

VOL 3 - PART 2

**EMPLOYMENT AND TRAINING FOR LABOUR EPWP-NYS PROJECTS
SPECIFICATION**

ADDITIONAL SPECIFICATION**SL EMPLOYMENT AND TRAINING OF YOUTH WORKERS ON THE EXPANDED
PUBLIC WORKS PROGRAMME (EPWP) INFRASTRUCTURE PROJECTS:
NATIONAL YOUTH SERVICE (NYS)****CONTENTS**

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SL 01 SCOPE

This project is part of the Expanded Public Works Programme and the National Youth Service Programme and aims to train young people and provide them with practical work experience as part of this programme. Youth aged between 18 and 35 will be recruited and trained in skills relevant to the work to be done on this project. These youth will have to be employed by the contractor as part of this project so that they can gain their work experience on these projects. The training of the youth will be coordinated and implemented by a separate service provider. This service provider will provide the contractor with a list of all the youth and the training each of these youth have received. The Contractor will be required to employ all of these youth for a minimum period of 6 months. Furthermore the Contractor will be required to supervise these youth to ensure that the work they perform is of the required standard. If necessary the contractor's staff will be required to assist and mentor the youth to ensure that they are able to perform the type of work they need to do to the satisfactory standards required. The contractor will not be required to employ all youth in the programme at the same time if not feasible, but may rotate the youth on the project, as long as all youth are employed for the minimum duration stated earlier.

SL.2

This specification contains the standard terms and conditions for workers employed in elementary occupations and trained on a Special Public Works Programme (SPWP) for the National Youth Services Programme. These terms and conditions do NOT apply to persons employed in the supervision and management of a SPWP.

SL 02 TERMINOLOGY AND DEFINITIONS

SL 02.01 TERMINOLOGY

- | | | |
|-----|------|--|
| (a) | SPWP | The Code of Good Practice for Special Public Works Programmes, which has been gazetted by the Department of Labour, and which provides for special conditions of employment for these EPWP projects. In terms of the Code of Good Practice, the workers on these projects are entitled to formal training, which will be provided by training providers appointed (and funded) by the Department of Labour. For projects of up to six months in duration, this training will cover life-skills and information about other education, training and employment opportunities. |
| (b) | EPWP | Expanded Public Works Programme, a National Programme of the government of South Africa, approved by Cabinet. |
| (c) | DOL | Department of Labour. |

SL 02.02 DEFINITIONS

- | | | |
|-----|---------------------|--|
| (a) | "employer" | means the contractor or any party employing the worker / beneficiary under the EPWP – NYS Programme. |
| (b) | "client" | means the Department of Public Works. |
| (c) | " worker / trainee" | means any person working or training in an elementary occupation on a SPWP. |

SL 03 APPLICABLE LABOUR LAWS

In line with the Expanded Public Works Programme (EPWP) policies, the Ministerial Determination, Special Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of labour in government Notice No. R63 of 25 January 2002, of which extracts have been reproduced below in clauses

SL 04, shall apply to works described in the scope of work and which are undertaken by unskilled or semi-skilled workers.

The Code of Good Practise for Employment and Conditions of Work for Special Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of Labour in Government Notice No. R64 of 25 January 2002 shall apply to works described in the scope of work and which unskilled or semi-skilled workers undertake.

SL 04 EXTRACTS FROM MINISTERIAL DETERMINATION REGARDING SPWP

SL 04.01 DEFINITIONS

In this specification –

- (a) “department” means any department of the State, implementing agent or contractor;
- (b) “employer” means any department that hires workers to work in elementary occupations on a SPWP;
- (c) “worker” means any person working in an elementary occupation on a SPWP;
- (d) “elementary occupation” means any occupation involving unskilled or semi-skilled work;
- (e) “management” means any person employed by a department or implementing agency to administer or execute a SPWP;
- (f) “task” means a fixed quantity of work;
- (g) “task-based work” means work in which a worker is paid a fixed rate for performing a task;
- (h) “task-rated worker” means a worker paid on the basis of the number of tasks completed;
- (i) “time-rated worker” means a worker paid on the basis of the length of time worked
- (j) “Service Provider” means the consultant appointed by Department to coordinate and arrange the employment and training of labour on EPWP infrastructure projects.

SL 04.02 TERMS OF WORK

- (a) Workers on a SPWP are employed on a temporary basis.
- (b) A worker may NOT be employed for longer than 24 months in any five-year cycle on a SPWP.
- (c) Employment on a SPWP does not qualify as employment and a worker so employed does not have to register as a contributor for the purposes of the Unemployment Insurance Act 30 of 1966.

SL 04.03 NORMAL HOURS OF WORK

- (a) An employer may not set tasks or hours of work that require a worker to work—
 - (i) more than forty hours in any week
 - (ii) on more than five days in any week; and
 - (iii) for more than eight hours on any day.
- (b) An employer and a worker may agree that the worker will work four days per week. The worker may then work up to ten hours per day.
- (c) A task-rated worker may not work more than a total of 55 hours in any week to complete the tasks (based on a 40-hour week) allocated to him.

Every work is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.

SL 04.04 MEAL BREAKS

- (a) A worker may not work for more than five hours without taking a meal break of at least thirty minutes duration.
- (b) An employer and worker may agree on longer meal breaks.
- (c) A worker may not work during a meal break. However, an employer may require a worker to perform duties during a meal break if those duties cannot be left unattended and cannot be performed by another worker. An employer must take

SL.5

reasonable steps to ensure that a worker is relieved of his or her duties during the meal break.

- (d) A worker is not entitled to payment for the period of a meal break. However, a worker who is paid on the basis of time worked must be paid if the worker is required to work or to be available for work during the meal break.

SL 04.05 SPECIAL CONDITIONS FOR SECURITY GUARDS

- (a) A security guard may work up to 55 hours per week and up to eleven hours per day.
- (b) A security guard who works more than ten hours per day must have a meal break of at least one hour duration or two breaks of at least 30 minutes duration each.

SL 04.06 DAILY REST PERIOD

Every worker is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.

SL 04.07 WEEKLY REST PERIOD

Every worker must have two days off every week. A worker may only work on their day off to perform work which must be done without delay and cannot be performed by workers during their ordinary hours of work ("emergency work").

SL 04.08 WORK ON SUNDAYS AND PUBLIC HOLIDAYS

- (a) A worker may only work on a Sunday or public holiday to perform emergency or security work.
- (b) Work on Sundays is paid at the ordinary rate of pay.
- (c) A task-rated worker who works on a public holiday must be paid –
 - (i) the worker's daily task rate, if the worker works for less than four hours;
 - (ii) double the worker's daily task rate, if the worker works for more than four hours.
- (d) A time-rated worker who works on a public holiday must be paid –

SL.6

- (i) the worker's daily rate of pay, if the worker works for less than four hours on the public holiday;
- (ii) double the worker's daily rate of pay, if the worker works for more than four hours on the public holiday.

SL 04.09 SICK LEAVE

- (a) Only workers who work four or more days per week have the right to claim sick-pay in terms of this clause.
- (b) A worker who is unable to work on account of illness or injury is entitled to claim one day's paid sick leave for every full month that the worker has worked in terms of a contract.
- (c) A worker may accumulate a maximum of twelve days' sick leave in a year.
- (d) Accumulated sick-leave may not be transferred from one contract to another contract.
- (e) An employer must pay a task-rated worker the worker's daily task rate for a day's sick leave.
- (f) An employer must pay a time-rated worker the worker's daily rate of pay for a day's sick leave.
- (g) An employer must pay a worker sick pay on the worker's usual payday.
- (h) Before paying sick-pay, an employer may require a worker to produce a certificate stating that the worker was unable to work on account of sickness or injury if the worker is –
 - (i) absent from work for more than two consecutive days; or
 - (ii) absent from work on more than two occasions in any eight-week period.
- (i) A medical certificate must be issued and signed by a medical practitioner, a qualified nurse or a clinic staff member authorised to issue medical certificates indicating the duration and reason for incapacity.

- (j) A worker is not entitled to paid sick-leave for a work-related injury or occupational disease for which the worker can claim compensation under the Compensation for Occupational Injuries and Diseases Act.

SL 04.10 MATERNITY LEAVE

- (a) A worker may take up to four consecutive months' unpaid maternity leave.
- (b) A worker is not entitled to any payment or employment-related benefits during maternity leave.
- (c) A worker must give her employer reasonable notice of when she will start maternity leave and when she will return to work.
- (d) A worker is not required to take the full period of maternity leave. However, a worker may not work for four weeks before the expected date of birth of her child or for six weeks after the birth of her child, unless a medical practitioner, midwife or qualified nurse certifies that she is fit to do so.
- (e) A worker may begin maternity leave –
 - (i) four weeks before the expected date of birth; or
 - (ii) on an earlier date –
 - (1) if a medical practitioner, midwife or certified nurse certifies that it is necessary for the health of the worker or that of her unborn child; or
 - (2) if agreed to between employer and worker; or
 - (iii) on a later date, if a medical practitioner, midwife or certified nurse has certified that the worker is able to continue to work without endangering her health.
- (f) A worker who has a miscarriage during the third trimester of pregnancy or bears a stillborn child may take maternity leave for up to six weeks after the miscarriage or stillbirth.
- (g) A worker who returns to work after maternity leave, has the right to start a new cycle of twenty-four months employment, unless the SPWP on which she was employed has ended.

SL 04.11 FAMILY RESPONSIBILITY LEAVE

- (a) Workers, who work for at least four days per week, are entitled to three days paid family responsibility leave each year in the following circumstances -
 - (i) when the employee's child is born;
 - (ii) when the employee's child is sick;
 - (iii) in the event of the death of –
 - (1) the employee's spouse or life partner
 - (2) the employee's parent, adoptive parent, grandparent, child, adopted child, grandchild or sibling

SL 04.12 STATEMENT OF CONDITIONS

- (a) An employer must give a worker a statement containing the following details at the start of employment –
 - (i) the employer's name and address and the name of the SPWP;
 - (ii) the tasks or job that the worker is to perform;
 - (iii) the period for which the worker is hired or, if this is not certain, the expected duration of the contract;
 - (iv) the worker's rate of pay and how this is to be calculated;
 - (v) the training that the worker may be entitled to receive during the SPWP.
- (b) An employer must ensure that these terms are explained in a suitable language to any employee who is unable to read the statement.
- (c) An employer must supply each worker with a copy of the relevant conditions of employment contained in this specification.
- (d) An employer must enter into a formal contract of employment with each employee. A copy of a pro-forma is attached at the end of this specification.

SL 04.13 KEEPING RECORDS

- (a) Every employer must keep a written record of at least the following –
 - (i) the worker's name and position;
 - (ii) in the case of a task-rated worker, the number of tasks completed by the worker;

- (iii) in the case of a time-rated worker, the time worked by the worker;
 - (iv) payments made to each worker.
- (b) The employer must keep this record for a period of at least three years after the completion of the SPWP.

SL 04.14 PAYMENT

- (a) A task-rated worker will only be paid for tasks that have been completed.
- (b) An employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the contractor having submitted an invoice to the employer. Payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.
- (c) A time-rated worker will be paid at the end of each month and payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.
- (d) Payment in cash or by cheque must take place –
- (i) at the workplace or at a place agreed to by at least 75% of the workers; and
 - (ii) during the worker's working hours or within fifteen minutes of the start or finish of work;
- (e) All payments must be enclosed in a sealed envelope which becomes the property of the worker.
- (f) An employer must give a worker the following information in writing –
- (i) the period for which payment is made;
 - (ii) the number of tasks completed or hours worked;
 - (iii) the worker's earnings;
 - (iv) any money deducted from the payment;
 - (v) the actual amount paid to the worker.
- (g) If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it.
- (h) If a worker's employment is terminated, the employer must pay all monies owing to that worker within one month of the termination of employment.

SL 04.15 DEDUCTIONS

- (a) An employer may not deduct money from a worker's payment unless the deduction is required in terms of a law.
- (b) An employer must deduct and pay to the SA Revenue Services any income tax that the worker is required to pay.
- (c) An employer who deducts money from a worker's pay for payment to another person must pay the money to that person within the time period and other requirements specified in the agreement law, court order or arbitration award concerned.
- (d) An employer may not require or allow a worker to –
 - (i) repay any payment except an overpayment previously made by the employer by mistake;
 - (ii) state that the worker received a greater amount of money than the employer actually paid to the worker; or
 - (iii) pay the employer or any other person for having been employed.

SL 04.16 HEALTH AND SAFETY

- (a) Employers must take all reasonable steps to ensure that the working environment is healthy and safe and that all legal requirements regarding health and safety are strictly adhered to.
- (b) A worker must:
 - (i) work in a way that does not endanger his/her health and safety or that of any other person;
 - (ii) obey any health and safety instruction;
 - (iii) obey all health and safety rules of the SPWP;
 - (iv) use any personal protective equipment or clothing issued by the employer;
 - (v) report any accident, near-miss incident or dangerous behaviour by another person to their employer or manager.

SL 04.17 COMPENSATION FOR INJURIES AND DISEASES

- (a) It is the responsibility of employers to arrange for all persons employed on a SPWP to be covered in terms of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993.
- (b) A worker must report any work-related injury or occupational disease to their employer or manager.
- (c) The employer must report the accident or disease to the Compensation Commissioner.
- (d) An employer must pay a worker who is unable to work because of an injury caused by an accident at work 75% of their earnings for up to three months. The employer will be refunded this amount by the Compensation Commissioner. This does NOT apply to injuries caused by accidents outside the workplace such as road accidents or accidents at home.

SL 04.18 TERMINATION

- (a) The employer may terminate the employment of a worker provided he has a valid reason and after following existing termination procedures.
- (b) A worker will not receive severance pay on termination.
- (c) A worker is not required to give notice to terminate employment. However, a worker who wishes to resign should advise the employer in advance to allow the employer to find a replacement.
- (d) A worker who is absent for more than three consecutive days without informing the employer of an intention to return to work will have terminated the contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.
- (e) A worker who does not attend required training events, without good reason, will have terminated the contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.

SL 04.19 CERTIFICATE OF SERVICE

- (a) On termination of employment, a worker is entitled to a certificate stating –

- (i) the worker's full name;
- (ii) the name and address of the employer;
- (iii) the SPWP on which the worker worked;
- (iv) the work performed by the worker;
- (v) any training received by the worker as part of the SPWP;
- (vi) the period for which the worker worked on the SPWP;
- (vii) any other information agreed on by the employer and worker.

SL 05 EMPLOYER'S RESPONSIBILITIES

The employer shall adhere to the conditions of employment as stipulated in the *Code of Good Practice for Employment and Conditions of Work for Special Public Works Programmes*. Over and above the conditions stipulated above, he shall be responsible to:

- (a) formulate and design a contract between himself/ herself and each of the recruited youth workers, ensuring that the contract does not contravene any of the Acts stipulated in South African Law, e.g. Basic Conditions of Employment Act, etc. (A copy of a pro-forma contract is attached at the end of this specification);
- (b) ensure that the recruited youth workers are made available to receive basic life skills training which will be conducted and paid for by the appointed service provider;
- (d) ensure that all youth workers receive instruction on safety on site prior to them commencing with work on site;
- (e) ensure that all youth workers are covered under workmen's compensation for as long as they are contracted to the contractor. Payment to the Compensation Commissioner shall be the responsibility of the contractor;
- (f) assist in the identification and assessment of potential youth workers to undergo advanced technical training in respective trades;
- (g) test and implement strict quality control and to ensure that the health and safety regulations are adhered to;
- (h) provide all youth workers with the necessary protective clothing as required by law for the specific trades that they are involved in.
- (i) provide overall supervision and day-to-day management of youth workers and/or sub-contractors; and

- (j) ensure that all youth workers are paid their wages on time through a pre-agreed payment method as stipulated in the contract with the youth worker.

SL 06 PLACEMENT OF RECRUITED YOUTH WORKERS

Employers will be contractually obliged to:

- (a) employ youth workers from targeted social groups from the priority list provided by the Departmental National Youth Service (NYS) manager.
- (b) facilitate on-the-job training and skills development programmes for the youth workers;
- (c) achieve the following minimum employment targets:
 - (i) 100% people between the ages of 18 and 35
 - (ii) 60% women;
 - (iii) 2% people with disabilities.
- (d) brief youth workers on the conditions of employment as specified in sub clause SL 04.09 above;
- (e) enter into a contract with each youth worker, which contract will form part of the Employment Agreement;
- (f) allow youth workers the opportunity to attend life skills training through DOL. This shall be arranged at the beginning of the contract;
- (g) ensure that payments to youth workers are made as set out in sub clauses SL 04.14 and SL 04.15 above.
- (h) set up of personal profile files as prescribed by the NYS Manager and as set out in sub clause SL 04.13 above.
- (i) In addition to (h)
 - a copy of the I.D;
 - qualifications;
 - career progress; e.g.
 - Status of technical improvement,
 - Willingness to work,
 - Leadership capabilities,
 - Discipline; and
 - Any other factors that can assist DPW-HR with the placement of the youth workers ant the end of the programme
 - EPWP Employment Agreement, and

- list of small trade tools;
must be included in the youth worker's personal profile file.

SL 07 TRAINING OF YOUTH WORKERS

Three types of training are applicable, namely

- Life skills;
- On the job training
- Technical Skills training.

Training will be implemented by training instructors accredited by DOL and/or CETA:

- Youth workers shall be employed on the projects for an average of 6 months.
- Youth workers shall be deployed on projects in the vicinity of their homes. The same arrangements as for other workers regarding accommodation, subsistence and travel shall be applicable to youth workers.

(a) Life skills training

All youth workers are entitled to undergo life skills training. Training of this module will be flexible enough to meet the needs of the employer. Training should take place immediately after site hand-over and during the period of site establishment and pre-planning before actual construction starts, alternatively this will be spread over the duration of the contract period. The contractor will be required to work closely with the person to schedule the training sessions so that the timing of the training is aligned with the contractors work schedule and his demand for workers.

(b) On-the job training

The Employer shall provide youth workers with on-the-job training to enable them to fulfil their employment requirements. The employer shall also be expected to closely monitor the job performance of youth workers and shall identify potential youth workers for skills development programmes.

(c) Technical skills training

The Employer shall assist in identifying youth workers for further training. These youth workers will undergo further technical training to prepare them for opportunities as semi-skilled labourers.

Such training will comprise of an off-site theoretical component and practical training on-site. The contractor will be responsible for on-site practical work under

his supervision. Youth workers who graduate from the first phase of the training programme will be identified and given opportunities to register for skills development programmes. These can ultimately result in an accredited qualification. The programme will consist of theoretical instruction away from the construction site as well as on-site practical work under the supervision of the employer. Candidates will be entitled to employment to complete all training modules.

SL 08 BENEFICIARY (YOUTH WORKERS) SELECTION CRITERIA

SL 08.01 PREAMBLE

The *Code of Good Practise for Employment and Conditions of Work for Special Public Works Programmes* encourages:

- optimal use of locally-based labour in a Special Public Works Programme (SPWP);
- a focus on targeted groups which consist of namely youth, consisting of women, female-headed households, disabled and households coping with HIV/AIDS; and
- the empowerment of individuals and communities engaged in a SPWP through the provision of training.

SL 08.02 BENEFICIARY (YOUTH WORKERS) SELECTION CRITERIA

- (a) The youth workers of the programmes should preferably be non-working individuals from the most vulnerable sections of disadvantaged communities who do not receive any social security pension income. The local community must, through all structures available, be informed of and consulted about the establishment of any EPWP – NYS
- (b) In order to spread the benefit as broadly as possible in the community, a maximum of one person per household should be employed, taking local circumstances into account.
- (c) Skilled artisans from other areas may be employed if they have skills that are required for a project and there are not enough persons in the local communities who have those skills or who could undergo appropriate skills training. However, this should not result in more than 20% of persons working on a programme not being from local communities.

(d) Programmes should set participation targets for employment with respect to youth, single male- and female-headed households, women, people with disabilities, households coping with HIV/AIDS, people who have never worked, and those in long-term unemployment.

(e) The proposed targets as set out in sub clause SL 06 (c)

- 100% youth from 18 to 35 years of age;
- 60% women;
- 2% disabled.

SL 09 CONTRACTUAL OBLIGATIONS IN RELATION TO YOUTH LABOUR

The youth workers to be employed in the programme (EPWP-NYS) shall be directly contracted to the employer. Over and above the construction and project management responsibilities, the employer will be expected to perform the tasks and responsibilities as set out in clause SL 05 above.

SL 10 RATES OF PAY

It is stipulated that youth workers on the EPWP-NYS receive a minimum of R2 200 per month (or R100 per day) whilst on the programme for both theoretical and on the job training.

SL 11 MEASUREMENTS AND PAYMENT

The number of youth workers specified for this contract that will receive orientation and technical training is 12

SL 11.01 TECHNICAL TRAINING CONDUCTED OFF SITE

SL 11.01.01 Skills development and technical training for youth workers for a period of 46 days per youth worker.....**R192 000.00**..... Unit: worker-days

The unit of measurement shall be the number of youth workers replaced while in training multiplied by the number of days absent from the site.

The rates tendered shall include full compensation for additional replacement labour during periods of off-site training.

SL 11.02 EMPLOYMENT OF YOUTH WORKERS

SL 11.02.01 Employment of youth workers.....**R224 400,00**.....Unit: Prov.Sum

The unit of measurement shall be the number of youth workers at the labour rate of R2 156-00 per month (in compliance with the minimum wage of EPWP Ministerial Document as issued by the Department of Labour) multiplied by the period employed in months and the rate tendered shall include full compensation for all costs associated with the employment of youth workers and for complying with the conditions of contract. The cost for the training shall be excluded from this item. This item is based on 6 months appointment for youth workers on site under the Contractor

SL 11.03 PROVISION OF EPWP DESIGNED OVERALLS, HARD HATS TO YOUTH WORKERS AS WELL AS ONE PAIR OF SAFETY BOOTS.

SL 11.03.01 Supply 1 x EPWP branded overalls and 1 x EPWP branded hard hat and 1 pair of safety boots to youth each youth worker**R11 200**... ..Unit: PC.Sum

Youth worker overalls should be orange (top and bottom) as per EPWP branding specification with the exception of Correctional Services contracts where the overalls should be blue (top and bottom). **A minimum of one set of overalls and 1 pair of safety boots per youth worker should be supplied.** Hard hats should be orange

and branded as per the EPWP branding specification which shall be provided to the Contractor.

SL 11.03.02 Profit and attendance..... Unit: %

An amount has been provided in the Schedule of Quantities under sub item SL 11.03.01 for the supply of EPWP designed overalls and hard hat, as per the EPWP branding specification provided by the EPWP unit. The Service Provider will have sole authority to spend the amounts or part thereof. The tendered percentage under sub items SL 11.03.01 will be paid to the contractor on the value of each payment pertaining to the supply of overalls and hard hats to cover his expenses in this regard.

SL 11.04 PROVISION OF SMALL TOOLBOX FOR YOUTH WORKERS

SL 11.04.01 Provide all youth workers with prescribed tools for their respective trades. Specification for the mentioned tools to be provided by the NYS Manager to the Contractor. These toolboxes will become the property of the youth workers after the completion of the programme...
(allowed R 1 500-00 / youth worker)**R18 000**.....Unit: PC.Sum

SL 11.04.02 Profit and attendance..... Unit: %

SL 11.05.01 Provision for medical fitness test for the learners before coming to site
(allowed R630 / youth worker)**R7 560**.....

SL 11.05.02 **PROVISION FOR THE GRADUATION CEREMONY OF THE LEARNERS & EXTERNAL STAKEHOLDERS**
(Allowed R13 500,00)

EPWP - NYS AGREEMENT
LIMITED DURATION CONTRACT OF EMPLOYMENT
[Example]
FOR
EXPANDED PUBLIC WORKS PROGRAMME
BETWEEN

Company Name:
(herein after referred to as the "contractor")

Company Address:

Contract Name:

AND

Surname and Name/s
(hereinafter referred to as the "Youth worker")

Residential Address:

ID number:

1. The contractor hereby appoints the Youth worker in terms of a Limited Duration Contract, to work as a youth worker within a Special Public Works Programme (SPWP) Project.
2. This contract must be read in conjunction with the standard terms and conditions of employment applicable to a SPWP, a copy of which is attached.
3. The project where you will be employed is referred to as
and is located at
4. The contract will start onand end
on.....

5. You must be aware that **this contract is a Limited Duration Contract and not a permanent job**. Your minimum period of employment will be 6 months and the contract may be terminated for one of the following reasons:
 - (a) Funding for the programme in your areas comes to an end.
 - (b) You repeatedly do not perform in terms of the tasks set out in your work programme.
 - (c) If you breach any of the terms and conditions of this contract.
6. You will be employed as a general worker within the contract, you may, depending on the contractor's operational needs, be required to perform other duties that can be reasonably expected of you.
7. You will adhere to the contractors' disciplinary code.
8. You will be required to work your daily hours from to which included your meal break.
9. While you are working you will report to
10. You will be paid an time-rate amount of R per hour.
11. The contractor shall not be required to provide to local workers:
 - holiday, leave, sick or severance pay;
 - a pension or similar scheme;
 - a medical aid or similar scheme.
12. Signed on this day of 20.....

Contractor:

Date:

Youth Worker:

Date:

Witness:

Date:



public works
& infrastructure

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

DECLARATION – EPWP PROGRAMME

I _____ from the Company

Hereby Undertake To Comply To :

1. LABOUR INTENSIVE CONSTRUCTION METHODS (LIC)

1.1 Comply To Implementation Of LIC BOQ Items Specified Elsewhere In The Tender Documents

2. RECRUITMENT AND PLACEMENT OF EPWP NYS PARTICIPANTS

2.1 Recruitment, Placement And Exposure Training Of ...N/A..... (N/A)
Participants

2.2 Comply To EPWP BOQ, Specifications and Code Of Good Practice

3. RECRUITMENT AND PLACEMENT OF LOCAL LABOURERS

3.1 Recruitment And Placement Of Eight (8) Local Labourers

3.2 Comply With Applicable Wage Order/ Determination or Agreement, In Terms of Labour
Relations Act or Wage Act

4. COMPLY TO EPWP MONTHLY REPORTING REQUIREMENTS

**Monthly, Prepare And Submit Below EPWP Reports Attached To Monthly Payments
Certificate :**

- 4.1 All Employees and EPWP Participants Contracts
- 4.2 All Employees And EPWP Participants Certified SA ID Copies
- 4.3 All Employees And EPWP Participants Attendance Registers
- 4.4 All Employees and EPWP Participants Proof Of Payment
- 4.5 EPWP Reports Populated On Standard Templates

5. PENALTY FOR NON COMPLIANCE

Acknowledge Non Compliance Penalty Of R 3000- 00 (Three Thousands Rand) Per Month Per
Participants

Signed by : _____
Director of the Company

Company name : _____

Date : _____



public works
& infrastructure

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

DECLARATION – EPWP PROGRAMME

I _____ from the Company

Hereby Undertake To Comply To :

1. LABOUR INTENSIVE CONSTRUCTION METHODS (LIC)

1.1 Comply To Implementation Of LIC BOQ Items Specified Elsewhere In The Tender Documents

2. RECRUITMENT AND PLACEMENT OF EPWP NYS PARTICIPANTS

2.1 Recruitment, Placement And Exposure Training Of ...N/A..... (N/A)
Participants

2.2 Comply To EPWP BOQ, Specifications and Code Of Good Practice

3. RECRUITMENT AND PLACEMENT OF LOCAL LABOURERS

3.1 Recruitment And Placement Of Twelve (12) Local Labourers

3.2 Comply With Applicable Wage Order/ Determination or Agreement, In Terms of Labour
Relations Act or Wage Act

4. COMPLY TO EPWP MONTHLY REPORTING REQUIREMENTS

Monthly, Prepare And Submit Below EPWP Reports Attached To Monthly Payments
Certificate :

- 4.1 All Employees and EPWP Participants Contracts
- 4.2 All Employees And EPWP Participants Certified SA ID Copies
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- 4.4 All Employees and EPWP Participants Proof Of Payment
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5. PENALTY FOR NON COMPLIANCE

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Signed by : _____
Director of the Company

Company name : _____

Date : _____

PW371-A: CONSTRUCTION WORKS: SPECIFICATION

PW 371-A

EDITION 2.0



**Department:
Public Works**
REPUBLIC OF SOUTH AFRICA

CONSTRUCTION WORKS: SPECIFICATIONS

GENERAL SPECIFICATION

First Edition October 1983

Second Edition July 2013

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Units, symbols, meaning of terms

Units of measurement, symbols

The units of measurement are metric units as standardised by the "Système International d'Unités" (SI). Note that the comma is the decimal indicator in Europe and South Africa, formally adopted by the *ISO* and the *IEC* as well, and that numerals are grouped into groups of three for readability, separated by a space, e.g. 1 233,55.

The following unit symbols (not abbreviations) are used in this document.

°C	degrees Celsius	L	litre
g	gram	m	metre
H _z	Hertz	m ²	square metre
h	hour	m ³	cubic metre
d	day		
kN	kilonewton	mm	millimetre
kPa	kilopascal	MPa	megapascal
kW	kilowatt	t	tonne

Meaning of terms

The following terms, highlighted in *italics* in the text of this publication, are explained as follows:

AAAMSA

Association of Architectural Aluminium Manufacturers of South Africa

according to manufacturer's instructions

the manufacturer's instructions at the time of tender

applicable standard

a national or recognised standard applicable to the works, implying that the relevant standard is a contract document, a copy of which has to be kept in the site office for reference

ARP

a Recommended Practice prepared by SSA

as specified

as specified in the Particular Specification or in the drawings or in the scope of work

BS

British Standard

CKS

Coordinating Specification prepared by SSA, mainly for the procurement of products for the use of government departments

coastal region

area between the coastline and an imaginary line 30 km inland, including the entire area of jurisdiction of any local authority falling within this region

competent person

person who is qualified by virtue of his education, training, experience and contextual knowledge to make a determination regarding the performance of a building or part thereof in relation to a

SSA

Standards South Africa, a division of the SABS

suitable

capable of fulfilling or having fulfilled the intended function, or fit for its intended purpose

VC

Compulsory Specification (technical regulation) prepared by SS.

2 Concrete works

2.1 Structural works

Applicable standard: SANS 2001-Construction works Part CC1: Concrete Works (structural).

2.2 Minor works

Applicable standard: SANS 2001-Construction Works Part CC2: Concrete Works (minor works).

2.3 Foundations

Applicable standard: SANS 2001-Construction Works Part CM2: Strip Footings, Pad footings and Slab-on-the-ground Foundations for Masonry Walling.

2.4 Concrete floors and paving on the ground

Invoked standard when required: SANS 10109 Concrete Floors

- a) floor: direct-finished one course slab as specified below, or as designed and constructed to SANS 10109 under direction of a *competent person* (civil engineering) when specified

damp-proof under-surface membrane

- b) material: polyolefin: SANS 952 type C: 0,25 mm thick
c) cutting: straight and square or to shape; use sharp instruments
d) joints: minimum, lapped and sealed with pressure sensitive tape.

fabric reinforcement

- e) welded steel fabric: SANS 1024
f) in large mats, overlap 300 mm, place near top surface
g) do not cross over construction or day joints.

preparation

- h) prepare thresholds before casting floor by casting concrete of same thickness, material and finish as specified for floor, in all door openings; thresholds to have keyways
i) prepare for contraction, construction and isolation joints; in case of columns, place edge forms diagonally to column
j) lay damp-proof membrane with sheet overlaps of 200 mm over entire floor area

placing

- k) place, compact, level, strike off, and wood float concrete floors to thickness, level, and/or gradient as specified

finishing

- l) direct-finish by means of delayed trowelling technique:
 - leave surface undisturbed until bleeding has ceased and surface has stiffened so that foot pressure barely indents the surface (2 – 4 hours)
 - remove bleed water and laitance
 - hand trowel using pressure, or power trowel
 - steel trowel to produce a smooth finish, or wood float to produce a slip-free surface
 - do not add water or neat cement.

Joints

Contraction joints:

- m) spacing and pattern: <4,5m in both directions

3 Masonry

3.1 Masonry walling

Applicable standard: SANS 2001-Construction Works Part CM1: Masonry Walling

Specification data:

burnt clay masonry units

- a) burnt clay masonry units: *SANS 227*
- class of common units: NFP for general masonry above damp-proof level to be plastered; NFX for masonry exposed to damp or in contact with the ground (e.g. foundation walls, manholes), or for fair face work
 - nominal dimensions: 222 x 103 x 76 mm, or as specified
 - nominal compressive strength: to table 1 of *SANS 2001-Construction Works Part CM1*
 - uniformity of colour and texture of face units: provide sample of 20 units
 - grade of efflorescence: normal for internal walls not exposed to damp; special for visible unplastered foundation walls, retaining walls and free-standing walls
 - limits of water absorption: 6—14%
 - limits of moisture expansion: 0,20%
 - required marking: designation on each dispatch or consignment note

concrete masonry units

- b) concrete masonry units: *SANS 1215*
- nominal compressive strength: *SANS 2001-Construction Works Part CM1* table 1
 - average drying shrinkage: normal (0,06%)
 - required marking: designation on each dispatch or consignment note

mortar

- c) sand: to *SANS 1090* when specified

reinforcement

- d) brick reinforcement in corrosive areas:
- in coastal regions: galvanized to *SANS 935* or 121, or stainless steel
 - in tidal splash zones: stainless steel
 - non-metallic ties (engineered polymer) may be used instead of stainless steel
- e) metal tie type: butterfly or modified PWD

work

- f) single leaf bond: stretcher
- g) multi leaf bond: stretcher and brickforce, or as specified
- h) reference panel: required
- i) position of control and articulation joints: as specified
- j) degree of accuracy: II

additional requirements

- k) wall ties in partial fill insulated cavity walls
- to have drip in centre of residual cavity
 - tie spacing: *SANS 10164* (2,5/m² or 600 mm vertical, 660 mm horizontal, staggered)
 - tie spacing around openings and construction joints: <300 mm vertical
- l) tie mortar cover: 15 mm minimum to outside face of mortar joint

3.3.2 Dimension stone

- a) natural stone with high compressive strength and good durability, sourced from an acceptable local quarry
- b) pointing: rake out exposed joints 12 mm deep and fill with *suitable* grout
- c) clean down, cover up to prevent soiling during progress of remaining work, remove covering upon completion and clean down again
- d) reference panel: required.

3.4 Masonry-type facings

- a) waterproofing: coat wall face with bituminous compound before covering with facings
- b) matching when relevant: lay out slabs of natural stone to match veining, colour and texture, number each slab and fix in same relative position
- c) attachment devices: 20 x 3 mm L-shaped stainless steel bonding lugs shot-nailed to background at 1 m intervals and staggered
- d) support shelf: 100 x 100 x 8 hot dip galvanized steel continuous angle bolted to structure with 30 x 6 flat steel hangers at 1,5 m intervals
- e) grouting, fixing of cramps, engaging cramps in dovetailed metal channels secured to backing with through-bolts or cramps, adjustment in cramps, attachment of lintels and soffits, alignment of joints and facings: SANS 10073
- f) clean down, cover up to prevent soiling during progress of remaining work, remove covering upon completion and clean down again
- g) joints: 3 mm wide between panels, sealed with suitable sealant of acceptable colour – see section 7.

5 Structural steelwork

5.1 Structural steelwork

Applicable standard: SANS 2001-Construction Works Part CS1: Structural Steelwork

Specification data:

additional items

- a) hot dip galvanized fasteners (M8–M64): SANS 10684

variations

- b) temporary fittings and holes for lifting: to be removed or filled up where visible after installation
- c) cut edges: grind smooth and straight where prominent or as indicated.

5.2 Sundry steelwork

5.2.1 material

- a) structural steel tubes: SANS 657 part 1, and mark-bearing
- b) steel tubes for furniture SANS 657 part 4, and mark-bearing
- c) steel wire rope (cables) SANS 2408
- d) shackles: SANS 2415
- e) thimbles: SANS 2262.

5.2.2 welding

- a) all visible welds: continuous, grind smooth
- b) dress all cut edges and holes to remove dross, burrs and irregularities.

5.3 Coating

- a) preparation of steel surfaces: SANS 10064

hot dip galvanizing

- b) hot dip galvanized coatings on prefabricated iron and steel products: SANS 121 / ISO1461
 - steel composition: for industrial/mining purposes: Si 0,125 — 0,30% with P < 0,02%; for architectural purposes: Si 0,03 with P < 0,01% or Si 0,15 — 0,25% with P < 0,02%
- c) do not bend or form articles after hot dip galvanizing

paint or varnish

- d) corrosion protection of structural steel of not less than 3 mm thickness by paint or varnish SANS 12944
 - source all paint from one manufacturer
 - paint system testing: laboratory tests to SANS 12944-6
 - discuss surface smoothness with all parties before commencing painting.

5.4 Fire protection

Protect structural steel against fire to comply with the required fire resistance as set out in SANS 10400-T table 17, as specified

5.5 Light steel frame building

Light steel frame building: SANS 517.

- fill existing wall cavities by pumping/blowing loose fill insulation through holes drilled in outer leaf, by specialist installer; refill holes after completion to match surrounding brickwork
- i) butt insulation tight against window/door frames

masonry wall external face insulation

- j) patent system of EPS external insulation bonded and mechanically fixed to dry, sound and flat surface, finished with reinforced polymeric plaster, or as specified
- k) by registered specialist strictly to supplier instructions

non-masonry wall insulation

- l) to SANS 204

pitched roof/ceiling insulation

- m) reflective foil under roof covering: with air space of >25 mm between foil and solid surfaces and with reflective surface facing down
- n) bulk insulation: cut neatly to fit snugly between rafters
- o) keep bulk insulation clear of incandescent and halogen downlighters/transformers
- p) observe electrical and other safety issues, e.g. defect wiring, adequate lighting for workmen

flat roof insulation

- q) material: rigid EPS insulation density 32D

floor insulation

- r) under slab insulation (in case of in-slab heating as required by SANS 204): required when specified

pipe insulation

- s) cover insulation exposed to weather and sunlight with protective material as recommended by insulation manufacturer/supplier
- t) tightly mitre bends and tees.

6.2 Vapour barriers

- a) type and position as specified.

6.3 Sound absorption

installation

- a) to a rational design
- b) airborne sound absorption:
 - fix battens to wall
 - fill space between battens with mineral fibre mats
 - fix perforated board / spaced hardwood slats to battens

6.4 Joint fillers/sealants

6.4.1 Materials

- a) building construction jointing and sealant products vocabulary: SANS 6927
- b) compatible with surfaces and materials they come into contact with; do not use material containing bitumen or volatile material with thermosetting chemically curing sealants.
- c) life expectancy: >30 years
- d) use fungus-proof sealant in all wet areas, e.g. between ceramic wall tiles and kitchen cupboards, baths, wash-basins and shower floors

7 Roof covering, cladding

7.1 General

underlay

- a) reflective foil laminate: SANS 1381-4 class B (reinforced, one surface reflective), and mark-bearing
- b) polyolefin undertile membrane: SANS 952 type E, 0,25 mm, and mark-bearing
- c) installation: according to manufacturer's instructions.

7.2 Tile roofing/cladding

7.2.1 Materials

- a) concrete roof tiles and accessories: SANS 542 and mark-bearing
- b) clay roof tiles: SANS 632 and mark-bearing
- c) natural slate tiles: from a *suitable* quarry, with two holes per tile, drilled (not punched)
- d) fibre cement slates: SANS 803, and mark-bearing
- e) metal roofing tiles: SANS 1022, and mark-bearing
- f) accessories: to match roofing material, as supplied by manufacturer/supplier
- g) fixing materials: hot dip galvanized steel SANS 121 in inland regions, or stainless steel grade 304 in *coastal regions* or corrosive atmospheres, except for clay tiles where all fixings shall be stainless steel
 - length of nails: to penetrate battens to a minimum depth of 25mm
 - steel wire: 1,6 mm diameter, galvanized
- h) mortar for bedding and pointing: 3 sand to 1 cement, pigmented to match tiles.

7.2.2 Roof tiling

Invoked standard when required: SANS 10062 Fixing of Interlocking Roof Tiles

Invoked standard when required: Concrete Roof Tiles – Technical Manual, published by the Concrete Manufacturer's Association (CMA)

preparation

- a) install gutter brackets, metal valley linings before tiling

laying

- b) according to manufacturer's instructions
- c) abutments and verges: half tiles in case of interlocking tiles, tile-and-a-half tiles in case of plain tiles/slates
- d) hips and valleys: cut and dress tiles/slates to neat line, overhanging valley gutters by 50 mm, unless specified as butt joined to conceal the valley gutter
- e) roof overhang into gutter: 50 mm measured from eaves to inside edge of gutter
- f) avoid contact of metal roofing tiles with other metals, cement products or treated timber

roof underlay

- g) lay reflective foil underlay with reflective surface facing downwards
- h) lay underlay across rafters/beams, stretch to a sag of ± 40 mm and nail down with battens/purlins or with hot dip galvanized clout nails, or *according to manufacturer's instructions*
- i) work from eaves upwards with 150 mm minimum overlap; join lengths of underlay at their ends over one rafter space

7.3.2 Fibre-cement sheet

- a) fibre-cement sheet: SANS 685/9933
- b) thickness: 5 mm
- c) profile: corrugated 57 mm deep, 178 mm pitch (Big-six)

7.3.3 Glass-reinforced polyester sheet

- a) glass-reinforced polyester sheet: SANS 1150
- b) required marking: trade name, type, class, light-transmission grading, mass, weather side in case of type 1, on each sheet.

7.3.4 Polycarbonate sheet

- a) grade: sheeting grade with a co-extruded layer of UV stabilised polymer on the weathering side

7.3.5 Fasteners and washers

- a) fasteners and washers: SANS 1273.

7.3.6 Installation

Invoked standard when required: SANS 10237 Roof and Side Cladding

- a) installation: according to manufacturer's instructions or to an active Agrément certificate

preparation

- b) ensure that
 - roof and or wall structure is aligned and grouted
 - roof pitch is as required
 - purlins are spaced correctly
 - framework is square
 - face of framework is free of protrusions
 - adjacent building work is complete, including gutters and painting

fixing in general

- c) cold cut in preference to abrasive disc cutting; remove swarf without damaging coating

exposed fixing

- d) holes in sheets: drilled, not punched
- e) hole size: oversize to accommodate thermal movement, especially in the case of polymer sheeting
- f) corrugated metal sheets: on crests of all outermost and middle corrugations, at overhangs and at end laps on every second crest
- g) box ribbed sheets: on crest of every second and fourth rib, with side laps stitched at 900 mm centres with 6 mm diameter self-tapping screws
- h) fibre-cement roof or cladding: 7 mm diameter hot dip galvanized drive screws to wood purlins, 8 mm diameter hot dip galvanized hook bolts to steel angle purlins
- i) all screws and bolts provided with bituminous or plastic washers with hot dip galvanized steel cups

concealed fixing

- j) patent fixing with concealed clips supplied by roof sheet manufacturer, nailed or screwed to purlins
- k) allow for expansion and contraction of the sheet without straining the securing points
- l) holes in sheets: prohibited

- e) clout nails: hard drawn copper wire 2,8 mm diameter x 22 mm with barbed shank
- f) screws: brass, flat head

laying

- g) screw softwood boarding onto battens with counter-sunk brass screws
- h) nail roofing felt with butt joints onto boarding with copper clout nails
- i) lay copper sheet with both edges bent up 90 degrees to form troughs 510 mm wide
- j) form double welged standing seams in direction of fall
- k) fold into seams clips at 300 mm centres formed of same material and nailed to boarding with copper clout-head nails
- l) lay 100—120 mm wide sheet at eaves, nail to boarding with copper nails and bend down with roof covering to form drip
- m) bend sheet up at parapet walls, ventilation pipes and chimneys and counter flash with copper set in silicon sealer
- n) form gutters and spouts from copper sheet of 0,6 mm thickness; provide movement joints in gutters every 10 m
- o) fix all copper securely but do not restrict thermal movement; finish nails and screws flush when covered by copper.

7.5 Thatch roofing

- a) thickness and minimum mass of thatching: SANS 10400-L
- b) lightning protection: required (See Electrical Work).

7.6 Flashings

material

- a) flashings and counter-flashings: metal; reinforced liquid membrane is prohibited
- b) fibre-cement roofs: 6 mm fibre-cement apron flashing finished off with metal counter-flashing against walls, or sill or U-flashing where required in vertical cladding, all *according to manufacturers instructions*
- c) tiled roofs: steel sheet hot dip galvanized class Z275 for inland regions, or class Z600 or copper for coastal/corrosive regions, thickness 0,6 mm
- d) sheet metal roofs: material similar to roofing sheets
- e) side-wall flashings: >75 mm high, >200 mm wide or to cover > two ribs of profiled metal sheeting
- f) head-wall flashings: purpose made flashings incorporating serrated closers and poly closers to suit metal roof profile where required, manufactured to roof angle - do not bend on site
- g) counterflashings: >150 mm high, with anti-capillary fold
- h) end laps: >150 mm for flashing; >75 mm for counter flashings
- i) flashing nails: same material as flashing
- j) flashings for pipes >50 mm diameter: tapered sheet metal collar of diameter to fit around pipe, soldered or sealed to holed flange at same angle as pitch of roof
- k) flashings for pipes <50 mm diameter: tapered sheet metal collar only

fixing

- l) cut, join, lap and form sheet metal flashings, concealed gutters and valleys to roof and vertical surfaces and around protruding pipes to make a watertight finish
- m) fix flashings to walls with 75 mm long flashing nails with a 20 mm hook
 - at ends and at 400 mm centres in between
 - drive flashing nail into wall above line of flashing turn-up, and use hook of flashing nail to keep flashing in position – do not drive nail through flashing
- n) fix flashings to roof sheets at <600 mm centres or on each alternate rib

8 Waterproofing

Invoked standard when required: SANS 10021 The waterproofing of buildings.

Invoked standard when required: SANS 952 annex C: Notes on use, installation and protection of film (supplement to SANS 10021).

8.1 Materials

reinforced bitumen membrane (RBM)

- a) flexible polyester and/or fibreglass reinforced APP polymer modified bitumen membrane: BS EN 13707 or the subject of an active Agrément certificate
- b) anti-root: in all planted areas
- c) bonding: heat-fused on primed surfaces

self-adhesive plastic membrane (APM)

- d) flexible polyethylene or polypropylene film backed SBS modified asphalt/bitumen adhesive compound: BS EN 13967 or the subject of an active Agrément certificate
- e) bonding: cold applied on primed surfaces

reinforced liquid membrane (RLM)

- f) of light colour
- g) reinforcement: non-woven needle-punched polyester or polypropylene fibre fabric with a mass of 125—150 g/m² for roofs and 95—100 g/m² for parapet walls

slip/protection layer

- h) bituminous felt: SANS 92 or 0,25 mm HDPE sheeting: SANS 952 type D

geomembranes

- i) thermoplastic sheeting: SANS 1526

cavity drainage membrane

- j) patent 0,5 mm thick polypropylene or HDPE sheet with studs 5–8 mm high at close centres to an active Agrément certificate

outlets

- k) roof outlets: patent cast iron flanged fullbore outlets with removable dome gratings, epoxy finish
- l) small balcony outlets: straight lengths of PVC pipe with chamfered ends and flanged inlets to accommodate waterproofing dressing without loss of bore or adherence
- m) shower outlets: special flanged shower outlet with trap and grating.

8.2 Preparation

substrate surfaces

- a) free of traffic and protrusions
- b) clean, smooth but not polished, even, stable and surface dry
- c) cracks in cementitious surfaces up to 0,3 mm are acceptable
- d) plywood: exposure class 1 (marine), with open butt joints
- e) sand-cement screeds: minimum 35 mm thick when laid directly onto concrete; minimum 50 mm thick when laid on insulation boards or slip/protection layers; 20 mm minimum as top layer on foamed-cement screeds

8.3 Application

- a) apply waterproofing system *according to manufacturer's instructions*, including priming procedures, to leave roof, internal wet areas like showers and plant rooms, and below-ground structures in a watertight condition
- b) slip/protection layers, blinding layers, metal lathe, ventilators etc.: as required
- c) apply basement/retaining wall waterproofing to face to be back-filled
- d) protect waterproofing after installation against puncturing

movement joints

- e) maintain movement joints in structure
- f) cap movement joints with waterproofing, or with a metal cover strip fixed to the sides to allow movement
- g) in the case of waterproofing caps, loop waterproofing into movement joint, lay backing cord in loop and cover movement joint and upstands with special expansion joint membrane.

8.3.1 system

- a) on exposed concrete roofs: 4 mm RBM
- b) on exposed timber roofs: 2 or 3 mm base sheet plus 4 mm RBM
- c) on balconies <10m²: 4 mm RBM
- d) on balconies >10m², terraces, walkways: 2 or 3 mm base sheet plus 4 mm RBM, or cementitious or acrylic RLM
- e) on parking decks: 5 mm RBM
- f) on planters: 4 mm anti-root RBM
- g) on roof gardens: 2 or 3 mm base sheet plus 4 mm anti-root RBM
- h) on concrete box gutters: 4 mm RBM
- i) on timber box gutters: 2 or 3 mm base sheet plus 4 mm RBM
- j) on parapet walls, freestanding walls: RLM
- k) rewaterproofing: 3 or 4 mm RBM
- l) on below ground surfaces, vertical or horizontal, above or below water table: 2 or 3 mm base sheet plus 4 mm RBM, or single layer APM.

8.3.2 Termination

- a) dress down waterproofing onto flanges of roof outlets
- b) turn up waterproofing against walls, chimney or extractor flues, roof lights, pipes etc. to >170 mm above roof level, or to the level of the damp proof course if present, or to above finished heights of masonry or concrete planter boxes, plant bases, steps etc where these abutt walls
- c) counter-flash turn-ups against masonry walls with the same membrane as the waterproofing, tucked into >40 mm deep preformed grooves
- d) counter-flash turn-ups against concrete walls with galvanized steel, aluminium or copper profiled cover strip bedded in a mastic sealant and mechanically fixed at 150 mm centres to the wall
- e) lap and bond waterproofing to wall damp proof courses in regions with extreme weather conditions (e.g. coastal); materials must be compatible, e.g. bituminous
- f) clamp waterproofing around pipes with suitable clamps
- g) take up waterproofing against, over the top and 50 mm down the outer edge of perimeter upstands, parapet and freestanding walls
- h) continue waterproofing over thresholds of balcony doors exposed to rain, and take up against metal floor finish edge strip
- i) terminate below-ground waterproofing >170 mm above all finished ground levels.

paving slabs on adjustable pads

- f) 600 x 600 x 50 mm precast concrete paving slabs SANS 541 laid on patent adjustable underlay pads to keep tiles 20 – 40 mm clear of waterproofing; joints between slabs: 5 mm, left open; paving surface: level or to follow gradient as specified.

8.5.3 Vehicular traffic areas**asphalt premix**

- a) 50 mm compact layer of asphalt premix laid directly on to waterproofing
- b) ensure premix and waterproofing are compatible

brick/concrete pavers on sand bed

- c) brick or concrete pavers laid on 25 – 30 mm sand bed (see Section 21 External works)

concrete paving

- d) 75 mm in situ concrete paving on protection/slip layer (see Section 2 Concrete works)

8.5.4 Basement, retaining walls

- a) before backfilling, protect waterproofing with covering
- b) install agricultural drain encased in stone and wrapped in geotextile membrane below level of basement floor and to fall to stormwater system, or as specified
- c) backfill with clean filter sand except where cavity drainage membrane is installed, in which case backfill with excavated material.

- b) brander spacing: 600 mm

gypsum board

- c) gypsum board: SANS 266, 6,4 mm thickness
d) brander spacing: 400 mm (300 when plastered)

storing and handling

- e) store boards inside a building on a damp-proof membrane or a timber platform
f) handle boards vertically by two men

cornices

- g) gypsum coved cornice: SANS 622
h) polystyrene core coved cornice: paper covered

fixing

- i) according to manufacturer's instructions
j) use longest board lengths possible
k) pattern when visible: arrange boards symmetrically about room, at right angles to brander, with cut boards along walls, or to pattern as specified
l) lay fibre-cement boards ripple face down to hide nail heads
m) nail boards to timber brander with 38 mm hot dip galvanized clout nails or 32 x 2,5 mm diameter hot dip galvanized serrated ceiling nails at 150 mm centres
n) screw boards to timber brander with 25 mm drywall screws when surface is to be plastered
o) screw boards to steel brander with 25 mm drywall screws at 150 mm centres
p) joints where ceiling is to be plastered: close butted and taped
q) provide movement/control joints through ceiling as follows or as specified
 - a clean break of 15 mm through the complete ceiling structure and finish
 - in interior ceilings at <15m intervals and total area <225 m²
 - in exterior ceilings at <9m and total area <81m²
 - where ceiling framing changes direction
 - to coincide with structural joints
r) nail and/or glue cornices to brander and walls; fix wood cornices to walls with *suitable* frame anchors; mitre corner joints, splay all heading joints; join fibre-cement cornices with H-profile jointing strips.

plaster boards

- s) ensure building is enclosed before ceiling boards are fixed
t) plaster entire ceiling with 3 – 6 mm patent lightweight plaster on same day as board has been erected
u) finish plaster to smooth polished surface.

9.1.3 Wood board ceilings, lining

- a) thickness: to suit span and density

tongue and groove board

- b) tongue and groove wood board: SANS 1039

wood strip, trim

- c) hardwood: SANS 1099

plywood

- d) 3-ply: SANS 929, of exposure class, veneer species, grade etc. as specified

- i) handle boards with clean gloves
- j) arrange grid symmetrically about rooms, with cut boards along walls, with straight joints in both directions, or to pattern as specified; edge perimeter infill units minimum size: half standard board width or length
- k) suspend main tees from structure by hot dip galvanized mild steel strapping or 2 mm diameter hot dip galvanized wire or by patent suspension rods or hooks combined with spring clips and suspension plates
- l) clip cross tees into main tees at the end of each board
- m) use fixers suitable to structural soffit: expanding anchors into concrete; bolts through holes in steel or with clips; screws to sides of timber into top third of beam/rafter/joist; shot nailing is prohibited
- n) level out
- o) hold down ceiling boards with patent hold-down tags or wedges
- p) provide extra hangers for light fittings, sound systems, air conditioning vents etc. as required

9.3 Partitions, linings

performance

- a) structural requirements: SANS 10160
- b) wall deflection requirements: to South African Building Interior Systems Association (SABISA)
- c) required fire resistance in minutes: SANS 10177
- d) required sound insulation grading: SANS 717/10218.

9.3.1 Materials

boards

- a) gypsum plasterboard: SANS 266
- b) fibre cement board: SANS 803

studs and tracks

- c) metal studs and tracks: hot dip galvanized steel with wall thickness and size complying with the structural requirements of the installed system
- d) timber studs: SANS 10082: for load-bearing or non-load-bearing walls as required

aluminium extrusions

- e) extruded aluminium sections: alloy 6063 or 6261 in temper T5 or T6, of wall thickness and strength to meet the structural requirements
- f) anodizing: SANS 1407

powder coating

- g) powder coating: SANS 1274/1578/1796/10322
- h) by applicators approved by the specified powder manufacturers

glass

- i) glass: SANS 1263/50572
- j) required marking in case of safety glass: permanently on each pane, visible after installation.

9.3.2 Drywall partitions, light weight internal walls

Frame system clad with gypsum or fibre cement board, doors, glazing, trims, skirtings etc. as specified.

10 Windows, doors, curtain walls, skylights, solar control

10.1 Performance

Unless specified otherwise, the following performance standards are required to be met:

mechanical performance

- a) mechanical performance of windows, doors, curtain walls and skylights in respect of wind action (deflection and structural strength), water penetration, air penetration and operation within the confines of the perimeter of the main frame, irrespective of the framing material: SANS 613
- b) design wind pressure: SANS 10160
- c) atmospheric temperature range: between -10°C and 35°C
- d) plastic, shrinkage and creep deflection of floor slabs: as specified

thermal performance

- e) U-value and Solar Heat Gain Factor, including permissible air leakage: SANS 204, or as supplied by the glazing manufacturer as verified according to the test method ASTM C 1199 and ISO 9050 for U-values, and given in NFRC / SAFIERA 100-2004 for SHGC values, or be custom product assessed from suppliers, manufacturers, industry associations (including their online resources), and from competent assessors, who must have assessed the products in the manner prescribed by SAFIERA, or be the subject of a rational design by a *competent person*.

10.2 General requirements

- a) fittings to be removable after windows have been glazed

burglar bars

- b) solid mild steel or aluminium alloy of pattern as specified
- c) kink bars at peg stays or latches where required

insect screens

- d) metal gauze screen frames: pressed steel with baked enamel finish, or extruded aluminium with natural anodised finish, filled with 1,5 x 1,5 mm mesh fibreglass gauze
- e) screens to outward opening sections:
 - attach to inside of window frame with studs or clips in such a way as to be readily removable
 - with sliding or hinged sections so as to allow access to opening stays and fasteners from the inside
 - screens to top-hung ventilators may be hinged for access to fasteners
- f) screens to inward opening sections and louvres:
 - deeper frames to allow opening of window/louvre, of a heavier gauge metal
 - fix to window frames with screws or rivets
- g) pivot type windows:
 - screen frames in two sections, one on outside and one on inside, with gap between sections filled with suitable rubber flashing fixed in a way as to be easily renewable

building in

- h) fix frames upright, square and free from warp
- i) use lugs provided with the frame

10.3.4 Pressed steel door frames

- a) pressed steel door frames: SANS 1129

additional clauses

- b) frames for continuous power floated floors without screeds or toppings to be suitable for surface placing without damage to the floor and without compromising proper building in of the frame or the fitment of standard doors
- c) steel thickness half wall width: 1,2 mm; steel thickness single rebate full wall width and frames for double swing doors: 1,6 mm
- d) frames for double swing doors: jambs with V-shaped centres to fit rounded edges of doors, and plain heads or transoms, holed and prepared to receive top centres of spring hinges
- e) buffers: two rubber buffers on lock side rebate of every frame.

10.3.5 Pressed steel door and frame combination

- a) doors: 1,2 mm pressed steel with 40 mm edge, > two V-shaped vertical ribs over full door height, and three horizontal rails
- b) frame: single rebate pressed metal door frame: SANS 1129
- c) lock box: 1,6 mm pressed steel
- d) hinges: 1 pair 100 mm steel.

10.4 Cold-rolled steel framed units

- a) patent cold-rolled tubular steel profile frame with integrated fittings and gaskets
- b) galvanized to 200g/m² and powder coated.

10.5 Aluminium framed units

- a) AAAMSA certified as to performance, glazing, surface finishing, hardware, fasteners, product certification and, when required, energy rating.

10.5.1 Windows and glazed doors

- a) Aluminium framed windows and glazed doors: as specified.

10.5.2 Skylights

- a) obtain a *competent person's* certificate on design loading compliance
- b) sloping glazing to have an overhang if shedding rainwater on significant vertical surfaces
- c) glazing bars to allow for water penetration and effective drainage to outside
- d) condensation: to be removed through guttered weep system
- e) screws and fixing bolts: covered with plastic head caps.

10.5.3 Curtain walling

Curtain walling: as specified.

10.6 Adjustable glass louvred windows

- a) standard: CKS 413
- b) operation: manual or remote control as specified
- c) for glass see Section 17
- d) fix louvre frames in fixed window frames with stainless steel or chromium plated brass dome-head screws
- e) fix after window frame has been painted, when relevant
- f) service louvres at completion and leave in perfect working order.

m) sealing: paint or seal trimmed edges before hanging.

10.11 Fire doors and fire shutters

- a) fire doors and fire shutters: SANS 1253
- b) installation: SANS 1253 Annex E.

10.12 Garage doors

up-and-over garage doors

- a) solid door panel of steel or wooden framework clad in weather boarding, tipping upward into horizontal open position; balanced by springs.

sectional overhead doors

- b) curtain of hinged panels sliding upwards and inwards in channel guides; balanced by springs.

10.13 Roller shutter doors

- a) curtain of interlocking slats or grilles running in channel guides from a spring loaded barrel, mounted overhead on steel support brackets; assembly bolted or welded to the building structure
- b) automatic operation to be supplied with light, safety reverse, manual override, and remote control
- c) electrical operation to include remote push button starter, limit switch assembly, emergency hand operator in event of power failure; electromagnetic brake.

10.14 Strongroom/record room doors, ventilators

strongroom and vault doors

- a) strongroom and vault doors: SANS 949
- b) required marking: manufacturer's name on outside of door; door category on inside of door.

fire-resisting record room doors

- c) fire-resisting record room doors: SANS 1015
- d) required marking: "FIRE RESISTANT ONLY", manufacturer's door number

ventilators for strongrooms

- e) double ended steel telescopic ventilator sleeves of $<127 \times 127$ mm internally and *suitable* for wall thickness, fitted with baffle plates and flame proof wire gauze screen; face plates $< 225 \times 225$ mm on both sides, the outer face plate fitted with drop shutter mechanism operating from a fusible metal plug; sleeves and baffle plates not less than 2 mm thick

installation

- f) bolt strongroom door(s) to walls with lugs provided
- g) in openings formed in walls after plastering has been completed
- h) according to manufacturer's instructions
- i) grout in solid with class I mortar
- j) door to clear finished floor by 25 mm
- k) build in ventilator(s) into openings formed in the walls in class I mortar, grouted in solid.

10.15 Solar control

Solar control devices: as specified.

- d) **aggregate for screeds:** concrete sand (not a plaster sand) passing through a 5 mm sieve; where a smooth surface is required, concrete sand may be blended with plaster sand in the proportion of 4:1
- e) **aggregate for toppings:** aggregate from natural sources: SANS 1083

Nominal aggregate size, mm	Minimum thickness of topping, mm
6,7	25
13	40
¼ thickness of topping, maximum19	>40

- f) **aggregate for terrazzo:** marble aggregate consisting of equal parts of sizes ranging from 3 to 4 mm and 4 to 6 mm

proprietary surface treatments

- g) **form:** dry shakes, coatings or screeds as specified
- h) **colouring pigment:** BS 1014 or BS EN 12878

joint sealants

- i) **sealants:** see section 6

mesh reinforcement

- j) **welded steel fabric for reinforcement of topping when specified:** SANS 1024, of fabric reference number 193 or 245

water

- k) **water for mixing:** drinking water

edge, dividing, feature strips

- l) see Section 16 Hardware.

11.2.2 Mix

screed

- a) 1 part cement to 3½ parts sand, or 50 kg (one bag) cement to 130 L sand (two wheelbarrows)
- b) **mixing:** by hand or preferably by forced-action mechanical mixer for 3 minutes
- c) **use within** 45 min.

topping

- d) **mix proportions** may be arrived at by a process of mix design or by the use of recognised tables of trial mixes with South African aggregates

terrazzo

- e) 1 part cement to 2 parts marble aggregate

consistency

- f) **slump:** 40 – 50 mm as measured by the standard slump test SANS 5862

colouring pigment

- g) **application:** mix with dry cement, or add to freshly laid surface as a dry shake

- use power trowels if areas are large
 - finish with carpet-faced floats or soft brushes or broom to desired texture
- c) do not add water or dry cement at any stage; do not trowel too soon; avoid overtrowelling

pigmentation

- d) integral application: lay mix in two thicknesses in one operation, the lower unpigmented thickness brought up to 6 mm of the finished level, and the upper pigmented thickness laid with the required amount of pigment mixed with the dry cement before adding water
- e) dry shake application: dry-shake pigment to the final surface and trowel in to an acceptable finish and pattern

grinding and polishing

- f) grind surface after four days by wet mechanical process until aggregate is fully exposed and surface is even and smooth or non-slip as required
- g) grind small or awkward surfaces by hand with carborundum stone
- h) wash clean.

11.2.6 Joints

isolation joints

- a) against walls, columns or other fixed objects
- b) 20 mm wide through full thickness of topping, screed or terrazzo
- c) to coincide with isolation joints in base

intermediate sawn contraction joints

- d) in continuously cast unreinforced topping only
- e) saw halfway through topping thickness with concrete saw
- f) form panels not exceeding 9 m², or to pattern as specified
- g) arris-round top edges of joints with a radius of 3 – 5 mm

patent movement joint systems

- h) patent movement joint system with flexible inserts when specified
- i) fix through pre-drilled holes using cross-head stainless steel screws and plugs at 300 mm centres on both sides of joint.

11.2.7 Surface regularity

- a) degree of surface regularity: II (SANS 10155) 5 mm along a 3 m straight-edge in any direction, and gradual, or as specified
- b) deviation of floor finish from datum level: ±15 mm and gradual; less near door openings or other defined areas where levels must be accurate.

11.2.8 External thresholds

- a) remove one masonry course of foundation wall over width of door opening
- b) place metal edge strip against exposed surface bed
- c) cast concrete topping grade 20 threshold between reveals, sloping away from door, or lay precast threshold
- d) finish threshold with a non-slip finish or 75 mm wide reeding, stopped 100 mm from threshold ends (see drawing), or finish concrete to a non-slip finish.

11.2.9 Edge strips

- a) see Section 16 Hardware for material, size
- b) under internal doors

12 Tiling

12.1 Materials

ceramic wall and floor tiles

- a) ceramic wall and floor tiles: SANS 1449
- b) porcelain tiles, fully vitrified: SANS 13006 group B1a, water absorption $\leq 0,5\%$
- c) moisture expansion limit: $<0,06\%$ for external floors, and for internal floors in wet and/or cold areas
- d) scratch hardness on the MOHS scale: >4 for walls; >7 for floors
- e) required marking on tile and/or packaging: trade name, country of origin, group, dimensions, class of resistance of glazed tiles to acids and alkalis, surface abrasion resistance of glazed tiles

stone tiles

- f) natural stone: from a South African quarry
- g) cast stone: BS 1217

concrete tiles

- h) precast concrete tiles: SANS 541
- i) terrazzo tiles: precast concrete with a terrazzo facing: BS EN 13748

mosaic

- j) tesserae glued to brown paper or water-resistant synthetic mesh fabric in squares of about 300 x 300 mm

profiled and decorative tiles

- k) skirting, dado, bullnose and other profiled or decorative tiles: as specified.

accessories

- l) movement joint strip: of depth that allows fixing to the substrate or background
- m) stair nosing and movement joint strip: with polyurethane or PVC infills.

adhesive

- n) proprietary adhesive BS EN 13007, of *suitable* type
- o) adhesive and associated systems: from one manufacturer

grout

- p) proprietary grout: BS EN 13007 of *suitable* type and colour
- q) use epoxy grout in areas where hygiene is important.

12.2 Tiling

Invoked standard when required: SANS 10107 Design and Installation of Ceramic Tiling

preparation

- a) complete all adjacent rough construction work and install and test all services in background before commencing tiling work
- b) examine backgrounds, remedy defects and allow to dry to equilibrium moisture content; remove dust, loose matter, efflorescence and laitance
- c) in the case of smooth and dense concrete: key surfaces with a priming agent as recommended by the adhesive manufacturer prior to application of the adhesive
- d) set out field, border and pattern, when relevant

- f) do not use in areas where hygiene is important

isolation (perimeter) joints

- g) isolation joint width: 10 mm
h) form around perimeter of floor, columns, kerbs, steps and plant bases
i) form joint adjacent to skirting in areas where hygiene is important

Intermediate joints

- j) to same width as grouted tile joint
k) position:
 - at 3 m centres maximum externally, or internally in wet areas or in areas where large thermal movement or vibration is expected
 - at 10 m centres maximum internally in areas of up to 500 m² of floor
 - at 5 m centres maximum internally in areas exceeding 500 m² of floor
 - over supporting walls or beams on suspended concrete or timber floors
 - where different background materials meet

l) adjust spacing to coincide with structural features like columns

structural joints

- m) joint width: same as structural joint width in substrate
n) to align with structural joints in the substrate or background
o) in the case of structural joints in substrates or backgrounds being irregular, not straight, or not coinciding with that of the tiling: obtain a decision as to its treatment.

12.5 Cleaning

- a) sponge tiled surface with water and polish with clean, dry cloth
b) do not use acid cleaners, scouring powder or abrasive cleaning materials
c) protect absorbent floor finishes (for example quarry tiles) with an application of non-slip wax polish or *suitable* proprietary sealer.

solid wood strip, block, parquet, mosaic

- b) density: >640 kg/m³ at moisture content of 12 %
- c) strip to be tongued, grooved and end-matched
- d) block dimensions: face width 57—90 mm, length 200—500 mm, thickness >20 mm
- e) parquet flooring: >6 mm thick

faced plywood or fibreboard

- f) factory assembled in panels of random lengths, and in widths up to 300 mm depending on species
- g) thickness: not less than 18 mm when laid on battens
- h) edges: tongue and grooved to produce a tight sliding fit and a flush joint on face side of strip, and end-matched

decorative melamine laminate

- i) decorative melamine laminate flooring: EN 13329
- j) thickness: 8 mm
- k) *suitable* for floating application to a fully supporting substrate
- l) provided with patent interlocking system
- m) built-in insulating underlay: when specified

adhesive

- n) single-pack elasticised adhesive or an adhesive as recommended by the manufacturer

battens

- o) battens: sawn softwood timber to comply with SANS 1783-4, size 40 x 20 mm minimum thickness
- p) battens for sprung floors: 50 x 50 mm laminated softwood

damp proof membrane

- q) over-slab damp proof membranes shall be new polyolefin film to SANS 952 class C or an Agrément certificated polyethylene sheet at least 0,2 mm thick.

movement joints

- r) patent movement joint strip: see Section 16.

13.4.2 Installation

preparation

- a) ensure partitions are in place before floating floors are laid

installation in general

- b) not over underfloor heating without written approval of the flooring manufacturer and/or the installer
- c) lay panels or strips in same direction as angle of light incidence; where this is not important, lay parallel to longest side of room
- d) continue pattern through door openings connecting rooms with similar flooring
- e) movement joints: allow 20 mm clear space against all fixed objects including door frames, and every 10 m in both directions
- f) stop or cut back plaster finish on walls short of finished floor level when required to ensure skirting covers the joint

- b) use coverings from same production run to ensure uniform colour and texture
- c) agree on direction of seams and pile; pile to lie down stairs; place longitudinal seams away from traffic areas; place cross seams in crotch of stairs
- d) start full widths on door side of room; finish carpets under doors within thickness of closed door
- e) cover exposed carpet edges with *suitable* metal edging strip
- f) to prevent bow-wave effects under wheels, for example in medical institutions, stick carpet to floor with suitable adhesive
- g) use protective stair nosing on carpet tiles and fibre-bonded coverings
- h) stair nosings to have minimum radius of 12,5 mm; if less, use protective nosing
- i) secure covering by carpet gripper lengths at each crotch riser and tread or by means of adhesive
- j) ensure continuity of level between covering and stair nosing; fix nosing to *suitable* spacers, e.g. hardboard or plywood strips with adhesive and screws
- k) nosings to be wide enough (60—100 mm) to prevent rocking.

13.6 Epoxy flooring

- a) type: seamless epoxy mortar floor
- a) epoxy mortar: epoxy resin mixed with *suitable* aggregate of specified colour and size

application

- b) according to manufacturer's instructions
- c) scabble or sandblast surface to provide necessary grip
- d) prime surface with low-viscosity epoxy
- e) apply final epoxy finish after 10 h by trowel or by self-levelling, to thickness and finish as specified
- f) prepare sample panel
- g) stop finish against metal strips on both sides of movement joints.

knotting, stopping, fillers

- w) knotting for the treatment of knots in wood: quick-drying resin solution or an aluminium primer
- x) stopping and fillers: *suitable* to fill holes and imperfections in the material to be painted
- y) fillers: oil-based, emulsion-based or supplied in powdered form

stirring

- z) stir paint materials before use and at intervals during use unless the manufacturer's instructions state otherwise

thinning

- aa) thin paint only to improve penetration or facilitate application, for example on surfaces of high or variable porosity, or for spray application; thinner type and proportion: as recommended by the manufacturer

two-pack materials

- bb) observe manufacturer's instructions regarding mixing proportions, induction period (standing time), pot life and the possible extension of pot life.

14.2 Preparation of surfaces

- a) allow time for the drying of surface moisture
- b) ensure work by other tradesmen that might affect painting has been completed
- c) inspect factory-primed components to ensure that the primer is in satisfactory condition; if not, take remedial action
- d) remove excess pipe jointing material
- e) when specified, remove hardware, light fittings and other removable fittings that can be contaminated; mark, store and refix after completion
- f) mask fittings that cannot be removed
- g) seal cracks between frames, skirtings, cornices etc. and walls with paintable acrylic sealant
- h) protect surfaces not to be painted

cleaning

- i) clean all surfaces of dirt, grease, soot, mould and marks –spare no time or effort
- j) limit cleaning to dry abrading and dusting when possible
 - by means of stiff brush (not wire), abrasive paper, emery cloth, steel wire wool or nylon fibre pads as required
 - always sandpaper wood in direction of grain
 - remove pencil marks and other surface discolouration
 - in the case of window frames, take care not to scratch the glass, especially with abrasive paper
 - dusting: after dusting down, sweep or vacuum floors; do not sweep or dust whilst painting is in progress
- k) remove superficial dirt by washing only if required
 - with a solution of sugar soap, household detergent, cleaning powder or mild soap
 - use proprietary cleaning materials strictly in accordance with the manufacturer's instructions
 - rinse surfaces with clean water before the solution dries
 - allow to dry before coating
 - proprietary emulsion cleaners or degreasing solutions may be used for removing heavy deposits of oil or grease

existing coatings

- l) keep only when in a sound condition and compatible to the coating to be applied

- d) do not paint when conditions are unsuitable, for example dust, insufficient light, direct sunlight or inclement weather; do not apply paint if the ambient temperature is <10>35 °C, or if the relative humidity is <10>85 %
- e) spray-paint only where this is the accepted method; mask all surrounding surfaces when spray-painting; do not spray paint in windy weather.

14.5 Knotting, stopping, filling and priming

- a) knotting: to cover wood knots
- b) stopping: for stopping up holes, wide cracks, open joints and similar imperfections, including the repair or removal and replacement of defective glazing putties
- c) use cement plaster or a proprietary plaster repair product for stopping holes in plaster; spot prime all plaster repairs, fillers etc. on walls with a masonry primer once fully cured
- d) fillers: for filling and levelling, for example shallow depressions, open grain, surface roughnesses, nail and screw heads, fine cracks and restoration of the original film thickness where this was locally damaged
- e) apply stopping and fillers by flexible putty knife on broad surfaces, and by brush on mouldings; allow surfaces to dry; rub down to a smooth surface
- f) prime or seal woodwork to be built in before building in; this applies to structural timber, all frames, all six sides of a door, and to rebates and backs of beads in glazing apertures.

14.6 On-site pre-treatment and priming of non-ferrous metals and stainless steel

aluminium

- a) smooth aluminium surfaces (sheets, extrusions and aluminized steel): degrease, and lightly abrade or pretreat with a twin-pack vinyl wash primer, followed by one coat zinc phosphate primer
- b) rough aluminium surfaces (castings and sprayed metal coatings): lightly abrade, remove dust and dirt; sprayed metal coatings might require washing; pretreat sprayed metal coatings with a wash primer or etching primer immediately after application of the coating, followed by one coat zinc phosphate primer

zinc and zinc aluminium alloy, sprayed coatings

- c) zinc sheet, zinc-coated steel (hot dip galvanized, sherardized or electroplated), and zinc aluminium alloy coated steel (hot dip): degrease, and lightly abrade or pretreat with a wash or etching primer, followed by one coat zinc phosphate primer
- d) sprayed zinc and zinc aluminium alloy coatings: wash if required, and pretreat with a wash or etching primer, preferably immediately after application of the coating, followed by one coat zinc phosphate primer
- e) where hot dip galvanized steel was unavoidably welded on site, clean joint and repair coating using a zinc rich paint or epoxy

copper, brass and bronze

- f) copper, brass and bronze coatings: degrease, and lightly abrade or pretreat with a wash or etching primer

lead

- g) lead: wet abrade and pretreat with a wash or etching primer

cadmium coatings

- h) cadmium coatings: degrease, and lightly abrade or pretreat with a wash or etching primer

- g) two coats matt, high-opacity finish "contract" emulsion paint SANS 1586 grade 4; or
- h) one coat ditto, spray applied; or, for exterior work
- i) two or three coats matt or semi-gloss finish general purpose emulsion paint, or
- j) for fibre-cement roofs in *coastal areas*, an anti-fungicidal paint

textured emulsion paint

- k) *suitable* primer; and, for interior work only,
- l) one coat sand-textured paint, over-painted if required

masonry paint

- m) *suitable* primer; and
- n) mineral type masonry paint for interior or exterior work; or, for exterior work only,
- o) two coats smooth or fine-textured solvent-borne or emulsion-based masonry paint; or
- p) one or two coats heavy-textured solvent-borne masonry paint; or
- q) one coat heavy-textured emulsion-based masonry paint.

cement paint

- r) two coats cement paint for interior or exterior work
- s) not on gypsum plaster

masonry sealers

- t) one or two coats according to manufacturer's instructions

lime wash

- u) two coats lime wash, applied with a 200 mm block brush.

14.8.2 Ferrous metals

- a) (clean iron and steel; total film thickness should be 115 to 145 μm)

alkyd paint on blast-cleaned surfaces

- b) two coats solvent-borne primer; and
- c) one coat solvent-borne undercoat; and
- d) two coats alkyd gloss finish

alkyd paint on manually cleaned surfaces

- e) two coats etching primer (one-pack or two-pack) or zinc phosphate primer; and
- f) one coat solvent-borne undercoat; and
- g) two coats alkyd gloss finish

alkyd paint on factory primed surfaces

- h) inspect primer for soundness and touch up where required, and
- i) one coat solvent-borne undercoat; and
- j) two coats alkyd gloss finish

alkyd paint on cast iron

- k) remove bitumen until clean, sound substrate is achieved
- l) paint one coat metal primer, and one coat high gloss alkyd paint, or
- m) two coats general purpose semi-gloss emulsion paint

micaceous iron oxide paint on blast-cleaned or manually cleaned surfaces

- n) two coats micaceous iron oxide paint, high-build type

- v) two coats alkyd semi-gloss finish

emulsion paint on wood fibre and particle board

(hardboard, mediumboard, medium density fibreboard (MDF) and softboard not factory-primed or sealed)

- w) no primer, except for absorbent board in which case first coats shall be thinned; or
- x) one coat alkali-resistant primer for flame-retardant treated board; or
- y) no primer for bitumen-impregnated softboard; or
- z) no primer for particle board, except for single layer board in which case a resin-based primer shall be applied; and
- aa) two or three coats semi-gloss finish general purpose emulsion paint

alkyd paint on softwood or hardwood gates and fences

- bb) one coat solvent-borne or aluminium primer; and
- cc) one or two coats universal undercoat; and
- dd) two coats alkyd gloss finish

transparent finish systems for wood (interior)

(interior general joinery, surfaces, linings and fittings)

- ee) decorative wood stain, as required; and
- ff) one or two coats interior alkyd, urethane or urethane/alkyd resin varnish, on worktops, or
- gg) one or two coats urethane varnish, two-pack or moisture-curing, for surfaces requiring exceptional abrasion resistance, or
- hh) one or two coats wood sealer *suitable* for interior use

transparent finish systems for wood (exterior)

(exterior window joinery, solid doors and frames, cladding, bargeboards, fascias and soffits)

- ii) two or three coats exterior wood sealer.

14.8.4 Plasterboard

(ceilings, bulkheads, partitions)

alkyd paint

- a) a primer-sealer or water-thinned primer; and
- b) one coat universal undercoat; and
- c) one coat alkyd semi-gloss finish; or
- d) two coats alkyd semi-gloss finish

emulsion paint

- e) two coats matt, high hiding, scrub resistant emulsion paint on walls
- f) two coats matt utility grade emulsion paint on ceilings and bulkheads.

14.8.5 Plastics

paint on unplasticized polyvinyl chloride (PVC-U)

(PVC-U cladding, window and door frames, gutters, down-pipes, waste and vent pipes and window frames)

- a) two-pack wash primer followed by conventional alkyd gloss or emulsion paint finish system; or
- b) a long-life coating of a specialized type, such as two-pack polyurethane or epoxy

paint on glass-reinforced polyester (GRP)

- c) remove wax coating; and

15 Furniture, equipment, stairs, architectural metalwork

15.1 Joinery

15.1.1 Solid wood

hardwood

- a) hardwood: *SANS 1099*
- b) grade: clear and free of sapwood for visible faces; semi-clear for faces that will not be visible.
- c) required marking: trade name, grade (clear grade—red, semi-clear grade—blue) on one piece in each bundle

softwood

- d) softwood: *SANS 1783-3*
- e) grade: clear and free of sapwood for visible faces; semi-clear for faces that will not be visible.
- f) preservative treatment: required for exterior work
- g) required marking: trade name on one end, grade on other end (clear grade – black; semi-clear – red) on each piece

laminated timber

- h) laminated timber: *SANS 1460*
- i) preservative treatment: required for softwood exterior work
- j) required marking: application, exposure class, type, appearance and finish on each board

15.1.2 Wood board

plywood and composite board

- a) plywood and composite board: *SANS 929*
- b) required marking: trade name, exposure class, thickness, grade, preservative treatment on each board

decorative melamine-faced boards (MFB)

- c) decorative melamine-faced boards (MFB): *SANS 1763*
- d) required marking: *SANS 1763* + 'MFB' + thickness + abrasion and lamina thickness + Z

fibreboard

- e) fibreboard: *SANS 540*
- f) required marking: type on each board.

particle board

- g) particle board: *SANS 50312*
- h) required marking: *SANS 50312 / EN 312*

oriented strand board (OSB)

- i) oriented strand board (OSB): *SANS 472*

15.1.3 Polymer laminate and solid surfaces

high pressure decorative laminates (HPL)

- a) high pressure decorative laminates (HPL): *SANS 4586*
- b) required marking: *SANS 4586* + type + resistance, e.g. HPDL—*SANS / ISO 4586—P333*

grain, pattern

- o) grain or pattern: grain of all fitted visible clear-finished timber, or pattern of laminates when relevant, to run vertically on vertical surfaces and parallel to walls on horizontal surfaces, wherever practicable
- p) veneer on any one fitting to match in grain and colour; veneer on pairs of doors to match

plinths

- q) form plinths with front and back members and full height cross members at <900 mm centres
- r) scribe plinths to floor and secure to wall to provide a level platform for carcasses

tops

- s) solid hardwood tops: boards in single lengths or, if not possible, with staggered end joints, jointed with grooved, cross-tongued and glued joints or with grooved rebated and glued joints stopped 25 mm back from visible ends
- t) moisture resistant particle board tops: faced with high pressure decorative laminates with postformed exposed edges
- u) screw tops to framework to allow for movement: with rebated hardwood clamps or metal cleats at 300 mm centres, screwed from underneath

backs

- v) backs to fittings: hardboard or as specified
- w) bevel all exposed edges

drawers

- x) drawers: 12 mm softwood front, sides and back, grooved for 6 mm tempered hardboard bottom, screwed to 16 mm drawer face, or as specified

shop painting

- y) deliver joinery on site fully painted, or as specified.

15.1.7 Fixing

- a) fix only after space is fully enclosed and secure, all wet work is complete and dry, and airconditioning, lighting, site and stormwater works are complete
- b) fix joinery to masonry or concrete walls with *suitable* frame fixing anchors; provide necessary blocking pieces and subframes to take up inaccuracies of wall and floor faces; where exposed hardwood is to be anchor fixed: sink and pellet screw heads
- c) in all food handling areas: seal all carcass joints with walls and floors, and cable entries, with silicone beads for vermin proofing

wood cornices, skirtings, quarter rounds, rails

- d) skirtings of 68 mm and higher: hollow-rounded at the back
- e) fix members to walls with concealed fixings at centres not exceeding 600 mm
- f) fix members in long lengths with splayed heading joints and mitred corner joints
- g) fix skirtings to walls, not to floor boards; nail quarter rounds to skirtings with panel pins.

shelf bands

- h) fix metal shelf bands to walls in a manner that will safely carry a working load of not less than 10,0 kN with a safety factor of 3
- i) use stainless steel anchors in areas within 1 km of the coastline
- j) start first band 100 mm away from corners of rooms or from other shelves which are at right angles.

16 Hardware

16.1 General

- a) sherardizing on ferrous products: SANS 53811
- b) electroplating: SANS 135/136/2081/2082.

16.2 Fasteners

- a) fasteners: SANS 1700
- b) metal screws for wood: SANS 1171
- c) masonry anchors: proprietary expansion or chemical type
- d) plugs: proprietary plastic
- e) mild steel nails SANS 820
- f) required marking: protective coating on container.

16.3 Locks, latches, catches, bolts

- a) locks, latches (domestic type): SANS 4

padlocks

- b) padlocks: SANS 1533

keys

- c) supply two keys to every lock; no key must pass more than one lock unless master keyed
- d) master and grand master keys: as specified
- e) proprietary key control security systems: submit details.

16.4 Hinges

hinges for medium to heavy doors

- a) type: butt hinges for doors opening 90°; projecting hinges for doors opening 180° when frames are set back from wall faces.
- b) aluminium hinges: high tensile aluminium with fixed stainless steel pins in nylon bushes, and with nylon washers to each knuckle joint
- c) doors fitted with closers: provide low-friction bearing hinges
- d) size for steel, stainless steel, brass or bronze butt hinges for wood doors in wood frames:

Nominal hinge size L x w x t (mm)	Door leaves not exceeding any of the following		
	Mass (kg)	Width (mm)	Thickness (mm)
70 x 50 x 1,6	16	620	30
85 x 60 x 1,6	20	820	35
100 x 75 x 1,6	30	920	40
100 x 75 x 2,5	50	920	50
100 x 75 x 3,2	70	1020	50
125 x 100 x 3,2	80	1220	50

16.11 Fixing

- a) deliver door hardware items, ready for installation, in individual complete sets for each door, as follows:
 - clearly labelled to show its intended location
 - in a separate dust and moisture proof package
 - including the necessary templates, fixings and fixing instructions
- b) verify correct handing on site before supplying
- c) fix hardware with matching screws
- d) fix locks, handles, latches etc. at 1 000 mm from finished floor level to centre line of hardware
- e) ease and adjust locks on completion
- f) hand over keys at completion; replace cylinders to which contractor had key access during construction with new cylinders with other keys
- g) label all keys with coloured plastic tags
- h) plug and screw curtain rail/rod brackets and tie-backs to wall
- i) project rails/rods 300 mm past reveals wherever possible, or continuous over windows occurring in series.
- j) fix safety signs according to SANS 1186
- k) protect hardware during construction.

quality assurance

- f) ensure disciplined quality assurance during all stages of fabrication and installation
- g) factory glazing is preferred over site glazing.

17.2.3 Protection and cleaning

- a) protect glass against harmful splashes and weld splatter
- b) clean glass as soon as practicable after installation with mild soap and water
- c) ensure cleaning materials are not harmful to plastic glazing materials and glazing compounds.

17.3 Mirrors

- a) silvered float glass mirrors: SANS 1236, class A
- b) privacy mirrors: clear glass with mirrored venetian strips for visual privacy and/or security
- c) stainless steel mirrors: 0,9 mm thick bright annealed mirrored stainless steel
- d) fasten glass mirrors with chromium plated mirror screws to wall and allow 3 mm air space at back for ventilation, or fix mirrors with vertical strips of double sided tape to allow for ventilation; support mirrors larger than 1 m² with additional clips, anchors or beads
- e) fasten stainless steel mirrors with screws and/or glue in acceptable manner.

- c) lay gutters in brackets to slight fall to outlets, nailed/screwed to roof timber at 2 m maximum centres in the case of sheet metal gutters, at 1 m in the case of U-PVC gutters, and at angles and outlets
- d) bolt sheet metal gutters to brackets close to underside of gutter bead with 6 mm diameter gutter bolts
- e) take measures to accommodate occasional overflow from eaves and box gutters, e.g. a weir overflow in the stop-end
- f) ensure gutters fall to outlets – no ponding is allowed
- g) fix downpipes to walls, 25 mm clear of finished wall face, seam towards wall when relevant, with 25 x 1,6 mm hot dip galvanized mild steel holderbats, bolted around pipe in two halves, and with 6 mm diameter hot dip galvanized steel spiral nail driven into wall, at least twice per downpipe length and at 2 m maximum centres
- h) where required, fit rainwater pipes to stormwater drains with sheet metal flange to fit into socket of drain pipe, riveted and soldered to pipe; join pipes to drains with cement mortar.

18.2 Flat concrete roof, balcony and floor drainage

18.2.1 Rainwater outlets

- a) type: patent outlet with grating, or pipe without grating as specified
- b) patent outlet type:
 - ductile iron consisting of flanged funnel-shaped head with outlet threaded to take standard mild steel hot dip galvanized pipes, and with removable domical gratings for roofs or flat gratings for car parks, secured by centre hook bolt
 - cast outlet heads with necessary pipework into concrete, at such a level that ponding does not occur after waterproofing
- c) outlet pipe without grating: 75 mm diameter minimum or one size larger than required by building regulations.

18.2.2 Floor outlets

- a) grating: removable and capable of taking heavy vehicle loading
- b) grease and solids trap: easy-clean
- c) with tapered bottom for installation on 100 mm diameter pipe or clamp coupling
- d) set at such a level that ponding does not occur after flooring is installed.

18.2.3 Outlet downpipes

- a) PVC-U pipes: SANS 967
- b) hot dip galvanized steel pipes with screwed ends: SANS 62
- c) hot dip galvanized malleable cast iron fittings: SANS 14.

18.3 Stormwater drainage

18.3.1 Earthworks

Applicable standard: SANS 2001-Construction Works Part DP1: Earthworks for buried pipelines and prefabricated culverts

18.3.2 Stormwater drainage

Applicable standard: SANS 2001 Construction Works Part DP5: Stormwater drainage pipes

- a) types of:
- b) concrete pipes and associated fittings: SANS 677
- c) fibre cement pipes and associated fittings: SANS 819

18.4.4 Surface boxes, manhole covers, gulley gratings, frames

- a) polymer concrete surface boxes, manhole and inspection covers, gulley gratings and frames: SANS 1882, mark-bearing
- b) cast iron, cast steel, rolled steel combined with concrete gulley tops and manhole tops for vehicular and pedestrian areas: SANS 50124 / EN 124, mark-bearing
- c) installation: top of dished gullies >150 mm above finished ground level or 50 mm above permanent paving.

18.4.5 Grease interceptors

- a) material, type, capacity and size: to approval of the local authority or as specified.

18.4.6 Pit latrines

- a) construction: masonry, patent precast concrete, patent polymer
- b) waterless ventilated improved pit (VIP) latrine: consisting of a structurally lined and ventilated underground pit, floor slab, ventilated wall enclosure with roof and door, toilet pedestal, toilet seat and lid
- c) masonry type: as described in NHBRC Home Building Manual Part 11 and relevant details, internal size of pit 750 x 1 500 x 2 000 mm minimum deep; exposed end of floor slab covered with precast concrete panels
- d) patent type: installed to manufacturer's instructions or to the requirements of an active Agrément certificate
- e) to the approval of the local authority.

18.4.7 Conservancy tanks, septic tanks and french drains

- a) conservancy tanks, septic tanks and french drains: SANS 10400-P, of type, construction, capacity as specified.
- b) patent type installed to manufacturer's instructions or to the requirements of an active Agrément certificate.

18.5 Water supply

18.5.1 Earthworks

Applicable standard: SANS 2001-Construction Works Part DP1: Earthworks for buried pipelines and prefabricated culverts.

18.5.2 Below ground medium pressure pipelines

Applicable standard: SANS 2001-Construction Works Part DP2: Medium pressure pipelines

Specification data:

- a) type of pipe, size etc.: as specified.

18.5.3 Below ground water installation for buildings

Applicable standard: SANS 2001-Construction Works Part DP6: Below ground Water installations for Buildings.

Specification data:

- a) type of pipe, size etc.: as specified.

18.5.4 Above ground water installation

Invoked standard when required: SANS 10252 Water supply and drainage for buildings.

18.6 Electric geysers and solar water heaters

18.6.1 Electric geysers

- a) geysers: SANS 151
- b) required marking: capacity, working pressure, mounting position, design, standing loss per 24h in kWh, moisture resistance class, colour coding (yellow—50 kPa, blue—100 kPa, black—200 kPa, brown—300 kPa, red—400 kPa, green—600 kPa)
- c) install: to SANS 10254 and according to manufacturer's instructions, including drip trays
- d) position geysers in roof spaces on firm timber bearers near ceiling hatch so that electric element can be reached through the hatch from a step ladder, whenever possible
- e) preset geyser thermostat to 50° C

18.6.2 Solar water heaters

- a) domestic solar water heaters: SANS 1307, mark-bearing.

18.7 Gas supply

Gas installation: SANS 10087.

18.8 Fire equipment

- a) all fire equipment to approval of local authority

fire hydrants

- b) fire hydrants: SANS 1128 part 1

fire hose reels

- c) fire hose reels: SANS 543, with 30 m long x 20 mm diameter light duty rubber fire hose, fixed base, couplings, connections, branch pipes and nozzles: SANS 1128 part 2
- d) fix reels against walls with *suitable* frame anchors or expansion bolts at a height of 2 100 mm from floor to spindle, or to height as specified
- e) enclose reel in security cupboard with clear acrylic cover and *suitable* closer when specified

portable fire extinguishers

- f) general purpose, non-refillable fire extinguishers: SANS 1322 and mark-bearing
- g) water, foam or dry powder rechargeable extinguishers: SANS 1910
- h) CO₂ type extinguishers: portable rechargeable carbon dioxide extinguishers: SANS 1567 and mark-bearing
- i) BCF type extinguishers: halogenated hydrocarbon fire extinguishers: SANS 1151 and mark-bearing
- j) hang extinguishers on wall hooks screwed and plugged to wall
- k) enclose in security cupboard with clear acrylic cover and *suitable* closer when specified.

18.9 Sanitary plumbing

18.9.1 Sanitary appliances

- a) fitted with waste, plug and chain as required

baths

- b) acrylic baths: SANS 1402 / 50198
- c) handles: when specified

basins

- d) glazed ceramic wash-hand basins: SANS 497

18.9.4 Miscellaneous

- a) holders, shelves, cabinets: as specified

18.9.5 Fixing of sanitary fittings generally

- a) leave protective wrappings in position for as long as possible
- b) fix in a manner that will facilitate future removal
- c) install fittings to manufacturer's instructions
- d) fix appliances securely; use manufacturer's brackets and fixing methods wherever possible; use frame anchors for fixing brackets – do not screw and plug
- e) bed water closet pans in 1:3 cement-sand mortar; bed squatter pans in grade 10 concrete
- f) brick up open sides of build-in type baths
- g) bed acrylic baths in 1:5 cement:sand mortar on three rows of bricks, or bed solidly on dry river sand or concrete
- h) fix shower heads at 2 100 mm above shower floor level
- i) fix urinals at 610mm from floor to front lip of urinal bowl
- j) seal joints.

- b) luminaires: SANS 60598, complete with lamps, ballasts, control gear and earth terminals; control gear within luminaires to be mark-bearing
- c) fix luminaires at as late a stage as possible, and protect from damage
- d) earth all luminaires

stove, hob, oven, cooker hood

- e) stoves: SANS 153
- f) commercial kitchen extraction systems: SANS 1850.

19.4 Testing

- a) inform local authority at completion of electrical installation for inspection
- b) provide a copy of the electrical test certificate before handing over.

19.5 Lightning protection

To SANS 10313/SANS 61024.

21 External works

21.1 Paving

Invoked standard s when specified:

Precast concrete paving blocks—laying manual. The Concrete Masonry Association
Technical guide: Clay Pavers & Paving—selection and construction guidelines. Corobrik

Applicable standard: SANS 1200 MJ Standardized specification for civil engineering construction:
Segmented paving.

21.1.1 Materials

units

- a) precast concrete segmental paving blocks: SANS 1058
- b) burnt clay paving units: SANS 1575
- c) precast concrete paving slabs: SANS 541.

in situ concrete

- d) in-situ concrete: see CONCRETE WORKS

sand for bedding and jointing of flexible paving

- e) free of soluble salts or contaminants likely to cause efflorescence or staining
- f) moisture content: 5 – 8 %
- g) grading limits:

Sieve size (mm)	% passing
9,25	100
4,75	95 – 100
2,36	80 – 100
1,18	50 – 85
0,60	25 – 60
0,30	10 – 30
0,15	5 – 15
0,075	0 – 10

- h) jointing sand: to pass a 1,18 mm sieve, containing 10 – 50 % material passing a 0,075 mm sieve

mortar for rigid paving

- i) sand with fineness modulus in the region of 2,2 – 4,0 to minimize permeability
- j) mortar: SANS 2001-Construction Works Part CM1, class I external, class II internal
- k) use minimum water

Infill concrete

- l) infill concrete: grade 25/10

21.1.2 Preparation

subgrade

- a) excavate to achieve finished levels and falls as specified
- b) remove soft spots and biodegradable material and replace with suitable filling material
- c) complete installation of all sub-soil drainage pipes

in situ concrete paving

- s) see section 2.4 Concrete Floors on the Ground

cutting

- t) cut pavers with a masonry disc cutter

accuracy

- u) gradual allowed deviation under 3 m straight edge: 10 mm maximum
- v) allowed difference in level between adjacent units: 3 mm maximum
- w) allowed deviation of line of pattern: 15 mm in 3 m maximum.

cleaning

- x) leave paving clean and free from stains.

21.2 Concrete culverts, kerbs, channels**21.2.1 Materials**

- a) precast concrete culverts: SANS 986, type portal
- b) kerbs, edgings and channels: SANS 927
- c) mortar: SANS 2001-Construction Works Part CM1, class I
- d) bedding material: crushed stone, sinter, slag, sand or *suitable* porous material with a particle size of 13 mm maximum
- e) backing concrete: grade 15
- f) sealant: see Section 6 INSULATION.

21.2.2 Laying

- a) excavate trenches for kerbs and channels to below required level and refill with >70 mm of bedding material
- b) compact to required level and slope to density of >90 % MOD AASHTO
- c) bed kerbs and channels on 50 mm bedding material with 10 mm joints filled with mortar; wet joints well before jointing
- d) lay kerbs and channels in 1 000 mm maximum lengths for straight or curved kerbs with a radius of >20 m
- e) lay in 500 mm maximum lengths for curved kerbs with a radius between 4 and 20 m, or 300 mm maximum for radii up to 4 m
- f) provide 12 mm wide movement joints in channels at intervals not exceeding 20 m and leave open or fill with polysulphide when dry as specified
- g) support backs of kerbs with well-compacted backing concrete
- h) fill behind kerbs with suitable material in layers not exceeding 150 mm, wet and compact to 90 % MOD AASHTO density
- i) protect concrete units against damage and discolouration.

accuracy

- j) maximum deviation of any edge, centre line or vertical surface from specified position: 25 mm
- k) maximum allowed deviation of any invert level: 10 mm.

21.3 Concrete retaining blocks

Invoked standard when required: SANS 207 Design and construction of reinforced soils and fills soil reinforcement

Invoked standard when required: SANS 10409 Design, selection and installation of geomembranes

- f) precast concrete posts: prestressed alkali aggregate reactive concrete
- g) wood posts, stays and droppers, preservative treated to SANS 1288 hazard class H4: hardwood SANS 457-3, 145—174 mm diameter posts and stays, 32—50 mm droppers
- h) posts provided with necessary holes for hinges, straining bolts, binding wire etc.

erection

- i) clear fence route; roughly level to obtain uniform gradient
- j) excavate holes 400 x 400 x 800 mm deep for posts and 300 x 300 x 600 mm deep for stays
- k) plant posts and stays in grade 15 concrete to 50 mm above ground level with chamfered top surface: at gates, ends, corners, intersections and at intermediate distances not exceeding 90 m, or at acute changes in level
- l) provide stays to all straining posts in direction of line of fence
- m) drive standards 450 mm deep into ground at 3 m centres
- n) thread straining wire through holes in standards at bottom, top and intermediate centres not exceeding 300 mm for wire fencing, or at intermediate centres not exceeding 600 mm for wire mesh fencing; bind around posts or straining eye bolts, and strain
- o) bind droppers to straining wire with binding wire
- p) cover with wire mesh when relevant, tension and bind securely to straining wire at every third mesh; join roll ends with a spiral to form a continuous fence; tie or clip welded mesh to straining wire at 300 mm centres; trim roll ends by overlapping 100 mm
- q) in the case of PVC-coated wire, take care not to crack or puncture the coating
- r) if ground is soft or post or stay cannot be securely fixed: improvise
- s) make good any damaged protective coatings
- t) do not cut preservative treated timber where it will be in the ground
- u) check fence on completion; grease hinges; cut off projecting bolt threads; burr over bolt ends to prevent nut removal, and coat with bitumen paint.

fencing gates

- v) steel gates with tubular frames and wire or mesh filling (for farm and domestic use): CKS 146
- w) hang gates on adjustable hinges
- x) provide gates with steel spring or U catches, drop bolts and locking devices
- y) drop bolts to drop in *suitable* length of pipe set in concrete to 30 mm above ground level

finish

- z) finish to gates and accessories: two coats bituminous aluminium paint SANS 682 grade 1 inland; hot dip galvanized SANS 121/14713 in the coastal region or corrosive atmospheres.

21.5.2 Weld mesh fencing

- a) material, mesh size, finish: as specified
- b) erection: according to manufacturer's instructions.

21.5.3 Barbed tape fencing

- a) barbed tape security barriers: SANS 1620, of material, form as specified
- b) erection: according to manufacturer's instructions.

21.5.4 Palisade fencing

steel

- a) steel palisade fences and gates: SANS 301-12
- b) pale points: forked or spiked
- c) panels: 3 m length, safety bolted to steel posts
- d) pales for heights up to 2,4 m for general purposes: corrugated and angle

structural laminated timber

- h) structural laminated timber SANS 1460
- i) exposure class: 1 (exterior)
- j) type: G (stocklam)
- k) stress grade: 5
- l) preservative treatment of softwood: SANS 1288 hazard class H3
- m) fire retardent treatment: when specified
- n) required marking: on each piece a combination of code letters: application, exposure class, type, appearance and finish, stress grade, e.g. S2GP5.

deck boarding

- o) softwood: industrial planed wood: SANS 1783-3
- p) hardwood: planed strip flooring: SANS 281
- q) shape: rectangular (not tongue-and groove) with arrised edges
- r) in long lengths
- s) preservative treatment: SANS 1288 hazard class H3

fixings

- t) brackets, shoes, threaded rod etc: mild steel, hot dip galvanized to SANS 121/SANS 14713
- u) nails, bolts, nuts, washers: SANS 1700, hot dip galvanized to SANS 121/SANS 14713
- v) screws: countersunk head to SANS 1171, of material as specified..

balustrades

- w) material, construction as specified.

21.8.2 Installation

- a) poles: plant in ground, or fix on brackets cast into concrete footings as specified
- b) plant poles in 300 mm diameter holes in ground on a bed of gravel or concrete; fill holes with gravel, tamp and top up with a collar of 200 mm concrete, shaped sloping away from pole
- c) bolt the structure of poles, beams, joists, cross bracing and strutting to comply with SANS 10082; recess bolt heads, washers and nuts
- d) space joists at centres less than 20x deck plank thickness
- e) fix decking boards at right angles to joists with a space of 7 mm between boards
- f) fix boards with screws with countersunk heads; plug with matching wood when specified
- g) pre-drill holes if wood tends to split
- h) support board header joints on double joists; leave space for ventilation between board heads
- i) protect end grain with metal caps when specified
- j) chamfer or round top surfaces of rails to assist the shedding of rainwater; round all sharp edges.

21.8.3 Wood finish

- a) seal wood with one coat of *suitable* sealant or oil before installation
- b) seal all end-grain as work proceeds after sawing to length
- c) finish with three coats sealant or oil after installation.

21.9 Landscaping**21.9.1 Definition of terms**

- a) *topsoil*: soil composed of 15—25 % clay, 10 % silt and 65—75 % sand with a minimum of 2% organic material, or red soil mixed with kraal manure in the ratio of 1 m³ kraal manure to 6 m³ red soil; topsoil to be free from omitrious matter and weed seeds

- f) shrubs to be multi-stemmed with generous side branches and well bushed to ground; shrubs to be >500 mm high as measured from crown of roots to outer leaf circumference, delivered ex nursery in minimum 4 kg bag containers except where specifically described otherwise in the bills of quantities
- g) trees to be >1,5 metre in height as measured from crown of roots to average top of tree (not to highest branch) and stem diameter >25 mm at ground level except where specified otherwise
- h) pruning wounds to be limited to 25 mm in size, showing vigorous bark growth all round
- i) replace all dead plants free of charge
- j) store plants under nursery conditions.

21.9.5 Planting

grass sods

- a) lay grass sods on wet prepared topsoil close together and fill joints and hollows with topsoil
- b) allow for area reduction
- c) roll surface to keep surface tolerance to a minimum and to allow a gradual change in slope at berms and embankments
- d) irrigate thoroughly after laying and rolling

ground covers

- e) plant ground covers in prepared topsoil and in holes somewhat larger than the plant bulb and at least 200 mm deep so that top of bulb coincides with finished level
- f) work edges of ground cover beds upwards to a height of 100 mm and compact
- g) irrigate thoroughly after planting

shrubs

- h) remove shrubs from containers and plant in backfilled holes so that top of soil originally in the containers is level with the finished ground level
- i) compact around shrubs and form 500 mm diameter x 150 mm deep soil dams around each shrub
- j) wet thoroughly after planting with 25 L of water per shrub

trees

- k) at distances from buildings, drains and freestanding walls that take into account the type of soil, especially expansive soils, and species and mature height of tree (see tree distance guidelines in SANS 10400-H Annex E)
- l) remove trees from containers and plant in backfilled holes so that top of soil originally in containers is level with finished ground level
- m) compact around trees and form 1000 mm diameter x 150 mm deep soil dams around each tree
- n) wet thoroughly after planting with 40 L of water per tree.

21.9.6 Hydroseeding

- a) on prepared soil
- b) water: 10 000 L per hectare
- c) fertiliser: lime at 4 t per hectare worked into the soil
- d) superphosphate: 0,3 t per hectare worked into the soil
- e) 2:3:2 at 0,5 t per hectare with seed mix
- f) LAN: 0,5 t per hectare worked into soil after 6 and 12 weeks
- g) anti-erosion compound: 200 kg per hectare with seed mix
- h) mulch: 400 kg per hectare with seed mix
- i) germinating agent: as per specialist's instruction
- j) seed mix: as specified.

PW371-B: CONSTRUCTION WORKS: SPECIFICATION

PW 371-B

EDITION 2.0



**Department:
Public Works**
REPUBLIC OF SOUTH AFRICA

CONSTRUCTION WORKS: SPECIFICATIONS

PARTICULAR SPECIFICATION

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1 Earthworks

1.1 Site clearance

Applicable standard: SANS 2001 – Construction Works Part BS1: Site clearance

Specification data:

SANS 2001-BS1 covers removal of vegetation, fences, guard rails and posts, litter and building rubble, boulders of size up to 0,15 m³, and surface and subsurface obstructions, and demolition and removal of structures (including their basements, if any), not directly associated with or incidental to any excavation.

X designated area/site in which work is to be carried out: see drawings

X level of finished earthworks: see drawings

X site clearing activity numbers: ...

1 / 3 / 6 / 9 / 10 /

1 removal and disposal of vegetation; 2 removal and disposal of structures by means of bulldozing; 3 demolition, breaking up and removal of buildings to ground level; 4 demolition, breaking up and removal of underground structures; 5 ditto septic tanks, soak pits; 6 ditto litter, rubble, rocks on surface; 7 removal and stacking of re-useable materials; 8 removal of asphalt layers; 9 removal of paving; 10 removal of kerbs, channels, haunching; 11 scarifying, ripping to blocks <200 mm; 12 removal of disused foul water and storm water drains and water mains

2 Concrete works

2.3 Foundations (*SANS 2001-CM2*)

SANS 2001-CM2 covers construction requirements for strip footings, pad footings and slab-on-the-ground foundations to receive masonry walling, and the construction of lightly loaded concrete surface beds.

Specification data:

X site class designation: see drawings

R /

R rock; H heaving (expansive) soils; C collapsible soils; S compressible sand; P fill, dolomite, marshy areas, mine waste, very soft clays. Site class designations R, H, C, S indicate that the expected range of total soil movements arising from ground movements is such that no special precautionary measures are required to minimize the effects of differential ground movements on buildings. Number denotes higher range of movement. Behaviour of P is variable and the reason for such classification should be given in brackets, e.g. P (fill).

X foundations: in accordance with the drawings / in accordance with the requirements of SANS 10400-H for strip footings, slab-on-the-ground foundations or modified normal construction for category of expected damage 1 or 2 / designed and constructed under supervision of a Competent Person (Civil Engineering)

X minimum founding depth: see drawings

Required where the geotechnical report indicates a deeper requirement than that provided for in SANS 10400-H.

additional requirements

X protection against termites: SANS 10124.

2.4 Concrete floors and paving on the ground

X industrial floors: direct-finished one course slab as designed and constructed to SANS 10109 under direction of a *Competent Person* (civil engineering)

Direct-finished one-course concrete floors on the ground are superior to concrete bases with screed or topping, and should be used if floor is to be left as is, or if to be covered with resilient floor finishes like thermoplastic tiles or carpet.

concrete

X concrete grade: see drawings

20 /

Show grades on drawings.

Default: (grade 20 for base courses of lightly loaded floors [no trucking] and one-course domestic and office floors on the ground that will serve as the final wearing surface, or grade 30 for paving and floors on the ground to carry fork-lift trucks) is acceptable.

damp-proof under-surface membrane

X DPM under floor area: required /

Dpm normally not required under external floors.

fabric reinforcement

X fabric reinforcement ref. no. 100 / not required

X floor/paving thickness: see drawings

Floor thickness ranges between 120 and 360 mm, depending on loading, use

placing

X levels and gradients: see drawings

joints

X joint sealing: sealed

Joints should be sealed when the floor is used under wet conditions, or where hygiene or dust has to be controlled.
mm; 150/280 – 350 mm; 120/280

3 Masonry

3.1 Masonry Walling (*SANS 2001-CM1*)

SANS 2001-CM1 Masonry Walling covers requirements for masonry walls, materials, the laying of masonry units in unreinforced and reinforced applications, the building in of door and window frames, holes and chases, the securing of timber roof structures and the fixing of slips.

Specification data:

masonry units

Bricks and blocks are collectively termed *masonry units*, whether solid or hollow. A block has dimensions which satisfy any one of the following conditions: a length of 300–650 mm, width of 130–300 mm, or height of 120–300 mm. See *SANS 2001-CM1* for standards and specifications.

X type: burnt clay

X masonry units: *SANS 2001-CM1* clause 4.1.1.3

Omit if default (to *SANS 227* and *SANS 1215*) is acceptable

Specify to clause 4.1.1.3 only with permission.

SANS 2001 CM1 clause 4.1.1.1 states "Masonry units shall comply with the requirements of either 4.1.1.2 (*SANS 227* and *SANS 1215*) or 4.1.1.3". Clause 4.1.1.3 is a generic description, which may be more practical in areas where bricks to *SANS 227* are unobtainable.

burnt clay masonry units (*SANS 227*)

Omit if requirements of *SANS 2001-CM1* clause 4.1.1.3 are acceptable.

X nature of face unit: solid /

X class of face units: FBS

Class E bricks are any class of masonry unit produced for structural or load-bearing purposes in face or non-face work, and is supplied to an agreed compressive strength e.g. FBSE2, where the number equals the nominal compressive strength in megapascals.

X nominal dimensions: 222 x 103 x 76 mm

See *SANS 227* for modular sizes, e.g. 190 x 90 x 90 mm.

X colour of face units: To match existing on site.

mortar

X sand: *SANS 1090*

Omit if default (clause 4.1.4.1) is acceptable.

Clause 4.1.4.1 states that "Sand shall either comply with all of the following requirements or, if required in terms of the *specification data*, the requirements of *SANS 1090* for mortar sand (natural or manufactured)"

X mortar class: II

Class I mortar is *suitable* for highly stressed masonry, e.g. multi-storey load bearing buildings; class II is *suitable* for normal load bearing applications, including parapets, balustrades, retaining structures, freestanding and garden walls, and walls exposed to severe dampness; class III mortar (not mentioned in *SANS 2001-CM1*) is *suitable* for lightly stressed bearing walls where exposure to dampness is not severe, or for renovation to un burnt clay masonry walling.

reinforcement

X pre stressing steel (hot-rolled bars or high tensile steel wire and strand) : ...

Provide particulars or omit if not required.

NOTE on metal wall ties: *SANS 204* requires masonry walls enveloping habitable portions of the building fabric in all climatic zones to be cavity or insulated cavity walls. Note that existing wire tie types may not be able to be centred centrally and conform to the minimum embedment rule of 50 mm.

work

X face work jointing: struck* / flush / recessed / drip

Struck (half-round) joints are denser with better resistance to water penetration. Flush joints require careful cleaning of face work. Face work includes fair face work.

X face work pointing shape, colour: ...

4 Structural timberwork

4.1 Structural timberwork (flooring) (SANS 2001-CT1)

SANS 2001-CT1 covers the installation of suspended timber floors in buildings to be constructed for occupancy class H3 (domestic residence) and H4 (dwelling house) buildings, as described in SANS 10400-J Floors, and that have a distance that does not exceed 7 m between supports, and a beam/joist spacing that does not exceed 600 mm. Modify to make this part of SANS 2001 applicable for the installation of suspended timber floors designed for other occupancies or for greater dimensions between beams or supports.

For wood floors on solid substrates see Section 13.

Specification data:

softwood timber joists

X type: solid / laminated

X cross section: see drawings

Omit if default description (to SANS 10400-J) is acceptable.

hangers, masonry anchors

X size/strength: ...

Omit if default description in SANS 2001-CT1 (hangers: 4,0 kN; masonry anchors: 10 dia x 45 mm length, 2,5 kN) is acceptable.

softwood flooring boards

Omit this part if default description in SANS 2001-CT1 is acceptable.

X softwood flooring boards: SANS 629

X nature: solid /

4.2 Structural timberwork (roofing) (SANS 2001-CT2)

SANS 2001-CT2 covers the construction of timber roof assemblies in buildings. It includes the manufacture of bolted trusses that are designed in accordance with the requirements of SANS 10400, the erection of prefabricated timber trusses, the erection of rafters and purlin rafters, the fixing of purlins and battens, and the fixing of bracing to roofing members to support ceilings that comprise gypsum plasterboard, fibre-cement board or similar boards

Specification data:

softwood roofing timber

X type: solid /

X cross section, grade: see drawings /

4.3 Structural laminated timber (SANS 1460)

X material: see drawings

softwood (Pinus) / hardwood (Eucalyptus) / board (fibreboard, plywood, composite board)

X cross section: see drawings.

5 Insulation, sealants, seals

6.1 Thermal insulation

6.1.1 Materials

Consider insulation materials with recycled content, e.g. polystyrene, glass fibre, cellulose and polyester fibre. Consult TIASA (Thermal Insulation Association of SA) or EPSASA (Expanded Polystyrene Ass. of SA).

X required R-value/thickness if not to SANS 204: ...

Show all insulation thicknesses on drawings. Actual R-value test results may be obtained from the South African Fenestration and Insulation Energy Rating Association (SAFIERA).

X required fire performance classification of thermally insulated building envelope systems (SANS 428):

X combustability: A /

A (non combustible); B (combustible)

X surface fire spread properties: / 2 /

X 1 (no flame spread) / 2 – 6 (rapid flame spread)

X application: see drawings

Consult SANS 10400-T for fire performance requirements.
of waterstops.

6.5 Architectural seals

X type: patent extruded aluminium carriers with flexible seal inserts of synthetic rubber, rigid PVC, nylon brush filaments, polypropylene pile, or silicone rubber / patent PVC, pile or neoprene door and window frame seals / patent silicone intumescent seals (fire and smoke) / patent external extruded aluminium threshold plate seals

7 Roof covering, cladding

To be published: SANS 2001-CR2 Tiled and sheeted roofs.

7.1 General

X type of cover, cladding: see drawings

tile / profiled sheet / fully supported sheet / thatch

X roof pitch: see drawings

Check minimum roof pitches with SANS 10400-L. Roof pitches below that recommended by the manufacturer can be achieved by laying plywood boarding over the rafters and covering with waterproofing before tiling. Check with manufacturer.

air infiltration and leakage".

7.3 Profiled sheet roofing/cladding

7.3.1 Metal sheet

Mass of metal sheet roofing is $\pm 11 \text{ kg/m}^2$.

metal

X metal and coating: zinc-coated (galvanized) steel / AZ-coated steel / pre painted zinc coated steel / natural aluminium alloy / pre painted aluminium alloy / stainless steel / copper

Copper, aluminium, stainless steel or weathering steel should be used in environments where atmospheric corrosion is aggressive. Check availability, thickness and finish of these metals with manufacturer/ supplier.

profile

X profile: corrugated

X sheet length: standard lengths with overlap (see ridding)

Standard lengths (1,8 – 14 m) – check with manufacturer/ supplier.

Corrugated and IBR sheets in standard lengths with overlap causes less thermal movement stress on exposed fixings than long lengths.

steel

X nominal sheet thickness: 0,5 mm

Check availability of 0,8 mm sheets. 0,6 mm thick sheet costs $\pm 16\%$ more than 0,5 mm.

X coating grade: Z275 /

Z275 and AZ150 for inland regions, Z600 and AZ200 for coastal regions and aggressive atmospheres.

Coiled sheeting with hot dip zinc coating (galvanizing) class Z275 has an average zinc coating thickness of about $19 \mu\text{m}$; Z600 - $42 \mu\text{m}$. AZ coatings have increased corrosion resistance over zinc coating by 3 or 4. See notes on hot dip galvanizing under Section 5 Structural Steel. Get expert advice from HDGASA or ARTF - SCRACE.

pre painted metal

X pre painted metal sheet type: 3 /

Type 3 (mild to moderate rural, urban, tropical and industrial environments) / 4 (marine and industrial) / 5a (severe marine) / 5b (heavy industrial and industrial marine) / 6a very severe marine) / 6b (very severe industrial).

Coil coated and pre painted products are e.g. Chromadek or Chromadek Plus (Mittal Steel) for marine and industrial environments; there are several others. Paint coating more than doubles the life of sheets with metal coating only.

X match roofing/cladding sheet / corrugated /

7.3.4 Polycarbonate sheet

X colour : White...

X thickness: 1,2 mm

9 Ceilings, linings, partitions, access flooring

To be published: SANS 2001- Construction Works Part EC1: Ceilings, partitions, access flooring.

9.1 Brandered ceilings

9.1.1 Branders, grounds

X type: timber /

timber branders/grounds

SANS 2001-CT2 (and SANS 10400-L) covers the fixing of timber brandering to roofing members to support ceilings that comprise gypsum plasterboard, fibre-cement board or similar boards only: "Brander of size 38 mm × 38 mm required to support gypsum plasterboard, fibre-cement board or similar board shall be securely spiked to the supporting timbers with 75 mm wire nails. Cross brandering shall be cut in between the longitudinal brandering and skew nailed to the same, using 75 mm wire nails at centres that do not exceed 900 mm".

Grounds for wall linings: depth of 25 mm may be influenced by thickness of required insulation.

9.1.2 Fibre cement and gypsum board brandered ceilings

X type: fibre-cement / gypsum

fibre-cement board

Flat fibre-cement boards are made with organic fibres, plain or textured, and are water and fire resistant.

gypsum board

Gypsum board is non-comustible. Standard board should not be exposed to contact with water – do not use in industrial bathrooms or kitchens, or in exterior applications. For high moisture conditions use moisture resistant board. For fire resistance use X-rated board. Use double layers where acoustic insulation is required.

X type: standard /

X edge: square /

Use tapered edge board for scrim and plaster joints when full ceiling surface is not to be plastered.

cornices

X material, size: coved gypsum 75 mm wide / ditto 125 mm wide /

cover strips

X joint cover strips: H-profile: pre painted galvanized steel, size: see drawings

Omit if ceiling is plastered.

fixing

X board pattern: see drawings

Omit if not visible or default (symmetrical about room) is acceptable.

X position of movement/control joints: see drawings

movement/control joints should be a clean break of 15 mm through the complete ceiling structure and finish.

finish

X finish to plaster board ceiling: plain with cover strips /

9.1.4 Hatches

X position of ceiling hatches: see drawings

10 Windows, doors, curtain walls, skylights, solar control

10.10 Wood doors (SANS 545)

X type of door: see drawings

batten / flush / / screen / cupboard /

X dimensions: see drawings

/ 813 / 864 mm x 457 / 2032 x 40/44 mm

457 mm high doors for cupboards. Entry doors for disabled persons in wheelchairs must be at least 813 mm wide.

X handing: see drawings

Hand refers to position of hinge when door opens towards viewer. Show first opening leaf of paired doors when important.

X exposure class: see drawings

2 /

2 (semi-exterior, partly or wholly exposed at infrequent intervals to unprotected open air conditions); 3 (humid interior); 4 (dry interior). Note there is no exposure class 1. Hardwood framed and braced batten doors are heavy duty doors, suitable for exposure class 2.

flush panel doors

X performance class: see drawings

HD

LD (light duty, hollow core) / MD (medium duty, semi-solid core) / HD (heavy duty, solid core)

Solid core flush panel doors are heavy duty doors suitable for dry interior use only – specify for frequent use and abuse, e.g. schools, public places, hospitals.

Semi-solid flush panel doors are medium duty doors suitable for dry interior use only - specify for general use in office blocks, dwellings, barracks and single quarters, including cupboard doors.

Hollow core flush panel doors are light duty doors suitable for dry interior use only – specify for dwellings or cupboard doors in dwellings only.

doors or corrosive conditions.

10.12 Garage doors

X type: sliding

X size: single

X framework material: steel

X cladding/boarding material: prepainted galvanised steel

X operation: manual

X finish: powder coated

X locking devices: chrome plated centre lock with spring loaded side catches, interior

11 Plaster, screeds, toppings, terrazzo

11.1 Plaster

X type: see drawings

cement plaster

11.1.1 Cement plaster (SANS 2001 EM1)

SANS 2001- Construction Works Part EM1: Cement Plaster Admixtures are not permitted in cement plasters to improve workability or improve the properties of the finished plaster.

Specification data:

X application: single coat

X finish to cement plaster: smooth

Show in drawings: V-joints through full plaster thickness at dpc level and where different materials meet; metal lath strips over roof anchors on single leaf masonry walls, or across joints between different materials – see SANS 2001-EM1. advice should be sought from the manufacturer/supplier.

12 Tiling

12.1 Materials

X type of tile: see drawings

ceramic / mosaic

ceramic wall and floor tiles (SANS 1449/13006)

X group: A1 /

Group A (extruded split /quarry tiles) and B (dust pressed tiles) are classified according to their water absorption properties. C=other. Group A1 and B1 have the lowest water absorption ($\leq 3\%$). Fully vitrified porcelain tiles, covered by SANS 13006 only, are frost resistant and suitable for cold rooms etc.. Not all manufacturers produce to SANS 13006.

X surface: glazed /

X shape, pattern, colour: See drawings

X nominal dimensions: see drawings

200 x 200 / 300 x 300 mm

X grade: first grade /

Second grade tiles have minor blemishes.

X glazed tile abrasion resistance class: not required

Abrasion resistance class to SANS 13006: 1 for interior soft domestic footwear such as bathrooms and bedrooms; 2 for interior light domestic traffic such as living rooms; 3 for interior and exterior areas such as domestic kitchens, halls and terraces, and low-traffic commercial areas; 4 for frequent traffic such as public entrances, shops, hospitals, hotel kitchens and exhibition rooms; 5 for severe pedestrian traffic such as shopping malls, airport concourses, sports stadia and factories.

X slip resistance value (coefficient of friction) : wet / on stairs and ramps

For slip resistance, contact manufacturer. Slip resistance is important in public places and on ramps and a requirement for disabled people (SANS 10400-S). Several test methods exist. The Pendulum Test Value (PTV) to BS 7932 is acceptable and a calibrated tester is available in SA. Slipperiness is also affected by use, water, spills and floor care.

X acid and alkali resistance of glazed tiles: / not required

450/300 / 600/450 x 50 / 65 mm

mosaic

X material: ceramic

X appearance: glazed

X colour: to be determined on site...

X size of tesserae: See drawings...

grout

X proprietary grout: cement-based

Epoxy grout e.g. in food storage and preparation and processing areas, abattoirs, breweries, dairies, bottling plants, restaurants, industrial kitchens, hospitals and clinics.

accessories

X edging, trim, stair nosing and movement joint strip material: PVC // brass //

X profile, size, colour: To be standard

12.2 Tiling

To be published: SANS 2001-ET Tiling.

bedding

X external angles: see drawings

mitred /

X internal sills in bathrooms: see drawings / level / sloping

13 Floor coverings, wall linings

13.6 Epoxy flooring

Epoxy floors are hard-wearing and have excellent resistance to chemicals, oils etc.

X aggregate colour, size: See drawings and specifications.

Application

X position of edge/dividing/feature strips: see drawings

X thickness: 2 mm

X finish: smooth.

Relevant standards:

SANS 10043 The installation of wood and laminate flooring

SANS 10070 The laying of thermoplastic and similar types of flooring.

SANS 10170 The cleaning and maintenance of floors.

SANS 10177 Fire testing of materials, components and elements used in buildings.

SANS 10186 The installation of textile floor coverings.

SANS 10245: The maintenance of textile floor coverings.

SANS 2424 Textile floor coverings – vocabulary.

SANS 10400-J Floors.

SANS 13746 Textile floor coverings – guidelines for installation and use on stairs.

14 Painting, paperhanging

To be published: SANS 2001-EP Painting.

14.1 Materials

primers

Standards for red lead or red lead/red oxide primers, zinc chromate primers, calcium plumbate primers, metallic lead primers have been withdrawn due to toxic lead content.

undercoats

Universal undercoats are *suitable* for interior and exterior use for subsequent application of solvent-borne finishes, especially gloss finishes.

X universal undercoat grade: 1 /

1 (high hiding), 2 (utility grade).

finishing paints

alkyd

Alkyd paint, also known as enamel paint, is solvent-borne.

X alkyd high gloss finishing paint (SANS 630) grade: 1 /

1 (high hiding), 2 (regular hiding).

X decorative paint for interior use (SANS 515) type: semi-gloss /

emulsion

X emulsion paint (SANS 1586)

X grade: / 2 /

Grade: 1 (high hiding, scrub resistant), 2 (high hiding, washable), 3 (general purpose, washable), 4 (utility, interior only)
Emulsion paint is water-borne and suitable for application over plaster and masonry substrates. Grade 1, 2 and 3 is suitable for interior and exterior use, grade 4 for interior use only.

X gloss designation: matt /

X textured emulsion wall coating (SANS 1227)

X type: 1 /

1 (smooth aggregate-free), 2 (low-relief, sand-textured finish), 3 (high-relief, coarse-textured)

X fungus resistance: required /

Aluminium paint is typically an alkyd resin binder pigmented with flake aluminium.

Micaceous iron oxide paint is typically solvent-borne. Masonry paint may be solvent-borne or emulsion type.

varnishes, varnish stains, stains, sealers

Varnishes are transparent or semi-transparent.

Stains have no protective or preservative properties and are *suitable* for interior work only.

X varnish or varnish stains for interior use (SANS 887)

X type: 1 /

1 (general purpose), type 2 (heat and chemical resistant)

X gloss designation: eggshell

14.2 Preparation of surfaces

X hardware etc.: remove, mark, store and refix / mask.

14.3 Colours

Specify colours on schedules. There is a marked difference in price for various colours, especially bright colours.

X identification colour marking (pipes etc.): required /

15 Furniture, equipment, stairs, architectural metalwork

15.1 Joinery

For wood doors and windows see Section 10.

15.1.1 Solid wood

wood

X type: hardwood / softwood / laminated wood

hardwood

X species: Iroko and Meranti

SANS 1099 includes requirements for preservative treatment. Annex C gives properties of 29 hardwood species, local or exotic.

softwood

X species: SA Pine...

laminated timber

x exposure class: / 4

1 (exterior); 2 (semi-exterior); 3 (humid interior); 4 (dry interior).

X type of wood: / softwood

X species: SA Pine...

15.1.2 Wood board

X type: / decorative melamine-faced boards (MFB) /

decorative melamine-faced boards (MFB) (SANS 1763)

MFB is low pressure melamine on particle board or MDF, suitable for medium duty vertical and light duty horizontal surfaces e.g. shelving – not for kitchen and office desktops.

X core: particle board /

X thickness: / 32 mm

Board size 3,6 x 1,8 m.

X shelving edge: sapele-print /

X surface finish: smooth matt /

15.1.3 Polymer laminate and solid surfaces

high pressure decorative laminates (HPL) (SANS 4586)

HPLs consist of layers of phenol formaldehyde impregnated sheets of Kraft paper with melamine formaldehyde (MF) impregnated décor and overlay paper, pressed together. Normally glued to suitable board with a backer laminate for balance, but can be self-supportive (solid core).

X material type: S /

S (standard) / F (flame-retardant) / P (post formable).

X grade/duty class (wear, impact and scratch resistance) : 1 /

16 Hardware

Hardware information should appear on door, window or finishes schedules.

16.1 General

X type: see drawings

lock / latch / handle / plate / closer / hook and eye / bracket / hinge / bolt / door stop / door knob / door knocker / sanitary / furniture / curtain rail / edge or feature strip / sunken door mat / signage / drawer runner
steel / aluminium / brass / nylon / ceramics / porcelain / wood

finish

For finishes on metal see SANS 1171 Annex C.

X finish: see drawings

16.3 Locks, latches, catches, bolts

X type lock: see drawings

mortise / rim / cylinder / cupboard / drawer

X type handle: see drawings

lever / knob

X type latch: see drawings

mortise / cupboard / finger

X type catch: see drawings

magnetic / ball / roller

X type of bolt, size: see drawings

barrel / flush / tower / stable / extension / size

SANS 10400-S stipulates that door handles should be 450 mm away from any wall.

Consider handles, levers and controls that are easy to operate by disabled persons. SANS 10400-S: The manual operation of handles, taps, levers, switches, locks, control mechanisms and keys is in part affected by their design. The selection of controls requiring a 'twist-action' of the wrist and hand, and fine-finger movements should be avoided.

keys

X master keys: see drawings.

16.4 Hinges

hinges for lightweight doors

X type: see drawings

piano / pivot / flush / european (adjustable) / strap

16.5 Door closers

X type: see drawings

overhead door closer / floor spring / transom concealed door closer

Consult AAAMSA Technical Publication: Hardware, Door Controls etc.

Ensure surface mounted overhead closers do not hit the wall when opening.

All fire doors are required to be fitted with closers (NBR), usually overhead. Do not fit a mechanical hold open arm to a fire door. Use concealed mechanisms in hygienic areas.

Ensure floor spring box depth of up to 75 mm can be accommodated.

Specify a higher strength closer for exposed, windy or draughty conditions. Specify a lower strength for narrow doors.

Double doors with rebated meeting stiles must be fitted with a door selector to ensure the inactive leaf closes first.

X size: see drawings

Size depends on door size and weight – see manufacturer's literature.

17 Glazing

SAGGA – South African Glass and Glazing Association – is the trade association and AAMSA member.

17.1 Materials

glass

Clear and tinted float glass is made in South Africa by one manufacturer in Springs.

X type of glass: see drawings

float / safety / security / pattern / tinted / insulated / polymer

X float glass thickness: see drawings

Local float glass thickness: 4, mm.

X laminated safety glass interlayer strength class: NS /

NS (normal strength), HPR (high penetration resistance), HI (high impact).

17.3 Mirrors

X type: silvered clear glass /

Stainless steel for vandal proof areas. Mirror backs are easily damaged. Silvered obscure glass also available. Consider full length mirrors in public places for children and disabled persons.

Relevant standards:

SANS 10137 The installation of glazing materials in buildings.

SANS 1263 Safety and security glazing materials for buildings.

SANS 10400-N Glazing.

SANS 2001-CG1 Installation of glazing.

Relevant sources:

Selection Guide for architectural Aluminium Products. AAMSA.

Skylight Association of Southern Africa.

18 Drainage, sewerage, water and gas supply, fire equipment, sanitary plumbing

18.1 Roof eaves drainage

18.1.2 Gutters and downpipes

X gutter type: see drawings

eaves / valley / box / parapet/chimney

X material: Z275 /

Galvanized sheet: Z275 or AZ150 for inland use; Z450/ Z600 or AZ200 for the *coastal region*, pre painted for corrosive industrial use. Commercial standard rainwater goods are made of 0,4 or 0,5 mm thick sheet.

X profile: see drawings

half round / square / rectangular

X size: see drawings

100 x 75 mm, or 100 / 125 / 150 mm half round (domestic); 125 x 100 (institutional); 150 x 100 / 200 x 150 / >225 x 225 (industrial). Sheet metal gutter standard lengths: 1,8; 3,0; 3,6; 4,8; 5,4; 6,0 m.

Gutter and downpipe sizes are determined by roof area and rainfall region in accordance with the requirements of SANS 10400-R: summer rainfall area: 140 mm²/m² roof area served; year-round rainfall area: 115 mm²; winter rainfall area: 80 mm². Downpipe internal size: 100 mm²/m² roof area served or 4400 mm² (75 mm diameter). For more information on gutter design, e.g. risk, rainfall intensity, hail and outlet protection, launders, drop boxes etc. see The Red Book – Southern African Steel Design Handbook, Section 11.

gutter brackets

X type: as supplied by gutter manufacturer

downpipes

X size: see drawings

100 / diameter

X sheet metal downpipe bends: crimped /

18.2 Flat concrete roof, balcony and floor drainage

18.2.1 Rainwater outlets

X type: see drawings

patent with grating / pipe without grating

X patent type: see drawings

vertical / 45° / 90° / two-way / car-park / pedestrian)

X size: see drawings

50 / 80 / 100 / 150 mm diameter

Outlets without gratings should be used for small roof areas in accessible position only, e.g. for balconies, and be not less than 75 mm in diameter due to the waterproof dressing restricting the pipe bore.

75 / 110 / 160 mm (PVC); 80 / 100 / 125 / 150 mm (steel)

18.3 Storm water drainage

18.3.1 Earthworks (SANS 2001-DP1)

SANS 2001-DP1 covers earthworks for trenches for all types and sizes of buried pipelines, ducts, cables and prefabricated culverts, including excavation, preparation of trench bottoms, bedding, backfilling and reinstatement of surfaces.

Specification data:

X pipes that are to be encased in concrete: see drawings

18.8 Fire equipment

fire hose reels

- X height from floor to spindle if not 2 100 mm: ...
- X enclose reel in security box with clear acrylic cover and suitable closer: required /

portable fire extinguishers

- X portable non-refillable general purpose extinguishers (SANS 1322):

Suitable for all classes of fire other than class D

- X class: I /

class I (temp <110°C); II (temp <65°C)

- X capacity: 2,5 kg
- X extinguishing medium: dry powder
- X dry powder rechargeable extinguishers (SANS 1910):
- X dry powder
- X class of fire: A

A (ordinary combustibles); B (flammable liquids); C (live electric power), or combinations, e.g. ABC

- X CO₂ type extinguisher (SANS 1567):

- X capacity: <9kg

- X class of fire: A

- X BCF type extinguisher (SANS 1151) capacity: 1 – 12 kg

Suitable for class of fire ABC

- X enclose extinguisher in security box with clear acrylic cover and suitable closer: required.

18.9 Sanitary plumbing

18.9.1 Sanitary appliances

appliances

- X appliance type: see drawings

wash-hand basin / bath / water closet / urinal / bidet / sink / flushing cistern

- X material: see drawings

glazed ceramic / stainless steel / plastic / stone / concrete

- X stainless steel grade: 430 / 304 / 316; finish: satin / bright

Omit if default (430) is acceptable. Stainless steel grades are listed by the American Iron and Steel Institute (AISI). Grade 430 is *suitable* for domestic purposes, kitchen sinks, wash troughs and hand wash basins. Grade 304 is *suitable* where mild corrosive conditions exist, e.g. in *coastal areas*. Grade 316 is *suitable* for laboratories, photographic workrooms and seagoing vessels where corrosive conditions are severe.

- X anti-theft waste plug: required /

- X flow restrictors: not required

baths

- X type, shape: see drawings

built-in / freestanding / spa / rectangular / oval / corner

- X handles: required /

basins

- X type, shape: see drawings

counter-top / wall hung / drop-in / pedestal / round / oval / corner

bottle trap / P-trap / P-trap resealing / pop-up

- X material: rubber /
- X depth of seal: 75 mm.

18.9.4 Miscellaneous

holders

- X holder type: see drawings

paper / soap / tumbler / tooth brush / toilet brush / towel rail/ring/hook

- X material: See drawings

shelves

- X material: / wood /

cabinets

- X type: wall / vanity /
- X material: wood /

Relevant standards:

SANS 10105 The classification, use and maintenance of portable fire extinguishers.

SANS 10112 The installation of polyethylene and PVC-U pipes.

SANS 10102 Selection of pipes for buried pipelines.

SANS 10252-1 part 1: Water supply and drainage for buildings; part 2: Drainage installation for buildings.

SANS 10254: The installation of fixed electric storage water heating systems.

SANS 10400-P Drainage.

SANS 10400-Q Non-water-borne means of sanitary disposal.

SANS 10400-R Stormwater disposal.

Relevant sources:

Concrete Pipe Handbook published by the Concrete Society of Southern Africa.

19 Electrical works

19.3 Materials and installation

19.3.1 Wiring

conduits

Chasing is prohibited in wall faces that are to receive roof flashing. Roof flashing is inserted in grooves sawn with disc cutters after conduits are installed, leading to unnecessary and costly repair work.

conductors

See SANS 10198 The selection, handling and installation of electric power cables of rating not exceeding 33 kV.

distribution board, meter cabinets

X position of DB's and meter cabinets: see drawings

19.3.2 Fittings

luminaires

X type: see drawings

surface mount / recessed / accent / down lighter / step / theatre / outdoor (pole, step, bollard)

stove, hob, oven, cooker hood

X stoves, hobs, ovens, cooker hoods model, type: see drawings.

Relevant standards:

SANS 10114 Interior lighting.

SANS 10389 Exterior lighting.

SANS 10142 The wiring of premises.

SANS 10222 Electrical security installations.

SANS 10313: The protection of structures against lightning.

SANS 61024 Lightning protection of structures.

20 Mechanical works

20.1 Installation

X routing and/or concealment of cables, ducts, trays, pipes etc. : see drawings.

20.3 Location and access

X catwalks, cat ladders, access panels: see drawings.

Catwalks and cat ladders should be detailed and coordinated with other services in order to keep to a minimum.

21 External works

21.1 Paving

21.1.1 Materials

units

- X paving unit type: see drawings (precast concrete blocks / burnt clay pavers / in-situ concrete / precast concrete slabs)

precast concrete segmental paving blocks

- X type: S-C (no interlock)

- X class: 25 /

Class 25 (MPa) concrete blocks should be specified for most uses.

- X nominal thickness: 60 mm

Thickness of blocks depends on site conditions, design requirements and cost.

- X top edges: chamfered /

- X colour: As specified...

Sub grade

- X sub grade levels and falls: see drawings

Check soil and traffic conditions with a Competent Person. The sub-base thickness is a function of both the type and amount of traffic to be carried and the strength of the sub grade. See also SANS 1200 ME, MF, ML.

weed killer

- X treat area to be paved with *suitable* weed killer: required / not required

levels, falls, pattern

- X levels and falls: see drawings

A fall of 1:60 is regarded as an optimum fall. Gradients of 1:100 are less forgiving (workmanship, settlement).

- X pattern: see drawings / herringbone / basket weave / stretcher / waving

Edge restraints along the perimeter of the paving is necessary to prevent lateral spread of the units and to retain the bedding course sand. See concrete culverts, kerbs etc. below.

21.1.3 Laying

- X type of paving: see drawings / flexible block/brick / flexible slab / rigid block / in situ concrete

21.5 Fencing

- X type: see drawings

line wire on steel posts, stays, droppers and standards / wire chain-link mesh on strain wire on steel posts, stays, droppers and standards / welded mesh / barbed tape / palisade / electric / private swimming pool

21.5.1 Line wire and chain-link mesh fencing

- X type wire: 1 /

1 (zinc coated) / 2 (zinc coated and PVC coated).

- X nominal size mesh of chain-link wire: 50 mm

posts, stays, standards, droppers

- X type: steel /

22 General requirements

In accordance with the principles of separation in procurement documentation, these items fall under the headings Construction and Management of the scope of work (refer to Table C1 of *ISO 10845 Construction Procurement Part 2: Formatting and compilation of procurement documentation*).

The sample clauses shown here (not comprehensive) may need to be considered when compiling the scope of work for a particular project.

See also SANS 1921 Construction and Management requirements for works contracts.

See also Annex B of individual SANS 2001 standards.

22.1 Order of preference

- X Annotation on drawings and any particular takes preference over the General Specification.

22.2 Descriptions in Bills of Quantities

- X Descriptions in Bills of Quantities are not considered to be specifications.

22.3 Site

- X location: Carnarvon – Northern Cape Province...

- X climatic zone SANS 204: / 6 /

1 (cold interior) / 2 (temperate interior) / 3 (hot interior) / 4 (temperate coastal) / 5 (sub-tropical coastal) / 6 (arid interior) / 7 (very hot interior). SANS 204 lists towns and their climatic zone.

- X site atmospheric corrosivity category ISO 9223: For Carnarvon – Northern Cape Province

C1 – very low (interior dry) / C2 – low (interior: occasional condensation exterior: exposed rural inland) / C3 – medium (interior: high humidity, some air pollution; exterior: urban inland or mild coastal) / C4 – high (interior: swimming pools, chemical plant, etc.; exterior: industrial inland or urban coastal) C5 – very high (exterior: industrial with high humidity or high salinity coastal).

22.4 Occupancy

- X class of occupancy or building: ...

see table 1, SANS 10400-A.

22.7 Materials and products

- X Materials and products are to be manufactured in South Africa unless an imported product is prescribed specifically, or when no *suitable* locally manufactured product for the specific use is available.

22.8 Materials storage

- X Provide materials storage facilities as follows: As indicated in the Bill of Quantities
- X store materials according to manufacturer's instructions, and
 - X under cover and off ground
 - X taking care during handling to avoid breaking, chipping, scratching, staining, soiling
 - X roofing and cladding sheets – lift, do not drag
 - X doors: flat (not on edge) on level surface in dry and well ventilated building.

22.9 Documentation

- X Description of an item implies the complete supply, assembly and operation of the item unless otherwise specified
- X use figured dimensions in preference to scaled dimensions
- X in the case of discrepancies, vagueness and doubt in contract documentation, request clarification in writing.

- X concrete flooring
- X solid wood flooring
- X joinery
- X waterproofing

22.19 Registered workmen

- X The following work is required to be done by registered workmen:
 - X plumbing and drainage
 - X electrical work

22.20 Maintenance manual

- X Full particulars of the following items are to be included in a hardcopy maintenance manual:
 - X training for ...
 - X spare products e.g. luminaires, tiles
 - X painting
 - X waterproofing

22.21 Tools and spare parts

- X Provide full particulars of tools and spare parts of
 - X mechanical services

22.22 Certificates of conformance/compliance/performance

- X Provide the following certificates of conformance/compliance/performance:
 - X architectural aluminium products (windows, doors, partitions, skylights): relevant AAAMSA Performance Certificate; Certificate of Conformance that all anodizing or powder coating has been processed in accordance with SANS 999 and SANS 1796 respectively; Certificate of Conformance that glazing has been installed in accordance with SANS 10137, ensuring that safety glazing materials have been installed in the mandatory areas and that each individual pane of safety glazing has been permanently mark-bearing
 - X lightning protection: Certificate of Compliance with SANS 10313/62305

22.23 Keys

- X Procedure for delivery of the following important keys is required; on no account shall these keys be delivered to the building site; arrange with manufacturer to have key(s) sent to ... by registered post, giving following particulars: manufacturer's name; manufacturer's door number; class of door; size of door; name of contractor by whom ordered; building and room where installed: ...
 - X strongroom(s)

22.24 Site inspection by supplier/manufacturer

- X A qualified agent of the following supplier(s)/ manufacturer(s) is required to do site inspection and confirm *approval* in writing in site instruction book:
 - X paint manufacturer: > twice during course of paintwork
 - X sheet roofing: ...
 - X waterproofing: ...

22.26 Quality control

- X The following quality control procedures, rules for substitutions, and definitions of the required quality of manufactured products, fabricated products and built products are required:
 - X lack of adhesion in screeds/toppings and decision whether repair work is necessary: ...

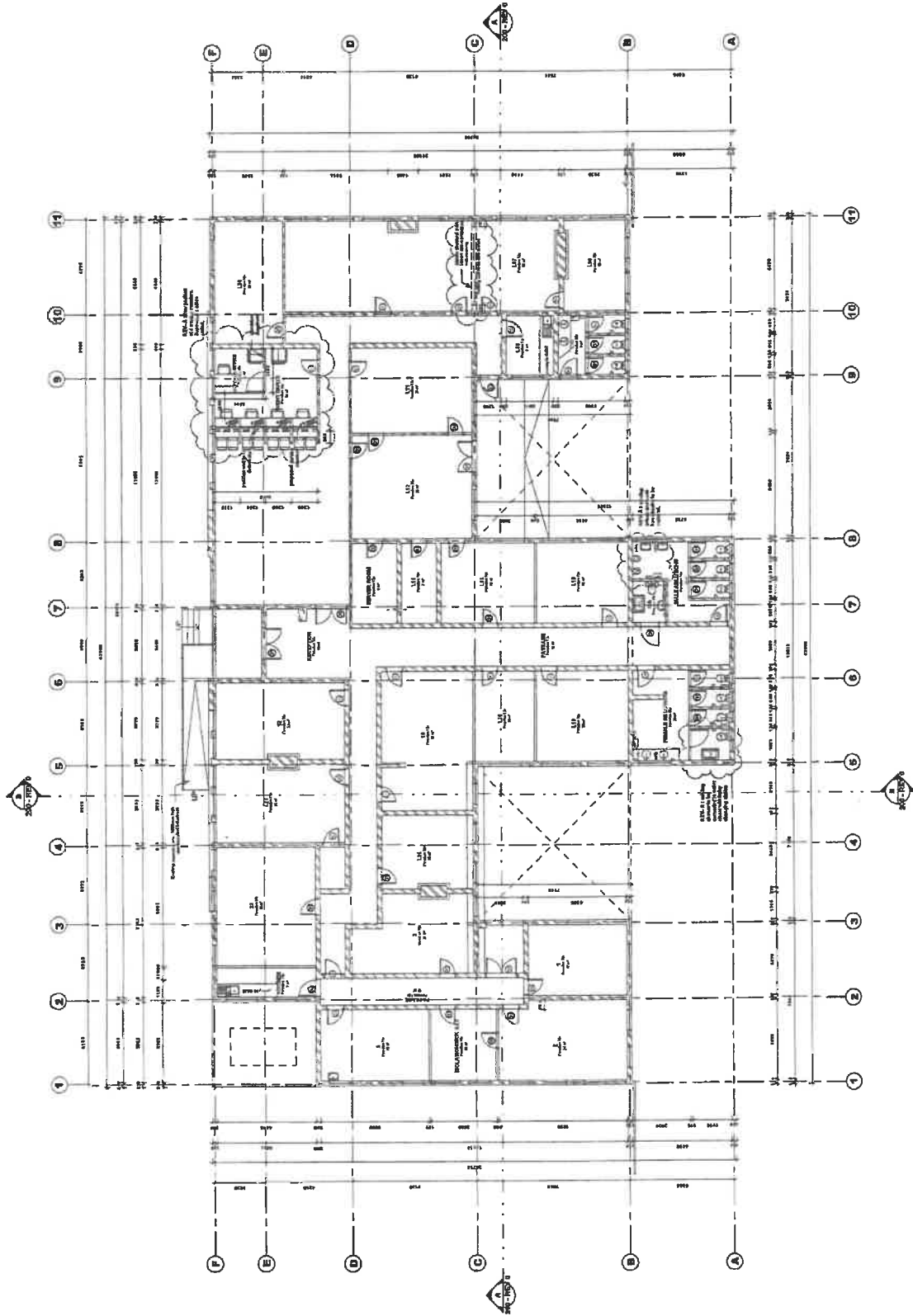
DETAILS AND DRAWINGS

REV.	DATE	AMENDMENT	DRAWN

<p>Contract Name: REPAIR AND MAINTENANCE OF THE EXISTING OTTIC TOWER</p> <p>Contract No: 100 - REV A</p>	
<p>Project Name: REPAIR AND MAINTENANCE OF THE EXISTING OTTIC TOWER</p> <p>Project No: 100 - REV A</p> <p>Client: DEPARTMENT OF LABOUR, UPINGTON, NORTH-WEST CAPT</p> <p>Contractor: REPAIR AND MAINTENANCE OF THE EXISTING OTTIC TOWER</p>	<p>Project Name: REPAIR AND MAINTENANCE OF THE EXISTING OTTIC TOWER</p> <p>Project No: 100 - REV A</p> <p>Client: DEPARTMENT OF LABOUR, UPINGTON, NORTH-WEST CAPT</p> <p>Contractor: REPAIR AND MAINTENANCE OF THE EXISTING OTTIC TOWER</p>

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GROUND FLOOR LEVEL
1:100

PART C4: SITE INFORMATION

C4 SITE INFORMATION

PG-03.2 (EC) SITE INFORMATION – JBCC 2000 PRINCIPAL BUILDING AGREEMENT (edition 4.1 of March 2005)

Project title:	<i>Upington:Employment and Labour:Total refurbishment of existing labour office</i>		
Tender no:	<i>KIM 13/2021</i>	Reference no:	<i>19/2/4/2/2/2349/192</i>

C4 Site Information

Access is at the existing Department of Labour, Schroder Street, Upington, Northern Cape.



public works

Department.
Public Works
REPUBLIC OF SOUTH AFRICA

SPECIFICATION

FOR THE

ELECTRICAL INSTALLATION

**FOR THE REFURBISHMENT OF EXISTING OFFICE (DEPARTMENT
OF LABOUR), UPINGTON, NORTHERN CAPE**

SPECIFICATION FOR THE ELECTRICAL INSTALLATION

OF THE REFURBISHMENT OF EXISTING OFFICES

AT

DEPARTMENT OF LABOUR, UPINGTON, NORTHERN CAPE ICE

CONSISTING OF:

SECTION C3.....: ELECTRICAL INSTALLATION WORK

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SPECIFICATION FOR ELECTRICAL WORK

PART 1 - GENERAL

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PART 1 - GENERAL

1 TESTS

After completion of the works and before practical completion is achieved, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installations will be inspected and the Contractor shall make good, to the satisfaction of the Principal Agent/Electrical Engineer or the employer, any defects which may arise.

The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installations at completion.

2 MAINTENANCE OF INSTALLATIONS

With effect from the date of the Practical completion Certificate the Contractor shall at his own expense undertake the regular servicing of the installation during the maintenance period and shall make all adjustments necessary for the correct operation thereof.

If during the said period the installations is not in working order for any reason for which the Contractor is responsible, or if the installations develop defects, he shall immediately upon being notified thereof take steps to remedy the defects and make any necessary adjustments.

Should such stoppages however be so frequent as to become troublesome, or should the installations otherwise prove unsatisfactory during the said period the Contractor shall, if called upon by the Principal Agent/Electrical Engineer or the Employer, at his own expense replace the whole of the installations or such parts thereof as the Principal Agent/Electrical Engineer or the Employer may deem necessary with apparatus specified by the Principal Agent/Electrical Engineer or the Employer.

3 REGULATIONS

The installation shall be erected and tested in accordance with the Acts and Regulations as indicated in the scope of works

4 NOTICES AND FEES

The Contractor shall give all notices required by and pay all necessary fees, including any inspection fees, which may be due to the local Supply Authority.

On production of the official account, only the net amount of the fee charged by the Supply Authority for connection of the installation to the supply mains, will be refunded to the Contractor by the Employer.

5 SCHEDULE OF FITTINGS

In all instances where schedule of light, socket outlet and power points are attached to or included on the drawings, these schedules are to be regarded as forming part of the specification.

6 QUALITY OF MATERIALS

Only materials of first-class quality shall be used and all materials shall be subject to the approval of the Employer. Departmental specifications for various materials to be used on this Contract are attached to and form part of this specification.

Wherever applicable the material is to comply with the relevant South African Bureau of Standards, specifications, or to IEC Specifications, where no SANS Specifications exist.

Materials wherever possible, must be of South African manufacture.

7 CONDUIT AND ACCESSORIES

The type of conduit and accessories required for the service, i.e., whether the conduit and accessories shall be of the screwed type, plain-end type or of the non-metallic type and whether metallic conduit shall be

black enamelled or galvanised, is specified in Part 2 of this specification.

Unless other methods of installation are specified for certain circuits, the installation shall be in conduit throughout. No open wiring in roof spaces or elsewhere will be permitted.

The conduit and conduit accessories shall comply fully with the applicable SANS specifications as set out below and the conduit shall bear the mark of approval of the South African Bureau of Standards.

- a) Screwed metallic conduit and accessories: SANS 61386-1 and 21.
- b) Plain-end metallic conduit and accessories: SANS 61386-1 and 21.
- c) Non-metallic conduit and accessories: SANS 61386-1 and 21.

All conduit fittings except couplings, shall be of the inspection type. Where cast metal conduit accessories are used, these shall be of malleable iron. Zinc base fittings will not be allowed.

Bushes used for metallic conduit shall be brass and shall be provided in addition to locknuts at all points where the conduit terminates at switchboards, switch-boxes, draw-boxes, etc.

Draw-boxes are to be provided in accordance with the "Wiring Code" and wherever necessary to facilitate easy wiring.

For light and socket outlet circuits, the conduit used shall have an external diameter of 20mm. In all other instances the sizes of conduit shall be in accordance with the "Wiring Code" for the specified number and size of conductors, unless otherwise directed in part 2 of this specification or indicated on the drawings.

Only one manufactured type of conduit and conduit accessories will be permitted throughout the installation.

Running joints in screwed conduit are to be avoided as far as possible and all conduit systems shall be set or bent to the required angles. The use of normal bends must be kept to a minimum with exception of larger diameter conduits where the use of such bends is essential.

All metallic conduit shall be manufactured of mild steel with a minimum thickness of 1,2mm for plain-end conduit and 1,6mm in respect of screwed conduit.

Under no circumstances will conduit having a wall thickness of less than 1,6mm be allowed in screed laid on top of concrete slabs.

Bending and setting of conduits must be done with special bending apparatus manufactured for the purpose and which are obtainable from the manufacturers of the conduit systems. Damage to conduit resulting from the use of incorrect bending apparatus or methods applied must on indication by the Department's inspectorate staff, be completely removed and rectified and any wiring already drawn into such damaged conduits must be completely renewed at the Contractor's expense.

Conduit and conduit accessories used for flame-proof or explosion proof installations and for the suspension of luminaires as well as all load bearing conduit shall in all instances be of the metallic screwed type.

All conduit and accessories used in areas within 50 km of the coast shall be galvanised to SANS 32 and SANS 121.

Tenderers must ensure that general approval of the proposed conduit system to be used is obtained from the local electricity supply authority prior to the submission of their tender. Under no circumstances will consideration be given by the Department to any claim submitted by the Contractor, which may result from a lack of knowledge in regard to the supply authority's requirements.

8 CONDUITS IN ROOF SPACES

Conduit in roof spaces shall be installed parallel or at right angles to the roof members and shall be secured at intervals not exceeding 1,5m by means of saddles screwed to the roof timbers.

Nail or crampets will not be allowed.

Where non-metallic conduit has been specified for a particular service, the conduit shall be supported and fixed with saddles with a maximum spacing of 450 mm. The Contractor shall supply and install all additional supporting timbers in the roof space as required.

Under flat roofs, in false ceilings or where there is less than 0,9m of clearance, or should the ceilings be insulated with glass wool or other insulating material, the conduit shall be installed in such a manner as to allow for all wiring to be executed from below the ceilings.

Conduit runs from distribution boards shall, where possible terminate in fabricated sheet steel draw-boxes installed directly above or in close proximity to the boards.

9 SURFACE MOUNTED CONDUIT

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified under Part 2 of the specification, conduit installed on the surface must be plumbed or levelled and only straight lengths shall be used.

The use of inspection bends is to be avoided and instead the conduit shall be set uniformly and inspection coupling used where necessary.

No threads will be permitted to show when the conduit installation is complete, except where running couplings have been employed.

Running couplings are only to be used where unavoidable, and shall be fitted with a sliced couplings as a lock nut.

Conduit is to be run on approved spaced saddles rigidly secured to the walls.

Alternatively, fittings, tees, boxes, couplings etc., are to be cut into the surface to allow the conduit to fit flush against the surface. Conduit is to be bedded into any wall irregularities to avoid gaps between the surface and the conduit.

Crossing of conduits is to be avoided, however, should it be necessary purpose-made metal boxes are to be provided at the junction. The finish of the boxes and positioning shall be in keeping with the general layout.

Where several conduits are installed side by side, they shall be evenly spaced and grouped under one purpose-made saddle.

Distribution boards, draw-boxes, industrial switches and socket outlets etc., shall be neatly recessed into the surface to avoid double sets.

In situations where there are no ceilings the conduits are to be run along the wall plates and the beams.

Painting of surface conduit shall match the colour of the adjacent wall finishes.

Only approved plugging materials such as aluminium inserts, fibre plugs, plastic plugs, etc., and round-head screws shall be used for fixing saddles, switches, socket outlets, etc., to walls, wood plugs and the plugging in joints in brick walls are not acceptable.

10 CONDUITS IN CONCRETE SLABS

In order not to delay building operations the Contractor must ensure that all conduits and other electrical equipment which are to be cast in the concrete columns and slabs are installed in good time.

The Contractor shall have a representative in attendance at all times when the casting of concrete takes place.

Draw-boxes, expansion joint boxes and round conduit boxes are to be provided where necessary. Sharp

bends of any nature will not be allowed in concrete slabs.

Draw and/or inspection boxes shall be grouped under one common cover plate, and must preferably be installed in passages or male toilets.

All boxes, etc., are to be securely fixed to the shuttering to prevent displacement when concrete is cast. The conduit shall be supported and secured at regular intervals and installed as close as possible to the neutral axis of concrete slabs and/or beams.

Before any concrete slabs are cast, all conduit droppers to switchboards shall be neatly spaced and rigidly fixed.

11 FLEXIBLE CONNECTIONS FOR CONNECTING UP OF STOVES, MACHINES, ETC.

Flexible tubing connections shall be of galvanised steel construction, and in damp situations of the plastic sheathed galvanised steel type. Other types may only be used subject to the prior approval of the Department's site electrical representative.

Connectors for coupling onto the flexible tubing shall be of the gland or screw-in types, manufactured of either brass or cadmium or zinc plated mild steel, and the connectors after having been fixed onto the tubing, shall be durable and mechanically sound.

Aluminium and zinc alloy connectors will not be acceptable.

12 WIRING:

Except where otherwise specified in Part 2 of this specification, wiring shall be carried out in conduit throughout. Only one circuit per conduit will be permitted.

No wiring shall be drawn into conduit until the conduit installation has been completed and all conduit ends provided with bushes. All conduits to be clear of moisture and debris before wiring is commenced.

Unless otherwise specified in Part 2 of this specification or indicated on the service drawings, the wiring of the installation shall be carried out in accordance with the "Wiring Code". Further to the requirements concerning the installation of earth conductors to certain light points as set out in the "Wiring Code", it is a specific requirement of this document that where plain-end metallic conduit or non-metallic conduit has been used, earth conductors must be provided and drawn into the conduit with the main conductors to all points, including all luminaires and switches throughout the installation.

Wiring for lighting circuits is to be carried out with 1,5mm² conductors and a 1,5mm²-earth conductor. For socket outlet circuits the wiring shall comprise 4mm² conductors and a 2,5mm²-earth conductor. In certain instances, as will be directed in Part 2 of this specification, the sizes of the aforementioned conductors may be increased for specified circuits. Sizes of conductors to be drawn into conduit in all other instances, such as feeders to distribution boards, power points etc., shall be as specified elsewhere in this specification or indicated on the drawings. Sizes of conductors not specified must be determined in accordance with the "Wiring Code".

The loop-in system shall be followed throughout and no joints of any description will be permitted.

The wiring shall be done in PVC insulated 600/1000 V grade cable to SANS 1507.

Where cable ends connect onto switches, luminaires etc., the end strands must be neatly and tightly twisted together and firmly secured. Cutting away of wire strands of any cable will not be allowed.

13 SWITCHES AND SOCKET OUTLETS

All switches and switch-socket outlet combination units shall conform to the Department Quality Specifications, which form part of this specification.

No other than 16 A 3 pin sockets are to be used, unless other special purpose types are distinctly specified or shown on the drawings.

All light switches shall be installed at 1,4m above finished floor level and all socket outlets as directed in the Schedule of Fittings which forms part of this specification or alternatively the height of socket outlets may be indicated on the drawings.

14 SWITCHGEAR

Switchgear, which includes circuit breakers, iron-clad switches, interlocked switch-socket outlet units, contactors, time switches, etc., is to be in accordance with the Departmental Quality Specifications which form part of this specification and shall be equal and similar in quality to such brands as may be specified.

For uniform appearance of switchboards, only one approved make of each of the different classes of switchgear mentioned in the Quality Specifications shall be used throughout the installations.

15 SWITCHBOARDS

All boards shall be in accordance with the types as specified, be constructed according to the detail or type drawings and must be approved by the Employer before installation.

In all instances where provision is to be made on boards for the supply authority's main switch and/or metering equipment the contractor must ensure that all requirements of the authorities concerned in this respect are met.

Any construction or standard type board proposed, as an alternative to that specified must have the prior approval of the Employer.

All busbars, wiring, terminals, etc., are to be adequately insulated and all wiring is to enter the switchgear from the back of the board. The switchgear shall be mounted within the boards to give a flush front panel. Cable and boxes and other ancillary equipment must be provided where required.

Clearly engraved labels are to be mounted on or below every switch. The working of the labels in English, is to be according to the lay-out drawings or as directed by the Electrical Engineer and must be confirmed on site. Flush mounted boards to be installed with the top of the board 2,0m above the finished floor level.

16 WORKMANSHIP AND STAFF

Except in the case of electrical installations supplied by a single-phase electricity supply at the point of supply, an accredited person shall exercise general control over all electrical installation work being carried out.

The workmanship shall be of the highest grade and to the satisfaction of the Employer.

All inferior work shall, on indication by the Employer's inspecting officers, immediately be removed and rectified by and at the expense of the Contractor.

17 VERIFICATION AND CERTIFICATION OF ELECTRICAL INSTALLATION (CERTIFICATE OF COMPLIANCE AND TEST REPORT)

On completion of the service, a certificate of compliance must be issued to the Principal Agent/Electrical Engineer or Employer in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) in the format as set out in SANS 10142-1 & 2.

18 EARTHING OF INSTALLATION

Main earthing

The type of main earthing must be as required by the supply authority if other than the Employer, and in any event as directed by the Principal Agent/Electrical Engineer, who may require additional earthing to meet test standards.

Where required an earth mat shall be provided, the minimum size, unless otherwise specified, being 1,0m

x 1,0m and consisting of 4mm diameter hard-drawn bare copper wires at 250mm centres, brazed at all intersections.

Alternatively, or additionally earth rods or trench earths may be required as specified or directed by the Electrical Engineer.

Installations shall be effectively earthed in accordance with the "Wiring Code" and to the requirements of the supply authority. All earth conductors shall be stranded copper with or without green PVC installation.

Connection from the main earth bar on the main board must be made to the cold water main, the incoming service earth conductor, if any and the earth mat or other local electrode by means of 12mm x 1,60 mm solid copper strapping or 16 mm² stranded (not solid) bare copper wire or such conductor as the Department's representative may direct. Main earth copper strapping where installed below 3m from ground level, must be run in 20 mm diameter conduit securely fixed to the walls.

All other hot and cold-water pipes shall be connected with 12mm x 0,8mm perforated for solid copper strapping (not conductors) to the nearest switchboard. The strapping shall be fixed to the pipework with brass nuts and bolts and against walls with brass screws at 150-mm centres. In all cases where metal water pipes, down pipes, flues, etc., are positioned within 1,6m of switchboards an earth connection consisting of copper strapping shall be installed between the pipework and the board. In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each distribution board.

Roofs, gutters and down pipes

Where service connections consist of overhead conductors, all metal parts of roofs, gutters and down pipes shall be earthed. One bare 10mm² copper conductor shall be installed over the full length of the ceiling void, fixed to the top purlin and connected to the main earth conductor and each switchboard. The roof and gutters shall be connected at 15m intervals to this conductor by means of 12mm X 0,8mm copper strapping (not conductors) and galvanised bolts and nuts. Self-tapping screws are not acceptable. Where service connections consist of underground supplies, the above requirements are not applicable.

Sub-distribution boards

A separate earth connection shall be supplied between the earth busbar in each sub-distribution board and the earth busbar in the Main Switchboard. These connections shall consist of a bare or insulated stranded copper conductors installed along the same routes as the supply cables or in the same conduit as the supply conductors. Alternatively armoured cables with earth continuity conductors included in the armouring may be utilised where specified or approved.

Sub-circuits

The earth conductors of fall sub-circuits shall be connected to the earth busbar in the supply board in accordance with SANS 10142.

Ring Mains

Common earth conductors may be used where various circuits are installed in the same wire way in accordance with SANS 10142. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wire way, alternatively the size of the conductor shall be as directed by the Engineer. Earth conductors for individual circuits branching from the ring main shall be connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

Non-metallic Conduit

Where non-metallic conduit is specified or allowed, the installation shall comply with the Department's standard quality specification for "conduit and conduit accessories".

Standard copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including metal switch boxes, socket-outlet boxes, draw-boxes, switchboards,

luminaires, etc. The securing of earth conductors by means of self-threading screws will not be permitted.

Flexible Conduit

An earth conductor shall be installed in all non-metal flexible conduit. This earth conductor shall not be installed externally to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

Connection

Under no circumstances shall any connection points, bolts, screws, etc., used for earthing be utilised for any other purpose. It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided.

Unless earth conductors are connected to proper terminals, the end shall be tinned and lugged.

19 MOUNTING AND POSITIONING OF LUMINAIRES

The Contractor is to note that in the case of board and acoustic tile ceilings, i.e., as opposed to concrete slabs, close co-operation with the building contractor is necessary to ensure that as far as possible the luminaires are symmetrically positioned with regard to the ceiling pattern.

The layout of the luminaires as indicated on the drawings must be adhered to as far as possible and must be confirmed with the Department's representative.

Fluorescent luminaires installed against concrete ceilings shall be screwed to the outlet boxes and in addition 2 x 6mm expansion or other approved type fixing bolts are to be provided. The bolts are to be $\frac{3}{4}$ of the length of the luminaires apart.

Fluorescent luminaires to be mounted on board ceilings shall be secured by means of two 40mm x No. 10 round head screws and washers. The luminaires shall also be bonded to the circuit conduit by means of locknuts and brass bushes. The fixing screws are to be placed $\frac{3}{4}$ of the length of the fitting apart.

Earth conductors must be drawn in with the circuit wiring and connected to the earthing terminal of all fluorescent luminaires as well as other luminaires exposed to the weather in accordance with the "Wiring Code".

Incandescent luminaires are to be screwed directly to outlet boxes in concrete slabs. Against board ceilings the luminaires shall be secured to the bracing or joists by means of two 40mm x No. 8 round head screws.

PART 2: INSTALLATION DETAILS

[Omit which is not applicable. Clauses 1 to 10 of Part 2 are standard clauses (which should not be altered) and must be inserted in the document in the order as set out.]

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PART 2: INSTALLATION DETAILS

1 CABLE SLEEVE PIPES

Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in earthenware or high-density polyethylene pipes.

The ends of all sleeves shall be sealed with a non-hardening watertight compound after the installation of cables. All sleeves intended for future use shall likewise be sealed.

2 NOTICES

The Contractor shall issue all notices and make the necessary arrangements with Supply Authorities, the Postmaster-General, and S.A. Transport Services, Provincial or National Road Authorities and other authorities as may be required with respect to the installation.

3 ELECTRICAL EQUIPMENT

All equipment and fittings supplied must be in accordance with the attached quality specification (Part 3 of this document), suitable for the relevant supply voltage, and frequency and must be approved by the Employers Electrical Engineer.

4 DRAWINGS

The drawings generally show the scope and extent of the proposed work and shall not be held as showing every minute detail of the work to be executed.

The position of power points, switches and light points that may be influenced by built-in furniture must be established on site, prior to these items being built in.

5 BALANCING OF LOAD

The Contractor is required to balance the load as equally as possible over the multiphase supply.

6 SERVICE CONDITIONS

All plant shall be designed for the climatic conditions appertaining to the service.

7 SWITCHES AND SOCKET OUTLETS

The installation of switches and socket outlets must conform to clause 13 of Part 1 of this specification.

8 LIGHT FITTINGS AND LAMPS

The installation and mounting of luminaires must conform to clause 19 of Part 1 of this specification.

All fittings to be supplied by the Contractor shall have the approval of the Employer.

The light fittings must be of the type specified in the Schedule of Light Fittings.

9 EARTHING AND BONDING

The Contractor will be responsible for all earthing and bonding of the building and installation. The earthing and bonding are to be carried out strictly as described in clause 18 of Part 1 of this specification and to the satisfaction of the Employer/s Electrical Engineer.

10 MAINTENANCE OF ELECTRICAL SUPPLY

All interruptions of the electrical supply that may be necessary for the execution of the work, will be subject to prior arrangement between the Contractor and the Client and the Employer's Electrical Engineer.

11 EXTENT OF WORK

The work covered by this contract comprises the complete electrical installation, in working order, as shown on the drawings and as per this specification, including the supply and installation of all fittings and also the installation of such equipment supplied by the Employer.

12 SUPPLY AND CONNECTION

The supply will be at 400/230 Volt 50Hz.

The Contractor must arrange in good time with the local Municipality for the disconnection and reconnection of supply (if necessary) during construction and will be responsible for any costs associated with this process and the required approvals.

The Contractor will be responsible for the supply and installation of the supply cable from the meter box to the main low-tension distribution board (MDB). The size and length of the cable is listed in the Schedule of Cables and measured in the Bills of Quantities.

Standby Plant

The 100kVA standby plant complete with automatic changeover control panel (Distribution Board – X) be supplied, installed and commissioned by others.

The Contractor will only be responsible for the supply and installation of the cable connections between the Main Distribution Board and the Charge- over Control Panel (Distribution Board - X).

The supply cables are listed in the Schedule of Cables and measured in the Bills of Quantities.

13 CONDUIT AND WIRING

Conduit and conduit accessories shall be black enameled/galvanized screwed conduit or black enameled/galvanized plain end conduit in accordance with SANS 61386.

All conduits, regardless of the system employed, shall be installed strictly as described in the applicable paragraphs of clauses 4 to 8 of Part 1 of the specification. Wiring of the installation shall be carried out as directed in clause 9 part 1 of this specification.

Where plain end conduit is offered all switches and light fittings must be supplied with a permanent earth terminal for the connection of the earth wire.

Lugs held by switch fixing screws or self-tapping screws will not be acceptable.

13.1 Telephone Installation

The Contractor shall allow for the complete installation of all conduits, outlet boxes, the communication service provider Distribution boards, sleeve pipes, etc., required for the telephone system as shown on the drawings.

The sizes of all telephone conduits are indicated on the drawings and must be installed in the floor slab. Galvanized steel draw-wires shall be installed in all conduits.

End boxes must consist of a 50mm x 100 mm x 100mm outlet box fitted with suitable blank cover plates, flush mounted 0,4m above floor level.

The communication service provider Distribution Board must consist of a 150mm x 600mm x 600mm metal box and hinged door with a 20mm thick wooden backboard. The board must be flush mounted, 1,37m above the floor.

13.2 Intercom Installation

The supply and installation of the intercom system is not included in this Contract.

The Contractor shall allow for the complete supply and installation of all conduits and outlet boxes required for the intercom installation as shown on the drawings.

The size of all conduits, boxes and mounting heights of the end boxes are indicated on the drawings. Galvanized steel draw-wires shall be installed in all conduits and the boxes fitted with suitable blank cover plates.

13.3 Power Trunking

The Contractor shall be responsible for the supply and installation of all power trunking complete with corner pieces, end pieces, junction pieces, supply conduits, cover plates and power outlets as specified and indicated on the drawings.

The power trunking must comply with SANS 61084. The Contractor must ensure that the power trunking is installed to satisfaction of the Employer's Electrical Engineer before commencing with the wiring of the power trunking.

14 POWER POINTS

Allow for the installation of power points and equipment as listed in the schedule, indicated on the drawings and described below:

- 14.1 AIRCON SPLIT UNITS
- 14.2 GEYSER(S)
- 14.3 HAND DRYERS
- 14.4 EXTRACTION FAN(S)
- 14.5 ALARM PANEL
- 14.6 TELEPHONE/PBX PANEL

The Contractor must electrically connect all the equipment listed above as specified and listed in the Schedule of Power Points.

NOTE: The geyser(s) installation must be approved by the Employers Electrical Engineer. Detail with regard to the size and type of geyser to be provided and must be obtained from the Mechanical Engineer.

15 CABLES

The Contractor shall supply and completely install all distribution cables as indicated on the drawings, and listed in the Schedule of Cables.

The storage, transportation, handling and laying of the cables shall be according to first class practice, and the contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operations.

The cable-trenches shall be excavated to a depth of 0,9m deep below ground level and shall be 450mm wide for one to three cables, and the width shall be increased where more than three cables are laid together so that the cables may be placed at least two cable diameters apart throughout the run. The bottom of the

trench shall be level and clean and the bottom and sides free from rocks or stones liable to cause damage to the cable.

The Contractor must take all necessary precautions to prevent the trenching work being in any way a hazard to the personnel and public and to safeguard all structures, roads, sewage works or other property on the site from any risk of subsidence and damage.

In the trenches the cables shall be laid on a 75mm thick bed of earth and be covered with a 150-mm layer of earth before the trench is filled in.

All joints in underground cables and terminations shall be made either by means of compound filled boxes according to the best-established practice by competent cable jointers using first class materials or by means of approved epoxy-resin pressure type jointing kits. Epoxy-resin joints must be made entirely in accordance with the manufacturer's instructions and with materials stipulated in such instructions. Low tension PVCA cables are to be made off with sealing glands and materials designed for this purpose which must be of an approved make. Where cables are cut and not immediately made off, the ends are to be sealed without delay.

The laying of cables shall not be commenced until the trenches have been inspected and approved. The cable shall be removed from the drum in such a way that no twisting, tension or mechanical damage is caused and must be adequately supported at intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after drawing in of the cables.

Backfilling (after bedding) of the trenches is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the addition of every 150mm. The surface is to be made good as required.

On each completed section of the laid and jointed cable, the insulation resistance shall be tested to approval with an approved "Megger" type instrument of not less than 500 V for low tension cables.

Earth continuity conductors are to be run with all underground cables constituting part of a low-tension distribution system. Such continuity conductors are to be stranded bare copper of a cross-sectional area equal to at least half that of one live conductor of the cable, but shall not be less than 4mm² or more than 70mm². A single earth wire may be used as earth continuity conductor for two or more cables run together, branch earth wires being brazed on where required.

15.1 LAYING, JOINTING AND MAKING OFF OF ELECTRICAL CABLES

[The requirements specified hereafter, are aimed essentially at high tension cable but are also valid for low tension cable, where applicable.]

1. The use of the term "Inspector", includes the engineer or inspector of the Department or an empowered person of the concerned supervising consulting engineer's firm.
2. No cable is to be laid before the cable trench is approved and the soil qualification of the excavation is agreed upon by the Contractor and inspector.
3. After the cable has been laid and before the cable trench is back-filled the inspector must ensure that the cable is properly bedded and that there is no undesirable material included in the bedding layer.
4. All cable jointing and the making off of the cables must only be carried out by qualified experienced cable jointers. Helpers of the jointers may not saw, strip, cut, solder, etc. The cable and other work undertaken by them must be carried out under the strict and constant supervision of the jointer.
5. Before the Contractor allows the jointer to commence with the jointing work or making off of the cable (making off is recognized as half a joint) he must take care and ensure:
 - 5.1 That he has adequate and suitable material available to complete the joint properly and efficiently.

Special attention must be given to ensure the cable ferrules and cable lugs are of tinned copper and of sufficient size. The length of the jointing lugs must be at least six times the diameter of the conductor,

- 5.2 That the joint pit is dry and that all loose stones and material are removed,
- 5.3 That the walls and banks of the joint pit are reasonable firm and free from loose material which can fall into the pit,
- 5.4 That the necessary coffer-dams or retaining walls are made to stop the flow of water into the joint pit,
- 5.5 That the joint pit is provided with suitable groundsheets so that the jointing work is carried out in clean conditions,
- 5.6 That the necessary tents or sails are installed over the joint pit to effectively avert unexpected rainfall and that sufficient light or lighting is provided,
- 5.7 That the necessary means are available to efficiently seal the jointing or cable end when an unexpected storm or cloudburst occurs, regardless of how far the work has progressed,
- 5.8 That the cables and other materials are dry, undamaged and in all respects are suitable for the joint work or making off,
- 5.9 That the heating of cable oil, cable compound, plumbers' metal and solder is arranged that they are at the correct temperature when required so that the cable is not unnecessarily exposed to the atmosphere and consequently the ingress of moisture (care must be taken of overheating)

Flow temperatures of cable oil and compound must be determined with suitable thermometers. Cable oil and compound must not be heated to exceed the temperatures given on the containers and precaution must be taken to ensure that the tin is not overheated in one position. The whole mass must be evenly and proportionally heated.

(Temperatures of solder and plumbers' metal may be tested with brown paper (testing time: 3 seconds). The paper must colour slightly - not black or burnt).

- 6. Before the paper-insulated cables are joined, they must be tested for the presence of moisture by the cable jointers test. This consists of the insertion of a piece of unhandled insulated impregnated paper tape in warm cable oil heated to a temperature of $130 \pm 5^{\circ}\text{C}$.

Froth on the surface of the oil is an indication that moisture is present in the impregnated insulation and the amount of the froth gives an indication of the moisture present.

- 7. If the cable contains moisture or is found to be otherwise unsuitable for jointing or making of the inspector is to be notified immediately and he will issue the necessary instruction to cope with the situation.
- 8. The joint or making off of paper insulated cables must not be commenced during rainy weather.
- 9. Once a joint is in progress the jointer must proceed with the joint until it is complete and before he leaves the site.
- 10. The jointer must ensure that the material and his tools are dry at all times, reasonably clean and absolutely free from soil.
- 11. Relating to the jointing of the cable the following requirements apply:
 - 11.1 All jointing must be carried out in accordance with recognized and tried techniques and comply strictly with the instructions given by the supplier of the jointing kit.
 - 11.2 The cables must be twisted by hand so that the cores can be joined according to the core numbers.

If necessary, the cable is to be exposed for a short distance to accomplish this. Under no circumstances may the cores in a joint be crossed so as to enable cores to be joined according to the core numbers. If it is not possible to twist the cables so that the preceding requirements can be met, then cores are to be joined in the normal way without any consideration of the core numbers.

- 11.3 Normally the cables will have profile conductors. The conductors shall be pinched with gas pliers to form a circular section, bound with binding wire so that they do not spread, and then tinned before jointing.

- 11.4 Jointing ferrules, the length of which are at least 6 times the diameter of the conductors, must be slid over the conductor ends to be joined and pinched tightly. Then they are soldered by means of the ladle process whilst being pinched further closed.

Use resin only as a flux. The slot opening in the ferrule must be completely filled, including all depressions.

Remove all superfluous metal with a cloth dipped in tallow. Work during the soldering process must be from top to bottom. Rub the ferrule smooth and clean with aluminium oxide tape after it has cooled down to ensure that there are not any sharp points or edges.

- NB:** The spaces between the conductor strands must be completely filled by soldering process and must be carried out quick enough to prevent the paper insulation from burning or drying out unnecessarily.

- 11.5 After the ferrules have been rubbed smooth and clean, they and the exposed cores must be treated with hot cable oil (110°C) to remove all dust and moisture. These parts are to be thoroughly basted with the oil.

- 11.6 The jointer must take care that his hands are dry and clean before the joint is insulated. Also, the insulating tape which is to be used must first be immersed in warm cable oil (110°C) for a sufficient period to ensure that no moisture is present.

- 11.7 After the individual cores have been installed, they must be well basted with hot cable oil and again after the applicable separator and/or belt insulation tape is applied before the lead joint sleeve is placed in position.

- 11.8 The lead joint sleeve must be thoroughly cleaned and prepared before it is placed on the cable and must be kept clean during the whole jointing process. Seal the filling apertures of the sleeve with tape until the sleeve is ready for compound filling.

- 11.9 The plumbing joints employed to solder the joint sleeve to the cable sheath, must be cooled off with tallow and the joint sleeve is to be filled with compound while it is still warm. Top up continuously until the joint is completely filled to compensate for the compound shrinkage.

- 11.10 The outer joint box must be clean and free from corrosion. After it has been placed in position it must be slightly heated before being filled with compound. Top up until completely full.

12. As far as cable end boxes are concerned the requirements as set out above are valid where applicable.

16. DISTRIBUTION BOARDS

In addition to clause 14 and clause 15 of Part 1 of this specification the following shall also be applicable to switchboards required for this service.

The Contractor shall supply and install the distribution boards as indicated on the drawings and listed in the distribution Board Schedule. All distribution boards shall comply with the quality specification in Part 3 of this specification, and be approved by the Employer's Electrical Engineer.

The following types of distribution boards are required for the service:

DB-Main
Sub DB-1

The latest Departmental Quality Specification Section for Distribution Boards must be included in Part 3 of the specification.]

17. SUBSTATION

17.1 GENERAL SUB-STATION WORK

17.2 SUB-STATION EARTHING

17.3 CONTRACTOR'S RESPONSIBILITY

18. SCHEDULE OF LIGHT FITINGS

The Departmental Quality Specification for the relevant luminaires must be included in Part 3 of the specification.

The light fittings and accessories are to be according to the quality specifications in Part 3 and shall be approved by the Employer.

Type A: Industrial 40W LED surface mounted channel luminaire with mid-power LED strip complete with diffuser colour 4000K with SANS approved mark.

Type B: Industrial 2 x 40W LED surface mounted channel luminaire with mid-power LED strips complete with diffuser colour 4000K with SANS approved mark.

Type C: Decorative 2 x 40W LED office luminaire with mid-power LED strips and low brightness double parabolic diffuser colour 4000K with SANS approved mark.

Type D: 53W wall/pole/stirrup mounted LED bulkhead luminaire with corrosion resistant aluminium housing and high impact UV resistant polycarbonate protector for LED's, IP66 with optimal photometric performance and flexible combinations of LED arrays, colour 4000K.

19. SCHEDULE OF POWER POINTS

BOARD	POWER POINT	TYPE	SIZE OF CABLES, CONDUIT AND WIRING	LOAD WATTS
DB-Main	PP1	150-liter Geyser	20mm dia. conduit with 2 x 4mm ² conductors and 2,5mm ² earth wire	2500
DB-Main	PP2	AC Split Unit	20mm dia. conduit with 2 x 4mm ² conductors and 2,5mm ² earth wire	2000
DB-Main	PP3	30A hand dryer	20mm dia. conduit with 2 x 4mm ² conductors and 2,5mm ² earth wire	2500
DB-Main	PP4	5A Extraction Fan	20mm dia. conduit with 2 x 4mm ² conductors and 2,5mm ² earth wire	1000
DB-Main/Sub DB1	PP5	Combined 16A 3-pin + 2-pin socket	20mm dia. conduit with 2 x 4mm ² conductors and 2,5mm ² earth wire	300

20. SCHEDULE OF CABLES, CONDUIT AND WIRING

Supply, install and connect the following cable, conduit and wiring:

FROM	TO	SIZE AND TYPE	LOAD (kVA)
Meter box Normal Power	Gen ATS	70mm ² 4-core PVCA cable and 35mm ² earth wire	87,62
Gen ATS	DB-Main	70mm ² 4-core PVCA cable and 35mm ² earth wire	87,62
DB-Main Normal Power	Sub -DB1	25mm ² 4-core PVCA cable and 16mm ² earth wire	36,05

21. SCHEDULE OF DISTRIBUTION BOARDS

The front panels of normal supply, standby power and no-break supply sections shall be painted in distinctive colours as follows:

Normal supply : Light Orange, colour B26 of SANS 1091.
Standby power : Signal Red, colour A11 of SANS 1091.
No-break supply: Dark Violet, colour F06 or Olive Green,
Colour H05 of SANS 1091.

Indicated is the probable fault level rating (kA) of the busbars. Refer to the Summary of Switchgear and Circuits for the minimum fault level rating of specified equipment.

BOARD	TYPE	PANEL	FAULT LEVEL	LOAD kVA
DB-Main	Surface, with door	Normal power	20	87,62
		Standby power	n/a	n/a
Sub-DB1	Surface, with door	Normal power	15	36,05

22. SUMMARY OF SWITCHGEAR AND CIRCUITS

The indicated fault current rating (kA) is the minimum value that the switchgear must comply with for connecting to the busbars of the respective panels-distribution boards.

MAIN DISTRIBUTION BOARD : DB-Main

PANEL - 1 : NORMAL POWER

Main switch : 250A three pole 20kA circuit breaker.
Sub-DB1 : 150A three pole 15kA circuit breaker.

PANEL-2 : NORMAL POWER

Local main switch: 100A three pole isolator
Lighting circuits 1-5: 5 x 10A one pole 3kA circuit breakers.
Socket outlets : 3 x 63A two pole 30mA single-phase earth leakage relays, and 10 x 20A
Single pole 5kA circuit breakers. (Circuits P1 to P10)

Dedicated Power (Circuit DP1-DP3) 20A one pole 5kA circuit breaker.

Isolators 20A two pole 6kA circuit breaker.
(Circuits AC1-AC15, HD1-HD3, G1 and EF1)

SUB DISTRIBUTION BOARD : SUB-DB1

PANEL - 1 : NORMAL POWER

Main switch : 150A three pole 15kA circuit breaker.

PANEL-2 : NORMAL POWER

Local main switch: 100A three pole isolator
Lighting circuits 1-5: 5 x 10A one pole 3kA circuit breakers.
Socket outlets : 2 x 63A two pole 30mA single-phase earth leakage relays, and 5 x 20A
Single pole 5kA circuit breakers. (Circuits P1 to P5)

Dedicated Power 20A one pole 5kA circuit breaker.
(Circuit DP1-DP6)

Isolators 20A two pole 6kA circuit breaker.
(Circuits AC15-AC26, HD4)

[Socket outlets circuits (P) must be controlled by 63A two pole 30mA single phase earth leakage relay and 20A single pole 5kA circuit breakers. With a maximum of 5 circuits (10 plugs) per earth leakage relay.]

PART 3: QUALITY SPECIFICATION FOR MATERIALS AND EQUIPMENT OF ELECTRICAL INSTALLATIONS

“Part 3: Quality specification for materials and equipment” manual of the Department of Public Works is applicable for this Contract and the manual can be obtained from the Department of Public Works.

[ONLY ITEMS OF MATERIAL applicable to the Contract must be included in Part 3]

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ADDITIONAL REQUIREMENTS OR SPECIFICATIONS NOT COVERED IN QUALITY SPECIFICATIONS ABOVE

LED LIGHTS

All Light fittings installed for this project is to be of the LED type, unless otherwise stated.

The following international standard specifications and South-African Bureau of Standards shall apply to the LED luminaire specification:

SANS 475	Luminaires for interior lighting, street lighting and floodlighting – Performance and requirements
SANS 10114-1	Interior lighting part 1: Artificial lighting of interiors
SANS 10114-2	Interior lighting part 2: Emergency lighting
SANS 60598-1	Luminaires part 1: General requirements and tests
SANS 60598-2.1	Luminaires part 2: Particular requirements section 1 – Fixed general purpose luminaires.
SANS 60598-2.2	Luminaires part 2: Particular requirements section 2 – Recessed luminaires.
SANS 60598-2.3	Luminaires part 2: Particular requirements section 3 – Luminaires for road and street lighting.
SANS 60598-2.5	Luminaires part 2: Particular requirements section 5 – Flood lighting.
SANS 61347-1 to 13	Lamp control gear
SANS 62031	LED modules for general lighting – Safety specifications

SANS 62384	DC or AC supplied electronic control gear for LED modules – Performance requirements.
SANS 62560	Self-ballasted LED lamps for general lighting services with supply voltages > 50V – Safety specification.
SANS 62612	Self-ballasted LED lamps for general lighting services with supply voltages > 50V – Performance requirements
EN 55015	Limits and methods of measurement of radio disturbance of electrical lighting or equipment.
EN 61000-3.2	Electromagnetic compatibility (EMC) limits for harmonic current emissions.
EN 61000-3.3	Electromagnetic compatibility (EMC) limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.
EN 61547	Equipment for general lighting purposes: EMC immunity requirements.
IEC-EN 62471	Photo biological safety of lamps and lamp systems for LEDs
IES LM-79-08	Approved method: Electrical and photometric measurement of solid-state lighting products.
IES LM-80	Approved method: Measuring lumen maintenance of LED light sources.

General requirements:

The luminaire shall be suitable for operation with mid-power LEDs. **Note that no LED tubes are allowed to be used.**

The luminaire shall be suitable for operation on a 230V single phase 50Hz mains supply.

Power factor capacitors shall be supplied to correct the power factor to at least 0.95 or higher.

The luminaire shall be marked with identification labels stating the brand name and model and shall bear the SANS approval mark.

The driver shall comply with IEC 61347-1 and IEC 61347-2B as applicable and shall be suitable for operation on 230V \pm 10%, 50Hz single phase system and it must be insured that harmonics filter is provided as per SANS 61000-3-2. The drivers and LED circuitry shall be protected against lighting and power surges. Suitable surge arrestors with a 10kA rating shall be provided for indoor installations and 20kA for outdoor installations.

Colour rendering (Ra) shall be not less than 80 and lumen depreciation of not more than 30% L70 at 50 000 hours @ Tq 25°C. Colour temperature of the LED lamp shall be 4000K, unless otherwise stated.

Thermal requirements:

The luminaire must be able to withstand an ambient temperature of 35°C. Storage temperature of this luminaire should be able to handle $-40^{\circ}\text{C} < T < 60^{\circ}\text{C}$.

To this end internal electrical and mechanical components shall not be allowed to exceed their maximum temperature ratings of 75°C. Test reports from an independent authorised testing facility proving this requirement shall be made available on request.

Noise requirements:

The noise level emitted from the luminaire shall be kept as low as possible. Drivers/electronic components shall therefore fully comply with the latest edition of SANS 55015.

= END OF SPECIFICATION =

PART 4: BILLS OF QUANTITIES

Electrical, mechanical and/or any other engineering work must be measured by the quantity surveyor and must be prepared in accordance with the latest edition of the Standard System of Measuring Building Work.

No additional provision for Preliminaries may be included in the engineering sections of the bills of quantities.

Bills of Quantities are included in part C2.2 of the tender document.

PART 5: ELECTRICAL WORK MATERIAL SCHEDULE

The Contractor shall complete the following schedules and submit them to the Electrical Engineer within 21 days of the date of the acceptance of the tender.

The schedules will be scrutinised by the Electrical Engineer and should any material offered not comply with the requirements contained in the specification, the Contractor will be required to supply material in accordance with the contract at no additional cost.

NB: Only one manufacturer's name to be inserted for each item.

Item	Material	Make or trade name	Country of origin
1.	Distribution boards		
2.	Circuit breakers 1P, 2P, 3P		
3.	On load isolators without trips		
4.	Contactors 1P, 2P, 3P		
5.	Earth leakage relays 1 & 3 phase		
6.	H.R.C. fuse switches		
7.	Kilowatt hour meter		
8.	Current transformers		
9.	Voltmeter		
10.	Maximum demand ammeter		
11.	Daylight sensitive switch		
12.	Time switch		
13.	Conduit		
14.	Conduit boxes		
15.	Power skirting		
16.	Surface switches		
17.	Watertight switches		
18.	16A flush socket outlets		
19.	16A surface socket outlets		
20.	16A watertight socket outlets		
21.	Fluorescent luminaires		
22.	Type A		
	Type B		
	Type C		
	Type D		
	Etc.		
23.	Bulkhead fittings: Type F		
24.	Spherical fittings: Type G		
25.	4 plate stoves		
26.	Convection heater		
27.	Fan heater		
28.	Fans		
29.	Clocks		
30.	PVCA cable		
31.	Cable trays		

PARTICULARS OF ELECTRICAL CONTRACTOR

Note to consultants

Please ensure that DPW -22(EC) Particulars of electrical contractor is inserted in main tender document.

PART 6: DRAWINGS

List all drawings

Drawing Description	Drawing Name	Drawing Number	Drawing Size
Main Distribution Board	DB-MAIN	UP-LAB/ELE/DB/01	A1
Sub Distribution Board	Sub-DB1	UP-LAB/ELE/DB/02	A1
MV/LV Schematic Layout	MV/LV Schematic Layout	UP-LAB/ELE/DB/03	A1
Small Power Layout	Small Power Layout	UP-LAB/ELE/P/01	A1
Lighting Layout	Lighting Layout	UP-LAB/ELE/L/01	A1

PROPOSED ALTERATIONS & ADDITIONS FOR DPW LABOUR CENTRE , UPINGTON

ELECTRICAL INSTALLATIONS

Item	Description	Amount
1	SECTION 1 : CABLES & CABLE MANAGEMENT	
2	SECTION 2 : DB's , SOCKETS, SWITCHES & ISOLATORS	
3	SECTION 3 : LUMINAIRES, GENSET, ELECTRONICS & LIGHTNING PROTECTION	
4	SECTION 4 : OTHERS	
TOTAL CARRIED TO FINAL SUMMARY OF BILLS OF QUANTITIES OF BUILDING WORKS		
	15% VAT	
TOTAL		

PROPOSED ALTERATIONS & ADDITIONS FOR DPW LABOUR CENTRE , UPINGTON

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
				R	R
Note	The complete installation must comply with SANS 0142 specifications and the Quality specification in this document. Therefore Tenders are advised to study the specification and drawings before the Bill is to be priced.				
1	CABLES, CONDUCTORS & SLEEVES				
1.1	CABLES Supply and installation of PVC SWA PVC insulated 600/1000V Cu cable and Bare Copper Earth Wire in sleeves and in trenches				
1.1.1	6mm² 4 core PVC insulated copper cable for guard house & gate motor	m	50		
1.1.2	Supply and install bare copper earth conductor 4mm² bare copper earth cable	m	50		
1.2	CONDUCTORS Supply and install 600/1000Volt PVC insulated stranded copper conductors drawn into conduits ,etc .:				
1.2.1	2,5mm²	m	1600		
1.2.2	4mm²	m	1400		
1.2.3	6mm²	m	300		
	Earth Wire				
1.2.4	2,5mm²	m	1400		
1.2.5	4mm²	m	300		
1.3	GLANDS AND SHROUDS				
1.3.1	6mm² 4 core PVC insulated copper cable	each	10		
1.4	GLANDS AND SHROUDS (Earth bare				
1.4.1	4mm² bare copper earth cable	each	10		
1.5	CABLE MARKERS & WARNING TAPES				
1.5.1	Cable markers for cable routes indication	each	1		
1.5.2	Cable warning tape	m	30		
1.6	SUPPLY & INSTALL PVC SLEEVES				
1.6.1	110 diameter	m	10		
1.6.2	50 diameter	m	5		
1.7	TRENCHING AND EXCAVATIONS (600mm wide & 500mm deep)				
1.7.1	Soft rock	m³	15		
1.7.2	Hard rock	m³	10		
1.7.3	Bedding	m³	20		
1.7.4	Backfilling	m³	20		
1.7.5	600mm x 600mm x 1000mm Manhole	each	1		
1.8	ELECTRICAL CABLE MANAGEMENT & TRUNKING				
1.8.1	CONDUITS Supply and install pipes including short lengths jointing, sweeping bends , buses				
1.8.1.1	20mm diameter galvanised steel pipe	m	300		
1.8.1.2	25mm diameter Galvanised steel pipe	m	100		
1.8.1.3	20mm diameter flexible conduit (PVC)	m	700		
1.8.2	Supply and install wall boxes:				
1.8.2.1	100mm x 50mm x 50mm deep (PVC)	each	120		
1.8.2.2	100mm x 100mm x 50mm deep (Galvanized)	each	30		

1.3	4 Way PVC round boxes	each	120	
1.8.2.4	Supply and install 1,6mm diameter steel galvanised draw wires drawn	m	1250	
1.8.3	SKIRTING & TRAYS			
1.8.3.1	Supply and install galvanised steel power skirting (2 compartment) including cutting, ends, covers, elbows, short lengths, screws etc. 2-Compartment with divider	m	100	
1.8.3.2	P9000 galvanized steel trunking	m	240	
AMOUNT CARRIED TO SUMMARY SECTION 1 (CABLES & CABLE MANAGEMENT)				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
				R	R
2	DISTRIBUTION BOARDS, Refer to drawings UPINGTON /REF/EL/P1/01 as well as design notes included				
	<i>Supply, delivery, storage and submission of workshop drawings for the Flush mounted architrave steel type power distribution boards complete with flush trays, doors, switch gear mounting trays, copper busbars, neutral and earth bars</i>				
2.1	MAIN DB (New DB complete with switchgear)	each	1		
2.2	Sub-DB1 New DB complete with switchgear	each	1		
2.3	DB-GH New DB complete with switchgear	each	1		
3	SOCKETS				
3.1	Supply, install and connect switch sockets in flush mounted boxes, complete with cover plates:				
3.1.1	SANS 164-1 & 2 combined socket (3 pin earthed + 2 pin unearthed)	each	55		
3.1.2	SANS 164-1 & 2 combined socket on power skirting	each	40		
3.1.3	16A single switched double socket	each	5		
3.1.4	16A dedicated (red) 3-pin single switched socket on power skirting	each	15		
3.1.5	Type W : 5 x SANS 164-1 & 2 combined socket (3 pin earthed + 2 pin unearthed) ground mounted	each	4		
3.1.6	5 Amp single unswitched Socket (on 60mm steel round box for light f	each	90		
4	SWITCHES				
4.1	Supply, install and connect switches on flush mounted boxes, complete with cover plates:				
4.1.1	16 Amp 1 -lever / 1-way	each	20		
4.1.2	16 Amp 1 - lever /2-way	each	30		
4.1.3	Day light switch/photocell	each	4		
4.1.4	PIR/Occupancy sensor	each	4		
5	ISOLATORS				
5.1	Double pole 5A isolator for extractor fan	each	3		
5.2	Double pole 30A isolator for hand dryers	each	10		
5.3	Double pole 30A isolator for split units	each	36		
AMOUNT CARRIED TO SUMMARY SECTION 2 (DB's , SOCKETS, SWITCHES & ISOLATORS)					
6	LUMINAIRES				
6.1	Supply, install and connect luminaires complete with lamps, fixings, brass screws washers, etc.: (See designs for luminaire spec and schedule of luminaires spec				
6.1.1	Type LED - 44W LED, 4750Lm , 2.5ft/1170mm ,6500/800, IP20	each	95		

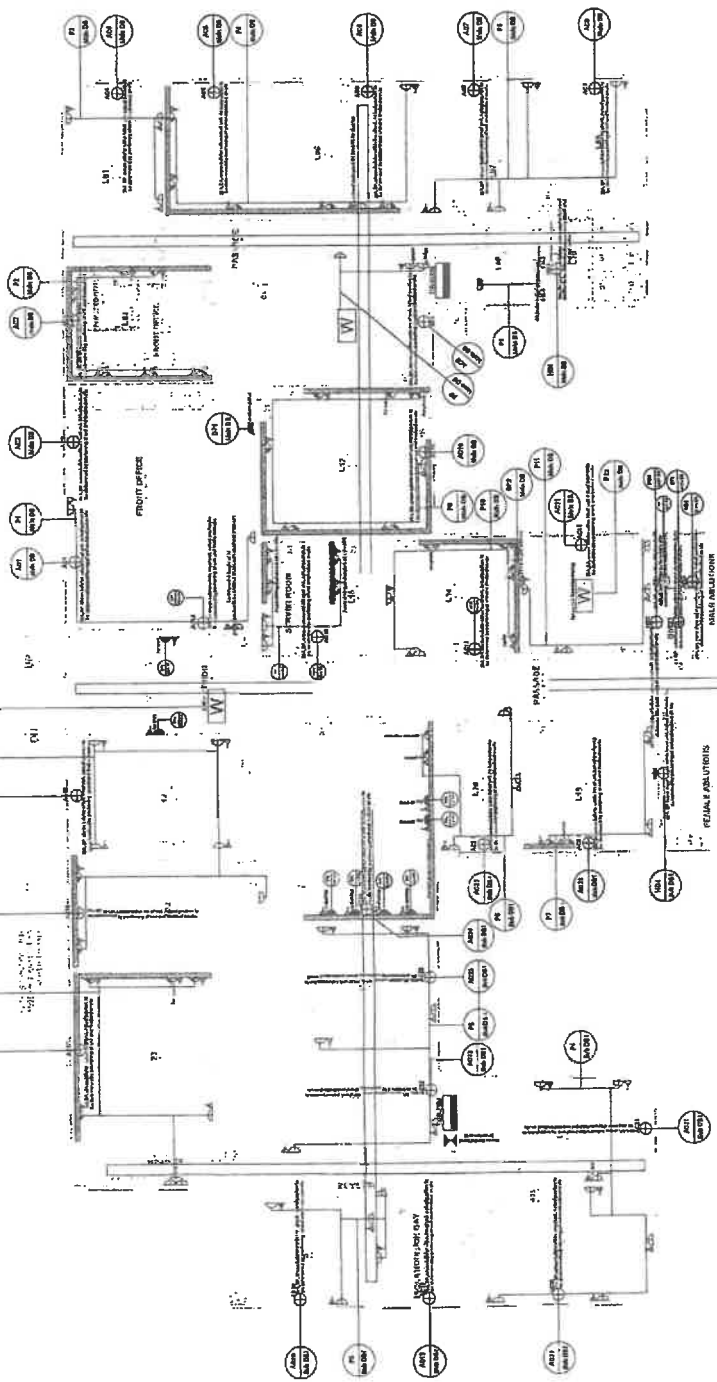
6.1.3	Type B - 2 x 9W LED Round Ceiling/Wall mounted bulkhead , IP65	each	20		
6.1.3	Type B1 - 2 x 18W LED or CFL Wall mounted bulkhead , IP65	each	25		
6.1.4	Type D - 9W LED,120mm recessed downlighter with smooth satin Aluminium reflector , IP20	each	2		
6.1.4	75-100W High Power LED spot light ,motion sensor controlled , IP65	each	2		
7	ELECTRIC GATE MOTOR Supply & install heavy duty 12V or 24V DC motor rated to drive a gate of up to 500kg in mass at a rate of at least 16m/minute . Installation to come with all accessories				
7.1	Heavy duty 12V or 24V DC motor to drive 500kg In mass	each	2		
8	GENERATOR SET Supply & install diesel , open installation silent generator				
8.1	100KVA Weather proof silent Genset Installation complete with ATM	each	1		
9	LIGHTNING PROTECTION SYSTEM Repair , make good , test and ensure compliance with a Level 2 lightning protection system to existing LP. This to apply to existing Al and Cu conductors, test joints, steel conduits, earth electrodes etc.				
9.1.1	4mm x 40mm Aluminium Strip along roof edge	m	100		
9.1.2	100 x 100 conduit box	each	22		
9.1.3	50mm ² black pvc insulated stranded galvanized steel cable down conductor	m	48		
9.1.4	70mm ² anti-theft composite stranded earth conductor equivalent to 10mm ² BCEW	m	90		
9.1.5	1200mm long 16mm Ø earth rods	each	22		
9.1.6	20mm galvanized conduits	m	75		
9.1.7	Finial Type Air Terminals	each	8		
9.1.8	Joints for electrical continuity	each	22		
9.1.9	Tests and certifying	each	1		
AMOUNT CARRIED TO SUMMARY SECTION 3 (LUMINAIRES, GENSET, ELECTRONICS & LIGHTNING PROTECTION)					
10	OTHERS				
10.1	Remove all unnecessary conduits , cables , wiring , obsolete electrical equipment & infrastructure eg electric bells , protective cages , satellite dishes etc and make neat accordingly	sum	1		
10.2	Safe removal and disposition of old luminaires & issuance of a crushing certificate	each	1		
10.3	Build a lockable steel palisade fence (4m (L) x 2m (W) x 2m (H) around generator	each	1		
10.4	Testing and Commissioning (CoC) of entire reticulation	sum	1		
AMOUNT CARRIED TO SUMMARY SECTION 4 (OTHERS)					

REV.	DATE	REVISION
1	05/11/15	ISSUE FOR TENDER
2	06/11/15	REVISED BASED ON COMMENTS
3	07/11/15	REVISED BASED ON COMMENTS

PROJECT INFORMATION	
PROJECT NAME	SMALL POWER LAYOUT
PROJECT LOCATION	SMALL POWER LAYOUT
PROJECT NO.	053767
PROJECT DATE	05/11/15
PROJECT STATUS	ISSUE FOR TENDER

DESIGNER INFORMATION	
DESIGNER NAME	OPTIMUM
DESIGNER ADDRESS	100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

ELECTRIC POWER REQUIREMENTS (kW)		ELECTRIC POWER REQUIREMENTS (kW)	
ITEM	REQUIREMENT (kW)	ITEM	REQUIREMENT (kW)
1. LIGHTING	1.0	11. TELEPHONE	0.1
2. HEATING	2.0	12. SECURITY	0.2
3. COOLING	3.0	13. OTHER	0.3
4. ELEVATOR	4.0		
5. PUMP	5.0		
6. OTHER	6.0		
7. TOTAL	7.0		
8. TOTAL	8.0		
9. TOTAL	9.0		
10. TOTAL	10.0		
11. TOTAL	11.0		
12. TOTAL	12.0		
13. TOTAL	13.0		
14. TOTAL	14.0		
15. TOTAL	15.0		
16. TOTAL	16.0		
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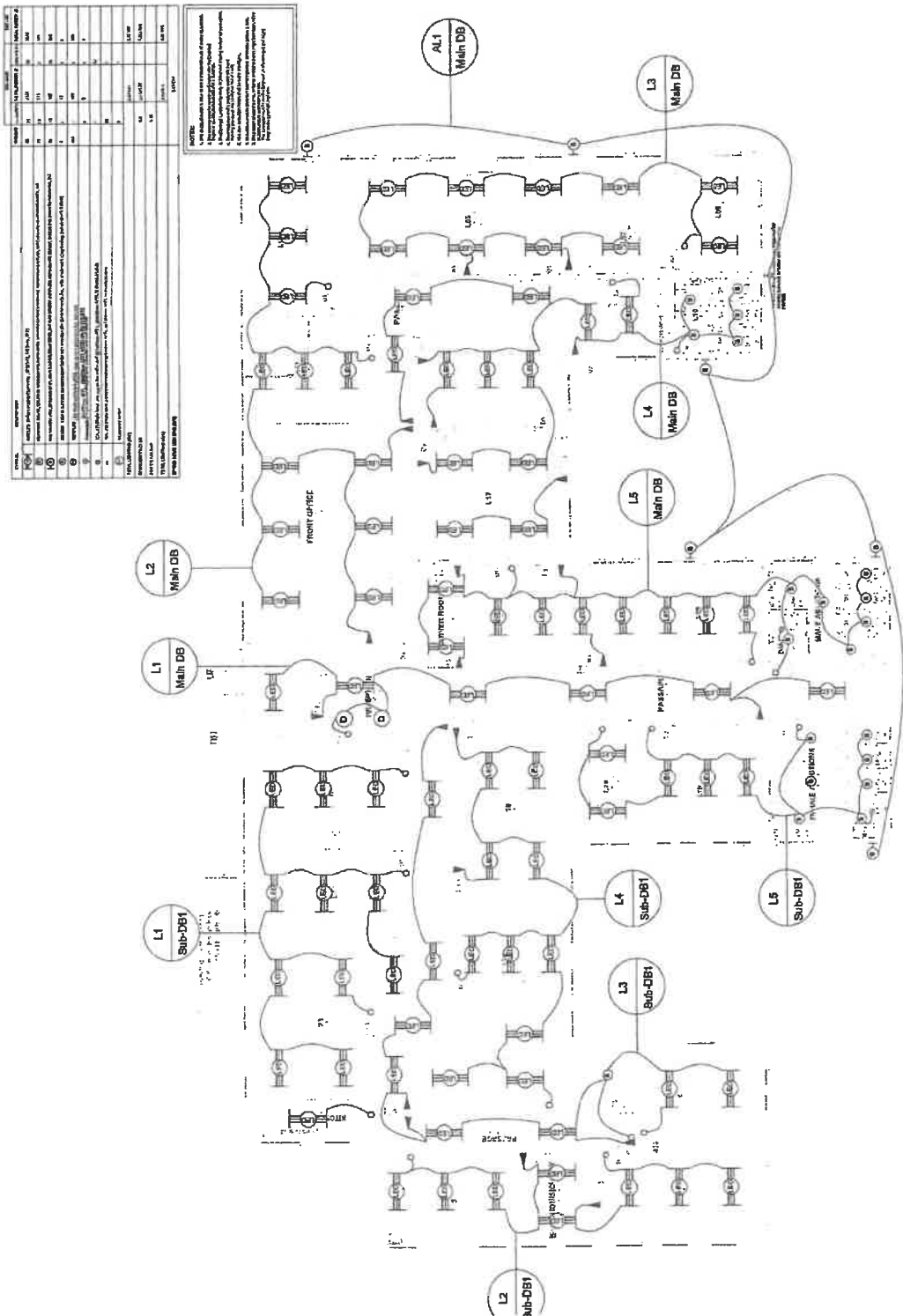
SMALL POWER LAYOUT
1:100

REV	DATE	DESCRIPTION
0	15/01/2017	INITIAL CONCEPT DESIGN
1	15/01/2017	DESIGN FOR CONSTRUCTION

Client	Optimum
Project	Optimum
Address	Optimum
City	Optimum
State	Optimum
Country	Optimum

Author	Optimum
Check	Optimum
Design	Optimum
Drawn	Optimum
Scale	Optimum

Rev	Date	Description
0	15/01/2017	INITIAL CONCEPT DESIGN
1	15/01/2017	DESIGN FOR CONSTRUCTION



LIGHTS LAYOUT

REV	DATE	DESCRIPTION
1	2020/01/20	REVISED SCHEMATIC LAYOUT
2	2020/01/20	REVISED SCHEMATIC LAYOUT

1	2020/01/20	REVISED SCHEMATIC LAYOUT
2	2020/01/20	REVISED SCHEMATIC LAYOUT

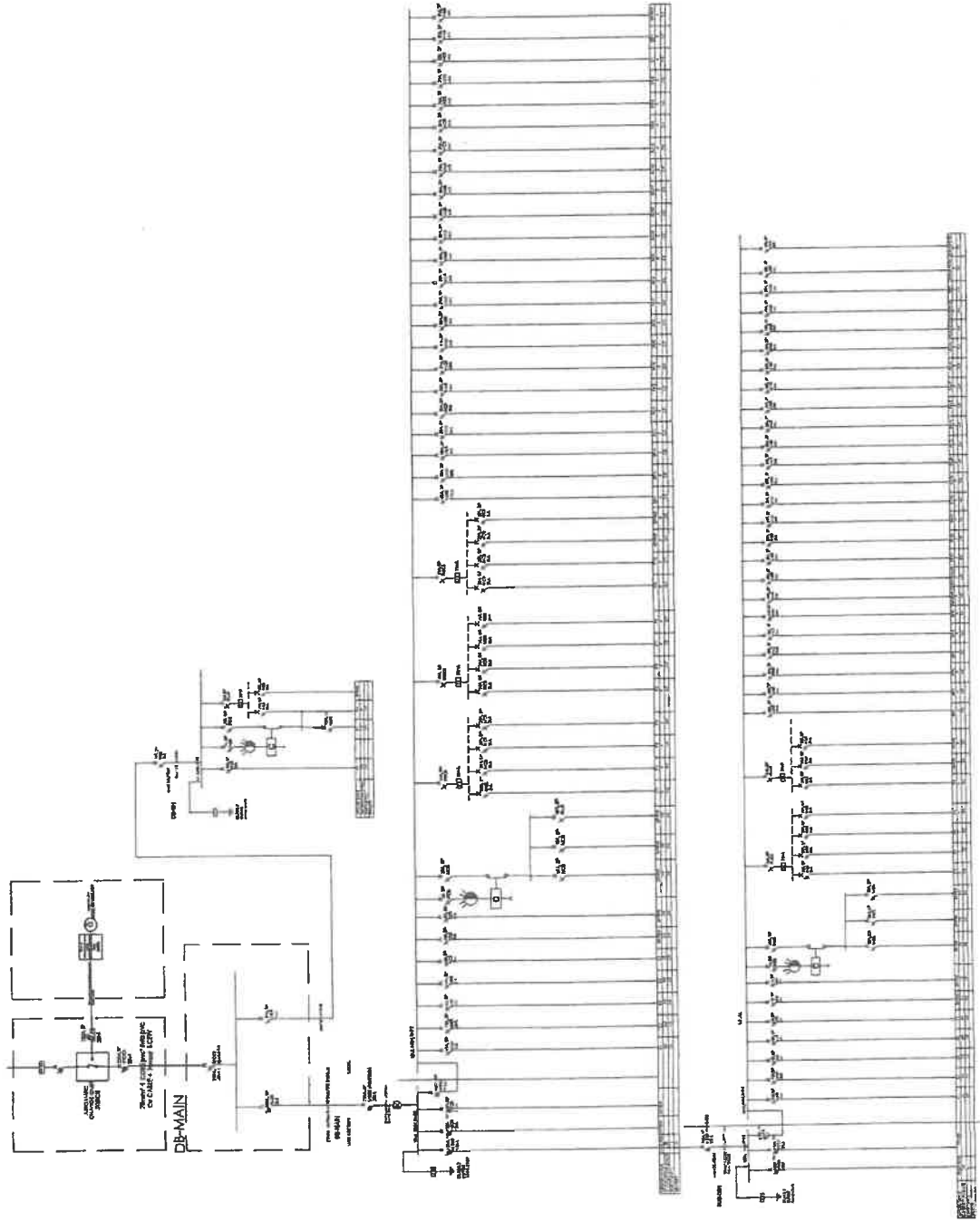
REV	DATE	DESCRIPTION
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2	2020/01/20	REVISED SCHEMATIC LAYOUT

REV	DATE	DESCRIPTION
1	2020/01/20	REVISED SCHEMATIC LAYOUT
2	2020/01/20	REVISED SCHEMATIC LAYOUT

REV	DATE	DESCRIPTION
1	2020/01/20	REVISED SCHEMATIC LAYOUT
2	2020/01/20	REVISED SCHEMATIC LAYOUT

REV	DATE	DESCRIPTION
1	2020/01/20	REVISED SCHEMATIC LAYOUT
2	2020/01/20	REVISED SCHEMATIC LAYOUT

REV	DATE	DESCRIPTION
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2	2020/01/20	REVISED SCHEMATIC LAYOUT



MV/LV SCHEMATIC LAYOUT

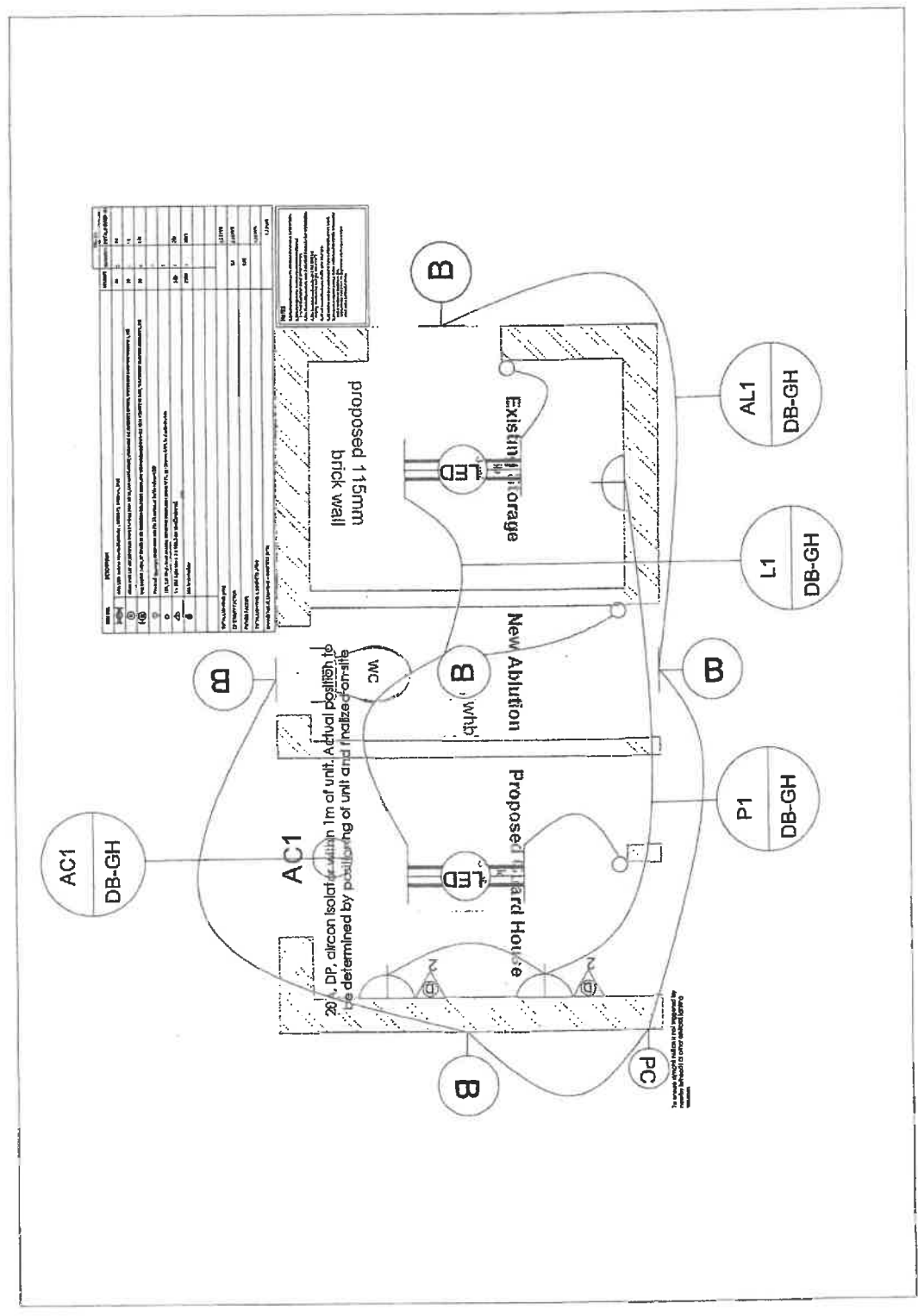
REV.	DATE	DESCRIPTION	BY
1	01/01/2023	ISSUED FOR CONSTRUCTION	ALF

PROJECT INFORMATION	
Project Name	GUARD HOUSE LIGHTS & SOCKETS LAYOUT
Client	MINISTRY OF DEFENCE
Location	AL-HADITHA
Scale	1:100
Drawn by	ALF
Checked by	ALF
Approved by	ALF

LEGEND	
Symbol	Description
(Circle with dot)	Lighting Point
(Circle with cross)	Socket Point
(Circle with line)	Lighting Fixture
(Circle with square)	Socket Fixture

NOTES	
1. All lighting fixtures shall be of the type specified in the schedule.	
2. All socket points shall be of the type specified in the schedule.	
3. All lighting fixtures shall be installed at the height specified in the schedule.	
4. All socket points shall be installed at the height specified in the schedule.	

PROJECT INFORMATION	
Project Name	GUARD HOUSE LIGHTS & SOCKETS LAYOUT
Client	MINISTRY OF DEFENCE
Location	AL-HADITHA
Scale	1:100
Drawn by	ALF
Checked by	ALF
Approved by	ALF

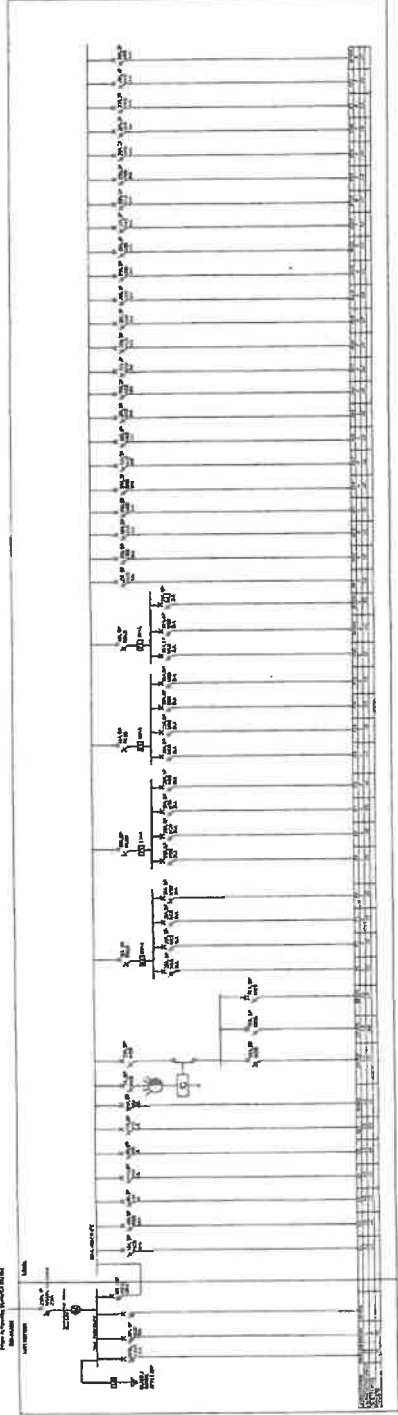


GUARD HOUSE LIGHTS & SOCKETS LAYOUT

LEGEND

①	CONNECTION POINTS TO THE MAIN
②	CONNECTION POINTS TO THE MAIN
③	CONNECTION POINTS TO THE MAIN

14.4. SCALE: 1:1
 14.5. PROJECT: DB-MAIN
 14.6. DRAWING: DB-MAIN-01



PROJECT DATA	
Project Name	DB-MAIN
Project Location	10/01/2017
Project Status	10/01/2017
Project Manager	10/01/2017
Project Engineer	10/01/2017
Project Designer	10/01/2017
Project Checker	10/01/2017
Project Approver	10/01/2017
Project Date	10/01/2017
Project Version	10/01/2017

14.7. PROJECT: DB-MAIN
 14.8. DRAWING: DB-MAIN-01
 14.9. SCALE: 1:1
 14.10. PROJECT: DB-MAIN
 14.11. DRAWING: DB-MAIN-01

14.12. PROJECT: DB-MAIN
 14.13. DRAWING: DB-MAIN-01
 14.14. SCALE: 1:1
 14.15. PROJECT: DB-MAIN
 14.16. DRAWING: DB-MAIN-01

DB-MAIN LAYOUT

UPINGTON DEPARTMENT OF LABOUR

Installation : INTERIOR LIGHTING

Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
Customer :
Processed by : Sibusiso Mkize
Date : 25.05.2021

Project description:
SUMMARY:

UPINGTON DEPARTMENT OF LABOUR

THE SIMULATIONS ARE DONE ACCORDING TO SANS 10114-1

PLEASE SEE THE COMPLETE REPORT FOR DETAILS.

CAT No.
90 X ALENA LED 44W 1500MM
13 X 9W DISK DOWNLIGHTER

The following values are based on precise calculations performed on calibrated lamps and luminaires, and their configurations, whereby gradual, unavoidable deviations can occur in practice. All guarantee claims are excluded for the specified data.

This exclusion of liability applies irrespective of the legal grounds for both damages and consequential damages suffered by users and third parties.

Object : UPINGTON DEPARTMENT OF LABOUR
Installation : INTERIOR LIGHTING
Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
Date : 25.05.2021

GENLUX LIGHTING
a lighting technology company

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1.2 9W SPL073 (9W SPL073)	
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Object : UPINGTON DEPARTMENT OF LABOUR
Installation : INTERIOR LIGHTING
Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
Date : 25.05.2021

GENLUX LIGHTING
a lighting technology company

1 Luminaire data

1.1 GENLUX LIGHTING, ALENA LED 44W 1500mm 8... (ALENA LED 44W 1...)

1.1.1 Data sheet

Manufacturer: GENLUX LIGHTING

ALENA LED 44W 1500mm 840

ALENA LED 44W 1500mm 840

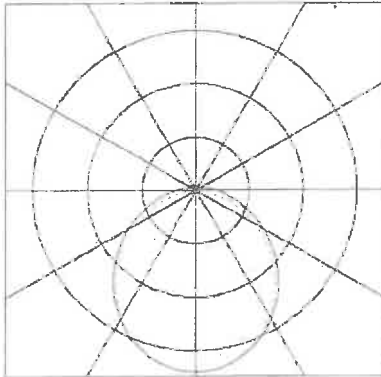
Luminaire data

Luminaire efficiency : 100%
Luminaire efficacy : 107.95 lm/W
Classification : A41 ↓94.0% ↑6.0%
CIE Flux Codes : 47 77 93 94 100
UGR 4H 8H : 21.8 / 20.9
Power : 44 W
Luminous flux : 4750 lm

Equipped with

Quantity : 1
Designation : LEDLine
Colour : 4000
Luminous flux : 4750 lm
Colour reproduction : 85

Dimensions : 1450 mm x 146 mm x 58 mm



Object : UPINGTON DEPARTMENT OF LABOUR
Installation : INTERIOR LIGHTING
Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
Date : 25.05.2021

1 Luminaire data

1.2 9W SPL073 (9W SPL073)

1.2.1 Data sheet

9W SPL073

9W SPL073

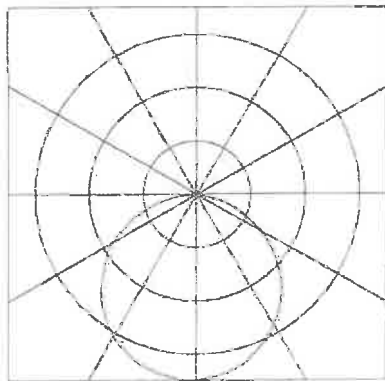
Luminaire data

Luminaire efficiency : 100%
Luminaire efficacy : 91.33 lm/W
Classification : A40 ↓99.4% ↑0.6%
CIE Flux Codes : 47 79 96 99 100
UGR 4H 8H : 25.8 / 28.0
Power : 9.8 W
Luminous flux : 895 lm

Dimensions : Ø120 mm x 1 mm

Equipped with

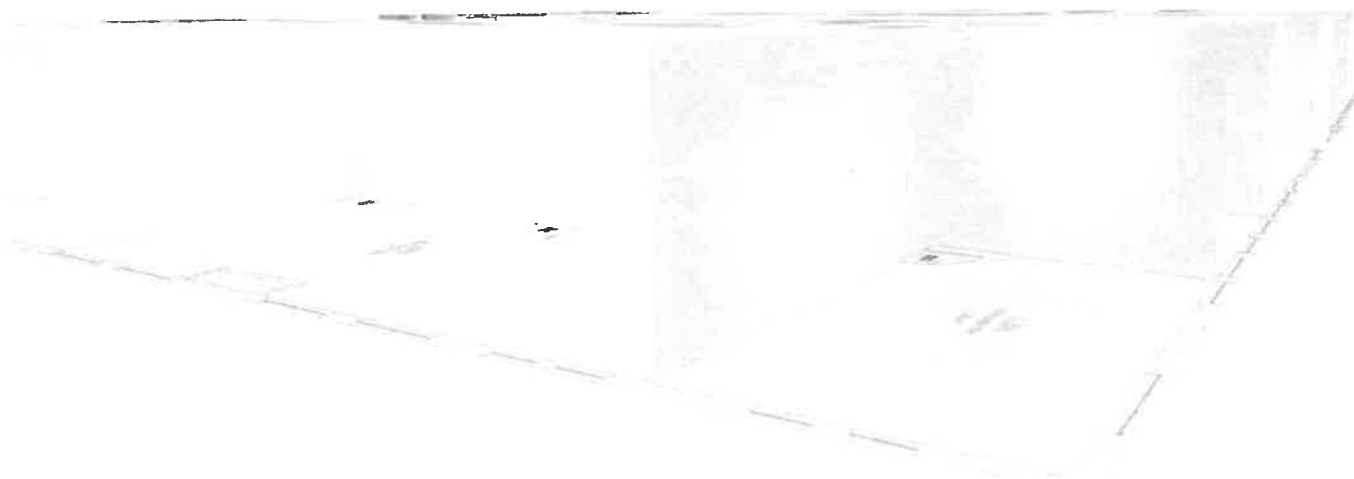
Quantity : 1
Designation : 9W
Colour : 4000k
Luminous flux : 895 lm
Colour reproduction : 80



Object : UPINGTON DEPARTMENT OF LABOUR
Installation : INTERIOR LIGHTING
Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
Date : 25.05.2021

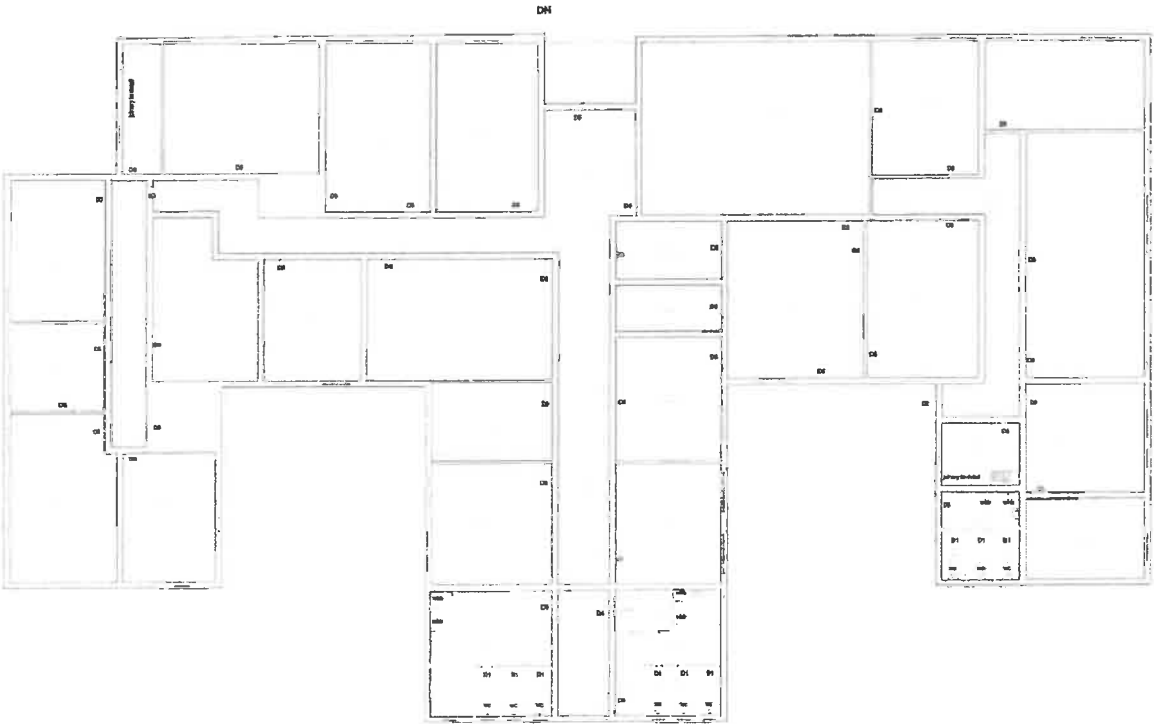
Description, Floor 1

.1 Floor 3D



Description, Floor 1

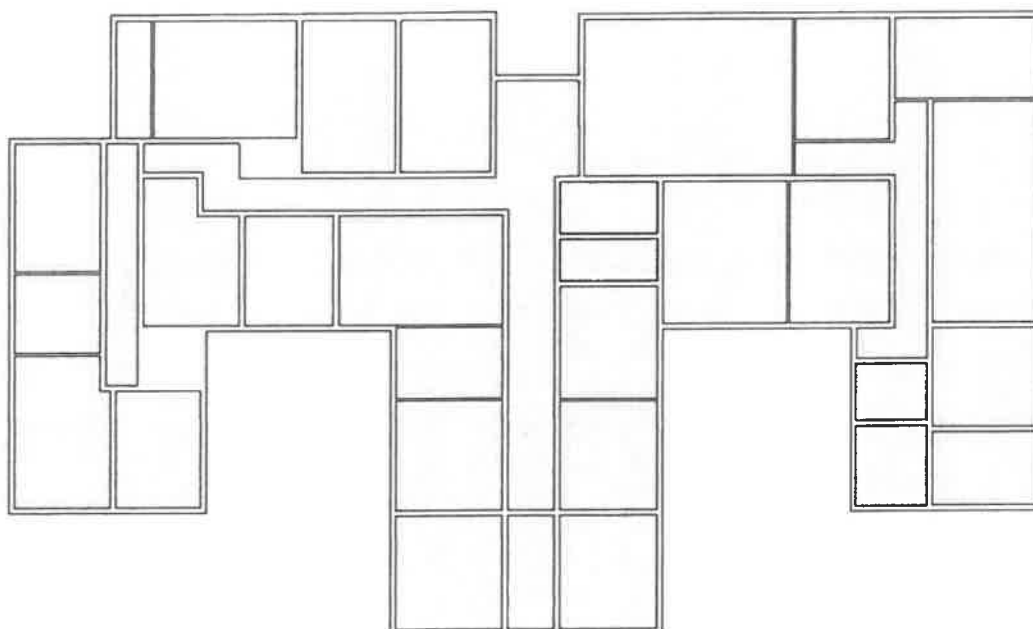
.2 Floor plan



Object : UPINGTON DEPARTMENT OF LABOUR
 Installation : INTERIOR LIGHTING
 Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
 Date : 25.05.2021

Summary, Floor 1

3 Floor overview



Number of rooms : 34
 Total area : 1494 m²
 Number of luminaires : 103
 Total luminous flux of all lamps : 439135 lm
 Total power : 4087.4 W
 Total power per area : 2.74 W/m²

[Light Blue Box] Uncalculated
 [White Box] Calculated

Parts list

Type No.\Make

- | | | GENLUX LIGHTING | |
|---|----|------------------------|------------------------------|
| 1 | 90 | Order No. | : ALENA LED 44W 1500mm 840 |
| | | Luminaire name | : ALENA LED 44W 1500mm 840 |
| | | Equipment | : 1 x LEDLine 44 W / 4750 lm |
| | | | |
| 2 | 13 | Order No. | : 9W SPL073 |
| | | Luminaire name | : 9W SPL073 |
| | | Equipment | : 1 x 9W 9.8 W / 895 lm |

Object : UPINGTON DEPARTMENT OF LABOUR
 Installation : INTERIOR LIGHTING
 Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
 Date : 25.05.2021

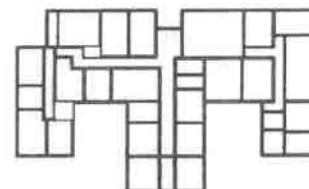
Summary, Floor 1

3 Floor overview

Rooms

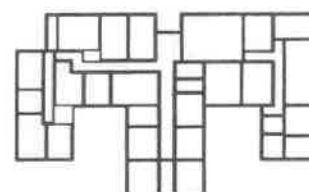
Room 1

Total luminous flux of all lamps	---
Total power	---
Total power per area (798 m²)	---
Em	---
Emin	---
Emin/Em (Uo)	---
UGR	---



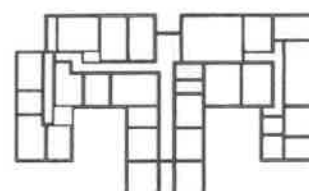
Room 2

	3 x Luminaires
Total luminous flux of all lamps	14250 lm
Total power	132 W
Total power per area (24 m²)	5.43 W/m²
Em	509 lx
Emin	342 lx
Emin/Em (Uo)	0.67
UGR	<=19.9



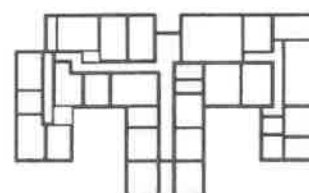
Room 3

	2 x Luminaires
Total luminous flux of all lamps	9500 lm
Total power	88 W
Total power per area (17 m²)	5.22 W/m²
Em	434 lx
Emin	312 lx
Emin/Em (Uo)	0.72
UGR	<=19.0



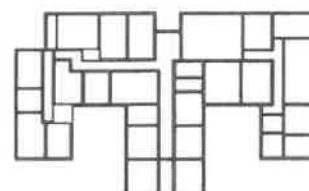
Room 4

	2 x Luminaires
Total luminous flux of all lamps	9500 lm
Total power	88 W
Total power per area (12 m²)	7.64 W/m²
Em	563 lx
Emin	402 lx
Emin/Em (Uo)	0.71
UGR	<=17.9



Room 5

	3 x Luminaires
Total luminous flux of all lamps	14250 lm
Total power	132 W
Total power per area (19 m²)	7.09 W/m²
Em	599 lx
Emin	424 lx
Emin/Em (Uo)	0.71
UGR	<=19.2

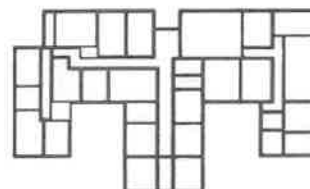


Object : UPINGTON DEPARTMENT OF LABOUR
 Installation : INTERIOR LIGHTING
 Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
 Date : 25.05.2021

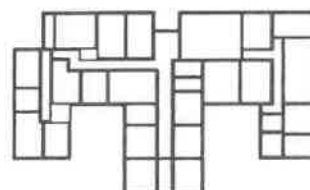
Summary, Floor 1

3 Floor overview

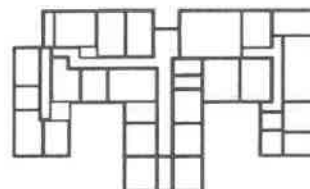
Room 6 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (21 m²) 6.19 W/m²
 Em 529 lx
 Emin 257 lx
 Emin/Em (Uo) 0.49
 UGR <=19.6



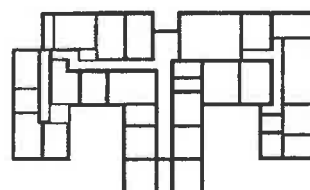
Room 7 4 x Luminaires
 Total luminous flux of all lamps 19000 lm
 Total power 176 W
 Total power per area (28 m²) 6.20 W/m²
 Em 598 lx
 Emin 421 lx
 Emin/Em (Uo) 0.70
 UGR <=20.2



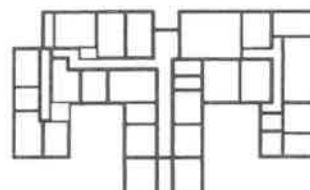
Room 8 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (24 m²) 5.40 W/m²
 Em 496 lx
 Emin 338 lx
 Emin/Em (Uo) 0.68
 UGR <=19.7



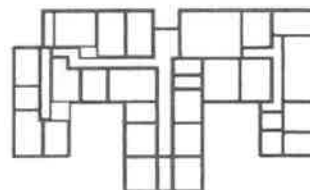
Room 9 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (24 m²) 5.55 W/m²
 Em 505 lx
 Emin 346 lx
 Emin/Em (Uo) 0.69
 UGR <=19.7



Room 10 2 x Luminaires
 Total luminous flux of all lamps 9500 lm
 Total power 88 W
 Total power per area (16 m²) 5.34 W/m²
 Em 445 lx
 Emin 315 lx
 Emin/Em (Uo) 0.71
 UGR <=18.8



Room 11 4 x Luminaires
 Total luminous flux of all lamps 19000 lm
 Total power 176 W
 Total power per area (31 m²) 5.66 W/m²
 Em 555 lx
 Emin 393 lx
 Emin/Em (Uo) 0.71
 UGR <=20.1

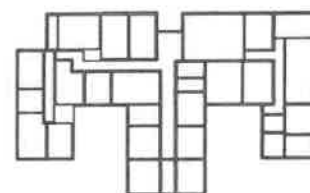


Object : UPINGTON DEPARTMENT OF LABOUR
 Installation : INTERIOR LIGHTING
 Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
 Date : 25.05.2021

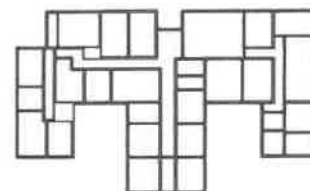
Summary, Floor 1

3 Floor overview

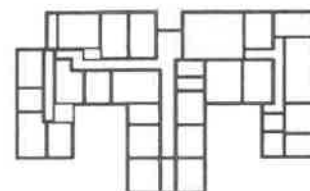
Room 12 2 x Luminaires
 Total luminous flux of all lamps 9500 lm
 Total power 88 W
 Total power per area (13 m²) 6.68 W/m²
 Em 521 lx
 Emin 398 lx
 Emin/Em (Uo) 0.76
 UGR <=18.7



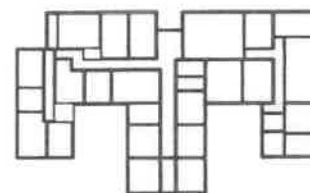
Room 13 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (20 m²) 6.50 W/m²
 Em 582 lx
 Emin 369 lx
 Emin/Em (Uo) 0.63
 UGR <=19.3



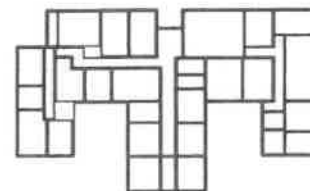
Room 14 6 x Luminaires
 Total luminous flux of all lamps 28500 lm
 Total power 264 W
 Total power per area (56 m²) 4.74 W/m²
 Em 552 lx
 Emin 388 lx
 Emin/Em (Uo) 0.70
 UGR <=21.2



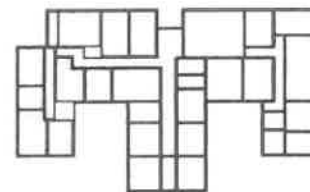
Room 15 4 x Luminaires
 Total luminous flux of all lamps 19000 lm
 Total power 176 W
 Total power per area (22 m²) 8.02 W/m²
 Em 425 lx
 Emin 204 lx
 Emin/Em (Uo) 0.48
 UGR ---



Room 16 4 x Luminaires
 Total luminous flux of all lamps 19000 lm
 Total power 176 W
 Total power per area (30 m²) 5.85 W/m²
 Em 572 lx
 Emin 402 lx
 Emin/Em (Uo) 0.70
 UGR <=20.3



Room 17 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (25 m²) 5.31 W/m²
 Em 499 lx
 Emin 320 lx
 Emin/Em (Uo) 0.64
 UGR <=19.5

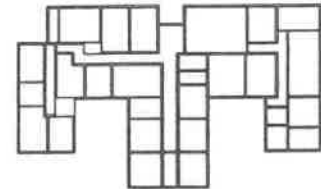


Object : UPINGTON DEPARTMENT OF LABOUR
 Installation : INTERIOR LIGHTING
 Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
 Date : 25.05.2021

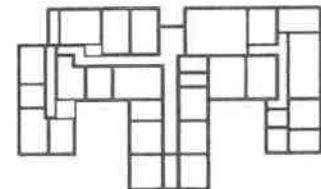
Summary, Floor 1

3 Floor overview

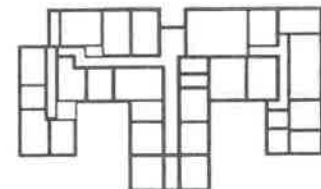
Room 18 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (20 m²) 6.57 W/m²
 Em 578 lx
 Emin 399 lx
 Emin/Em (Uo) 0.69
 UGR <=19.1



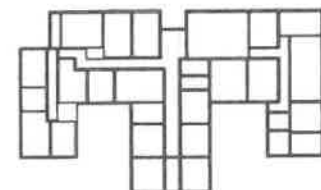
Room 19 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (20 m²) 6.50 W/m²
 Em 556 lx
 Emin 395 lx
 Emin/Em (Uo) 0.71
 UGR <=19.6



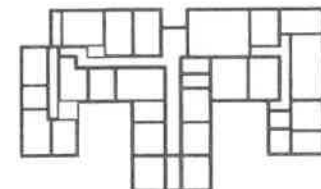
Room 20 6 x Luminaires
 Total luminous flux of all lamps 28500 lm
 Total power 264 W
 Total power per area (41 m²) 6.43 W/m²
 Em 645 lx
 Emin 419 lx
 Emin/Em (Uo) 0.65
 UGR <=20.8



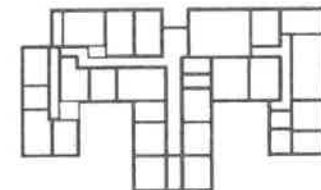
Room 21 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (18 m²) 7.21 W/m²
 Em 619 lx
 Emin 415 lx
 Emin/Em (Uo) 0.67
 UGR <=18.7



Room 22 2 x Luminaires
 Total luminous flux of all lamps 9500 lm
 Total power 88 W
 Total power per area (14 m²) 6.48 W/m²
 Em 507 lx
 Emin 383 lx
 Emin/Em (Uo) 0.76
 UGR <=18.7



Room 23 1 x Luminaires
 Total luminous flux of all lamps 4750 lm
 Total power 44 W
 Total power per area (7 m²) 6.46 W/m²
 Em 393 lx
 Emin 294 lx
 Emin/Em (Uo) 0.75
 UGR <=17.5

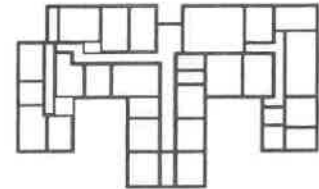


Object : UPINGTON DEPARTMENT OF LABOUR
 Installation : INTERIOR LIGHTING
 Project number : GL - 20210525 - UPINGTON DEPARTMENT OF LABOUR
 Date : 25.05.2021

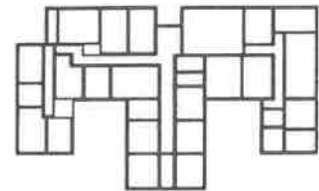
Summary, Floor 1

3 Floor overview

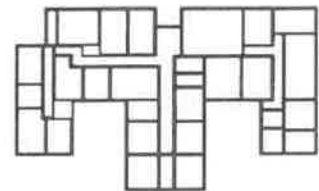
Room 24 1 x Luminaires
 Total luminous flux of all lamps 4750 lm
 Total power 44 W
 Total power per area (9 m²) 5.16 W/m²
 Em 335 lx
 Emin 228 lx
 Emin/Em (Uo) 0.68
 UGR <=18.3



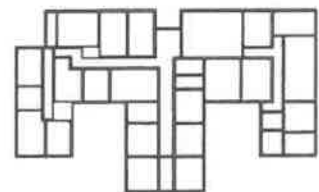
Room 25 1 x Luminaires
 Total luminous flux of all lamps 4750 lm
 Total power 44 W
 Total power per area (7 m²) 6.38 W/m²
 Em 361 lx
 Emin 231 lx
 Emin/Em (Uo) 0.64
 UGR <=18.3



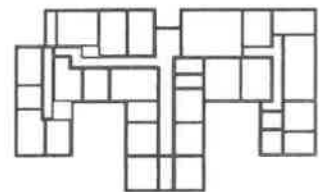
Room 26 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (18 m²) 7.15 W/m²
 Em 615 lx
 Emin 417 lx
 Emin/Em (Uo) 0.68
 UGR <=18.9



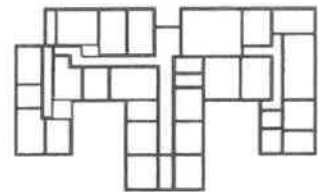
Room 27 3 x Luminaires
 Total luminous flux of all lamps 14250 lm
 Total power 132 W
 Total power per area (18 m²) 7.35 W/m²
 Em 625 lx
 Emin 424 lx
 Emin/Em (Uo) 0.68
 UGR <=18.8



Room 28 6 x Luminaires
 Total luminous flux of all lamps 28500 lm
 Total power 264 W
 Total power per area (62 m²) 4.25 W/m²
 Em 301 lx
 Emin 50 lx
 Emin/Em (Uo) 0.16
 UGR ---



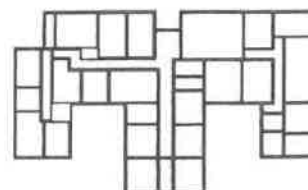
Room 29 2 x Luminaires
 Total luminous flux of all lamps 9500 lm
 Total power 88 W
 Total power per area (13 m²) 6.70 W/m²
 Em 354 lx
 Emin 176 lx
 Emin/Em (Uo) 0.50
 UGR <=20.4



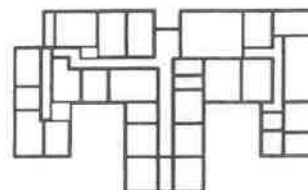
Summary, Floor 1

3 Floor overview

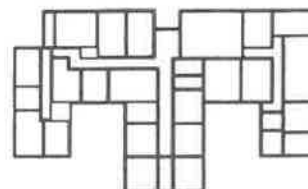
Room 30	1 x Luminaires
Total luminous flux of all lamps	4750 lm
Total power	44 W
Total power per area (9 m ²)	4.89 W/m ²
Em	310 lx
Emin	176 lx
Emin/Em (Uo)	0.57
UGR	<=19.0



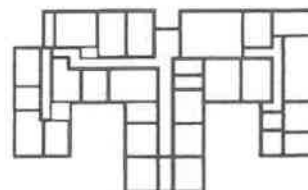
Room 31	4 x Luminaires
Total luminous flux of all lamps	7435 lm
Total power	73.4 W
Total power per area (10 m ²)	7.57 W/m ²
Em	211 lx
Emin	48 lx
Emin/Em (Uo)	0.23
UGR	---



Room 32	4 x Luminaires
Total luminous flux of all lamps	7435 lm
Total power	73.4 W
Total power per area (21 m ²)	3.48 W/m ²
Em	153 lx
Emin	0.0 lx
Emin/Em (Uo)	---
UGR	---



Room 33	8 x Luminaires
Total luminous flux of all lamps	11015 lm
Total power	112.6 W
Total power per area (19 m ²)	6.00 W/m ²
Em	170 lx
Emin	68 lx
Emin/Em (Uo)	0.40
UGR	---



Room 34	1 x Luminaires
Total luminous flux of all lamps	4750 lm
Total power	44 W
Total power per area (7 m ²)	6.34 W/m ²
Em	329 lx
Emin	171 lx
Emin/Em (Uo)	0.52
UGR	<=19.0

