup>rd</sup> party embedded devices. The ODCP shall provide the following:
  - Alarm Status for all VLF alarm levels
  - Current smoke level
  - Current flow level (% flow and litres/min)
  - Detector state (Running, Disable & Standby)
  - Fault Status
  - Remaining Days for Filter Life
  - Smoke Threshold levels

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- Detector's product ID (serial number)
- Reset
- Disable
- Standby
- Normalise

## 5.1.6 Application

### Detection Alarm Levels

The standard laser based air sampling detection system is supplied with two alarm relay outputs (Alert and Fire 1). For four-relay alarm levels use the optional relay interface card.

The standard alarm outputs may be used as follows:

- Alert (Alarm Level 1)

Activate a visual and audible alarm in the fire risk area.

- Action (Alarm Level 2)

Activates the electrical/electronic equipment shutdown relay and activates visual and audible alarms in the Security Office or other appropriate location.

The additional alarm outputs, with the optional relay interface card may be used as follows:

- Fire 1 (Alarm Level 3)

Activate an alarm condition in the Fire Alarm Control Panel to call the Fire Brigade and activate all warning systems.

- Fire 2 (Alarm Level 4)

Activate a suppression system and / or other suitable countermeasures (e.g. evacuation action or shutdown of systems).

## 5.1.7 Initial Detection Alarm Settings

Initial settings for the alarm levels shall be determined by the requirements of the fire zone. Default settings of the unit shall be:

- |                          |                              |
|--------------------------|------------------------------|
| • Alarm Level 1 (Alert)  | 0.08% obs/m (0.0025% obs/ft) |
| • Alarm Level 2 (Action) | 0.14% obs/m (0.0448% obs/ft) |
| • Alarm Level 3 (Fire 1) | 0.20% obs/m (0.0625% obs/ft) |
| • Alarm Level 4 (Fire 2) | 2.0% obs/m (0.625% obs/ft)   |

### Initial (Factory Default) Alarm Delay Thresholds

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Initial (factory default) settings for the alarm delay threshold shall be:

- Alarm Level 1 (Alert) 10 seconds
- Alarm Level 2 (Action) 10 seconds
- Alarm Level 3 (Fire 1) 10 seconds
- Alarm Level 4 (Fire 2) 10 seconds
- Fault Alarm 5 seconds

## 5.1.8 Fault Alarms

The Detector Fault relay shall be connected to the appropriate alarm zone on the Fire Alarm Control Panel (FACP) in such a way that a Detector Fault would register a fault condition on the FACP. The fault relay shall also be connected to the appropriate control system.

## 5.1.9 Power Supply And Batteries

The system shall be powered from a regulated supply of nominally 24V DC. The battery charger and battery shall comply with the relevant Codes, Standards or Regulations. Typically 24 hours standby battery backup is required followed by 30 minutes in an alarm condition in accordance with EN 54: Part 4.

## 5.1.10 Sampling Pipe Design

### Sampling Pipe

The installation contractor shall ensure that the proposed air sampling system design for the area(s) to be protected, complies with the recommendations and product approvals, with regard to the maximum number of sample points, maximum lengths of sampling pipes and the maximum area of coverage per sampling point and / or detector.

The sampling pipe network design for each installation must be approved by the Engineer. The design details given to the aspirating system designer shall indicate materials of construction, sampling pipe type, size and lengths together with 'Sampling Point' and 'Capillary Sampling Point' hole spacing and size.

Any significant design deviation may alter the operation of the system and therefore any adjustment of the air sampling network design must be approved by the fire Engineer.

The installation contractor shall ensure that the aspirating system sampling pipe work configuration is confirmed as acceptable using the applicable sampling pipe calculation program. The calculation program shall determine the transport

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times, airflow and balance details for each individual sampling pipe and sampling point.

The maximum 'transport time' must not exceed 120 seconds or 60 seconds (Class A response time) from the furthest sampling point on the pipe work system to the aspirating detector.

Where appropriate the installation contractor shall include within their design / installation sampling pipe 'test points'. These will be installed at the end of each sampling pipe run after the last sampling point. These test points are provided for future system servicing and to test the integrity of the sampling pipe from the furthest point back to the aspirating detector. Test points should be located within accessible and secure areas to prevent tampering by unauthorised personnel. Please note that it is not a requirement for the sampling pipe test point to comply with the maximum transport time of 120 seconds or 60 seconds (Class A response time).

The sampling pipe shall be smooth bore. Normally, pipe with an outside diameter (OD) of 25mm and internal diameter (ID) of 21mm shall be used.

The pipe material should be suitable for the environment in which it is installed, or should be the material as required by the specifying body (UL 1887 Plenum rated CPVC).

All joints in the sampling pipe must be air tight and made by using solvent cement, except at entry to the detector.

The pipe shall be identified as Air Sampling / Aspirating Smoke Detector Pipe (or similar wording) along its entire length at regular intervals not exceeding the manufacturer's recommendation or that of local codes and standards.

All pipes should be supported at not less than 1.5m centres, or that of the local codes or standards.

The far end of each trunk or branch pipe shall be fitted with an end-cap and made air-tight by using solvent cement. Use of an end-cap will be dependent on detailed calculations.

All sampling pipes shall be red in colour.

### **5.1.11 Sampling Holes**

Sampling holes shall not be separated by more than the maximum distance allowed for conventional point detectors as specified in the local codes and standards. Intervals may vary according to calculations.

Each sampling point port shall be identified.

Consideration shall be given to the manufacturer's recommendations and standards in relation to the number of sampling points and the distance of the sampling points from the ceiling or roof structure and forced ventilation systems.

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Sample port size shall be as specified by detailed calculations.

## 5.1.12 Installation

### The Detection system

The contractor shall install the system in accordance with the manufacturer's System Design Manual.

### The Capillary Sampling Network

Where false ceilings are installed, the sampling pipe shall be installed above the ceiling, and Capillary Sampling Points shall be installed on the ceiling and connected by means of a capillary tube.

The typical internal diameter of the capillary tube shall be 5mm, the maximum length of the capillary tube shall be 8m unless the manufacturer in consultation with the Engineer have specified otherwise.

The Capillary tube shall terminate at a Ceiling Sampling Point specifically designed and approved by the manufacturer. The performance characteristics of the Sampling Points shall be taken into account during the system design.

### Air Sampling Pipe Network Calculations

For specific performance requirements that fall outside the pre-engineered designs, a sampling pipe aspiration-modelling program shall provide air sampling pipe network calculations. Pipe calculations shall be supplied with the proposed pipe layout design to indicate the following performance criteria:

- **Transport Time**

Wherever possible the transport time (i.e. the time taken by smoke sampled to reach the detector) for the least favourable sampling point shall be less than 60 seconds for open hole sampling and less than 90 seconds for capillary tubes.

- **Balance %**

The sample point balance for the pipe shall not be less than 70%. That is, the volume of air drawn from the last sampling point shall not be less than 70% of the average volume of air through the other holes.

## 5.1.13 Commissioning Tests

The contractor shall allow for the manufacturer's representative to attend commissioning of the entire installation in the presence of the owner and/or its representative.

All necessary instrumentation, equipment, materials and labour shall be provided by the Contractor.

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The Contractor shall record all tests and system calibrations and a copy of these results shall be retained on site in the System Log Book.

A wire burn test would be required during the commissioning and handing-over of the HSSD systems and should be demonstrated to the Engineer and client.

### **System Checks**

Visually check all pipes to ensure that all joints, fittings, bends, sampling points, etc., comply with the Specification.

Check the system to ensure the following features are operational and programmed in accordance with the specification.

- Alarm threshold levels (for both day and night settings),
- Detector address,
- Time and date,
- Time delays,
- Air flow fault thresholds,
- External buttons operable (Reset / Disable / Test / Instant Fault Finder, AutoLearn Smoke and AutoLearn Flow),
- Referencing (if VESDAnet card is used)
- Units set to U.S./S.I. (for US only) or metric for other regions

Check to ensure that all ancillary warning devices operate as specified.

Check interconnection with Fire Alarm Control Panel to ensure correct operation.

Set smoke thresholds

## **5.2 POINT-TYPE OPTICAL SMOKE DETECTORS**

Optical smoke sensors must comply with standard EN 54.

Optical smoke sensors will be suitable for detecting invisible products of combustion as well as visible smoke and be of the dual chamber source type to provide good stability in changing environmental conditions.

The detector shall be capable of operating within the following environmental limits:

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| Description                 | Value                                    |
|-----------------------------|------------------------------------------|
| Temperature operating range | -20°C to +60°C                           |
| Humidity operating range    | 0% to 95% RH<br>(excluding condensation) |
| Wind                        | Up to 10 m/s                             |

The detector shall be capable of protecting an area up to 100m<sup>2</sup> at a height of up to 12m. The installation and siting of the sensors must conform to the latest revision of SANS 10139

### 5.2.1 Key features

- Optical technology - responds quickly to slow smouldering fires
- CE marked
- Designed for use with the Firewatch single and two loop fire alarm panels
- Self- extinguishing white polycarbonate case
- Unaffected by wind or atmospheric pressure
- Supply voltage: 17 to 28 Volts dc
- Operating temperature: -20°C to +60°C
- IP23D rating

### 5.2.2 Approvals / Certifications

- Certified to EN54 – 7 by the LPCB
- Loss Prevention Certification Board (LPCB) and VdS approved.

## 5.3 ANALOGUE ADDRESSABLE HEAT DETECTORS

Heat sensors shall comply with standard EN 54-5 (1996).

The heat detector shall be electronic in operation and shall monitor ambient temperature by means of a NTC thermistor.

The detector shall be capable of operating within the following environmental limits.

| Description                 | Value                                    |
|-----------------------------|------------------------------------------|
| Temperature operating range | -20°C to +60°C.                          |
| Humidity operating range    | 0% to 95% RH<br>(excluding condensation) |
| Wind                        | Not affected                             |

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Each detector shall be suitable for protecting an area up to 50m<sup>2</sup> at a height of up to 7.5m. The installation and siting of the sensors shall be carried out on accordance with SABS 0139.

## 5.4 OEPN AREA SMOKE IMAGING DETECTORS (OSID ONLY)

Open Area Smoke Imaging Detectors (OSID) are to comply with EN 54 and meet the following performance criteria:

| Description             | Value                                                   |
|-------------------------|---------------------------------------------------------|
| Maximum detection range | Up to 150 meters                                        |
| Status LEDs             | Fire, trouble and power                                 |
| Interrogation           | Dust and intrusive solid-object rejection               |
| Alignment               | Easy alignment with large adjustment and viewing angles |
| Configuration           | DIP switch configuration                                |
| Alarm thresholds        | Configurable                                            |

### 5.4.1 Key Features

- High tolerance to building flex and vibration.
- Dual wavelength LED-based smoke detection. (UV and IR Wavelengths Spectrums)
- Limited maintenance requirements.
- Configurable alarm thresholds

## 6 LOOP POWERED SOUNDER/STROBE

Every warning device shall be a combined siren/strobe unit and installed in accordance with the attached drawing.

The loop sounder/strobe shall connect directly to the analogue addressable loop with its own unique address. The sounder shall be able to be operated in a continuous or pulsed mode. It shall be possible to connect 32 sounders to an analogue addressable loop. The loop sounder shall have an output of 85 dB (A) at 1 metre at a current consumption of only 3 mA. The unit shall be able to be

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supplied as a sounder base, or a sounder base with cap, for use as a standalone sounder.

## **7 INTERFACE WITH OTHER SYSTEMS**

The loop shall be capable of receiving information from third-party systems, e.g. operation of Sprinkler flow switch, by means of standard interface units. The source of this information shall be identified by its own unique address. In addition, the interface unit shall indicate to the panel the type of alarm, e.g. "sprinkler activated", etc.

The system must be able to support optional relays. Each relay must be software programmable and must be able to be allocated to a loop device, a zone, fire alarm, fault or coincide operation.

The operation relays must be able to be allocated in a different grouping or the same grouping as the zones. Each optional relay shall have a change-over-free contact rated at 2A at 24V DC

## **8 INPUT/OUTPUT**

The input/output unit shall provide a programmable voltage-free, single pole, change-over relay output; a single, monitored switch input and an unmonitored, non-polarised opto-coupled input. The unit shall be loop-powered and operate at between 14-28 VDC.

## **9 MANUAL CALL POINT**

Manual call points shall be installed at all exits and stairwell exits from each floor and every exit to fresh air on the ground floor as indicated in the drawing.

All manual call points shall be red in colour and mounted at 1400mm from the floor and one should not walk more than 45 meters without finding a manual call point.

### **9.1 Key Features**

- Anti-Tamper facility
- Integral Short Circuit
- Re-settable Break Glass Element
- Backward Compatibility
- Fully Approved to the latest Standards

## **10 REVIEW OF ELECTRICAL COMPONENTS**

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- (a) All wiring systems shall be properly installed in compliance with the appropriate national standard and the system drawings. AC and DC wiring shall not be combined in a common conduit unless properly shielded and grounded.
- (b) All field circuitry shall be tested for ground fault and short circuit condition. When testing field circuitry, all electronic components (such as smoke and flame detectors or special electronic equipment for other detectors, or their mounting bases) shall be removed and jumpers properly installed to prevent the possibility of damage within these devices. Replace components after testing the circuits.
- (c) Adequate and reliable primary standby sources of energy which comply with 6.4 shall be used to provide for operation of the detection, signalling, control and actuation requirements of the system.
- (d) All auxiliary functions (such as alarm sounding or displaying devices, remote annunciators, air handling shutdown, power shutdown, etc.) shall be checked for proper operation in accordance with system requirements and design specifications.

Alarm devices shall be installed so that they are audible and visible under normal operating and environmental conditions.

Where possible, all air-handling and power cut-off controls should be of the type that once interrupted require manual restart to restore power.

- (e) Check that for systems using alarm silencing, this function does not affect other auxiliary functions such as air handling or power cut-off where they are required in the design specification.
- (f) Check the detection devices to ensure that the types and locations are as specified in the system drawings and are in accordance with the manufacturer's requirements.
- (g) Check the manual release devices are properly installed, and are readily accessible, accurately identified and properly protected to prevent damage.
- (h) Check that all manual released devices used to release extinguishants require two separate and distinct actions for operation. They shall be properly identified. Particular care shall be taken where manual release devices for more than one system are in close proximity and could be confused or the wrong system actuated. Manual release devices in this instance shall be clearly identified as to which hazard enclosure they protect.
- (i) Check that for systems with a main/reserve capability, the main/reserve switch is properly installed, readily accessible and clearly identified.

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- (j) Check that for systems using hold switches requiring constant manual force, these are properly installed, readily accessible within the hazard area and clearly identified.
- (k) Check that the control panel is properly installed and readily accessible.

## 10.1.1 Preliminary Functional Test

- (a) Where a system is connected to a remote central alarm station, notify the station that the fire system test is to be conducted and that an emergency response by the fire department or alarm station personnel is not required. Notify all concerned personnel at the end-user's facility that a test is to be conducted and instruct them as to the sequence of operation.
- (b) Disable or remove each extinguishant storage container release mechanism and selector valves, where fitted, so that activation of the release circuit will not release extinguishant. Reconnect the release circuit with a functional device in lieu of each extinguishant storage container release mechanism.

For electrically actuated release mechanisms, these devices may include suitable lamps, flash bulbs or circuit breakers. Pneumatically actuated release mechanisms may include pressure gauges. Refer to the manufacturer's recommendations in all cases.

- (c) Check each resettable detector for proper response.
- (d) Check that polarity has been observed on all polarized alarm devices and auxiliary relays.
- (e) Check that all required end-of-line devices have been installed.
- (f) Check all supervised circuits for correct fault response.

## 10.1.2 System Functional Operation Test

- (a) Operate the detection initiating circuit(s). All alarm functions shall occur according to the design specification.
- (b) Operate the necessary circuit to initiate a second alarm circuit if present. Verify that all second alarm functions occur according to design specifications.
- (c) Operate the manual release device. Verify that manual release functions occur according to design specifications.
- (d) Where appropriate, operate the hold switch. Verify that functions occur according to the design specifications. Confirm that visual and audible supervisory signals are received at the control panel.

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- (e) Check the functional all resettable valves and activators, unless testing the valve will release extinguishant.  
  
"One-Shot" valves, such as those incorporating frangible discs, should not be tested.
- (f) Check pneumatic equipment, where fitted, for integrity to ensure proper operation.

### **10.1.3 Remote Monitoring Operations (If Applicable)**

- (a) Disconnect the primary power supply, then operate one of each type of input device while on standby power. Verify that an alarm signal is received at the remote panel after the device is operated. Reconnect the primary power supply.
- (b) Operate each type of alarm condition and verify receipt of fault condition at the remote station.

### **10.1.4 Control Panel Primary Power Source**

- (a) Verify that the control panel is connected to a dedicated unswitched circuit and is labelled properly. This panel shall be readily accessible, but access shall be restricted to authorized personnel only.
- (b) Test a primary power failure in accordance with the manufacturer's specification, with the system fully operated on standby power.

### **10.1.5 Completion of Functional Test**

When all functional tests are completed, reconnect each storage container so that activation of the release circuit will release the extinguishant. Return the system to its fully operational design condition. Notify the central alarm station and all concerned personnel at the end-user's facility that the fire system test is complete and that the system has been returned to full service condition by following the procedures specified in the manufacturer's specifications.

## **11 COMPLETION CERTIFICATE AND DOCUMENTATION**

The installer shall provide to the end user a completion certificate, a complete set of instructions, calculations and drawings showing the system as-installed, and a statement that the system complies with all the appropriate requirements of this part of ISO 14520, and giving details of any departure from appropriate recommendations. The certificate shall give the design concentrations and, if carried out, reports of any additional test including the door fan test.

### **11.1 PROGRAMME**

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By completing the tender documents, the Contractor confirms that he is able to meet the dates set out in the Preliminaries. Any uncertainty should be resolved with the Engineer prior to tender submission.

## 11.2 SUBMISSION OPTIONS

All equipment and installation by Contractors are to comply fully with the following standards:

- SANS 10139; and
- Applicable EN 54 standard

## 12 VOICE EVACUATION SYSTEM

**Note:** The quoted system shall comply with the following standards: SANS 7240 parts: 4 and 16 (ISO 7240-4, -16, 24); EN 54 parts: 4, 16 and 24; and/or BS 5839 part 8, whichever one applies, as specified below. Certification to be provided, where indicated.

Further, the standards SANS 10139 and SANS 10400-T: 2020 Edition 4 shall be adhered to.

**Note:** While this specification is based on the preferred **TOA voice evacuation system**, there is nothing preventing the Contractor from offering equipment which performs equal to or better than the equipment specified.

### 12.1 STANDARD OF COMPLIANCE - KEY ELEMENTS

The quoted system shall comply to the EN 54 standard, as specified below:

- All-call emergency evacuation. Includes all zones.
- Automated emergency evacuation per individual zone.
- Built-in voice/tone alarms from pre-recorded messages.
- 2-phased voice alarm message broadcasting (alert and evacuation), but not simultaneously.

#### 12.1.1 Relevant Safety Elements and Features of the System:

- All-call emergency evacuation. Includes all zones
- Automated emergency evacuation per individual zone
- Built-in voice/tone alarms from pre-recorded messages
- 2-phased voice alarm message broadcasting (VM-3000),
- (signal and voice) per channel, and two message channels sequentially (alert and evacuation)
- Fireman's Microphone, built into the master amplifier (VM-3000)

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- Remote fireman's microphone
- Remote and built-in fireman's microphones capsule fault detection
- the fireman microphones' capsule is included in the signal path's fault detection
- Critical signal path fault detection
- from microphone capsule to the last speaker on any speaker line
- Continuous speaker line monitoring
- without interruption of BGM distribution or paging announcements
- Automatic log-bookkeeping, internal, review via LAN connection on external PC
- Power Supply and Battery backup
- with automatic and seamless switch over between AC and DC, according to EN 54 part 4
- VRLA (vent regulated lead acid) batteries
- Flame retardant according to UL94V-0 or UL94HB, and compliant to EN 50272-2, EN 60896-2
- Speaker cable supplied having been tested in accordance with EN 50200, class PH30. I.e. having a fire duration of survival of 30 minutes at 830°C surrounding temperature
- Standby amplifier(s)
- Speakers equipped with thermal fuse (72°C or higher)
- Speakers equipped with fire resistant terminal block
- Speakers equipped with steel fire dome
- Separate zone for stairways

The various components are fully integrated into one system, from where the main processor head end device surveys and controls the entire setup, reporting to the internal data logbook all occurrences within the system as well as indicating on the front panel via LEDs. The system shall be connected to an external fire panel for receiving alarm signals and respond accordingly. The voice alarm system (VAS) to understand simultaneous triggers from the fire panel and relate them to the respective zones, regarding evacuation and/or alert:

The various components are to be fully integrated into one system, from where the main processor headend device surveys and controls the entire system, reporting to the internal data logbook and touch screen console all occurrences within the system as well as indicating on the front panel via LEDs. The system is to be connected to an external fire panel, for receiving alarm signals and reacting accordingly.

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## 12.2 DESIGN CRITERIA

The system is to be designed for "Automated Voice Emergency Evacuation", paging included, BGM possible. Fully integrated system, according to key element schedule, as listed earlier on.

Fully compliant with EN 54.

The "Automated Emergency Voice Evacuation System" shall:

- be a fully integrated voice evacuation system,
- contain all components and features within one manufacturers system,
- not rely other vendors' or manufacturers' devices,
- in order to analyse and report on all safety standard features build-in as listed above,
- be interconnected to a fire panel for receiving alarm signals relating to fire and evacuation signalling.
- has to be interconnected to a fire panel for receiving alarm signals relating to fire and evacuation signalling.

A build-in protocol is to be available to access the internally stored data from an external personal computer, such as status and system information, as well as control of the outputs and reading of the inputs.

### 12.2.1 Sound Pressure Level

The Sound Pressure Level (SPL) of the alarm message(s) in each zone shall be of good coverage. The emergency message signal shall broadcast at 10dB SPL above ambient noise, as per ISO/SANS 7240-19 or BS 5839-8 Standard.

### 12.2.2 Number of zones

The Voice Alarm System VAS (Emergency Voice Evacuation System) is designed for **(12) zones**.

## 12.3 SYSTEM DESCRIPTION

### 12.3.1 Sound Pressure levels of speakers

The following sound pressure levels shall be obtainable from the proposed loudspeakers at the following parameters.

SPL at 1m distance, power input as specified.

- Voice alarm system:
- Ceiling speakers: [6W, 1m]: 102dB SPL

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- Wall mount speakers: [6W, 1m]: 102dB SPL
  - Horn speaker: [15W, 1m]: 121dB SPL
- Sound reinforcement systems:

### 12.3.2 Speakers and Cabling

Above speakers to be compliant, tested and certified in accordance to the relevant Standard, i.e. EN 54-24 and/or BS 5839-8, as per schedule on pages 1 and 2. Certification has to be presented in the tender document.

If the speakers are assembled in accordance to above standards but not certified, the Contractor has to make the consultant aware of this fact, so it can be considered during the material and information equipment data review.

Speaker wiring has to be chosen such that not more than 10% power loss occurs over the cable in total, in order to conduct as much amplifier power to the speakers for full sound volume and minimal loss of sound pressure level. The speaker cable has to adhere to the Standard BS EN 50200.

The Sound Pressure Level (SPL) in each zone shall be of good coverage and between +6 and +10 dB SPL above ambient noise.

### 12.3.3 Amplifier wattage

The Voice Alarm System VAS (Emergency Voice Evacuation System) is designed for (12) zones, of which its power requirements are to be satisfied by the respective amplifier(s) quoted in the technical specification list at the end of this document, and leaving enough headroom for more speakers to come in the future, without exhausting the existing amplifier capacity.

Please consider in your calculations the sensitivity of the speakers you propose (please see above), as well as the necessary sound pressure level (SPL in decibel) required per respective area and zone (please see above Design Criteria – Sound Pressure Level).

### 12.3.4 Microphones

Fireman's Microphone integrated into the front panel of the master amplifier (VM-3000)

The Remote Paging Microphone (incorporating 10 extension buttons), with 10-button extension keypad, shall be desk mounted as per instruction by the Consulting Engineer.

### 12.3.5 Emergency Broadcasting

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Broadcasting automatically (pre-recorded messages) or manually. Individually per zone, group of zones or all call.

Broadcasting of pre-recorded emergency messages to occur not simultaneously but sequentially, first the evacuation message in the emergency zone(s), then following the alert message in the neighbouring zone(s).

Additionally, each broadcast may contain two or more messages, or an attention drawing signal first and then followed by an announcement, etc.

### 12.3.6 Standby Amplifier(s)

The standby amplifiers to take over the respective failing amplifier/s in the system.

Per each group of maximum ten operating amplifiers, one standby amplifier has to be provided, with the same or more signal power than the largest operational amplifier out of the ten.

### 12.3.7 Speaker/Amplifier Wiring

Each operational amplifier for PA/EVAC to provide single line output speaker connection.

The loudspeaker lines to utilise impedance matching between the amplifier's transformer output and the group of parallel switched loudspeaker transformer inputs. The high impedance speaker line shall utilise a 100V system.

### 12.3.8 Battery Backup

The following rating has to be sufficed:

- 24 hours system standby time, plus
- 30 minutes evacuation period under full speaker load.

The battery capacity provided has to be sufficient for the chosen system to stay operational for the above periods of time. Calculation of the battery capacity to be in compliance with Standards BS 5839 part 8.

Above battery backup is required for the 'Automated Emergency Voice Evacuation System', including the fireman microphone(s) and remote paging microphone(s). Further, the emergency power supply itself, including battery backup, is powered via the general power grid. Correct circuit breaker rating to be considered and supplied.

Those components of the system that are not directly part of the emergency evacuation system are to be supplied with electrical power via the general power grid, and backed up by UPS and/or emergency generator.

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## **Accessories:**

Equipment rack(s) with accessories, complete, to be provided, containing all head-end equipment, battery backup, etc.

### **12.3.9 Warranty and Support**

Local warranty valid in South Africa to be considered, when sourcing all items.

Commercial and technical support has to be available within South African borders.

Warranty has to be maintained for at least two(2) years after handover, plus technical support from the manufacturer to be available for at least the following ten (10) years.

The equipment and individual components shall be available from the manufacturer for at least ten (10) years, and spares and spare parts shall be available for at least seven (7) years after discontinuance of the product range.

### **12.3.10 Rack building, setup, test and commissioning**

The rack(s) and system to be factory build, configured, setup and tested. Test certificate to be supplied.

Commissioning to happen on site, handover and commissioning certificate to be supplied.

### **12.3.11 Certification**

The complete system has to be compliant and certified in accordance to EN 54 parts 4, 16 and 24, and all other relevant Standards, as previously mentioned.

Certification has to be presented in the tender document.

If certification does not exist, the Contractor has to make the consultant aware of this fact, so it can be considered during the material and equipment data review.

In addition to the system proposed, the Letter of Authority (LOA) supplied by the National Regulator for Compulsory Specifications (NRCS) of South Africa must be provided, thereby proving that the product is authorised to be imported into South Africa and be connected to the electrical mains grid of the local electricity supplier. Submissions, without the relevant LOA certificate included with the tender proposal, will not be considered and deemed disqualified.

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## **13 SYSTEM OPERATION AND EVACUATION STRATEGY**

### **13.1 Detection Strategy**

The entire building/precinct will be protected and monitored by a networked analogue fire detection system which will be integrated with an emergency voice evacuation system. The proposed fire detection system will consist of a number of addressable fire detection control panels networked together throughout the building that would provide the required detection protection and will control the required triggers to the emergency voice evacuation system to each block.

### **13.2 Fire Alarm Control Panel**

There shall be addressable analogue fire control panel provided for each block. These fire control panels shall be interconnected by a network which will serve as a data highway. Some sub-panels will simply act as data gathering panels and provide no indication while others will be fully functional control and indicating panels, configured so as to "**stand-alone**" and continue to operate normally in the event of a failure of the communication link between sub-panels. The network shall be via a fibre cable in which the operation of the panels will be peer-to-peer feeding all information data to the panel located in Block 4 inside the control room. Networked panels which the communication link forms a critical signal path will comprise of a loop or ring system for more resiliency to network failure.

### **13.3 Evacuation Strategy**

A **Phased Evacuation Strategy** will be utilised. In order to achieve this, it will be necessary to break the building down into detection zones and alarm zones.

### **13.4 Fire Detection Zones**

To direct those responding to a fire alarm signal to the affected area, particularly the emergency fire services, the building will be divided into **detection zones per block**. This is also done in order to make it easier for the operator/user to identify any faults in the system quicker. Each zone has been limited to a floor area of **2000m<sup>2</sup>** as specified in SANS 10139: 2021.

Also, all automatic fire detectors installed within enclosed stairwell will be considered as separate detection zones.

### **13.5 Alarm Zones**

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A separate evacuate signal shall be provided for each alarm zone. On operation of manual call point or automatic fire detectors, the emergency voice evacuation system will operate in sequence as per the configured phased evacuation strategy. Because this is a large complex building all the staircases are not sized to accommodate a simultaneous evacuation, the '**Evacuate Signal**' will first be sent on the effected zone whiles other areas such as the floor above and below or the other block will receive an '**Alert Signal**'.

# PLANTECH



**DETAILED TENDER SPECIFICATION FOR  
FIRE DETECTION AND GASEOUS FIRE SUPPRESSION  
SYSTEMS  
at the  
ARMSCOR HEAD QUARTERS  
in  
PRETORIA GAUTENG  
PROVINCE**

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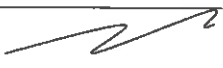
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## PART I: PRELIMINARIES AND GENERAL

### 1. DEFINITIONS AND ABBREVIATIONS

#### 1.1 DEFINITIONS

The following terms shall, unless the context otherwise requires, have the meanings hereunder assigned to them:

|                                  |                                                                                                                          |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>acceptable, adequate</b>      | : acceptable, adequate, satisfactory or suitable in the opinion of                                                       |
| <b>satisfactory, suitable</b>    | : the authority having jurisdiction                                                                                      |
| <b>Act</b>                       | : the National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977) as amended.                       |
| <b>addressable system</b>        | : a system in which signals from each detector or call point (or both) are individually identified at the control panel. |
| <b>analogue</b>                  | : ng device is one which transmits a signal indicating varying degrees of condition.                                     |
| <b>Authority Having</b>          | : for the purposes of this sub-                                                                                          |
| <b>Jurisdiction (AHJ)</b>        | contract, the Authority Having                                                                                           |
|                                  | : be - Plantech (Pty) Ltd;                                                                                               |
|                                  | - the relevant Fire                                                                                                      |
|                                  | Department;                                                                                                              |
|                                  | - South African Bureau of                                                                                                |
|                                  | Standards as the case may                                                                                                |
|                                  | be                                                                                                                       |
|                                  | as determined appropriate                                                                                                |
|                                  | by                                                                                                                       |
|                                  | the engineer.                                                                                                            |
| <b>automatic / manual switch</b> | : means of converting the system from automatic to manual action.                                                        |

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Note: this may be in the form of a manual switch on the control panel or other units, or a personnel door interlock. In all cases, this changes the actuation mode of the system from automatic and manual to manual only or vice versa.

## automatic installation

: installation or part of an installation that, when activated, performs a predetermined function, such as issuing a fire alarm, without manual intervention.

## Class of Fire

: ABC and D denoting the class of fire.

Combustible (mainly carbonaceous) materials, such as coal, paper, straw, wood, cloth, rubber and many plastics, in which combustion normally takes place with the formation of glowing embers.

The letters A, AC, B, BC,

### Class A

Fires involving solid

### Class AC

Fires involving materials of a type similar to those involved in a Class A fire and occurring in the presence of a live electrical power source such as electric cables, generators, transformers and switchboards.

### Class B

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Fires involving flammable liquids such as greases, oils, tars, oil-base paints, lacquers, flammable gases and liquids formed from liquefiable solids.

#### Class BC

Fires involving materials of a type similar to those involved in a Class B fire and occurring in the presence of a live electrical power source such as electric cables, generators, transformers and switchboards.

#### Class ABC

Fires involving materials of a type similar to those involved in Class A and Class B fires but occurring in the presence of a live electrical power source such as electric cables, generators, transformers and switchboards.

#### Class D

Fires involving metals such as magnesium, aluminium, titanium, zirconium, sodium, lithium and potassium, that burn at a high temperature and require a special type of extinguisher and extinguishing medium.

**Note:** The letter C in any combination of letters denotes a fire in the presence of a live electrical power source.

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|                             |                                                                                                                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>clearance</b>            | : air gap between equipment, including piping and nozzles and unenclosed or insulated live electrical components at other than ground potential                                                 |
| <b>competent person</b>     | : a person who is a registered person in terms of Section 1 of the Engineering Profession of South Africa Act, 1990 (Act 114 of 1990)                                                           |
| <b>commissioning</b>        | : work necessary to place the installation and work covered by this specification into normal operating condition                                                                               |
| <b>concealed</b>            | embedded in masonry or other construction, installed in spaces within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.                                        |
| <b>Condition</b>            | <p>condition of control equipment.</p> <p>Note : the control equipment may be in the normal condition, the fault condition, the alarm condition, etc.</p>                                       |
| <b>Conventional</b>         | with regards initiating devices means one which can only indicate an on/off condition                                                                                                           |
| <b>design</b>               | the planning of an installation by reasoning and calculation in accordance with generally acceptable engineering and scientific principles, and in accordance with the provisions of a standard |
| <b>design concentration</b> | Concentration of extinguishant, including a safety factor, required for system design purpose.                                                                                                  |

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## **detector**

device that responds automatically to predetermined conditions and is classified in terms of its output.

Note 1 : a detector is part of an automatic fire detection system that contains at least one sensor that constantly or at frequent intervals monitors a suitable physical or chemical phenomenon (or both) associated with fire, and that provides at least one corresponding signal to the control and indicating equipment.

Note 2 : the decision to give the fire alarm or to operate automatic fire protection equipment may be made at the detector or at another part of the system, for example at the control and indicating equipment.

## **engineered system**

System in which the supply of extinguishant stored centrally is discharged through a system of pipe and nozzles in which the size of which the size of each section of pipe and nozzle orifice has been calculated in accordance with relevant parts of ISO 14520

Note: The design flow rates from nozzles may vary according to the design requirements of the hazard.

## **expellant**

The agent or agents contained in an extinguisher and providing internal pressure to expel the extinguishing medium, the pressure being either stored

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|                                    |                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    | pressure or obtained by chemical reaction or by the release of auxiliary gas.                                                                                                                                                                                                                                                                      |
| <b>exposed</b>                     | : Not installed underground or concealed as defined above.                                                                                                                                                                                                                                                                                         |
| <b>extinguishant</b>               | : Electrically non-conducting gaseous fire extinguishant that does not leave a residue upon evaporation                                                                                                                                                                                                                                            |
| <b>extinguishing concentration</b> | : Minimum concentration of extinguishant required to extinguish fire involving particular fuel under define experimental conditions excluding any safety factor.                                                                                                                                                                                   |
| <b>exposed</b>                     | : not installed underground or concealed as defined above.                                                                                                                                                                                                                                                                                         |
| <b>extinguishing medium</b>        | : The product or products that cause/causes the fire to be extinguished.                                                                                                                                                                                                                                                                           |
| <b>fire load</b>                   | : the sum of the heat energy values of all combustible materials, including combustible partitions and other exposed combustible elements, contained in a component or a division.<br>Note: The fire load is expressed either as a timber equivalent (in kilograms per square metre), or as a heat energy value (in mega joules per square metre). |
| <b>fill density</b>                | : Mass of extinguishant per unit volume of container.                                                                                                                                                                                                                                                                                              |
| <b>fire resistance</b>             | : the ability of a building element or component to satisfy, for a stated period of time, the appropriate criteria specified for                                                                                                                                                                                                                   |

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|                          |                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | stability, integrity and insulation in the presence of fire.                                                                                                                                                                                                                                                                                     |
| <b>flooding quantity</b> | : Mass of volume of extinguishant required to achieve the design concentration within the protected volume within the specified discharge time.                                                                                                                                                                                                  |
| <b>gas cartridge</b>     | : A cylindrical container that fits into or is attached to the extinguisher and that contains either inert, compressed or liquefied gas.                                                                                                                                                                                                         |
| <b>Halon</b>             | : A halogenated hydrocarbon used as an extinguishing medium in the form of a vaporising liquid.                                                                                                                                                                                                                                                  |
| <b>hold time</b>         | : Period of time during which a concentration of extinguishant greater than the fire extinguishing concentration surrounds the hazards.                                                                                                                                                                                                          |
| <b>install</b>           | : to erect, mount and connect complete with all related accessories.                                                                                                                                                                                                                                                                             |
| <b>Liquefield gas</b>    | : Gas or gas mixture (normally a halocarbon) which is liquid at the container pressurization level at room temperature (20°C)                                                                                                                                                                                                                    |
| <b>listed</b>            | : equipment, materials, or services included in a list published by an organisation acceptable to the authority having jurisdiction and concerned with evaluation of products or services whose listing either that the equipment, material or service meets identified standards or has been tested and found suitable for a specified purpose. |

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|                                           |                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>lock-off device</b>                    | : Manual shut-off valve installed into the discharge piping downstream of the agent containers; or another type of device that mechanically prevents agent container actuation.<br>Note 1: The action of this device provides an indication of system isolation.<br>Note 2: The intent is to prevent the discharge of agent into the hazard area when the lock-off device is activated |
| <b>LOAEL<br/>(Lowest Observe Adverse)</b> | : Lowest concentration at which an adverse toxicological or physiological effect has been observed.                                                                                                                                                                                                                                                                                    |
| <b>manual call point</b>                  | : also referred to as a break glass alarm point, shall mean a manually operated device used to initiate an alarm signal                                                                                                                                                                                                                                                                |
| <b>Maximum concentration</b>              | : Concentration achieved from the actual extinguishant quantity at the maximum ambient temperature in the protected area                                                                                                                                                                                                                                                               |
| <b>maximum working pressure</b>           | : Equilibrium pressure within a container at the maximum working temperature<br><b>Note 1:</b> For liquefied gases this is at the maximum fill density and may include super pressurization.<br><b>Note 2:</b> The equilibrium pressure for a container in transit can differ from that in storage within a building.                                                                  |

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|                                       |                                                                                                                                                                                                                                      |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>mimic diagram</b>                  | : topographic representation of the protected premises and their subdivisions, with indicating devices for each subdivision such that the indications of the fire alarm system can be rapidly related to the layout of the premises. |
| <b>monitored wiring</b>               | : wiring in which a failure, whether to open circuit or to short circuit, will result in a fault warning and not a fire alarm                                                                                                        |
| <b>NOAEL<br/>(No Observe Adverse)</b> | : Highest concentration at which no adverse toxicological or physiological effect has been observed.                                                                                                                                 |
| <b>non-liquefied gas</b>              | : Gas or gas mixture (normally an inert gas), which, under service pressure and allowable service temperature conditions, is always present in the gaseous form.                                                                     |
| <b>normally unoccupied area</b>       | : area not normally occupied by people but which may be entered occasionally for brief periods.                                                                                                                                      |
| <b>occupancy class</b>                | : the particular use or the type of use to which a building or portion thereof is normally put or intended to be put.                                                                                                                |
| <b>operating temperature</b>          | : the temperature at which a component, a fitting or an installation functions when in normal use.                                                                                                                                   |
| <b>owner of the building</b>          | : of the premises, whether as occupier or otherwise, or any person delegated by the person having control of the premises to                                                                                                         |

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## pre-engineered systems

be responsible for the fire alarm system and the fire procedures.

System consisting of a supply of extinguishant of specified capacity coupled to pipework with a balanced nozzle arrangement up to a maximum permitted design

**Note:** No deviation is permitted from the limits specified by the manufacturer or authority

## Protection

presence of

a) one or more detector(s) able to initiate actions needed to ensure the safety of life or property in the event of a fire

b) mechanical devices to prevent damage to system components from impact, abrasion, rodent attack, etc.

provision of

a) fire resistance to prevent damage to system components from fire in their vicinity

b) electrical protection to prevent temporary or permanent disruption of the system owing to over-voltage, excessive current, or high transient or radio-frequency interference (or a combination of these)

## Provide

to supply, install and connect up complete and ready for safe operation.

## Recharging

The replacement of the extinguishing medium and, when

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|                        |   |                                                                                                                                                                                                                                                                                      |
|------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |   | relevant, of the expellant of an extinguisher.                                                                                                                                                                                                                                       |
|                        |   | Prescribed measures (see SABS 1475) taken by an approved reconditioning organization at prescribed intervals to restore the extinguisher to full operational readiness, and that include a minor service, or a major service and pressure test, as relevant.                         |
| <b>search distance</b> | : | distance that has to be travelled by a searcher within a zone in order to determine visually the position of a fire.                                                                                                                                                                 |
| <b>Sector</b>          | : | subdivision of the protected premises normally containing several zones<br>Note A sector may cover more than one building                                                                                                                                                            |
| <b>selector valve</b>  | ⚙ | Valve installed in the discharge piping downstream of the agent containers, to direct the agent to the appropriate hazard enclosure.<br>Note: It is used where one or more agent containers are arranged to selectively discharge agent to any of several separate hazard enclosures |
| <b>shall</b>           | ⚙ | indicates a mandatory requirement and must be complied with.                                                                                                                                                                                                                         |
| <b>Should</b>          | : | indication or that which is advised but not required.                                                                                                                                                                                                                                |
| <b>similar</b>         | ⚙ | of approved manufacture equal as regards to materials, weight,                                                                                                                                                                                                                       |

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|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Smoke</b>            | size and efficiency of performance to product specified by name.                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Supply</b>           | particulate products of combustion generated by fire, whether the fire is of the smouldering or open-flame type in general the particle diameters range from 1 nm (invisible smoke) to 10 pm (visible smoke).                                                                                                                                                                                                                      |
| <b>smoke alarm</b>      | to purchase, procure, acquire and deliver complete with all related accessories.                                                                                                                                                                                                                                                                                                                                                   |
| <b>standby supply</b>   | device that contains within one housing all the components, except possibly the energy source, necessary for detecting fire and giving an audible alarm                                                                                                                                                                                                                                                                            |
| <b>State</b>            | electricity supply, commonly from a rechargeable battery, that is automatically connected to the fire alarm system when the normal supply fails                                                                                                                                                                                                                                                                                    |
| <b>suitable for use</b> | <p>outputs of a detector</p> <p>equipment or components that are deemed in the opinion of the authority that has jurisdiction to be acceptable within their predetermined tested parameters for a particular application in a system or, in relation to any document issued by such authority, in the opinion of such authority</p> <p>components that have been tested and approved and bear the mark of one of the following</p> |

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testing authorities will normally be deemed to be suitable for fire detection:

- a) Loss Prevention Council (LPC);
- b) Factory Mutual (FM);
- c) South African Bureau of Standards (SABS);
- d) Underwriters Laboratory (UL); or
- e) British Approvals Service for Electrical Equipment in flammable atmospheres (BESEFA).

## **Superpressurization**

- : Addition of a gas to the extinguishant container, where necessary, to achieve the required pressure for proper system operation

## **Testing**

- : work and checks necessary to determine qualitative and quantitative performance of equipment, installation and workmanship

## **types of detector**

- : Detectors classified by the form of their output, as follows:

### **Analogue Detector**

- : A detector that gives an output signal representing the value of the sensed phenomenon, for example a truly analogue signal or a digitally coded equivalent of the sensed value. (Note: This detector does not itself make a decision of fire.)

### **Aspirating Detector**

- : Detector in which a sample of the atmosphere in the protected space is sucked by a fan or pump

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## Multi-State Detector

into a detector, which may be remote from the protected space.

: Detector that gives one of a limited number (greater than two) of output states relating to normal or fire alarm conditions and other abnormal conditions.

## Two-State Detector

: Detector that gives one of two output states relating to either normal or fire alarm conditions.

## Open-area Smoke Imaging Detection. (OSID)

: The beam projected from each Emitter contains a unique sequence of ultraviolet (UV) and infrared (IR) pulses that are synchronised with the Imager and enable the rejection of any unwanted light sources. By using two wavelengths of light to detect particles, the system is able to distinguish between particle sizes. The shorter UV wavelength interacts strongly with both small and large particles while the longer IR wavelength is affected only by larger particles. Dual wavelength path loss measurements therefore enable the detector to provide repeatable smoke obscuration measurements, while rejecting the presence of transient dust particles or solid intruding objects.

## unoccupiable area

: area which cannot be occupied due to dimensional or other physical constraints

## wiring

: conduit, fittings, wiring, junction and outlet boxes, switches, cut-

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|             |   |                                                                                                                                                                                                                                             |
|-------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Work</b> | : | outs and socket outlets and all related items.                                                                                                                                                                                              |
|             | : | all labour, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation.                                                                                                           |
| <b>Zone</b> | : | subdivision of the protected premises such that the occurrence of a fire within it will be indicated by a fire alarm system separate from an indication of fire in any other subdivision                                                    |
|             |   | Note: a zone will usually consist of an area protected by several manual call points or detectors (or a combination of these), and is indicated separately to assist in location of the fire, evacuation of the building and fire-fighting. |

## 1.2 ABBREVIATIONS

Abbreviations used in these documents shall mean:

|       |   |                                            |
|-------|---|--------------------------------------------|
| BS    | : | British Standard Specification             |
| BSI   | : | British Standard Institute                 |
| DIN   | : | German Standards Institute                 |
| FDVES | : | Fire Detection & Voice Evacuation System   |
| FDIA  | : | Fire Detection Installers Association      |
| FM    | : | Factory Mutual (American)                  |
| LPC   | : | Loss Prevention Council                    |
| NFPA  | : | National Fire Protection Association (USA) |
| SABS  | : | South African Bureau of Standards          |
| UL    | : | Underwriters Laboratories                  |

## 2. GENERAL

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The contract works to be carried out consists of the detailed design, engineering, manufacturing, supply, delivery, offloading, erection, testing and commissioning into service, guarantee and maintenance of a clean agent 200 Bar 80 Litre Pyroshield IG-55 gaseous fire extinguishing system, including fire detection and gas control equipment.

The engineering, quality control and inspections, equipment selection, preparation of shop drawings, testing, commissioning and preparation of operating and maintenance manuals, are to be executed in a systematic manner, once programmed, under the Engineer's general supervision and direction.

### **3. ENGINEER'S DRAWINGS**

The drawings to be prepared by the consulting engineer show general layout of all equipment and distribution systems, complete with schematic arrangements. These, together with the specification, give sufficient information to enable the contractor to estimate the cost and to determine how the system must be installed, tested, inspected, operated, serviced and maintained.

These drawings are not dimensioned shop drawings and cannot be used as shop drawings. Location dimensions shown are only indicative of the routes and zones in which the service must be installed.

Design / selection / construction details and installation arrangements for equipment and /or distribution systems which are available from either the manufacturer / supplier in their officially published literature / documentation, design / application manuals, or other authoritative sources such as SANS, BS, NFPA, etc. shall be used as the basis for shop drawings. The specific source shall be identified at submission stage.

Where these details are non-existent or not sufficient, reference might be made to the sections and detail drawing.

### **4. CONTRACTOR'S DRAWING, EQUIPMENT SELECTION AND SAMPLE SUBMISSIONS**

#### **4.1 SHOP DRAWING SUBMISSIONS**

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- 4.1.1 Shop drawings shall indicate all equipment, distribution systems, testing / inspection / instrumentation positions, access requirements and builder's work requirements.
- 4.1.2 Shop drawings shall be based on the engineer's design concept shown on the tender drawings, approved equipment selections and samples. The shop drawings shall be checked and passed by the contractor's chief draughtsman and project engineer/manager. The shop drawings shall be stamped to confirm that co-ordination with structural and other affected sub- contractor's drawings, has taken place.
- 4.1.3 Four (4) copies of shop drawings in PDF and DWG (AutoCad) formats of all parts of the subcontract works shall be submitted to the engineer for approval within 7 days of appointment.
- 4.1.4 The contractor may, if he so desires, obtain "electronic / e-mail" copies of the engineer's drawings for modifications and updating if required. These drawings shall be re-titled in accordance with the contractor's system and shall thereafter be submitted as the sub- contractor's shop drawings. No portion of the sub- contractor's works shall be commenced until the shop drawing has been approved by the engineer.

## **4.2 DESIGN CALCULATIONS – GAS SUPPRESSION**

The successful Contractor shall submit for perusal by the Engineer copies of his detailed design calculations within the time period specified in the specification. These shall include at least the following:

- System sizing calculations. Design concentration shall be clearly indicated for each and every zone or space, and whether such spaces are normally occupied or normally unoccupied.
- Distribution system detail design. All discharge pressures, both upstream and downstream of the main orifice shall be clearly indicated, together with proposed nozzle and pipe sizes, specifications, and allowable working pressures.

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- Final discharge quantities for every protected space, design concentration, 95% discharge time.

#### **4.3 DESIGN CALCULATIONS – ASPIRATING DETECTION**

The installation contractor shall be responsible for the design, supply and commissioning of a fully supervised Aspirating Fire & Smoke Detection System as specified herein and indicated on the relevant drawings.

Where necessary the installation contractor shall employ the services of the relevant supplier to assist with any or all aspects of the system design, supply, commissioning and maintenance to ensure the completed system meets the requirements for the project.

The completed aspirating fire and smoke detection system shall comply fully with all the requirements of:

- (UK) - FIA Code of Practice for Design, Installation, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems – Issue 3 February 2012.
- South African National Standard SANS 10139 - Fire detection and alarm systems for buildings

The proposed sampling system design is generally as described within the FIA Code of Practice for Design, Installation, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems 2012 and as such is defined as:

- A 'Primary Sampling System' that utilises the airflow created by the air conditioning and ventilation system to carry the sampled air to the sampling point.
- A 'Secondary Sampling System' where the sampling points are sited and spaced as if they are point type smoke detectors.

The installation contractor shall ensure that the proposed air sampling system design for the area(s) to be protected, complies with the recommendations and product approvals, with regard to the maximum number of sample points,

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maximum lengths of sampling pipes and the maximum area of coverage per sampling point and/or detector.

The sampling pipe network design for each installation must be approved by the Engineer. The design details given to the Engineer shall indicate materials of construction, sampling pipe type, size and lengths together with 'Sampling Point' and 'Capillary Sampling Point' hole spacing and size.

Any significant design deviation may alter the operation of the system and therefore any adjustment of the air sampling network design must be approved by the relevant supplier as well as the Engineer.

The installation contractor shall ensure that the aspirating system sampling pipe work configuration is confirmed as acceptable using the applicable supplier's sampling pipe calculation program. The calculation program shall determine the transport times, airflow and balance details for each individual sampling pipe and sampling point.

The maximum 'transport time' must not exceed 120 seconds or 60 seconds (Class A response time) from the furthest sampling point on the pipe work system to the aspirating detector.

Where appropriate the installation contractor shall include within their design / installation sampling pipe 'test points'. These will be installed at the end of each sampling pipe run after the last sampling point. These test points are provided for future system servicing and to test the integrity of the sampling pipe from the furthest point back to the aspirating detector. Test points should be located within accessible and secure areas to prevent tampering by unauthorised personnel.

Please note that it is not a requirement for the sampling pipe test point to comply with the maximum transport time of 120 seconds or 60 seconds (Class A response time).

The contractor shall submit a certificate of compliance on his company letterhead stipulating that the system has been installed in accordance with the design and complies with all relevant standards and manufacturers requirements.

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## **4.4 "AS BUILT" DRAWING SUBMISSIONS**

- 4.4.1 "as built" drawings are the shop drawings embodying all modifications made during construction. They shall include floor- and ceiling layout drawings indicating all equipment.
- 4.4.2 copies of "as built" drawings shall be submitted in PDF and DWG (AutoCad) formats to the engineer for approval.

## **4.5 EQUIPMENT SELECTION SUBMISSIONS**

- 4.5.1 The contractor shall select equipment which complies with these specifications. These selections shall be submitted to the Engineer for approval.
- 4.5.2 No equipment shall be installed until the equipment selection submission has been approved by the Engineer if the selected equipment deviates from the design concept and/or deviates from the accepted equipment offered.

## **4.6 SAMPLE SUBMISSIONS**

Samples are any samples required by the Engineer. Samples shall be physical examples to illustrate materials, equipment or workmanship, and to establish standards by which the works may be judged. Such samples, after approval, will be retained by the Engineer for a period sufficient to ascertain that the relevant component is actually provided as per such sample, but will then be returned to the contractor for incorporation in the works.

## **4.7 SUBMISSION PROCEDURES**

Submission for approval will consist of the following activities executed by the contractor and other parties involved:

- 4.7.1 the contractor shall review, stamp, date and sign to signify his approval and submit in the manner required by the Engineer and with reasonable promptness and in orderly sequence so as to cause no delay in the work, all contractor's drawings, equipment selections and / or samples required by the subcontract documents or subsequently by the Engineer. Contractor's

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drawings, equipment selections and samples shall be properly identified as specified or as the Engineer may require.

- 4.7.2 At the time of submission the contractor shall inform the Engineer in writing of any deviation in the contractor's drawings, equipment selection or samples from the requirements of the subcontract documents.
- 4.7.3 Each individual equipment selection submission shall be accompanied by a copy of the applicable detailed technical specification. Each clause of this specification shall be marked "complies" or "does not comply", complete with reason stated and countersigned by the contractor's project Engineer/manager.
- 4.7.4 The drawings and equipment selections shall be submitted in a number of copies and along the channels agreed.
- 4.7.5 by submitting drawings, equipment selections and/or samples, the contractor represents that he has determined and verified all site measurements, site instruction criteria, materials, catalogue numbers and similar data, or will do so, and that he has checked and co-ordinated each contractor's drawing and sample with the requirements of the works and of the subcontract documents.
- 4.7.6 The Engineer, on behalf of the contractor, will review contractor's drawings, equipment selections and samples with reasonable promptness so as to cause no delay, but only for conformance with the design concept of the subcontract works and with the information given in the subcontract documents. The Engineer's approval of a separate item shall not indicate approval of an assembly in which the item functions.
- 4.7.7 The contractor shall make any corrections required by the Engineer and shall re-submit the required number of corrected copies of the contractor's drawings, equipment selections or new samples until approved. The contractor shall direct specified attention in writing on resubmitted drawings to revisions other than the corrections required by the Engineer on previous submissions.

## **5. WORK PROVIDED BY OTHERS**

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## 5.1 GENERAL

The following related work to the Detection and Gaseous Suppression System (GSS) contract will be provided by others. The Detection and Gaseous Suppression System (GSS) Contractor shall be responsible for the detailing, checking and ensuring that the work as listed in the schedules and shown in principle on the drawings is provided as per his detailed builder's work and related services drawings.

Instructions for GSS Contractor's exact requirements shall be transmitted to the Contractor timeously in the form of builder's and associated services drawings in accordance with an agreed Contractor's programme. Should these instructions be issued after the completion of the relevant areas, then this work will be carried out at the expense of the GSS Contractor.

## 5.2 ELECTRICIAN AND GSS CONTRACTOR

| Item                                                                                                                                                                          | Contract Documents |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|
|                                                                                                                                                                               | Electrician        | GSS |
| Provision of single phase 15A power supplies as per plan – must be fed from the uninterrupted power supply (UPS) and own circuit breaker on the main distribution board (DB). |                    | X   |

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| Item                                                                                                                                                                                                                                                                   | Contract Documents |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|
|                                                                                                                                                                                                                                                                        | Electrician        | GSS |
| Supply and installation of conduits, related fittings, elbows and electrical reticulation to all gas control panels, Addressable Control Panels, HSSD Detectors, Interface Relays and any other detection equipment that would require high voltage electrical supply. |                    | X   |
| Fire detection and gas suppression work.                                                                                                                                                                                                                               |                    | X   |
| Electrical connections to Distribution Boards and relevant circuit breakers. (Detection contractor to appoint as his cost an qualified electrician for this scope of works. COC to be issued with hand-over pack)                                                      |                    | X   |

### 5.3 HVAC SUBCONTRACTOR AND GSS CONTRACTOR

| Item                                                                                             | Contract Documents |     |
|--------------------------------------------------------------------------------------------------|--------------------|-----|
|                                                                                                  | HVAC               | GSS |
| Low voltage relay for isolating any fresh air supply units and any other services as per design. |                    | X   |
| Fire detection and gas suppression work.                                                         |                    | X   |

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## 5.4 OTHER SUB-CONTRACTORS AND GSS CONTRACTOR

| Item                                                                         | Contract Documents |     |
|------------------------------------------------------------------------------|--------------------|-----|
|                                                                              | Others             | GSS |
| Holes through structure and brickwork – Pressure relief dampers              |                    | X   |
| Access routes, holes for equipment                                           |                    | X   |
| Maintenance space for equipment                                              |                    | X   |
| Access to shafts                                                             |                    | X   |
| Cut openings in plaster board ceiling for devices                            |                    | X   |
| Access to outlets and control                                                |                    | X   |
| Building of 2-hour fire rated brick-walls and or closing up of any openings. |                    | X   |

## 6. COMPLIANCE WITH REGULATIONS AND STANDARDS

### 6.1 GENERAL

The contractor shall comply with all acts of parliament and all regulations and bylaws of local and or other authorities having jurisdiction regarding the execution of the n/s works in particular the following:

- SANS 10142 Code of Practice, as amended, for the Wiring of Premises.

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- SANS 10139 Code of Practice, Fire Detection and Alarm Systems for Buildings - System Design, Installation and Servicing.
- SANS 14520 Part 1 Code of Practice - Gaseous fire-extinguishing systems - Physical properties and system design
- SANS 14520 Part 14 Code of Practice - Gaseous fire-extinguishing systems - Physical properties and system design Part 14: IG-55 extinguishant.
- SANS 369 - Electrical actuation of gaseous total flooding extinguishing.
- National Building Regulations and Building Act (Act 103 of 1977).
- The contractor is to comply with all requirements of the Occupational Health and Safety Act (Act 85 of 1993) and all subsequent revisions thereof. Further, the contractor undertakes to employ only people who have been duly authorised in terms thereof and who have received sufficient health and safety training to ensure that they can comply therewith. In addition, the Contractor warrants that it shall enforce the terms of this clause on any Contractor employed by the contractor in connection with the contract.
- Government, provincial and local authorities ordinances, regulations, by-laws, rules and other statutory requirements.
- Specifications and codes of practice issued by the South African Bureau of Standards and British Standards Institute. The former shall have precedence over the latter where both bodies have issued conflicting specifications or codes of practice.

## **6.2 AUTOMATIC SYSTEMS**

Control and indicating equipment from automatic fire alarm systems shall comply with SANS EN 54-2.

## **6.3 MANUAL SYSTEM (TYPED M)**

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Control and indicating equipment from manual fire alarm systems shall comply with

SANS EN 54-2 and SANS EN 54-4.

## 6.4 PROGRAMMING

1. contractor shall submit to the Engineer and client within one week of appointment, a practicable work programme.

This Subcontractor's programme shall state:

- Access dates to various areas to start installing equipment.
  - Access dates to either ceiling and / or floor plenums of the different floors (or section of floors) to start installing in these areas (so called 1st Fix).
  - Access dates to the various rooms with completed walls and partitioning (fully cleaned out) to start installing room equipment and connect these (so called 2nd Fix).
2. The section of the programme covering submission of structural and Installation Drawings, equipment selection, submission of inspection reports of completed sections of the installation, preparation of Operating Instructions and Maintenance Manuals, Testing and Commissioning shall be presented in the form Gantt chart.
  3. The network graphic representation must clearly depict the sequence of the activities planned by the Subcontractor, according to the Main Contractor's requirements, their interdependence, and time required to perform each activity. In developing the project network, the contractor shall use arrow or precedence notation (on which available computer programmes are based).
  4. The contractor shall furnish with the initial programme, a tabular listing of all activities listed on the programme. For each activity there shall be listed the earliest and latest finish times and the "float". Activities on the critical path shall be so indicated.

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5. The contractor shall regularly, throughout the progress of the works, amend and update the work schedule (both the network graphic representation and the tabular list of activities) to incorporate all variations, new drawings and site instructions, and all such amendments are to be subject to the Contractor's approval and shall not amend the completion date of the project unless extensions of time have been granted by the Contractor's.
6. If, in the opinion of the Contractor, the contractor falls behind the programme, the contractor shall take such steps as may be necessary to improve his progress. The Contractor may require him to increase the number of shifts and/or overtime operation, days of work and/or the amount of construction plant, and to submit for approval revised programmes in the form required above in order to demonstrate the manner in which the required rate of progress will be achieved, all without additional cost to the Employer.
7. Regular meetings to monitor progress will be held under the chairmanship of the Engineer. The meetings must be attended by as many of the representatives of the as the Engineer shall require.
8. The purpose of such meetings will be to review progress against the programme, to investigate and establish actual or impending causes of delays, to instruct on such remedial action as may from time to time be necessary and generally to ensure that the progress of the work remains on programme at all times.

## 7. **APPROVALS**

The contractor shall, before installation starts, submit the following to the consulting Engineer:

- (a) the application for the approval of the design;
- (b) a signed declaration that the installation has been designed in accordance with this specification by a competent person;

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- (c) a signed undertaking that the installation will be installed by an approved installer, in accordance with the appropriate plans and drawings, and as specified in this specification and relevant standards;
- (d) appropriate plans, drawings, details and information required in terms of this specification;
- (e) particulars of the power supplies; and
- (f) a statement that the installation will comply with this standard, together with details of any deviation(s), and

The consulting Engineer shall be provided with a summarized schedule that contains all the relevant information relating to the system.

## **8. CONTRACT MANAGEMENT**

All activities, information required, approvals, etc. shall be managed by the officially appointed contractor's Project Engineer / Manager to ensure completion of the Subcontract at the agreed completion date and of specified quality.

It shall be the duty and responsibility of this Project Engineer / Manager to identify any item such as delays, activity time overrun, late information and/or approval at least weekly, and describe in his standard report to the Engineer proposed action to overcome the adverse conditions to maintain the planned construction schedule.

It shall be the duty and responsibility of this Project Engineer / Manager to prepare a detailed tabulated construction activities breakdown with related earliest and latest dates for information required, approval, area availability and inspection.

Construction activities are:

1. Drawing Submissions.
2. Equipment Selection Submissions.

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3. Off Site Manufacturing.
4. Installation on Site.
5. Testing and Commissioning Procedures Submission.
6. Testing, of the complete works.

The Project Engineer / Manager shall weekly, throughout the progress of the Subcontract, amend and update the 'tabular list of activities' to incorporate all variations, delays and remedial action to ensure that the completion date will be met. He shall particularly note and report to the Engineer on unusual conditions encountered which may (or has) delayed progress of the work related to the Contractor's programme.

The successful Contractor shall weekly report to the client, with copies to the Engineer, in writing only and shall sign each progress report, equipment submission, drawings and inspection checklists.

The Client shall be capable of using network diagrams to explain the sequence and actual dates used by him in his tabular form monthly report in order to prove that 'cut-off' dates are realistic and factual and not an attempt to formulate claims for delays.

On the request of the Engineer and / or Client, the contractor shall remove from the works a person who is negligent in his contractual obligations.

## **9. ORGANISATION AND STAFF OF CONTRACTOR**

In addition to the site supervisor / foreman, the contractor shall employ, (apart from the required artisans and labourers), as many trustworthy and experienced Engineers, programmers, inspectors and administrators as may be necessary for the purpose of the subcontract.

The duties and responsibilities of the contractor engineering and management staff shall be inter alia:

- Programming of the works in agreement with the Engineer as per N/S subcontract agreement.
- Directing his employees to ensure efficient, timely and safe execution of the

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work, and co-operation with the Engineer and other trades to ensure such execution.

- Selection and / or engineering of equipment and components into working assemblies all in conformance with the design concept contained herein.
- Equipment selection and submissions of shop drawings for approval in accordance with the required procedures.
- Expediting of the work.
- Attendance of routine site progress meetings and programme monitoring meetings which may be arranged by the Engineer.
- Preparation and submission of testing and commissioning procedures and programming.

## **10. PROTECTION AGAINST DAMAGE**

Special care shall be taken in transport, delivery, storage on site and installation to ensure that the entire system is in 'as new' condition at start-up.

Packaging material shall be of sufficient strength and/or temporarily reinforced during transport to - and handling on site, until installed in its final position, to ensure that the equipment "packed" retains its structural and dimensional integrity during these phases of the contract.

The contractor shall remain responsible for equipment in 'as new condition' and is not allowed to install equipment in areas or spaces where it can be subjected to damage through weather or trades for which it has not been designed.

## **11. ACCESS TO EQUIPMENT AND SYSTEMS**

The contractor shall familiarise himself with the proposed location of the equipment and shall be responsible for ensuring that sufficient access is available on site to allow the largest component parts to be brought into position.

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The required unobstructed space shall be left around the equipment for access, maintenance and service of the equipment in accordance with the manufacturer's instructions.

Equipment shall be installed so as to be readily accessible for testing, operation, maintenance and repair. Minor deviations from drawings may be made to accomplish this, but changes of magnitude or which involve extra costs shall not be made without approval of the Engineer.

## **12. CLEANING AND START UP**

Repaired equipment/components will be accepted at "handover" of system if defects become apparent during start-up, testing and commissioning only at the discretion of the Engineer.

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### 13. TESTING, COMMISSIONING, OPERATING OF PLANT AND HANDOVER

1. Concurrent with equipment submissions the contractor shall submit full testing and commissioning procedures for each item of equipment.
2. Prior to the pre-start inspection the contractor shall submit and have obtained approval of a fully detailed commissioning programme.

The programme shall include but may not be limited to the following:

- checking of earth containing and earth loops impedance to ensure compliance with SANS 10142
  - the alarm devices comply with the requirements,
  - all detectors and manual call points function correctly and initiate the correct operation,
  - any connection to the fire brigade or remote manned centre operates correctly,
  - any radio links have adequate signal strength, and
  - any signals to ancillary equipment are given correctly.
3. After physical completion of the subcontract works the contractor shall carry out all preliminary tests necessary to satisfy himself that the plant, materials and equipment comply with the provisions of the subcontract and are in a state suitable to satisfy the requirements of the acceptance tests by the Engineer. The preliminary tests shall then be completed satisfactorily before the contractor, through the contractor, requests the Engineer to witness the acceptance tests.
  4. The Engineer may request the contractor to replace any portion of the contract work which does not conform to the requirements of the contract documents.

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5. In the event of the installation not conforming to the requirements of the subcontract documents, the employer shall be at liberty to either recover from the contractor or to deduct from the subcontract price all reasonable expenses incurred by himself or his agents attending the repeated test.
6. After physical completion has been reported and all defects made good, "programming" shall take place.
7. Prior to the carrying out of acceptance tests the contractor shall operate the entire system for as long a period as may be required to provide satisfactory performance as specified in this specification and SANS 10139 code of practice at all times for 24 hours a day continuously.
8. The contractor's operator(s) shall be fully conversant with the plant operation and experienced in running similar installations. The contractor shall train the employer's operator(s) to enable them to be responsible for the capable of operating the plant. Logging of the plant operation (alarm, dirt, etc. History) shall commence once plant has been commissioned and the contractor shall continue logging until the acceptance tests have been carried out and the plant handover.

## **14. GUARANTEE**

The contractor shall guarantee that the systems are installed and commissioned in such a manner that they will function to the true intent and meaning of the sub-contract documents.

## **15. CERTIFICATIONS**

### **15.1 BACKGROUND**

In order to obtain acceptance and approval of the detection and gaseous suppression systems on completion of the project, it will be necessary to prove to the Engineer that the systems specified and as installed under this contract have been correctly installed and are fully operational and complies with all relevant codes of practice specified in this document.

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## 15.2 CERTIFICATION REQUIRED FROM CONTRACTOR

Upon completion of the installation of a system contained in this document, the contractor shall provide to the Engineer (Plantech) a signed written statement, substantially in form as follows:

*"The undersigned, having installed the Fire Detection and Gaseous Suppression Systems at the Armscor Head Office Building, Pretoria confirms that the above-mentioned systems were installed in accordance with the specification, instructions and directions provided to us by the manufacturers."*

*In addition, the certificate as provided in the relevant annexure of this specification and SANS 10139 Code of Practice must be completed in full, with no qualifications or amendments on handover.*

At project completion, supplier is to provide written confirmation detailing the fire suppression equipment, quantity of equipment supplied, type and volume of all gasses used. The contractor shall also ensure and be responsible for the submission of the hydrostatic pressure testing certificates for each one of the gaseous suppression cylinders.

## 16. QUALITY MANAGEMENT SYSTEM – TESTING - INSPECTION

The tender will take into account the Contractor official Quality Manual and Quality Control Systems.

The manual shall not only describe in detail the qualifications, responsibilities, and authority of the proposed Project Engineering, Managing and Quality Assurance personnel but also the firm's technical standards and detail procedures for:

- i. Programme Submission and Contract Management.
- ii. Equipment Selection Submissions.
- iii. Installation / Shop Drawing Submissions.

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- iv. Sub-systems(s) Testing and Commissioning Manual Submission.
- v. Site Installation Inspection Report Submissions.
- vi. Progress Payments and Evaluation.

The quality of managing, as reflected in the Subcontractor's submission of:

- i. Work programming.
- ii. Equipment selection.
- iii. Shop drawings.
- iv. Testing and Commissioning Documentation.
- v. Operating Instructions and Maintenance Manuals.
- vi. Inspection Record Cards/Checklist shall be in accordance with ISO-9000 or otherwise/approved.

No portion of the work shall commence before the Quality Manual has been approved by the Engineer.

## **17. OPERATING AND MAINTENANCE MANUALS**

### **17.1 GENERAL**

The Contractor shall hand over to the Engineer, as part of his scope of works, 2 weeks prior to first delivery being accepted by the Engineer, one full set of his as-built documentation, including:

- One set of transparencies of his up to date working drawings.
- All electrical and control schematics.
- Complete detail design calculations.

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Two draft sets of operational and maintenance manuals, prepared in English, and written in layman's terms, shall be handed over for comments to the Engineer at least 2 weeks before first delivery.

Paper copies of all as-built documentation shall be bound into every operating and maintenance manual. Manuals shall be properly bound in a durable hard cover. Material shall be clearly legible, well organised, and be provided with index. Drawings and diagrams A2 and larger shall be folded to A4 size, and included in thick clear plastic pockets.

The Contractor shall hand over five sets of approved O&M manuals. First delivery shall not be accepted before the complete sets of approved O&M manuals have been handed over.

## **17.2 GENERAL REQUIREMENTS**

The items above are to be specifically prepared for the contract. No standard forms or manufacturers literature is acceptable. Maintenance check sheets to refer to items of equipment by name and not general descriptions.

Maintenance instructions may consist of manufacturers printed instructions where these are detailed and pertinent. Copies of general technical and sales literature are not acceptable.

The contractor shall supply four (4) comprehensively indexed operating and maintenance manuals, bound in loose leaf plastic covers for the entire building as specified and covered in this scope.

The manuals shall be arranged in two parts:

## **17.3 OPERATION MANUAL**

This manual should consist of two parts.

### **17.3.1. Part I - Operation Instruction**

Contains information a qualified operator needs

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- 1) to start and stop equipment;
- 2) to control and monitor the performance of the equipment in normal modes of operation;
- 3) to change from one mode of operation to another and;
- 4) to operate equipment in emergency situations.

Operation procedures with proper flow charts for all integrated systems are also required. The system function should be represented pictorially and in writing.

Full trouble analysis procedures shall also be included.

### **17.3.2. Part II - Performance Verification Procedures**

Contains all the information a qualified operator needs to verify equipment and overall system performance at the. Any design calculations needed for performance verification shall be included in this manual.

## **17.4 MAINTENANCE MANUAL**

This manual should also consist of two parts.

### **17.4.1. Part I - Inventory**

Contains a listing of all systems and pieces of equipment to be maintained as well as all the technical information needed to order spare parts. Manufacturers' catalogues are considered useful adjuncts only.

The full names, addresses and contact details of all suppliers of equipment shall be included.

### **17.4.2. Part II - Maintenance Programme**

Contains the information necessary to perform breakdown, preventative, and predicative maintenance. These programmes include written information regarding when or how often to perform maintenance in the most efficient and economical fashion to satisfy tenant needs.

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## 18. ONE YEAR'S MAINTENANCE

The contractor shall furnish free of charge all maintenance on the entire subcontract works for a period of twelve (12) months after completion of subcontract works. Maintenance shall include systematic examination and adjustment of equipment as set out in the schedules below:

### 18.1 FIRE DETECTION EQUIPMENT – MAINTENANCE SCHEDULE

|   | Description                                                           | Daily                       | Weekly | Monthly | Three-Monthly | Six-Monthly | Annual |
|---|-----------------------------------------------------------------------|-----------------------------|--------|---------|---------------|-------------|--------|
| 1 | Maintained in Accordance to SANS 10139                                | At All Times                |        |         |               |             |        |
| 2 | Clear space of at least 500mm below detectors maintained at all times |                             |        |         | X             |             |        |
| 3 | Check that manual call points are accessible and conspicuous          |                             |        |         | X             |             |        |
| 4 | Review logbook and automatic alarm log                                |                             |        | X       |               |             |        |
| 5 | Repair / reinstate after activation of fire (within 24 hours)         | At All Times                |        |         |               |             |        |
| 6 | Check that panel is in Normal mode (no faults)                        |                             |        | X       |               |             |        |
| 7 | Record any faults in log                                              |                             |        | X       |               |             |        |
| 8 | Repair any faults identified                                          | Within 8 Hours of Discovery |        |         |               |             |        |
| 9 | Test communication with Fire Department                               |                             |        |         | X             |             |        |

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| Description |                                                                                                                                                                                                                                                                                                                                                                                                                         | Daily                               | Weekly | Monthly | Three-Monthly | Six-Monthly | Annual |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------|---------|---------------|-------------|--------|
| 10          | Visual inspection of backup batteries                                                                                                                                                                                                                                                                                                                                                                                   |                                     |        | X       |               |             |        |
| 11          | Full test of backup batteries                                                                                                                                                                                                                                                                                                                                                                                           |                                     |        |         | X             |             |        |
| 12          | Test each zone of detection system                                                                                                                                                                                                                                                                                                                                                                                      |                                     |        |         | X             |             |        |
| 13          | Test each individual detector                                                                                                                                                                                                                                                                                                                                                                                           |                                     |        |         |               |             | X      |
| 14          | Visual inspection of cables                                                                                                                                                                                                                                                                                                                                                                                             |                                     |        |         |               |             | X      |
| 15          | Complete certificate as per SANS 10139 on completion of testing                                                                                                                                                                                                                                                                                                                                                         |                                     |        |         |               |             | X      |
| 16          | <p>Check the following after a fire:</p> <ul style="list-style-type: none"> <li>o All radioactive detectors are handled as per Occupational Health and Safety Act requirements;</li> <li>o Each detector and break glass unit in fire area is tested;</li> <li>o Visual inspection of all other parts of the system;</li> <li>o Batteries and battery charger; and</li> <li>o Issue certificate as per Annex</li> </ul> | Immediately Following a Fire        |        |         |               |             |        |
| 17          | <p>After any false alarm check:</p> <ul style="list-style-type: none"> <li>o Which device caused the false alarm;</li> <li>o If device not faulty, identify cause of device trigger (eg. Someone smoking, etc.)</li> </ul>                                                                                                                                                                                              | Immediately Following a False Alarm |        |         |               |             |        |

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The contractor shall in the course of such maintenance or on call during the maintenance period, repair or replace defective parts, and shall use only genuine parts produced by the manufacturer of the original part.

The contractor shall supply all replacement parts, as required at no cost where work is of a routine nature (ie. not maliciously damaged).

## **18.2 ONE YEAR'S MAINTENANCE – GAS SUPPRESSION EQUIPMENT**

The Contractor shall furnish free of charge all maintenance on the entire subcontract works for a period of twelve (12) months after completion of subcontract works.

The Contractor shall in the course of such maintenance or on call during the maintenance period, repair or replace defective parts, and shall use only genuine parts produced by the manufacturer of the original part.

The Contractor shall supply all replacement parts, as required

During the free maintenance and guarantee period, the Contractor shall perform:

- Monthly/quarterly inspections and maintenance as applicable.
- Comprehensive maintenance service at the end of a period of 11 months verifying all commissioning set points, proper operation etc.

Maintenance shall consist of maintenance in accordance with the maintenance schedules and actual maintenance performed shall be recorded on the maintenance check sheets and signed off by the Engineer.

All inspections and services shall be followed, within 7 days of such inspection or service, by report outlining:

- The scope of the inspection.
- Any maintenance carried out.
- General state of installation & items requiring further attention

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Report shall be completed in duplicate and forwarded to the Client and Engineer.

All items requiring replacement, repair or service within the 12 months maintenance and guarantee period, whether equipment or consumables, shall be repaired, replaced or serviced by the Contractor at his own expense as part of this contract.

The system shall be fully guaranteed against all defects, and where a major defect occurs during the guarantee period, the item involved shall be guaranteed for a further 12 months from date on which the defect was repaired, and the Department notified in writing.

| Description |                                                                                                                                                                                                                                                                                                                                                   | Daily        | Weekly | Monthly | Three-Monthly | Six-Monthly | Annual |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------|---------|---------------|-------------|--------|
| <b>A</b>    | <b>GENERAL</b>                                                                                                                                                                                                                                                                                                                                    |              |        |         |               |             |        |
| 1           | Maintained in Accordance to SANS 14520-1:2006                                                                                                                                                                                                                                                                                                     | At All Times |        |         |               |             |        |
| 2           | All extinguishant removed from containers during service or maintenance procedures shall be collected and recycled, or disposed of in an environmentally sound manner, and in accordance with existing laws and regulations. Inert gas mixtures based on those gases normally found in the earth's atmosphere are exempted from this requirement. | At All Times |        |         |               |             |        |
| 3           | The date of inspection and the name of the person performing the                                                                                                                                                                                                                                                                                  | At All Times |        |         |               |             |        |

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|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |   |   |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|---|---|
|   | inspection shall be recorded on a tag attached to the container.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |   |   |
| 4 | Containers shall be subjected to periodical tests as required by the relevant national standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |   |   |
| 5 | All systems shall be thoroughly inspected and tested for proper operation by competent personnel only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |  |   | X |
| 6 | Inspection report with recommendations shall be filed with the owner                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  |  | X |   |
| 7 | <p>The container contents shall be checked as follows:</p> <p>(a) <u>Liquefied gases</u>: for halocarbon extinguishants, if a container shows a loss in extinguishant quantity of more than or a loss in pressure (adjusted for temperature) of more than , it shall be refilled or replaced.</p> <p>(b) <u>Non-liquefied gases</u>: for inert gas extinguishants, pressure is an indication of extinguishant quantity. Unless otherwise specified by the authority, if an inert gas extinguishant container shows a loss in pressure (adjusted for temperature) of more than, it shall be refilled or replaced. Where container pressure gauges or weight-monitoring</p> |  |  |  |  | X |   |

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|          |                                                                                                                                                                                                                                                                                                                                                                      |              |  |  |  |  |   |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--|--|--|--|---|
|          | devices are used for this purpose, they shall be compared to a separate calibrated device at least annually.                                                                                                                                                                                                                                                         |              |  |  |  |  |   |
| <b>B</b> | <b>ENCLOSURES</b>                                                                                                                                                                                                                                                                                                                                                    |              |  |  |  |  |   |
| 1        | At least every 12 months it shall be determined whether boundary penetration or other changes to the protected enclosure have occurred that could affect leakage and extinguishant performance. If this cannot be visually determined, it shall be positively established by repeating the test for enclosure integrity                                              |              |  |  |  |  | X |
| 2        | Where the integrity test reveals increased leakage that would result in an inability to retain the extinguishant for the required period, remedial action shall be carried out.                                                                                                                                                                                      | At All Times |  |  |  |  |   |
| 3        | Where it is established that changes to the volume of the enclosure or to the type of hazard within the enclosure, or both, have occurred, the system shall be redesigned to provide the original degree of protection. It is recommended that the type of hazard within the enclosure, and the volume it occupies, be regularly checked to ensure that the required | At All Times |  |  |  |  |   |

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|           |                                                                                                                                                                                                                                                                                                                                                                                                              |              |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|           | concentration of extinguishant can be achieved and maintained.                                                                                                                                                                                                                                                                                                                                               |              |
| <b>C</b>  | <b>MAINTENANCE</b>                                                                                                                                                                                                                                                                                                                                                                                           |              |
| <b>C1</b> | <b>GENERAL</b>                                                                                                                                                                                                                                                                                                                                                                                               |              |
| 1         | The user shall carry out a programme of inspection, arrange a service schedule, and keep records of the inspections and servicing. The continued capability for effective performance of a fire fighting system depends on fully adequate service procedures with, where possible, periodic testing. Installers shall provide the user with a record in which inspection and service details can be entered. | At All Times |
| <b>C2</b> | <b>USER'S PROGRAMME OF INSPECTION</b>                                                                                                                                                                                                                                                                                                                                                                        |              |
| 1         | <p>The installer shall provide the user with an inspection programme for the system and components. The programme shall include instructions on the action to be taken in respect of faults.</p> <p>The user's inspection programme is intended to detect faults at an early stage to allow rectification before the system may have to operate.</p>                                                         | At All Times |

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|          |                                                                                                                                                                                               |  |   |   |   |   |  |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|---|---|---|--|
| 2        | Visually check the hazard and the integrity of the enclosure for changes which might reduce the efficiency of the system.                                                                     |  | X |   |   |   |  |
| 3        | Carry out a visual check that there is no obvious damage to pipework and that all operating controls and components are properly set and undamaged.                                           |  | X |   |   |   |  |
| 4        | Check pressure gauges and weighing devices, if fitted, for correct reading and take the appropriate action specified in the users' manual.                                                    |  | X |   |   |   |  |
| 5        | Check that all personnel who may have to operate the equipment or system are properly trained and authorized to do so and, in particular, that new employees have been instructed in its use. |  |   | X |   |   |  |
| <b>D</b> | <b>SYSTEM PERFORMANCE VERIFICATION</b>                                                                                                                                                        |  |   |   |   |   |  |
| 1        | Test and service all electrical detection and alarm systems as recommended in the appropriate national standards.                                                                             |  |   |   | X |   |  |
| 2        | Externally examine pipework to determine its condition; replace or pressure test and repair as                                                                                                |  |   |   |   | X |  |

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|   |                                                                                                                                                                                                                                                                       |                                                                        |  |  |  |   |   |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|--|--|--|---|---|
|   | necessary pipework showing corrosion or mechanical damage.                                                                                                                                                                                                            |                                                                        |  |  |  |   |   |
| 3 | Check all control valves for correct manual function and automatic valves additionally for correct automatic function                                                                                                                                                 |                                                                        |  |  |  | X |   |
| 4 | Externally examine containers for signs of damage or unauthorized modification, and for damage to system hoses                                                                                                                                                        |                                                                        |  |  |  | X |   |
| 5 | Check pressure gauges of extinguishing containers; liquefied gas should be within and non-liquefied gases within of correct charge pressure; replace or refill any showing greater loss                                                                               |                                                                        |  |  |  | X |   |
| 6 | For liquefied gases, check weigh or use a liquid level indicator to verify correct content of containers                                                                                                                                                              |                                                                        |  |  |  | X |   |
| 7 | Carry out a check of enclosure integrity using the method described in 9.2.4.1. If the measured aggregate area of leakage has increased from that measured during installation which would adversely affect system performance, carry out work to reduce the leakage. |                                                                        |  |  |  |   | X |
| 8 | <b>As required by statutory regulations,</b> but otherwise when convenient, remove the containers and pressure test when necessary.                                                                                                                                   | Every 10 years or as per manufacture's specifications and requirements |  |  |  |   |   |

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A service schedule shall include requirements for periodic inspection and test for the complete installed system, including pressurized containers, as specified in the appropriate national standards.

The schedule shall be carried out by a competent person who shall provide the user with a signed, dated report of the inspection, advising any rectification carried out or needed. During servicing, every care and precaution shall be taken to avoid release of extinguishant.

## 19. **TRAINING**

The contractor will at no additional cost train the staff selected by the client.

The training shall be continued until the contractor is satisfied that the selected staff is capable in the operation and maintenance requirements of the system(s).

All persons who may be expected to inspect, test, maintain or operate fire-extinguishing systems shall be trained and kept adequately trained in the functions they are expected to perform.

Personnel working in an enclosure protected by a gaseous extinguishant shall receive training in the operation and use of the system, in particular regarding safety issues.

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## 20. **COMPLETION OF SUBCONTRACT WORKS**

Completion of the works will occur after the following procedure has been certified by the Engineer as having been carried out in accordance with the specification:

- After the defects are made good and approval of the Engineer is obtained, physical completion has been reported to the Engineer by the contractor and the Engineer has given approval for "start-up".

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- "start-up" has taken place.
- Commissioning and testing has taken place as specified and test results have been witnessed (where required), recorded and finally approved by the Engineer.
- Four (4) hard and four (4) soft copies of Operations and Maintenance Manuals have been received.

## **21. QUALITY**

### **21.1 STANDARD OF WORKMANSHIP**

#### **21.1.1. General**

All aspects of the installation (e.g. setting out, alignment, levels, positions, etc.) must be checked on site and the installation installed correctly within the parameters of the SANS 10139, SANS 14520 Part 1 and Part 14, SANS 369, and EN 54: Part 16 Codes of Practice.

#### **21.1.2. Visual Appearance**

The visual appearance of installation is important and the Contractor must ensure that the lines and levels followed by the equipment are correct not only within the tolerances specified but also look aesthetically correct to the satisfaction of the Client and Engineer.

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**PART II: GENERAL TECHNICAL SPECIFICATION****1. MATERIALS**

Only equipment and components specifically designed for the proposed use may be used. To this end, all equipment shall be either listed / approved by an approved testing laboratory / authority. Proof of such compliance shall be provided for each item, with proof of compatibility with the system as a whole.

Under normal conditions of use, all materials shall be free from defects, which are liable to cause undue deterioration or failure. Materials shall not shrink, warp or cause mould or odours and shall be resistant to attack by local vermin and destructive pests.

Materials shall be stored in areas allocated by the Employer. Stored materials shall not overload the floor construction beyond design limits.

**2. COMPATIBILITY**

All the components of a fire alarm system shall be mutually compatible.

Compliance of an individual component with any standard or approval does not necessarily guarantee that it will work satisfactorily in conjunction with another component that complies with another standard.

The contractor shall consider the subjects below, and the data provided with each item shall provide the information necessary for the consideration of its compatibility with other items. All specifications and details are to be forwarded to the Engineer for approval.

In relation to a given control and indicating panel, such consideration shall include at least the following:

- a) for all devices:
  - the requirements of the system in order to satisfy electrical safety requirements;
  - any provision for earthing;

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- the earth insulation resistance;
- the method of adjustment where adjustment is required to ensure compatibility;
- any preferred method(s) for monitoring line continuity;
- whether the current taken or delivered has an appreciable reactive component;
- the characteristics of any signals that pass between components;
- the ability of the control and indicating equipment to operate in conjunction with the number of devices to which it will be connected;
- any software provided for programming the system or its components, and the compatibility of other components with the software; and
- any limitations on the numbers, types, sizes or other parameters (such as impedance) of wires that can be connected.

b) for fire detectors:

- the form of output;
- the operating voltage, including tolerances;
- the quiescent current;
- the alarm current or maximum permissible alarm current rating;
- the method of resetting the device after an alarm;
- the states of the detector that indicate normal conditions, fault conditions and fire conditions;
- any requirements for indications of operation to be provided in the vicinity of a detector, together with any resultant changes in system conditions, e.g. Reliability or power consumption; and
- the number of conductors required.

c) for alarm devices:

- whether polarized connection is required;
- whether precautions might be required in order to suppress any interference generated by the device;
- what methods for monitoring the interconnections can be used;
- whether the power supply arrangements can provide sufficient power;
- whether a high starting current is required.

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- d) for manual call points:
  - whether they are of open or closed circuit operation;
  - whether they are of polarized operation;
  - the method of discrimination between alarm and fault conditions;
  - the method of resetting the device after an alarm.
  
- e) for power supplies:
  - the correct voltage for the type of battery used (i.e. Lead-acid or alkaline types);
  - the correct charging characteristics for the type of battery (i.e. Constant current or constant voltage);
  - the relationship between polarity and earth, or whether the potential is earth-free;
  - the current rating in relation to calculated maximum demand;
  - the permissible limits of ripple;
  - the degree of stabilization;
  - the formula for power capacity for the system, including the storage capacity of the standby supplies and the required standby duration;
  - the permissible range for the supply voltage; and
  - whether the standby power supplies are able to provide the necessary current for the specified duration.
  
- f) for automatic fire protection equipment:
  - whether the energy required by the automatic fire protection equipment is available from the control and indicating equipment or whether additional power supplies will be required;
  - whether the voltage(s) required by the automatic fire protection equipment are compatible with those available from the control and indicating equipment;
  - whether the equipment is compatible with proposed monitoring facilities;
  - whether the equipment requires positive or negative switched input; and

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- whether the equipment is normally energized or normally de-energized.
- the functions provided;
- the signal conditions for each function; and
- the terminal connections.

### 3. **IDENTIFICATION**

A label shall be provided under each device, detector, relay, controller and panel identifying the equipment controlled and / or performance indication by such items.

The labels shall consist of a non-corroding material with a non-glossy appearance, engraved with black, lettering on a white background.

A battery room or cabinet should be secured against unauthorized admission and should display notices indicating its purpose, the importance of not smoking, and the need to use insulated tools and to remove metallic personal adornment to avoid accidental short-circuits.

In addition to the warning and information labels that should be provided in accordance with SANS 10142, a label should be provided on any isolating protective device that affects the fire alarm system and should read as follows:

*"Warning: this switch also controls the supply to the fire alarm system"*

### 4. **POWER**

#### 4.1 **GENERAL**

Provision is made for a normal power supply and a standby power supply, each shall be capable of supplying the largest load to be placed on it under normal, fire and fault conditions.

Transition between supplies shall not cause momentary interruptions. Where devices such as fuses are fitted in order to protect power supplies, the

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operation of a single protective device shall not interrupt both power supplies and cause the system to fail.

The condition of the normal supply shall be indicated by a green pilot light, which lights up when the normal supply is on.

The largest alarm load is the maximum load imposed by the fire alarm system on a power supply under fire conditions. It will include the power required to operate the sounders, detectors, fault warning devices, the illumination and any ancillary services powered by the fire alarm system etc.

Any power required for a display should be derived from the fire alarm system power supply and should be taken into account when assessing the capacity of the power supply.

The load imposed on the power supply by the simultaneous operation of detectors or manual call point (or both) shall not cause an existing fire alarm to cease. In systems using microprocessors or stored programs, the imposition of the maximum alarm load should not cause incorrect operation.

## **4.2 NORMAL POWER SUPPLY**

The normal supply for the fire detection and alarm system shall be derived from the public supply system, transformed or modified as necessary.

## **4.3 STANDBY POWER SUPPLY – SECONDARY BATTERIES**

Where secondary batteries with an automatic charger are used, they should be of a type that has a life of at least 4 years under the conditions of use likely to be experienced in the fire alarm system. Automotive lead-acid batteries (e.g. the type normally used for starting cars) are not acceptable.

Because the life of the battery frequently depends on its charging conditions, care should be taken that the battery charger satisfies any requirement specified by the battery supplier. Where replacement batteries or battery chargers are used, similar care should be taken to ensure charging compatibility. Replacement cells shall be compatible with the existing cells in

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both charge and discharge characteristics. The supplier of the system shall specify a method of test that is likely to predict failure of the battery in the interval between routine tests.

The charging rate of the battery shall be such that, having been discharged to its final voltage, the battery can be charged sufficiently to comply with the recommendations after a charging period of 24 hours.

The battery calculation sheet is to be completed and approved by the Engineer prior to the commencement of installation activities.

## **5. CIRCUIT DESIGN**

### **5.1 GENERAL**

**Note:** The tender drawings are intended to show the principal layout of the system. As specified elsewhere in this document, it will be the responsibility of the contractor to complete the circuit design in terms of the guidelines provided and the SANS 10139 Code of Practice.

Care should be taken to ensure compatibility of all components that are part of the fire alarm system or connected with it in any way.

Circuits should be so arranged that an indication is given at the control and indicating equipment within 100 seconds of the occurrence of any disconnection, open or short circuit in a cable that would disable one or more detectors or call points (or both), or of a failure of any other interconnection, and this should be done without giving a false alarm.

Even where the wiring of a system is monitored, regular routine testing is important and should be considered during installation.

The contractor shall provide a method of manually testing of circuits.

### **5.2 CIRCUITS THAT CONTAIN FIRE DETECTORS**

The wiring arrangement of the system shall be such that:

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- a) if separate circuits are used for each zone, a fault or faults on one circuit shall not affect any other circuit,
- b) if any circuit is used for more than one zone, a fault or faults on one circuit shall not affect any other circuit,
- c) if a circuit is used for more than one zone and multiple faults within one fire compartment could remove protection from an area greater than that allowed for a zone, the circuit within that division is suitably protected, and
- d) two simultaneous faults shall not remove protection from an area greater than  
10 000 m<sup>2</sup>.

If the system is such that the removal of a detector or call point from the circuit could affect the operation of other detectors or call points

- a) removal of a detector or call point shall cause a 'fault' signal to be generated at the control equipment, indicating the need to replace the missing detector or call point as soon as possible, and
- b) the operating instructions shall draw the users attention to any adverse effects on the remainder of the system due to the removal of one or more detectors or call points (or a combination of these).

### **5.3 CIRCUITS THAT CONTAIN FIRE ALARM SOUNDERS**

If alarm sounders use the same wiring as detectors, no alarm sounder shall be affected by the removal of any detector. Any sounder that is necessary in order to reach the audibility levels recommended shall only be removable by the use of a special tool, and removal shall generate a fault warning at the control and indicating equipment.

The wiring of sounder circuits shall be so arranged that, should a short circuit develop in any part of the wiring of sounder circuits during a fire, at least one alarm sounder will continue to sound. This minimum provision shall ensure that

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a general alarm can be given at the start of a fire and for a significant period thereafter and that, in the event of the fire's burning through a sounder cable, the alarm will be maintained at, at least one point in the building, usually near the control equipment.

#### **5.4 RING SYSTEMS**

If devices such as detectors, call points or sounders are connected to control equipment by a ring circuit, then, provided that the devices can receive or send signals in either direction, they will continue to operate even with a single open circuit or high series resistance in the ring. Such faults shall be indicated at the control and indicating equipment within 60 seconds of their occurrence. A simple ring circuit, however, cannot give protection against short-circuit faults and hence such faults have to be indicated, without giving a false fire alarm, within 100 seconds. Where sounders are used on simple ring circuits, the distribution wiring to each sounder circuit should be protected against overload owing to a short circuit by a fuse or similar device.

#### **5.5 CIRCUITS PROTECTED AGAINST CABLE FAULTS**

In some ring systems (usually those using computer techniques with addressable devices) short-circuit isolating devices can be provided such that a short circuit will only affect the section between the isolators. The isolators could be independent devices, or could be contained within other devices on the circuit. In such a system a single fault, whether to open-circuit or to short-circuit conditions, can affect at most the section of the loop between the nearest isolators. (other circuit arrangements that have the same general effect are possible). Where the effect of the fault is to reduce to one the number of signal paths to any detector or call point, the control equipment should indicate the fault within 60 seconds of its occurrence and should preferably indicate the position of the fault. It is essential that action be taken to repair such faults since, if a fault is left unprepared, the system has no protection against further faults. However, if, because of redundancy in the

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circuit design, at least two signal paths to each detector and to each call point remain, it is necessary to ensure the indication of the fault only within 24 hours of its occurrence.

## **5.6 ZONES**

When a signal of fire is given it is vital that there should be no confusion about the zone from which it is received. To facilitate response by people who provide assistance, the zone should be small enough for a fire to be located quickly. It is often important that there should be adequate fire separation between the zones; this is particularly so if the initial evacuation procedures in the building usually entail movement from the zone of the fire to one of temporary refuge.

On larger premises in particular, the fire alarm system should therefore be so designed and arranged that it is both fully compatible with the emergency procedures and provides at some central or convenient point, or points, an indication of the zone in which an alarm has originated. In the case of two-stage alarms, clear and unambiguous signals should indicate the emergency procedure to be adopted throughout each zone.

In general the signals used in different zones on the same premises should be the same unless the background noise in one or more zones is such as to require different sounders.

If the system has been installed for purposes of safety of life (type I or m), each zone should be readily accessible from the point(s) where the indication of the location of fire is provided. In general, access to any zone should be by normal circulation routes; however, where small areas of the building are defined as zones for specific purposes (such as the existence of a special risk) it might be permissible for access in the immediate vicinity of that zone to be by another route, for example through another room.

Note: in systems other than addressable systems, signals coming from individual detectors or groups of detectors cannot be separately identified. In these systems, therefore, to allow zone identification, it is usual for each zone to be fed by a separate circuit. It has thus become common for the concepts of 'zones' and 'circuits' to be used interchangeably. In addressable systems, however, several zones

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(defined as subdivisions of the premises) can be fed from a single circuit while retaining zone identification. It is therefore important that in such systems the concepts of 'zones' and 'circuits' be treated separately.

## 5.7 LOOPS

It shall be possible to connect the following detectors / devices to the control unit addressable loop.

- multisensors – optical / thermal type
- optical smoke sensors – analogue type
- high sensitivity smoke detector – loop/address interface
- open-area smoke imaging detection (OSID)/beam detectors–  
loop/address interface
- heat sensors – analogue type
- manual call point "break-glass" units
- wireless radio-based analogue multisensors – optical/thermal (with loop interface)
- wireless radio-based analogue sensors – heat type (with loop interface)
- wireless radio – based call points (with loop interface)
- addressable relays i.e. Output devices
- addressable sounders (loop powered)
- sounder circuit controllers
- addressable remote led indicators
- gas discharge control units
- line isolators

Note: detectors within any area protected by a gaseous suppression system shall be connected to at least two loops.

## 6. CABLES AND CONDUCTORS

### 6.1 CABLES

It is essential that connections between detectors or call points and the control equipment should be able to maintain the alarm without a continued signal

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from the detector or call point, i.e. Destruction of the connection after the initial operation shall not affect the sounding of the alarm.

Where multi-core cable, flexible cable, or flexible cords are used for interconnections in fire alarm circuits, none of the conductors shall be used for circuits other than those of fire alarms.

Electric cables should:

- a) be suitable in the opinion of the authority that has jurisdiction for a particular application and comply with approved standards where relevant,
- b) be selected, handled and installed in accordance with SANS 10198-2; SANS 10198-4 and SANS 10198-8,
- c) be protected from direct exposure to fire, and
- d) be appropriately insulated and armoured, be enclosed in appropriate conduit, or be mineral-insulated and copper-sheathed.

Note the following types of cable are normally deemed to be suitable, subject to the restrictions on their use and the recommendations for further protection:

- i) impregnated-paper-insulated metal-sheathed cables that comply with SANS 97;
- ii) cables designed for the detection of heat that comply with SANS 529;
- iii) polymeric or rubber insulated cables that comply with SANS 1268;
- iv) cross-linked polyethylene (XPLE)-insulated electric cables that comply with the requirements of SANS 1339; and
- v) cables with solid dielectric insulation that comply with SANS 1507.

**Note:** FR-20 cable is not considered acceptable.

Cable is to be red in colour.

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## **6.2 APPLICATIONS**

### **6.2.1. General**

A wide variety of different cables can be used in various parts of a fire alarm system. However, because of their varying abilities to resist both fire and electrical or mechanical damage, many of these cables might be restricted in their suitability for specific applications. The applications are classified according to the need for fire protection.

### **6.2.2. Applications in Which Prolonged Operation during a Fire Is Required**

Cables used for the interconnection of components of a fire alarm system are required to continue operating after a fire is first discovered (e.g. Sounders, control and indicating equipment and power supplies) unless they are protected against cable failure. Cables used within protected premises for the transmission of the alarm to a remote centre should also be protected against cable failure. In general it may be assumed that interconnections between sounders, control and indicating equipment and power supplies that can resist fire for at least 0,5 hours will be satisfactory. In special cases, however, longer periods might be required (for example, in buildings with a two-stage alarm system).

### **6.2.3. Applications in Which Prolonged Operation during a Fire Is Not Required**

Cables that are not required to continue operating for appreciable periods after the fire is discovered or after they are attacked by fire will usually be only those to detectors or call points, but might also include those to ancillary devices (such as door holders), in which case a failure of the cable due to a fire will not lead to a dangerous condition.

### **6.2.4. Protection from Fire**

- i. Applications that do not require prolonged operation during a fire

Where prolonged operation during a fire is not required, any of the cables listed may be used without additional fire protection.

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Cables designed for the detection of heat, or coaxial cable, may be used for the interconnection of detectors within a zone, provided that the system is such that it gives a fire alarm in response to the occurrence of fire at such a cable.

ii. Applications requiring prolonged operation during a fire

Cables that are required to continue operating during exposure to fire should be protected against exposure to the fire by either:

- a) burial in the structure of the building and protection by the equivalent of at least 12 mm of plaster, or
- b) separation from any significant fire risk by a wall, partition or floor that will resist a fire for at least 0,5 hours.

Note: the mechanical protection of cables by conduit, ducting or trunking should not be considered as giving protection against fire.

iii. Reduced protection

Where possible, cables should be routed through areas of low fire risk. Where cables pass through areas of very low fire risk or where cables are protected by an automatic extinguishing system or sprinkler installation, a reduction in the degree of fire protection recommended might be acceptable following consultation with interested parties.

## 6.2.5. Protection of Cables from Electrical or Mechanical Damage

i. Electrical protection

Cables designed for the detection of heat should be used within the manufacturer's ratings.

ii. Mechanical protection

Some types of cable are not sufficiently robust to withstand the mechanical hazards that they might be exposed to in practice, such as

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impact, abrasion, or attack by rodents. In order to protect such cables from damage both during and after installation, it will be necessary to provide mechanical protection by installation in conduit, ducting or trunking or by laying the cable in a channel.

Cables should be given mechanical protection when appropriate if

- a) they are not monitored,
- b) they are less than 2,25 m above the floor, or
- c) physical damage or rodent attack is likely.

The above recommendations for resistance to mechanical damage would be expected to be sufficient for most applications. However, where particularly severe conditions might be experienced (such as impact by forklift trucks), it might be necessary to provide additional protection designed to withstand the expected hazards. Armoured cable should be used where appropriate.

### **6.3 JOINTS**

Unless specifically approved otherwise by the Engineer, all connections shall be made at the devices (so-called loop-in, loop-out arrangement). No other joints shall be allowed.

### **6.4 SEGREGATION OF WIRING**

Conductors that carry fire alarm power or signals should be separated from conductors that are used for other systems. The separation may be by one or more of the following methods:

- a) installation in conduit, ducting, trunking or a channel reserved for fire alarm conductors;
- b) a mechanically strong, rigid and continuous partition of non-combustible material;
- c) mounting at a distance of at least 300 mm from conductors of other systems; or
- d) wiring in mineral-insulated copper-sheathed cable with an insulating sheath or barrier.

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If a cable that should be segregated from cables of other services is not enclosed in ducting, trunking or a channel reserved for fire alarm circuits, it should be suitably marked or labelled at intervals not exceeding 2 metres to indicate its function and the need for segregation. Ducting, trunking or a channel reserved for fire alarm circuits should be marked to indicate this reservation. The fire alarm cable should be completely enclosed when the cover of the ducting, trunking or channel is in place, and all covers should be securely fixed.

Segregation of the fire alarm power supply cables need not be applied on the supply side of the isolating protective device. Cables carrying power in excess of extra-low voltage should be separated from other fire alarm cables. In particular, the mains supply cable should not be brought in through the same cable entry as cables carrying extra-low voltage power or signals.

## **6.5 TELECOMMUNICATION CABLES**

Public telecommunication operator lines used for the transmission of alarms to the fire brigade should be mechanically protected and should be considered as required to give prolonged operation during a fire.

## **6.6 ALTERNATIVE CABLES**

Types of cable or cable system other than those described above may be used only if it can be shown that, in the application in which they are to be used

- a) their resistance to heat and fire is suitable for the application,
- b) their resistance to ambient conditions, including resistance to mechanical impact and abrasion, is suitable for the application,
- c) they are not prone to faulty assembly or installation,
- d) their electrical properties under both normal and fault conditions are suitable for the application, and
- e) they are operated within their manufacturer's ratings.

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Where possible, alternative types of cable should be certified or approved under a recognized certification or approval scheme as satisfactory for their application.

## **6.7 DAMP, CORROSIVE OR UNDERGROUND LOCATIONS**

Cables intended for installation in damp, corrosive or underground locations, or in plasters or cements that have corrosive effects on metallic sheathing, should be pvc-sheathed overall. Where the environment can attack pvc, a suitable alternative sheath should be adopted. In some locations further protection might be necessary.

## **6.8 CONDUCTORS**

### **6.8.1. General**

Conductors should

- a) be suitable in the opinion of the authority that has jurisdiction for a particular application and comply with approved standards, where relevant, and
- b) have an appropriate temperature rating for their intended use.

**Note:** the following are normally deemed to be suitable (depending on the particular application):

- i heat-resisting wiring cables complying with SANS 529; and
- ii. single-core, PVC insulated, annealed copper conductors of 600 V grade in accordance with SANS 1507.

### **6.8.2. Conductor Sizes**

In selecting conductor sizes, physical strength and limitations imposed by voltage drop should be taken into account. Voltage drop in a cable should

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not be such as to prevent devices from operating within their specification limits, even under minimum supply and maximum load conditions. Consideration should be given to any possible extensions to the system.

Unless otherwise recommended, conductors shall be of multi-strand copper, each with a cross-sectional area of **not less than 1.0mm<sup>2</sup>**.

### 6.8.3. Ambient Temperatures

Care should be taken that the combination of ambient temperature and temperature rise caused by load current does not result in a conductor temperature that exceeds the limit for the insulation.

Subject to any overruling consideration, safety factors and consultation with the relevant authority, the fire alarm system may be so designed that detectors or call points (or both), in addition to giving an alarm and calling the fire brigade, will close or open circuits of ancillary services by means of relays or similar devices.

Note: examples of ancillary services include the

- a) actuation of fixed fire-extinguishing systems,
- b) control of ventilating systems, and

Means to temporarily disable an item or items of ancillary equipment for routine servicing or maintenance of that equipment may be provided if it does not affect the operation of the fire alarm system.

If operation of the fire alarm system during servicing or testing can have undesirable effects on ancillary equipment, means should be provided for disabling the automatic operation of the ancillary equipment. The disablement may take the form of a transfer from automatic to manual operation. A visual indication of disablement should be provided.

Power supplies to ancillary services should be such that the power supply to the fire alarm system is not prejudiced. Indications of both the state of ancillary systems and that of ancillary systems that take power only when there is a fire

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may be operated from the fire alarm supply, but ancillary systems that take power (other than for indicators) in the non-fire state should not be operated from the fire alarm supply. Any additional loads taken by ancillary systems should be taken into account in the calculations of power supply capacity.

## 6.9 CONDUIT AND TRUNKING

All conduit, trunking, sleeves and associated provisions will be provided by and installed by the fire detection contractor.

## 7. INTERFACE WITH OTHER SYSTEMS

The system must be capable of interfacing with other systems via Input / Output units, relays and similar equipment. All relays and equipment beyond the Input / Output units will be provided by others. The systems to be interfaced include:

| System                           | Action                                                                                                             |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------|
| HSSD Systems                     | Interface and monitoring of all High Sensitivity Smoke Detectors (HSSD) with Gas Control Panels.                   |
| Any Fresh Air Systems            | To shut down fresh air supplies.                                                                                   |
| Fire Dampers                     | Closing of any fire dampers.                                                                                       |
| Pilot Cylinder Pressure Gauge    | Monitoring of the pressure on all pilot cylinders for a drop in pressure.                                          |
| Gas Suppression System           | All connections to actuators inside gas cylinder room to release gas on confirmation of a double knock fire signal |
| Addressable Control Panel        | Interfacing to Gas Control Panel and High Sensitivity Smoke Detectors as well as all optical devices.              |
| Main Building Addressable System | Activate sounders to warn occupants in the rest of the building, should a signal be send by the gas                |

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|  |                                                              |
|--|--------------------------------------------------------------|
|  | control panel to the Main Addressable Panel of the building. |
|--|--------------------------------------------------------------|

**Note:** Final connections between the fire detection system and associated equipment to be carried out by the fire detection contractor.

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## PART III: DETAILED SPECIFICATION

### 1. DESCRIPTION OF THE SYSTEM

#### 1.1 THE BUILDINGS

The project involves for the detailed design, manufacturing, supply, delivery, offloading, erection and guarantee of new fire detection and gaseous suppression systems at Armscor Office Building, Pretoria, Gauteng Province. The rooms to be provided with detection and gaseous suppression systems are listed under item 31 of this document.

The building is made up of the following occupancy classification in terms of Regulation A20 of the *National Building Regulations and Building Standards Act (Act 103 of 1977)*:

| Class of Occupancy | Occupancy                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| G1                 | <b>Offices</b><br>Occupancy comprising offices, banks, consulting rooms and other similar usage.                                        |
| D4                 | <b>Plant Room</b><br>Occupancy comprising usually unattended mechanical or electrical services necessary for the running of a building. |
| J4                 | <b>Parking Garage</b><br>Occupancy used for storing or parking of more than 10 motor vehicles.                                          |

#### 1.2 SYSTEM DESCRIPTION – GAS SUPPRESSION

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The gas suppression agent will be a 200 Bar 80 Litre IG-55 Pyroshield clean agent Fire Extinguishing Systems and an Engineered system utilising a fixed nozzle agent distribution network. It will be re-designed and installed in accordance with the SANS 14520 – 1, 14520-14, SANS 369 and SANS 10139 Codes of Practice.

The system shall be actuated by detection and control equipment for automatic system operation along with providing local and remote manual operation as required.

Work under this portion of the contract consists of:

- Detailed design, supply, delivery and installation of an automated gas total flooding fire suppression system, complete with all pipework, valves, nozzles, signage, discharge control units and interfacing to gas monitor units and the main building fire detection panel.
- The gas system shall consist of a total storage bank and be capable of totally flooding the protected areas to a design concentration applicable to the gas offered at an ambient temperature of 21°C. Discharge times will be those as specified in the SANS ISO 14520 – Part 1 and Part 14 Code of Practice.
- In determining the quantity of gas required to achieve the necessary concentration for a period of not less than 10 minutes, the Contractor shall allow for and provide additional gas to compensate for any leakage from the enclosure.

The system design shall be based on the following criteria:

- |                                           |        |
|-------------------------------------------|--------|
| • Indoor temperature (Anticipated design) | 21°C   |
| • Altitude above sea level – Bloemfontein | 1 395m |

A complete system and design approval shall be provided on the total inert gas installation. Approval shall be by either FM, UL, VDS or LPC. Proof of compliance with this requirement shall be by means of certified copies of the original certificates.

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The detailed design shall form part of an approved, integrated design, manufacture and testing process in compliance with ISO9001. Proof of ISO9001 certification shall be provided to the Engineer.

The design of the fire protection layout shall be done as part of an ISO9001 certified design program. The technical interface as required by the ISO 9001 process, shall be the Engineer.

Final design verification, as called for by ISO9001, shall be included in the scope of works.

### **1.3 SYSTEM DESCRIPTION – DETECTION**

As the lowest aerosol concentrations have to be detected in such occupancies covered in this scope, an ASD (aspirating smoke detection) with very high sensitivity is recommended for smoke as well as fire detection and also as the only method utilised for detecting invisible smoke particles at the inception stages of a fire.

A "High Tech" Sensitivity Smoke Detection System is specified and to be installed throughout the areas nominated on the drawings and as mentioned elsewhere in this report. (See Annexure B)

The specified system should consist of highly sensitive PLC micro – processor aspirating fire and smoke detectors, an aspirator, and a dual-stage filter cartridge connected to sampling pipe networks and sampling holes. It shall be provided with four sample pipe inlets, internal flow monitoring, smoke detection and a facility for exhaust pipe connection.

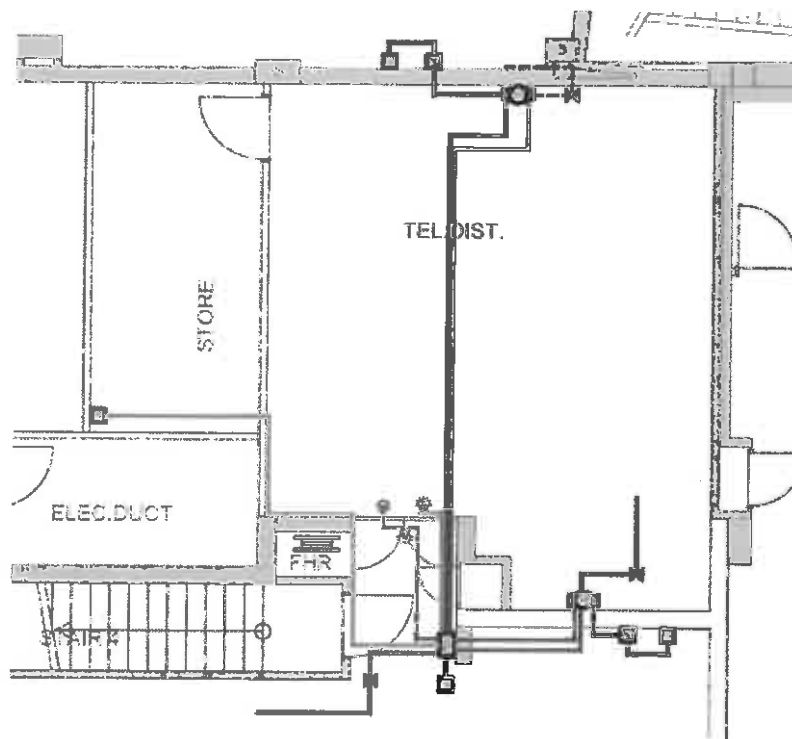
The system shall support Pre-Engineered sampling pipe network designs with verified calculations in addition to custom sampling pipe network designs using a computer-based design modelling tool. Sampling pipe material shall be UL 1887 approved for use in air sampling smoke detection systems and shall be red in colour.

The HSSD's (High Sensitivity Smoke Detector) shall be connected to an approved and specified 3 (three) zone conventional gas release control panel.

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## 1.4 DETECTION SYSTEM DESIGN INTEND

Our recommendation and design intend is to provide each room with 2 x 4 pipe aspirating detectors wired and connected to a three (3) zone conventional gas release control panel to each of the rooms. (See figure 1 below).



**Figure 1 - Aspirating Connection Diagram to Gas Release Panels**

The design intend is to provide and achieve the maximum redundancy on the critical detection component of the rooms to be protected. This is to ensure, that if in the unforeseen event of any one aspirating detector fails, that the protected room is still fully protected by the secondary aspirating detector and could still be monitoring all levels, namely the floor void, ceiling void as well as room void spaces, for invisible smoke associated with these types of rooms.

This design intend described above is not required by code and is based on the risk category associated with each of the rooms to be protected.

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It is understandable that without continuous 365/24/7 monitoring of the protected rooms and relevant spaces by the recommended high tech aspirating detection system the gas suppression component becomes absolute as it relies in its totally on signals from the smoke detection monitoring system.

## 1.5 SCOPE OF CONTRACT

This contract consists of the detailed design, manufacturing, supply, delivery, offloading, erection and guarantee of fire detection and gaseous suppression systems referred to above in accordance with these specifications and:

- SANS 10139,
- SANS 14520-14;
- SANS 369 and;
- EN 54 Codes of Practice.

## 2. AREAS TO BE PROTECTED

The following table describes the rooms to be protected (approximate measurements only; actual measurements to be verified on site prior to putting work in hand):

| Room Number | Room Name            | Approximate Volume        |
|-------------|----------------------|---------------------------|
| 1           | Server Room          | 210m <sup>3</sup>         |
| 2           | Tele Dist. Room      | 240m <sup>3</sup>         |
| 3           | UPS Room             | 161m <sup>3</sup>         |
| 4           | Battery Room         | 161m <sup>3</sup>         |
| 5           | Archive Storeroom #1 | 308m <sup>3</sup>         |
| 6           | Archive Storeroom #2 | 1050m <sup>3</sup>        |
| 7           | Archive Storeroom #3 | 364m <sup>3</sup>         |
|             | <b>Total Volume</b>  | <b>2 130m<sup>3</sup></b> |

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**Note:** It remains the responsibility of the Contractor to calculate the exact room volumes to determine gas quantities.

### 3. EXTINGUISHANT

The extinguishant to be used for this project shall have zero Ozone Depleting Potential in manufacture or composition; ie. IG-55 (Pyroshield) complying with the following properties:

SANS 14520 – Part 14: IG 55

| Description      | Argon                  | Nitrogen               | Carbon Dioxide          |
|------------------|------------------------|------------------------|-------------------------|
| Purity           | > 99.9%                | < 99.9%                | <99.5%                  |
| Moisture Content | < 4 x 10 <sup>-6</sup> | < 5 x 10 <sup>-6</sup> | < 10 x 10 <sup>-6</sup> |

| Property                                                    | Units                                                                                  | Value |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------|-------|
| Molecular Mass                                              | -                                                                                      | 34    |
| Boiling point at 1,013 bar (absolute)                       | °C                                                                                     | -196  |
| Freezing point                                              | °C                                                                                     | -78.5 |
| Critical temperature                                        | °C                                                                                     | -     |
| Critical pressure                                           | bar abs                                                                                | -     |
| Critical volume                                             | cm <sup>3</sup> /mol                                                                   | -     |
| Critical density                                            | Kg/m <sup>3</sup>                                                                      | -     |
| Vapour pressure 20°C                                        | bar abs                                                                                | 152   |
| Liquid density 20°C                                         | kg/m <sup>3</sup>                                                                      | -     |
| Saturated vapour density 20°C                               | kg/m <sup>3</sup>                                                                      | -     |
| Specific volume of superheated vapour at 1.013 bar and 20°C | m <sup>3</sup> /kg                                                                     | 0.706 |
| Components                                                  | N <sub>2</sub> – 52% by volume<br>Ar – 40% by volume<br>CO <sub>2</sub> – 8% by volume |       |

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The design concentration for this application shall be 39.9%.

## **4. MATERIALS**

### **4.1 GENERAL**

Only equipment and components specifically designed for the proposed use may be used. To this end, all equipment shall be either listed / approved by an approved testing laboratory / authority. Proof of such compliance shall be provided for each item, and in the case of the gaseous extinguishing system, the system as a whole.

### **4.2 TEMPERATURE LIMITATIONS**

All devices shall be designed for the service they will encounter and shall not readily be rendered inoperative or susceptible to accidental operation. Devices normally shall be designed to function properly from -20°C to +50°C, or marked to indicate temperature limitations, or in accordance with manufacturers' specifications which shall be marked on the nameplate, or (where there is no name-plate) in the manufacturer's instruction manual.

## **5. WORKING DOCUMENTS**

The contractor shall be responsible for producing the following working documents which shall include the following items:

- (a) drawings, to an indicated scale of extinguishant distribution system, including containers, location of containers, piping and nozzles, valves and pressure – reducing devices and pipe hanger spacing;
- (b) enclosure cross-section, full height or schematic diagram, including raised access floor and suspended ceiling;
- (c) extinguishing concentration, design concentration and maximum concentration;

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- (d) specification of containers used, including capacity, storage pressure and mass including extinguishant;
- (e) description of nozzle(s) used, including inlet size, orifice port configuration, and orifice size/code and orifice size of pressure – reducing devices, if applicable.
- (f) description of pipes, valves and fittings used, including material specifications, grade and pressure rating;
- (g) equipment schedule or bill of materials for each piece of equipment or device, showing device name, manufacturer, model or part number, quantity and description.
- (h) isometric view of extinguishant distribution system, showing the length and diameter of each pipe segment and node reference numbers relating to the flow calculations;
- (i) enclosure pressurization and venting calculations;
- (j) description of fire detection, actuation and control systems; and
- (k) installation, testing and commissioning instructions and trouble analysis guide and details of all safety protection devices, where applicable.

## **6. CYLINDERS & MANIFOLDS**

### **6.1 STORAGE CONTAINERS**

#### **6.1.1. General**

Containers shall be designed to hold the specific extinguishant. Containers shall not be charged to a full density greater than specified in that part of ISO 14520 relating to the specific extinguishant. Cylinders shall be designed to suit the working pressure of the gas offered. Design pressure shall be at least 1.5 times the working pressure

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Container and valve manifolds shall be tested hydraulically to a pressure of the specified SANS 14520 / manufacturer and be substantiated by a relevant test certificate. All cylinders will be supplied with a pressure relief valve as per manufacturer / SANS 14520 specification.

The containers used in these systems shall be designed to meet the requirements of relevant national standards, particularly the Vessels Under Pressure Regulations under the Occupational Health and Safety Act (Act 85 of 1993). The Contractor shall provide written proof of compliance with such design code by the manufacturer. Furthermore, the Contractor shall submit test certificates for each and every storage cylinder before bringing them onto site. Where no certificates have been issued, the Contractor shall submit a list of cylinders, including manufacturer, serial number, and the date and test pressure of the latest hydrostatic test stamped on every cylinder.

Where required, the container and valve assembly should be fitted with a pressure relief device complying with the appropriate national standards.

All storage cylinders shall be supplied new, and all cylinders forming part the installation shall be of interchangeable without any modification whatsoever.

Cylinder shipping shall be in accordance with the design code of the cylinders.

Storage cylinders shall be shipped fully charged, and with an approved protective cap over the cylinder valve. Protective caps shall be removed only once cylinders have been finally bracketed into position.

Storage cylinders shall be installed in banks in accordance with the manufacturer's specifications and SANS 14520 Code of Practice. All cylinders shall be securely positioned by means of a rigid bracketing assembly, which eliminates any lateral movement of cylinders after installation.

#### **6.1.2. Contents Indication**

The Contractor shall hand over a charging certificate for every charged cylinder before commissioning commences, which confirms that charge composition is within the allowable tolerance. The charging certificate shall

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indicate the cylinder serial number, date of charge, location where charged, and charge contents.

Means shall be provided to indicate that each container is correctly charged.

## **6.2 CONTAINER ARRANGEMENT**

Arrangements shall be made for container and valve assemblies and accessories to be accessible for inspection, testing and other maintenance when required.

Containers shall be adequately mounted and suitably supported according to the systems installation manual so as to provide for convenient individual servicing of the container and its contents.

Containers shall be located as near as is practical to the enclosure they protect.

Storage containers shall not be located where they will be subjected to severe weather conditions or to potential damage due to mechanical, chemical or other causes. Where potentially damaging exposure or unauthorized interference are likely, suitable enclosure or guards shall be provided.

Different sized storage containers connected to a common manifold may be used for non-liquefied gas containers, provided they are all pressurized to the same nominal working pressure.

Manifolds manufactured shall be certified suitable and tested by Inert Gas Agent equipment manufacturers. No manifold may be fabricated on site, or welded on site after pressure testing is complete.

All welding on an Inert Gas agent manifold shall conform to SANS 044, performed by coded welders, and preferably machine welded. Suitable approved electrodes shall be used.

The Engineer retains the right to inspect, at any stage of manufacture, the welds on any manifold. This right of inspection, whether exercised or not, shall

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not in any way detract from the right of the Engineer of reject inferior equipment at any stage.

Where the Engineer, at its sole discretion, feels that welds may be of inferior quality, it may require of the Contractor that he performs or have performed X-ray testing of such welds, at the Contractor's expense.

Flexible connection hoses shall consist of flexible, steel reinforced hose, with swaged-on threaded connectors on either end, and shall incorporate a check valve to prevent agent loss in case of a discharge with any cylinder disconnected from the hose for any reason.

### **6.3 SOLENOID VALVES**

At each bank, an electrical solenoid operated control head (not detonator type) shall automatically release the gas on receipt of the appropriate fire alarm signal. Each control head shall be provided with an override manual control arm, pull-out pin and safety chain.

### **6.4 MAIN ORIFICE**

Any Clean Agent main orifice shall be either a clamped plate orifice or configured as a nipple, and connected on the upstream side to the manifold, and on the downstream side to the distribution pipe system. Contractors shall ensure that the orifice is installed for the right direction flow.

All main orifices shall be supplied by the ISO9001 certified manufacturer of the Clean Agent equipment. No Contractor or other party shall under any circumstances be allowed to perform any drilling, machining, or other work or modification on an orifice assembly.

Any main orifice shall be certified by its manufacturer as suitable for the application intended, and a certificate to this end handed over to the Engineer.

The main orifice shall be positively anchored to the building structure, in accordance with the requirements of the equipment manufacturer, and to the satisfaction of the Engineer, to avoid pipe movement during discharge. The

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Contractor shall specifically detail his main orifice fixing arrangement on his drawing submittals for approval by the Engineer.

An orifice union shall incorporate a stainless steel orifice plate clamped between bolted clamping flanges or inside a threaded union. The orifice opening shall be drilled by the manufacturer, and the opening size clearly and indelibly stamped on the orifice assembly.

An orifice nipple shall be brass construction, with centre hex for assembly purposes. The orifice opening shall be drilled by the manufacturer, and the opening size clearly and indelibly stamped on the body of the nipple.

## **7. DISTRIBUTION**

### **7.1 GENERAL**

Pipework and fittings shall comply with the appropriate national standards, shall be non-combustible and able to withstand the expected pressures and temperatures without damage.

Before final assembly, pipe and fittings shall be inspected visually to ensure they are clean and free of burrs and rust, and that no foreign matter is inside, and the full bore is clear. After assembly, the system shall be thoroughly blown through with dry air or other compressed gas.

A dirt trap consisting of a tee with a capped nipple, at least 50mm long, should be installed at the end of each pipe run. Drain traps protected against interference by unauthorised personnel should be fitted at the lowest points in the pipework system if there is any possibility of a build-up of water.

Over pressure relief devices shall be designed to operate at a pressure not greater than the test pressure of the pipework, or as required by the appropriate standard.

Pressure relief devices, which can include the selector valve, should be fitted so that the discharge, in the event of operation, will not injure or endanger personnel and, if necessary, so that the discharge is piped to an area where it will not become a hazard to personnel.

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In the systems using pressure-operated container valves, automatic means shall be provided to vent any container leakage that could build up pressure in the pilot system and cause unwanted opening of the container valve. The means of pressure venting shall not prevent operation of the container valve.

The manifolds to the containers and valve assembly shall be hydraulically tested by the manufacturer to a minimum pressure of 1.5 times maximum working pressure, or as required by the appropriate national standards.

## **7.2 PIPING**

Piping shall be of non-combustible material having physical and chemical characteristics such that its integrity under stress can be predicated with reliability. The pressure shall be the developed pressure at a maximum storage temperature of not less than 50°C. If higher operating temperatures are approved for a given system, the design pressure shall be adjusted to the developed pressure at maximum temperature. In performing this calculation, all joint factors and threading, grooving or welding allowances shall be taken into account.

Where a static pressure-reducing device is used in a non-liquefied gas system, the maximum working pressure in the distribution pipework downstream of the device shall be used in the calculation of the downstream pipe wall thickness.

Cast iron and non-metallic pipes shall not be used.

Flexible tubing or hoses (including connections) shall be of approved materials and shall be suitable for service at the anticipated extinguishant pressure and maximum and minimum temperatures.

All pipes to be ASTM A 106 Grade B Seamless as specified in the relevant part of SANS 14520.

## **7.3 FITTINGS**

Fittings shall have a minimum rated working pressure equal to than the maximum pressure in the container at 50°C when filled to the maximum

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allowable fill density for the extinguishant being used. For systems that use a pressure-reducing device in the distribution piping, the fittings downstream of the device shall have a minimum rated working pressure equal to or greater than the maximum anticipated pressure in the downstream piping.

Cast iron fittings shall not be used.

Welding and brazing alloys shall have a melting point above 500°C.

Welding shall be performed in accordance with relevant national standards.

Fittings to be 3000lb as specified in the relevant part of SANS 14520.

#### **7.4 PROTECTION AGAINST CORROSION**

All steelworks shall be adequately protected against corrosion. Where no specific protection has been specified, steelwork shall be painted as follows:

Surfaces shall be thoroughly cleaned in accordance with SANS 064. A zinc chromate primer complying with SANS 679 type 1 shall then be applied. Finally two coats of paint complying with Grade 1 of SANS 630 shall be applied. Colours shall be approved by the Engineer.

Care shall be taken that the entire surface is covered to the same standard and where surfaces have been damaged during the installation, these shall be touched up to the same standard.

All hangers, anchors, brackets, guides and supports inside and outside building shall be treated as described above.

Nuts, bolts and screw threads shall be cadmium plated or brass.

#### **7.5 PAINTING**

All equipment, pipework, ductwork, supports, hangers, plinths, bars, etc., located in plant rooms and where it is visibly exposed shall be painted to a colour scheme approved by the Engineer. Items, which are protected against

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corrosion by other means (galvanising etc.) shall be subject to painting when located as described above.

Surfaces shall be painted as follows:

Surfaces shall be thoroughly cleaned in accordance with SABS 064. A zinc chromate primer complying with SANS 679 type 1 shall then be applied. Finally two coats of paint complying with Grade 1 of SANS 630 shall be applied.

Care shall be taken that the entire surface is covered to the same standard and where surfaces have been damaged during the installation these shall be touched up to the same standard.

## **7.6 IDENTIFICATION**

Identification colours shall be approved by the Engineer. Identification shall be neat and legible and shall be applied after completion of final finishes.

### **7.6.1. Piping and Valves**

Piping shall be marked with colour coded polyvinyl chloride bands identifying contents carried and direction of flow. Band widths shall be 200 mm wide for pipes up to 250 mm diameter and 400 mm wide for larger piping.

Piping shall be marked after installation and painting has been completed.

Piping shall be marked every 10 m of pipe run, before and after bends, pipe connections to valves and equipment, where pipes leave walls, floors, ceiling and where concealed pipes are visible through access doors.

Valve tags identifying its function shall be bronzed or welded to all valves or fastened by heavy brass chains. Valve tags shall be at least 50 mm in diameter. Numbering or identification of tags shall correspond to identification on central and diagrammatic charts framed in the gas storage room and contained in operating and maintenance manuals.

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**7.6.2. Labels**

Labels shall be of non-corroding material, shall consist of white lettering with a minimum height of 4mm on a black non-glossy background. Labels shall be screwed into position.

Labels shall be provided under each gauge, meter, pilot light, instrument, panel, switches, controllers, etc., identifying the function and set point if applicable to such equipment.

**7.7 PIPE SUPPORTS**

Pipe and valve supports shall be suitable for the expected temperature and shall be able to withstand the dynamic and static forces involved. Due allowance shall be made for the stresses induced in the pipework by temperature variations. Adequate environmental protection shall be given to supports and associated steelwork. The distance between pipe supports shall be as specified below:

| Nominal Diameter of Pipe<br>DN | Maximum Pipework Span<br>m |
|--------------------------------|----------------------------|
| 6                              | 0.5                        |
| 10                             | 1.0                        |
| 15                             | 1.5                        |
| 20                             | 1.8                        |
| 25                             | 2.1                        |
| 32                             | 2.4                        |
| 40                             | 2.7                        |
| 50                             | 3.4                        |
| 65                             | 3.5                        |
| 80                             | 3.7                        |
| 100                            | 4.3                        |
| 125                            | 4.8                        |
| 150                            | 5.23                       |
| 200                            | 5.8                        |

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Adequate support shall be provided for nozzles and their reactive forces such that in no case shall the distance from the last support be greater than as follows:

- (a) dia. 25mm pipe : 100mm
- (b) >25mm pipe : 250mm

Movement of pipework caused by temperature fluctuations arising from environment or the discharge of extinguishant may be considerable particularly over long lengths and should be considered in the support fixing methods.

All pipe runs and system components shall be so located so as to maintain a minimum clearance of 200mm from electrical conduit or equipment, unless greater clearance is indicated in the Supplementary Specification or on Departmental drawings.

Where equipment is to be bolted down on concrete plinths, anchor studs shall preferably be cast into concrete bases. In such instances, the thread of the anchor studs shall be suitably protected to readily facilitate repeated disassembly of fixing assemblies.

Where equipment is to be fixed to concrete or brickwork surfaces, and where building or casting in is not feasible or desirable, fixing shall be by means of approved expansion type anchor bolts. Due care shall be taken to ensure adequate penetration of any expansion bolt, to eliminate surface damage.

All pipelines shall be firmly bracketed to walls and ceilings to the satisfaction of the Engineer. Any piping system shall be securely supported with due allowance for expansion and contraction and shall not be subject to possible damage.

The Contractor shall supply all bolts, fasteners, fittings, braces, supports, packings, gaskets, etc. necessary for assembly all equipment supplied by him. All such items required for assembly shall be supplied by the manufacturer of the Clean Agent equipment, or alternatively approved by the manufacturer.

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Assembly of equipment shall be done in accordance with the requirements of the Clean Agent equipment manufacturer. Assemblies shall be neat and in accordance with the Client's and Engineer's requirements regarding quality of workmanship.

All pipe ends shall be reamed clean of any burrs before assembly. Contractors shall physically check the inner diametral tolerance of particularly smaller pipe sizes for conformity with the prescribed specification.

Contractors are advised to blow through all distribution pipework and nozzles to ensure that no blockages exist, prior to performing the full discharge test.

## **8. VALVES & NOZZLES**

### **8.1 VALVES**

All valves, gaskets, O-rings, sealant and other valve components shall be constructed of materials that are compatible with the extinguishant and shall be suitable for the envisaged pressures and temperatures.

Valves shall be protected against mechanical, chemical or other damage.

Special corrosion-resistant materials or coatings shall be used in severely corrosive atmospheres.

### **8.2 NOZZLES**

#### **8.2.1. Nozzle Choice and Location**

Nozzles, including nozzles directly attached to containers, shall be as supplied by the certified manufacturer of the Clean Agent equipment, and shall be of adequate strength for use with the expected working pressures, able to resist normal mechanical damage, and constructed to withstand expected temperatures with deformation.

All discharge nozzle orifices shall be pre-drilled by the certified manufacturer of the Clean Agent equipment, and the equivalent single orifice size clearly

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and indelibly stamped on the nozzle body, regardless of shape and number of orifices. This equivalent size shall refer to the size of standard single orifice type with rounded entry and a coefficient of discharge of not less than 0.98, having the same flow rate as the nozzle in question. No Contractor or any other party shall under any circumstances be allowed to modify in any way any pre-drilled nozzle orifice.

Where possible, a minimum of two nozzles shall be provided in every protected space, or any part of subdivision separated from the main part of the protected space by any physical barrier, such as access flooring or ceiling. Single nozzles shall only be used in spaces too small to accommodate two nozzles. Where single nozzles are installed, blind elbows shall be fitted.

All discharge nozzles shall be located to achieve the best results and shall be selected and so positioned that the discharge will not splash flammable liquids or create dust clouds that might spread a fire, create an explosion, or otherwise adversely affect the contents of the protected space. Nozzles vary in design and discharge characteristics and shall be selected on the basis of their suitability for the use intended.

The type number and placement of nozzles shall be such that:

- the design concentration is achieved in all parts of the enclosure;
- the discharge does not unduly splash flammable liquids or create dust clouds that might extend the fire, create an explosion or otherwise adversely affect the occupants;
- the velocity of discharge does not adversely affect the enclosure or its content

Where clogging by foreign materials is possible, the discharge nozzles shall be provided with frangible discs or blow-out caps. These devices shall provide an unobstructed opening upon system operation and shall be designed and arranged so they will not injure personnel.

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Nozzles shall be suitable for the intended use and shall be approved for discharge characteristics, including area coverage and height limitations.

Nozzles shall be of adequate strength for use with the expected working pressures, they shall be able to resist nominal mechanical abuse and shall be constructed to withstand expected temperatures without deformation.

Nozzle discharge orifice inserts shall be of corrosion – resistant material and be brass with male threaded connections to ANSI B1.20.1, and compatible with the pipe threaded being used. The Contractor shall individually ensure that the threaded on each and every nozzle matches pipe threaded before commissioning.

### **8.2.2. Nozzles in Ceiling Tiles**

In order to minimize the possibility of lifting or displacement of lightweight ceiling tiles, precautions shall be taken to securely anchor tiles for a minimum distance of 1.5m from each discharge nozzle.

### **8.2.3. Marking**

Discharge nozzles shall be permanently marked to identify the manufacturer and size of the orifice.

### **8.2.4. Filters**

The inlet of any nozzle assembly or pressure-reducing assembly which contains an orifice of area less than 7mm<sup>2</sup> shall be provided with an internal filter capable of preventing obstruction of the orifice.

## **9. OPERATION**

### **9.1 GAS RELEASE CONTROL UNIT**

Gas control units shall provide the interface between the smoke detection – and gas extinguishing systems. The control signals required to trigger the gas system shall be provided as part of the smoke detection system and shall be wired to the gas release valves.

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Two signals from separate alarm circuits inside the area shall be necessary to activate the gas release. Activation of the break glass unit located on the gas control unit shall directly start the extinguishing cycle.

The gas control units shall have key switches for manual or automatic selection as well as an isolate switch for maintenance purposes. Dual LED's shall indicate automatic or manual mode, gas discharge, isolate, reset and fault statuses.

The control unit shall provide the necessary outputs for gas release valves, audible and visual alarms.

Gas control units shall be equipped with break glass units in the same panel and will be installed outside the risk areas in the positions as indicated on the drawings.

## **9.2 APPROVALS**

- EN12094-1 Approved
- EN54-2 & EN54-4 Approved

## **9.3 WARRANTY**

The gas control panel shall at least carry a warrantee period of minimum 3 years.

## **9.4 SPECIAL FEATURES**

### **9.4.1. Switch Inputs**

- 4 X Programmable
- 1 x Manual Trigger
- 6 x Release Related (Mode select, Valve Monitor, Pressure Monitor, Hold, Abort and Flow)

### **9.4.2. USB Ports**

- 1x USB port onboard for PC download

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#### 9.4.3. Countdown Timer and LCD

- Large digit countdown timer and LCD

#### 9.4.4. On Board Relays

- 4 x 1 A 30 V DC Relay Outputs (Fire, Fault & 2 Programmable)

#### 9.4.5. Event Log

- 1,000 event time stamped event log

### 9.5 WARNING NOTICES

Warning notices shall be provided on the doors leading into the gas protected area(s) in accordance with the specifications of SANS 14520.

### 9.6 CONTROL PROCEDURES

#### 9.6.1. With Gas Control Unit in the Automatic Mode

Release of gas will work on a double knock and coincidence basis and according to the following procedure:

The extinguishing system shall use the double knock and coincidence principle before activating the gas release valve. Two signals from separate detector circuits inside the area shall be necessary to activate the gas release.

***First knock: HSSD detects a fire.***

Step 1: Activate Siren and Strobe (inside & outside room) - standard tone.

***Second knock: Second HSSD detects a fire.***

Step 2: Activate alarm bells (inside & outside room) - intermittent tone. (Siren and Strobe still activated) – inside and outside room.

Step 3: Activate evacuation signs - flashing mode.

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Step 4: Close motorised dampers and stop any fresh air and air conditioning units.

Step 5: Activate pre-release timer adjustable from 20 to 120 seconds.

***After pre-release period:***

Step 10: Alarm Bells (inside & outside) - Solid Tone.

Step 11: Activate evacuation signs - steady on mode.

Step 12: Open gas release valve.

The image below shows the implementation of 2 sounder-strobe devices each on a separate sounder circuit as the 1st stage alarms devices on a gas protected area.

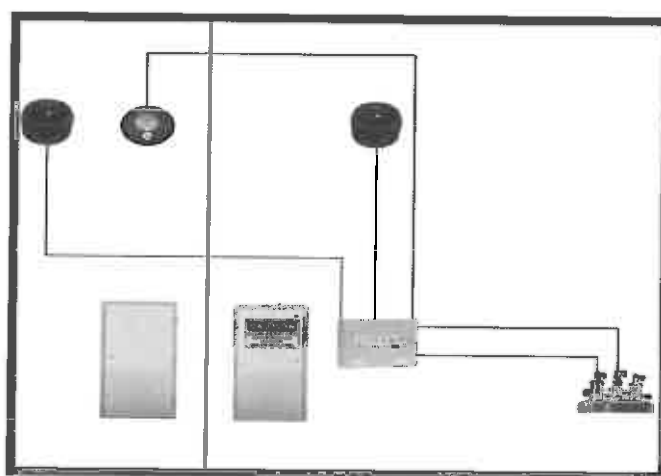
A bell is shown inside of the room connected to the second stage alarm (End Of Line resistor must be connected at the last device to ensure active monitoring).

The bell will be pulsed pre-discharge and remain on (solid tone) upon discharge.

Schematic below indicates the positions of the bells and sire/strobes for the gas protected rooms:

**INSIDE OF ROOM**

**OUTSIDE OF ROOM**



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| AUDIBLE AND VISUAL WARNINGS FOR GAS PROTECTED AREAS |                      |                 |                  |                  |                   |                                  |
|-----------------------------------------------------|----------------------|-----------------|------------------|------------------|-------------------|----------------------------------|
|                                                     | Bell<br>inside       | Siren<br>inside | Strobe<br>inside | Siren<br>outside | Strobe<br>outside |                                  |
| First detector<br>activates                         |                      | ON              | ON               | ON               | ON                | Standard/<br>house fire<br>alarm |
| Second detector<br>activates & timer<br>starts      | ON<br>(intermittent) | ON              | ON               | ON               | ON                | Intermittent<br>sound            |
| Timer expires /<br>Discharge                        | ON<br>(solid)        | ON              | ON               | ON               | ON                | Solid sound                      |

## 9.6.2. With the Gas Control Unit in the Manual Mode

Follow steps 1 to 3 above.

NO GAS RELEASE SHALL TAKE PLACE IN THIS MODE

Gas release in this mode shall only be affected by either switching to the automatic mode or by activating the break glass unit on the gas control unit. All pressure dampers shall be closed 60 seconds after a gas discharge.

## 9.6.3. Break Glass Unit Activated

Activation of the break glass unit located on the gas control unit (status panel) shall directly start steps 2 to 5 of the extinguishing cycle.

Manual release of the extinguishing gas shall always be possible by operation of the break glass unit on the gas control unit, regardless of the mode selected (manual or automatic).

All alarms shall be reported to the main fire panel.

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## **9.7 MEANS OF SYSTEM CONTROL**

The system shall be provided with:

### **9.7.1. Time Delay Device**

The gaseous suppression system shall incorporate a pre-discharge alarm with a time delay sufficient to allow personnel evacuation prior to discharge. Time delay devices shall be used only for personnel evacuation or to prepare the hazard area for discharge.

### **9.7.2. Automatic / Manual Switch**

The system is to be provided with an Automatic / Manual switch which will allow isolation of the system and manually triggered discharge, if desired.

The Gas Control Panel should have the ability to remotely monitor the auto / manual status of the panel via an input/output module/relay.

The auto / manual switching status will be reported to the end-user by the installed SMS communicator and or through the PLC interfacing.

## **10. VISUAL AND AUDITORY WARNINGS**

Continuous visual and audible alarms at entrances and designed exists inside the protected area and continuous visual alarms outside the protected area which operate until the protected area has been made safe.

These shall be provided in strict accordance with the requirements of SANS 14520 Code of Practice.

## **11. INSTRUCTIONS FOR USE**

Instructions shall consist of:

Notices, certificates, diagram, etc., and all notices as required by the SANS 14520 Code of Practice.

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Schematic layout of all systems on which all equipment, control devices and instruments are correctly indicated for that particular plant room. Diagrams shall contain information on set differential bands, throttling ranges, time delays, overload settings and other relevant data necessary for the checking and adjusting of each instrument, control and motor function.

Wiring diagrams.

Detailed instructions for working of the system / equipment.

Instructions shall be printed on high quality, non-deteriorating paper framed behind glass.

## 12. POST DISCHARGE VENTING

No post discharge venting is to be allowed for.

## 13. PROXIMITY TO ELECTRICAL HAZARDS

Where exposed electrical conductors are present, clearances no smaller than those given in the table below shall be provided, where practicable, between the electrical conductors and all parts of the system that may be approached during maintenance. Where these clearance distances cannot be achieved, warning notices shall be provided and a safe system of maintenance work shall be adopted.

| Maximum<br>Rated<br>Voltage<br><br>kV | Minimum Clearance from Any Point On Or About The<br>Permanent Equipment Where A Person May Be<br>Required To Stand |                                                                                                                             |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|                                       | To The Nearest Unscreened<br>Live Conductor In Air<br>(Section Clearance)<br><br>m                                 | To The Nearest Part Not At<br>Earth Potential Of An Insulator<br>Supporting A Live Conductor<br>(Ground Clearance)<br><br>m |
| 15                                    | 2.6                                                                                                                | 2.5                                                                                                                         |

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| Maximum<br>Rated<br>Voltage<br><br>kV | Minimum Clearance from Any Point On Or About The<br>Permanent Equipment Where A Person May Be<br>Required To Stand |                                                                                                                             |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|                                       | To The Nearest Unscreened<br>Live Conductor In Air<br>(Section Clearance)<br><br>m                                 | To The Nearest Part Not At<br>Earth Potential Of An Insulator<br>Supporting A Live Conductor<br>(Ground Clearance)<br><br>m |
| 33                                    | 2.75                                                                                                               |                                                                                                                             |
| 44                                    | 2.90                                                                                                               |                                                                                                                             |
| 66                                    | 3.10                                                                                                               |                                                                                                                             |
| 88                                    | 3.20                                                                                                               |                                                                                                                             |
| 110                                   | 3.35                                                                                                               |                                                                                                                             |
| 132                                   | 3.50                                                                                                               |                                                                                                                             |
| 165                                   | 3.80                                                                                                               |                                                                                                                             |
| 220                                   | 4.30                                                                                                               |                                                                                                                             |
| 275                                   | 4.60                                                                                                               |                                                                                                                             |

## 14. HIGH SENSITIVITY SMOKE DETECTION (HSSD)

### 14.1 GENERAL

A High Sensitivity Smoke Detection System shall be installed throughout the areas nominated on the drawings.

The system consists of highly sensitive PLC micro – processor aspirating fire and smoke detector, an aspirator, and a dual-stage filter cartridge connected to sampling pipe networks and sampling holes. It shall be provided with a single

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sample pipe inlet, internal flow monitoring, smoke detection and a facility for exhaust pipe connection.

Reset, disable, test and fault determination functions will be available via the field service access door. System configuration will be provided through AutoLearn Smoke and Flow functions, also available via the field service access door.

The system shall support Pre-Engineered sampling pipe network designs with verified calculations in addition to custom sampling pipe network designs using a computer based design modelling tool. Sampling pipe material shall be UL 1887 approved for use in air sampling smoke detection systems and shall be red in colour.

## 14.2 APPROVALS

The High Sensitivity Smoke Detection System must be of a type submitted to, tested, approved, and / or listed by nationally recognized testing laboratories as follows:

- UL (Underwriters Laboratories Inc)
- ULC (Underwriters Laboratories Canada)
- FM (Factory Mutual)
- FM approved for Hazardous Locations, Class 1, Div.2, Groups A, B, C, D (3020906)
- CSFM (California State Fire Marshall)
- LPCB (Loss Prevention Certification Board)
- ActivFire
- VdS (Verband der Sachversicherer e. V.)
- AFNOR
- VNIPO
- CFE
- KFI

When used within the EU, the system shall be formally approved by a notified body (such as VdS or LPCB) to EN54-20 Class A, B and C and shall carry appropriate CE marking to confirm this approval.

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## 14.3 CODES, STANDARDS OR REGULATIONS

The smoke detection system shall be installed to comply with one or more of the following codes or standards:

- AS 1670.1-2004, AS1603.8 – 1996, , ASNZS 3000
- Fire Industry Association (FIA), Code of Practice for Design, Installation, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems
- NFPA Standards, US
- NEC Standards, US
- NZS 4512 : 2003
- Local codes and standards

## 14.4 SYSTEM DESCRIPTION

### 14.4.1. Aspirating System Requirements

- The detector shall consist of a highly sensitive PLC micro – processor aspirating fire and smoke detector, an aspirator, and a dual-stage filter cartridge.
- The detector shall have control switches for Reset, Disable, Test and restricted access switches for Alarm Setup and Flow Setup.
- The aspirating detector must contain two separate detection elements to detect two different phenomenon associated with fire (fire particles and smoke particles). The detector shall include as its primary sensor a 'Cloud Chamber' fire detector. This is supplemented by high sensitivity 'Optical' detectors provided within each of the four detector sampling ports.
- The cloud chamber detector (CCD) must be capable of recognising the normal quantity of invisible airborne sub-micron particles within each of the protected areas, and to detect an abnormal or significantly higher quantity of these sub-micron particles produced from combustion, electrical arcing or overheating. The cloud chamber detector must

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have the capability of detecting invisible particles ranging in size from 0.0025 to 10 microns.

- The cloud chamber detector must not be responsive to false alarm conditions resulting from ordinary dust, moisture/condensation (water vapour), air currents (change in air pressure and/or velocity) or ambient thermal changes.
- The cloud chamber measurement scale is in Particles per cm<sup>3</sup> (PPCC) and provides the 'Fire' detection element of the aspirating detector.
- The High sensitivity LED Optical 'Scatter Chamber Detectors' (SCD's) shall be provided within the aspirating detector to each of the connected sampling ports, providing high sensitivity smoke detection per pipe. Each SCD smoke sensor shall identify the visible smoke particles generated as material over-heats.
- The detector shall have individual illuminated indicators for:
  - Four alarm levels (Alert, Action, Fire 1 & Fire 2).
  - Fault, Power & Disabled.
  - Alarm Setup and Flow Setup.
- The CCD and SCD detectors shall operate both independently from each other and through the use of complex algorithms operate together, to provide intelligent alarm decision making.
- The synergy of these two technologies shall provide an aspirating detector that can verify true fire/smoke alarm conditions and as importantly, can discriminate unwanted or false alarms which can cause false alarms to optical only aspirating detectors.
- The aspirating detector shall indicate both of the two separate detection element scales (PPCC & %obs/m) independently and also display these two scales on a bespoke scale known as Combined Fire and Smoke (CFS) as the primary display.
- The detector shall provide for the addition of one interface card.
- The detector shall provide a general-purpose input to allow either: Reset, Disable, Reset & Disable, Standby, External and Night Time Thresholds.
- The detector may also be configured by a PC and allow programming of four smoke threshold alarm levels, time delays, faults including airflow, detector, power and filter as well as an indication of the urgency of the fault and three relay outputs for remote indication of alarm and fault.
- The detector shall consist of an air sampling pipe network to transport air to the detection system and support pre-engineered designs. Complex

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designs are supported by calculations from a computer-based design-modelling tool.

- The detector shall incorporate an ultrasonic flow sensor in the pipe inlet port for airflow monitoring purposes.

#### **14.5 SPECIAL FEATURES**

In addition to the 'CCD' primary sensor and 'SCD' supplementary sensors within the Cirrus HYBRID detector, the following facilities and functions shall also be provided (subject to the detector model):-

- Inbuilt 7" colour touch screen multi-function, multilingual LCD.
- CFS Combined Fire & Smoke particle level status 'dial'
- CCD particle level status 'dial'
- SCD particle level status 'dial'
- 4 x programmable alarm points and output contacts for Pre-alarm, Fire 1, Fire 2 & Fire 3 per pipe
- LCD & LED status indication of Pre-alarm, Fire 1, Fire 2 and Fire 3 (per pipe if required)
- LCD & LED status indication of 'Common Fault' and 'Power Healthy'
- Detector 'Silence' and detector 'Reset' buttons
- Individual pipe 'High Airflow' and 'Low Airflow' fault monitoring status 'dials'
- CFS & alarm level sensitivity setting screen
- 5 x Programmable output contacts for Fault, Pre-Alarm, common Fire 1 signal, common Fire 2 signal, common Fire 3 signal, Pipe 1 Fire, Pipe 2 Fire, Pipe 3 Fire and Pipe 4 Fire
- Double knock (dual technology particle increase) programmable output
- 'Optical' signal only programmable output
- Optical Settings for optical % pre-alarm (common) and fire trigger points (common or per pipe) when CCD sensor increases
- 3 x Programmable input contacts for Isolate, Reset, Fault, Gain Set, Battery Fault and Mains Fault
- 7 day Day / Night mode programmable menu function
- Detector Text
- Pipe Text
- Alarm Text
- Programmable User and Engineer access codes
- IP Network configuration screen

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- 10 minute 'Real-time' particle data graph
- 30 day 'Historic' particle data graph
- 24,000 event data logging facility
- Live camera stream from up to 6no. IP cameras
- 'Detector Tour' product training animation
- 'Engineers Fault Finding Assistant' training animations
- PDF format 'Pipe Plan' images to indication pipework configuration.
- Programmable On/Off detector audible buzzer
- Up to 4 x 'Individual Identifiable' sampling pipe 'Inlet' Ports
- Single sampling pipe 'Exhaust' port
- Support 25mm dia. sampling pipe configuration (subject to sampling pipe calculation program)
- In-built Protec 6000 Protocol loop interface
- In-built TCP/IP network interface
- RS485 Network configurable
- Commissioning Engineer 'Log' and 'Notepad'

#### 14.5.1. Performance Requirements

- The detection system shall be listed and approved to cover up to a minimum of 250m<sup>2</sup>.
- The detection system shall be approved to provide very early warning smoke detection and provide up to four output levels corresponding to Alert, Action, Fire 1 and Fire 2. These levels shall be programmable and able to be set at sensitivities ranging from 0.025-20% obs/m.
- The detector shall provide fault indication on the unit using the Instant Fault Finder function.
- The detector shall be self-monitoring for filter contamination.
- The detector shall provide staged airflow faults via the use of an ultrasonic flow sensor in the pipe inlet port.

#### 14.6 SUBMITTALS

Product data and site drawings shall be submitted and shall include pipe layout, operational calculations and performance criteria.

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A copy of the manufacturer's installation, operation and maintenance manuals shall be supplied upon completion of the installation.

System commissioning data shall be supplied (in a format recommended by the manufacturer and per the instructions provided by the manufacturer) within 30 days of completion of the installation.

## 14.7 QUALITY ASSURANCE

### 14.7.1. Qualifications

#### Manufacturer

- The manufacturer shall have a minimum of 15 years production experience in the manufacture and design of high sensitivity air sampling smoke detection systems.
- The manufacturer shall be certified as meeting ISO 9001:2008 for manufacturing.

#### Equipment Supplier

The equipment supplier shall be authorized and trained by the manufacturer to calculate/design, install, test and maintain the air sampling system and shall be able to produce a certificate stating such on request.

## 14.8 DETECTOR ASSEMBLY

The Detector, Filter, Aspirator and Relay Outputs shall be housed in a mounting box and shall be arranged in such a way that air is drawn from the fire risk area and a sample passed through the Dual Stage Filter and Detector by the Aspirator.

The Detector shall have four independent field programmable smoke alarm thresholds across its sensitivity range with adjustable time delays for each threshold between 0-60 seconds.

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The detector shall also incorporate the facility to transmit a fault either via a relay.

The detector shall have a single pipe inlet that must contain an ultrasonic flow sensor. High flow fault (urgent and non-urgent) and low flow fault (urgent and non-urgent) can be reported.

The filter must be a two-stage disposable filter cartridge. The first stage shall be capable of filtering particles in excess of 20 microns from the air sample. The second stage shall be ultra-fine, removing more than 99% of contaminant particles of 0.3 microns or larger, to provide a clean air barrier around the detector's optics to prevent contamination and increase service life.

The aspirator shall be a purpose-designed aspirator assembly.

When using pre-engineered sampling pipe networks shall be capable of supporting combined sampling pipe length up to 100m with a transport time per applicable local codes. Custom sampling pipe network designs shall be supported using calculation software.

The assembly must contain relays for basic alarm and fault conditions. The relays shall be software programmable (latching or non-latching). The relays must be rated at 1A at 30 VDC.

The assembly shall have built-in event and smoke logging. It shall have separate event log storage for smoke levels, alarm conditions, operator actions and faults. The date and time of each event shall be recorded. Each detector (zone) shall be capable of storing up to 128 events on a First In First out (FIFO) basis.

#### **14.9 DIGITAL COMMUNICATION PORT**

- An RS 232 compatible serial port will be provided on the detector for configuration, status monitoring, command input, event log extraction and software upgrades. It shall comply with EIA RS232 Protocol.
- The unit shall support an Open Detector Control Protocol (ODCP) for connection to 3<sup>rd</sup> party embedded devices. The ODCP shall provide the following:
  - Alarm Status for all VLF alarm levels

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- Current smoke level
- Current flow level (% flow and litres/min)
- VLF Detector state (Running, Disable & Standby)
- Fault Status
- Remaining Days for Filter Life
- Smoke Threshold levels
- Detector's product ID (serial number)
- Reset
- Disable
- Standby
- Normalise
- Set smoke thresholds

## 14.9.1. Initial Detection Alarm Settings

Initial settings for the alarm levels shall be determined by the requirements of the fire zone. Default settings of the unit shall be:

- Alarm Level 1 (Alert) 0.08% obs/m (0.025% obs/ft)
- Alarm Level 2 (Action) 0.14% obs/m (0.0448% obs/ft)
- Alarm Level 3 (Fire 1) 0.20% obs/m (0.0625% obs/ft)
- Alarm Level 4 (Fire 2) 2.0% obs/m (0.625% obs/ft)

## 14.9.2. Initial (Factory Default) Alarm Delay Thresholds

Initial (factory default) settings for the alarm delay threshold shall be:

- Alarm Level 1 (Alert) 10 seconds
- Alarm Level 2 (Action) 10 seconds
- Alarm Level 3 (Fire 1) 10 seconds
- Alarm Level 4 (Fire 2) 10 seconds
- Fault Alarm 5 seconds

## 14.9.3. Fault Alarms

The Detector Fault relay shall be connected to the appropriate alarm zone on the Fire Alarm Control Panel (FACP) in such a way that a Detector Fault would

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register a fault condition on the FACP. The fault relay shall also be connected to the appropriate control system.

#### **14.9.4. Power Supply and Batteries**

The system shall be powered from a regulated supply of nominally 24V DC. The battery charger and battery shall comply with the relevant Codes, Standards or Regulations. Typically 24 hours standby battery backup is required followed by 30 minutes in an alarm condition in accordance with EN 54: Part 4.

### **14.10 SAMPLING P**

#### **14.11 IPE DESIGN**

##### **14.11.1. Sampling Pipe**

The sampling pipe shall be smooth bore. Normally, pipe with an outside diameter (OD) of 25mm and internal diameter (ID) of 21mm shall be used.

The pipe material should be suitable for the environment in which it is installed, or should be the material as required by the specifying body (UL 1887 Plenum rated CPVC).

All joints in the sampling pipe must be air tight and made by using solvent cement, except at entry to the detector.

The pipe shall be identified as Air Sampling / Aspirating Smoke Detector Pipe (or similar wording) along its entire length at regular intervals not exceeding the manufacturer's recommendation or that of local codes and standards.

All pipes should be supported at not less than 1.5m centres, or that of the local codes or standards.

The far end of each trunk or branch pipe shall be fitted with an end-cap and made air-tight by using solvent cement. Use of an end-cap will be dependent on detailed calculations.

All sampling pipes shall be red in colour.

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**14.11.2. Sampling Holes**

Sampling holes shall not be separated by more than the maximum distance allowed for conventional point detectors as specified in the local codes and standards. Intervals may vary according to calculations.

Each sampling point port shall be identified.

Consideration shall be given to the manufacturer's recommendations and standards in relation to the number of sampling points and the distance of the sampling points from the ceiling or roof structure and forced ventilation systems.

Sample port size shall be as specified by detailed calculations.

**14.12 INSTALLATION****14.12.1. The Detection system**

The contractor shall install the system in accordance with the manufacturer's System Design Manual as well as comply with the original client approved design intend.

**14.12.2. The Capillary Sampling Network**

Where false ceilings are installed, the sampling pipe shall be installed above the ceiling, and Capillary Sampling Points shall be installed on the ceiling and connected by means of a capillary tube.

The typical internal diameter of the capillary tube shall be 5mm, the maximum length of the capillary tube shall be 8m unless the manufacturer in consultation with the Engineer have specified otherwise.

The Capillary tube shall terminate at a Ceiling Sampling Point specifically designed and approved by the manufacturer. The performance characteristics of the Sampling Points shall be taken into account during the system design.

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**14.12.3. Air Sampling Pipe Network Calculations**

For specific performance requirements that fall outside the pre-engineered designs, a sampling pipe aspiration-modelling program shall provide air sampling pipe network calculations. Pipe calculations shall be supplied with the proposed pipe layout design to indicate the following performance criteria:

- **Transport Time**

Wherever possible the transport time (i.e. the time taken by smoke sampled to reach the detector) for the least favourable sampling point shall be less than 60 seconds for open hole sampling and less than 90 seconds for capillary tubes.

- **Balance %**

The sample point balance for the pipe shall not be less than 70%. That is, the volume of air drawn from the last sampling point shall not be less than 70% of the average volume of air through the other holes.

**Commissioning Tests**

The contractor shall allow for the manufacturer's representative to attend commissioning of the entire installation in the presence of the owner and/or its representative.

All necessary instrumentation, equipment, materials and labour shall be provided by the Contractor.

The Contractor shall record all tests and system calibrations and a copy of these results shall be retained on site in the System Log Book.

A wire burn test would be required during the commissioning and handing-over of the HSSD systems and should be demonstrated to the Engineer and client.

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#### 14.12.4. System Checks

Visually check all pipes to ensure that all joints, fittings, bends, sampling points, etc., comply with the Specification.

Check the system to ensure the following features are operational and programmed in accordance with the specification.

- Alarm threshold levels (for both day and night settings),
- Detector address,
- Time and date,
- Time delays,
- Air flow fault thresholds,
- External buttons operable (Reset / Disable / Test / Instant Fault Finder, AutoLearn Smoke and AutoLearn Flow),
- Referencing (if VESDAnet card is used)
- Units set to U.S./S.I. (for US only) or metric for other regions.

Check to ensure that all ancillary warning devices operate as specified.

Check interconnection with Fire Alarm Control Panel to ensure correct operation.

#### 14.12.5. Tests

Introduce smoke into the detector assembly to provide a basic Go / No-Go functional test.

Verify that transport time from farthest sampling port does not exceed the local code requirements.

Activate the appropriate Fire Alarm zones and advise all concerned that the system is fully operational. Fill out the logbook and commissioning report accordingly.

### 15. ADDRESSABLE DETECTION CONTROL PANEL

#### 15.1 PANEL DESCRIPTION

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The fire alarm panel shall be a 24 volt analogue addressable unit, designed to communicate with the sensors and field devices. It shall be a microprocessor based unit, and shall incorporate all hardware and software to enable it to make decisions based upon information received from sensors, and operate appropriate outputs to initiate required alarms and signals.

The panel shall comply fully with standard EN54: Part 2.

The control unit shall continuously monitor the analogue status of all sensing devices, and initiate action when a fire or smoke condition is present.

The alarm management shall be field configurable from the control panel via a key pad to enable the system to be tailored to suite the protected building, and to permit future changes. This configuration shall be maintained under power failure conditions.

The control unit shall have a front panel comprising of indicating LED's, control keyboard, and LCD display, as described in detail later.

The system will comprise of one 4 loop Addressable Control Panel. The zones must be fully field programmable to permit sensors to be allocated to any zone. The zoning must be manually configured on system start-up, or on request by an authorised operator.

The panel must provide facilities for the operator to inspect the zoning configuration, and inhibit, or activate devices. Facilities must be provided for identifying all active and inhibited addressed, and all connected device types.

## 15.2 PANEL OPERATION

Four levels of access into the system menu via the keypad are to be provided.

These are to be as follows:

- Level 1  Operating (no access code required)
-  Level 2  Maintenance Technician (access code required)

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- Level 3 : Commissioning (access code plus key)
- Level 4 : Access Code Changes (access code plus key)

Facilities for "locking-off" controls are to be provided.

The panel is to incorporate a keyboard and push-button with the following functions:

- numeric keyboard
- system reset button
- alarm accept button/silence alarm button
- alarm sound button
- panel buzzer "mute" button
- lamp test function
- control buttons as required for system operation
- menu functions for maintenance and commissioning

### 15.3 POLLING

The system is to incorporate a polling system which polls each sensors individually and reads information at regular intervals to the control unit. The idle value shall be continuously updated in order to compensate for ageing and atmospheric conditions. The panel shall make decisions based upon the number of devices attached to the loop.

All communication shall be under the control of the panel, which shall sequentially poll each device in turn and authorise communication. No device shall communicate with the control panel without authority.

The control panel must be able to read information from a device or send instructions to a device.

The panel shall monitor each device on every scan, and give a fault signal for any of the following conditions, within 30 seconds:

- (a) detector removed
- (b) address unit removed

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- (c) incorrect device type
- (d) faulty calibration or sensitivity

#### **15.4 CALIBRATION**

The system must check the calibration of each analogue line device and record changes caused by environmental contamination.

When maximum calibration adjustment is reached the panel must indicate a "maintenance" signal. This must be a dedicated signal, and must be separate from the pre-alarm" signal.

The build-up of dirt or similar contamination on the optical surface will cause the output signal from the detector to gradually change. The control panel shall be capable of monitoring this slow change in signal and at a predetermined level indicate that the detector is in need of servicing.

#### **15.5 PANEL DISPLAY**

All display and indicators shall be LCD for text, and LED for lamp indication.

The type, calibration, sensitivity and status of each device must be able to be displayed at the control panel.

The control panel shall be able to physically identify the zone in which each sensor or device address resides and shall give a "configuration-fault" signal if a sensor or device address is located in the incorrect zone.

Fire indication shall be by zone, displayed on LED indicators, and on the LCD text display.

Fault, maintenance, pre-alarm, and device/zone disabled signals shall be indicated visually by LCD text display, and audibly, in the control unit.

The top portion of the LCD text display shall always show the first alarm received. The lower portion of the LCD text display shall show the last alarm

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received. It must be possible to manually scroll through all alarms on the lower portion of the screen, using "up" and "down" scroll buttons.

The display must show the total number of alarm events currently in the system.

Fire alarm shall take priority when displaying. However, it must be possible to view all events currently in the system, displayed devices, and other events.

It shall be possible to view the devices, by address, that initiated the alarm on the LCD text display, on manual request. When viewing the device, a 40 character location message specific to each device shall be displayed.

The visual indications must be arranged so that the different warnings are clearly distinguished. (i.e. amber for fault , red for alarm).

The internal audible signal device may be the same for all alarms, but either tone variation or time switching shall be used to differentiate the signals.

Outputs shall be provided for audible alarms, control functions, remote mimics and connection for computers and printers.

The LCD text display must be able to simultaneously display a minimum of the following information in each display mode.

One display mode:

- type of alarm
- 2 zones (first and last)
- alarm count
- total number of alarms
- 40 character zone location message for each zone
- time and date

Device display mode:

- type of alarm
- 2 zones (first and last)

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- alarm count
- total number of alarms
- 40 character zone location message for each zone
- time and date

Device display mode:

- loop number, zone number, detector address
- alarm count
- detector in alarm
- alarm type
- active or accepted
- time and date

The LCD must be at least a 160 character display.

## 15.6 SOFTWARE ALGORITHMS

The data from which sensor must be evaluated by intelligent software algorithms to identify the presence of fire or smoke, and any possible faults present.

The system must support a number of software different algorithms, each tailored to suit the profile of a different hazard or protected area. These algorithms must be specifically matched to provide the optimum protection for each type of area. It must be possible to allocate selected algorithms independently to each sensor in the system. In addition, different algorithms must be automatically allocated to the same sensor at different times.

It must be possible to customise algorithms to take into account special conditions that may exist in certain specific hazards. This customisation should incorporate the features below.

Alarm sensitivity relative to each analogue detector is to be individually adjustable, device by device, by the control panel. Not less than four levels of sensitivity adjustment are required for each device, as follows:

- smoke sensors
  - (1) 1.5%/m obs
  - (2) 2.5%/m obs

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(3) 3.5%/m obs

(4) 5.0%/m obs

heat sensors

(1) 42 °C

(2) 58 °C

(3) 70 °C

(4) 82 °C

## 15.7 ALARMS

There shall be no limit to the number of devices which may be in alarm simultaneously.

Every analogue detector must have the facility for verifying the validity of an alarm signal over a 20 second period, before initiating an alarm. This alarm verification function must be able to be enable or disable, on a device by device basis, from the control panel.

### 15.7.1. Alarm Outputs

The panel must incorporate two monitored audible alarm outputs for the switching-on of bells of electronic sounders.

These outputs must be continuously monitored for open and short circuit.

Each output must be rated at 0.75 A at 24V dc.

It shall be possible to independently display either of the alarm bell output by means of a control push button.

A test facility shall be provided in order to test each of the alarm bell out outputs. When the test is initiated the selected alarm bell will operate intermittently.

Both the alarm bells will have a delay facility which is selected by controls on the front panel. Manual call points will override this delay.

### 15.7.2. Alarm Contacts

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One voltage free change-over contact must be provided. This must operate on a "fire" condition, and is to remain "on" until the system is reset.

The contacts are to be rated 2 A at 24 V dc.

### **15.7.3. Double-Knock (Coincidence) Operation**

It shall be possible to programme any of the control outputs or addressable relays to operate upon an alarm from any two sensors in the programmed group.

### **15.7.4. Silencing Operation**

It shall be possible to programme any of the control outputs or addressable relays to operate in either "silencing" mode or "non-silencing" mode.

In "silencing" mode the relay or outputs shall de-activate when the "alarm accept" button is pressed, or when the "reset" button is pressed, or when the "reset" button is pressed.

In "non-silencing" mode, the relay or output shall be de-activated only when the "reset" button is pressed.

## **15.8 ACTIVATION DELAY**

It shall be possible to programme any of the control outputs or addressable relays to activate after a delay period from receipt of the control signal.

This delay shall be 0-16 minutes, in one second increments.

## **15.9 SOFTWARE CONTROL**

All the above functions, shall be under software control, and programmed through the panels keyboards or by means of a computer.

It must be possible, as an option, to programme the panel off-line on a computer, and download the programme into the panel.

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It must be possible to save the programme to disk for future reference.

## 15.10 REMOTE PANEL OUTPUTS

An optional serial port shall be provided for connecting to remote panels and computers.

The remote units must have the following display and controls:

Remote 160 character LCD text display which repeats all events being displayed on the panel display.

- numeric keyboard
- system reset button
- alarm accept button/silence alarm button
- alarm sound button
- panel buzzer "mute" button
- lamp test function
- "help" button
- control buttons as required for system operation
- menu functions for maintenance and commissioning

## 15.11 PROCESSOR MONITORING

The panel must be provided with fault tolerance enabling monitoring and resetting of the microprocessor in the event of microprocessor failure. For diagnostic purposes, a counter must allow the viewing of the incidents that the processor has been reset by the system. This information must be stored in non-volatile memory, enabling it to be viewed even if the panel has been turned off. The counter must only be able to be reset by an authorised Engineer, under a level 3 access code.

The microprocessor must perform full diagnostic tests on all memory devices on start-up, as follows:

|                             |                     |
|-----------------------------|---------------------|
| RAM Test                    | (running data)      |
| EPROM Checksum Verification | (programme storage) |

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## EEPROM Checksum Verification (site configuration storage)

Should any test fail an audible and visual fault indication must be given, and the LCD display must indicate the nature of the fault.

The control unit shall perform periodic checksum tests, at intervals not exceeding 60 minutes, on the RAM, EPROM, EEPROM memories, and give an audible, visual, and LCD text fault indication in the event of a discrepancy.

It must be possible to view the original and current checksums for all memories on the panel LCD display, as a maintenance (Level 2) function.

In the event of a fault condition where the processor will not restart within 20 seconds, the panel must give an audible and visual alarm indication.

### 15.12 SYSTEM MAINTENANCE

The control panel shall keep statistics for each of the system sensors. These statistics shall be able to be displayed on demand by a level 2 operator.

The following statistics shall be displayed:

- maximum value attained by the sensor as well as the date and time.
- the minimum value attained by the sensor as well as the date and time.
- the average idle value attained by the sensor.
- communication error rate

It shall be possible to put up to 1 Zone (20 detectors) in soak test mode. Sensors in soak test mode will log their conditions in the vent buffer without raising fire alarms. It shall be possible to display or printout the result of the soak-test.

### 16. GAS CONTROL PANEL

The gas control panel / gas discharge panel shall be a Technoswitch TC3001 Advanced 3 Zone combination panel or similar approved.

- The panel shall comply fully with standard EN54: Part 2.

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- EN12094-1 Approved f EN54-2 & EN54-4 Approved f
- Full CPD Approval
- 1,000 event time stamped event log
- Software Extraction Tool for Downloading Configuration and Event Logs
- Large LCD / Digit Countdown Timer
- On Board Relays : 4 x 1 A 30 V DC Relay Outputs (Fire, Fault & 2 Programmable)

## **17. COMMISSIONING AND ACCEPTANCE OF GAS SUPPRESSION SYSTEM**

### **17.1 GENERAL**

This clause sets out the minimum requirements for the commissioning and acceptance of the gaseous extinguishing system.

### **17.2 TESTS**

#### **17.2.1. General**

The completed system shall be reviewed and tested by a competent person to meet the approval of the authority. Only equipment and devices designed to national standards shall be used in the systems. To determine that the system has been properly installed and will function as specified, the tests as determined in this specification shall be completed.

#### **17.2.2. Enclosure Check**

Determine that the protected enclosure is in general conformance with the plans and requirements of SANS 14520 Code of Practice.

#### **17.2.3. Review of Mechanical Components**

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The piping distribution system shall be inspected to determine that it is in compliance with the design and installation documents.

Nozzles and pipe size and, if appropriate, pressure – reducing devices, shall be in accordance with system drawings. The means for pipe size reduction and attitudes of tees shall be checked for conformance to the design.

Piping joints, discharge nozzles and piping supports shall be securely fastened to prevent unacceptable vertical or lateral movement during discharge. Discharge nozzles shall be installed in such a manner that piping cannot become detached during discharge.

During assembly, the piping distribution system shall be inspected internally to detect the possibility of any oil or particulate matter which could soil the hazard area or affect the extinguishant distribution due to a reduction in the effective nozzle orifice area.

The discharge nozzles shall be oriented in such a manner that optimum extinguishant dispersal can be effected.

If nozzles deflectors are installed, they shall be positioned to obtain the maximum benefit.

The discharge nozzles, piping, and mounting brackets shall be installed in such a manner that they will not potentially cause injury to personnel. Extinguishant shall not directly impinge on areas where personnel may be found in the normal work area, or on any loose objects or shelves, cabinet tops, or similar surfaces where loose objects could be present and become missiles.

All extinguishant storage containers shall be properly located in accordance with 'approved for construction' set of system drawings.

All containers and mounting brackets shall be securely fastened in accordance with the manufacturer's requirements.

A discharge test for extinguishants is generally not recommended. However, if a discharge test is to be conducted, the mass of extinguishant shall be determined by weighing or other approved methods. Concentration

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measurements should be made at a minimum of three points, one at the highest hazard level.

Other assessment methods may normally be used to reduce unnecessary discharge into the environment, for example, the door fan pressurization test specified in annex E. However, a discharge test may be conducted if acceptable to the authority.

An adequate quantity of extinguishant to produce the desired specified concentration shall be provided. The actual enclosure volumes shall be checked against those indicated on the system drawings to ensure the proper quantity of extinguishant. Fan rundown and damper closure time shall be taken into consideration.

Unless the total piping contains not more than one change in direction fitting between the storage container and the discharge nozzle, and unless all piping has been physically checked for tightness, the following tests shall be carried out.

- All open-ended piping shall be pneumatically tested in a closed circuit for a period of 10 min at 3 bar. At the end of 10 min, the pressure drop shall not exceed 20% of the test pressure.
- All closed-section pipework shall be hydrostatically tested to a minimum of 1.5 times the maximum working pressure for 2 min during which there shall be no leakage. On completion of the test, the pipework shall be purged to remove moisture.

It is recommended that hydrostatic testing be carried out at the manufacturer's work where practicable.

**WARNING:** Pneumatic pressure testing creates a potential risk of injury to personnel in the area, as a result of airborne projectiles if rupture of the piping system occurs. Prior to conducting the pneumatic pressure test, the protected area shall be evacuated and appropriate safeguards shall be provided for test personnel

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A test using nitrogen, or a suitable alternative, shall be performed on the piping network to verify that flow is continuous and that the piping and nozzles are unobstructed.

#### **17.2.4. Review of Enclosure Integrity**

It is important that an effective extinguishant concentration not only be achieved, but is maintained for a sufficient period of time to allow effective emergency action. This is equally important in all classes of fires since a persistent ignition source (e.g. an arc, heat source, oxyacetylene torch, or "deep-seated" fire) can lead to resurgence of the initial event once the extinguishant has dissipated.

It is essential to determine the likely period during which the extinguishing concentration will be maintained within the protected enclosure. This is known as the hold time. The predicted hold time shall be determined by the door fan test specified in annex E, or full discharge test based on the following criteria.

- (a) At the start of the hold time, the concentration throughout the enclosure shall be the design concentration
- (b) At the end of the hold time, the extinguishant concentration throughout the enclosure shall be the design concentration.
- (c) The hold time shall be not less than 10 minutes, unless otherwise specified by the authority.

A written report shall be prepared on completion of the test containing the following information:

- (a) the enclosure leak flow characteristics;
- (b) the design concentration of extinguishant;
- (c) the gross volume of the enclosure;
- (d) the quantity of extinguishant provided;

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- (e) the height of the enclosure;
- (f) the height of the highest hazard;
- (g) the predicted minimum hold time and whether or not the value complies with the Code i.e. whether it is less than 10 min or the higher necessary value, as appropriate;
- (h) the sketch plan used in the evaluation of the enclosure;
- (i) the current calibration data for the fan unit and the pressure-measuring devices, and if available, corresponding certificates;
- (j) the test results, including a record of the test measurements and any appropriate computer printout.

#### **17.2.5. Review of Electrical Components**

- (a) All wiring systems shall be properly installed in compliance with the appropriate national standard and the system drawings. AC and DC wiring shall not be combined in a comm. Conduit unless properly shielded and grounded.
- (b) All field circuitry shall be tested for ground fault and short circuit condition. When testing field circuitry, all electronic components (such as smoke and flame detectors or special electronic equipment for other detectors, or their mounting bases) shall be removed and jumpers properly installed to prevent the possibility of damage within these devices. Replace components after testing the circuits.
- (c) Adequate and reliable primary standby sources of energy which comply with 6.4 shall be used to provide for operation of the detection, signalling, control and actuation requirements of the system.
- (d) All auxiliary functions (such as alarm sounding or displaying devices, remote annunciators, air handling shutdown, power shutdown, etc.)

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shall be checked for proper operation in accordance with system requirements and design specifications.

Alarm devices shall be installed so that they are audible and visible under normal operating and environmental conditions.

Where possible, all air-handling and power cut-off controls should be of the type that once interrupted require manual restart to restore power.

- (e) Check that for systems using alarm silencing, this function does not affect other auxiliary functions such as air handling or power cut-off where they are required in the design specification.
- (f) Check the detection devices to ensure that the types and locations are as specified in the system drawings and are in accordance with the manufacturer's requirements.
- (g) Check the manual release devices are properly installed, and are readily accessible, accurately identified and properly protected to prevent damage.
- (h) Check that all manual released devices used to release extinguishants require two separate and distinct actions for operation. They shall be properly identified. Particular care shall be taken where manual release devices for more than one system are in close proximity and could be confused or the wrong system actuated. Manual release devices in this instance shall be clearly identified as to which hazard enclosure they protect.
- (i) Check that for systems with a main/reserve capability, the main/reserve switch is properly installed, readily accessible and clearly identified.
- (j) Check that for systems using hold switches requiring constant manual force, these are properly installed, readily accessible within the hazard area and clearly identified.
- (k) Check that the control panel is properly installed and readily accessible.

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**17.2.6. Preliminary Functional Test**

- (a) Where a system is connected to a remote central alarm station, notify the station that the fire system test is to be conducted and that an emergency response by the fire department or alarm station personnel is not required. Notify all concerned personnel at the end-user's facility that a test is to be conducted and instruct them as to the sequence of operation.
- (b) Disable or remove each extinguishant storage container release mechanism and selector valves, where fitted, so that activation of the release circuit will not release extinguishant. Reconnect the release circuit with a functional device in lieu of each extinguishant storage container release mechanism.

For electrically actuated release mechanisms, these devices may include suitable lamps, flash bulbs or circuit breakers. Pneumatically actuated release mechanisms may include pressure gauges. Refer to the manufacturer's recommendations in all cases.

- (c) Check each resettable detector for proper response.
- (d) Check that polarity has been observed on all polarized alarm devices and auxiliary relays.
- (e) Check that all required end-of-line devices have been installed.
- (f) Check all supervised circuits for correct fault response.

**17.2.7. System Functional Operation Test**

- (a) Operate the detection initiating circuit(s). All alarm functions shall occur according to the design specification.

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- (b) Operate the necessary circuit to initiate a second alarm circuit if present. Verify that all second alarm functions occur according to design specifications.
- (c) Operate the manual release device. Verify that manual release functions occur according to design specifications
- (d) Where appropriate, operate the hold switch. Verify that functions occur according to the design specifications. Confirm that visual and audible supervisory signals are received at the control panel.
- (e) Check the functional all resettable valves and activators, unless testing the valve will release extinguishant.

"One-Shot" valves, such as those incorporating frangible discs, should not be tested.

- (f) Check pneumatic equipment, where fitted, for integrity to ensure proper operation.

#### **17.2.8. Remote Monitoring Operations (If Applicable)**

- (a) Disconnect the primary power supply, then operate one of each type of input device while on standby power. Verify that an alarm signal is received at the remote panel after the device is operated. Reconnect the primary power supply.
- (b) Operate each type of alarm condition and verify receipt of fault condition at the remote station.

#### **17.2.9. Control Panel Primary Power Source**

- (a) Verify that the control panel is connected to a dedicated unswitched circuit and is labelled properly. This panel shall be readily accessible but access shall be restricted to authorized personnel only.

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- (b) Test a primary power failure in accordance with the manufacturer's specification, with the system fully operated on standby power.

#### **17.2.10. Completion of Functional Test**

When all functional tests are completed, reconnect each storage container so that activation of the release circuit will release the extinguishant. Return the system to its fully operational design condition. Notify the central alarm station and all concerned personnel at the end-user's facility that the fire system test is complete and that the system has been returned to full service condition by following the procedures specified in the manufacturer's specifications.

### **18. COMPLETION CERTIFICATE AND DOCUMENTATION**

The installer shall provide to the user a completion certificate, a complete set of instructions, calculations and drawings showing the system as-installed, and a statement that the system complies with all the appropriate requirements of this part of ISO 14520, and giving details of any departure from appropriate recommendations. The certificate shall give the design concentrations and, if carried out, reports of any additional test including the door fan test.

#### **18.1 FIRE PROTECTION BY CONTRACTOR:**

The following fire protection measures will be provided by the detection and gas contractor:

- Hand-held fire equipment; and
- Passive fire protection measures including emergency escape provision, statutory emergency signage, etc.

#### **18.2 CLASSIFICATION OF SYSTEM**

The fire alarm system shall comply with the requirements as defined by SANS 10139 Code of Practice and the relevant and applicable parts of SANS 14520.

#### **18.3 PROGRAMME**

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By completing the tender documents, the Contractor confirms that he is able to meet the dates set out in the Preliminaries. Any uncertainty should be resolved with the Engineer prior to tender submission.

## **18.4 SUBMISSION OPTIONS**

All equipment and installation by Contractor are to comply fully with the following standards:

- SANS 10139; and
- SANS 14520 – 1
- SANS 14520 – 14
- SANS 369
- SANS 50054-20
- Applicable EN 54 standard.



## **ARMSCOR HEAD QUATERS**



# **Occupational Health and Safety Specification for the Fire Detection and Gas Fire Suppression System Project**

**Proudly prepared by**

**MGOVELA  
ENVIRONMENTALS**

**APRIL 2022**

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# Occupational Health and Safety Specification for the Armscor Fire Detection and Gas Fire Suppression System Project

## 1. Definitions

- 1.1 **Client** means any person for whom construction work is being performed and/or undertaken [i.e. Armscor Head Quarters for purposes of this specification];
- 1.2 **Construction Regulations** means the Occupational Health and Safety Act's, No 85 of 1993, new Construction Regulations (GNR.84 of 07 February 2014) that came into effect on 01 March 2014;
- 1.3 **SANS Codes** means the South African National Standards Codes or the South African Bureau of Standards Codes as defined in Regulation No. 1373 published in Government Gazette 24002, dated 8 November 2002 in terms of the standards Act, 1993 (Act 29 of 1993);
- 1.4 **Occupational health and safety plan** means a sufficiently documented plan to the standards of the Client, which addresses hazards identified and includes safe working procedures to mitigate, reduce or control the hazards identified;
- 1.5 **Occupational health and safety specification** means a documented specification of all health and safety requirements pertaining to the associated works on a construction site, so as to ensure the health and safety of persons working, visiting, passing, staying and/or working close to the construction site and/or other applicable areas such as site camp;
- 1.6 **OHSACT** means the Occupational Health and Safety Act, No 85 of 1993, as amended; and
- 1.7 **Principal Contractor** means an employer, as defined by Section 1 of the OHSACT who performs construction work and is appointed by the Client to be in overall control and management of the construction site and works.

## 2. Introduction

In terms of Construction Regulation 5(1)(b) of the OHSACT, the Client is required to compile an occupational health and safety specification for any intended project and provide such specification to prospective tenderers/bidders.

This specification has as objective to ensure that the principal contractor entering into a contract with the Client achieves and maintain an acceptable level of occupational health and safety performance and compliance. This document forms an integral part of the contract between the Client and the principal contractor and the principal- and other contractors should make it part of any contract/s that they may have with other contractors and/or suppliers as far as this project is concerned.

Compliance with this document does not absolve the principal contractor from complying with any other minimum legal requirements and the principal contractor remains responsible for the health and safety of his employees, those of his mandataries as well as any persons coming on site or on adjacent properties as far as it relates to the construction activities.



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### 3. Scope

To develop a project specific occupational health and safety specification that addresses the reasonable and foreseeable risks, exposures and aspects of occupational health and safety as affected by the abovementioned contract work.

The specification will provide the requirements that the principal contractor and other contractors will have to comply with in order to reduce the risks associated with the abovementioned contract work and that may lead to incidents causing injury and/or ill health, to a level as low as reasonably practicable and possible.

Any contractor interested in submitting a bid in response to the Client's formal tender for any construction project, has to prepare and include a draft occupational health and safety plan based on this specification and the OHSACT in its tender submission. The Client will evaluate this plan as part of its formal tender adjudication processes to ensure compliance with Construction Regulation 5 that stipulates that the Client may only appoint a contractor who has the necessary competencies and resources to carry of the work appointed for safely.

### 4. General occupational health and safety provisions

#### 4.1 Hazard identification and risk assessment (Construction Regulation 9)

##### 4.1.1 Risk assessments

Annexure 5 of this specification contains a list of risk assessment headings that have been identified by the Client as possibly applicable to the abovementioned contract work. It is, by no means, exhaustive and is only offered as assistance to the contractors intending to tender for the applicable works. It therefore remains the overall responsibility of the principal contractor to consider all applicable risks and pro- actively undertake risk assessments and implement appropriate risk mitigation measures.

##### 4.1.2 Development of risk assessments

Every principal contractor performing construction work shall, before the commencement of any construction work or work associated with the aforesaid construction work and during such work, ensure that risk assessments are undertaken by a competent person, appointed in writing, and the risk assessments shall form part of the occupational health and safety plan and be implemented and maintained as contemplated in Construction Regulation 9(1).

The risk assessments shall include, at least:

- The identification of the current as well as emerging risks and hazards to which persons may be exposed to;
- The analysis and evaluation of the risks and hazards identified;



- A documented plan of safe working procedures (SWP) and any method statements to mitigate, reduce or control the risks and hazards that have been identified;
- A plan to monitor the application of the SWPs; and
- A plan to review the risk assessments as the work progresses and changes are introduced or incidents occurred which requires the re-evaluation of the processes/risk mitigation.

Based on the risk assessments, the principal contractor must develop a set of site-specific occupational health and safety rules that will be applied to regulate the occupational health and safety aspects of the construction.

The risk assessments, together with the site-specific occupational health and safety rules, must be submitted to the Client before mobilisation on site commences.

Despite the risk assessments listed in Annexure 5, the principal contractor is required to conduct a baseline risk assessment and the aforesaid risk assessments must be incorporated into the baseline risk assessment. The baseline risk assessment must further include the SWPs and the applicable method statements based on the risk assessments.

Hazard identification and risk assessments must be undertaken whilst SWPs must be developed for all out-of-scope work.

#### **4.1.3 Review of risk assessments**

The principal contractor is to review the hazards identified, the risk assessments and the SWPs at each production planning and progress report meeting as the contract work develops and progresses and each time changes are made to the designs, plans and construction methods and/or processes.

It is also proposed that should an incident occur the SWPs and all other applicable processes be re-evaluated to ensure that the mitigation measures are still applicable and appropriate and if not a revision of the risk assessments be undertaken.

The principal contractor must provide the Client, other contractors and all other concerned or affected parties with copies of any changes, alterations or amendments as soon as possible but within 14 calendar days of such changes.

## **4.2 Legal Requirements**

All Contractors entering into a contract with the Client shall, as a minimum, comply with the -



- OHSACT and a current, up-to-date copy of the OHSACT and its Regulations must be available on site at all times; and
- Compensation for Occupational Injuries and Diseases Act, No 130 of 1993 (COIDA) as amended. The principal contractor will be required to submit a letter of registration and "good-standing" from the Compensation Commissioner or compensation insurer before being awarded the contract. A current, up-to-date copy of the COIDA must be available on site at all times.

#### 4.3 Structure and responsibilities

##### 4.3.1 Overall supervision and responsibility for occupational health and safety

- The principal contractor [appointed in terms of Construction Regulation 5(1)(k)] is responsible to implement and maintain the occupational health and safety plan approved by the Client.
- The Chief Executive Officer (in terms of Section 16(1) of the OHSACT) of the principal contractor is to ensure that the Employer (as defined in the OHSACT) complies with the OHSACT. Annexure 1 "Legal Compliance Checklist" may be used for this purpose and assistance.
- The principal contractor's Chief Executive Officer may appoint any person reporting to him/her as Designated Person in terms of Section 16(2) of the OHSACT. Such Designated Person is responsible to assist the Chief Executive Officer to ensure that the Employer complies with the requirements of the OHSACT.
- The construction manager, assistant construction manager, construction supervisor and assistant construction supervisor(s) appointed in terms of Construction Regulation 8 are responsible for supervising the construction work and in specific to ensure that all work undertaken comply with the requirements of the OHSACT, its Regulations and the Client's specifications.

##### 4.3.2 Operational responsibilities for occupational health and safety

The principal contractor shall appoint designated **competent employees** and/or other competent persons as outlined in the following list to assist with the operational responsibilities for occupational health and safety. This list is only the minimum requirement and is therefore in no way exhaustive.

| Appointment description                                     | Appointment required in terms of |
|-------------------------------------------------------------|----------------------------------|
| Assistant construction manager                              | Construction Regulation 8(2)     |
| Assistant construction supervisor                           | Construction Regulation 8(8)     |
| Construction health and safety officer                      | Construction Regulation 8(5)     |
| Construction manager                                        | Construction Regulation 8(1)     |
| Construction supervisor                                     | Construction Regulation 8(7)     |
| Construction vehicle, mobile plant and machinery supervisor | Construction Regulation 23       |

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| <b>Appointment description</b>                          | <b>Appointment required in terms of</b>         |
|---------------------------------------------------------|-------------------------------------------------|
| COVID-19 compliance officer                             | Regulation 16(6) of Government Notice, No R 480 |
| Drivers of construction vehicles and operators of plant | Construction Regulation 23                      |
| Electrical installation and appliances inspector        | Construction Regulation 24                      |
| Emergency, security and fire coordinator                | Construction Regulation 29                      |
| Excavation supervisor                                   | Construction Regulation 13                      |
| Fall risk protection supervisor                         | Construction Regulation 10                      |
| First-aiders                                            | General Safety Regulation 3                     |
| Fire fighting equipment inspector                       | Construction Regulation 29                      |
| Hazardous chemical agents supervisor                    | Regulations for Hazardous Chemical Agents       |
| Incident investigator                                   | General Administrative Regulation 9             |
| Ladder inspector                                        | General Safety Regulation 13(a)                 |
| Lifting machines and equipment inspector                | Construction Regulation 22                      |
| Occupational health and safety committee                | OHSACT Section 19                               |
| Occupational health and safety representatives          | OHSACT Section 17                               |
| Person responsible for machinery                        | General Machinery Regulation 2                  |
| Risk assessor                                           | Construction Regulation 9(1)                    |
| Scaffolding supervisor                                  | Construction Regulation 16                      |
| Stacking and storage supervisor                         | Construction Regulation 28                      |
| Structures supervisor                                   | Construction Regulation 11                      |
| Temporary works supervisor                              | Construction Regulation 12                      |
| Traffic management supervisor                           | OHSACT Section 9(1)                             |
| Traffic safety officer                                  | OHSACT Section 9(1)                             |
| Pressure equipment supervisor                           | Pressure Equipment Regulations                  |
|                                                         |                                                 |

These appointments must be in writing and the responsibilities clearly stated together with the period for which each appointment is made. This information must be communicated to and agreed with the appointees.

Copies of appointments must be submitted to the Client together with concise CV's (or other applicable proof of competency) of the appointees as part of the principal contractor's health and safety plan and if appointed copies of the appointments included in the occupational health and safety file. All appointments must be approved by the Client and any changes of appointees or appointments must be communicated to the Client and agreed upon before being implemented.

The principal contractor must, furthermore provide the Client with an organogram of all contractors that he/she has appointed or intends to appoint and keep this list updated on a weekly basis.



#### **4.3.3 Construction health and safety officer**

This project requires the appointment of a full-time construction health and safety officer, appointed in terms of Construction Regulation 8(5). This appointee should be duly registered and in good standing with a statutory body approved by the Chief Inspector as is required by Construction Regulation 8(6).

The South African Council for Project and Construction Management Professions (SACPCMP) is currently the statutory body responsible for the professional registration of construction health and safety officers and a copy of the appointee's SACPCMP's registration certificate should be submitted as part of the principal contractor's health and safety plan and also be readily available in the health and safety file to be kept and maintained on site.

#### **4.3.4 Designation of occupational health and safety representatives (Section 17 of the OHSACT)**

Where the principal contractor employs more than 20 persons [including the employees of other contractors (sub-contractors) and its supervisors] he has to appoint one occupational health and safety representative for every 50 employees or part thereof. General Administrative Regulation 6 requires that the election, appointment and subsequent designation of the occupational health and safety representatives be executed in consultation with employee representatives or employees. (Section 17 of the OHSACT as well as General Administrative Regulation 6 and 7 refer).

Occupational health and safety representatives have to be designated in writing and the designation must include the area of responsibility of the person and term of the designation.

#### **4.3.5 Duties and functions of the occupational health and safety representatives (Section 18 of the OHSACT)**

- a. The principal contractor must ensure that the designated occupational health and safety representatives conduct a weekly inspection of their respective areas of responsibility, using a checklist, and report thereon to the principal contractor.
- b. Occupational health and safety representatives must be included in accident and/or incident investigations.
- c. Occupational health and safety representatives must attend all occupational health and safety committee meetings.

#### **4.3.6 Appointment of occupational health and safety committee (Section 19 of the OHSACT)**

The principal contractor must establish an occupational health and safety committee consisting of all the designated occupational health and safety representatives together with a number of management



representatives that are not allowed to exceed the number of occupational health and safety representatives on the committee and a representative of the Client who shall act as the chairperson without voting rights. The members of the occupational health and safety committee must be appointed in writing and copies of the appointments included in the occupational health and safety file.

The occupational health and safety committee must meet as a minimum on a monthly basis and consider, at least, the following agenda items:

1. Opening and welcome.
2. Members present, apologies and absent.
3. Minutes of previous meeting.
4. Matters arising from the previous meeting.
5. Occupational health and safety representatives' reports.
6. Incident and/or accident reports and investigations.
7. Incident, accident and/or injury statistics.
8. Other matters.
9. Endorsement of registers and other statutory documents by a duly authorised representative of the principal contractor.
10. Close and next meeting.

#### **4.4 Mandataries**

It is a requirement that the principal contractor, when he appoints contractors or sub-contractors in terms of Construction Regulations 7(1)(c) includes an OHSACT Section 37(2) agreement (i.e. Agreement with Mandatary) in his agreement with such contractor.

#### **4.5 Administrative controls and the occupational health and safety file**

##### **4.5.1 The occupational health and safety file [Construction Regulation 7(1)(b)]**

As required by Construction Regulation 7(1)(b), the principal contractor and other contractors will each keep an occupational health and safety file on site containing the following documents as a minimum:

1. Notification of construction work (Construction Regulation 4.).
2. Updated copies of the OHSACT and its Regulations as well as the COIDA Act (General Administrative Regulation 4.).
3. Proof of registration and good standing with the Compensation Commissioner or a COIDA Insurer [Construction Regulation 5(1)(j)].
4. Occupational health and safety plan agreed with the Client including the underpinning risk assessment(s) and method statements [Construction regulation 7(1)].
5. Copies of occupational health and safety committee meetings and other relevant minutes.
6. Designs and/or drawings [Construction Regulation 7(1)(b)].
7. A list of contractors (sub-contractors) including copies of the agreements between the parties, proof of good standing with



- the Compensation Commissioner or COID Insurer, and the type of work to be undertaken by each contractor (Construction Regulation 7).
8. Appointment and designation forms as per paragraphs 4.3.1 and 4.3.2 above.
  9. Copy of the construction health and safety officer's SACPCMP registration certificate.
  10. The following registers:
    - Accident and/or incident register (Annexure 1 of the General Administrative Regulations);
    - Occupational health and safety representatives' inspection register;
    - Construction vehicles and mobile plant inspections by controller;
    - Daily inspections of vehicles, plant and other equipment by the operator, driver and/or user;
    - Designer's inspections and structures record;
    - Inspection of electrical installations (including inspection of portable electrical tools, electrical equipment and other electrical appliances);
    - Fall risk protection inspections;
    - First-aid box content;
    - Record of first-aid treatment;
    - Fire equipment inspections and maintenance;
    - Record of hazardous chemical agents kept and used on site;
    - Ladder inspections;
    - Machine safety inspections (including machine guards, lock-outs etcetera);
    - Inspection registers and logbooks for lifting machines and – tackle (including daily inspections by drivers/operators);
    - Inspections of scaffolding;
    - Inspections of stacking and storage;
    - Inspections of structures; and
    - Pressure equipment inspections.
  12. All other applicable records.

The Client will conduct and evaluation of the principal contractor's occupational health and safety file from time to time.

#### **4.6 Occupational health and safety goals and objectives and arrangements for monitoring and review of occupational health and safety performance**

The principal contractor is required to maintain a compensation incidence frequency rate (CIFR) of not more than four (See Annexure 2 to this document: "Measuring Injury Experience") and report on this to the Client on a monthly basis.



#### **4.7 Notification of construction work (Construction Regulation 4)**

The principal contractor must, where the contract meets the requirements laid down in Construction Regulation 4, at least 7 days before construction work is to be carried out, notify the Department of Employment and Labour of the intention to carry out construction work and use the form (Annexure 2 in the Construction Regulations) for this purpose. A copy of the notification must be held on the occupational health and safety file and a copy must also be forwarded to the Client for record purposes.

#### **4.8 Medical certificates of fitness (Construction Regulation 7)**

As required by Construction Regulation 7(1)(g), the principal contractor must ensure that all employees have a valid medical certificate of fitness specific to the construction work to be performed. These certificates must be issued by an occupational health practitioner in the form of Annexure 3 (i.e. Annexure 3 in the Construction Regulations).

#### **4.9 Training, awareness and competence**

The contents and syllabi of all training required by the OHSACT and Regulations must be included in the principal contractor's occupational health and safety plan.

##### **4.9.1 General induction training**

All members of the contractor's site management as well as all the persons appointed as responsible for occupational health and safety in terms of the Construction and other Regulations will be required to attend a general induction session.

All employees of the principal and other contractors must be in possession of proof of general induction training.

All subsequent and newly appointed employees must also be subjected to the induction training as soon as possible after the appointment but prior to starting working on site.

##### **4.9.2 Site-specific induction training**

The principal contractor will be required to develop a contract work project specific induction training course based on the risk assessments for the contract work and train all employees and other contractors and their employees in this.

All employees of the principal and other contractors must be in possession of proof that they have attended a site-specific occupational health and safety induction training at all times.



#### 4.9.3 Other training

1. All operators, drivers and users of construction vehicles, mobile plant and other equipment must be in possession of valid proof of training and where applicable licenses or proof of competency.
2. All employees in jobs requiring training in terms of the OHSACT and Regulations must be in possession of valid proof of training.
3. Occupational health and safety training requirements [as required by the Construction Regulations and as indicated by the occupational health and safety specification and the risk assessment(s)] i.e. -
  - a. General induction (Section 8 of the OHSACT);
  - b. Site and job specific induction, including visitors (Sections 8 and 9 of the OHSACT);
  - c. Site and project manager;
  - d. Construction manager;
  - e. Construction supervisor;
  - f. Occupational health and safety representatives [Section 18 (3) of the OHSACT];
  - g. Training of the appointees indicated in paragraphs 4.3.1 and 4.3.2;
  - h. Operators and drivers of construction vehicles and mobile plant (Construction Regulation 23);
  - i. Basic fire prevention and protection (Environmental Regulations 9 and Construction Regulation 29);
  - j. Basic first-aid (General Safety Regulations 3);
  - k. Storekeeping methods and safe stacking (Construction Regulation 28);
  - l. Storage and handling of hazardous chemical agents; and
  - m. Emergency, security and fire coordinator.

#### 4.9.4 Awareness and promotion

The principal contractor is required to have a promotion and awareness programme in place to create an occupational health and safety culture within employees as well as sub-contractors. The following are some of the methods that may be used:

- Toolbox talks
- Posters
- Videos
- Competitions
- Suggestion schemes
- Participative activities such as employee "occupational health and safety circles".

#### 4.9.5 Notices and signs

The following notices and signs are, where applicable, compulsory on the construction site as well as the contractors' yards:



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| Area and/or activity where notice or sign is required                                                                      | Notice or sign required in terms of                                                         |
|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Display of notices and signs                                                                                               | General Safety Regulation 2B and SABS Code 1186                                             |
| Entry                                                                                                                      | General Safety Regulation 2C(2)                                                             |
| First-aid                                                                                                                  | General Safety Regulation 3(6)                                                              |
| Toilets and change rooms                                                                                                   | Facilities Regulation 2 (5) 4(2)(f)                                                         |
| Storage of flammable materials                                                                                             | General Safety Regulation 4(8)(a)(i) and (ii) [10(e) only applicable to contractor's yards] |
| Machinery                                                                                                                  | General Machinery Regulation 9 (Schedule D)                                                 |
| Prohibition on smoking and eating or drinking at the workplaces where high risk substances [FR5 (1)] are stored or handled | Facilities Regulation 6(b)                                                                  |
| Non-potable water                                                                                                          | Facilities Regulation 7(B)                                                                  |
| COVID-19 awareness                                                                                                         | COVID-19 best practice                                                                      |

#### 4.9.6 Competence

The principal contractor shall ensure that his and other contractors' employees appointed are competent and that all training required to undertake the work safely and without risk to health of their or other persons, has been successfully completed before work commences.

The principal contractor shall ensure that follow-up and refresher training is conducted on a regular basis as well as the contract work progresses and the work situation or requirements changes.

Records of all training must be kept on the occupational health and safety file for auditing purposes.

#### 4.10 Consultation, communication and liaison

The following arrangements will apply-

- 4.10.1** Occupational health and safety liaison between the Client, the principal contractor, the other contractors, the designer and other concerned parties will be through the occupational health and safety committee. In the absence of a health and safety committee, the Client and principal contractor will agree on an alternative communication forum to be implemented.
- 4.10.2** In addition to the above, communication may be directly to the Client or his appointed Agent, verbally (followed up in writing within 14 calendar days) or in writing, as and when the need arises.
- 4.10.3** Consultation with the workforce on occupational health and safety matters will be through their supervisors, occupational health and safety representatives, the occupational health and safety committee and their elected trade union representatives, if any.



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- 4.10.4** The principal contractor will be responsible for the dissemination of all relevant occupational health and safety information to the other contractors, for example design changes agreed with the Client and the designer, instructions by the Client and/or his Agent, exchange of information between contractors, the reporting of hazardous and/or dangerous conditions and/or situations etcetera.
- 4.10.5** The principal contractor will be required to do site safety walks with the Client and/or his Agent on a basis to be determined and agreed between the parties.
- 4.10.6** The principle and other contractors will be required to conduct toolbox talks with their employees on at least a weekly basis and records of these including the topics discussed must be kept on the occupational health and safety file. Employees must acknowledge the receipt of toolbox talks which record must, likewise be kept on the occupational health and safety file.
- 4.10.7** The principal contractor's most senior manager on site will be required to attend all the Client's occupational health and safety meetings.
- 4.10.8** The Client or his Agent and the principal contractor will agree on the dates, times and venues of the occupational health and safety meetings.

#### **4.11 Checking, reporting and corrective actions**

##### **4.11.1 Monthly compliance assessment by Client [Construction Regulation 5(1)(0)]**

The Client will be conducting a periodic assessment to comply with Construction Regulation 5(1)(o) and to confirm that the principal contractor has implemented and is maintaining the agreed and approved occupational health and safety plan.

##### **4.11.2 Other assessments and inspections by the Client**

The Client reserves the right to conduct other ad-hoc assessments and inspections as deemed necessary. This could include among others site safety walks.

##### **4.11.3 Conducting an assessment**

A representative of the principal contractor must accompany the Client on all assessments and inspections and may conduct his/her own inspection at the same time. Each party will, however, take responsibility for the results of his/her own assessment and/or inspection.



#### **4.11.4 Contractor's assessments and inspections**

The principal contractor is to conduct his own internal assessments and inspections to verify compliance with his own occupational health and safety plan and management system as well as the requirements of this specification and the compliance of other contractors under his/her control.

#### **4.11.5 Planned and critical task observations (PTO/CTO)**

Planned and critical task observation frequency shall be determined in a risk-based manner, but at least twice a month. Such task observations shall be conducted by duly trained and competent construction supervisor(s) and assistant construction supervisor(s).

All deviations and findings identified through the observation shall be managed in accordance with the principal contractor's non-conformance management procedure including guidance and training to the employee(s) concerned. The principal contractor shall make provision for the frequency, tasks to be observed, related safe work procedures and responsible persons in the occupational health and safety plan.

#### **4.11.6 Inspections by occupational health and safety representatives and other appointees**

Occupational health and safety representatives must conduct weekly inspections of their areas of responsibility and report thereon to their foreman or supervisor whilst other appointees must conduct inspections and report thereon as specified in their appointments for example vehicle, plant and machinery drivers, operators and users must conduct daily inspections before start-up.

#### **4.11.7 Recording and review of inspection results**

All the results of the abovementioned inspections must be in writing, reviewed at occupational health and safety committee meetings, endorsed by the chairperson of the meeting and placed on the occupational health and safety file.

#### **4.11.8 Reporting of inspection results**

The principal contractor is required to provide the Client with a monthly report in the format as per the attached Annexure 3: "Safety, Health and Environment Risk Management Report".



## 4.12 Incident reporting and investigation

### 4.12.1 Reporting of accidents and incidents (Section 24 and General Administrative Regulation 8 of the OHSACT)

The principal contractor must report all incidents where an employee is injured on duty to the extent that he/she:

- dies
- becomes unconscious
- loses a limb or part of a limb
- is injured or becomes ill to such a degree that he/she is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he/she was usually employed

or where -

- a major incident occurred
- the health or safety of any person was endangered
- where a dangerous substance was spilled
- the uncontrolled release of any substance under pressure took place
- machinery or any part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects
- machinery ran out of control

to the Client within two calendar days and to the Provincial Director of the Department of Employment and Labour within seven calendar days from date of incident (Section 24 of the OHSACT and General Administrative Regulation 8), **except** that, where a person has died, has become unconscious for any reason or has lost a limb or part of a limb or may die or suffer a permanent physical defect, the incident must be reported to both the Client and the Provincial Director of the Department of Employment and Labour forthwith by telephone, telefax or e-mail. All other reports should still be completed and provided as required.

The principal contractor is required to provide the Client with copies of all statutory reports required in terms of the OHSACT within seven calendar days of the incident occurring.

The principal contractor is required to provide the Client with copies of all internal and external accident/incident investigation reports, including the reports contemplated in 4.11.2 (3) and (4) below, within seven calendar days of the incident occurring.

### 4.12.2 Accident and incident investigation (General Administrative Regulation 9)

1. The principal contractor is responsible for the investigation of all accidents and/or incidents where employees and non-employees were injured to the extent that he, she and/or they



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had to be referred for medical treatment by a doctor, hospital or clinic.

2. The results of the investigation to be entered into the accident and/or incident register.
3. The principal contractor is responsible for the investigation of all minor and non-injury incidents as described in Section 24 (1) (b) and (c) of the OHSACT and keeping a record of the results of such investigations including the steps taken to prevent similar accidents/incidents in future.
4. The principal contractor is responsible for the investigation of all road traffic accidents, related to the construction activities, and keeping a record of the results of such investigations including the steps taken to prevent similar accidents in future.
5. The Client reserves the right to hold its own investigation into an incident or call for an independent external investigation.

## **5. Operational control**

### **5.1 Emergency preparedness, contingency planning and response**

- 5.1.1 The principal contractor must appoint a competent person to act as emergency controller and/or coordinator.
- 5.1.2 The principal contractor must conduct an emergency identification exercise and establish what emergencies (such as health, safety, environmental, third party or community related actions etcetera) could possibly develop. He/she must then develop detailed contingency plans and emergency procedures, taking into account any emergency plan that the Client may have in place.
- 5.1.3 The principal contractor and the other contractors must hold regular practice drills of contingency plans and emergency procedures to test them and familiarise employees with them.

### **5.2 First-aid (General Safety Regulation 3)**

- 5.2.1 The principal contractor must provide first-aid equipment and have qualified first-aiders on site as required by General Safety Regulation 3 of the OHSACT.
- 5.2.2 The contingency plan of the principal contractor must include arrangements for the speedily and timeously transportation of injured and/or ill person(s) to a medical facility or getting emergency medical support to person(s) who may require it.



- 5.2.3** The principal contractor must have firm arrangements with his contractors in place regarding the responsibility of these contractor's first-aid arrangements as well as treatment of injured and/or ill employees.

### **5.3 Security**

- 5.3.1** The principal contractor must establish site access rules and implement and maintain these throughout the construction period. Access control must, among others, include the rule that non- employees will not be allowed on site unaccompanied.
- 5.3.2** The principal contractor must ensure that no person under the age of eighteen (18) is allowed to undertake any work on the construction site.
- 5.3.3** The principal contractor must develop a set of project applicable security rules and procedures and maintain these throughout the construction period.

### **5.4 Accommodation of traffic**

The following requirements shall apply to ensure that construction vehicles entering and leaving the site are doing so in a safe manner:

- 5.4.1** The principal contractor shall appoint a competent traffic safety officer to take responsibility for the accommodation of all traffic.
- 5.4.2** The principal contractor shall ensure that appropriate as well as a sufficient number of road signs are posted to protect all road users of the presence of construction work as well as construction employees/vehicles. These signs shall be repeated and utilised, where appropriate, as actual construction work is approached.
- 5.4.3** When construction vehicles enter or leave the site, duly trained flag persons shall be deployed a good distance ahead of the entrance. These flag persons to be managed assertively to ensure that they add optimal value and should they not do so they should be retrained and if necessary replaced.

### **5.5 Work in fall risk positions [Fall protection (Construction Regulation 10)]**

- 5.5.1** Although the risk posed by working in a fall risk position is as far as reasonable possible mitigated by the project design, a pre-emptive risk



assessment is required for any work to be carried out from a fall risk position.

- 5.5.2** As far as is practicable, any person working in a fall risk position will work from a stable platform, ladder or other device that is at least as safe as if he or she is working at ground level and whilst working in this position be wearing suitable fall arrest equipment to prevent the person falling from the platform, ladder or other device utilised. This fall arrest equipment will be, as far as is possible, secured to a point away from the edge over which the person might fall and the lanyard must be of such a length and strength that the person will not be able to move over the edge.

Alternatively any edge over which a person may fall shall be fitted with suitable guard rails at two different heights as prescribed in SANS 10085 code of practice for the design, erection, use and inspection of access scaffolding.

- 5.5.3** Where the requirement in paragraph 5.5.2 is not practicable, the person will be provided with a full body harness that will be worn and attached above the wearer's head at all times and the lanyard must be fitted with a shock absorbing device or the person must be attached to a fall arrest system that is approved by the Client.
- 5.5.4** Where the requirements in paragraph 5.5.3 are not practicable, a suitable catch net, which must be able to sustain the weight of at least the average person working in the elevated position, must be erected.
- 5.5.5** Employees working in fall risk positions must be trained to do this safely and without risk to their or other person's health and safety.
- 5.5.6** Where work on roofs is carried out, the risk assessment must take into account the possibility of persons falling through openings in the roof.
- 5.5.7** Updated records confirming the physical and psychological fitness of employees working in fall risk positions should be kept on the health and safety file at all times.

## **5.6 Structures (Construction Regulation 11)**

The principal contractor must ensure that:

- 5.6.1** Only skilled employees are allowed to erect structures and that the skills of these employees are being verified at regular intervals.
- 5.6.2** Steps are taken to ensure that no structure becomes unstable or collapses due to construction work being performed on it or in the vicinity of it.
- 5.6.3** No structure is overloaded to the extent where it becomes unsafe.



**5.6.4** He or she has received from the designer the following information:

- Information on known or anticipated hazards relating to the construction work and the relevant information required for the safe execution of the construction work.
- A geo-scientific report (where applicable).
- The loading the structure is designed to bear.
- The methods and sequence of the construction process.
- Any other applicable information.

**5.6.5** All drawings pertaining to the design are on site, utilised and available for inspection.

**5.7 Access scaffolding (Construction Regulation 16)**

Access scaffolding must be erected, used and maintained safely in accordance with Construction Regulation 16 and SA Bureau of Standards Code of Practice, SANS 10085 entitled, "The Design, Erection, Use and Inspection of Access Scaffolding".

Detailed consideration must be given to all scaffolding to ensure that it is properly planned to meet the working requirements, designed to carry the necessary loadings and maintained in a sound condition. It must also be ensured that there is sufficient material available to erect the scaffolding properly and safely.

Scaffolding must be erected, altered, maintained or dismantled by person(s) who has/have adequate training and experience in this type of work or under the continuous and direct supervision of such a person.

**5.8 Lifting equipment (Construction Regulation 22)**

Lifting equipment must be designed and constructed in accordance with the manufactures/designers specifications as well as generally accepted technical standards and operated, used, inspected and maintained in accordance with the manufactures requirements as well as that of the Driven Machinery Regulation 18 of the OHSACT:

The Driven Machinery Regulation requires that:

- a. Lifting equipment to be clearly and conspicuously marked with the maximum mass load (MML) that it is designed to carry safely. When the MML varies with the conditions of use, the table of maximum loadsshould be used by the driver/operator;
- b. Each winch on a lifting machine must at all time have, at least, three full turns of rope on the drum when the winch has been run to its lowest limit;
- c. Lifting equipment be fitted with a brake or other applicable device capable of holding the MML. This brake or device must automatically prevent the downward movement of the load when the lifting power is interrupted;
- d. Lifting equipment fitted with a load limiting device that automatically arrest the lift when the load reaches its highest safe position or when the mass of the load is greater than the MML;



- e. Every chain or rope on a lifting machine that forms an integral part of the machine must have a factor of safety as prescribed by the manufacturer of the machine and where no standard is available the factor of safety must be:
  - chains – 4 (four)
  - steel wire ropes - 5 (five)
  - fibre ropes- 10 (ten)
- f. Every hook or load attaching device must be designed as such or fitted with a device that will prevent the load from slipping off or disconnecting;
- g. Every lifting machine must be inspected and load tested by a competent person every time it has been dismantled and re-erected and every 12 months after that. The load test must be in accordance with the manufacturers prescription or to 110% of the MML in addition all ropes, chains, hooks or other attaching devices, sheaves, brakes and safety devices forming an integral part of a lifting machine must be inspected every 6 months by a competent person;
- h. All maintenance, repairs, alterations and inspection results must be recorded in a log book and each lifting machine must have its own log book; and
- i. No person may be lifted by a lifting machine not designed for lifting persons unless in a cradle approved by an inspector of the Department of Employment and Labour.

### 5.9 Lifting tackle

The following requirements will apply to lifting tackle:

- a. Manufactured of sound material, well constructed and free from latent defects;
- b. Clearly and conspicuously marked with an identity number;
- c. Maximum mass load factor of safety:
 

|                                          |           |
|------------------------------------------|-----------|
| • Natural fibre ropes                    | 10(ten)   |
| • Man-made fibre ropes and woven webbing | 06(six)   |
| • Steel wire ropes – single rope         | 06(six)   |
| • Steel wire ropes – combination slings  | 08(eight) |
| • Mild Steel chains                      | 05(five)  |
| • High tensile/alloy steel chains        | 04(four)  |
- d. All lifting equipment must be discarded (not used any further for lifting purposes) when wear and/or corrosion is evident.
- e. All lifting tackle should in terms of Driven Machinery Regulation 18(10)(e) be formally examined at intervals not exceeding three (3) months by the competent person contemplated in Driven Machinery Regulation 18(5) and the results recorded in a designated log book.

### 5.10 Construction vehicle and mobile plant operators

The following requirements will apply to construction vehicle and mobile plant operators:

- a. Only certified and/or competent employees may be allowed to operate any construction vehicle and mobile plant.



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- b. Every lifting machine operator must be trained specifically for the type of lifting machine that he or she is operating.
- c. Only employees duly authorised to do so may operate any construction vehicle and mobile plant.
- d. Only employees physically and psychologically fit, i.e. in possession of a medical certificate of fitness, may be allowed to operate any construction vehicle and mobile plant.

#### **5.11 Construction vehicles and mobile plant (Construction Regulation 23)**

Construction vehicles and mobile plant should be formally and duly inspected by a competent person appointed by the principal contractor prior to being allowed on a project site and suppliers of hired vehicles, plant and equipment must be required to comply with this specification as well as the OHSACT and Regulations.

Construction vehicles and mobile plant must be:

- a. Of acceptable design and construction;
- b. Maintained in good working order;
- c. Used in accordance with their design and intention for which they were designed;
- d. Operated and/or driven by trained, competent and authorised operators/drivers. No unauthorised persons to be allowed to drive construction vehicles and mobile plant;
- e. Where applicable, be provided with safe and suitable means of access;
- f. Fitted with adequate signalling devices to make movement safe including reversing;
- g. Excavations and other openings must be provided with sufficient barriers to prevent construction vehicles and mobile plant from falling into same;
- h. Provided with roll-over protection;
- i. Inspected daily before start-up by the driver, operator and/or user and the findings recorded in a register/log book and any defects addressed as matter of urgency;
- j. Fitted with two head and two tail lights that is in good working condition whilst operating under poor visibility conditions; and
- k. Used for transporting persons must have seats firmly secured and sufficient for the number of persons being transported.

No loose tools, material etcetera is allowed in the driver and/or operators compartment/cabin nor in the compartment in which any other persons are transported.

No person may ride on construction vehicles and mobile plant except for in a safe place designed and provided for this purpose.

The construction site must be organised to facilitate the movement of construction vehicles and mobile plant in such a manner that pedestrians and other vehicles are not endangered. Traffic routes to be suitable, sufficient in number and adequately demarcated.



All construction vehicles and mobile plant daily inspection records must be kept in the occupational health and safety file.

#### **5.12 Electrical installations (Construction Regulation 24)**

Any electrical work undertaken as part of the project, including the installation of temporary electricity for construction use shall be in accordance with Construction Regulation 24 and the Electrical Installation Regulations.

The principal contractor must ensure that:

- a. Existing services are to be located and clearly marked before construction commences and during the progress thereof;
- b. Where the abovementioned is not possible, employees with jackhammers etc. will be protected against electric shock by the use of suitable protective equipment e.g. rubber mats, insulated handles etcetera;
- c. Electrical installations and -machinery are sufficiently robust to withstand normal working conditions on site;
- d. Temporary electrical installations must be inspected at least once per week by a competent person and a record of the inspections kept on the occupational health and safety file;
- e. Electrical machinery used on a construction site must be inspected daily before start-up by the competent driver/operator or any other competent person and a record of the inspections kept on the occupational health and safety file; and
- f. A competent person appointed in writing must control all temporary electrical installations.

#### **5.13 Electrical and mechanical lockout**

An electrical and mechanical lockout procedure must be developed by a competent person (i.e. duly qualified and certified electrician) and signed off by the Construction Manager. The principal contractor must ensure that the lockout procedure is duly implemented and maintained, i.e. all contractors on site are informed of and adhere to this lockout procedure.

#### **5.14 Use and storage of flammables (Construction Regulation 25)**

The principal contractor must ensure that:

- a. No person is required or permitted to work in a place where there is the danger of fire or an explosion due to flammable vapours being present unless adequate precautions is taken;
- b. Flammables stored on a construction site are stored in a well-ventilated, reasonably fire-resistant container, cage or room that is kept locked with consistent access control measures in place and sufficient firefighting equipment installed and fire prevention methods practiced for example proper housekeeping;
- c. Only one day's quantity of flammable is to be kept in the workplace; and
- d. Containers (including empty containers) to be kept closed to prevent fumes/vapours from escaping and accumulating in low lying areas.



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### 5.15 Hazardous chemical agents (HCA)

The principal contractor must ensure that:

- a. Employees receive the necessary information and training to be able to use, handle and store hazardous chemical agents safely;
- b. Employees obey lawful instructions regarding:
  - The wearing and use of personal protective equipment;
  - The use, handling and storage of hazardous chemical agents;
  - The prevention of the release of hazardous chemical agents;
  - The wearing and using of exposure monitoring and measuring equipment;
  - The cleaning up and disposal of materials containing hazardous chemical agents; and
  - Housekeeping, personal hygiene and the protection of the environment;
- c. The risk assessments required in terms of Construction Regulation 9 include employee exposure to hazardous chemical agents and that the necessary measures be taken to protect persons from being detrimentally affected by hazardous chemical agents present or used in the workplace.
- d. Suppliers provide the necessary information in the form of Material safety data sheets (MSDS) regarding hazardous chemical agents required to ensure the safe use, handling and storage of these substances. The safety data sheets have to meet the following –
  - be GHS (UN Globally Harmonized System) compliant;
  - classify the HCA, in accordance with regulation 14;
  - be reviewed at least once every five years; and
  - be amended whenever necessary to ensure that it contains correct and current information, aligned to its GHS classification required by regulation 14(c), which includes new data regarding the hazard presented by an HCA that changes its classification in a category or subcategory of a hazard class or results in its classification to another hazard class; and
- e. An up-to-date list is kept on site of hazardous chemical agents stored and used together with the safety data sheet of the said hazardous chemical agents;
- f. Hazardous chemical agent containers should be clearly and duly labelled, i.e. label to include –
  - the product identifier and, where applicable, the United Nations proper shipping name;
  - the chemical identity of all the ingredients contributing to the final GHS classification of the HCA;
  - the name, address, and business telephone number of the manufacturer or importer;
  - an emergency telephone number where support is available;
  - a signal word, hazard statement, precautionary statement and hazard pictogram consistent with the HCA's GHS classification, made in accordance with regulation 14;
  - the quantity of the HCA in the package, unless this quantity is specified elsewhere on the package;



- the quantity of each HCA ingredient;
  - any information about the hazards, and first-aid and emergency procedures relevant to the HCA, not otherwise included in the hazard statement or precautionary statement;
  - first-aid measures; and
  - an expiry date, where applicable.
- b. Hazardous chemical agents are not cleared by using compressed air but should be vacuumed;
  - c. No person eats or drinks in an area where hazardous chemical agents are stored or utilised; and
  - d. Hazardous chemical agents waste is disposed of safely in terms of hazardous waste disposal requirements.

#### **5.16 Storage of flammable and hazardous chemicals (Regulations for Hazardous Chemical Agents)**

See paragraphs 5.14 and 5.15 above.

#### **5.17 Fire prevention and protection**

The principal contractor must ensure that:

- a. The risk of fire is avoided;
- b. Sufficient and suitable storage of flammables is provided;
- c. All employees are instructed in the use of the firefighting equipment and know how to attempt to extinguish a fire;
- d. A sufficient number of employees are appointed and trained to act as an emergency team to deal with fires and other emergencies;
- e. Employees are informed regarding emergency evacuation procedures and escape routes;
- f. Emergency escape routes are kept clear at all times and clearly marked;
- g. Evacuation assembly points are demarcated and made known to employees;
- h. Evacuation is regularly practiced to ensure that all persons are evacuated timeously and;
- i. Roll call is held after evacuation to account for all employees and to ensure that no-one including visitors and disabled persons have been left behind; and
- j. A clearly audible, to all persons on site, siren or alarm is fitted and regularly tested.

#### **5.18 Housekeeping (Construction Regulation 27)**

The principal contractor must ensure that:

- a. Housekeeping is continuously implemented and maintained;
- b. Materials and equipment are properly stored;
- c. Scrap, waste and debris are removed off site regularly;
- d. Materials placed for use are placed safely and not allowed to accumulate or cause obstruction to the free-flow of pedestrians and vehicular traffic;



- e. Waste and debris not to be removed by throwing from heights but by chute or crane;
- f. Where practicable, construction sites are fenced off to prevent entry of unauthorised persons;
- g. An unimpeded work space is maintained for every employee;
- h. Every workplace is kept clean, orderly and free of tools and the likes that are not required for the work being done; and
- i. As far as is practicable, every floor, walkway, stair, passage and gangway is kept in good state of repair, skid-free and free of obstruction, waste and materials.

#### **5.19 Stacking and storage (Construction Regulation 28)**

The principal contractor must ensure that:

- a. A competent person is appointed in writing to supervise all stacking and storage on a construction site;
- b. Adequate storage areas are provided and demarcated;
- c. The storage areas are kept neat and under control;
- d. The base of any stack is level and capable of sustaining the weight exerted on it by the stack;
- e. The items in the lower layers can support the weight exerted by the top layers;
- f. Cartons and other containers that may become unstable due to wet conditions are kept dry;
- g. Pallets and containers are in good condition and no material is allowed to spill out;
- h. The height of any stack does not exceed 3 times the base unless stepped back at least half the depth of a single container at least every fifth tier or the approval of an inspector of the Department of Employment and Labour has been obtained to build the stacks higher with the aid of a machine. (The operator of the machine must be protected against items falling from overhead or off the stack and no items may overhang);
- i. The articles that make up a single tier are consistently of the same size, shape and mass;
- j. Structures for supporting stacks are structurally sound and able to support the mass of the stack;
- k. No articles are removed from the bottom of the stack first but from the top tier first;
- l. Anybody climbing onto a stack can and does do it safely and that the stack is sufficiently stable to support him or her;
- m. Stacks that are in danger of collapsing are broken down and restacked;
- n. Stability of stacks are not threatened by vehicles or other moving plant and machinery;
- o. Stacks are built in a header and stretcher fashion and that corners are securely bonded; and
- p. Persons climbing onto stacks do not approach unguarded moving machinery or electrical installations.



## **5.20 Eating, changing, washing and toilet facilities (Construction Regulation 30)**

### **5.20.1 Toilets**

- a. The provision of toilets for each sex is required in terms of the National Building Regulations and Construction Regulation 30.
- b. Chemical toilets are allowed instead of the water borne sewerage type. Toilets have to be provided at a ratio of at least 1 toilet per 30 employees.

### **5.20.2 Showers**

The principal contractor is required to provide shower facilities after consultation with the employees or employees representatives, or at least one shower facility for every fifteen employees. If provided these shower facilities are to meet the requirement set by Facilities Regulation 5(d).

### **5.20.3 Change rooms**

The principal contractor is required to provide changing facility for each sex.

### **5.20.4 Eating facility**

The principal contractor is required to provide an eating facility sheltered from the sun, wind and rain.

## **5.21 Personal and other protective equipment (Sections 8, 15 and 23 of the OHSACT)**

The principal contractor is required to proactively identify the hazards in the workplace and deal with them on an ongoing basis. He/she must either remove them or, where impracticable take steps to protect employees and make it possible for them to work safely and without risk to health under the hazardous conditions.

Personal protective equipment should, however, be the last resort and there should always first be an attempt to apply re-engineering and other solutions to mitigating hazardous situations before the issuing of personal protective equipment is considered.

Where it is not possible to create an absolutely safe and healthy workplace the principal contractor is required to inform employees regarding this and issue, free of charge, suitable equipment to protect them from any hazards being present and that allows them to work safely and without risk to health in the hazardous environment.

It is a further requirement that the principal contractor maintain the said equipment, that he/she instructs and trains the employees in the use of the



equipment and ensures that the prescribed equipment is used by the employee/s in a consistent and correct manner.

Employees do not have the right to refuse to use and/or wear the equipment prescribed by the employer and, if it is impossible for an employee to use or wear prescribed protective equipment through health or any other valid reason, the employee cannot be allowed to continue working under the hazardous condition(s) for which the equipment was prescribed but an alternative solution has to be found that may include relocating the employee.

The principal contractor may **not charge any fee** for protective equipment prescribed by him or her **but may charge for equipment under the following conditions:**

- Where the employee requests additional issue in excess of what is prescribed;
- Where the employee has blatantly abused or neglected the equipment leading to early failure; and
- Where the employee has lost the equipment.

**Please note:** Bullet points two and three above should form part of a formal disciplinary process, i.e. following a disciplinary hearing.

## 5.22 Tools and equipment

### 5.22.1 Portable electrical tools and equipment (Electrical Machinery Regulation 9)

Portable electrical tools and equipment includes every unit that takes electrical power from a 15 ampere plug point and is moved around for use in the workplace i.e. drills, saws, grindstones, portable lights, etcetera. In addition electrical appliances such as fridges, hotplates, heaters, etcetera must be inspected regularly but at least on a weekly basis and maintained to the same standards as portable electrical tools and appliances.

The use, inspection and maintenance of portable electrical tools and equipment must be governed by the following:

- Regular inspections by a competent person appointed in writing;
- Inspection results must be recorded in a register;
- Only competent authorised persons are allowed to use portable electrical tools and equipment; and
- The correct protective equipment is worn/used whilst operating portable electrical tools and equipment.

This equipment -

- Must be maintained in good condition at all times to prevent an electrical shock to the user;
- The main source should incorporate an earth leakage protection device or receive power through a double wound transformer or be double insulated and clearly marked as such; and



- All equipment must be fitted with a switch to allow for safe and easy starting and stopping.

#### 5.22.2 Hand tools

Section 8(2)(a) of the OHSACT stipulates that the employer shall ensure that plant and machinery, including hand tools, are safe for use. To meet this requirement hand tools ought to be inspected, recorded and defects reported at intervals specified. The inspection registers also serves as proof that a formal process was implemented and maintained to ensure that hand tools are safe for use.

To ensure compliance with the above, the principal contractor shall implement and maintain a process to ensure that hand tools utilised are formally inspected and declared safe for use.

#### 5.22.3 Defective tools and equipment

Any defective tools or equipment must be placed in a designated "quarantine" area or clearly marked as "defective" and steps be taken to ensure that these are no longer allowed to be used.

The use of defective hand tools must be strictly managed with no exceptions being allowed. Documentary proof must also be kept of actions taken against supervisors allowing and employees using unsafe tools to ensure that this could be used in a court of law to proof that the usage of such tools was not generally tolerated.

### 5.23 Public health and safety (Section 9 of the OHSACT)

The principal contractor is responsible for ensuring that non-employees affected by the construction work are made aware of the dangers likely to arise from said construction work as well as the precautionary measures to be observed to avoid or minimise those dangers. This includes among others:

- Non- employees entering the site for whatever reason;
- The surrounding community; and
- Passers by the site.

Appropriate signage must be posted to this effect and all employees on site must be instructed to ensure that non-employees are protected at all times.

All non-employees entering the site must receive site applicable induction into the hazards and risks and the control measures for these.

### 5.24 Working in confined spaces

#### 5.24.1 Ventilation

The confined space must be opened and allowed to ventilate for at least 15 minutes before entering the confined space. All confined spaces must be barricaded and manned at all times.

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A gas monitor must be lowered to the bottom of the confined space with a rope to test the presence of any toxic/flammable gas. If any gas is detected, the space must be force ventilated by means of a blower for at least 15 minutes where after the air must be tested again. Under no circumstances may any space be entered while there is a toxic/flammable gas present.

After the undertaking of the necessary work, the person in charge of the activities must confirm that all the employees are accounted for.

#### **5.24.2 Entering a confined space**

When entering a confined space, the person entering the space must wear a safety harness and fully operational gas detector. A lifeline must be attached to the safety harness and a person on the surface must be in continuous contact with the person in the confined space. At least one person on the surface must be trained in basic first-aid (level 1) with proof of such training as well as a fully equipped first aid box available on site.

No person shall remain within a confined space for a period of more than one hour at a time. A minimum of 5 minute rest periods on the surface must be taken after this period before re-entering.

Should the alarm sound on the gas monitor, all employees must exit the confined space and the immediate area must also be evacuated immediately. The area must be properly ventilated and re-tested before re-entering the confined space. Professional support should be called for if necessary.

Employees must be provided with flameproof lighting when entering a confined space with the possibility of flammable gases. No naked lights, smoking or unprotected electrical apparatus which may cause sparks, shall be permitted in any confined space or in its vicinity.

#### **5.24.3 General**

All employees working in confined spaces must be issued with fully functioning gas monitoring equipment and safety harnesses. All these employees must be trained (including refresher training on a regular and continuous basis) in the use thereof.

#### **5.24.4 Safety equipment**

All teams must be issued with fully functional gas monitoring equipment and safety harnesses where applicable. All employees must be trained (including refresher training on a regular and continuous basis) in the use thereof.



#### 5.24.5 General records

The following records shall be implemented and maintained by the principal contractor:

- a. Confined space entry permits
- b. Confined space entry registers
- c. Safety harness and gas monitoring equipment registers
- d. Risk assessments
- e. Incident registers

#### 5.24.6 Training

- a. All employees that have to enter a confined space must be formally trained and confirmed competent before being required to enter such areas (new employees to complete this training and be declared competent before allowed to work in a confined space).
- b. Refresher courses must be attended by employees at least once every 2 years or immediately if new methodologies or equipment are adopted or acquired.
- c. Continuous onsite training and support by supervisory staff should be undertaken and enforced where required.



## 5.25 Temporary work

- a. Temporary work must be carried out under the supervision of the competent person designated in writing.
- b. Temporary work structures must be so designed, erected, supported, braced and maintained that they will be able to support any vertical or lateral loads that may be applied.
- c. No load may be imposed onto a structure that the structure is not designed to carry.
- d. Temporary work must be erected in accordance with the structural design drawings for such temporary work and if there is any uncertainty, the designer must be consulted before proceeding with the erection/use of the temporary work.
- e. All drawings pertaining to the temporary work must be kept and be available on site.
- f. All equipment used in the erection of temporary work must be checked by a competent person before use.
- g. The foundation or base upon which the temporary work is erected must be able to bear the weight and keep the structure stable.
- h. Employees erecting temporary work must be trained in the safe work procedures for the erection, moving and dismantling of the temporary work.
- i. Safe access and emergency escape must be provided for employees.
- j. A competent person must inspect the temporary work structures that have been erected before, during and after pouring of concrete or the placing of any other load and thereafter daily until the temporary work is



stripped. The dismantling must also be undertaken under the direct supervision of the appointed competent person. The results of all inspections must be recorded in a register kept on the site health and safety file.

- k. The temporary work must be left in place until the designated competent person has authorised its stripping in writing.
- l. Any damaged temporary work must be repaired and/or rectified without delay.
- m. Deck panels must be secured against displacement.
- n. The slipping of employees and other persons on release agents on deck panels must be prevented at all times.
- o. Employees' health must be protected against the use of solvents, oils or other similar substances.

## **5.26 Transportation of employees**

**5.26.1** Any vehicle used to transport employees must have seats firmly secured and adequate for the number of employees to be carried. No employee may be permitted to stand on the back or sit on the edge of the vehicle.

**5.26.2** The vehicle utilised for the transportation of employees must be equipped with a serviced and fully operational fire extinguisher.

**5.26.3** Regulation 247 of the National Road Traffic Act, Number 93 of 1996 (NRTA) stipulates that the principal contractor shall not allow employees to be transported in a vehicle unless the portion of the vehicle in which the employees are being conveyed is enclosed to a height of –

- a. at least 350 mm above the surface on which employees are seated; or
- b. at least 900 mm above the surface on which employees are standing,

in a manner and with a material of sufficient strength to prevent employees from falling from such vehicle when it is in motion.

**5.26.4** Regulation 247 of the NRTA also stipulates that the principal contractor shall also not allow any employees to be conveyed in the goods compartment of a vehicle together with any tools or goods, except their personal effects, unless that portion in which the employees are being conveyed is separated by means of a partition, from the portion in which such goods are being conveyed.

## **5.27 Exposure to poisonous animals or insects**

The principal contractor shall ensure that the following are duly adhered to:

- a. the emergency procedure be expanded to provide for the effective treatment of employees or other persons visiting exposed to bites or



- stings from poisonous animals and insects, i.e. the contact details of the nearest medical unit that could treat employees exposed to bites or stings be obtained and arrangements be made with this service provider on the procedures to be followed to ensure swift response when required;
- b. confirmation be obtained from this medical unit that they have anti venom reserved to treat employees or other persons visiting that may be exposed to snake bites or scorpion stings;
- c. competent first aiders be available to facilitate the treatment of employees or other persons visiting exposed to stings or bites; and
- d. the potential exposure posed by poisonous animals or insects and awareness thereof is discussed with all employees as part of the toolbox talks and general awareness training and other persons visiting as part of the pre-site visit induction process.

## **5.28 Working in inclement weather**

The principal contractor shall implement an early warning system to identify inclement weather and to prevent such weather from posing negative implications on the safety of employees and other persons visiting.

The early warning system shall as a minimum provide for the following:

### **5.28.1 Construction work done during electrical storms**

- a. The principal contractor shall ensure that all employees are removed from heights and all employees are as safe as possible, in inclement weather conditions.
- b. No work is allowed on the construction site during electric storms where employees cannot be protected from it. Protection involves employees being restricted to:
  - eating area fitted with a lightning mast
  - workshops
  - inside buildings
- c. No work is allowed in electrical storms on top of open structural steel, even when earthed.
- d. No work is allowed on heights when the lightning is within a 10 kilometre radius.
- e. After inclement weather on-site risk assessments will be reviewed to include wet conditions.

### **5.28.2 Lifting equipment operations during inclement weather**

- a. Lifting operations will stop during lightning within a 10 kilometre radius and wind above 28 km/h, and the lifting equipment operator will not be allowed to leave the lifting equipment with the booms extended.
- b. Lifting operations will stop during rain, rigging and hand lifts.
- c. Booms on all lifting equipment will be retracted.
- d. All rigging operations will stop and employees will be removed from site.



### 5.28.3 Construction work done during rain

- a. During rainy conditions all work on steel structures will stop.
- b. No electrical tools will be used during rainy weather in open areas.
- c. Work can be done in water proof areas where there is a zero risk for electrocution.
- d. Areas that may be cleared for work during rain includes:
  - workshops
  - offices
  - work on ground level with the provision that the area is maintained in a safe dry condition

### 5.28.4 Scaffolding activities during inclement weather conditions

During inclement weather only limited scaffolding actions will be permitted i.e. erecting and dismantling activities.

Guidelines for safe choices:

| Weather type  | Building and dismantling of scaffolding |
|---------------|-----------------------------------------|
| Lightning     | Stop all activities                     |
| Light rain    | Stop all activities                     |
| Heavy rain    | Stop all activities                     |
| Wind <28 km/h | Full use                                |
| Wind >40 km/h | Stop all activities                     |
| Light mist    | Full use                                |
| Heavy mist    | Full use                                |
| Hail          | Stop all activities                     |

### 5.28.5 Driving in inclement weather

The principal contractor shall ensure that the danger of driving in wet conditions is adequately covered in a risk assessment.

The risk assessment will include, but not limited to:

- a. route planning
- b. speed reduction
- c. planning for emergency situations
- d. driving precautions for slippery surfaces
- e. visibility hazards

### 5.29 Pressure equipment

The principal contractor must ensure that:

- a. any pressure equipment in use is subjected to a formal inspection and pressure test by an approved inspection authority before commissioning, after installation, re-erection or repairs (i.e. Pressure Equipment Regulation 11 has reference). Once installed, similar inspections and pressure tests are required every 36 months.



- b. formal registers by an approved inspection authority are duly maintained (with copies readily available in the occupational health and safety file) to proof that any pressure equipment in use was subjected to the necessary inspections and pressure tests.
- c. pressure equipment (such as compressors) is provided with all appropriate safety accessories required to ensure that it is safe for use (i.e. Pressure Equipment Regulations 10(1) has reference). This include but are not limited to safety latches to secure the pressure hoses to the compressor's outlet valves as well as the pressure driven equipment at the other end of the hoses to prevent these pressure hoses from causing serious injuries to employees should their securing mechanisms fails and they become loose whilst under pressure.
- d. should gas fuel be utilised, either on site or as part of the construction process, no person be allowed to install a fixed appliance, equipment or system for gas fuel unless such person is a holder of a certificate of registration (i.e. Pressure Equipment Regulation 17(3) has reference).

### 5.30 Occupational health

The principal contractor shall ensure that –

- a. the work area and surrounding site, which is part of the operational area, are at all times maintained to a reasonably practicable level of hygiene and cleanliness; and
- b. all areas, where work is performed, are kept neat, clean and orderly without any unnecessary waste.

#### 5.30.1 Risk assessment

The principal contractor shall undertake a risk assessment to identify the potential health hazards that employees and other affected persons are or may be exposed to during the construction process and also identify the appropriate risk mitigation measures to be taken and maintained to ensure the health of employees and affected persons.

#### 5.30.2 Health hazards

The principal contractor shall ensure that appropriate measures are put in place to prevent exposure to health hazards such as viruses, the accidental inhalation, ingestion, and absorption of any hazardous substance, high noise level exposure etcetera.

#### 5.30.3 Medical surveillance

The principal contractor shall provide for the management of an employee medical surveillance program that will ensure the following:

- a. All employees on site undergo routine medical examinations specific to the work to be performed taking into account the hazard and risk exposures. This must address pre-employment



- examination, periodic examination as required, and exit examinations.
- b. Where medical examinations are governed by legislation, the principal contractor shall ensure the legislative requirements are complied with by all employees.
  - c. All the employees performing work on site are declared medically fit for the work they are to perform.
  - d. Employees are notified confidentially by the construction health and safety officer or other appropriate delegated person of the results and interpretation of their medical examinations on any abnormal findings, health conditions, referrals or recommendations made as well as any restrictions that may become evident from medical examinations.
  - e. Maintain written confirmation/proof of the consultation, notification and communication with the employee, provided that, the required proof does not contain any confidential, sensitive, highly personal or information which might place the employee in an uncomfortable or disconcerting state or situation when such information is known by others.
  - f. In the event of referrals or recommendations for additional testing or consultation with health specialists, proof of action taken by the principal contractor should be maintained. Action taken could be a scheduled appointment with a specialist, an appointment for the additional testing etcetera.
  - g. Copies of valid medical certificates of fitness are available in the occupational health and safety file. The requirements above are founded on a duty of care towards employees to ensure employees are made aware of any health conditions or health restrictions which may have resulted from or may be aggravated by work activities on site or associated areas. The consultation, notification and communication with the employee should, with the employees' written consent, be made available upon request for verification by the client, regulatory authority or their representatives.

#### 5.30.4 COVID-19

As a result of the current COVID-19 pandemic and subsequent exposure, the principal contractor must develop a COVID-ready Workplace Plan addressing among others the following:

- a. Appointment of a COVID-19 Compliance Officer.
- b. The date the construction site will open.
- c. The hours the site it will be open.
- d. A timetable setting out the phased return of employees to enable appropriate measures to be taken to avoid and reduce the spread of the virus.
- e. List of employees who can work from home, employees who are 60 years or older and those with comorbidities.



- f. Detailed procedure adopted to reduce the risk of infection or transfer to employees or affected persons. The procedure should among others provide for –
1. An employee and visitor disclosure questionnaire.
  2. Staggering of entrance/exit.
  3. Access control.
  4. Thermal testing, i.e. who will be undertaking the testing, maximum thermal limit allowed as well as frequency of testing.
  5. Recordkeeping of entering and exiting the site as well as safe keeping of these records.
  6. Response when an infected person is identified.
  7. Isolation area to be provided and maintained on site to ensure that any person presenting symptoms could be isolated pending the undertaking of a second thermal test and/or whilst arrangements are made to transport the person to a facility for self-isolation, or for medical examination or testing
  8. Return to work protocols, i.e. who will evaluate and what medical information to be submitted when a employee wants to return to work.
  9. All employees, visitors, suppliers and sub-contractors be duly inducted as well as regularly informed to understand the severity, relevant information as well as control measures to comply with requirements.
  10. Ways to be adopted to minimise the number of employees on site.
  11. Measures taken to minimise contact between employees as well as employees and other persons.
  12. Social distancing – how will that be implemented and maintained. If not practicable physical barriers to be placed between work stations.
  13. Operational plant and construction vehicle sanitising and frequency.
  14. Sanitising of ablution facilities and eating areas.
  15. Sanitising of tools and shared equipment as well as work areas in general.
  16. Ventilation inside confined spaces such as offices.
  17. Raise awareness among construction workers of the risk of infection, promote early diagnosis and assist affected persons.
  18. Display suitable awareness posters at all applicable areas such as high-traffic areas as well as replacement to ensure relevancy.
  19. Provide and display information regarding counselling, support and care for those that are affected.
  20. Identify, provide and maintain the required personal protective equipment based on a relevant risk assessment, including the correct use, removing and replacement as well as disposal.



21. Encourage employees to report and undergo COVID-19 testing should they encounter any applicable symptoms.
22. Establish methods of identifying persons who may be at risk, and support them without attracting stigma and discrimination. This could include employees who have recently travelled to a high area, or who have conditions that put them at higher risk of serious illness (e.g. diabetes, HIV/AIDS, tuberculosis, heart and lung disease).
23. Management of medical surveillance.
24. Management of COVID-19 waste, i.e. used masks, gloves etcetera, as this is regarded as infected or when applicable hazardous waste and as such waste bins with lids and labelled as hazardous waste as well as sealed bags to be provided.
25. The procedure adopted to resolve any issue that may arise from the exercise by an employee of the right to refuse to work.
- g. Reporting of any incidents to the Project Manager and client.
- h. Development of project specific business continuity plan.

#### **5.32.4.1 COVID-19 statutory reporting and administrative measures**

- a. The principal contractor must report the following to the National Institute of Occupational Health -
  1. the data of every employee who may be vulnerability to serious outcomes in case of COVID-19 infection on a once-off basis;
  2. the details of employees testing positive for the COVID-19 virus before Tuesday for the previous calendar week commencing on the Sunday (guideline requirements); and
  3. the details of post-infection outcomes of those who have tested positive, weekly before Tuesday until the employee returns to work.
- b. If the principal contractor employs more than 50 employees, it must submit a record of its COVID-19 risk assessment together with a written policy concerning the protection of the health and safety of its employees from COVID-19 to the Department of Employment and Labour.

#### **5.30.5 Smoking**

The principal contractor must ensure that a smoking policy is developed and maintained for the project providing among others for -

- a. no person to be allowed to smoke on site, other than in demarcated smoking areas.
- b. The establishment and maintenance of designated smoking areas in terms of the Tobacco Product Control Act (No. 83 of



1993) as amended and the National Health Act (No. 61 of 2003) as amended.

- c. The following signage should also be displayed at the designated smoking areas:
  - 1. "Smoking of tobacco products is harmful to your health and to the health of children, pregnant or breastfeeding women and non-smokers. For help to quit phone (011) 720 3145."
  - 2. "Any person who fails to comply with this notice shall be prosecuted and may be liable to a fine."

## **6. Health and safety policy**

The principal contractor has to provide the Client, as an annexure to the health and safety plan, with a detailed health and safety policy outlining the principal contractor's stance on and principles adopted for health and safety.

## **7. Cost for health and safety measures during the construction process**

To enable the Client to comply with Construction Regulation 5(1)(g), all potential principal contractors submitting tenders/bids have to demonstrate to the Client that sufficient provision has been made for the cost to implement and maintain the health and safety plan proposed by the principal contractor to meet the requirements of this health and safety specification as well as that of the OHSACT and its Regulations.

A detailed schedule of costs has to be included in the health and safety plan submitted as part of the potential principal contractor's tender document. Failure by the principal contractor to adhere to this requirement will force the Client to reject the tender/bid in terms of Construction Regulation 5(1)(h).

## **8. Project specific risk assessment requirements**

See Annexure 5.

## **9. Overview of annexures**

- Annexure 1: Legal compliance assessment.
- Annexure 2: Measuring injury experience.
- Annexure 3: SHE risk management report.
- Annexure 4: Guide to risk assessments.
- Annexure 5: List of risk assessments.

## **10. Enquiries**

For any enquiries regarding this occupational health and safety specification, please



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