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|  | <b>Standard</b> | <b>Technology</b> |
|---|-----------------|-------------------|

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## **1. INTRODUCTION**

The equipment used in control and instrumentation (C&I) field installations is exposed to potentially damaging operating and environmental conditions such as high temperature, vibration, vermin, and water and dust ingress therefore material specifications and installation become key in the establishing the longevity of field equipment.

The purpose of this standard is to detail the requirements for Junction Box/Local Control Panel (LCP)/Local Control Station (LCS) and Cable Termination which form part of C&I field installations.

## **2. SUPPORTING CLAUSES**

### **2.1 SCOPE**

- This standard specifies requirements for terminal blocks to be fixed to a support to provide electrical and mechanical connection between copper conductors. The standard is primarily intended for Control and Instrumentation field installation in Fossil, Gas and Hydro Power Generating Stations. It applies to terminal blocks intended to connect round copper conductors having a maximum cross section of 1.5 mm<sup>2</sup>.
- This standard specifies requirements for Junction Boxes primarily intended for Control and Instrumentation Field installation in Fossil, Gas and Hydro Power Generating Stations, to be mounted to a stand or the structure of the building. It applies to junction boxes intended to provide protection, housing and access of terminal blocks.
- This standard specifies the requirements for acceptable cable termination Control and Instrumentation field installations in Fossil, Gas and Hydro Power Generating Stations.
- This standard specifies requirements for Local Control Panels primarily intended for Control and Instrumentation Field installation in Fossil, Gas and Hydro Power Generating Stations.
- This standard specifies requirements for Local Control Stations primarily intended for Control and Instrumentation Field installation in Fossil, Gas and Hydro Power Generating Stations.

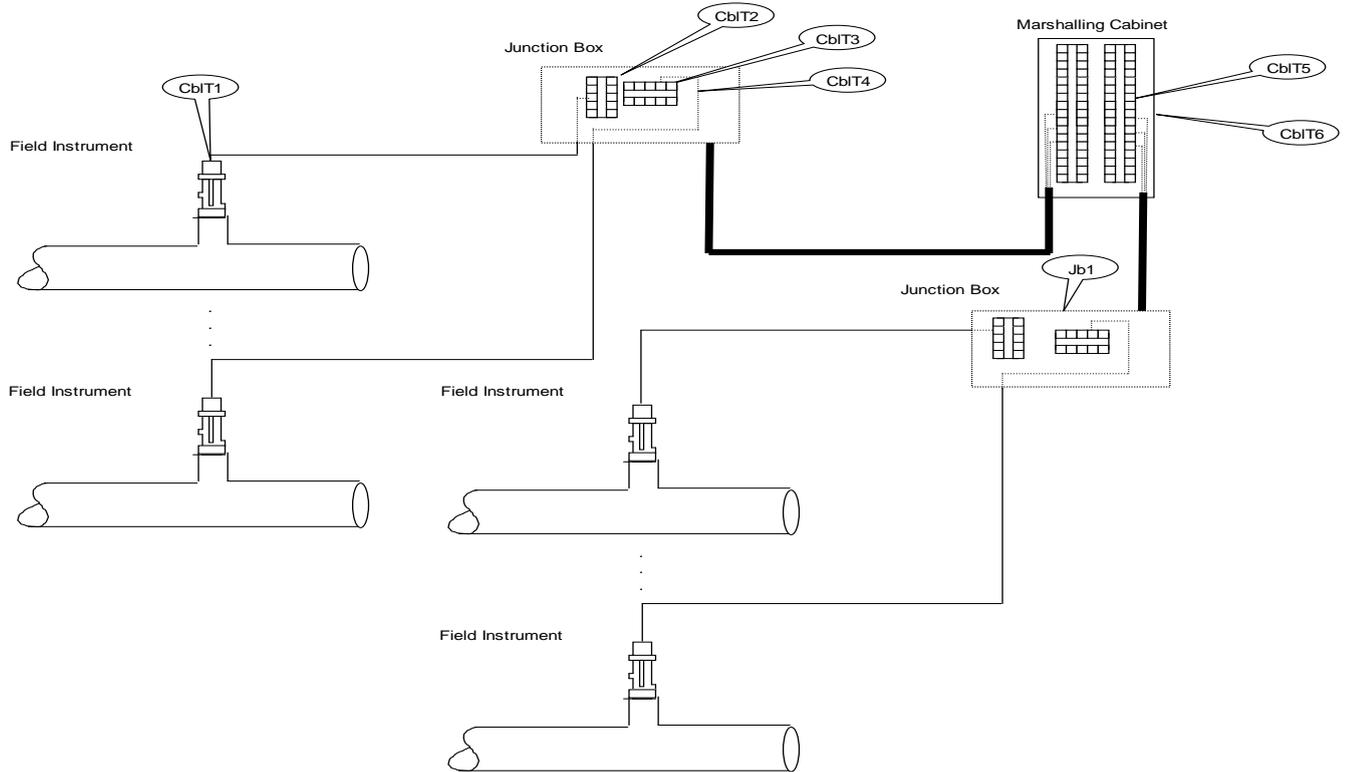
#### **2.1.1 Boundaries**

Figure 1 shows a typical field installation layout. The 'Callouts' in this figure identifies the items that are covered by this standard.

The following callouts are shown:

- CbIT1 – Field Instrument Cable Termination.
- CbIT2 – The Junction Box Terminal Block.
- CbIT3 – Junction Box Cable Termination
- CbIT4 – Junction Box Wiring Configuration
- CbIT5 – The Marshalling Cabinet Terminal Block.
- CbIT6 – Marshalling Cabinet Cable Termination.
- Jb1 – The field Junction Box/LCP/LCS.

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**Figure 1: Typical Field Installation Layout Scope**

### 2.1.2 Purpose

The purpose of this standard is to detail the requirements for Junction Box/LCP/LCS and Cable Termination which form part of C&I field installations.

### 2.1.3 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

#### 2.1.3.1 Generation

- C&I Maintenance

#### 2.1.3.2 Engineering

- C&I Engineering
- C&I Contractors

#### 2.1.3.3 Projects

- C&I Projects

## 2.2 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

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### 2.2.1 Normative

[1] *Field Instrument Installation Standard*, Eskom Technology 240-56355754 (FIIS 1), 2013.

### 2.2.2 Informative

None

### 2.3 DEFINITIONS

| Definition                  | Description   |
|-----------------------------|---|
| Acceptability Criteria      | is the characteristics of the system that will allow evaluation for acceptance of that system.                                |
| Controlled Disclosure       | Controlled disclosure to external parties (either enforced by law, or discretionary).   |
| Junction Box                | An enclosure within which electric circuits are connected.  |
| Lacing/Restraining Criteria | The criteria for restricting the movement of the cable  |
| Local Control Panel         | Are remote operator stations located in the field that interface to the control system through the process communication bus. |
| Local Control Station       | Are remote operator stations located in the field with a hardwired interface to the control system.                           |
| Terminal Block              | An insulating base with binding posts to make connections where sets of terminals are mounted.                                |
| Termination                 | in electrical wiring termination is the process of connecting one cable to another at the point at which it ends.             |
| Wiring Harness              | A gathering of electrical wires terminating in a central plug   |

### 2.4 ABBREVIATIONS

| Abbreviation | Description                               |
|--------------|---|
| C&I          | Control and Instrumentation               |
| EN           | European Standard                         |
| IEC          | International Electrotechnical Commission |
| IP           | Ingress Protection                        |
| JB           | Junction Box                              |
| LCP          | Local Control Panel                       |
| LCS          | Local Control Station                     |
| OEM          | Original Equipment Manufacturer           |
| SANS         | South African National Standard           |

### 2.5 ROLES AND RESPONSIBILITIES

None

### 2.6 PROCESS FOR MONITORING

This document will be reviewed as per the next review date or earlier if warranted.

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## **2.7 RELATED/SUPPORTING DOCUMENTS**

- SANS 10142-1 The wiring of premises: Low voltage installations
- SANS 60947-1 Low Voltage Switchgear and Control Gear: General Rules
- SANS 60947-7-1 Low Voltage Switchgear and Control Gear Part 7-1: Ancillary Equipment – Terminal Blocks for Copper Conductors
- SANS 60947-7-2 Low Voltage Switchgear and Control Gear Part 7-2: Ancillary Equipment – Protective Conductor Terminal Blocks for Copper Conductors
- SANS 10108:2005 The Classification of Hazardous Locations and the Selection of Apparatus for Use in such Locations
- SANS 60529:2001 Degrees of protection provided by enclosures (IP Code)
- SANS 60695-11-10 Part 11-10: Test flames — 50 W horizontal and vertical flame test methods
- EN 50022 Low Voltage Switchgear and Controlgear for Industrial Use Mounting Rails Top Hat Rails 35 mm Wide for Snap-on Mounting of Equipment
- IEC 62491:2008 Industrial Systems, Installations and Equipment and Industrial Products - Labelling of Cables and Cores
- SANS 61312-2 Protection against Lightning Electromagnetic Impulse, Part 2: Shielding of structures, bonding inside structures and earthing

## **3. INSTALLATION REQUIREMENTS**

### **3.1 GENERAL REQUIREMENTS**

- All field equipment installations shall firstly comply with Field Instrument Installation Standard, 240-56355754 and then all requirements of this standard.
- All cable connections at junction boxes, field Instruments and marshalling cabinets shall be made using compression crimp connectors when required. The crimping tools shall be of type so as not to allow a release until a correct compression crimp has been achieved and also not to cause any damage to the connector insulation. Indentation type crimp tools will not be used.

### **3.2 LABELING**

All Labeling:

- Shall be permanent.
- Shall be according to the relevant labeling specification as dictated by Configuration Management for the project in question.
- Shall not be affected by maintenance activities and should facilitate the ease of maintenance.
- Shall be consistently and unambiguously used throughout the system.
- Of such a nature as to be easily read and interpreted.
- Durable enough to withstand expected wear and environmental conditions.
- Coordinated and compatible with:
  - Codes and labels on related equipment.
  - Other coding and labeling within the system.

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- Related job aids, instructions, handbooks, and manuals.
- The fixing of nameplates shall not negate the enclosure IP rating. The fixing method shall be approved by Eskom.

### **3.3 EARTHING**

- All components of the enclosure i.e. Door, Terminal plate, Gland plate, Enclosure and Earth Bar shall be individually star terminated to the earth stud.
- The earth stud shall have all the appropriate nuts, washers, and lock washers for proper installation.

### **3.4 EQUIPMENT LOCATION**

- Equipment shall be installed in locations as detailed on approved drawings and as per Field Instrument Installation Standard, 240-56355754.
- Due regards shall be given in the location of the Junction Boxes to access to plant for maintenance activities in the vicinity of the Junction Box. Junction Boxes shall not obstruct passageways even when open and being worked on.

### **3.5 EQUIPMENT MOUNTING**

- Mounting plates and support brackets shall be supported on floor mounted channel or pipe supports.
- Mounting plates and support brackets shall be supported from floor or permanent walkway level. Supports shall be fastened behind and beneath walkways and shall not obstruct passageways.
- Enclosures shall be mounted on a stand and must be securely fastened as per this specification.
- Enclosures shall have external mounting brackets. Drilling through the rear of the Junction Box/LCP/LCS to mount is not acceptable.
- No piece of equipment shall be mounted in any position where it is not accessible and visible to a viewer looking into the box through the door opening.
- Adequate access shall be provided beneath the gland plate to ensure that the floor slot can be sealed from above using adequately rated fire rated material, where required, after installation.
- Supports shall be provided for fixing the terminal rails and cable leads in position. Adequately sized wire trunking is to be provided for small power (and control cables).
- The enclosure shall be installed in a configuration that conforms to this standard, is aesthetically pleasing and includes:
  - All enclosures installed in a common location shall be at a uniform enclosure centre level of 1450mm.
  - The installed enclosure orientation shall be level to the floor/ground.
  - The configuration of all cables, conduit and trunking associated to the enclosure shall be uniform and follow proper installation techniques as per Field Instrument Installation Standard, 240-56355754, SANS 10142-1 and The wiring of premises Part 1 – Low voltage installations, and other appropriate installation standards approved by the Eskom before the contract is placed.

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- The use of temporary fasteners for junction enclosure mounting is not allowed.

### **3.6 MATERIALS**

- All supplied equipment and materials shall be new.
- Continuity of operation is of prime importance therefore where material has not been specified, materials shall be chosen considering the reliability under the operational and environmental conditions.
- Materials shall be installed in a manner approved by the manufacturer of the material. The manufacturer's recommended installation guidelines as well as this specification shall be used in determining the quality of the installation.

### **3.7 FIXINGS**

- Fixings and fastenings shall be suitable for design in the requisite application and sufficiently substantial and rigid to minimize vibration.
- All threads shall be metric.
- Washers shall be provided under both nuts and bolts heads. All nuts, bolts or other fastenings on any part of the plant shall be securely locked by means of a tension washer. All nuts and bolts shall be stainless steel. Special care shall be taken to ensure accurate placement of holding down bolts, concrete inserts, sleeves and any special fixing devices.
- Bolts shall be of the correct size for the holes provided and shall be fitted with matching sizes of washers and lock-washers. Self-tapping screws, captive head nuts or cage nuts shall not be used in the construction of the boxes.
- All holes for fixing or any other purpose shall be machine drilled. Cutting or blowing holes with gas cutting equipment is not permitted.
- Cutting, boring, notching and patching shall be kept to the absolute minimum.
- All fixings shall be non-corrodible.
- All fixings shall be composed of entirely compatible materials throughout.
- Components shall be composed of entirely compatible materials throughout.
- Components shall be compatible with the fixing, e.g. countersunk screws shall not be used for fixing flat sheets, brass screws shall not be fitted with steel washers, etc.

### **3.8 HAZARDOUS AREA ZONES**

- Zone classification is as per SANS 10108:2005.
- Any additional requirements for equipment in hazardous area systems shall take precedence over this specification and be in accordance with the zone classification but should be indicated so in the deviation list of this specification.

### **3.9 FIELD INSTRUMENT CABLE TERMINATION (CBLT1)**

- Field instrumentation shall be terminated according to the instrument manufacturer's installation instructions and Field Instrument Installation Standard, 240-56355754.

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- The instrument manufacturer's installation instructions in conjunction with Field Instrument Installation Standard: Field Installation Requirements FIIS-1 shall be used in determining the acceptability of the termination.

### **3.10 JUNCTION BOX TERMINAL BLOCK (CBLT2)**

- The terminal block shall use tension clamp technology.
- The terminal block shall be a single layer type terminal block.
- The terminal block shall be highly reliable and conform to type-tests as per IEC 60947-7.
- It shall be possible to replace any terminal in an assembly without dismantling adjacent terminals; it is permissible, however, to loosen any clamping devices.
- All terminal blocks are readily accessible and when wired and mounted as in service, will have a close fitting to avoid the accumulation of foreign matter between adjacent terminals.
- The terminal block shall not require any special hand tools to perform the connection but rather make use of a standard screwdriver.
- The terminals are safe from finger-touch in accordance with SANS 60529.
- End plates as per manufacturer's specifications shall be inserted.
- The materials used are environmentally compatible e.g. free of cadmium and without halogen or silicone.
- The plastics used are flame-retardant and self-extinguishing according to IEC 60695.
- All termination shall incorporate end sleeves.
- Access to the cable terminal point shall be from the top (top entry terminal blocks).
- Terminal blocks shall incorporate integral test points.
- The clamping point is opened by insertion of the operating device (screwdriver), the conductor is inserted to the stop and is clamped tight after the screwdriver is removed. This method guarantees observation of all tensile requirements.
- The spring steel of the spring-loaded clamp is of a material (such as nickel-chromium) that ensures that the contacting between the conductor and the terminal is corrosion-proof and vibration-resistant.
- The terminal block cable entries are designed in such a way that the insulation of the rated conductor cross-section as well as that of the next smaller cross-section cannot be clamped in this opening.
- The terminal blocks are snapped onto 35mm mounting rails conforming to EN50022-35 and secured against sliding by means of end retainers.

### **3.11 JUNCTION BOX CABLE TERMINATION (CBLT3)**

- All cables glands shall be made of approved, weather-proof, compression type brass (nickel plated) cable glands.
- The cable glands for the UVG2 field cable shall be of a gland appropriate for the cable.
- The cable glands for the UVG16 to UVG24 trunk cable shall be of a gland appropriate for the cable.

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- A plastic weather-proof shroud shall be fitted to each gland exposed to adverse environmental conditions.
- All necessary thread adapters (brass/stainless steel) required to facilitate cable termination shall be incorporated.
- All cables shall have identification tags at each end. These tags will bear the cable number as listed in the cable schedule. Stainless Steel or Anodised Aluminium metal tags or other tags deemed suitable and accepted by Eskom shall be used.
- Wire numbers shall be installed on all control cores. Wire numbers shall be sized to suit the cores to which they are fitted and shall be tight fitting on the core insulation.
- Specialized cable shall be terminated in accordance with the manufacturers specifications.
- All terminations shall be made in termination boxes fitted with rail mounted terminals.
- Only one termination per terminal point shall be permitted.
- The OEM specification shall be used as a guide in determining the quality of the termination and thus the acceptability.

### **3.12 JUNCTION BOX WIRING CONFIGURATION (CBLT4)**

- Terminals for digital and analogue signals within the same junction box shall be grouped i.e. all analogue signals shall be terminated first, followed by the digital signal termination. If possible the digital and the analogue signals shall be physically separated with the analogue signals terminated on the terminals on the left side and the digital signals on the right side.
- All junction boxes shall be fitted with numbered terminals, mounted according to **Figure 3**.
- Each junction box will incorporate appropriate terminals for the accepted design of which 10% are spare marked and terminated.
- For termination of the earth cores, a separate earth bar shall be used.
- All terminal strips shall be permanently tagged using nameplates engraved to show black lettering, in accordance with the instrument wiring diagrams and labelling guideline for the project as supplied by Configuration Management.
- Trunking within the Junction Box will be a minimum of 40x60 grey coloured with covers on both sides.
- Where field cabling enters the junction box through a glanded entry point on the bottom left/right side of the box, the cable shall be routed inside the trunking opposite to the side where it will be terminated. This is to cater for additional cable length for field modifications. This is depicted in **Figure 3**.
- The multicore cable shall enter the junction box on the left side and be routed though the left hand or centre trunking for termination. This is depicted in **Figure 3**.

### **3.13 MARSHALLING CABINET TERMINAL BLOCK (CBLT5)**

- Marshalling cabinet terminal blocks shall conform to requirements as specified for the Junction Box Terminal Block.

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### 3.14 MARSHALLING CABINET CABLE TERMINATION (CBLT6)

- The OEM specification shall be used as a guide in determining the quality of the termination and thus its acceptability.

### 3.15 COMMON REQUIREMENTS FOR JUNCTION BOXES, LCP'S AND LCS'S

- These enclosures shall be totally enclosed, free standing front access type, fabricated from stainless steel having a minimum thickness of 2 mm.
- Enclosure material shall be grade 3CR12 stainless steel or higher, powder coated RAL 7035.
- Free standing enclosures shall be provided with a 75 mm deep channel section base-frame painted black when mounted directly on the floor/ground.
- Enclosures shall be framed and supported to withstand, without the loss of functional integrity or sealing, all loads, mechanical and electrical, which may be imposed.
- The assembled enclosures shall be dust, water, vermin and insect proof according to this specification.
- All cables shall exit/enter the enclosures from the bottom side as per **Figure 4**.
- The enclosures shall have classification of at least IP65 and IP66 in water hosed down areas to SANS 60529: 2001.
- All enclosures shall be lockable and use IP65 304 Stainless Steel door locks with 6mm square key (or as dictated by Eskom) and seals.
- Hinges to be made out of 304 Stainless Steel same as the locks.
- All enclosures shall have hinged doors that will open outwards. A release mechanism shall be provided on the door hinges to allow the door to be removed.
- The hinges shall be located on the left hand side of the Junction Box and shall be reinforced to prevent distortion when open.
- All enclosures shall have a continuous door seal with polyurethane gasket and concealed hinges. It shall be placed in grooves in the door and constrained to ensure that the seal is not dislodged by closure or the application of clamping pressure. The gasket shall be uniform along the "lipped box".
- The enclosures shall incorporate a lipped box seal (gutter seal).
- Unused gland entries must be sealed with a nickel brass blanking plug and seal.
- All enclosures shall have a removable, robust gland plate covering the complete cable glanding at the bottom of the junction box. The gland plate shall have a continuous polyurethane gasket seal.
- All enclosures shall have an integrated angled canopy with a minimum angle of 5 degrees slope towards the front.
- Multi-core cabling shall enter the junction boxes through the correct type of gland fitting.
- All terminal blocks and the earth bar shall be mounted on an internal galvanized mounting plate.
- Shall be able to withstand a temperature range of -20 to +80 degrees Celsius.

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### **3.16 FIELD JUNCTION BOX (JB1)**

- See Figure 2: Junction Box Layout .
- Junction boxes shall incorporate a condensate drain/breather or louvres for free circulation of air within the box to reduce condensation. The louvers or breathers shall be designed to comply with the degree of protection and shall be covered internally with a fine mesh of stainless steel gauze to exclude insects.
- A drain pipe, positioned at the lowest point of the box, shall be provided. The pipe shall have a minimum diameter of 20mm and shall be covered with a fine mesh of stainless steel gauze. The internal design of the box and arrangement of components shall not obstruct drainage.
- The dimensions for the junction box shall be 500 H x 400 W x 200 D.
- The gland plate shall accommodate the appropriate number and layout of gland entries for the accepted design.
- Provision shall be made for an isolated earth bar that can accommodate the sufficient separate cable shield core terminations as required by the accepted design.
- An internal M6 Earth stud with a strap must be provided on the Junction Box door, mounting plate and removal gland plate.
- A brass or bronze protective earth conductor (10 mm diameter earth terminal), to which all metal are connected shall be provided on the closest side to the door hinges on the junction box. The terminal shall be connected by a set of earth links by means of a copper earthing strap on the inside of the box to the junction box door, mounting plate and removable gland plate. The junction box door shall be connected to this earth terminal by means of a flexible braided flat earth strap. The terminal and earth links shall be in an accessible position to allow for the connection of earthing of cables. Provision shall be made for connecting the terminal to the protective earth, external to the box.

### **3.17 LOCAL CONTROL PANEL**

#### **3.17.1 General**

- Each LCP shall be equipped with a LCD that serves as the operator visual interface.
- A 19 inch (diagonal) LCD with a resolution of 1024 X 768 shall be provided for each LCP.
- The LCP shall be provided with illuminated pushbuttons (IP 65 rated) for administering control functions and or an interface i.e. touch screen, pointing device etc. that meets at least the same IP requirements of the panel.
- The worst-case lighting condition of the plant area in which the LCP is situated is considered in the design of the LCP operator interface.
- All plant information and display graphics on the LCD can be easily seen and read by the operator.
- All local control panels exposed to adverse conditions shall have two hinged doors that form two compartments.
- The inner compartment door is lockable by means of a keylock and all local control panel keylocks are operated by means of a master key.
- The inner compartment houses the LCD, terminal blocks etc.
- The outer door is opened to give access to the operator interface side of the LCD.

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- The outer door is of hardened static free shatterproof glass window positioned over the display area of the LCD.

### **3.17.2 Local Control Panel Facilities**

- As a minimum, each LCP provides a plant operator with the following facilities for all plant and equipment assigned to the LCP:
  - Status of plant and equipment
  - LOCAL/REMOTE switching facilities per drive and actuator
  - Indication of LOCAL and MAINTENANCE release from the control room per drive and actuator
  - START/STOP or OPEN/CLOSE capabilities (whichever is applicable) per drive and actuator

## **3.18 LOCAL CONTROL STATIONS**

### **3.18.1 General**

- All local control stations have two hinged doors that form two compartments.
- The inner compartment door is lockable by means of a keylock and all local control stations keylocks are operated by means of a master key.
- The inner compartment houses the terminal blocks etc.
- The outer door is opened to give access to the all push buttons (except the STOP push button), selector switches and indicators.
- The outer door is of hardened static free shatterproof glass window positioned over the push buttons and indicators of the inner door.
- The outer door does not enclose the emergency STOP push button that is mounted in the bottom ¼ of the LCS.
- Any local control facilities provided as a standard on actuators do not form part of the local control stations requirements.

### **3.18.2 Local Control Station Facilities**

- As a minimum the local control stations are provided with the following facilities:
  - Selector switch for REMOTE and LOCAL
  - Two illuminated LEDs for indication of LOCAL and MAINTENANCE release from the control room.
  - Two illuminated LED push buttons for START & STOP or OPEN & CLOSE (whichever is applicable).
  - One illuminated LED push-button for the TEST for all LEDs.
  - ANALOGUE or DIGITAL METERS (whichever is applicable).

## **CONTROLLED DISCLOSURE**

### **3.19 MEASUREMENT AND VERIFICATION**

#### **3.19.1 Pre-Installation Verification**

- Eskom will inspect the Junction Box/LCP/LCS before shipment. This inspection will entail a thorough check to ensure compliance with this specification.
- Agreement must be obtained from the test engineer before the Junction Box/LCP/LCS is despatched. Eskom requires at least 14 days notice of the date on which the junction box will be ready for inspection.
- All test and manufacturing certifications for the Junction Box/LCP/LCS and Terminal Blocks shall be presented prior to installation.
- A Junction Box/LCP/LCS conforming to the requirements of this specification shall be presented upon which the Enclosure Acceptance Certificate (Appendix D) shall be signed. Compliance to this Acceptance Certificate shall be verified during the Post Installation Verification.
- The Enclosure Checklist (Appendix F) shall be used in conjunction with this specification for determining conformance of the junction box.
- It is recommended that a pilot installation, either on site or at the installation contractor's facility be carried out to determine a benchmark for installation quality.
- The number of junction boxes to "verify" is dependent on the size of installation. Defects become apparent when monitoring the different batches of equipment manufactured. As a guide, at least two junction boxes should be "verified" per batch produced.

#### **3.19.2 Post Installation Verification**

- Evaluation of Junction Boxes, terminal blocks and cable termination shall be performed on an ad-hoc basis during installation.
- The Enclosure Installation Acceptance Certificate (Appendix E) shall be signed during acceptance of junction boxes during post installation verification.
- Frequency of inspections/recheck is not covered in this paper and should be developed by the user of this paper. As a guide the minimum requirement of inspection during equipment arrival on site, again at 25% completion and then 75% completion shall be adhered to.
- At least two random terminations per junction box shall be "verified".
- The OEM standard will be used as a guide in determining the acceptability of cable and wire preparation including lacing and restraining criteria.
- The Cable Termination Acceptance Certificate is signed upon acceptance. This includes field instrument, junction box and marshalling cabinet terminations. For field instrument termination, the manufacturer's recommended installation practices shall be used.

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**4. AUTHORISATION**

This document has been seen and accepted by:

| <b>Name &amp; Surname</b> | <b>Designation</b>                         |
|---------------------------|--|
|                           | Document Approved by TDAC ROD 16 July 2013 |
| J. Geustyn                | Senior Technician                          |
| D. Huppe                  | C&I Manager                                |
| E. Motsoatsoe             | Technologist                               |
| Y. Motsepe                | Engineer                                   |
| G. Mngadi                 | Engineer                                   |
| H. Maphumulo              | Engineer                                   |
| S. Gwafa                  | Engineer                                   |
| D. Abrie                  | Engineer                                   |
| F. Moolman                | Engineer                                   |

**5. REVISIONS**

| <b>Date</b>   | <b>Rev.</b> | <b>Compiler</b> | <b>Remarks</b>                                   |
|---------------|-------------|-----------------|--|
| February 2012 | 0           | J Geustyn       | Draft document for review created from FIIG 2    |
| October 2013  | 1           | E Motsoatsoe    | Final Document for Authorisation and Publication |

**6. DEVELOPMENT TEAM**

None

**7. ACKNOWLEDGEMENTS**

None

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APPENDIX A: JUNCTION BOX LAYOUT DRAWING

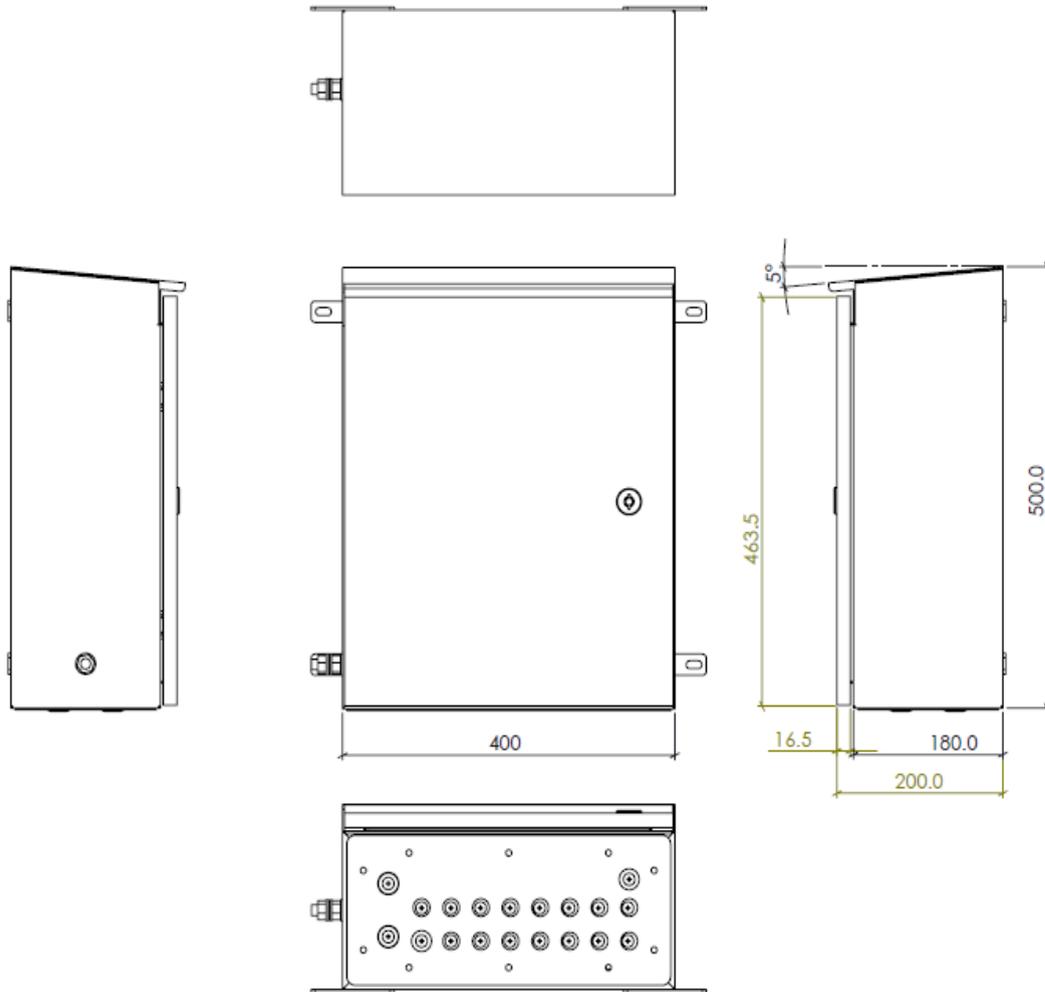


Figure 2: Junction Box Layout Drawing

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### APPENDIX B: JUNCTION BOX TYPICAL INTERNAL TERMINAL AND TRUNKING LAYOUTS

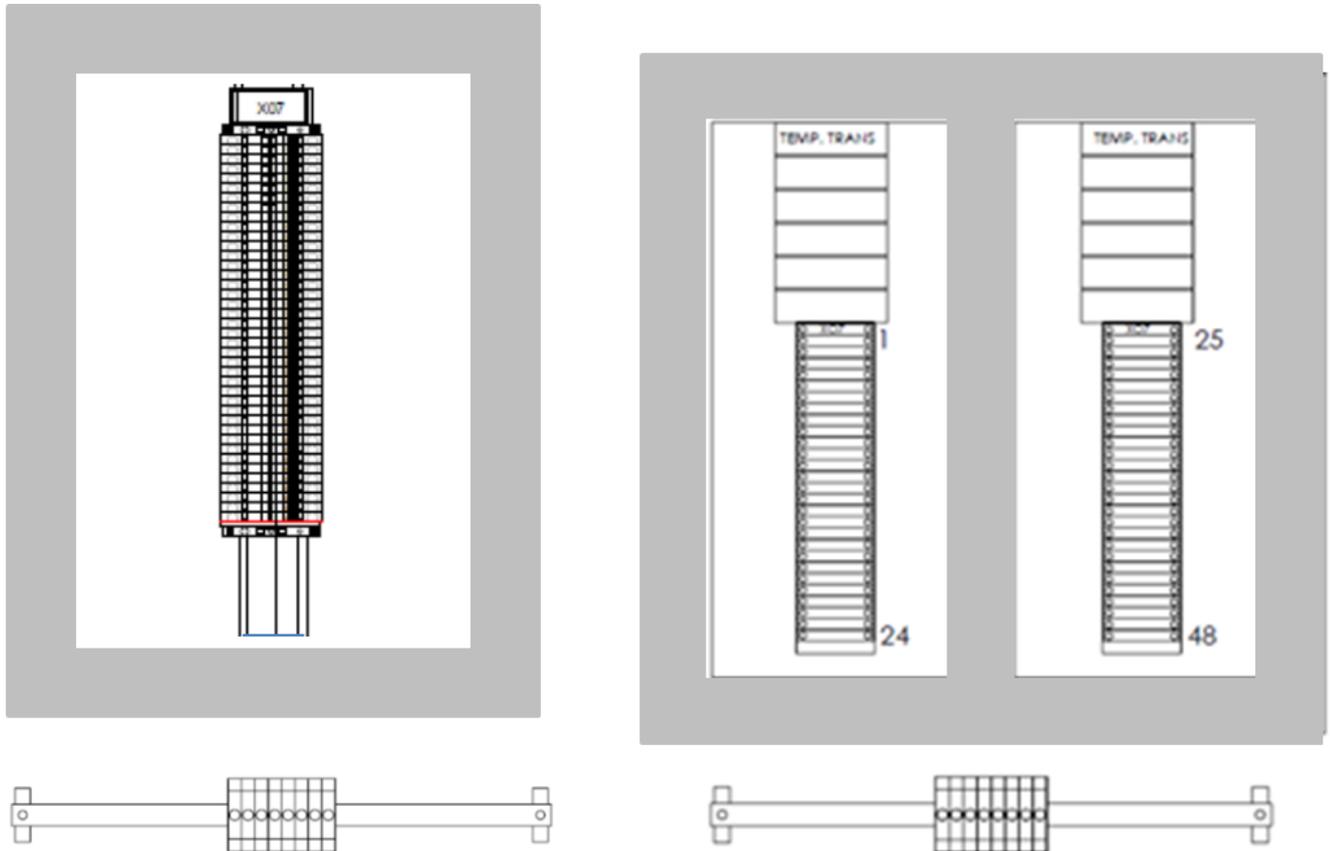
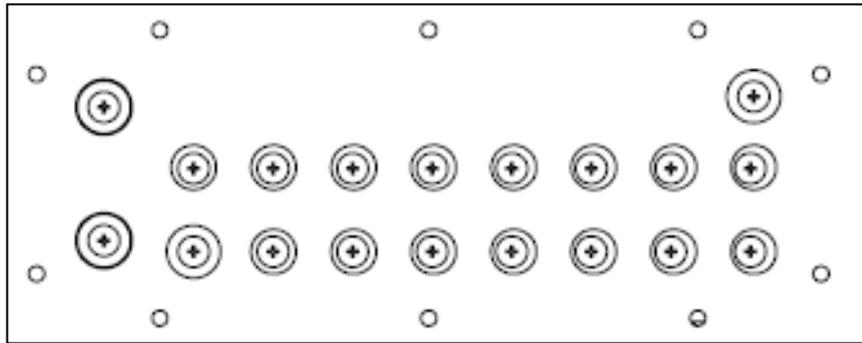


Figure 3: Junction Box Typical Internal Terminal and Trunking Layouts

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**APPENDIX C: TYPICAL JUNCTION BOX GLAND PLATE LAYOUT**



**Figure 4: Typical Junction Box Gland Plate Layout**

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**APPENDIX D: ENCLOSURE ACCEPTANCE CERTIFICATE**

**Enclosure Acceptance Certificate**

ACCEPTED

NOT ACCEPTED

|                 |  |             |  |
|-----------------|--|-------------|--|
| Customer        |  |             |  |
| Project         |  | Project No  |  |
| Plant/Unit      |  |             |  |
| Junction Box No |  | FINISHED ON |  |

**PERSON IN CHARGE**

|          |  |      |  |
|----------|--|------|--|
| Customer |  | Dep. |  |
| Vendor   |  | Dep. |  |

|                                |                          |
|--------------------------------|--------------------------|
| <b>Special Requirements:</b>   |                          |
|                                |                          |
|                                |                          |
| <b>No Defect Items Found</b>   | <input type="checkbox"/> |
| <b>Defect Items were Found</b> | <input type="checkbox"/> |
| <b>Recheck Necessary</b>       | <input type="checkbox"/> |
| <b>Not necessary</b>           | <input type="checkbox"/> |
| <b>Remarks</b>                 |                          |
|                                |                          |
|                                |                          |

**CONTROLLED DISCLOSURE**

**APPENDIX E: ENCLOSURE INSTALLATION ACCEPTANCE CERTIFICATE**

**Enclosure Installation Acceptance Certificate**

ACCEPTED

NOT ACCEPTED

|              |  |             |  |
|--------------|--|-------------|--|
| Customer     |  |             |  |
| Project      |  | Project No  |  |
| Plant/Unit   |  |             |  |
| Enclosure No |  | FINISHED ON |  |

**PERSON IN CHARGE**

|          |  |      |  |
|----------|--|------|--|
| Customer |  | Dep. |  |
| Vendor   |  | Dep. |  |

|   |   |
|---|---|
| <b>Special Requirements:</b>                      |   |
|   |   |
|   |   |
| <b>No Defect Items Found</b>                      | <input type="checkbox"/>                      |
| <b>Defect Items were Found</b>                    | <input type="checkbox"/>                      |
| <b>Recheck Necessary</b> <input type="checkbox"/> | <b>Not necessary</b> <input type="checkbox"/> |
| <b>Remarks</b>                                    |   |
|   |   |
|   |   |

**CONTROLLED DISCLOSURE**

**APPENDIX F: ENCLOSURE CHECKLIST**

| No. | Description                    | Specifications           | Remarks | Acceptable | Defect |
|-----|--------------------------------|--------------------------|---------|------------|--------|
| 1.  | Junction Box Dimensions        | 500 H x 400 W x 200 D    |         |            |        |
| 2.  | Front Access                   |                          |         |            |        |
| 3.  | Stainless Steel                |                          |         |            |        |
|     | Thickness                      | 2mm                      |         |            |        |
|     | Grade                          | 3CR12                    |         |            |        |
| 4.  | Powder Coat                    | RAL7035                  |         |            |        |
| 5.  | Gland Plate                    |                          |         |            |        |
|     | Layout                         |                          |         |            |        |
|     | Seal                           | Continuous               |         |            |        |
|     | Glands                         | Brass( Nickel Plated)    |         |            |        |
|     | Removable                      |                          |         |            |        |
|     | Earth strap                    |                          |         |            |        |
| 6.  | Ingress Protection             | IP65 or IP66             |         |            |        |
| 7.  | Door                           |                          |         |            |        |
|     | Earth strap                    |                          |         |            |        |
|     | Locks                          | IP65 304SS               |         |            |        |
|     | Seal                           | Continuous, Polyurethane |         |            |        |
|     | Hinges                         |                          |         |            |        |
|     | Removable                      |                          |         |            |        |
|     | Lipped                         |                          |         |            |        |
| 8.  | Angled Canopy                  |                          |         |            |        |
| 9.  | Terminal Blocks                |                          |         |            |        |
|     | Number                         |                          |         |            |        |
|     | Type                           | Tension Clamp            |         |            |        |
|     | Mounting Rail, end plates, etc |                          |         |            |        |
|     | Certification                  | SANS/IEC                 |         |            |        |
| 10. | Wiring Configuration           |                          |         |            |        |
| 11. | Temperature Range              |                          |         |            |        |

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|     |                                     |            |  |  |  |
|-----|-------------------------------------|------------|--|--|--|
| 12. | Junction Box Internal Configuration |            |  |  |  |
| 13. | LCP Display                         |            |  |  |  |
|     | Inches                              | 19 Inches  |  |  |  |
|     | Resolution                          | 1024 X 768 |  |  |  |
| 14. | LCP Facilities                      |            |  |  |  |
| 15. | LCS Compartment Configuration       |            |  |  |  |
| 16. | LCS Facilities                      |            |  |  |  |

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**APPENDIX G: CABLE TERMINATION ACCEPTANCE CERTIFICATE**

**Cable Termination Acceptance Certificate**

ACCEPTED

NOT ACCEPTED

|                 |  |             |  |
|-----------------|--|-------------|--|
| Customer        |  |             |  |
| Project         |  | Project No  |  |
| Plant/Unit      |  |             |  |
| Junction Box No |  | FINISHED ON |  |

**PERSON IN CHARGE**

|          |  |      |  |
|----------|--|------|--|
| Customer |  | Dep. |  |
| Vendor   |  | Dep. |  |

|   |   |
|---|---|
| <b>Special Requirements:</b>                      |   |
|   |   |
|   |   |
| <b>No Defect Items Found</b>                      | <input type="checkbox"/>                      |
| <b>Defect Items were Found</b>                    | <input type="checkbox"/>                      |
| <b>Recheck Necessary</b> <input type="checkbox"/> | <b>Not necessary</b> <input type="checkbox"/> |
| <b>Remarks</b>                                    |   |
|   |   |
|   |   |

**CONTROLLED DISCLOSURE**

