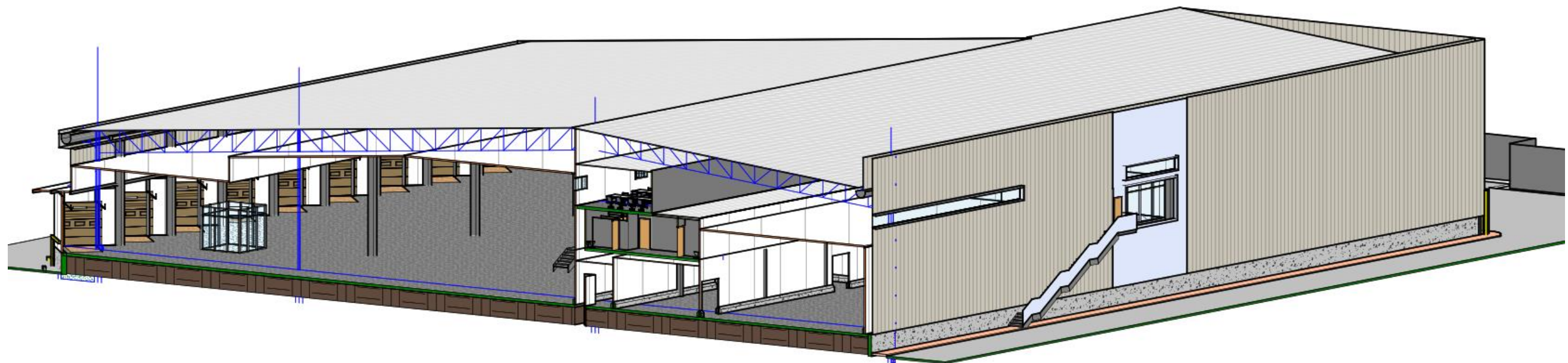


Sundale Dairy ELIDZ Zone1A

CONTRACT NO.: EB/SUN/EXT/04/19/Z1A

DESIGN SPECIFICATIONS & CRITERIA



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1 CARTOON SECTION



ARCHITECTURAL

E.1: Design Criteria and Parameters
The design criteria applied to the electrical engineering services shall include the following, namely :
a Capital costs
b Operational and maintenance requirements and costs
c Ease of functionality, operation and maintenance
Compliance with general energy efficiency and / or sustainability standards.

E.2: Bulk Electricity Service Connection

The East London Industrial Development Zone is the licensed electricity supply authority within the defined industrial zone, and in terms of its authority granted by National Electricity Regulator (South Africa), has the right to supply electricity to all customers situated within the industrial development zone.
The Dairy facility presently has an 11 000 V, 1.8 MVA bulk electricity service connection. Their present maximum demand is considerably lower than the capacity provided to them. It is anticipated that the electrical requirement of the proposed extensions to their facility, to accommodate the Cheese Factory and additional Cold Storage, will be accommodated within the spare capacity available and that the existing bulk electricity service connection need not be upgraded.
However, it remains the responsibility of the appointed Design Team to consider the electrical loads presented to themselves by the East London Industrial Development Zone and / or User (Tenant) still be submitted to the East London Industrial Development Zone for the necessary bulk electricity service connection, for record purposes.
The East London Industrial Development Zone shall not impose any electricity service connection fees and / or electricity account deposits on the project.
If required, the project shall be responsible for the necessary extension of the existing medium voltage reticulation.

E.3: Medium Voltage Switchgear and Equipment

It is anticipated that the existing medium voltage switchgear and equipment shall suffice. However, if the existing medium voltage switchgear and equipment has to be extended and / or upgraded in any way, the extension and / or upgrading thereof shall comply with the standard specifications set by the ELIDZ which shall be made available upon request.
Briefly, the standard medium voltage switchgear and equipment may be summarised as follows:
a All 11 000 V switchboard (with "incomers", "feeders", "transformer feeders" and "voltage transformer" panels as is necessary
b All medium voltage equipment fed, and inter-connected, by a dual, redundant and ring-fed medium voltage cable network
c Over current & earth fault relay (Alstom MICOM P122 or equal and approved), Trip circuit monitoring, Buchholz & oil temperature auxiliary relays (Alstom MVA4 or equal and approved), Intertrip relay, etc.
d Customer energy and demand electricity metering
11 kV / 420 V, Dyn11, transformers, sized as is necessary, with copper windings, suitable for outdoor application in coastal areas, all compliant with SANS 780

C.1 External Roads, Hardstand and Stormwater

External hardstands will consist of 200mm thick, Unreinforced 30MPa/38mm concrete on two layers of imported G5 type material. Joining of concrete surfaces will be designed by the Engineer and will consist of sealed saw cut joints and sealed construction joints. Construction joints will be fitted with 115 x 115 x 6mm galvanised steel plates. Saw cut joints to be min 6mm width with an effective cut of 1/3 the depth of the hard stand surface, cut in a two-cut process. Construction joints to be min 6mm effective width fitted with a backing strip and sealant. Joint sealant to be specified and approved by the ELIDZ, joint sealant to be silicone free.
Saw cut panels to have maximum dimensions of 4.5m x 4.5m.
Expansion joints against building edges or structures.
Finishes of hardstand areas will be to a mechanical foot "Pan Finish" texture.
Curing of hardstand surface will be via an approved curing compound acceptable to the design Engineer.

Hardstands will be cast to falls away from buildings to drainage collectors such as kerb inlets along roads edge with underground concrete storm water pipes class 1000, sized to take a 1 in 5 year flood event. Heavier rain will result in surface water drainage across the site to site entrances and onto external roads. Where collection of storm water cannot be achieved along the coachhardstand edge, drop inlet structures with heavy duty grill covers are to be positioned at the required design intervals and trapezoidal shaping of hardstands designed to achieve drainage to falls not exceeding 120 to the drop inlets must be constructed. Where there is evidence of sub-surface ground water on site, A sub soil drainage system must be designed by the engineer.

Office and visitor parking area – will consist of 200mm thick Unreinforced 30MPa/38mm concrete as per the hardstand specification.

Traffic manoeuvring models are to be verified and reported on to the ELIDZ, and to the requirements of the tenant.

C.2 Kerbing and Access Ramps

Hardstand edges finished with 180mm high precast Fig 3 type barrier kerbs set on 15MPa concrete haunching. Space from building to back of kerb is finished with bond paved sidewalks of varying widths with lawns or planted areas in between. Pavers will consist of 80mm interlocking pavers colour to architect's specification on a 2 x 150mm G5 type base.

Access Ramps with vehicle traffic will consist of 200mm thick, Unreinforced 30MPa/38mm concrete on two layers of imported G5 type material. The access ramps to have a 1:13 slope between hardstand and finished floor level with 10mm weather step.
Access ramps for pedestrian use only will consist of 100mm thick, unreinforced 25MPa/19mm concrete on a 150mm subbase layer of G7 type material with a 150mm base layer of G5 type material. Concrete panels via saw cuts at 2.5m max.

C.3 Access to Sewage and Water Reticulation.

Municipal services are provided along the road reserve. The site is serviced with a sewer and water connection point.

The underground sewers servicing the building must be provided to accommodate all the internal plumbing outlets. The minimum diameter and class are 110mm uPVC Class 34 solid wall pipe.

Water supply mains provide 20 kl per day per hectare of erf area with a max head of 90m and a min of 25m. Separate metered connections to each building must be provided. A separate external fire main must be provided to supply the fire hydrants for the building.



STRUCTURAL

E.4: Medium Voltage Cables

All single core and three core cables with stranded copper conductors and insulated with cross linked polyethylene, shall comply with SANS 1339.
Conductors shall comprise standard annealed copper, complying with the requirements for class 2 conductors in SANS 1411-1.
All single core cables shall comply with the requirements given in tables 11, 12 and 13 of SANS 1339:1981.
All three core cables shall comply with the requirements given in tables 23, 25 and 26 of SANS 1339:1981 for type A cable and tables 29, 31, 32 and 33 for type B cables.

E.5: Load Shedding / Load Curtailment

The Buffalo City Metropolitan Municipality (BCM) has recently directed that the East London Industrial Development Zone will no longer be exempt from any electrical load shedding implemented by themselves and / or Eskom.
Furthermore, BCM has directed the East London Industrial Development Zone begin participating in their (BCM) electrical load curtailment programme.
Therefore, it is imperative that all electricity users within the East London Industrial Development Zone comply with the requirement in that when directed to do so, they reduce their operating electrical load by 20 % of their base load, for the duration of the load shedding cycle.
The electrical installation of the new Dairy Facility is to be designed such that participation in this electrical load curtail programme is possible.
Furthermore, and is this project is an extension of an existing facility, it is imperative that the design of the electrical load curtailment be such that the value of the reduction in the operating electrical load be calculated on the base load of the existing and proposed facility, for the duration of the load shedding cycle.

E.6: Low Voltage Reticulation

The low voltage reticulation shall comprise the following, namely:
a Extension to / modification of existing Main Low Voltage Panel so as to accommodate the proposed new facility
b Main Low Voltage Panel, termed MLVP B, housed within the new facility
c A series of electrical distribution boards throughout the new facility servicing the respective load centres i.e. Cheese Factory, Cold Storage, AC Plant, Refrigeration Plant, etc.
Note: all electrical distribution boards and associated low voltage cables necessary for the User (Tenant) internal electrical installation shall be provided under this contract
d All main low voltage panels and respective electrical distribution bars shall be inter-connected by a low voltage cable network

Electricity feeder cables shall be Cu PVC PVC SWA ECC PVC cables, with stranded conductors.
All main low voltage panels and electrical distribution boards are to be manufactured by a reputable company, with relevant experience in the manufacturing of low voltage panels, electrical distribution boards, control panels, etc.



CIVIL

E.7: Builder's and related Works, Trench Excavations, Brick-built Enclosures (Manholes), Ducts

The Contractor shall be responsible for the necessary co-ordination and timing of the builder's and related Works pertaining to the Contract.
All Utility Rooms shall be constructed with the necessary floor trenches for the installation of all associated electrical services.
The Contractor shall undertake all trench excavations, including backfilling and compaction, required for the electrical installation.
The Contractor shall be responsible for the provision of the brick-built enclosures (manholes).
The Contractor shall be responsible for the provision of all ducts necessary for the electrical and, telecommunications, and associated installations. In summary, ducts shall be installed beneath (across) all walkways, driveways, and finished surfaces.
The ducts shall be manufactured from a high-density polyethylene with a double wall construction, allowing a corrugated outer wall finish and a smooth inner wall finish, and of the internal diameters as indicated on the attached drawings.
All ducts shall be minimum 160 mm outer diameter, with minimum 137 mm internal diameter.

E.8: Standby Generator Set / Uninterruptible Power Supply Installation

The Contractor shall not be responsible for the provision of a generator set.
The Contractor shall be not be responsible for the provision of an uninterruptible power supply unit.

E.9: Lighting Installation

A lighting installation, in accordance with the relevant regulations, which will ensure the efficient and proper usage of all spaces throughout the new buildings, shall be provided.
All luminaires specified shall be fitted with light emitting diode type lamps.
The lighting design calculations shall be based on achieving the minimum lighting levels, in accordance with the relevant South African National Standards documentation, as follows:
• Manufacturing General Working Areas (*) 350 lux
• Administrative Buildings Entrance Halls 100 lux
Reception Areas 100 lux
Board rooms, offices 300 lux
Computer rooms 500 lux
• Maintenance Buildings General 300 lux

The lighting design shall (where applicable) take into account and include the following, namely:
a Specified luminaires shall provide high levels of luminous flux and be fitted with electronic control gear
b Specified lamps shall provide the correct colour rendering for the application and use energy efficient lamps i.e. light emitting diode (LED) type
c Maximum natural daylight usage and controllable light levels
d Task specific light sources
e Multiple control for light circuits / zones covering areas greater than 100 m²

Emergency exit signage and route lighting shall be provided for any evacuation procedures that could occur.
Allowances shall be made for decorative post-top type luminaires, with light emitting diode type lamps, on fireplaces poles to be installed throughout the complex including along all walkways, roadways and parking areas.
The luminaires shall comply with the specification detailed in the Project Specification.
All low voltage single core conductors shall be of the PVC insulated type with stranded copper conductors, rated at 600 V general service duty and manufactured in accordance with SANS 1507 - 1990.



ELECTRICAL

E.10: Small and Large Power

Generally, power shall be provided to the various areas by means of switched socket outlets. The layout and quantity of the switched socket outlets shall be determined by the use of the specific room, the equipment to be installed therein and the services / activities to be rendered from these.
Switched socket outlets shall be provided approximately every 10 m² in all passages and public areas for cleaning and maintenance purposes.
Should the activity or specific equipment require, i.e. within the kitchen areas, the power supply provided shall be in the form of a switched isolator.
As the design responsibility ends at the switched socket outlet or isolator points, we cannot guarantee what the End User is going to connect to the installation. Therefore, it is only possible to encourage (and not guarantee) energy savings at switched socket outlet and isolator points. All low voltage single core conductors shall be of the PVC insulated type with stranded copper conductors, rated at 600 V general service duty and manufactured in accordance with SANS 1507 - 1990.

E.11: Power Factor Correction and Harmonic Filtration

The Contractor shall be responsible for the design and supply of necessary power factor correction and harmonic filtration equipment, designed to service the electrical installation.



MECHANICAL & FIRE

M.1: Air-conditioning

The Auxiliary Office-related Buildings (Production Offices, Server Rooms, Drivers Kitchen, Canteen, etc.) shall be provided with Daikin inverter split type air-conditioning equipment. The air-conditioning system shall be an air cooled, inverter split type system consisting of one outdoor unit and one indoor unit, each unit having capability to control heating or cooling independently to suit the requirements of the rooms.
The refrigeration compressor in the outdoor unit shall be equipped with inverter controller and capable of changing the rotating speed to follow variations in cooling or heating load.
The system shall be capable of operating continuously at ambient temperatures between -5°C and 40°C. Both indoor and outdoor units shall be assembled, tested, and charged with refrigerant at the factory.

M.2 Fire Protection

The site and facility / building are to be designed and constructed in accordance with the National Building Regulations SANS 10400 "Part T".

M.3: Ventilation

Ventilation in building will be provided in terms of the stipulated minimums in SANS 10400 "Part O" and the OHS Act under the Environmental Regulations for Workplaces.
Air extraction systems will be provided for ablation facilities, canteens and tea kitchens in accordance with SANS 10400 "Part O".
Fresh air will be provided for all air-conditioned spaces in accordance with SANS 10400 "Part O". Room areas are to be less than 500m² to eliminate the need for smoke extraction, according to SANS 10400 "Part T".



GENERAL

G.1 Effluent Disposal

Tenant is responsible for industrial effluent disposal and applications for Trade Effluent Permit.

G.2 Access Control

Sundale has access to an integrated access control system to monitor and control the entrance and egress of all staff and vehicles to and from each zone of the IDZ. The ELIDZ will provide tenants with the opportunity to subscribe to the central access control system subject to payment of a defined subscriber fee.

G.3 Logistic Facility

The site shall be a logistic facility subject to tenants making their own contractual arrangements with the service provider of the logistic facility.

G.4 Landscaping

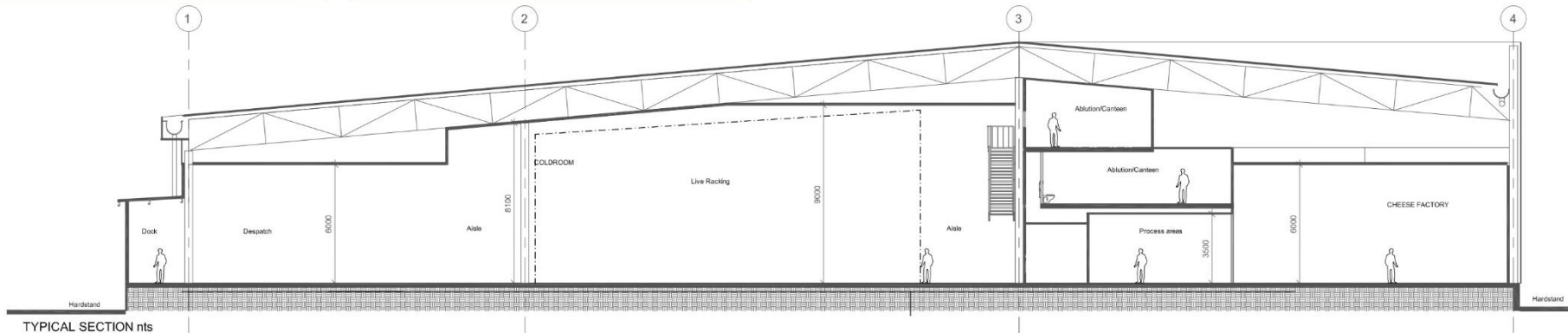
ELIDZ will provide site landscaping.

G.5 Exclusions

The following services, unless otherwise stated or agreed, are not provided by the landlord:

- Standby diesel generators.
- UPS and computer equipment.
- Internal computer network cabling.
- Purpose made computer access flooring.
- Internal PBX, data and telephone networks, cabling.
- Power factor correction equipment.
- Electricity reticulation from the internal site electricity network to tenant's plant components.
- Special foundations for tenant's equipment.
- Internal divisions walls within factory.
- Catering and kitchen equipment.
- Lockers.
- Compressed air supply and equipment.
- Gas suppression.
- Bulk storage tanks.
- Compressor rooms.
- Forklift refuelling enclosures.
- AC and ventilation plant including plant rooms to process areas.
- Water supply, effluent control and other under floor wet services to process areas.
- Specific fire protection other than general industrial fire protection.
- Steam generation.
- Furniture, fixtures and fittings.
- Building, operational and tenant signage.
- Logistics equipment.

Protection of building and equipment from process or logistics equipment. Special security systems and access control.
Specialised lifting equipment and crawler beams.



TYPICAL SECTION nts

A.1 Ceilings

Canteen and Ablutions - (Non Process areas)
"Non-process" rooms on the Ground floor and upper floor ablutions and canteens to be finished with 600 x 600mm suspended vinyl clad gypsum ceiling tiles laid in exposed aluminium T-grid suspended from roof structure/ slab

A.2 Walls

Canteen and Ablutions - (Non Process areas)
Canteen, change room and Ablution spaces are located on the first and second floor; in-between the coldroom and cheese factory double volume spaces :

- 100mm Insulated wall panels between the Process and Non-Process areas.
- Non-process Dry areas to be seamless painted 90mm dry wall partition with aluminium top track, with 200 high skirting Plasco n "Wall n Air" in light tint colour.
- Non-Process Wet areas to 90mm Moisture Resistant Silicone impregnated dry wall partitioning be sealed with Tal Superflex flexible waterproof membrane capable of accommodating normal structural movement in the background and suitable for waterproofing internal wet areas. Continuous membrane from underside of floor finish up to the wall and flush with the ceiling. Walls to be tiled up to ceiling level and bonded with appropriate adhesive and movement joints.
- Showers to be lined with 21mm Marine plywood sealed in waterproofing as described above and tiled as ditto

A.3 Floors

Coldroom and Cheese Factory:
Cold store, Product dry store and all Process areas to be Insulated Wall panels. Thickness of wall between 50mm to 100mm, depending on the internal thermal requirements of the Room.
Insulated panel from floor to ceiling with finishes, flashing and trims to be Chromadeck. No aluminium. Bump rails and Bollards to be provided at Forklift circulation areas and at dock levelers.

A.4 Doors

Canteen and Ablutions - (1st and 2nd floor)
Structure: 50mm screed on PRESTRESSED HOLLOW CORE SLABS supported on steel structure to Eng Detail.
Finishes: Porcelain tiles and Heavy duty flexible hygienic Vinyl sheet.
Cold Room and Cheese Factory
Polyurethane finish on floor sloped to drains & channels

A.5 Openings in Envelope - Roller Shutter and Sectional doors

Roller Shutter: galvanneal and manually operated by chain slatted doors. Door openings will be formed and framed using steel channel sections.
Sectional doors: with pre-painted skins, hot dipped galvanneal steel with rigid polyurethane insulation core

A.6 Openings in Envelope - Windows

Generally, no openings in the steel structure will be made for windows. Windows fixed onto side cladding rails. External Openable Windows to be aluminium Sheerline 36. External Curtain wall to be Sheerline 90

A.7 Roof Sheetting and Insulation

Hulett's Aluminium GRS Zip-Tek, 0.9mm thick with embossed PVDF finish on exterior and standard backing coat to underside fixed to galvanneal cold rolled purlins with isolation tape between purlin and roof sheet. Owens Corning SA 50mm Factorytile insulation laid over purlins in single lengths and supported on galvanneal straining wires at 300mm centres.

A.8 Gutters and Downpipes

Internal gutter:
GRP half-round gutters with integral fibreglass drop-outs at 12m c/c's with "Gebert Pluvia" rainwater head at base of each drop-out. Each head to be serviced by 2 no. "Gebert Pluvia" continuous HDPE welded pipes, suspended to approved Gebert detail from gutter support structure. Gutter support would be as per engineers specification
Rainwater heads and downpipes are located internal to the building on east and west extremities of the gables.

A.9 Side Cladding

Hulett's Aluminium GRS BR7 profile, 0.8mm thick with embossed PVDF finish on exterior and standard backing coat on inside from eaves to finished floor level fixed to galvanneal steel girt rails to all external walls.
No side wall insulation is provided.
Translucent sheeting to be Molek opal polycarbonate sheeting with profile to match side cladding

S.1 Roof Structure

The roof structure consists of a welded and bolted girder truss spanning 24000mm with horizontal tie and 5° slope top chord with HDG finish. Trusses are at 6000mm centres. Alternate trusses are supported internally on plate girder running the length of the building supported on stanchions at 12000mm centres. Services load is 40 kg/m² with 20 kg/m² reserved for standard mechanical and electrical services and 20 kg/m² available for tenant services.

S.2 Structure - Internal Stanchions

Girder columns: 203x203x60kg/m, UC steel sections at 12000mm centres with HDG finish on grid 3. Girder columns: 254x254x7kg/m, UC steel sections at 12000mm centres with HDG finish on grid 3. Note: Vertical bracing from floor to underside of truss will be required in one 12m girder bay on grid line 2&3. Vertical K bracing is used on internal grids under the plate girder.

S.3 Concrete Surface Beds

Seamless floor: Concrete to be 35/19 MPa with washed sand, minimum 200mm thick, reinforced top and bottom and receive Macro Fibre at a rate of 600g - 900gm/m³. Floor to be cast in max 30m x 30m panels with armoured "terapont" type joints.
Finishes: Floor to be cast to falls. Finish with a Mechanical power pan floated finish followed by a mechanical grind to expose aggregate, in order to apply a seamless polyurethane antimicrobial epoxy self-leveling, HACCP certified Polyurethane 6-8mm screed as per the manufacturer's specification. (to be approved by client) Flat areas to have FM3 fitness and the same polyurethane finish.
Damp proofing membrane 250 micron to be installed under surface beds.
Saw-cut joints were required shall be done as soon as concrete is firm enough not to damage the edges, usually between 6 to 16 hours but not later than 48 hours. Joints to be repeated in finished surfaces spacing at 4m c/c.
Maximum wall load on slab = 9.0 ton / m run.
Maximum uniformly distributed load = 6.4 ton / m²
Maximum racking post load = 12 ton at 2500mm intervals along aisles and 1000mm to 2500mm in opposite direction.
Maximum axle load = 10 ton assuming a nominal forklift lifting capacity of 4.5 tons.

S.4 Perimeter structure

Exposed steel columns along the sides. Iso panels to be located/fixed onto the inside flange of the steel columns, flush.
Sheeting along the front to extend down to floor level.

S.5 Column Protection

Column protection will be provided to all centre row internal steel stanchions by means of 750 x 750mm steel lined, sand-cement filled barriers 1000mm high painted in diagonal black and yellow.

S.6 Structure - Perimeter Stanchions

457x191x 67mm UB steel sections at 6000mm centres with HDG finish.

S.7 Canopies

Canilevered structural steel canopies will be provided above the full length of the dock levelers. Canopies will extend nominally 3600mm off grid line 1.

S.8 Structure - Modular Design + Expansion

The structure is designed to fit a 6m perimeter bays and 12m structural internal grid.

S.9 Staircases

All staircases to upper levels are galvanized structural steel.

| ELIDZ Design Specifications | | Contractor’s Proposal | | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | |
|--|--|-----------------------|--|--|--|
| 2 GENERAL INFORMATION (REFER TO ABOVE CARTOON SECTION) | | | | | |
| 2.1 Architectural Notes | | | | | |
| 2.1.1 A.1: Ceilings <i>a) Canteen and Ablutions - (Non Process areas)</i> 'Non-process' rooms on the Ground floor and upper floor ablutions and canteens to be finished with 600 x 600mm suspended vinyl clad gypsum ceiling tiles laid in exposed aluminium T-grid suspended from floor structure above. Rooms with no floor above, T-grid to suspend from a timber joist structure <i>b) Cheese Factory</i> All 'process/clean' areas to have suspended insulated ceiling panels, with sealed joints. Blending/Cooking Room and CL room to have a trafficable ceiling. Catwalk to be installed by tenant. | | A | | | |
| | | C | | | |
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| | | | | | |
| 2.1.2 A.2: Walls <i>a) Canteen and Ablutions - (Non Process areas)</i> Canteen, Change Room and Ablution spaces are located on the First and Second floor; in-between the Coldroom and cheese factory double volume spaces.: <div><div>1. 100mm Insulated wall panels between the Process and Non-Process areas.</div><div>2. Non-process Dry areas to be seamless painted 90mm dry wall partition with aluminium top track, with 200 high skirting. Plascon "Wall n All" in light tint colour</div><div>3. Non-Process Wet areas to 90mm Moisture Resistant Silicone impregnated dry wall partitioning be sealed with Tal Superflex flexible waterproof membrane capable of accommodating normal structural movement in the background and suitable for waterproofing internal wet areas. Continuous membrane from underside of floor finish up the wall and flush with the ceiling. Walls to be tiled up to ceiling level and bonded with appropriate adhesive and movement joints.</div><div>4. Showers to be lined with 21mm Marine plywood sealed in waterproofing as described above and tiled as ditto</div></div> <i>b) Cold Room and Cheese Factory:</i> Cold store, Product dry store and all Process areas to be Insulated Wall panels. Thickness of wall between 50mm to 100mm, depending on the internal thermal requirements of the Room. Insulated panel from floor to ceiling with finishes, flashing and trims to be all Chromadek. No aluminium. Wall protection: Bump rails and Bollards to be provided at Forklift and pallet circulation areas. Rails and Bollards to be HD Galvanised, de-greased, well primed and painted by hand. Concrete curb to be provided in specified areas in the Cheese factory, as per ‘RoomMatrix’. Curb to be finished with Polyurethane. <div><div>1. External Insulated Walls and Ceilings Insulation: Minimum 100mm 15dv Polystyrene Core Walls Finish: 0.5mm Frost White Z-200 Chromadek Joint System : Tongue and Groove Thermal Conductivity (K Value) : 0.04 W/mK (Maximum) Density : ±15 kg/m³ Fire Rating: Fire Retardant Expanded Polystyrene Columns to be cladded and insulated Ceilings to allow for foot traffic</div><div>2. Internal Insulated Walls Insulation: Minimum 50mm 15dv Polystyrene Core Walls Finish: 0.5mm Frost White Z-200 Chromadek Joint System : Tongue and Groove Thermal Conductivity (K Value) : 0.04 W/mK (Maximum) Density : ±15 kg/m³ Fire Rating: Fire Retardant Expanded Polystyrene</div><div>3. Insulated Fire Walls (as per Mechanical Eng spec) Insulation: Minimum 100mm Polyphen Core Walls Finish: 0.58 mm Chromadek Frost White (Z-200 Zinc Substrate) Joint System : Tongue and Groove Joint Sealants : Approved Fire Stop Sealants to meet rating required (Hilti or equivalent) Thermal Conductivity (K Value) : 0.037 W/mK (Maximum) Density : ±50 kg/m³ Fire Rating: International Class 1 (FM, or equivalent SANS Approved) Fire Rating Required (Minutes) : As per relevant Regulations and Design requirement Columns to be cladded and insulated</div></div> | | A | | | |
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| 2.1.3 A.3: Floors <i>a) Canteen and Ablutions - (Non Process areas)</i> Structure: 50mm screed on PRESTRESSED HOLLOW CORE SLABS supported on steel structure to Eng Detail. Finishes: Porcelain tiles and Heavy-duty flexible Vinyl sheet, hygienic <i>b) Cheese Factory</i> Polyurethane finish on Screed sloped to floor drains and channels on flat Concrete slab. As per Engineers specification. Floors to slope at minimum 1%. Appropriate sealant to be used around the floor drains which will be watertight, hygienic and tolerant. | | A | | | |
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| <p>c) Cold Room</p> <p>Polyurethane finish on Concrete slab sloped to a continues centralised floor channel.</p> <p>Appropriate sealant to be used around the floor drains which will be watertight, hygienic and tolerant.</p> | | | |
| <p>2.1.4 A.4: Doors</p> <p>a) Internal doors (non process)</p> <p>To be standard flush panel 2032 x 813mm solid core doors with concealed edges finished with primer and two coats "velvaglo" or similar. Change rooms and toilets to be undercut as required.</p> <p>b) External doors</p> <p>To be hardwood 2032 x 813mm FLBB doors with flush panel internally in hardwood frame set in steel sub frame.</p> <p>c) All doors in process/clean areas</p> <p>To be insulated standard/Cold Room doors faced both sides with Chromadek and with perimeter trim. No Aluminium. Sizes vary.</p> <p>d) Kick plates and push plates</p> <p>Doors in to have adequate Kick plates, push plates and protection to be stainless steel.</p> | | A | |
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| <p>2.1.5 A.5: Openings in Envelope</p> <p>a) Roller Shutter doors</p> <p>3m high x 3m wide galvanised and manually operated by chain slatted doors. Door openings will be formed and framed using steel channel sections. The doors will be protected by steel bollards placed internally and externally on either side of the door opening.</p> <p>b) Dock levellers.</p> <p>Sectional door with 38mm thick panel, with pre-painted skins, hot dipped galvanised steel with rigid polyurethane insulation core. Wall opening to be 2.2m wide by 2.5m high. Doors to have robust Curtain Dock Seal to create a sealed link between a docked truck and the Cold Room.</p> | | A | |
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| <p>2.1.6 A.6: Openings in Envelope - Windows</p> <p>Generally, no openings in the Cheese and Cold-room will be made for windows. Windows fixed onto side cladding rails. Windows in office accommodation to be powder coated aluminium in accordance with Sans 1578 parts 1 & 2</p> <p>System to meet requirements of AAAMSA performance and design loading of SANS 10160.</p> <p>External Openable Windows to be aluminium Sheerline 36. External Curtain wall to be Sheerline 90</p> | | A | |
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| <p>2.1.7 A.7: Roof Sheeting and Insulation</p> <p>Hulett's Aluminium 'Global Roofing Solutions' 0,9mm thick Ziptech 420 Profile aluminium roof sheeting and accessories with stucco embossed mill finish, concealed fixed through insulation to galvanised cold rolled purlins with insulation tape between purlin and roof sheet, with 'Ziptech' Aluminium Halters fixed with stainless steel screws. Installation region: from 0m to 400m of the coast – C5 High Corrosion Risk. All in strict accordance with the manufacturer’s instructions.</p> <p>Isover 75mm Factorylite insulation laid over purlins in single lengths and supported on galvanised straining wires at 300mm centres.</p> <p>Owens Corning SE 50mm Factorylite insulation laid over purlins in single lengths and supported on galvanised straining wires at 300mm centers.</p> | | A | |
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| <p>2.1.8 A.8: Gutters and Downpipes</p> <p>Internal gutter: GRP half-round gutters with integral fibreglass drop-outs at 12m c/c's with 'Geberit Pluvia' rainwater head at base of each drop-out. Each head to be serviced by 2 no. 'Geberit Pluvia’ continuous HDPE welded pipes, suspended to approved Geberit detail from gutter support structure. Gutter support would be as per engineer’s specification</p> <p>Rainwater heads and downpipes are located internal to the building on east and west extremities of the gables.</p> <p>External gutter: GRP half-round gutters with integral fibreglass drop-outs with standard UPVC Downpipes</p> | | A | |
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| <p>2.1.9 A.9: Side Cladding</p> <p>Standard sheeting Hulett's Aluminium GRS BR7 profile, 0.8mm thick with embossed PVDF finish on exterior and standard backing coat fixed to galvanised cold rolled steel girt rails with insulation tape between girt and cladding with stainless steel screws. C5 High Corrosion Risk. All in accordance with the manufacturer’s instructions. Cladding to vary from eaves to finished floor level and eaves to ceiling level.</p> <p>Coloured sheets- As described above with Chromadek Azure blue finish.</p> <p>Translucent sheeting to be Modek opal polycarbonate sheeting with profile to match side cladding with Azure blue Chromadek flashing.</p> <p>No side wall insulation is provided.</p> | | A | |
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| 2.2 Structural Notes | | | |
| <p>2.2.1 S.1: Roof Structure</p> <p>The roof structure consists of a welded and bolted girder truss spanning 24m with horizontal tie and 5° slope top chord with HDG finish.</p> <p>Trusses are at 6m centres. Alternate trusses are supported internally on plate girder running the length of the building supported on stanchions at 12m centres. Services load is 40kg/m² with 20kg/m² reserved fir standard mechanical and electrical services and 20kg/m² available for tenant services.</p> <p>Trusses supporting iso panels ceilings, additional DL = 60ka/m², LL = 150ka/m²</p> | | A | |
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| Suspended Cat-walk LL = 200kg/m ² All steel hot dipped galvanised. | | S | |
| 2.2.2 S.3: Concrete Surface Beds Seamless floor: Concrete to be 35/19MPa with washed sand, minimum 200mm thick, reinforced top and bottom and receive Micro Fibre at a rate of 600-900g/m ³ . Floor to be cast in max 30mx30x panels with armoured “terajoint” type joints. Finishes: Floor to be cast to falls. Finish with a mechanical power pan floated finish followed by a mechanical grind to expose aggregate, in order to apply a seamless polyurethane antimicrobial epoxy self-levelling HACCP certified Polyurethane 6-9mm screed as per the manufacturer's specification (to be approved by client). Flat areas to have FM3 flatness and the same polyurethane finish. Damp proofing membrane 250 micron to be installed under surface beds. Saw-cut joints were required shall be done as soon as concrete is firm enough not to damage the edges, usually between 6-16 hours but not later than 48 hours. Joints to be repeated in finished surfaces spacing at 4m c/c. Maximum wall load on slab = 9.0 ton/m run Maximum uniformly distributed load = 6.4 ton/m ² Maximum racking post load = 12 ton at 2.5m intervals along aisles and 1 – 2.5m in opposite direction. Maximum axle load = load = 10 ton assuming a nominal forklift lifting capacity of 4.5 tons. | | A | |
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| 2.2.3 S.4: Perimeter Structure Exposed galvanized steel columns along the sides. Iso panels to be located/fixed onto the inside flange of the steel columns, flush. Sheeting along the front to extend down to floor level. | | A | |
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| 2.2.4 S.5: Column Protection Column protection will be provided to all centre row internal steel stanchions by means of 750 x 750mm steel lined, sand-cement filled barriers 1,000mm high painted in diagonal black and yellow. | | A | |
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| 2.2.5 S.6: Structure – Perimeter Stanchions 457x191x67mm UB steel sections at 6000mm centres with HDG finish. | | A | |
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| 2.2.6 S.7: Canopies Cantilevered structural steel canopies will be provided above the full length of the dock levellers. Canopies extend nominally 3,600mm off gridline 1. | | A | |
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| 2.2.7 S.8: Structure – Modular Design + Expansion The structure is designed to fit a 6m perimeter bays and 12m structural internal grid. | | A | |
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| 2.2.8 S.9: Staircases All staircases to upper levels are galvanised structural steel. | | A | |
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| 2.2.9 S.10 Suspended floor Slabs Loadings: First floor slab: LL = 500kg/m ² Second floor: LL = 500kg/m ² ADD: As indicated on the Architect's drawings the following Live Loads are applicable to the walk-on ceilings: ADD: 3.5m high, Walk-on ceiling required between grid lines T to V in the Cheese Factory with LL = 1000kg/m ² ADD: 6m high, Walk-on ceiling required between grid lines Q to S in the Cheese Factory with LL = 150kg/m ² Note: the requested loading is higher than what the SANS code recommends for the occupancy class (normally 300kg/m ²) | | A | |
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| 2.3 Civil Notes | | | | | |
| 2.3.1 C.1: External Hard Standing External hardstands will consist of 200mm thick, Unreinforced 30MPa/38mm concrete on two layers of imported G5 type material. Jointing of concrete surfaces will be designed by the Engineer and will consist of sealed saw cut joints and sealed construction joints. Construction joints will be fitted with 115 x 115 x 6mm galvanised steel plates. Saw cut joints to be min 6mm width with an effective cut of 1/3 the depth of the hard stand surface, cut in a two-cut process. Construction joints to be min 6mm effective width fitted with a backing strip and sealant. Joint sealant to be specified and approved by the ELIDZ, joint sealant to be silicone free. Saw cut panels to have maximum dimensions of 4.5m x 4.5m. Expansion joints against building edges or structures. Finishes of hardstand areas will be to a mechanical float “Pan Finish” texture. Curing of hardstand surface will be via an approved curing compound acceptable to the design Engineer. Hardstands will be cast to falls away from buildings to drainage collectors such as kerb inlets along roads edge with underground concrete storm water pipes class 100D, sized to take a 1 in 5-year flood event. Heavier rain will result in surface water drainage across the site to site entrances and onto external roads. Were collection of storm water cannot be achieved along the road/hardstand edge, drop inlet structures with heavy duty grill covers are to be positioned at the required design intervals and trapezoidal shaping of hardstands designed to achieve drainage to falls not exceeding 1:20 to the drop inlets must be constructed. Where there is evidence of sub-surface ground water on site, A sub soil drainage system must be designed by the engineer. Office and visitor parking area – will consist of 200mm thick Unreinforced 30MPa/38mm concrete on two layers of imported G5 type material. The same as specified above. Traffic manoeuvring models are to be verified and reported on to the ELIDZ, and to the requirements of the tenant. | | | | A | |
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| 2.3.2 C.2: Kerbing and Access Ramps Hardstand edges finished with 180mm high precast Fig.3 type barrier kerbs set on 15MPa concrete haunching. Space from building to back of kerb is finished with bond paved sidewalks of varying widths with lawns or planted areas in between. Pavers will consist of 80mm interlocking pavers colour to architect’s specification on a 2 x 150mm G5 type base. Access Ramps with vehicle traffic will consist of 200mm thick, Unreinforced 30MPa/38mm concrete on two layers of imported G5 type material. The access ramps to have a 1:13 slope between hardstand and finished floor level with 10mm weather step. Access ramps for pedestrian use only will consist of 100mm thick, unreinforced 25MPa/19mm concrete on a 150mm subbase layer of G7 type material with a 150mm base layer of G5 type material. Concrete panels via saw cuts at 2.5m max. | | | | A | |
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| 2.3.3 C.3: Access to Sewage and Water Reticulation Municipal services are provided along the road reserve. The site is serviced with a sewer and water connection point. The underground sewers servicing the building must be provided to accommodate all the internal plumbing outlets. The minimum diameter and class are 110mm uPVC Class 34 solid wall pipe. Water supply mains provide 20 kl per day per hectare of erf area with a max head of 90m and a min of 25m. Separate metered connections to each building must be provided. A separate external fire main must be provided to supply the fire hydrants for the building. | | | | A | |
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| 2.4 Mechanical Notes | | | | | |
| 2.4.1 M.1: Air-conditioning The Auxiliary Office-related Buildings (Production Offices, Server Rooms, Drivers Kitchen, Canteen, etc.) shall be provided with Daikin inverter split type air-conditioning equipment. The air-conditioning system shall be an air cooled, inverter split type system consisting of one outdoor unit and one indoor unit, each unit having capability to control heating or cooling independently to suit the requirements of the rooms. The refrigeration compressor in the outdoor unit shall be equipped with inverter controller and capable of changing the rotating speed to follow variations in cooling or heating load. The system shall be capable of operating continuously at ambient temperatures between -5°C and 40°C. Both indoor and outdoor units shall be assembled, tested, and charged with refrigerant at the factory. | | | | A | |
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| 2.4.2 M.2 Fire Protection The site and facility / building are to be designed and constructed in accordance with the National Building Regulations SANS 10400 "Part T". | | | | A | |
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| 2.4.3 M.3: Ventilation Ventilation in building will be provided in terms of the stipulated minimums in SANS 10400 "Part O" and the OHS Act under the Environmental Regulations for Workplaces. Air extraction systems will be provided for ablution facilities, canteens and tea kitchens in accordance with SANS 10400 "Part O". Fresh air will be provided for all air-conditioned spaces in accordance with SANS 10400 "Part O". Room areas are to be less than 500m² to eliminate the need for smoke extraction, according to SANS 10400 "Part T". | | | | A | |
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| 2.5 Electrical Notes | | | | | |
| 2.5.1 E.1: Design Criteria and Parameters The design criteria applied to the electrical engineering services shall include the following, namely : <input type="checkbox"/> Capital costs <input type="checkbox"/> Operational and maintenance requirements and costs <input type="checkbox"/> Ease of functionality, operation and maintenance | | | | A | |
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| <input type="checkbox"/> Compliance with general energy efficiency and / or sustainability standards | | M | |
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| 2.5.2 E.2: Bulk Electricity Service Connection The East London Industrial Development Zone is the licensed electricity supply authority within the defined industrial zone, and in terms of its authority granted by National Electricity Regulator (South Africa), has the right to supply electricity to all customers situated within the industrial development zone. The Dairy facility presently has an 11 kV, 1.6 MVA bulk electricity service connection. Their present maximum demand is considerably lower than the capacity provided to them. It is anticipated that the electrical requirement of the proposed extensions to their facility, to accommodate the Cheese Factory and additional Cold Storage, will be accommodated within the spare capacity available and that the existing bulk electricity service connection need not be upgraded. However, it remains the responsibility of the appointed Design Team to consider the electrical loads presented to themselves by the East London Industrial Development Zone and / or User (Tenant) and to confirm the electrical requirements. Whether the bulk electricity service connection is to be upgraded or not, an application shall still be submitted to the East London Industrial Development Zone for the necessary bulk electricity service connection, for record purposes. The East London Industrial Development Zone shall not impose any electricity service connection fees and / or electricity account deposits on the project. If required, the project shall be responsible for the necessary extension of the existing medium voltage reticulation. | | A | |
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| 2.5.3 E.3: Medium Voltage Switchgear and Equipment It is anticipated that the existing medium voltage switchgear and equipment shall suffice. However, if the existing medium voltage switchgear and equipment has to be extended and / or upgraded in any way, the extension and / or upgrading thereof shall comply with the standard specifications set by the ELIDZ which shall be made available upon request. Briefly, the standard medium voltage switchgear and equipment may be summarised as follows: <input type="checkbox"/> a 11kV switchboard (with “incomers”, “feeders”, “transformer feeders” and “voltage transformer” panels as is necessary <input type="checkbox"/> All medium voltage equipment fed, and inter-connected, by a dual, redundant and ring-fed medium voltage cable network <input type="checkbox"/> Over current & earth fault relay (Alstom MiCOM P122 or equal and approved), Trip circuit monitoring, Buchholz & oil temperature auxiliary relays (Alstom MVAA or equal and approved), Intertrip relay, etc. <input type="checkbox"/> Customer energy and demand electricity metering <input type="checkbox"/> 11kV / 420V, Dyn11, transformers, sized as is necessary, with copper windings, suitable for outdoor application in coastal areas, all compliant with SANS 780 | | A | |
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| 2.5.4 E.4: Medium Voltage Cables All single core and three core cables with stranded copper conductors and insulated with cross linked polyethylene, shall comply with SANS 1339. Conductors shall comprise standard annealed copper, complying with the requirements for class 2 conductors in SANS 1411-1. All single core cables shall comply with the requirements given in tables 11, 12 and 13 of SANS 1339:1981. All three core cables shall comply with the requirements given in tables 23, 25 and 26 of SANS 1339:1981 for type A cable and tables 29, 31, 32 and 33 for type B cables. | | A | |
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| 2.5.5 E.5: Load Shedding / Load Curtailment The Buffalo City Metropolitan Municipality (BCMM) have recently directed that the East London Industrial Development Zone will no longer be exempt from any electrical load shedding implemented by themselves and / or Eskom. Furthermore, BCMM have directed the East London Industrial Development Zone begin participating in their (BCMM) electrical load curtailment programme. Therefore, it is imperative that all electricity users within the East London Industrial Development Zone comply with the requirement in that when directed to do so, they reduce their operating electrical load by 20 % of their base load, for the duration of the load shedding cycle. The electrical installation of the new Dairy Facility is to be designed such that participation in this electrical load curtail programme is possible. Furthermore, and is this project is an extension of an existing facility, it is imperative that the design of the electrical load curtailment be such that the value of the reduction in the operating electrical load be calculated on the base load of the existing and proposed facility, for the duration of the load shedding cycle. | | A | |
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| 2.5.6 E.6: Low Voltage Reticulation The low voltage reticulation shall comprise the following, namely: <input type="checkbox"/> Extension to / modification of existing Main Low Voltage Panel so as to accommodate the proposed new facility <input type="checkbox"/> Main Low Voltage Panel, termed MLVP B, housed within the new facility <input type="checkbox"/> A series of electrical distribution boards throughout the new facility servicing the respective load centres i.e. Cheese Factory, Cold Storage, AC Plant, Refrigeration Plant, etc. <i>(note : all electrical distribution boards and associated low voltage cables necessary for the User (Tenant) internal electrical installation shall be provided under this contract)</i> <input type="checkbox"/> All main low voltage panels and respective electrical distribution bards shall be inter-connected by a low voltage cable network Electricity feeder cables shall be Cu PVC PVC SWA ECC PVC cables, with stranded conductors. All main low voltage panels and electrical distribution boards are to be manufactured by a reputable company, with relevant experience in the manufacturing of low voltage panels, electrical distribution boards, control panels, etc. | | A | |
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| 2.5.7 E.7: Builder's and related Works, Trench Excavations, Brick-built Enclosures (Manholes), Ducts The Contractor shall be responsible for the necessary co-ordination and timing of the builder's and related Works pertaining to this Contract. All Utility Rooms shall be constructed with the necessary floor trenches for the installation of all associated electrical services. | | A | |
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| The Contractor shall undertake all trench excavations, including backfilling and compaction, required for the electrical installation. The Contractor shall be responsible for the provision of the brick-built enclosures (manholes). The Contractor shall be responsible for the provision of all ducts necessary for the electrical and, telecommunications and associated installations. In summary, ducts shall be installed beneath (across) all walkways, driveways, and finished surfaces. The ducts shall be manufactured from a high-density polyethylene with a double wall construction, allowing a corrugated outer wall finish and a smooth inner wall finish, and of the internal diameters as indicated on the attached drawings. All ducts shall be minimum 160mm outer diameter, with minimum 137mm internal diameter. | | M | | | |
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| 2.5.8 E.8: Standby Generator Set / Uninterruptible Power Supply Installation The Contractor shall be not be responsible for the provision of a generator set. The Contractor shall be not be responsible for the provision of an uninterruptible power supply unit. | | A | | | |
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| 2.5.9 E.9: Lighting Installation A lighting installation, in accordance with the relevant regulations, which will ensure the efficient and proper usage of all spaces throughout the new buildings, shall be provided. All luminaires specified shall be fitted with light emitting diode-type lamps. The lighting design calculations shall be based on achieving the minimum lighting levels, in accordance with the relevant South African National Standards documentation, as follows: <div><div><input type="checkbox"/> Manufacturing</div><div>-</div><div>General Working Areas (*)</div><div>-</div><div>350 lux</div></div> <div><input type="checkbox"/> Administrative Buildings</div> <div>-</div> <div>Entrance Halls</div> <div>-</div> <div>100 lux</div> <div><input type="checkbox"/></div> <div>-</div> <div>Reception Areas</div> <div>-</div> <div>100 lux</div> <div><input type="checkbox"/></div> <div>-</div> <div>Board rooms, offices</div> <div>-</div> <div>300 lux</div> <div><input type="checkbox"/></div> <div>-</div> <div>Computer rooms</div> <div>-</div> <div>500 lux</div> <div><input type="checkbox"/> Maintenance Buildings</div> <div>-</div> <div>General</div> <div>-</div> <div>300 lux</div> The lighting design shall (where applicable) take into account and include the following, namely: <div><input type="checkbox"/> Specified luminaires shall provide high levels of luminous flux and be fitted with electronic control gear</div> <div><input type="checkbox"/> Specified lamps shall provide the correct colour rendering for the application and use energy efficient lamps i.e. light emitting diode (LED) type</div> <div><input type="checkbox"/> Maximum natural daylight usage and controllable light levels</div> <div><input type="checkbox"/> Task specific light sources</div> <div><input type="checkbox"/> Multiple control for light circuits / zones covering areas greater than 100 m²</div> Emergency exit signage and route lighting shall be provided for any evacuation procedures that could occur. Allowances shall be made for decorative post-top type luminaires, with light emitting diode type lamps, on fibreglass poles to be installed throughout the complex including along all walkways, roadways and parking areas. The luminaires shall comply with the specification detailed in the Project Specification. All low voltage single core conductors shall be of the PVC insulated type with stranded copper conductors, rated at 600 V general service duty and manufactured in accordance with SANS 1507 - 1990. | | A | | | |
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| 2.5.10 E.10: Small and Large Power Generally, power shall be provided to the various areas by means of switched socket outlets. The layout and quantity of the switched socket outlets shall be determined by the use of the specific room, the equipment to be installed therein and the services / activities to be rendered from there. Switched socket outlets shall be provided approximately every 10m² in all passages and public areas for cleaning and maintenance purposes. Should the activity or specific equipment require, i.e. within the kitchen areas, the power supply provided shall be in the form of a switched isolator. As the design responsibility ends at the switched socket outlet or isolator points, we cannot guarantee what the End User is going to connect to the installation. Therefore, it is only possible to encourage (and not guarantee) energy savings at switched socket outlet and isolator points. All low voltage single core conductors shall be of the PVC insulated type with stranded copper conductors, rated at 600V general service duty and manufactured in accordance with SANS 1507 - 1990. | | A | | | |
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| 2.5.11 E.11: Power Factor Correction and Harmonic Filtration The Contractor shall be responsible for the design and supply of necessary power factor correction and harmonic filtration equipment, designed to service the electrical installation. | | A | | | |
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| 2.6 General Notes | | | | | |
| 2.6.1 G.1: Effluent Disposal Tenant is responsible for industrial effluent disposal and applications for Trade Effluent Permit. | | A | | | |
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| 2.6.2 G.2: Access Control The ELIDZ operates an integrated access control system to monitor and control the entrance and egress of all staff and vehicles to and from each zone of the IDZ. The ELIDZ will provide tenants with the opportunity to subscribe to the central access control system subject to payment of a defined subscriber fee. | | A | |
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| 2.6.3 G.3: Logistic facility The Automotive Supplier Park has access to a logistic facility subject to tenants making their own contractual arrangements with the service provider of the logistic facility. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 2.6.4 G.4: Landscaping ELIDZ will provide site landscaping. | | A | |
| | | C | |
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| | | S | |
| 2.6.5 G.5: Exclusions The following services, unless otherwise stated or agreed, are not provided by the landlord: <input type="checkbox"/> Standby diesel generators. <input type="checkbox"/> UPS and computer equipment. <input type="checkbox"/> Internal computer network cabling. <input type="checkbox"/> Purpose made computer access flooring. <input type="checkbox"/> Internal PABX, data and telephone networks, cabling. <input type="checkbox"/> Power factor correction equipment. <input type="checkbox"/> Electricity reticulation from the internal site electricity network to tenant's plant components. <input type="checkbox"/> Special foundations for tenant's equipment. <input type="checkbox"/> Internal division walls within the warehouse. <input type="checkbox"/> Catering and kitchen equipment. <input type="checkbox"/> Lockers. <input type="checkbox"/> Compressed air supply and equipment. <input type="checkbox"/> Gas suppression. <input type="checkbox"/> Bulk storage tanks. <input type="checkbox"/> Compressor rooms. <input type="checkbox"/> Forklift refuelling enclosures. <input type="checkbox"/> AC and ventilation plant including plant rooms to process areas. <input type="checkbox"/> Specific fire protection other than general industrial fire protection. <input type="checkbox"/> Steam generation. <input type="checkbox"/> Furniture, fixtures and fittings. <input type="checkbox"/> Building, operational and tenant signage. <input type="checkbox"/> Logistic equipment. <input type="checkbox"/> Protection of building and equipment from process or logistics equipment. Special security systems and access control. <input type="checkbox"/> Specialised lifting equipment and crawler beams. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3 DESIGN – EXTERNAL ROADS AND HARDSTAND | | | |
| 3.1 Site Entrances | | | |
| 3.1.1 General All works to shall be in accordance with the latest SANS 1200 Specifications. Concrete Hardstand will consist of 200mm Unreinforced 30MPa/38mm concrete hardstands on two layers of imported G5 type material. Concrete for hardstands shall be placed only on approval of a recognised mix design that has proven strength results. Mix design and material sampling from ready mix suppliers shall be verified and confirmed. Slumps and on-site cube sampling of concrete shall be required as part of the approved QMS, in batch sizes approved by the Engineer. Approved curing methods are to be implemented. Jointing of concrete surfaces will be designed by the Engineer and will consist of sealed saw cut joints and sealed construction joints. Construction joints will be fitted with 115 x 115 x 6mm galvanised steel plates. Saw cut joints to be min 6mm width with an effective cut of 1/3 the depth of the hard stand surface, cut in a two-cut process. Construction joints to be min 8mm effective, fitted with a backing strip and sealant. Joint sealant to be specified and approved by the ELIDZ, joint sealant to be silicone free. Saw cut panels to have max dimensions of 4.5m x 4.5m Mesh 395, to be placed in all irregular formed panels, round protrusions and as directed by the Engineer. Shear bar design as per the Engineer. Finishes of hardstand areas will be to a mechanical float “Pan Finish” texture. Curing of hardstand surface will be with an approved curing compound acceptable to the design Engineer. | | A | |
| | | C | |
| | | E | |
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| | | S | |

| ELIDZ Design Specifications | Contractor's Proposal | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | |
|--|-----------------------|--|--|
| 3.1.2 Entrance gates Concrete hardstand as per specification as stated in item 4.1.1 above. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.2 On Site Parking | | | |
| 3.2.1 Vehicle Parking All staff vehicles must be accommodated on SITE no offsite parking is allowed. Concrete hardstand as per specification as stated in item 4.1.1 above. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.3 Loading Requirements | | | |
| 3.3.1 Loading and Unloading space requirements Traffic manoeuvring models are to be verified and reported on to the ELIDZ, and to the requirements of the tenant. Design Vehicles are as per the ASSTHO Geometric Design guidelines and are listed below: <ul style="list-style-type: none">SU-10 Truck (10tonner)Passenger Car | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.3.2 Access to the Street Refer to: <ul style="list-style-type: none">ELIDZ Design Guideline (Aug 2004, Rev 3)ELIDZ Development Guideline (March 2011, Draft 24) | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.4 Kerbing | | | |
| 3.4.1 Junction between building & external hard stand Junctions between building and hardstands will be designed by the Architect. The surface will be as per the Architects specification either paving or unreinforced concrete. Pavers will consist of 80mm interlocking pavers colour to specification on a 2 x 150mm G5 type base. Unreinforced concrete will be 200mm thick on a 2 x 150mm G5 type base. Edging of the area “Apron” will be fig 3 type precast Barrier kerb set on 15Mpa/19 haunching. Jointing of concrete panels via saw cuts 2.5m max. 10mm Expansion jointing between Brick and adjacent concrete surface to be installed and joint sealed. Apron to be cast to fall away from building. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.4.2 Building entrances on sidewalk Where entrances may be required these would have a 1:13 slope between hard stand and finished floor level with 10mm step weather sill aligned with inner face of door. Step formed using a galvanised steel angle set into concrete. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.4.3 Joint between building & hard stand 10mm Expansion jointing between Building brickwork and adjacent concrete surface to be installed and joint sealed. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.5 External Hardstand | | | |
| 3.5.1 Hardstand surface drains Hardstands will be cast to falls away from buildings to drainage collectors along roads edge. Were collection of storm water cannot be achieved along road edge drop inlet structures are to be positioned and trapezoidal shaping of hardstands designed to achieve drainage. Minor storms 1: 5y return period will be piped via concrete storm water pipes of class 100D minimum rating spigot socket type. Major storm 1:20y and greater will spill over onto road surfaces, flooding areas to be checked by Engineer, and reported and will be contained on hardstand areas along site boundaries. All manhole accesses in hardstand areas are to be of Heavy-Duty type SANS 558, Type 2A, “Modified “to be cast integrally with Hard Stand Concrete. External hardstands are to be shaped and graded to allow uniform drainage to catch pits and storm water inlets along road edges. Surface drains with heavy duty grill covers generally located at 24m centres to underground storm water pipes, will be located in open hardstand areas with dished drainage. where uniform flow cannot be achieved and drainage is required in open areas. | | A | |
| | | C | |
| | | E | |
| | | L | |
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|---|-----------------------|--|--|
| 3.5.2 Surface drains pipe sizes Storm water pipes sized to take 1:5-year storm event. Heavier rain will result in surface water drainage to entrances and onto external roads. Pipe sizes will be as per the manufacturer's specification, and will be limited to class 100D spigot and socketed type concrete pipes. Major storm events are to be determined by the Engineer and if found that an overflow of storm water could endanger or pose risk to adjacent property adequate sizing of the storm water installation must be made to prevent this. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.5.3 Size of trucks and frequency for unloading Truck sizing and frequency of unloading must be confirmed with the Architect and all traffic manoeuvring simulations must be checked and reported on to the tenant and ELIDZ. Design Vehicles are as per the ASSTHO Geometric Design guidelines and are listed below: <ul style="list-style-type: none">SU-10 Truck (10ton)WB-20 SemitrailerWB-20D Interlink | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.5.4 Size of trucks and frequency for dispatch Truck sizing and frequency of unloading must be confirmed with the Architect and all traffic manoeuvring simulations must be checked and reported on to the tenant and ELIDZ. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.5.5 Hardstand thickness, finish & slope. Generally, 200 mm thick, unreinforced 30 MPa surface bed. The Engineer to design check on the pavement against vehicle loadings and design traffic. Finishes of hardstand areas will be to a mechanical float "Pan Finish" texture. Hardstands will be cast to falls away from buildings to drainage collectors along roads edge. Were collection of storm water cannot be achieved along road edge drop inlet structures are to be positioned and trapezoidal shaping of hardstands designed to achieve drainage with falls not exceeding 1:20. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.5.6 Hardstand joints Jointing of concrete hardstands will be designed by the Engineer and will consist of sealed saw cut joints and sealed construction joints. Construction joints will be fitted with 115 x 115 x 6mm galvanised steel plates. Saw cut joints to be min 6mm width with an effective cut of 1/3 the depth of the hard stand surface, cut in a two-cut process. Construction joints to be min 8mm effective width fitted with a backing strip and sealant. Joint sealant to be specified and approved by the ELIDZ, joint sealant to be silicone free. Saw cut panels to have max dimensions of 4.5m x 4.5m. | | A | |
| | | C | |
| | | E | |
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| 3.5.7 Service Trenches Service trenches will comply to the specifications of the SANS 1200, DB, L, LB, LC, LD, LE and will be made safe in accordance the guidance of the OHS specifications. Classification of materials will be done in accordance the SANS 1200 DB, or particular specification as drawn up by the design Engineer. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.5.8 Platform Platforming activities will be conducted in accordance the SANS 1200 D. The cut to fill of the platform must be optimised with available cut materials. All spoil must be taken off site to an approved spoil site. Imported fill material must comply to a minimum spec of G7 type quality material. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.6 Dock Levellers | | | |
| 3.6.1 General Height of dock levellers measured from the external hardstand to factory floor level is 1.35m | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 3.7 Traffic Signage and Road Markings | | | |
| 3.7.1 Traffic signage and road markings To latest SARTSM. | | A | |
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| | | E | |
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| | | M | |
| | | S | |

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|---|--|-----------------------|--|--|--|--|--|---|--|
| 3.8 Sleeves Required | | | | | | | | | |
| 3.8.1 All Buildings Sleeves are to be of a min 110mm diameter of approved type HDPE material, fitted with couplings, end caps draw wires and parking's as directed by the local authority. Sleeves are to be positioned in depth and quantity as per the site requirements a client needs, minimum depth 1.2mm. Junction boxes and termination ends are to be marked as per the local authority requirements. Kerb markings and plaques are to be erected on road and hardstand crossings. | | | | A | | | | | |
| | | | | C | | | | | |
| | | | | E | | | | | |
| | | | | L | | | | | |
| | | | | M | | | | | |
| | | | | S | | | | | |
| 4 DESIGN – STRUCTURAL | | | | | | | | | |
| 4.1 Concrete Foundations | | | | | | | | | |
| 4.1.1 General All earthworks required for the foundations shall be in accordance with the latest SANS 1200 D Specifications. All concrete work shall be designed in accordance with SANS 10100-1 & 2 and carried out strictly in accordance with SANS 1200 G. All foundations and bases to be minimum 25 MPa / 19mm Reinforced Concrete at 28 days. | | | | | | | | | |
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| 4.1.2 Cold Room and Cheese Factory Foundations will consist of conventional base designed by a Structural Engineer. Perimeter walls will be 330mm reinforced concrete cavity filled retaining walls designed by a Structural Engineer. Concrete for foundations shall be placed only on approval of a recognised mix design that has proven strength results. Mix design and material sampling from ready mix suppliers shall be verified and confirmed. Slumps and on-site cube sampling of concrete shall be required as part of the approved QMS, in batch sizes approved by the Engineer. Approved curing methods are to be implemented. | | | | A | | | | | |
| | | | | C | | | | | |
| | | | | E | | | | | |
| | | | | L | | | | | |
| | | | | M | | | | | |
| | | | | S | | | | | |
| 4.1.3 Offices and Buildings Pad and strip foundations to be cast Monolithically in order to allow for reinforcement tie in. Pad and strip foundations to be cast Monolithically in order to allow for reinforcement tie in. All concrete shall be placed on a layer of blinding concrete, not exceeding 50mm, 15MPa/19. Concrete will either be reinforced strip footings or conventional base and ground beam construction. | | | | A | | | | | |
| | | | | C | | | | | |
| | | | | E | | | | | |
| | | | | L | | | | | |
| | | | | M | | | | | |
| | | | | S | | | | | |
| 4.2 Structural Concrete – Columns, Beams & Floor slabs | | | | | | | | | |
| 4.2.1 General All concrete work shall be designed in accordance with SANS 10100-1 & 2 and carried out strictly in accordance with SANS 1200G. All structural concrete elements to be minimum 30 MPa / 19mm Reinforced Concrete at 28 days. | | | | | | | | | |
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| 4.3 Structural Steel – Roof Structure | | | | | | | | | |
| 4.3.1 General All structural steelwork shall be designed in accordance with SANS 10162-1 and fabricated and erected in accordance with SANS 1200 H (Structural steelwork) and SANS 10162 (Structural use of Steel) | | | | | | | | | |
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| | | | | | | | | | |
| 4.3.2 Cold Room and Cheese Factory The roof structure consists of a welded and bolted girder parallel chord truss spanning 17m / 25m / 24m and 5° slope, HDG finish. Trusses are at 6000mm centres. Alternate trusses are supported internally on girders running the length of the building supported on stanchions at 12000mm centres. Services load is 40 kg/m² with 20kg/m² reserved for standard mechanical and electrical services and 20kg/m² available for tenant services. (PV panels @ 20kg/m²) | | | | A | | | | | |
| | | | | C | | | | | |
| | | | | E | | | | | |
| | | | | L | | | | | |
| | | | | M | | | | | |
| | | | | S | | | | | |
| 5 DESIGN – FLOORS AND SURFACE BEDS | | | | | | | | | |
| 5.1 Concrete Floor and Surface Beds | | | | | | | | | |
| 5.1.1 General All concrete work shall be designed in accordance with SANS 10100-1 & 2 and carried out strictly in accordance with SANS 1200 G. | | | | | | | | | |
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| | | | | | | | | | |
| 5.1.2 Cold Room and Cheese Factory Seamless floor: Concrete to be 35/19 MPa with washed sand, minimum 200mm thick, reinforced top and bottom and receive Micro Fibre at a rate of 600 - 900g/m³. Floor to be cast in max 30mx30m panels with armoured "terajoint" type joints. Finishes: Floor to be cast to falls. Finish with a Mechanical power pan floated finish followed by a mechanical grind to expose aggregate, in order to apply a seamless polyurethane antimicrobial epoxy self- levelling, HACCP certified Polyurethane 6-9mm screed as per the manufacturer's specification. (to be approved by client) Flat areas to have FM3 flatness and the same polyurethane finish. Damp proofing membrane 250 micron to be installed under surface beds. Saw-cut joints were required shall be done as soon as concrete is firm enough not to damage the edges, usually between 6 to 16 hours but not later than 48 hours. ~ Joints to be repeated in finished surfaces spacing at 4m c/c." Maximum wall load on slab = 9.0 ton/m run. Maximum uniformly distributed load = 6.4 ton/m² Maximum racking post load = 12 ton at 2500mm intervals along aisles and 1000mm to 2500mm in opposite direction. Maximum axle load = 10 ton assuming a nominal forklift lifting capacity of 4.5 tons. | | | | A | | | | | |
| | | | | C | | | | | |
| | | | | E | | | | | |
| | | | | L | | | | | |
| | | | | M | | | | | |
| | | | | S | | | | | |
| | | | | 5.1.3 Offices, Worker's Section and Ablutions | | | | A | |

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|--|-----------------------|--|--|---|--|
| Suspended floor slab: In-situ suspended concrete slab. The pre-stressed, pre-cast concrete floor slabs will be more economical due to the following reasons - substantial one-way spanning lengths; large area; rectangular layout of floor. Suspended reinforced concrete slab on load bearing brickwork designed for: <ul style="list-style-type: none">Occupancy load = 300 kg/m²Partition load = 200 kg/m² | | C | | | |
| | | E | | | |
| | | L | | | |
| | | M | | | |
| | | S | | | |
| 6 DESIGN – LANDSCAPING AND RAINWATER HARVESTING | | | | | |
| 6.1 Landscaping | | | | | |
| 6.1.1 Landscaping ELIDZ palette of waterwise plants. | | A | | | |
| | | C | | | |
| | | E | | | |
| | | L | | | |
| | | M | | | |
| | | S | | | |
| 6.2 Irrigation | | | | | |
| 6.2.1 Irrigation No formal irrigation system to be provided. | | A | | | |
| | | C | | | |
| | | E | | | |
| | | L | | | |
| | | M | | | |
| | | S | | | |
| 6.3 Rainwater Harvesting | | | | | |
| 6.3.1 Main building Provide 8 x 5000l vertical water tanks, placed above ground on raised platform along northern façade. Tanks to be interconnected and include suitable submersible pump for connecting to landscaping/irrigation/grey water flushing system. | | A | | | |
| | | C | | | |
| | | E | | | |
| | | L | | | |
| | | M | | | |
| | | S | | | |
| 7 DESIGN – WATER, WASTEWATER AND EFFLUENT | | | | | |
| 7.1 Trade Effluent and Disposal | | | | | |
| 7.1.1 General The design of the Civil Engineering infrastructure must be in accordance with the following as listed below: <ul style="list-style-type: none">Guidelines for the Provision of Engineering Services and Residential Amenities in Residential Township Development” (the Red Book) by the Department of Housing, 2000.SABS 10252-1:2012 – Water supply and drainage to buildingsSANS 10400- building regulationsSANS 1200 AD, C, D, DB, DK, DM, GA, L, LB, LC, LD, LE, ME, MJ, MK, MMELIDZ Development Manual 24th Draft, 14th March 2011 | | | | | |
| | | 7.1.2 Responsibility Tenant is responsible for industrial effluent disposal and applications for Trade Effluent Permit. | | A | |
| | | | | C | |
| | | | | E | |
| | | | | L | |
| M | | | | | |
| 7.1.3 General Trade effluents that are discharged into the wastewater drainage system will fall under the control of BCM. Any person wishing to discharge Trade Effluent into the wastewater drainage system must apply to BCM for a license to do so. The wastewater must comply with BCM's standards for the acceptance of trade effluents into the municipal sewerage system. | | S | | | |
| | | A | | | |
| | | C | | | |
| | | E | | | |
| | | L | | | |
| 7.2 Water Supply | | | | | |
| 7.2.1 Water Demand The ELIDZ water supply system has been designed to cater for an averaged demand of 20 kl/d/ha, with a peak day demand 4.2 times the average daily demand, equivalent to a peak flow of 0.97 l/s/ha. Special consideration should be given to the location of any industries and/or the reinforcement of the distribution system where the peak demand for potable water is expected to be in excess of 1.0 l/s/ha. A single water supply connection is provided by the ELIDZ, from a 110mm or 160mm existing erf connection. The existing connection consists of a uPVC main of class 9 pressure rating. Water supply will be split into domestic and fire main reticulation downstream of the water meter positioned within the property boundary. | | A | | | |
| | | C | | | |
| | | E | | | |
| | | L | | | |
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| | | S | | | |

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|---|-----------------------|--|-----------------------------------|
| The water meter must be a "Sensus" Type automatic pulse meter 1:10 output. The meter is to be sized to allow operation flow to within 25% of the maximum allowable flow of the instrument. Isolation valves are to be installed and directional flow controlled with non-return valves. All control valves to be SANS 664 Left hand closing. | | | |
| 7.2.2 Fire Water Supply In addition to the above, the water reticulation system is designed to provide a fire flow of up to 50 l/s anywhere in the ELIDZ. The fire mains to be uPVC class 12 with a minimum diameter of 75mm. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 7.2.3 Refuse Yard A water supply and an appropriate drainage system are to be provided for washing the storage area. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 7.2.4 Static Pressures The maximum and minimum static pressures are 90m and 25m respectively. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 7.2.5 Auxiliary water storage See "Design Fire Protection" below. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 7.2.6 Excess water required In terms of the Conditions of Establishment of the ELIDZ, any industrialist wishing to draw in excess of 150 kl/day on an average must have approval of, and be licensed by the Department of Water Affairs and Forestry to do so. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 7.3 Access to Sewage and Water Reticulation | | | |
| 7.3.1 Underground Sewers Underground sewers are provided to municipal sewer connection point. Sewer pipes to be uPVC Class 34 solid wall with a minimum diameter of 110mm. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 7.3.2 Industrial Effluent Sewer Drains The industrial effluent sewer drains must be provided to the tenant's wastewater treatment plant which is the responsibility of the tenant. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 7.3.3 Water Reticulation Water supply mains to buildings will provide domestic water at a rate of 4 kl per day per 1,000m ² of building floor area. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | 5200m ² – 20kl per day |
| | | S | |
| 8 DESIGN – STORMWATER, SUBSOIL AND WASTEWATER DRAINAGE | | | |
| 8.1 Wastewater Drainage | | | |
| 8.1.1 IDZ Wastewater Drainage System The IDZ wastewater drainage system conveys all sewage and industrial wastewaters generated in the IDZ. The system has been designed to cater for a peak flow of 0.8 l/s/ha. | | A | |
| | | C | |
| | | E | |

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|---|-----------------------|--|--|
| | | L | |
| | | M | |
| | | S | |
| 8.1.2 Drainage connections Wastewater drainage connections have been provided for every erf. The connections are generally sited at the lowest point on the boundary and are approximately 1.0m deep. The Connection has been established and tied into from site wastewater system. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 8.1.3 Water treatment plant Tenant's responsibility. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 8.2 Storm water Drainage | | | |
| 8.2.1 50-Year Major Storm In terms of BCM's By-laws all new development proposals must provide for the on-site containment of a 50-year mayor storm and have a controlled release of not more than a 5-year storm, with calculations based on maximum hardening. BCM has exempted all developments within Zones 1A, 1B and 1C from this requirement. Therefore, no stormwater management plan required. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
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| 8.2.2 Piped Systems Zones 1A,1B and 1C have piped storm water drainage systems laid within the road reserves, and in Zone 1A the system has been extended to provide midblock connections to the erven. The piped storm water systems are generally designed to cater for the 1:5-year minor storm. Minor storms 1: 5y return period will be piped via concrete storm water pipes of class 100D minimum rating spigot socket type. Major storm 1:20y and greater will spill over onto road surfaces, flooding areas to be checked by Engineer, and reported and will be contained on hardstand areas along site boundaries. Where there is any possibility of damage or flooding of property downstream of the installation due to the above adequate allowance must be made in the piped system to accommodate the flooding. All manhole accesses in hardstand areas are to be of Heavy-Duty type SANS 558, Type 2A, "Modified "to be cast integrally with Hard Stand Concrete External hardstands are to be shaped and graded to allow uniform drainage to catch pits and storm water inlets along road edges Surface drains with heavy duty grill covers generally located at 24m centres to underground storm water pipes, will be located in open areas. | | A | |
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| 8.2.3 Inlet Manholes Storm water runoff from the individual erven is to be discharged into the ELIDZ's piped storm water drainage system. In many cases, inlet manholes have been provided at low points on the erven for this purpose. An existing stormwater network exists along the property boundary of the site, tie into the network must be achieved from all developed erven. All manhole accesses in hardstand areas are to be of Heavy-Duty type SANS 558, Type 2A, "Modified "to be cast integrally with Hard Stand Concrete. External hardstands are to be shaped and graded to allow uniform drainage to catch pits and storm water inlets along road edges Surface drains with heavy duty grill covers generally located at 24m centres to underground storm water pipes, will be located in open areas where discharge to side inlets are not possible. | | A | |
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| 8.2.4 Excess flows Flows in excess of the design capacity will drain overland, generally via the access roads onto the road network. The road network has been designed to divert the flow into the existing watercourses through the public open spaces. Where there is any possibility of damage or flooding of property downstream of the installation due to the above adequate allowance must be made in the piped system to accommodate the flooding. | | A | |
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| 8.2.5 Liquids not permitted No domestic, industrial or process effluent, chemicals, oils, factory waste water etc. may be discharged into the storm water drainage system. | | A | |
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| ELIDZ Design Specifications | | Contractor’s Proposal | | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | |
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| 8.2.6 Potential sources of contamination Potential sources of storm water contamination should be identified and measures taken to mitigate these at source by appropriate design of materials' storage and handling". Particular attention should be given to the following features: a) draining vehicle wash areas via oil trap into sewerage system. b) covering vehicle wash areas to ensure that the storm water does not drain into sewerage system. c) providing adequate bunding in the case of above ground fuel or chemical storage tanks to contain leaks and spills and prevent contaminants from being washed into the storm water drains. d) avoiding the storing and/or handling of chemicals or fuels in close proximity to the storm water drains. e) covering raw materials and waste storage areas to prevent contamination of storm water e.g. solid hazardous waste. f) providing grids to prevent litter and debris from entering the bulk storm water system. | | | | A | |
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| 8.3 Subsoil Drainage Detailed investigation is required into the potential of rising damp, within the factory footprint and when any possibility exists a network of below floor filter media must be designed. External sub soil drains below hard stand and cut faces will consist of conventional HDPE filter drains “Megaflow “or conventional 100mm sub soil perforated pipework with filter separator. The pipework will be installed to grade and discharged into the storm water network. The design must allow free drainage of all subsoil networks during peak floods Inspection facility “rodding eye” are to be provided on long runs. Filter media to be checked for permeability and piping. | | | | A | |
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| 9 DESIGN – ELECTRICAL | | | | | |
| 9.1 Design Criteria and Parameters | | | | | |
| <p>The design criteria applied to the electrical engineering services shall include the following, namely:</p> <div><input type="checkbox"/> Capital costs</div> <div><input type="checkbox"/> Operational and maintenance requirements and costs</div> <div><input type="checkbox"/> Ease of functionality, operation and maintenance</div> <div><input type="checkbox"/> Compliance with general energy efficiency and / or sustainability standards</div> <p>Furthermore, the electrical engineering services shall be designed in accordance with, but not limited to, the current versions of the following, namely:</p> <div><input type="checkbox"/> the South African National Standard : Code of Practice for “The Application of the National Building Regulations” i.e. those included in the “National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977)”, as published in the Government Gazette, number 31084, dated 30 May 2008, which became effective as of 01 October 2008, and known as “SANS 10400 - 2010”</div> <div><input type="checkbox"/> the Occupational Health and Safety Act, 1993 (Act 85 of 1993),</div> <div><input type="checkbox"/> SANS 204-1 : 2008 - Energy Efficiency in Buildings : Part 1 - General Requirements,</div> <div><input type="checkbox"/> SANS 204-2 : 2008 - Energy Efficiency in Buildings : Part 2 - The Application of the Energy Efficiency Requirements for Buildings with Natural Environmental Control,</div> <div><input type="checkbox"/> SANS 204-3 : 2008 - Energy Efficiency in Buildings : Part 3 - The Application of the Energy Efficiency Requirements for Buildings with Artificial Ventilation or Air-conditioning,</div> <div><input type="checkbox"/> any other relevant by-laws of the Local Authorities,</div> <div><input type="checkbox"/> SANS 507-1 : (NRS 034-1 : 2007) Electricity Distribution - Guidelines for the Provision of Electricity Distribution Networks in Residential Areas (Part 1 : Planning and Design of Distribution Networks)</div> <div><input type="checkbox"/> SANS 10114-1 : 2005 : Interior Lighting</div> <div><input type="checkbox"/> South African National Standard : SANS 10142-1: 2003 - The Wiring of Premises : Part 1 - Low-voltage Installations</div> <div><input type="checkbox"/> “SANS 0313 - 1999 : The Code of Practice for “The Protection of Structures against Lightning”</div> <p>All apparatus, components, parts, fittings and materials supplied and / or installed, whether specifically specified herein or not, shall conform in respect of quality, manufacture, tests and performance with the requirements of the appropriate current South African (SANS) or British Standard Specifications (BS) and Addenda thereto, except where otherwise required by this specification or permitted by approval of the Client / Employer, in writing.</p> <p>All materials and workmanship, which may, in the opinion of the Client / Employer, be inferior to that specified for the Work, will be condemned. All condemned material and workmanship must be replaced or rectified as the case may be, to the satisfaction of the Client / Employer.</p> <p>Any fitting or item of equipment not specifically mentioned but obviously necessary for the successful completion of the installation is to be included so as to form a complete working installation.</p> | | | | A | |
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| 9.2 Building Classification | | | | | |
| <p>The buildings shall be classified as follows, namely :</p> <div><input type="checkbox"/> Offices</div> <div><input type="checkbox"/> Cheese Factory</div> <div><input type="checkbox"/> Cold Store</div> | | | | A | |
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| ELIDZ Design Specifications | | Contractor’s Proposal | | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | |
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| 9.3 Definitions | | | | | |
| <input type="checkbox"/> Design | To create a plan or a specification for the construction of a system, or for the implementation of an activity or a process | | A | | |
| <input type="checkbox"/> Supply | To purchase, procure and deliver complete with all related specified accessories | | C | | |
| <input type="checkbox"/> Erect | To place or mount and fix in position | | E | | |
| <input type="checkbox"/> Install | To erect, connect up and commission, complete with related accessories | | L | | |
| <input type="checkbox"/> Indicated shown, Noted | As indicated or shown on drawings | | M | | |
| <input type="checkbox"/> Approved, Alternative | Approved in writing by the Client / Employer | | S | | |
| <input type="checkbox"/> Similar, Equal | Equal or better in efficiency of performance and compatibility | | | | |
| 9.4 Acceptance, Testing and Commissioning | | | | | |
| <p>The Contractor shall allow for two representatives of the Client / Employer to participate in, and witness, all acceptance tests undertaken by the respective Manufacturers, for all major items of electrical equipment i.e. but not limited to, medium voltage switchgear, medium voltage equipment, generator set, uninterruptible set, main low voltage panels, electrical distribution boards, etc.</p> <p>The Contractor shall carry out all testing and commissioning required in terms of the respective Supplier specifications, relevant Acts, SANS Codes of Practice and Local Authority requirements. The Contractor shall provide all the equipment and apparatus required for the purpose of carrying out all necessary tests.</p> <p>The Contractor is responsible for carrying out all necessary tests and obtaining / preparing / issuing all necessary certificates for the installation and operation of the plant.</p> <p>If any part of the Works fails the test, the Contractor shall be responsible for rectifying, at his own cost, the defective Works and the re-testing thereof to ensure compliance. If in consequence, the Client / Employer are obliged to attend the further acceptance tests the additional costs incurred by the Engineers shall be payable by the Contractor.</p> <p>The Works shall be deemed to be practically complete only when the Client / Employer has approved all tests and inspections, and a Completion Advice Notice or other relevant completion notice is issued.</p> | | | A | | |
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| 9.5 Defects Liability Period | | | | | |
| <p>The Contractor shall be responsible for the carrying out of inspections, services and maintenance-related tasks that are specified / recommended by the relevant Manufacturers / Suppliers for each component of the respective installations described herein, including but not limited to the following:</p> <p>Medium Voltage:</p> <ul style="list-style-type: none"><input type="checkbox"/> clean and wipe down all equipment<input type="checkbox"/> carry out a visual inspection of complete installation to ensure that all fittings are still in place, covers fitted properly, etc.<input type="checkbox"/> check whether switchboard is still seated level<input type="checkbox"/> verify that paint is in good condition<input type="checkbox"/> check whether circuit breakers are still seated level<input type="checkbox"/> check open and closed circuit breaker positions<input type="checkbox"/> check all alarm and indication signals<input type="checkbox"/> record number of operations, where applicable<input type="checkbox"/> check pressure of SF6 gas<input type="checkbox"/> verify that each cabinet is free of moisture and that respective heating circuit is operating<input type="checkbox"/> check whether transformer is still seated level<input type="checkbox"/> verify that paint is in good condition<input type="checkbox"/> check oil level in main tank and conservator<input type="checkbox"/> check condition of breather<input type="checkbox"/> record winding / liquid temperature<input type="checkbox"/> check medium and low voltage insulators<input type="checkbox"/> check integrity of tank<input type="checkbox"/> carry out thermographic imaging of transformer<input type="checkbox"/> visual inspection of batteries<input type="checkbox"/> visual inspection of electrolyte levels<input type="checkbox"/> verify that no battery grounds exist<input type="checkbox"/> check intercell impedance / resistance<input type="checkbox"/> check strap resistance<input type="checkbox"/> check individual cell voltages / total cell voltage<input type="checkbox"/> equalize voltages<input type="checkbox"/> record battery voltage and current<input type="checkbox"/> verify charger alarms<input type="checkbox"/> check voltage ripple <p>Low Voltage and Building Services-related:</p> <ul style="list-style-type: none"><input type="checkbox"/> test the incoming voltages and determine whether they are within normal parameters<input type="checkbox"/> check all switchgear within the respective electrical distribution board<input type="checkbox"/> test all earth leakage units<input type="checkbox"/> test all socket outlets circuits i.e. one socket outlet per circuit to be tested in terms of correct earth leakage operation<input type="checkbox"/> test all light switches and determine whether all light fittings are operating correctly<input type="checkbox"/> test all photo-electrical daylight switches to ensure their correct operation<input type="checkbox"/> check all isolators to ensure correct operation<input type="checkbox"/> carry out a visual inspection of complete electrical installation to ensure that all electrical fittings are still in place, covers fitted properly, etc. | | | A | | |
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| <div>Standby Generator:</div> <div><div><input type="checkbox"/> oil levels are correct</div><div><input type="checkbox"/> radiator core for fouling</div><div><input type="checkbox"/> radiator hose condition</div><div><input type="checkbox"/> block heater working</div><div><input type="checkbox"/> fuel level litres added</div><div><input type="checkbox"/> fuel solenoid linkage for security</div><div><input type="checkbox"/> governor operation</div><div><input type="checkbox"/> voltage regular adjustment</div><div><input type="checkbox"/> start battery electrolyte level</div><div><input type="checkbox"/> control battery electrolyte level</div><div><input type="checkbox"/> charging voltage</div><div><input type="checkbox"/> housekeeping clean up</div><div><input type="checkbox"/> record hours run time on start</div><div><input type="checkbox"/> record kwh meter reading</div><div><input type="checkbox"/> check fuel, oil, water and exhaust systems for leakages</div><div><input type="checkbox"/> fan belt tension</div><div><input type="checkbox"/> fan belt wear</div><div><input type="checkbox"/> check battery terminals</div><div><input type="checkbox"/> change engine sump oil</div><div><input type="checkbox"/> change full flow oil filter</div><div><input type="checkbox"/> empty, flush and refill radiator</div><div><input type="checkbox"/> change bypass oil filter</div><div><input type="checkbox"/> flush daily service fuel tank</div><div><input type="checkbox"/> change fuel filter</div><div><input type="checkbox"/> change air filter</div><div><input type="checkbox"/> check and clear crankcase breathers</div><div><input type="checkbox"/> check all nuts, bolts and clamps</div><div><input type="checkbox"/> check starter motor solenoid</div><div><input type="checkbox"/> check all electrical connections</div><div><input type="checkbox"/> clean engine</div><div><input type="checkbox"/> remove and clean air grilles</div><div><input type="checkbox"/> inspect/check all alternator output connections</div><div><input type="checkbox"/> clean alternator</div><div><input type="checkbox"/> inspect all components and cubicle</div><div><input type="checkbox"/> inspect all wiring and terminals</div><div><input type="checkbox"/> clean switchboard</div><div><input type="checkbox"/> test with load</div></div> <div>Uninterruptible Power Supply:</div> <div><div><input type="checkbox"/> check control switches and test on bypass</div><div><input type="checkbox"/> check parameters of control board</div><div><input type="checkbox"/> tested and inspection of all fans and filters</div><div><input type="checkbox"/> check fuses</div><div><input type="checkbox"/> check machines for common errors</div><div><input type="checkbox"/> load tested to be actioned and battery life cycles to be calculated</div><div><input type="checkbox"/> banks of batteries to be tested and replaced if necessary</div></div> <div>The Contractor shall ensure that the inspections, services and maintenance-related tasks are undertaken at intervals not greater than three months.</div> <div>The Contractor shall ensure that each inspection, service and / or maintenance-related task is undertaken in the presence of a representative of either the Client / Employer or the Client / Employer.</div> <div>The Contractor shall ensure that the necessary documentation is completed and submitted to the Client / Employer confirming the completion of the relevant tasks after every inspection, service and / or maintenance-related task milestone.</div> <div>The Contractor shall also timeously attend to any defects, which may occur through the normal operation of the Works.</div> <div>If, during the defects liability period, the installation is not in working order for any reason for which the Contractor is responsible, or if the respective installation develops a defect, the Contractor shall, immediately upon being notified thereof, take steps to remedy the defects and make any necessary adjustments.</div> <div>Should such stoppages, however be so frequent as to become troublesome, or should the installation otherwise prove unsatisfactory during the said period the Contractor shall, if called upon by the Client / Employer, at his own expense replace the whole of the installation, or such parts thereof, as the Client / Employer may deem necessary with equipment specified by the Client / Employer.</div> <div>Upon completion of the defects liability period, the Client / Employer shall undertake the final inspection, service and / or maintenance-related task, as explained above and ensure that the necessary documentation is completed and submitted to the Client / Employer on behalf of the Client / Employer.</div> | | | | | | |
| 9.6 Detailed Schedule of Work | | | | | | |
| 9.6.1 Local Supply Authority The East London Industrial Development Zone is the licensed electricity supply authority within the defined industrial zone, and in terms of its authority granted by National Electricity Regulator (South Africa), has the right to supply electricity to all customers situated within the industrial development zone. | | | | A | | |
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| 9.6.2 Bulk Electricity Service Connection The Dairy facility presently has an 11 000 V, 1.6 MVA bulk electricity service connection. Their present maximum demand is considerably lower than the capacity provided to them. It is anticipated that the electrical requirement of the proposed extensions to their facility, to accommodate the Cheese Factory and additional Cold Storage, will be accommodated within the spare capacity available and that the existing bulk electricity service connection need not be upgraded. However, it remains the responsibility of the appointed Design Team to consider the electrical loads presented to themselves by the East London Industrial Development Zone and / or User (Tenant) and to confirm the electrical requirements. Whether the bulk electricity service connection is to be upgraded or not, an application shall still be submitted to the East London Industrial Development Zone for the necessary bulk electricity service connection, for record purposes. The East London Industrial Development Zone shall not impose any electricity service connection fees and / or electricity account deposits on the project. If required, the project shall be responsible for the necessary extension of the existing medium voltage reticulation. | | | | A | |
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| 9.6.3 Medium Voltage Equipment It is anticipated that the existing medium voltage equipment shall suffice. However, if the existing medium voltage equipment has to be extended and / or upgraded in any way, the extension and / or upgrading thereof shall comply with the following, namely: | | | | A | |
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| | | AC mains failure Battery high volts alarm | | |
| 3 | Particulars of Circuit Breakers | | | |
| 3.1 | Interrupting medium | Vacuum | | |
| 3.2 | Current rating of circuit breaker | 1 250 A | | |
| 3.3 | Current rating of busbars | 1 250 A | | |
| 3.4 | Busbar configuration | Single | | |
| 3.5 | Fault level | 25 kA (11 kV) 3 second rating | | |
| 3.6 | Local operating conditions | Max temperature : 40 degrees Celsius, with 98% Humidity | | |
| 3.7 | Circuit breaker mechanism | Motor charged spring closing mechanism | | |
| 3.7 | Charging motor / auxiliary supply voltage | 30 V dc | | |
| 3.9 | Maximum spring recharge time | 10 seconds | | |
| 3.10 | Maximum break time | 50 milli-seconds | | |
| 3.11 | Maximum closing time | 40 milli-seconds | | |
| 3.12 | Spring release and shunt trip coil rating | 30 V dc | | |
| 3.13 | Spring charged indication | Required | | |
| 3.14 | Circuit breaker remote opening & closing plug & extension | 10 m remote operating switch required | | |
| 4 | Particulars of Incoming Circuit Breaker Panels | | | |
| 4.1 | Current transformers | 800 / 400 / 1 A, 10 VA Class 10P10 800 / 400 / 200 / 1 A, 10 VA | | |
| 4.2 | Protection relays and measurement equipment required | Three phase over-current and earth fault relay (Micom P122) Trip circuit supervisory relay (see below detailed specification for relays and measurement equipment) | | |
| 4.3 | Local indication equipment | 11 kV busbar voltmeter 3 x MDI Ammeters 0 / 200 / 400 A Breaker open indication lamp Breaker closed indication lamp Breaker spring charged indication lamp Cable Alive Neon Indication Lamps Fault counter Panel label | | |
| 4.4 | Local control equipment | All equipment labelling Voltmeter selector switch Breaker control switch Local / Remote Selector Switch Lamp test switch | | |
| 4.5 | Local protection auxiliary equipment | Remote operating connection plug 2 no. CT test blocks (PK2 protection & C&H metering) Main Tripping Circuit DC MCB (20 A double pole) Closing Circuit DC MCB (20 A double pole) Spring charge DC MCB (20 A double pole) VT MCB's (2 A single pole) VT selection auxiliary relays Cable compartment anti-condensation heaters | | |
| 4.6 | Supervisory indication requirements to be provided for remote indication | Breaker open Breaker closed Cable earth on Breaker racked out / in service position | | |
| 4.7 | Supervisory alarm requirements to be provided for remote indication | Supervisory isolated Protection not healthy O/C or E/F trip Circuit breaker spring discharged Trip circuit fail Auxiliary supply fail | | |
| 4.7 | Supervisory analogue signal requirements to be provided for remote indication | Current - White Phase (4 - 20 mA output) Power (4 - 20 mA output) Voltage (4 - 20 mA output) | | |
| 4.9 | Incoming cable details | XLPE insulated, steel wire armoured 70mm ² x 3 core, 6.35/11 kV cable, Type A (all in accordance with SANS 1339) and 70 mm ² bare stranded copper earth wire (<i>or as per final design</i>) | | |
| 5 | Particulars of Local Transformer Circuit Breaker Panel | | | |
| 5.1 | Current transformers | 800 / 400 / 1 A, 10 VA Class 10P10 multi ratio 200 / 100 / 1 A, 10 VA Class 0.5 multi ratio | | |

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| 5.2 | Protection relays and measurement equipment required | Three phase over current and earth fault relay (Micom P122) Trip circuit supervisory relay Buchholz & oil temperature auxiliary (Alarm & Trip) (Alstom MVAA) Intertrip relay (Micom MVAJ) | | |
| 5.3 | Local indication equipment | MDI Ammeter 0 / 100 / 200A Breaker open indication lamp Breaker closed indication lamp Breaker spring charged Indication Lamp Fault counter Panel label All equipment labelling Oil temperature alarm Oil temperature trip Buchholz alarm Buchholz trip | | |
| 5.4 | Local control equipment | Breaker control switch Local / Remote Selector Switch Lamp test switch Remote operating connection plug | | |
| 5.5 | Local protection auxiliary equipment | 2 no. CT test blocks Main Tripping Circuit DC MCB (20A double pole) Closing Circuit DC MCB (20A double pole) Spring charge DC MCB (20A double pole) Cable compartment anti-condensation heaters | | |
| 5.6 | Supervisory indication requirements to be provided for remote indication | Breaker open Breaker closed Cable earth on Breaker racked out / in service position | | |
| 5.7 | Supervisory alarm requirements to be provided for remote indication | Supervisory isolated Protection not healthy O/C or E/F trip Circuit breaker spring discharged Trip circuit fail Auxiliary supply fail Oil temperature alarm Oil temperature trip Buchholz alarm Buchholz trip | | |
| 5.7 | Supervisory analogue signal requirements to be provided for remote indication | Current - White Phase (4 – 20 mA output) Power (4 - 20 mA output) Voltage (4 - 20 mA output) | | |
| 5.9 | Incoming cable details | XLPE insulated, steel wire armoured 70mm ² x 3 core, 6.35/11 kV cable, Type A (all in accordance with SANS 1339) and 70 mm ² bare stranded copper earth wire <i>(or as per final design)</i> | | |
| 6 | Particulars of Bus-Section Circuit Breaker Panel | | | |
| 6.1 | Current transformers | Not Required | | |
| 6.2 | Protection relays and measurement equipment required | | | |
| 6.3 | Local indication equipment | Not Required Breaker open Breaker closed Breaker not healthy Fault counter Panel label All equipment labelling | | |
| 6.4 | Local control equipment | Breaker control switch Supervisory isolating switch Lamp test switch Remote operating connection plug | | |
| 6.5 | Local protection auxiliary equipment | Main DC circuit breaker (20A double pole) Spring charge DC circuit breaker (20A) | | |
| 6.6 | Supervisory indication requirements to be provided for remote indication | Breaker open Breaker closed Cable earth on Breaker racked out | | |
| 6.7 | Supervisory alarm requirements to be provided for remote indication | Supervisory isolated Circuit breaker spring discharged Auxiliary supply fail | | |

| ELIDZ Design Specifications | Contractor’s Proposal | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|---------|---|--|--|---|-------------------|--|-----|--|--|-----|-------------------------|--|-----|---|--|-----|-----------------|---|---|--------------------|--|-----|---|---|-----|--|--|---|------------------------------------|--|-----|--------------|--|---|---------------------------------|--|-----|--|--|------|-------------|---------|---|--|--|-----|-------------|---------------------------------|-----|----------|---|-----|------------|----------|-----|------------------------|-------|-----|---------------------------------|-------|-----|---|-------|-----|---------------------------|--|-----|----------|--|-----|-----------------------|------------|------|--------------------------|--|--|--------|-----------|--|--------------|-------|--|----------|--------|--|--------------------|-------|--|-----------------------|-------|--|-------------------------|--------------------------------------|--|-------------|---------------------------|--|---------------------|--------------------------------|--|--------------------------|----------|--|--------------------|----------|--|------------------------|---------------------------------------|--|---------------------|----------|--|--|
| <p>It is anticipated that the existing protection relays and electrical measurement equipment shall suffice. However, if the existing protection relays and electrical measurement has to be extended and / or upgraded in any way, the extension and / or upgrading thereof shall comply with the following, namely:</p> <table><tr><th>Item</th><th>Description</th><th>Details</th></tr><tr><td colspan="3"><i>Note : All 11 kV switchgear shall be tested in accordance with the requirements of SANS 1885:2015 Metal-clad switchgear for rated voltages above 1 kV and up to and including 36 kV : Part 1 : General Requirements and Methods of Test.</i></td></tr><tr><td>1</td><td>Protection Relays</td><td></td></tr><tr><td>1.1</td><td>Over current & earth fault relay (Alstom MiCOM P122 or equal and approved)</td><td>Three phase and earth relays Three independent phase and earth over current stages High set instantaneous phase over current</td></tr><tr><td>1.2</td><td>Trip circuit monitoring</td><td>Trip circuit supervision with circuit breaker in opened and closed state to be monitored with an input of the Micom P122 Operation indicator required</td></tr><tr><td>1.3</td><td>Buchholz & oil temperature auxiliary relays (Alstom MVAA or equal and approved)</td><td>Operated by either the oil temperature trip setting, or the Buchholz relay Operation indicator required</td></tr><tr><td>1.4</td><td>Intertrip relay</td><td>Inter-trip circuit between transformer LV and MV circuit breakers Operation indicator required</td></tr><tr><td>2</td><td>Metering equipment</td><td></td></tr><tr><td>2.1</td><td>Customer energy and demand electricity metering : ABB type “Elster A1700” or equal and approved</td><td>3 phase 4 wire 11 kV / 1 A Class 0.5 Optical local reading port RS232 communication port</td></tr><tr><td>2.2</td><td>Customer (direct reading) energy and demand metering</td><td>Three phase, four wire 420V / 100A polyphase integrating kWh/kVA meter</td></tr><tr><td>3</td><td>Power quality monitoring equipment</td><td></td></tr><tr><td>3.1</td><td>Not required</td><td></td></tr><tr><td>4</td><td>Current transformer test blocks</td><td></td></tr><tr><td>4.1</td><td>Four-way current transformer test blocks to be installed on all protection, metering and indication current transformer circuits, complete with voltage terminals, and front or rear entry to suit panel manufacture (PK2 for protection and C&H for metering)</td><td></td></tr></table> <p>It is anticipated that the existing medium voltage transformer shall suffice. However, if the existing medium voltage transformer has to be extended and / or upgraded in any way, the extension and / or upgrading thereof shall comply with the following, namely :</p> <p>The shall generally comply with the following specification, namely:</p> <table><tr><th>Item</th><th>Description</th><th>Details</th></tr><tr><td colspan="3"><i>Note : All 11 kV / 420 V transformers shall be manufactured and tested in accordance with the requirements of NRS 005-1990 and SABS 780.</i></td></tr><tr><td>1.1</td><td>Designation</td><td>Transformer A and Transformer B</td></tr><tr><td>1.2</td><td>Quantity</td><td>2</td></tr><tr><td>1.3</td><td>Compliance</td><td>SANS 780</td></tr><tr><td>1.4</td><td>Nominal system voltage</td><td>11 kV</td></tr><tr><td>1.5</td><td>Rated no-load secondary voltage</td><td>420 V</td></tr><tr><td>1.6</td><td>Minimum MV power frequency withstand test voltage</td><td>12 kV</td></tr><tr><td>1.7</td><td>MV cable box and bushings</td><td>Yes, welded onto transformer frame with bottom cable entry facilities, air medium and MV bushings to NRS 008</td></tr><tr><td>1.7</td><td>MV cable</td><td>XLPE insulated, steel wire armoured 70mm² x 3 core, 6.35/11 kV cable, Type A (all in accordance with SANS 1339) and 70 mm² bare stranded copper earth wire</td></tr><tr><td>1.9</td><td>MV cable terminations</td><td>Heatshrink</td></tr><tr><td>1.10</td><td>Transformer Requirements</td><td></td></tr><tr><td></td><td>Rating</td><td>TBC (kVA)</td></tr><tr><td></td><td>Vector group</td><td>Dyn11</td></tr><tr><td></td><td>Windings</td><td>Copper</td></tr><tr><td></td><td>MV system earthing</td><td>Solid</td></tr><tr><td></td><td>MV system fault level</td><td>25 kA</td></tr><tr><td></td><td>Off-load tapping switch</td><td>Required (-5%, -2.5%, 0%, +2.5, +5%)</td></tr><tr><td></td><td>Conservator</td><td>Required, with drain plug</td></tr><tr><td></td><td>Oil level indicator</td><td>Required (Prismatic Flat Type)</td></tr><tr><td></td><td>Transformer rating plate</td><td>Required</td></tr><tr><td></td><td>Thermometer pocket</td><td>Required</td></tr><tr><td></td><td>Indicating thermometer</td><td>Required (with alarm & trip contacts)</td></tr><tr><td></td><td>Silica gel breather</td><td>Required</td></tr></table> | Item | Description | Details | <i>Note : All 11 kV switchgear shall be tested in accordance with the requirements of SANS 1885:2015 Metal-clad switchgear for rated voltages above 1 kV and up to and including 36 kV : Part 1 : General Requirements and Methods of Test.</i> | | | 1 | Protection Relays | | 1.1 | Over current & earth fault relay (Alstom MiCOM P122 or equal and approved) | Three phase and earth relays Three independent phase and earth over current stages High set instantaneous phase over current | 1.2 | Trip circuit monitoring | Trip circuit supervision with circuit breaker in opened and closed state to be monitored with an input of the Micom P122 Operation indicator required | 1.3 | Buchholz & oil temperature auxiliary relays (Alstom MVAA or equal and approved) | Operated by either the oil temperature trip setting, or the Buchholz relay Operation indicator required | 1.4 | Intertrip relay | Inter-trip circuit between transformer LV and MV circuit breakers Operation indicator required | 2 | Metering equipment | | 2.1 | Customer energy and demand electricity metering : ABB type “Elster A1700” or equal and approved | 3 phase 4 wire 11 kV / 1 A Class 0.5 Optical local reading port RS232 communication port | 2.2 | Customer (direct reading) energy and demand metering | Three phase, four wire 420V / 100A polyphase integrating kWh/kVA meter | 3 | Power quality monitoring equipment | | 3.1 | Not required | | 4 | Current transformer test blocks | | 4.1 | Four-way current transformer test blocks to be installed on all protection, metering and indication current transformer circuits, complete with voltage terminals, and front or rear entry to suit panel manufacture (PK2 for protection and C&H for metering) | | Item | Description | Details | <i>Note : All 11 kV / 420 V transformers shall be manufactured and tested in accordance with the requirements of NRS 005-1990 and SABS 780.</i> | | | 1.1 | Designation | Transformer A and Transformer B | 1.2 | Quantity | 2 | 1.3 | Compliance | SANS 780 | 1.4 | Nominal system voltage | 11 kV | 1.5 | Rated no-load secondary voltage | 420 V | 1.6 | Minimum MV power frequency withstand test voltage | 12 kV | 1.7 | MV cable box and bushings | Yes, welded onto transformer frame with bottom cable entry facilities, air medium and MV bushings to NRS 008 | 1.7 | MV cable | XLPE insulated, steel wire armoured 70mm² x 3 core, 6.35/11 kV cable, Type A (all in accordance with SANS 1339) and 70 mm² bare stranded copper earth wire | 1.9 | MV cable terminations | Heatshrink | 1.10 | Transformer Requirements | | | Rating | TBC (kVA) | | Vector group | Dyn11 | | Windings | Copper | | MV system earthing | Solid | | MV system fault level | 25 kA | | Off-load tapping switch | Required (-5%, -2.5%, 0%, +2.5, +5%) | | Conservator | Required, with drain plug | | Oil level indicator | Required (Prismatic Flat Type) | | Transformer rating plate | Required | | Thermometer pocket | Required | | Indicating thermometer | Required (with alarm & trip contacts) | | Silica gel breather | Required | | |
| Item | Description | Details | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Note : All 11 kV switchgear shall be tested in accordance with the requirements of SANS 1885:2015 Metal-clad switchgear for rated voltages above 1 kV and up to and including 36 kV : Part 1 : General Requirements and Methods of Test.</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Protection Relays | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.1 | Over current & earth fault relay (Alstom MiCOM P122 or equal and approved) | Three phase and earth relays Three independent phase and earth over current stages High set instantaneous phase over current | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2 | Trip circuit monitoring | Trip circuit supervision with circuit breaker in opened and closed state to be monitored with an input of the Micom P122 Operation indicator required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.3 | Buchholz & oil temperature auxiliary relays (Alstom MVAA or equal and approved) | Operated by either the oil temperature trip setting, or the Buchholz relay Operation indicator required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4 | Intertrip relay | Inter-trip circuit between transformer LV and MV circuit breakers Operation indicator required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Metering equipment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.1 | Customer energy and demand electricity metering : ABB type “Elster A1700” or equal and approved | 3 phase 4 wire 11 kV / 1 A Class 0.5 Optical local reading port RS232 communication port | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | Customer (direct reading) energy and demand metering | Three phase, four wire 420V / 100A polyphase integrating kWh/kVA meter | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Power quality monitoring equipment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.1 | Not required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Current transformer test blocks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.1 | Four-way current transformer test blocks to be installed on all protection, metering and indication current transformer circuits, complete with voltage terminals, and front or rear entry to suit panel manufacture (PK2 for protection and C&H for metering) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Item | Description | Details | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Note : All 11 kV / 420 V transformers shall be manufactured and tested in accordance with the requirements of NRS 005-1990 and SABS 780.</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.1 | Designation | Transformer A and Transformer B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2 | Quantity | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.3 | Compliance | SANS 780 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4 | Nominal system voltage | 11 kV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.5 | Rated no-load secondary voltage | 420 V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.6 | Minimum MV power frequency withstand test voltage | 12 kV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.7 | MV cable box and bushings | Yes, welded onto transformer frame with bottom cable entry facilities, air medium and MV bushings to NRS 008 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.7 | MV cable | XLPE insulated, steel wire armoured 70mm² x 3 core, 6.35/11 kV cable, Type A (all in accordance with SANS 1339) and 70 mm² bare stranded copper earth wire | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.9 | MV cable terminations | Heatshrink | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.10 | Transformer Requirements | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Rating | TBC (kVA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Vector group | Dyn11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Windings | Copper | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | MV system earthing | Solid | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | MV system fault level | 25 kA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Off-load tapping switch | Required (-5%, -2.5%, 0%, +2.5, +5%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Conservator | Required, with drain plug | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Oil level indicator | Required (Prismatic Flat Type) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Transformer rating plate | Required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Thermometer pocket | Required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Indicating thermometer | Required (with alarm & trip contacts) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Silica gel breather | Required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| ELIDZ Design Specifications | | | Contractor's Proposal | | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | |
|--|---|---|-----------------------|--|--|--|
| | Buchholz relay General | Required (with open contacts) Lifting lugs Jacking pads Corrugated radiator Drain and filler valves and plugs | | | | |
| 1.11 | LV cable box and bushings | Yes, welded onto transformer frame with bottom cable entry facilities, air medium and LV bushings to NRS 008 and aluminum gland plate | | | | |
| 1.12 | LV cable | 5 x 630 mm ² single core XLPE with copper conductors on each phase, with 2 x 300 mm ² single core XLPE with copper conductors for the neutral (<i>or as per final design</i>) | | | | |
| 1.13 | LV cable terminations | Cable clamping to suit LV cables to be provided in air cable box Aluminum gland plate Auxiliary terminal box | | | | |
| 1.14 | Auxillary cable box | Yes, welded onto transformer frame with bottom cable entry facilities, air medium and LV bushings to NRS 008 and aluminum gland plate | | | | |
| 1.15 | Auxillary cable | 2.5 mm ² x 12 core PVC insulated with copper conductors (numbered) | | | | |
| 1.16 | Auxillary cable terminations | Cable clamping to suit LV cables to be provided in air cable box Aluminum gland plate Auxiliary terminal box | | | | |
| 1.17 | Earth | Earth bar on LV side | | | | |
| 1.18 | Construction | Indoor | | | | |
| 1.19 | Underbase | Skid type | | | | |
| 1.20 | Corrosion protection - general | Suitable for outdoor application in coastal areas, compliant to NRS 003-1 | | | | |
| 1.21 | Corrosive protection - radiator | Galvanised (to SANS 121:1999) | | | | |
| 1.22 | Corrosive protection - transformer tank | Zinc metal sprayed | | | | |
| 1.23 | LV Neutral terminal rating | Equal to phase terminal rating & utilise identical bushing | | | | |
| 1.24 | Paint colour | Navy Light Grey, Colour G35 to SANS 1091 : 1975 | | | | |
| 9.6.4 Medium Voltage Cables | | | | | | |
| 9.6.4.1 General | | | | | A | |
| All single core and three core cables with stranded copper conductors and insulated with cross linked polyethylene, shall comply with SANS 1339. | | | | | C | |
| Conductors shall comprise standard annealed copper, complying with the requirements for class 2 conductors in SANS 1411-1. | | | | | E | |
| All single core cables shall comply with the requirements given in tables 11, 12 and 13 of SANS 1339:1981. | | | | | L | |
| All three core cables shall comply with the requirements given in tables 23, 25 and 26 of SANS 1339:1981 for type A cable and tables 29, 31, 32 and 33 for type B cables.. | | | | | M | |
| | | | | | S | |
| 9.6.4.2 Installation | | | | | A | |
| The cable shall be removed from the drum in such a manner that the cable is not subjected to twisting or tension exceeding that stipulated by the cable manufacturer. | | | | | C | |
| Cable rollers shall be used to run out cables. Rollers shall be spaced so that the length of cable in the trench shall be prevented from touching the ground. The spacing between rollers shall not exceed 3 meters. | | | | | E | |
| Lubricated skid plates shall be used where cables have to be drawn around corners. | | | | | L | |
| Where cables have to be drawn through conduits or ducts, a suitable cable sock shall be used and particular care shall be exercised to avoid abrasion. | | | | | M | |
| The maximum allowable tension when pulling a cable is 70 N/mm ³ of phase conductor area, and the maximum speed at which cable shall be drawn shall not exceed 10 meters/minute. | | | | | S | |
| Where cables are cut and not immediately made off, the ends are to be sealed without delay by means of an approved method. | | | | | | |
| Where cables are installed around corners, the minimum radius of curvature must not be less than "12d", where "d" is the overall diameter of the cable. | | | | | | |
| Cables shall be installed at the minimum depth of 900mm below ground level or as otherwise specified in the Detailed Specification. | | | | | | |
| Cables installed in the same trench shall be laid parallel to each other with a minimum horizontal clearance between adjacent cables equal to twice the overall diameter of the larger cable. | | | | | | |
| Cables laid beneath road crossings shall be laid at a depth of 1200mm, measured to the top of the cable. | | | | | | |
| All cable conduits shall be HDPE thick wall type to EN50086-2-4:1991. | | | | | | |
| One 160mm diameter conduit shall be provided for each 11 kV cable at each road crossing. | | | | | | |
| Each conduit shall extend at least 1500 mm on either side of the road. | | | | | | |
| All conduits not containing cables, shall be provided with a 1.6mm diameter galvanised steel draw wire or PVC draw tape and shall be sealed with a watertight end cap at each end. | | | | | | |
| All cables shall be fitted with identification labels. Identification labels shall be of flat lead with 9mm punched characters as an identification code. Labels shall be fitted to cables at each end and at 10m intervals. | | | | | | |
| The medium voltage cables, or where applicable, the ducts, shall be placed on a bed of 75mm of sifted sand, and covered with a bed of 200mm of sifted sand, over the entire length. | | | | | | |
| Pre-cast concrete cable slabs, 500mm long x 250mm wide x 50mm thick, are to be placed immediately above the 200mm bed of sifted sand. | | | | | | |
| 9.6.4.3 Cable Jointing | | | | | A | |
| Jointing of cables must be restricted to an absolute minimum and shall not be carried out during overcast conditions. | | | | | C | |

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|---|--|--|--|--|--|--|--|--------------------------|------------------------|--|----|----|-----------|----|---|-----------|----|---|--|---|--|
| At every MV cable joint, the cable shall be looped in the ground to allow for future re-making of the joint, should this become necessary. The jointing of XLPE cables is to be carried out using 3 M, Sigmaform or Raychem type jointing kits. The procedure for preparing the two cable ends for jointing shall be carried out in accordance with the recommendations provided by the supplier of the jointing kit. Care must be taken when ring cutting to remove the inner jackets as damage to the copper shielding tapes could result in a failure of the joint. Only aluminum oxide abrasive cloth shall be permitted for sanding procedures. Special care shall be observed when preparing the ends of XLPE cables such that the underlying insulation does not become damaged when removing semi-conducting screens. A special rotating tool shall be used to remove semi-conductive layers. The correct size ferrules must be used. An hexagonal crimping tool shall be used. All sharp edges shall be filed smooth. Where applicable, the armour continuity sock, bridging the armouring at the joint, shall be adequate to carry the fault current and shall not be less than 7 mm². One constant force roll spring shall be used at either end of the joint to ensure uniform contact pressure between the earth sock and the armouring. | | E | | | | | | | | | | | | | | | | | | | |
| | | L | | | | | | | | | | | | | | | | | | | |
| | | M | | | | | | | | | | | | | | | | | | | |
| | | S | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| 9.6.4.4 Termination Cables Cable ends shall be terminated with glands or in cable boxes with the associated accessories such as clamps, shrouds, etc. in a manner recommended by the manufacturer. The termination of cables shall not be carried out during overcast conditions. At every cable termination, the cable shall be looped in the ground to allow for future re-making of the termination, should this become necessary. XLPE cable terminations shall be carried out using 3M, Sigmaform, Raychem or pre-stressed sleeves of the 3M type. Sheds shall be used on outdoor terminations. The procedure, dimensions and method of preparing and terminating an XLPE cable end shall be in accordance with the supplier’s recommendations of the termination kit chosen. A copper earth braid with a minimum cross-section area of 50sq/mm is to be connected to each copper screen and to the armour using steel constant force roll springs to ensure uniform contact pressure between the earth braid and the screen. The screen and armouring braids shall be bonded to the main earth bar of the transformer, but the bond shall be easily removable for testing purposes. The manufacturer’s insulation clearances between the copper screens and the armouring shall be adhered to, so that the testing procedures, detailed in the Specification, can be applied. Correctly sized lugs shall be crimped onto the ends of the cable using the correctly sized hexagonal crimping tool. The lug hole size shall match that of the termination bolts. A pre-stretched tube or heat shrink tube shall be placed over the end lug and switchgear spout to completely insulate the termination. Taping of the end lug shall not be allowed. Cable end boxes shall be installed, as specified, to prevent mechanical damage or access to the terminals Cable end boxes shall not be filled with any type of filling compound. The dimensions of the cable end box shall be such that the crutch of the termination shall fall inside the box. The cable shall be clamped outside the cable end box using suitable wooden clamps Where it is not possible to provide a cable end box, a suitable bracket or other approved means of support shall be provided to remove mechanical stress from the cable termination and crutch. Where the cable is to terminate on a transformer pole or on an overhead line structure, the cable shall be secured to the pole with acceptable clamps or straps. For terminations on a transformer pole, the cable shall be taken to 1 meter above the transformer bushings. | | A | | | | | | | | | | | | | | | | | | | |
| | | C | | | | | | | | | | | | | | | | | | | |
| | | E | | | | | | | | | | | | | | | | | | | |
| | | L | | | | | | | | | | | | | | | | | | | |
| | | M | | | | | | | | | | | | | | | | | | | |
| | | S | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| 9.6.4.5 Testing Each cable shall be tested after installation in accordance with SANS 1339 for cross-linked polyethylene (XLPE) insulated cables. MV cables shall be pressure tested after installation in accordance with the tables below and the exact leakage current shall be tabulated and certified. All tests shall include the identification of the phase rotation applicable to each section of each of the 11 kV underground reticulation circuits. The phase rotation of each section shall be recorded on the associated terminal equipment and in the Record Drawings. Furthermore, the tests shall include: <table><tr><td>Cable Rating (Volts)</td><td colspan="2">Test Voltage (Volts)</td></tr><tr><td></td><td>Conductors to screen / binder / armour</td><td>Between overall copper screen and armour</td></tr><tr><td></td><td>(Applied for 15 minutes)</td><td>(Applied for 1 minute)</td></tr><tr><td></td><td>DC</td><td>DC</td></tr><tr><td>2.6 / 6.6</td><td>11</td><td>4</td></tr><tr><td>6.35 / 11</td><td>18</td><td>4</td></tr></table> The copper screens, copper cores and armouring of cable, shall be commonly bonded during sheath testing. If the cable breaks down during the sheath test, the Contractor shall be required to rectify the fault to the satisfaction of the Client/ Employer. The Contractor shall notify the Client/ Employer timeously, so that their representative may witness the tests. On completion of the tests, the Contractor shall submit three copies of the certified test reports to the Client / Employer. The Contractor shall make provision for the liaison with the Client/ Employer’s relevant operational staff, and to arrange all interruptions to the electricity services as may be required to execute the Works in accordance with the procedures specified by the Client / Employer. Such provision shall include, but shall not be restricted to: <input type="checkbox"/> Arranging and attending meetings with the operational staff in order to finalise Work programmes and interruptions to supply, <input type="checkbox"/> Coordinating the isolation, issue of Permits to Work, earthing and de-isolation process with the operational staff, | Cable Rating (Volts) | Test Voltage (Volts) | | | Conductors to screen / binder / armour | Between overall copper screen and armour | | (Applied for 15 minutes) | (Applied for 1 minute) | | DC | DC | 2.6 / 6.6 | 11 | 4 | 6.35 / 11 | 18 | 4 | | A | |
| Cable Rating (Volts) | Test Voltage (Volts) | | | | | | | | | | | | | | | | | | | | |
| | Conductors to screen / binder / armour | Between overall copper screen and armour | | | | | | | | | | | | | | | | | | | |
| | (Applied for 15 minutes) | (Applied for 1 minute) | | | | | | | | | | | | | | | | | | | |
| | DC | DC | | | | | | | | | | | | | | | | | | | |
| 2.6 / 6.6 | 11 | 4 | | | | | | | | | | | | | | | | | | | |
| 6.35 / 11 | 18 | 4 | | | | | | | | | | | | | | | | | | | |
| | | C | | | | | | | | | | | | | | | | | | | |
| | | E | | | | | | | | | | | | | | | | | | | |
| | | L | | | | | | | | | | | | | | | | | | | |
| | | M | | | | | | | | | | | | | | | | | | | |
| | | S | | | | | | | | | | | | | | | | | | | |
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|--|-----------------------|---|--|
| <div><div><div><div><div><div></div></div></div><div><div><div></div></div></div></div><div>Undertaking such Works as required by the operational staff outside of normal working hours, in order to limit the impact of the Works on electricity customers,</div><div><div><div></div></div></div><div>Arranging for the inspection by the operational staff of the completed Works, prior to handing over the Works to the relevant institution.</div></div><div>No additional payments shall be certified to the Contractor for additional preliminary and general, dayworks or labour rates resulting from the Contractor having to comply with the above conditions.</div></div> | | | |
| <div><div><div><div><div><div></div></div></div><div><div><div></div></div></div></div><div>9.6.4.6 Cable Markers</div><div>The cable markers shall consist of a concrete block in the shape of a truncated pyramid, approximately 300 mm deep x 150 mm x 150 mm at the top and 230 mm x 230 mm at the bottom. An aluminium indicator plate shall be cast onto the top of the marker.</div><div>Indicator plates shall have the following inscriptions:</div><div><div><div></div></div><div>CABLE / CABLE SLEEVES</div></div><div><div><div></div></div><div>INDICATE NUMBER AND SIZE</div></div></div><div>Markers for cable joints shall have the following stamped inscription on the indicator plate:</div><div><div><div></div></div><div>CABLE JOINT No</div></div><div>Markers shall be placed at regular intervals along the cable routes, approximately 50 meters apart and also at all changes in direction with arrows indicating route of cable.</div><div>A sample of the proposed markers shall be submitted to the Client / Employer for approval before they are manufactured.</div><div>The position of the cable markers shall be indicated on the Record Drawings.</div></div> | | <div><div><div><div><div><div>A</div></div></div><div><div><div></div></div></div></div><div>C</div><div><div><div></div></div></div></div><div>E</div><div><div><div></div></div></div></div> <div>L</div> <div><div><div></div></div></div> <div>M</div> <div><div><div></div></div></div> <div>S</div> <div><div><div></div></div></div> | |
| <div><div><div><div><div><div></div></div></div><div><div><div></div></div></div></div><div>9.6.4.7 Crossing of Existing Services</div><div>The Contractor shall acquaint himself with all services that are existing and to be maintained to ensure that any excavations he may undertake will not damage or hinder such services or expose his work to possible damage by others.</div><div>The Contractor will be held responsible for damage to any existing or concurrently installed service, which might be brought to his attention by the relevant authority and shall be held responsible for the cost of any repairs.</div></div></div> | | <div><div><div><div><div><div>A</div></div></div><div><div><div></div></div></div></div><div>C</div><div><div><div></div></div></div></div><div>E</div><div><div><div></div></div></div></div> <div>L</div> <div><div><div></div></div></div> <div>M</div> <div><div><div></div></div></div> <div>S</div> <div><div><div></div></div></div> | |
| <div><div><div><div><div><div></div></div></div><div><div><div></div></div></div></div><div>9.6.5 Power Factor Correction and Harmonic Filtration</div><div>The Contractor shall be responsible for the design and supply of necessary power factor correction and harmonic filtration equipment, designed to service the electrical installation.</div></div></div> | | <div><div><div><div><div><div>A</div></div></div><div><div><div></div></div></div></div><div>C</div><div><div><div></div></div></div></div><div>E</div><div><div><div></div></div></div></div> <div>L</div> <div><div><div></div></div></div> <div>M</div> <div><div><div></div></div></div> <div>S</div> <div><div><div></div></div></div> | |
| <div><div><div><div><div><div></div></div></div><div><div><div></div></div></div></div><div>9.6.6 Low Voltage Reticulation</div><div>The low voltage reticulation shall comprise the following, namely:</div><div><div><div></div></div><div>Extension to / modification of existing Main Low Voltage Panel so as to accommodate the proposed new facility</div></div><div><div><div></div></div><div>Main Low Voltage Panel, termed MLVP B, housed within the new facility</div></div><div><div><div></div></div><div>A series of electrical distribution boards throughout the new facility servicing the respective load centres i.e. Cheese Factory, Cold Storage, AC Plant, Refrigeration Plant, etc. (note : all electrical distribution boards and associated low voltage cables necessary for the User (Tenant) internal electrical installation shall be provided under this contract)</div></div><div><div><div></div></div><div>All main low voltage panels and respective electrical distribution bards shall be inter-connected by a low voltage cable network</div></div></div><div><div>The Contractor shall be responsible for the supply and installation of all necessary electricity feeder cables between the main low voltage panels and their respective electrical distribution boards.</div><div>Where applicable, electricity feeder cables shall be Cu PVC PVC SWA ECC PVC cables, with stranded conductors.</div><div>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.</div><div>All low voltage reticulation cables shall have been manufactured to SANS 1507 - 1990 and shall have stranded copper conductors with PVC insulation, PVC bedding, steel wire armouring and PVC sheathing.</div><div>No jointing of the low voltage reticulation cables will be allowed, without the prior consent and approval of the Client / Employer.</div><div>Cables shall be fitted with suitable flameproof identification labels at both ends and at appropriate, intermediate positions. The labels shall bear the identification of the boards of origin and destination.</div><div>The cable installation shall be coordinated with the other services i.e. water pipes, etc. The Contractor shall timeously notify the Client / Employer of any clashing of services i.e. electrical cables and water pipes installed in close proximity to each other, etc.</div><div>The laying of cables shall not be commenced until the trenches, ducts, wiring ducts, cable trays or cable ladders 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.</div><div>Where cables are cut and not immediately made off, the ends are to be sealed.</div><div>On each completed section of the laid cable, the insulation resistance shall be tested to approval with an approved “Megger” type instrument of not less than 500 V for low voltage cables.</div><div>The Contractor shall be responsible for the supply and installation of all ducts, wiring ducts, cable trays or cable ladders, including all necessary suspension brackets and fixing materials, as is necessary for the low voltage reticulation installation.</div></div></div> | | <div><div><div><div><div><div>A</div></div></div><div><div><div></div></div></div></div><div>C</div><div><div><div></div></div></div></div><div>E</div><div><div><div></div></div></div></div> <div>L</div> <div><div><div></div></div></div> <div>M</div> <div><div><div></div></div></div> <div>S</div> <div><div><div></div></div></div> | |

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| 9.6.7 Builder's and Related Works The Contractor shall be responsible for the necessary co-ordination and timing of the builder's and related Works pertaining to this Contract. All Utility Rooms shall be constructed with the necessary floor trenches for the installation of all associated electrical services. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 9.6.8 Trench Excavation The Contractor shall undertake all trench excavations, including backfilling and compaction, required for the electrical installation. Where possible, all routes should be either parallel or perpendicular to the nearest building and / or structure, maintaining a minimum distance of 0.5 mm from the edge of the foundation of the boundary wall and or building walls. The Client / Employer should be notified immediately should any deviations to the routes be required. The cable-trenches shall be excavated to a depth of 800 mm deep below ground level and shall be 500 mm 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 75 mm thick bed of earth and be covered with a 150 mm layer of earth before the trench is filled in. Trenches are to be backfilled and consolidated in stages (150 mm intervals) to prevent subsequent subsidence. 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 150 mm. The surface is to be made good as required. All compactions shall be to Mpa density of 93% AASHTO density. Any subsidence, either during the construction period, or the guarantee period, shall be remedied. The backfilling of all post-mounted, or similar, luminaires shall be done with a 10 : 1 sand / cement mix. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 9.6.9 Brick-built Enclosures (Manholes) The Contractor shall be responsible for the provision of the brick-built enclosures (manholes). The manholes shall be constructed on a mass concrete Class D base, 150 mm thick and projecting 150 mm all way round, and comprise two-brick thick walls, plastered internally, and fitted with a (minimum) 600 mm diameter, heavy duty, Type 8UA frame and lid. The Contractor is to ensure that all manholes are waterproofed. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 9.6.10 Ducts The Contractor shall be responsible for the provision of all ducts necessary for the electrical and, telecommunications and associated installations. In summary, ducts shall be installed beneath (across) all walkways, driveways, and finished surfaces. The ducts shall be manufactured from a high-density polyethylene with a double wall construction, allowing a corrugated outer wall finish and a smooth inner wall finish, and of the internal diameters as indicated on the attached drawings. All ducts shall be minimum 160 mm outer diameter, with minimum 137 mm internal diameter. Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in high-density polyethylene pipes. The ends of all ducts shall be sealed with a non-hardening watertight compound after the installation of cables. All ducts intended for future use shall be sealed. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 9.6.11 Access Floor The Contractor shall be not be responsible for the provision of any raised access floors. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 9.6.12 Standby Generator Set / Uninterruptible Power Supply Installation The Contractor shall be not be responsible for the provision of a generator set. The Contractor shall be not be responsible for the provision of an uninterruptible power supply unit. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |
| 9.6.13 Main Low Voltage Panels / Electrical Distribution Boards All main low voltage panels and electrical distribution boards are to be manufactured by a reputable company, with relevant experience in the manufacturing of low voltage panels, electrical distribution boards, control panels, etc. Approval of the manufacturing company should be obtained from the Client / Employer prior to the placing of any orders / commencement of Works. Detailed wiring diagrams and shop (manufacturing) drawings of the proposed low voltage panels and electrical distribution boards are to be submitted to the Client / Employer for approval, prior to manufacture. | | A | |
| | | C | |
| | | E | |
| | | L | |
| | | M | |
| | | S | |

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| <p>Approval of the wiring diagrams and shop (manufacturing) drawings by the Client / Employer does not remove any responsibility from the Contractor to ensure the completeness and compliance of the low voltage panels and electrical distribution boards. The Contractor shall ensure that each low voltage panel and electrical distribution board is constructed to fit into the space provided, that sufficient space is allowed for the cable ends and termination thereof and that each board is provided with an architrave and a hinged lockable door. The low voltage panels and electrical distribution boards shall have a protection rating of no less than IP55.</p> <p>All gland plates, as well as top or side plates used for the termination of cables shall be easily removable to facilitate the drilling and punching of holes. Panels (fascia) and cover plates are to be fixed to the framework by means of “Quicklock” or other similar captive fasteners. Self-tapping screws or dome nuts will not be accepted. Panels (fascia) and cover plates are to be fitted with chrome plated handles to facilitate removal.</p> <p>Where applicable, the outer and inner frames and front panels of the respective sections shall be painted in the following distinctive colours, namely:</p> <div><div><input type="checkbox"/> Frame (Outer and Inner)</div><div><input type="checkbox"/> Normal</div><div><input type="checkbox"/> Essential</div><div><input type="checkbox"/> Critical</div><div><input type="checkbox"/> Photovoltaic</div><div><input type="checkbox"/> Un-interruptible</div></div> <div><div>- White</div><div>- White</div><div>- Orange</div><div>- Red</div><div>- Green</div><div>- Blue</div></div> <div><div>- RAL 9010 (Pure White)</div><div>- RAL 9010 (Pure White)</div><div>- RAL 2004 (Pure Orange)</div><div>- RAL 3020 (Traffic Red)</div><div>- RAL 6037 (Pure Green)</div><div>- RAL 5005 (Signal Blue)</div></div> <p>Each section of the low voltage panel and electrical distribution board shall be provided with a legend cardholder with a clear perspex front. Each circuit breaker shall be clearly numbered in accordance with the single line diagrams. Corresponding numbers and circuit descriptions shall be clearly typed on the legend cards.</p> <p>All main switches shall be clearly marked “MAIN SWITCH” and the necessary warning labels are to be installed at the switch. Each low voltage panel and electrical distribution board shall have sufficient ways for each circuit neutral and each circuit earth wire. Doubling up of circuits w.r.t terminations will not be accepted.</p> <p>Particular note shall be taken of the fault current requirements of each low voltage panel and electrical distribution board electrical distribution board. Unless otherwise stated, low voltage panels and electrical distribution boards shall be rated for a minimum fault current rating of 5 kA.</p> <p>The following tests shall be carried out on the low voltage panels and electrical distribution boards by the appointed Contractor (or their appointed manufacturing company), prior to installation thereof, namely:</p> <div><div><input type="checkbox"/> high voltage test of 2 000 V, 50 Hz, tested for 1 minute per phase to earth (with remaining phases earthed)</div><div><input type="checkbox"/> a 1 000 V Megger test on all insulated sections between phases and between phases and earth (resistance readings not to exceed 1 000 Mega ohms)</div><div><input type="checkbox"/> full operational tests of all control circuits, relays and switchgear</div><div><input type="checkbox"/> a trip test of all earth leakage relays, creating an earth fault on each of the protected circuits</div><div><input type="checkbox"/> a current injection trip test on all main breakers to ensure that they trip at their set currents</div></div> <p>Proof of these tests, and the results thereof, shall be issued to the Client / Employer for approval, prior to dispatch of the low voltage panels and electrical distribution boards to site.</p> | | | |
| <p>9.6.14 Load Shedding / Load Curtailment</p> <p>The Buffalo City Metropolitan Municipality (BCMM) have recently directed that the East London Industrial Development Zone will no longer be exempt from any electrical load shedding implemented by themselves and / or Eskom.</p> <p>Furthermore, BCMM have directed the East London Industrial Development Zone begin participating in their (BCMM) electrical load curtailment programme.</p> <p>Therefore, it is imperative that all electricity users within the East London Industrial Development Zone comply with the requirement in that when directed to do so, they reduce their operating electrical load by 20 % of their base load, for the duration of the load shedding cycle.</p> <p>The electrical installation of the new Dairy Facility is to be designed such that participation in this electrical load curtail programme is possible.</p> <p>Furthermore, and is this project is an extension of an existing facility, it is imperative that the design of the electrical load curtailment be such that the value of the reduction in the operating electrical load be calculated on the base load of the existing and proposed facility, for the duration of the load shedding cycle.</p> | | <div><div>A</div><div>C</div><div>E</div><div>L</div><div>M</div><div>S</div></div> <div></div> | |
| <p>9.6.15 Conduit and Conduit Accessories</p> <p>All flush-mounted conduit and conduit accessories shall be PVC conduit in accordance with SANS 950.</p> <p>All surface-mounted conduit and conduit accessories shall be galvanised conduit type, and manufactured in accordance with SANS 162, 763 and 1007 respectively.</p> <p>The Contractor shall ensure that conduit installation shall, wherever possible, be installed within the ceiling voids / roof space. Wherever necessary, the services shall be chased, or cast into, the concrete slabs and brick walls.</p> <p>Should flush mounting not be practical (or possible), the Contractor shall obtain prior approval from the Client / Employer, for the installation of surface mounted conduit and / or accessories. If approved, surface mounted conduits shall be installed using galvanised spacer brackets, allowing a clear space of 25 mm. Conduit accessories shall be mounted on similar brackets, ensuring an aesthetic installation.</p> <p>All exposed conduit and conduit accessories shall be galvanised, powder coated, orange.</p> | | <div><div>A</div><div>C</div><div>E</div><div>L</div><div>M</div><div>S</div></div> <div></div> | |
| <p>9.6.16 Conductors</p> <p>All low voltage single core conductors shall be of the PVC insulated type with stranded copper conductors, rated at 600V general service duty and manufactured in accordance with SANS 1507-1990.</p> <p>The colour coding for the PVC insulation shall be:</p> <div><div><input type="checkbox"/> red, white and blue for phases</div><div><input type="checkbox"/> black for neutral</div><div><input type="checkbox"/> green and / or yellow for earth</div></div> <p>The Contractor shall be allowed to utilise “twin and earth” or “surfix” type conductors.</p> | | <div><div>A</div><div>C</div><div>E</div><div>L</div><div>M</div><div>S</div></div> <div></div> | |

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| Single core conductors shall only be installed within conduits, wiring ducts or channels. No single core conductors will be permitted in open channels, or on cable trays and / or cable ladders. “Twin and earth” or “surfix” conductors shall only be installed within conduits, wiring ducts or channels, or on cable trays and / or cable ladders. The drawing in of more than two circuits per conduit shall not be allowed. | | | |
| 9.6.17 Lighting Installations A lighting installation, in accordance with the relevant regulations, which will ensure the efficient and proper usage of all spaces throughout the new buildings, shall be provided. All luminaires specified shall be fitted with light emitting diode-type lamps. The lighting design calculations shall be based on achieving the minimum lighting levels, in accordance with the relevant South African National Standards documentation, as follows: <div><div><div><input type="checkbox"/> Manufacturing</div><div>-</div><div>General Working Areas (*)</div><div>-</div><div>350 lux</div></div><div><input type="checkbox"/> Administrative Buildings</div><div>-</div><div>Entrance Halls</div><div>-</div><div>100 lux</div></div> <div><input type="checkbox"/></div> <div>-</div> <div>Reception Areas</div> <div>-</div> <div>100 lux</div> <div><input type="checkbox"/></div> <div>-</div> <div>Board rooms, offices</div> <div>-</div> <div>300 lux</div> <div><input type="checkbox"/></div> <div>-</div> <div>Computer rooms</div> <div>-</div> <div>500 lux</div> <div><input type="checkbox"/> Maintenance Buildings</div> <div>-</div> <div>General</div> <div>-</div> <div>300 lux</div> The lighting design shall (where applicable) take into account and include the following, namely: <div><input type="checkbox"/> Specified luminaires shall provide high levels of luminous flux and be fitted with electronic control gear</div> <div><input type="checkbox"/> Specified lamps shall provide the correct colour rendering for the application and use energy efficient lamps i.e. light emitting diode (LED) type</div> <div><input type="checkbox"/> Maximum natural daylight usage and controllable light levels</div> <div><input type="checkbox"/> Task specific light sources</div> <div><input type="checkbox"/> Multiple control for light circuits / zones covering areas greater than 100m²</div> Emergency exit signage and route lighting shall be provided for any evacuation procedures that could occur. Light outlet points shall be installed as symmetrical as possible within the area in which they are fitted. Cognisance must be taken of the finishes and structural components to avoid clashes of services. Ceiling mounted fluorescent fittings shall be secured to the concrete ceiling by means of expansion bolts, or “Hilti” fixings, and to the ceiling boards by means of galvanised “Butterfly” expansion nuts. The Contractor is to include in the Tender Price the provision of additional fixing materials, where needed. Allowances shall be made for decorative post-top type luminaires, with light emitting diode type lamps, on fibreglass poles to be installed throughout the complex including along all walkways, roadways and parking areas. Light switches shall be of the Crabtree Diamond Range, a fully modular system comprising a strong, universal steel support frame, an easy clip-on assembly and a white screwless cover plate complete with all necessary accessories, clip-on covers, etc. Light switches shall be installed at 1,400mm AFFL. All lamp types shall be guaranteed for the full duration of the guarantee period and / or the stipulated lamp life, as stated by the Lamp Manufacturers, whichever is the greater. The Contractor shall, upon completion of the Contract, issue to the Client / Employer, for their maintenance purposes, sufficient spare lamps. All external lighting circuitry shall be controlled by means of photo-electric daylight switches. | A | | |
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| 9.6.18 Schedule of Luminaires All luminaires shall comply fully with the specifications detailed herein. The Contractor is to make allowance for the provision of sample luminaires for approval by the Client / Employer, prior to the placement of orders. The Contractor is to ensure that sufficient time is allowed for the approval process. The luminaires, as approved by the East London Industrial Development Zone, shall comply with the following : Type 1 - LED Panel - 600 x 600 - 32 W, as offered by Beka Schröder (Pty) Ltd Name : LED Panel Manufacturer's code : LED Panel - 600 x 600 - 32 W General description : Recessed LED Panel Mounting method : Recess in-lay into 600 mm x 600 mm wide T-bar ceiling grid Dimensions : 595 mm x 595 mm x 10.5 mm Gear Compartment : IP20 Lamp Compartment : IP20 Battery Compartment : IP20 Lamps General : Osram Colour : 6500 K, 80 CRI Efficacy : 100 lumens per watt Working life : L70, 30 000 hours Dimming facilities : Non-dimmable Driver General : Osram Input voltage : 220 VAC - 240 VAC Power factor : 0.95 Total harmonic distortion : < 20% Surge protection : No Accessories : 3 m 5 A cabtyre plug top | A | |
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|--|---|-----------------------|--|
| Battery type | : Nickle metal hydride | | |
| Battery housing | : Integral with luminaire | | |
| Operating temperatures | : -10 - 40 degrees | | |
| Warranty | : 5 Year Warranty Comply | | |
| Type 2 - LLSA / GLL L-bay / 2 x 81 W / 5700 K, as offered by LED Lighting SA (Pty) Ltd | | | |
| Name | : GLL - Lbay | | |
| Manufacturer's code | : LLSA / GLL L-bay / 2 x 81 W / 5700 K | | |
| General description | : 2 x 81 W, Linear Lowbay Luminaire | | |
| Mounting method | : Surface mounted | | |
| Dimensions | : 1435 mm (l) x 155 mm (w) x 50 mm (h) | | |
| Housing | General : High Grade Aluminum, powder coated white or black wit acrylic lenses. Conformal coated PCB's suitable for corrosive environment. Stainless steel gear tray and screws, Aluminum end caps, see attached Cenrtional specification sheet | | |
| Gear Compartment | : The power supply enclosure within the control gear compartment, which has an IP 20 rating, may be rated at IP65 | | |
| Lamp Compartment | : Conformal-coated LED PCBs suitable corrosive environment. IP20 enclosure | | |
| Battery Compartment | : The power supply enclosure within the control gear compartment, which has an IP 20 rating, may be rated at IP65 | | |
| Diffuser | : Acrylic lense diffuser, highly effective, anti corrosive and suited to coastal environment, impact resistant. | | |
| Lamps | General : Osram high powered, high efficacy, low consumption LED | | |
| Colour | : White, 5700 K, 80 CRI | | |
| Efficacy | : 180 lumens per Watt LED efficacy at 150 mA operating current | | |
| Working life | : L70, > 100 000 hours | | |
| Dimming facilities | : Non-dimmable | | |
| Driver | General : Tridonic Driver | | |
| Input voltage | : 198 VAC - 264 VAC | | |
| Power factor | : >0.95 | | |
| Total harmonic distortion | : <10% | | |
| Surge protection | : 10 kV (replaceable, installed in DB per circuit) | | |
| Accessories | : 3 m 5 A cabtyre plug lead 3 pin socket (standard luminaire), 3 m 5 A cabtyre plug lead 4 pin socket (emergency luminaire) | | |
| Emergency | General : 10% of luminaire output for 3 hours | | |
| Battery type | : Nickle Metal Hydride | | |
| Battery housing | : Integral with luminaire | | |
| General | Certificates : SABS / IEC 60598-2-1 , SABS / IEC 60598-1 | | |
| Operating temperatures | : 0 degree Celsius to +40 degree Celsius | | |
| Warranty | : 5 year, full replacement, irrespective of problem experienced | | |
| Replacement components | : Power supply unit, optics, batteries, control gear | | |
| Manufacturing lifespan | : Luminaire will be in production for no less than 10 years | | |
| Type 3 - LLSA / VP2 - 43 W, as offered by LED Lighting SA (Pty) Ltd | | | |
| Name | : Vapour Proof luminaire | | |
| Manufacturer's code | : VP2 - 43 W | | |
| General description | : Vapour Proof surface mounted luminaire | | |
| Mounting method | : Surface mounted onto any surface | | |
| Dimensions | : 1277 mm x 101 mm x 101 mm | | |
| Gear Compartment | : IP66 | | |
| Lamp Compartment | : IP66 | | |
| Battery Compartment | : N/A | | |
| Lamps | General : Osram | | |
| Colour | : 5700 K, 80 CRI | | |
| Efficacy | : 180 lumens per watt | | |
| Working life | : L70, 54 000 hours | | |
| Dimming facilities | : Dali / 0 - 10V | | |
| Driver | General : Tridonic | | |
| Input voltage | : 110 VAC - 220 VAC | | |
| Power factor | : 0.95 | | |
| Total harmonic distortion | : < 20% | | |
| Surge protection | : No | | |
| Accessories | : 3 m 5 A cabtyre plug top | | |
| Battery type | : N/A | | |
| Battery housing | : N/A | | |
| Operating temperatures | : -20 degree Celsius to +40 degree Celsius | | |
| Warranty | : 5 Year | | |
| Type 3 - LLSA / VP2 - 43 W (Emergency), as offered by LED Lighting SA (Pty) Ltd | | | |
| Name | : Vapour Proof Luminaire | | |

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| Manufacturer's code | : VP2 - 43 W | | |
| General description | : Vapour Proof surface mounted luminaire | | |
| Mounting method | : Surface mounted onto any surface | | |
| Dimensions | : 1277 mm x 101 mm x 101 mm | | |
| Gear Compartment | : IP66 | | |
| Lamp Compartment | : IP66 | | |
| Battery Compartment | : IP66 | | |
| Lamps | General : Osram | | |
| Colour | : 5700 K, 80 CRI | | |
| Efficacy | : 180 lumens per watt | | |
| Working life | : L70, 54 000 hours | | |
| Dimming facilities | : Dali / 0 - 10V | | |
| Driver | General : Tridonic | | |
| Input voltage | : 110 VAC - 220 VAC | | |
| Power factor | : 0.95 | | |
| Total harmonic distortion | : < 20% | | |
| Surge protection | : No | | |
| Accessories | : 3 m 5 A cabtyre plug top | | |
| Battery type | : Nickle Cadium | | |
| Battery housing | : Integral with luminaire | | |
| Operating temperatures | : -20 degree Celsius to +40 degree Celsius | | |
| Warranty | : 5 Year | | |
| Type A - LLSA / DL-D - 170mm- 16 W, as offered by LED Lighting SA (Pty) Ltd | | | |
| Name | : LED Down lighter | | |
| Manufacturer's code | : DL-D - 170mm- 16 W | | |
| General description | : Recessed LED down lighter | | |
| Mounting method | : Recess into ceiling grid or cut into skimmed ceiling | | |
| Dimensions | : 190 mm x 84 mm | | |
| Gear Compartment | : IP20 | | |
| Lamp Compartment | : IP20 | | |
| Battery Compartment | : N/A | | |
| Lamps | General : Osram | | |
| Colour | : 5700 K, 80 CRI | | |
| Efficacy | : 103 lumens per watt | | |
| Working life | : L70, 50 000 hours | | |
| Dimming facilities | : Non-dimmable / Dali / Triac / 0-10V | | |
| Driver | General : Tridonic / TCI / Vossloh-Schwabe | | |
| Input voltage | : 110 VAC - 230 VAC | | |
| Power factor | : 0.95 | | |
| Total harmonic distortion | : < 11% | | |
| Surge protection | : Yes, 2kV | | |
| Accessories | : 3 m 5 A cabtyre plug top | | |
| | : Occupancy Sensor (group control) | | |
| | : Tridonic ConnecDim | | |
| Battery type | : N/A | | |
| Battery housing | : N/A | | |
| Operating temperatures | : -20 degree Celsius to +40 degree Celsius | | |
| Warranty | : 5 Year | | |
| Type A - LLSA / DL-D - 170mm- 16 W (Emergency), as offered by LED Lighting SA (Pty) Ltd | | | |
| Name | : LED Down lighter | | |
| Manufacturer's code | : DL-D - 170mm- 16 W | | |
| General description | : Recessed LED down lighter | | |
| Mounting method | : Recess into ceiling grid or cut into skimmed ceiling | | |
| Dimensions | : 190 mm x 84 mm | | |
| Gear Compartment | : IP20 | | |
| Lamp Compartment | : IP20 | | |
| Battery Compartment | : IP20 | | |
| Lamps | General : Osram | | |
| Colour | : 5700 K, 80 CRI | | |
| Efficacy | : 103 lumens per watt | | |
| Working life | : L70, 50 000 hours | | |
| Dimming facilities | : Non-dimmable / Dali / Triac / 0-10V | | |
| Driver | General : Tridonic / TCI / Vossloh-Schwabe | | |
| Input voltage | : 110 VAC - 230 VAC | | |
| Power factor | : 0.95 | | |
| Total harmonic distortion | : < 11% | | |
| Surge protection | : Yes, 2kV | | |

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|---|--|-----------------------|--|
| Accessories | : 3 m 5 A cabtyre plug top : Occupancy Sensor (group control) : Tridonic ConnecDim | | |
| Battery type | : Nickle metal hydride | | |
| Battery housing | : Exterior with the driver | | |
| Operating temperatures | : -20 degree Celsius to +40 degree Celsius | | |
| Warranty | : 5 Year | | |
| Type B - Beka Nova LED - 35W, as offered by Beka Schröder (Pty) Ltd | | | |
| Name | : Factory Flood light | | |
| Manufacturer's code | : Beka Nova LED - 35W | | |
| General description | : Surface mounted floodlight | | |
| Mounting method | : Surface mount | | |
| Dimensions | : 440 mm x 378 mm x 217 mm | | |
| Gear Compartment | : IP66 | | |
| Lamp Compartment | : IP66 | | |
| Battery Compartment | : N/A | | |
| Lamps General | : Vossloh-Schwabe | | |
| Colour | : 4000 K, 70 CRI | | |
| Efficacy | : 153 lumens per watt | | |
| Working life | : L70, 100 000 hours | | |
| Dimming facilities | : Non-dimmable | | |
| Driver General | : Osram | | |
| Input voltage | : 210 VAC - 240 VAC | | |
| Power factor | : 0.90 | | |
| Total harmonic distortion | : < 11% | | |
| Surge protection | : 11kV, external to driver | | |
| Accessories | : Daylight switch mini | | |
| Battery type | : N/A | | |
| Battery housing | : N/A | | |
| Operating temperatures | : -20 degree Celsius to +45 degree Celsius | | |
| Warranty | : 5 Year | | |
| <i>(Please note that this luminaire may be substituted with an alternative Beka product. We await further communication from the ELIDZ in this regard.)</i> | | | |
| Type B - Beka Nova LED - 35W (Emergency), as offered by Beka Schröder (Pty) Ltd | | | |
| Name | : Factory Flood light | | |
| Manufacturer's code | : Beka Nova LED - 35W | | |
| General description | : Surface mounted floodlight | | |
| Mounting method | : Surface mount | | |
| Dimensions | : 440 mm x 378 mm x 217 mm | | |
| Gear Compartment | : IP66 | | |
| Lamp Compartment | : IP66 | | |
| Battery Compartment | : IP66 | | |
| Lamps General | : Vossloh-Schwabe | | |
| Colour | : 4000 K, 70 CRI | | |
| Efficacy | : 153 lumens per watt | | |
| Working life | : L70, 100 000 hours | | |
| Dimming facilities | : Non-dimmable | | |
| Driver General | : Osram | | |
| Input voltage | : 210 VAC - 240 VAC | | |
| Power factor | : 0.90 | | |
| Total harmonic distortion | : < 11% | | |
| Surge protection | : 11kV, external to driver | | |
| Accessories | : Daylight switch mini | | |
| Battery type | : Ni-Cd | | |
| Battery housing | : Internal with luminaire, 5W built in LED with up to 3Hr backup | | |
| Operating temperatures | : -20 degree Celsius to +45 degree Celsius | | |
| Warranty | : 5 Year | | |
| <i>(Please note that this luminaire may be substituted with an alternative Beka product. We await further communication from the ELIDZ in this regard.)</i> | | | |
| Type C - Beka Series 42 LED, Black, Opaque - 9W, as offered by Beka Schröder (Pty) Ltd | | | |
| Name | : Walkway luminaire | | |
| Manufacturer's code | : Beka Series 42 LED, Black, Opaque - 9W | | |
| General description | : Surface mounted general light | | |
| Mounting method | : Surface mount | | |

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| Dimensions | : 341 mm x 195 mm x 105 mm | | |
| Gear Compartment | : IP65 | | |
| Lamp Compartment | : IP65 | | |
| Battery Compartment | : N/A | | |
| Lamps General | : Vossloh-Schwabe | | |
| Colour | : 4000 K, 80 CRI | | |
| Efficacy | : 153 lumens per watt | | |
| Working life | : L70, 60 000 hours | | |
| Dimming facilities | : Non-dimmable | | |
| Driver General | : Tridonic / TCI | | |
| Input voltage | : 210 VAC - 250 VAC | | |
| Power factor | : 0.90 | | |
| Total harmonic distortion | : < 11% | | |
| Surge protection | : Yes, 2kV | | |
| Accessories | : | | |
| Battery type | : N/A | | |
| Battery housing | : N/A | | |
| Operating temperatures | : -20 degree Celsius to +35 degree Celsius | | |
| Warranty | : 3 Year | | |
| Type C - Beka Series 42 LED, Black, Opaque - 9W (Emergency), as offered by Beka Schröder (Pty) Ltd | | | |
| Name | : Walkway luminaire | | |
| Manufacturer's code | : Beka EM-Series 42 LED, Black, Opaque - 9W | | |
| General description | : Surface mounted general light | | |
| Mounting method | : Surface mount | | |
| Dimensions | : 341 mm x 195 mm x 105 mm | | |
| Gear Compartment | : IP65 | | |
| Lamp Compartment | : IP65 | | |
| Battery Compartment | : IP65 | | |
| Lamps General | : Vossloh-Schwabe | | |
| Colour | : 4000 K, 80 CRI | | |
| Efficacy | : 153 lumens per watt | | |
| Working life | : L70, 60 000 hours | | |
| Dimming facilities | : Non-dimmable | | |
| Driver General | : Tridonic / TCI | | |
| Input voltage | : 210 VAC - 250 VAC | | |
| Power factor | : 0.90 | | |
| Total harmonic distortion | : < 11% | | |
| Surge protection | : Yes, 2kV | | |
| Accessories | : | | |
| Battery type | : Ni-Cd (1 hour backup) | | |
| Battery housing | : Integral with luminaire | | |
| Operating temperatures | : -20 degree Celsius to +35 degree Celsius | | |
| Warranty | : 3 Year | | |
| Type D - Beka LEDduo / Square, Pearl Light Grey - 2 x 7W, as offered by Beka Schröder (Pty) Ltd | | | |
| Name | : Staircase luminaire | | |
| Manufacturer's code | : Beka LEDduo / Square, Pearl Light Grey - 2 x 7W | | |
| General description | : Surface mounted square staircase light | | |
| Mounting method | : Surface mount | | |
| Dimensions | : 262 mm x 121 mm x 81 mm | | |
| Gear Compartment | : IP65 | | |
| Lamp Compartment | : IP65 | | |
| Battery Compartment | : IP65 | | |
| Lamps General | : Bridgelux | | |
| Colour | : 4000 K, 80 CRI | | |
| Efficacy | : 125 lumens per watt | | |
| Working life | : L70, 50 000 hours | | |
| Dimming facilities | : Non-dimmable | | |
| Driver General | : Tridonic / TCI / Osram | | |
| Input voltage | : 198VAC - 250 VAC | | |
| Power factor | : 0.95 | | |
| Total harmonic distortion | : < 11% | | |
| Surge protection | : Yes, 2kV | | |
| Accessories | : | | |
| Battery type | : N/A | | |
| Battery housing | : N/A | | |
| Operating temperatures | : -20 degree Celsius to +35 degree Celsius | | |
| Warranty | : 3 Year | | |

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| Any, or all, of the above-mentioned luminaires may be utilised in the design of the lighting installation. | | | |
| 9.6.19 Small and Large Power Installation Generally, power shall be provided to the various areas by means of switched socket outlets. The layout and quantity of the switched socket outlets shall be determined by the use of the specific room, the equipment to be installed therein and the services / activities to be rendered from there. Switched socket outlets shall be provided approximately every 10m² in all passages and public areas for cleaning and maintenance purposes. Weatherproof small power socket outlets are to be provided along the western boundary wall of the site for use by the refrigerated trucks whilst parking overnight, on the basis of one electrical outlet per dock leveler provided on the perimeter of the new building extension. Small power socket outlets are to be provided per dock leveler, and shall be positioned adjacent each dock leveler, as is required by the Dock Leveler Supplier. Should the activity or specific equipment require, i.e. within the kitchen areas, the power supply provided shall be in the form of a switched isolator. As the design responsibility ends at the switched socket outlet or isolator points, we cannot guarantee what the End User is going to connect to the installation. Therefore, it is only possible to encourage (and not guarantee) energy savings at switched socket outlet and isolator points. All small and large power outlet points shall be installed as symmetrical as possible within the area in which they are fitted. Cognisance must be taken of the finishes and structural components to avoid clashes of services. The Contractor is to include in the Tender Price the provision of additional fixing materials, where needed. Small and large power outlets shall be of the Crabtree Diamond Range, a fully modular system comprising a strong, universal steel support frame, an easy clip-on assembly and a white screwless cover plate complete with all necessary accessories, clip-on covers, etc. Small power outlet points shall be installed at 400mm AFFL. Large power outlet points shall be installed at 1,400mm AFFL, complete with a 50 mm diameter round conduit box at 300mm AFFL and a conduit “link” in between, or as is necessary for the connection to the relevant electrical equipment. Where applicable, small and large power outlets shall be colour-coded as follows: <input type="checkbox"/> normal power outlets, white <input type="checkbox"/> essential power outlets, red <input type="checkbox"/> uninterruptible power outlets, blue Where applicable, small power outlets shall be equipped as follows: <input type="checkbox"/> normal power outlets, round earth pin <input type="checkbox"/> essential power outlets, 0 degree shaven earth pin <input type="checkbox"/> uninterruptible power outlets, 45 degree shaven earth pin | | A | |
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| ELIDZ Design Specifications | Contractor's Proposal | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | |
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| All electrical outlets installed within the flush floor / under-screed ducting system shall be Crabtree Diamond Range, a fully modular system comprising a strong, universal steel support frame, an easy clip-on assembly and a white screwless cover plate complete with all necessary accessories, clip-on covers, etc. matching those supplied as small power outlets. | | | |
| 9.6.23 Cable Support Systems <i>Cable Ladder</i> Where applicable, the cable ladder shall be manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut or O-Line. The cable ladder shall be of a weld-free construction, allowing fitment on site. No alternatives shall be accepted. The cable ladder shall be complete with all standard accessories i.e. height reducing, width reducing and adjustable splices, radiused bends, 90 degree droppers, 90 degree risers, horizontal crossovers, horizontal tees, etc. The cable ladder shall be supported on unistrut, suspended from the roof trusses / roof slab by means of suitably-sized galvanised steel threaded rods. <i>Cable Tray</i> Where applicable, the cable tray shall be manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut or O-Line. The cable tray shall be of an inward bend return flange construction, allowing the use of thinner gauge materials, without compromising loading or deflection standards. No alternatives shall be accepted. The cable tray shall be complete with all standard accessories i.e. height reducing, width reducing and adjustable splices, fishplate couplers radiused horizontal bends, internal elbow (droppers), internal elbow (risers), variable internal riser and external dropper, 4-way crossovers, horizontal tees, covers, dividers, etc. The cable tray shall be supported on unistrut, suspended from the roof trusses / roof slab by means of suitably-sized galvanised steel threaded rods. <i>General</i> All exposed cable support systems shall be powder coated, orange. | | <div>A</div> <div>C</div> <div>E</div> <div>L</div> <div>M</div> <div>S</div> | |
| 9.6.24 Wiring Duct Installation Where applicable, the wiring duct shall be manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut or O-Line. No alternatives shall be accepted. The wiring duct shall be complete with all standard accessories i.e. PVC covers, splices, radiused and non-radiused internal and external elbows (bends), radiused and non-radiused, horizontal elbows (bends), tee-offs, cross-overs, etc. The wiring duct shall be supported on unistrut, suspended from the roof trusses / roof slab by means of either galvanised steel threaded rods and / or stainless steel hangers. The wiring duct shall be of the suitably sized to accommodate the installed services and have sufficient spare capacity for the installation of future services. All exposed wiring duct shall be powder coated, orange. | | <div>A</div> <div>C</div> <div>E</div> <div>L</div> <div>M</div> <div>S</div> | |
| 9.6.25 Wiring Mesh Installation Where applicable, the wiring mesh shall be manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut or O-Line. No alternatives shall be accepted. The wiring mesh shall be complete with all standard accessories i.e. splices, radiused and non-radiused internal and external elbows (bends), radiused and non-radiused, horizontal elbows (bends), tee-offs, cross-overs, etc. The wiring mesh, if suspended, shall be supported on unistrut, suspended from the roof trusses / roof slab by means of either galvanised steel threaded rods and / or stainless steel hangers, or if wall mounted, secured to the wall by means of unistrut, splice clamps, washer and a M6 x 16 cup square bolt and nut arrangement. The wiring mesh shall be of the suitably sized to accommodate the installed services and have sufficient spare capacity for the installation of future services. All exposed wiring mesh shall be powder coated, orange. | | <div>A</div> <div>C</div> <div>E</div> <div>L</div> <div>M</div> <div>S</div> | |
| 9.6.26 Earthing (Bonding), Specialist Earthing, Surge Protection and Lightning Protection Systems <i>Earthing (Bonding) System</i> The Contractor shall be responsible for the supply and installation of the required earthing (bonding) system. The earthing (bonding) system shall comply with SANS 0142 - 1987 and shall comprise a continuous main copper earth bar together with connections to all items of electrical, electronic and mechanical equipment. Bonding of the earth system to metal work in buildings, concrete reinforcing, roofs or pipework, etc. shall also be supplied under this Contract. The clamping surfaces of all connections shall be properly tinned to prevent oxidation. Where earthing conductors are run on walls or vertical surfaces they shall be secured by “stand-off” bolted saddles at intervals not exceeding 1,250mm. Earth electrodes to be supplied and installed under this contract shall consist of 16 mm diameter extensible molecular bonded copper clad steel rods 1,800mm long, complete with coupling and terminal. These electrodes must comply with SANS 0163 - 1985. <i>Specialist Earthing</i> The Contractor shall be responsible for the supply and installation of the specialist earthing system. A general description of the minimum requirement of the specialist earthing system is as follows : The specialist earthing system shall comprise insulated 70mm² copper wire, terminating onto insulated equipotential busbars, interconnected to earth mats and / or earth stars. A minimum of four insulated equipotential busbars, which are for the equipotential bonding of all data and telecommunications equipment, shall be positioned within each Data Centre Hall, or similar room. Similar insulated equipotential busbars shall be provided adjacent each telephone and data board. The insulated equipotential busbars shall comprise a copper bar with snap-on terminals suitable for solid and stranded conductors, fitted to a UV stabilised, insulated frame and shall be used to bond all manufacturing equipment. | | <div>A</div> <div>C</div> <div>E</div> <div>L</div> <div>M</div> <div>S</div> | |

| ELIDZ Design Specifications | Contractor’s Proposal | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | | | | | | | | | | | | | |
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| <p>The specialist earthing conductor shall be installed in 20/25mm galvanised conduit, complete with all necessary conduit accessories. The galvanised conduit shall be secured to the structural steel structure by means of “beam clip / snap-in conduit combination” unit (in the horizontal plane, where out of reach from day-to-day operations) and by means of galvanised, stand-off (hospital) saddles, in the vertical plane).</p> <p>Where applicable, the galvanised conduit saddles, earth bars, etc. are to be secured to the structural steel columns by using a “Hilti”, or similar and approve, screw. All Works affecting the structural steel columns shall be approved by the Consulting Structural Engineer, prior to the commencement thereof.</p> <p>The respective equipotential busbars shall be inter-connected, in a dual / redundant manner, by means of 70 mm² bare copper earth wire, terminating onto an earth mat (or earth mat per building component), constructed from 70 mm² bare copper earth wire, placed in a crisscross arrangement, spaced at intervals not more than 300 mm apart, with all intersections / cross-overs, etc. cad-welded. A minimum of two corners of each earth mat shall be connected to the lengths of 70 mm² bare copper earth wire en route to the respective earth bars.</p> <p>The earth mats, where applicable, shall be sized to suit the application and shall be manufactured from lengths of 70 mm² bare copper earth wire, placed in a crisscross arrangement, spaced at intervals not more than 300 mm apart, with all intersections / cross-overs, etc. cad-welded. A minimum of two corners of each earth mat shall be connected by means of lengths of 70 mm² bare copper earth wire to an earth bar.</p> <p>The earth star systems, where applicable, shall comprise a 5 metre three point star electrode system, with two 70 mm² bare stranded copper conductors, fitted to earth spikes with a crimped lugs, an a three point electrode system, comprising 1.7 m x 16 mm² electrodes, connected with 70 mm² bare copper earth wire.</p> <p>The earth resistance of the respective earth bars, earth mats and earth star systems shall not exceed 30 ohms and shall be supplemented as necessary with driven molecular bonded copper clad steel rods manufactured to SANS 0163 - 1985. Separate earth mats / systems shall be provided for the following facilities / areas, (where applicable), namely:</p> <div><input type="checkbox"/> Substations, Medium Voltage Switch Rooms, Transformer Rooms, Low Voltage Switch Rooms, Generator Installations</div> <div><input type="checkbox"/> Uninterruptible Power Supply Installations, etc.</div> <div><input type="checkbox"/> Telecommunications / Data Server Rooms / Data Centre Halls</div> <p><i>Surge Protection System</i></p> <p>The Contractor shall be responsible for the supply and installation of the required surge protection equipment.</p> <p>All low voltage panels and electrical distribution boards are to be fitted with surge protection, as is required by the relevant regulations.</p> <p><i>Lightning Protection System</i></p> <p>The Contractor shall be responsible for the supply and installation of the required lightning protection system, protecting all buildings within the Data Centre.</p> <p>The lightning protection system shall be installed in accordance with the relevant South African National Standards documentation and shall comprise (per building) :</p> <div><input type="checkbox"/> An air termination system installed on all parapet walls / exposed elements</div> <div><input type="checkbox"/> A down-conductor system installed within wall cavities, or surface mounted, whichever is necessary</div> <div><input type="checkbox"/> A down-conductor bonded to earth termination system</div> <div><input type="checkbox"/> Ground earth electrodes</div> <div><input type="checkbox"/> An earth termination system</div> <p>The lightning protection system shall consist of 20 mm x 3 mm flat aluminium conductor and / or 12mm round aluminium conductor, complete with stand-off type saddles.</p> | | | | | | | | | | | | | | | |
| 9.7 Staff Training | | | | | | | | | | | | | | | |
| <p>The Contractor shall provide comprehensive training of male and female operational staff and nominated maintenance personnel, to the approval of the Client / Employer.</p> <p>Training shall be comprehensive, covering all aspects of systems installed as part of these Works.</p> <p>The Contractor shall provide a detailed training programme and a copy of the training documentation to the Client / Employer, for comment and review, no less than 4 weeks prior to the commencement of training.</p> <p>No training will commence on site prior to the written approval of the Client / Employer. Should the Client / Employer not approve the training programme and documentation, the training programme and documentation will be referred back to the Contractor for re-evaluation and re-submission to the Client / Employer.</p> <p>The number of staff to be trained is to the full discretion of the Client / Employer. However, the Contractor shall allow for 4 groups, each of up to 4 personnel. Each group shall receive a minimum of two 2-hour training sessions. One of these sessions shall be held prior to the commissioning of the electrical engineering services installation, and the other of these sessions, upon expiry of the defects liability period.</p> <p>Training shall be adequate to ensure that the groups trained are:</p> <div><input type="checkbox"/> Competent in the operation of systems.</div> <div><input type="checkbox"/> Adequately trained to carry out on-going training.</div> <div><input type="checkbox"/> Fully aware of the location of all equipment installed as part of this Contract within their area of responsibility.</div> <p>The names of personnel attending the training shall be recorded and submitted to the Client / Employer at the conclusion of training.</p> <p>Maintenance staff shall demonstrate a complete understanding of the location and connectivity of the various elements of the electrical engineering services installation.</p> <p>All training aids and course notes necessary to conduct effective operational and maintenance training shall be supplied by the Contractor.</p> <p>The training venue will be made available on site by the Client / Employer.</p> | | <table><tr><td>A</td><td></td></tr><tr><td>C</td><td></td></tr><tr><td>E</td><td></td></tr><tr><td>L</td><td></td></tr><tr><td>M</td><td></td></tr><tr><td>S</td><td></td></tr></table> | A | | C | | E | | L | | M | | S | | |
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| 10 DATA AND TELECOMMUNICATIONS | | | | | |
| 10.1 Design Criteria and Parameters | | | | | |
| <p>The design criteria applied to the electrical engineering services shall include the following, namely:</p> <div><div><input type="checkbox"/></div>Capital costs</div> <div><div><input type="checkbox"/></div>Operational and maintenance requirements and costs</div> <div><div><input type="checkbox"/></div>Ease of functionality, operation and maintenance</div> <div><div><input type="checkbox"/></div>Compliance with general energy efficiency and / or sustainability standards</div> <p>Furthermore, the electrical engineering services shall be designed in accordance with, but not limited to, the current versions of the following, namely:</p> <div><div><input type="checkbox"/></div>the South African National Standard : Code of Practice for “The Application of the National Building Regulations” i.e. those included in the “National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977)”, as published in the Government Gazette, number 31084, dated 30 May 2008, which became effective as of 01 October 2008, and known as “SANS 10400 - 2010”</div> <div><div><input type="checkbox"/></div>the Occupational Health and Safety Act, 1993 (Act 85 of 1993),</div> <div><div><input type="checkbox"/></div>SANS 204-1 : 2008 - Energy Efficiency in Buildings : Part 1 - General Requirements,</div> <div><div><input type="checkbox"/></div>SANS 204-2 : 2008 - Energy Efficiency in Buildings : Part 2 - The Application of the Energy Efficiency Requirements for Buildings with Natural Environmental Control,</div> <div><div><input type="checkbox"/></div>SANS 204-3 : 2008 - Energy Efficiency in Buildings : Part 3 - The Application of the Energy Efficiency Requirements for Buildings with Artificial Ventilation or Air-conditioning,</div> <div><div><input type="checkbox"/></div>any other relevant by-laws of the Local Authorities,</div> <div><div><input type="checkbox"/></div>SANS 507-1 : (NRS 034-1 : 2007) Electricity Distribution - Guidelines for the Provision of Electricity Distribution Networks in Residential Areas (Part 1 : Planning and Design of Distribution Networks)</div> <div><div><input type="checkbox"/></div>SANS 10114-1 : 2005 : Interior Lighting</div> <div><div><input type="checkbox"/></div>South African National Standard : SANS 10142-1: 2003 - The Wiring of Premises : Part 1 - Low-voltage Installations</div> <p>All apparatus, components, parts, fittings and materials supplied and / or installed, whether specifically specified herein or not, shall conform in respect of quality, manufacture, tests and performance with the requirements of the appropriate current South African (SANS) or British Standard Specifications (BS) and Addenda thereto, except where otherwise required by this specification or permitted by approval of the Client / Employer, in writing.</p> <p>All materials and workmanship, which may, in the opinion of the Client / Employer, be inferior to that specified for the Work, will be condemned. All condemned material and workmanship must be replaced or rectified as the case may be, to the satisfaction of the Client / Employer.</p> <p>Any fitting or item of equipment not specifically mentioned but obviously necessary for the successful completion of the installation is to be included so as to form a complete working installation.</p> | | | <div><div>A</div></div> <div><div>C</div></div> <div><div>E</div></div> <div><div>L</div></div> <div><div>M</div></div> <div><div>S</div></div> | | |
| 10.2 Building Classification | | | | | |
| <p>The buildings shall be classified as follows, namely:</p> <div><div><div><input type="checkbox"/></div>Offices</div><div>“G1 : Offices”, with the definition “Occupancy comprising offices, banks, consulting rooms and other similar usage”</div></div> <div><div><input type="checkbox"/></div>Cheese Factory</div> <div>“D2 : Occupancy where an industrial process is carried out and where either the material handled or the process carried out is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions”</div> <div><div><input type="checkbox"/></div></div> <div>“J2 : Occupancy where material is stored and where the stored material is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions”</div> <div><div><input type="checkbox"/></div>Cold Store</div> <div>“J2 : Occupancy where material is stored and where the stored material is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions”</div> | | | <div><div>A</div></div> <div><div>C</div></div> <div><div>E</div></div> <div><div>L</div></div> <div><div>M</div></div> <div><div>S</div></div> | | |
| 10.3 Definitions | | | | | |
| <div><div><input type="checkbox"/></div>Design</div> <div>To create a plan or a specification for the construction of a system, or for the implementation of an activity or a process</div> <div><div><input type="checkbox"/></div>Supply</div> <div>To purchase, procure and deliver complete with all related specified accessories</div> <div><div><input type="checkbox"/></div>Erect</div> <div>To place or mount and fix in position</div> <div><div><input type="checkbox"/></div>Install</div> <div>To erect, connect up and commission, complete with related accessories</div> <div><div><input type="checkbox"/></div>Indicated shown, Noted</div> <div>As indicated or shown on drawings</div> <div><div><input type="checkbox"/></div>Approved, Alternative</div> <div>Approved in writing by the Client / Employer</div> <div><div><input type="checkbox"/></div>Similar, Equal</div> <div>Equal or better in efficiency of performance and compatibility</div> | | | <div><div>A</div></div> <div><div>C</div></div> <div><div>E</div></div> <div><div>L</div></div> <div><div>M</div></div> <div><div>S</div></div> | | |
| 10.4 Acceptance, Testing and Commissioning | | | | | |
| <p>The Contractor shall allow for two representatives of the Client / Employer to participate in, and witness, all acceptance tests undertaken by the respective Manufacturers, for all major items of the mechanical equipment i.e. but not limited to, air-conditioning, ventilation, CRAC / chiller / DX systems, fire detection / suppression systems, integration between electrical and mechanical systems, etc.</p> <p>The Contractor shall carry out all testing and commissioning required in terms of the mechanical equipment Supplier specifications, relevant Acts, SANS Codes of Practice and Local Authority requirements. The Contractor shall provide all the equipment and apparatus required for the purpose of carrying out all necessary tests.</p> <p>The Contractor is responsible for carrying out all necessary tests and obtaining / preparing / issuing all necessary certificates for the installation and operation of the plant.</p> | | | <div><div>A</div></div> <div><div>C</div></div> <div><div>E</div></div> <div><div>L</div></div> <div><div>M</div></div> <div><div>S</div></div> | | |

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| If any part of the Works fails the test, the Contractor shall be responsible for rectifying, at his own cost, the defective Works and the re-testing thereof to ensure compliance. If in consequence, the Client / Employer are obliged to attend the further acceptance tests the additional costs incurred by the Engineers shall be payable by the Contractor. The Works shall be deemed to be practically complete only when the Client / Employer has approved all tests and inspections, and a Completion Advice Notice or other relevant completion notice is issued. | | | |
| 10.5 Defects Liability Period | | | |
| <p>The Contractor shall be responsible for the carrying out of inspections, services and maintenance-related tasks that are specified / recommended by the relevant Manufacturers / Suppliers for each component of the respective installations described herein, including but not limited to the following:</p> <p>General</p> <ul style="list-style-type: none"><input type="checkbox"/> clean and wipe down all equipment<input type="checkbox"/> carry out a visual inspection of complete installation to ensure that all fittings/devices are still in place, covers fitted properly, etc. <p>Access Control – Biometrics / Locking Devices</p> <ul style="list-style-type: none"><input type="checkbox"/> check readers are seated and secured to the wall<input type="checkbox"/> check all battery backed equipment and record charging and static current<input type="checkbox"/> check and verify all alarms conditions<input type="checkbox"/> record number of operations, where applicable<input type="checkbox"/> check operation of locking devices<input type="checkbox"/> verify that each cabinet is free of moisture and that all cooling equipment is operational<input type="checkbox"/> print operating software for record purposes<input type="checkbox"/> all equipment to be blown out and clear of any dust <p>Access Control Booms</p> <ul style="list-style-type: none"><input type="checkbox"/> check that all floor bolts are tight<input type="checkbox"/> check isolator and power supply units, record the voltage<input type="checkbox"/> grease lifting and lowering mechanism with approved lubrication<input type="checkbox"/> check and test all loop detectors<input type="checkbox"/> ensure lock out is fully functional<input type="checkbox"/> check fire break or trigger from the fire detection system<input type="checkbox"/> check control panel and test each trigger button<input type="checkbox"/> ensure all wireless triggers are functional<input type="checkbox"/> clean, wash and wipe outer housing of the booms <p>Access Control Turn-Stile (Turn Star-Triumph 4 Double Turnstile) (including pedestrian gate)</p> <ul style="list-style-type: none"><input type="checkbox"/> check that all floor bolts are tight<input type="checkbox"/> check isolator and power supply units, record the voltage<input type="checkbox"/> grease turning mechanism with approved lubrication<input type="checkbox"/> clean and wipe the 316 stainless steel<input type="checkbox"/> ensure lock out is fully functional<input type="checkbox"/> check fire break or trigger from the fire detection system<input type="checkbox"/> check control panel and test each trigger button<input type="checkbox"/> ensure all wireless triggers are functional<input type="checkbox"/> clean, wash and wipe outer housing of the housing<input type="checkbox"/> disabled full height pedestrian gate<input type="checkbox"/> apply protective wax/ polish to the stainless steel <p>Data Network Installation / Internet Protocol Telephone Installation</p> <ul style="list-style-type: none"><input type="checkbox"/> Provision of conduits, terminations and end couplers for the data and telephone points<input type="checkbox"/> Equipment and devices shall be provided for by the client <p>The Contractor shall ensure that the inspections, services and maintenance-related tasks are undertaken at intervals not greater than three months.</p> <p>The Contractor shall ensure that each inspection, service and / or maintenance-related task is undertaken in the presence of a representative of either the Client / Employer or the Client / Employer.</p> <p>The Contractor shall ensure that the necessary documentation is completed and submitted to the Client / Employer confirming the completion of the relevant tasks after every inspection, service and / or maintenance-related task milestone.</p> <p>The Contractor shall also timeously attend to any defects, which may occur through the normal operation of the Works.</p> <p>If, during the defects liability period, the installation is not in working order for any reason for which the Contractor is responsible, or if the respective installation develops a defect, the Contractor shall, immediately upon being notified thereof, take steps to remedy the defects and make any necessary adjustments.</p> <p>Should such stoppages, however be so frequent as to become troublesome, or should the installation otherwise prove unsatisfactory during the said period the Contractor shall, if called upon by the Client / Employer, at his own expense replace the whole of the installation, or such parts thereof, as the Client / Employer may deem necessary with equipment specified by the Client / Employer.</p> <p>Upon completion of the defects liability period, the Client / Employer shall undertake the final inspection, service and / or maintenance-related task, as explained above and ensure that the necessary documentation is completed and submitted to the Client / Employer on behalf of the Client / Employer.</p> | | A | |
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| 10.6 Detailed Schedule of Work | | | |
| 10.6.1 Access Control – Bio metrics /Locking Devices Booms | | A | |
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| <p>The access control system offered shall consist of a biometric-based system with fingerprint recognition being the primary identification method, and proximity / contactless card detection as the secondary means of identification. The system shall provide a fast, accurate and versatile solution capable of managing a minimum of 20 000 users.</p> <p>The access control system shall record all movements and activities at each control point.</p> <p>The access control terminals shall be vandal resistant in construction and shall be capable of being mounted either indoors or outdoors. Furthermore, the access control terminals shall incorporate both finger recognition and proximity / contactless card recognition within a single housing. By default, fingerprint matching shall be utilised for identification, and only in cases where a user's fingerprint cannot be captured, shall a proximity or contactless card be used.</p> <p>The access control terminals shall be able to connect directly onto an Ethernet-type network and shall be capable of operating in a standalone configuration, without the need for a separate field controller. The terminal shall provide the necessary on-board secure input / output points necessary to control and monitor a single door.</p> <p>The access control terminal shall consist of an embedded real time device with on-board database management, including the ability to configure and process daily, weekly, monthly and holiday schedules.</p> <p>Anti-pass back management can either be a function of the respective access control terminals or via the access control system. In the event of an emergency, the unlocking of a group of selected doors, by the security management system's control (work) stations, shall be possible.</p> <p>The access control system will be capable of providing a "guard tour function" using the access control terminals explained above.</p> <p>The access control system shall include double Turnstar Triumph 4 316 Stainless full height turnstiles, at the staff entrance including full height disabled gate.. All turnstiles shall be equipped with vandal resistant, weatherproof access control terminals on each side of the turnstile, which shall be linked with the access control system.</p> <p>Auto gate 318 stainless steel housing, single phase, red and white boom gates shall be equipped with vandal resistant, weatherproof access control terminals on the incoming side of the boom gate, which shall be linked with the access control system and security management system. Control panel mounted on a 316 stainless pre manufactured mounting plate shall be mounted. Presence and exit loops shall be provided per boom. The loops shall be spaced adequately to avoid cross activation and interference.</p> | | L M S | |
| 10.6.2 Internet Protocol Telephone/Data Network Installation | | | |
| 10.6.2.1 Telephone System <p>The Client / Employer shall appoint a Specialist Telephone Service Provider for the installation of the telephone system. The contractor shall only provide the conduits, terminations and end couplers for the data and telephone installation</p> | | A C E L M S | |
| 10.6.3 Termination of Cables <p>Cable ends shall be terminated with glands or in cable boxes with the associated accessories such as clamps, shrouds, etc. in a manner recommended by the manufacturer.</p> <p>At every cable termination, the cable shall be looped in the ground to allow for future re-making of the termination, should this become necessary.</p> <p>Correctly-sized lugs shall be crimped onto the ends of the cable using the correctly-sized hexagonal crimping tool. The lug hole size shall match that of the termination bolts.</p> <p>A pre-stretched tube or heat shrink tube shall be placed over the end lug and switchgear spout to completely insulate the termination. Taping of the end lug shall not be allowed.</p> <p>Cable end boxes shall be installed, as specified, to prevent mechanical damage or access to the terminals.</p> <p>Cable end boxes shall not be filled with any type of filling compound.</p> | | A C E L M S | |
| 10.6.4 Testing <p>Each cable shall be tested after installation thereof to ensure proper functionality.</p> <p>All tests shall be recorded on the associated terminal equipment and in the Record Drawings.</p> <p>The Contractor shall notify the Client / Employer timeously, so that their representative may witness the tests. On completion of the tests, the Contractor shall submit three copies of the certified test reports to the Client / Employer.</p> | | A C E L M S | |
| 10.6.4.1 Cable Markers <p>The cable markers shall consist of a concrete block in the shape of a truncated pyramid, approximately 300mm deep x 150mm x 150mm at the top and 230mm x 230mm at the bottom. An aluminium indicator plate shall be cast onto the top of the marker. Indicator plates shall have the following inscriptions:</p> <p><input type="checkbox"/> CABLE / CABLE SLEEVES</p> <p><input type="checkbox"/> INDICATE NUMBER AND SIZE</p> <p>Markers for cable joints shall have the following stamped inscription on the indicator plate:</p> <p><input type="checkbox"/> CABLE JOINT No</p> <p>Markers shall be placed at regular intervals along the cable routes, approximately 50 meters apart and also at all changes in direction with arrows indicating route of cable.</p> <p>A sample of the proposed markers shall be submitted to the Client / Employer for approval before they are manufactured.</p> <p>The position of the cable markers shall be indicated on the Record Drawings.</p> | | A C E L M S | |
| 10.6.4.2 Crossing of Existing Services <p>The Contractor shall acquaint himself with all services that are existing and to be maintained to ensure that any excavations he may undertake will not damage or hinder such services or expose his work to possible damage by others.</p> | | A C E | |

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| The Contractor will be held responsible for damage to any existing or concurrently installed service, which might be brought to his attention by the relevant authority and shall be held responsible for the cost of any repairs. | | L | |
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| 10.6.4.3 Builder’s and Related Works The Contractor shall be responsible for the necessary co-ordination and timing of the builder’s and related Works pertaining to this Contract. All Utility Rooms shall be constructed with the necessary floor trenches for the installation of all associated mechanical services. | | A | |
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| 10.6.4.4 Trench Excavations The Contractor shall undertake all trench excavations, including backfilling and compaction, required for the electrical installation. Where possible, all routes should be either parallel or perpendicular to the nearest building and / or structure, maintaining a minimum distance of 0.5mm from the edge of the foundation of the boundary wall and or building walls. The Client / Employer should be notified immediately should any deviations to the routes be required. The cable-trenches shall be excavated to a depth of 600mm deep below ground level and shall be 500mm 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 150mm layer of earth before the trench is filled in. Trenches are to be backfilled and consolidated in stages (150mm intervals) to prevent subsequent subsidence. 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. All compactions shall be to MPa density of 93% AASHTO density. Any subsidence, either during the construction period, or the guarantee period, shall be remedied. The backfilling of all post-mounted, or similar, luminaires shall be done with a 10:1 sand / cement mix. | | A | |
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| 10.6.4.5 Brick-built Enclosures (Manholes) The Contractor shall be responsible for the provision of the brick-built enclosures (manholes). The manholes shall be constructed on a mass concrete Class D base, 150mm thick and projecting 150mm all way round, and comprise two-brick thick walls, plastered internally, and fitted with a (minimum) 600mm diameter, heavy duty, Type 8UA frame and lid. The Contractor is to ensure that all manholes are waterproofed. | | A | |
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| 10.6.4.6 Ducts The Contractor shall be responsible for the provision of all ducts necessary for the electrical and, telecommunications and associated installations. In summary, ducts shall be installed beneath (across) all walkways, driveways, and finished surfaces. The ducts shall be manufactured from a high-density polyethylene with a double wall construction, allowing a corrugated outer wall finish and a smooth inner wall finish, and of the internal diameters as indicated on the attached drawings. All ducts shall be minimum 100mm outer diameter, with minimum 87mm internal diameter. Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in high-density polyethylene pipes. The ends of all ducts shall be sealed with a non-hardening watertight compound after the installation of cables. All ducts intended for future use shall be sealed. | | A | |
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| 10.7 Staff Training | | | |
| The Contractor shall provide comprehensive training of male and female operational staff and nominated maintenance personnel, to the approval of the Client / Employer. Training shall be comprehensive, covering all aspects of systems installed as part of these Works. The Contractor shall provide a detailed training programme and a copy of the training documentation to the Client / Employer, for comment and review, no less than 4 weeks prior to the commencement of training. No training will commence on site prior to the written approval of the Client / Employer. Should the Client / Employer not approve the training programme and documentation, the training programme and documentation will be referred back to the Contractor for re-evaluation and re-submission to the Client / Employer. The number of staff to be trained is to the full discretion of the Client / Employer. However, the Contractor shall allow for 4 groups, each of up to 4 personnel. Each group shall receive a minimum of two 2-hour training sessions. One of these sessions shall be held prior to the commissioning of the electrical engineering services installation, and the other of these sessions, upon expiry of the defects liability period. Training shall be adequate to ensure that the groups trained are: <input type="checkbox"/> competent in the operation of systems <input type="checkbox"/> adequately trained to carry out on-going training <input type="checkbox"/> fully aware of the location of all equipment installed as part of this Contract within their area of responsibility | | A | |
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| The names of personnel attending the training shall be recorded and submitted to the Client / Employer at the conclusion of training. Maintenance staff shall demonstrate a complete understanding of the location and connectivity of the various elements of the electrical engineering services installation. All training aids and course notes necessary to conduct effective operational and maintenance training shall be supplied by the Contractor. The training venue will be made available on site by the Client / Employer. | | | | | |
| 11 DESIGN – MECHANICAL ENGINEERING SERVICES | | | | | |
| 11.1 Design Criteria and Parameters | | | | | |
| <div>The design criteria applied to the mechanical engineering services shall include the following, namely:<div><div><input type="checkbox"/>Capital costs</div><div><input type="checkbox"/>Operational and maintenance requirements and costs</div><div><input type="checkbox"/>Ease of functionality, operation and maintenance</div><div><input type="checkbox"/>Compliance with general energy efficiency and / or sustainability standards</div></div></div> <div>Furthermore, the mechanical engineering services shall be designed in accordance with, but not limited to, the current versions of the following, namely:<div><div><input type="checkbox"/>the South African National Standard : Code of Practice for “The Application of the National Building Regulations” i.e. those included in the “National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977)”, as published in the Government Gazette, number 31084, dated 30 May 2008, which became effective as of 01 October 2008, and known as “SANS 10400 - 2010”</div><div><input type="checkbox"/>the Occupational Health and Safety Act, 1993 (Act 85 of 1993),</div><div><input type="checkbox"/>SANS 204-1 : 2008 - Energy Efficiency in Buildings : Part 1 - General Requirements,</div><div><input type="checkbox"/>SANS 204-2 : 2008 - Energy Efficiency in Buildings : Part 2 - The Application of the Energy Efficiency Requirements for Buildings with Natural Environmental Control,</div><div><input type="checkbox"/>SANS 204-3 : 2008 - Energy Efficiency in Buildings : Part 3 - The Application of the Energy Efficiency Requirements for Buildings with Artificial Ventilation or Air-conditioning,</div><div><input type="checkbox"/>South African National Standard : SANS 10142-1: 2003 - The Wiring of Premises : Part 1 - Low-voltage Installations</div><div><input type="checkbox"/>the current version of the South African Bureau of Standards : Code of Practice for “Automatic Sprinkler Installations for Fire Fighting Purposes”, Edition 1:2000, which became effective as of 17 March 2000, and known as “SABS 0287 - 2010”, together with subsequent amendments</div><div><input type="checkbox"/>the current version of the South African Bureau of Standards : Code of Practice for “Water Supplies and Drainage for Buildings – Part 1 : Water Supply Installations for Buildings”, Edition 2.1 : 2004, and known as “SANS 10252-1:2004”, together with subsequent amendments</div><div><input type="checkbox"/>the current version of the South African Bureau of Standards : Code of Practice for “Fire Detection and Alarm Systems for Buildings - System Design, Installation and Servicing”, Edition 3.2 : 2012, and known as “SABS 10139-2012”, together with subsequent amendments</div><div><input type="checkbox"/>the current version of the South African Bureau of Standards : Code of Practice for “Fire Protection for Electronic Equipment Installations”, Edition 2 : 2015, and known as “SANS 246 - 2015”, together with subsequent amendments</div><div><input type="checkbox"/>the current version of the South African Bureau of Standards : Code of Practice for “the Operation of Fire Protection Measures Part 1 & 2 : Gaseous Extinguishing Systems”, known as “SANS 369”, together with subsequent amendments</div><div><input type="checkbox"/>the current version of the South African Bureau of Standards : Code of Practice for “Gaseous Fire-Extinguishing Systems”, known as “SANS 14520”, together with subsequent amendments</div><div><input type="checkbox"/>any other relevant by-laws of the Local Authorities.</div></div></div> <div>All apparatus, components, parts, fittings and materials supplied and / or installed, whether specifically specified herein or not, shall conform in respect of quality, manufacture, tests and performance with the requirements of the appropriate current South African (SANS) or British Standard Specifications (BS) and Addenda thereto, except where otherwise required by this specification or permitted by approval of the Client / Employer, in writing.</div> <div>All materials and workmanship, which may, in the opinion of the Client / Employer, be inferior to that specified for the Work, will be condemned. All condemned material and workmanship must be replaced or rectified as the case may be, to the satisfaction of the Client / Employer.</div> <div>Any fitting or item of equipment not specifically mentioned but obviously necessary for the successful completion of the installation is to be included so as to form a complete working installation.</div> | | | | <div><div>A</div><div>C</div><div>E</div><div>L</div><div>M</div><div>S</div></div> | |
| 11.2 Building Classification | | | | | |
| <div>The buildings shall be classified as follows, namely:<div><div><div><input type="checkbox"/>Offices</div><div>“G1: Offices”, with the definition “Occupancy comprising offices, banks, consulting rooms and other similar usage”</div></div><div><div><input type="checkbox"/>Cheese Factory</div><div>“D2: Occupancy where an industrial process is carried out and where either the material handled or the process carried out is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions”</div></div><div><div><input type="checkbox"/></div><div>“J2: Occupancy where material is stored and where the stored material is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions”</div></div><div><div><input type="checkbox"/>Cold Store</div><div>“J2: Occupancy where material is stored and where the stored material is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes. or cause explosions”</div></div></div></div> | | | | <div><div>A</div><div>C</div><div>E</div><div>L</div><div>M</div><div>S</div></div> | |

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| 11.3 Definitions | | | | | |
| <input type="checkbox"/> Design | To create a plan or a specification for the construction of a system, or for the implementation of an activity or a process | | | A | |
| <input type="checkbox"/> Supply | To purchase, procure and deliver complete with all related specified accessories | | | C | |
| <input type="checkbox"/> Erect | To place or mount and fix in position | | | E | |
| <input type="checkbox"/> Install | To erect, connect up and commission, complete with related accessories | | | L | |
| <input type="checkbox"/> Indicated shown, Noted | As indicated or shown on drawings | | | M | |
| <input type="checkbox"/> Approved, Alternative | Approved in writing by the Client / Employer | | | S | |
| <input type="checkbox"/> Similar, Equal | Equal or better in efficiency of performance and compatibility | | | | |
| 11.4 Acceptance, Testing and Commissioning | | | | | |
| The Contractor shall allow for two representatives of the Client / Employer to participate in, and witness, all acceptance tests undertaken by the respective Manufacturers, for all major items of the mechanical equipment i.e. but not limited to, air-conditioning, ventilation, CRAC / chiller / DX systems, fire detection / suppression systems, integration between electrical and mechanical systems, etc. The Contractor shall carry out all testing and commissioning required in terms of the mechanical equipment Supplier specifications, relevant Acts, SANS Codes of Practice and Local Authority requirements. The Contractor shall provide all the equipment and apparatus required for the purpose of carrying out all necessary tests. The Contractor is responsible for carrying out all necessary tests and obtaining / preparing / issuing all necessary certificates for the installation and operation of the plant. If any part of the Works fails the test, the Contractor shall be responsible for rectifying, at his own cost, the defective Works and the re-testing thereof to ensure compliance. If in consequence, the Client / Employer are obliged to attend the further acceptance tests the additional costs incurred by the Engineers shall be payable by the Contractor. The Works shall be deemed to be practically complete only when the Client / Employer has approved all tests and inspections, and a Completion Advice Notice or other relevant completion notice is issued. | | | | A | |
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| 11.5 Defects Liability Period | | | | | |
| The Contractor shall be responsible for the carrying out of inspections, services and maintenance-related tasks that are specified / recommended by the relevant Manufacturers / Suppliers for each component of the respective installations described herein, including but not limited to the following: General <input type="checkbox"/> clean and wipe down all equipment <input type="checkbox"/> carry out a visual inspection of complete installation to ensure that all equipment / fittings are still in place, covers fitted properly, etc. Air-conditioning and Ventilation: <input type="checkbox"/> check system functions for normal operations <input type="checkbox"/> check air filters and change if dirty <input type="checkbox"/> check that electrical loads drawn are within normal parameters <input type="checkbox"/> using manual control, check the operation of the refrigeration circuit <input type="checkbox"/> check VRV / split system is operating correctly including refrigeration systems <input type="checkbox"/> ensure that there are no signs of ice formation on the evaporator coils <input type="checkbox"/> inspect all fuses and thermal overload devices <input type="checkbox"/> ensure that there are no obstructions in the path of the air supply to and from the unit <input type="checkbox"/> check the condensate pipe for blockages <input type="checkbox"/> check the operation of the compressor / chiller and consumption of current is normal <input type="checkbox"/> inspect the fan motor(s) and bearings and condenser coil, cleaning dirt from between fins if necessary <input type="checkbox"/> check fan speed <input type="checkbox"/> ensure display panel lights and/or controls are functioning correctly <input type="checkbox"/> inspect fans, check that direction of rotation is correct and that bearings are not running hot <input type="checkbox"/> check mains voltage <input type="checkbox"/> check the surface temperature of the compressor housing <input type="checkbox"/> check insulation on tubing / piping Early Warning Detection and Alarm: <input type="checkbox"/> check control equipment <input type="checkbox"/> check system functions for normal operations <input type="checkbox"/> check fire brigade signalling (if applicable) <input type="checkbox"/> check GMS signalling (check numbers provided are still correct) <input type="checkbox"/> check all lamps in visual indicators and control desk <input type="checkbox"/> check all audible alarms and fire evacuation speech system (if applicable) <input type="checkbox"/> check battery, electrolyte level of accumulators and charging unit <input type="checkbox"/> check random detectors and end of line units for operation <input type="checkbox"/> detection circuit is to be tested each 3 monthly service and each detector tested is to be logged on a maintenance sheet in order to ensure that within a 6 month period every detector will have been tested <input type="checkbox"/> ensure display panel lights and/or controls are functioning correctly <input type="checkbox"/> test the interface controls with other services Fire Protection: | | | | A | |
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| Air-conditioning units shall be controlled by means of hard-wired controllers. The controllers shall be mounted adjacent the light switch position in the respective rooms. Wired remote type computerized PID controllers shall be used to maintain correct room temperatures and interrogate the system log. Units shall be equipped with a self-diagnostic and logging system for easy and quick maintenance and service. The LCD {Liquid Crystal Display} remote controllers shall memorize the latest malfunction code for easy maintenance, it shall be able of controlling up to 16 indoor units and change fan speeds individually in the group. <i>d) Refrigeration Systems</i> It is to be noted that the Tenant shall be installing isopanel type ceilings and partitioning walls within the Cold Store and Cheese Production Areas. The refrigeration systems shall be designed and installed by the Tenant. | | | |
| 11.6.1.2 Office Block Ventilation The air extract / supply ventilation systems shall be by means of ducted systems run within the ceiling void with axial extract / supply air fans securely mounted to the roof slab / trusses. The extraction / supply flow shall be calculated in terms of the stipulated minimum requirements in accordance with SANS 10400 “Part O” and the OHS Act w.r.t. the Environmental Regulations for Workplaces. The axial extract / supply fan shall either be a Silent Series type fan, or an axial extract fan including two off 1.5 D sound attenuators for a quite running system (45db). Ducting is to be galvanized un-insulated sheet metal inclusive of branch ducting and collars. All external ducting, fans, attenuators and fittings are to be corrosion resistant. Louvers shall be natural anodized aluminium weather louvers (color-coded to Principal Architect's specification). In the case of a fresh air system, washable filters are to be installed within respective plenum box. Ducting is to be connected to the disc valves located in ceiling using flexible ducting. | | A | |
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| 11.6.1.3 Transformer Room Ventilation <i>a) Ventilation System</i> The air extract ventilation systems shall be by means of ducted systems with axial extract / supply air fans securely mounted to the roof slab / trusses. The extraction flow shall be calculated in terms of the stipulated minimum requirements in accordance with SANS 10400 “Part O”, ASHRAE and the OHS Act w.r.t. the Environmental Regulations for Workplaces. The axial extract fan shall be a spark proof axial extract fan including sound attenuators for a quite running system (45db). The room shall be designed to have a temperature of approximately no more than 35°C. Ducting is to be galvanized un-insulated sheet metal inclusive of branch ducting and collars. All external ducting, fans, attenuators and fittings are to be corrosion resistant. Louvers shall be natural anodized aluminium weather louvers (color-coded to Principal Architect’s specification). Ducting is to be connected to a galvanized steel canopy, including bird mesh, positioned above each respective transformer. <i>b) Ventilation System Control Panel</i> The control panel will comprise an IP55 mild steel enclosure with orange powder coated finish. The control panel will have the following indication equipment for each fan: <input type="checkbox"/> Power ON Indicator <input type="checkbox"/> Fire Incident Indicator <input type="checkbox"/> System Fault Indicator The control panel will be fitted with manual and automatic selector switches. The manual selector shall be used to override the system, and the automatic selector shall operate via a thermostat / temperature sensor positioned at high level. The control panel shall be used to operate the fans. The fans are to be switched off in the event of a fire, via a fire signal from the early warning detection and alarm and sprinkler systems. | | A | |
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| 11.6.1.4 Production Facility Ventilation Ventilation in production areas shall be provided in terms of the stipulated minimums in SANS 10400 “Part O” and the OHS Act w.r.t. the Environmental Regulations for Workplaces. The Tenant installation includes the isopanel ceilings and partition walls within the facility, including refrigeration, ventilation and sprinklers within ceilings etc. The extent of the Tenant installation ceilings and panels are shown on the Architects Drawings. <i>a) Roof Void</i> The roof void is to be ventilated naturally, incorporating high level louvers positioned on the West elevation, they shall be vertical, weather / dust-proof louvres manufactured from 0.8 mm aluminium, with colour specification as per Architects detail. The louver installation shall be inclusive of a 24V DC actuator (to be controlled by the respective control panel) and bird proof mesh. The combination of louvers and sheeting shall give a warranty / guarantee of 25 years. <i>b) Ventilation System Control Panel</i> The control panel will comprise an IP55 mild steel enclosure with orange powder coated finish. The control panel will have the following indication equipment for each fan: <input type="checkbox"/> Power ON Indicator <input type="checkbox"/> Fire Incident Indicator <input type="checkbox"/> System Fault Indicator The control panel will be fitted with manual and automatic selector switches. The manual selector shall be used to override the system, and the automatic selector shall operate via a thermostat sensor positioned at high level within the ceiling void (created by Tenant). | | A | |
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| <p>The control panel shall be used to operate the relevant automatic high-level louvers within the ceiling void. The louvers are to close in the event of a fire, via a fire signal from the early warning detection and alarm and sprinkler systems. The high level louvers shall be manually overridden by the smoke extraction system master control panel, positioned in the ICV Chamber. In the event of a fire, the Fire Department shall be able to operate the smoke extraction system, including the high level louvers, as they see fit, for either cold smoke purging or helping exhaust the smoke build-up.</p> | | | |
| <p>11.6.1.5 Smoke Ventilation Smoke extraction shall be an actuated natural smoke and heat exhaust ventilation system in accordance with SANS 10400 “Part T”, EN12101 standards. The smoke extraction systems shall only be used as a manually-operated cold smoke purging system, and / or as the Fire Department sees fit in the event of a fire.</p> <p><i>a) Smoke Extraction Louvers</i> Roof mounted smoke extraction louvers / ventilators manufactured from zincalume, with a colour specification to match the roof sheeting, and shall be inclusive of dust seals and a 24 V DC actuator (to be controlled by the master control panel within the sprinkler installation's ICV Chamber). The master control panel shall override the fan control panels and control the lower level louvers if and when required by the Fire Department. A secondary means of operation shall be in the form of a fusible link, with an activation rating in accordance with the design of the sprinkler system. The Contractor shall ensure that the smoke extraction louvers installed:</p> <ul style="list-style-type: none"><input type="checkbox"/> are installed correctly and are in accordance with regulations and standards required<input type="checkbox"/> are manufactured with corrosion resistant materials and equipment<input type="checkbox"/> are installed in such a manner that the system is a water tight system (rain and leak proof) <p>The combination of louvers and roof sheeting shall give a warranty / guarantee of 25 years.</p> <p><i>b) Control Panels</i> Each fire zone shall include a control panel with the following indication equipment; power on indicator, fire incident indication, system-initiated indicators, system running indicators, system fault indicators, audible alarm sounder and red stroboscopic flashing beacon. The master control panel will be fitted with manual selector switches, and positioned within the sprinkler installation's ICV chamber, including a schematic of the factory layout. The manual selector switches shall be labelled in accordance with the schematic of the factory layout, so as the Fire Department are able to operate the system accordingly. The smoke ventilation louvers shall remain closed at all times, and once the Fire Department are on site, in the event of a fire, they shall be able to operate the smoke extraction system, helping exhaust the smoke build-up, and allowing the Fire Department to enter the building where desired. The installation is to include temperature rated cabling to the necessary SABs / EN54 and SANS10142 standards, and the entire smoke ventilation system shall be in accordance with SANS 10400 and the relevant parts of EN12101. It is to be noted that the Tenant shall be installing an isopanel type ceiling throughout the cold store and cheese factory areas. The Contractor is to allow the relevant relays and interface control system within the smoke extraction control panel, to control the necessary actuators required to open ceiling type panels, within the isopanel ceilings.</p> <p><i>c) Smoke Reservoirs</i> Where smoke reservoirs are required wrt the above standards, creating smoke zones, they shall be static grey smoke curtains, manufactured from materials to withstand the required fire rating. The combination of the smoke extraction system and smoke reservoirs shall be designed to maintain a clear layer of 2.5m above the floor of the highest occupied level.</p> | | A | |
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| <p>11.6.2 Early Warning Detection and Alarm System The facility shall be equipped with an early warning detection and alarm installation, in accordance with the relevant South African National Standards, comprising of:</p> <ul style="list-style-type: none"><input type="checkbox"/> A category L fire detection system within the Administration Facility, and<input type="checkbox"/> A category M fire detection system within the Manufacturing Facility <p>The early warning detection and alarm system shall be an analogue addressable control panel (Ziton to match existing systems), for the Manufacturing Facility, the supply and installation of early warning detection devices (smoke sensitive, heat sensitive, combustion gas sensitivity and light emitting diodes), alarm sirens / sounders, break-glass units, fire retardant (PH120) cable, door magnets, door sequential closers, etc. Communication links and cabling to be provided from the fire detection control panel to the ELIDZ Maestro system. Programming of the Maestro system shall be undertaken by the ELIDZ. In the event of a fire the early warning detection and alarm installation shall send a signal to the following electrical and mechanical systems:</p> <ul style="list-style-type: none"><input type="checkbox"/> Air-conditioning and ventilation systems to close / switch off<input type="checkbox"/> East London Industrial Development Zone Maestro System, which shall alert the relevant authority persons<input type="checkbox"/> Fire doors to close and alarms / evacuation alarms to sound<input type="checkbox"/> Smoke ventilation systems to close / switch off <p>There is an existing early warning detection and alarm system within the existing Manufacturing Facility (control panel is positioned within the reception of Sundale Dairy). The Contractor shall allow for the interfacing of the new system to the existing system, including programming thereof. It is to be noted that the Tenant shall be installing isopanel type ceilings and internal walls / panels throughout the cold store and cheese factory areas. The Contractor is to allow additional space on the new addressable control panel, to allow for the</p> | | A | |
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| Tenants early warning detection and alarm requirements, i.e. devices, alarms, break glass units, relays, etc. The new early warning detection and alarm control panel shall be a minimum of a four (4) loop panel. | | | |
| 11.6.3 Fire Protection The site and facility / building are to be designed and constructed in accordance with the National Building Regulations SANS 10400 "Part T". Where fire walls are required, any penetrations are to be fire proofed accordingly, by using correct passive fire protection methods (fire stops, fire dampers, etc.) in accordance with relevant SANS Standards (SANS 10400 / SANS10177). | | | |
| 11.6.3.1 Fire Appliance Bulk Fire Water Supplies a) <i>Fire Appliance Water Supply</i> The Contractor shall provide a single, metered water connection to each building facility (site) separating into domestic water and manual firefighting systems (one water meter per site). The Contractors fire main reticulation shall be external to the building, including external fire hydrants and a fire booster connection at the site entrance, and shall enter and terminate within the facility floor with a minimum of a flanged 100 mm diameter galvanized steel pipe. In the event of galvanized steel piping being used underground, all such underground steel piping and fittings shall be wrapped with "Wrap it Bond" in accordance with the manufacturer's specification / recommendations, and to the Client's approval, in order that the piping and fittings are fully protected against external corrosion. The Contractor shall be responsible for the entire fire appliance reticulation externally and within the respective buildings. b) <i>Sprinkler System Water Supply</i> The water supply for sprinkler protection is provided by an ASIB-approved pumped firefighting system, comprising two (2) pumps and two (2) dedicated storage tanks as follows: <input type="checkbox"/> Booster pumps capacity = 9000 l/min @ 1000 kPa <input type="checkbox"/> Sprinkler water storage effective capacity = 1112 m ³ (2 off 580m ³) There is an existing 250 diameter galvanized steel main positioned on the north side of the existing Sundale Dairy Facility. The Contractor shall connect to the existing 250 diameter main, and shall extend the sprinkler main (buried 250 diameter galvanized steel pipe to match the existing installation, including necessary thrust blocks, connections, etc.) under the existing Sundale entrance, and shall enter / terminate the service within the sprinkler ICV chamber, inclusive of a galvanized 250 diameter flanged termination point 150 mm AFFL. The existing Sundale entrance and any cut road / platforms shall be made good, and the roadway / platforms etc. are to be reinstated to match the existing roadway / platform, including the correct compaction, infill materials and requirements as per the relevant standards and Client Specifications (See Civil / Structural Specifications). In the event of galvanized steel piping being used underground, all such underground steel piping and fittings shall be wrapped with "wrap it bond" type insulation in accordance with the manufacturer's specification / recommendations, and to the Client's approval, in order that the piping and fittings are fully protected against external corrosion. The Contractor shall be responsible for the entire sprinkler reticulation to site and within the respective buildings. The above existing pumping and storage capacities are to be taken into consideration for the new building development design. The new sprinkler hydraulic designs and storage requirements, including that of the respective Tenant, are to be within the pumping and storage capacities recorded above. Where designs exceed the existing sprinkler booster system capacities, the ELIDZ are to be notified, and proof of the flow, pressure (hydraulics) and storage requirements for the new buildings are to be forwarded as confirmation thereof. Once received by the ELIDZ, further investigations shall take place and if necessary, they (the ELIDZ) may upgrade the existing system. | | A | |
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| 11.6.3.2 Fire Appliance Installation Positions of the fire appliances should be in coordination with the Tenants internal isopanel type walls etc. as shown on the Clients Drawings for information. a) <i>Fire Extinguishers</i> Fire extinguishers shall be supplied in accordance with SANS 10400 "Part T" of the National Building Regulations, with a Building Occupancy as detailed above in "Sub-heading 2", i.e.: <input type="checkbox"/> 5 kg CO ₂ type hand-held fire extinguishers complete with meranti wooden backing board, etc., where necessary <input type="checkbox"/> 4.5 kg dry chemical powder type hand-held fire extinguishers, complete with meranti wooden backing board, etc., where necessary <input type="checkbox"/> 9 kg dry chemical powder type hand-held fire extinguishers, complete with meranti wooden backing board, etc., where necessary b) <i>Fire Hose Reels</i> Fire hose reels shall be supplied in accordance with SANS 10400 "Part T" of the National Building Regulations, i.e.: <input type="checkbox"/> fire hose reels shall be provided within the buildings, at the rate of one (1) per 500m ² or part thereof, mounted at 1,500mm (to center of the appliance) above finished floor level, 30m x 20mm internal diameter rubber hose and nozzle, pressure gauge, brass water way and gland, stopcock, pipework etc. all in accordance with the relevant South African National Standards documentation. <input type="checkbox"/> any piping feeding any single fire hose reel is to be a minimum of 25mm diameter galvanized pipe in accordance with the relevant South African National Standards documentation. <input type="checkbox"/> all pipework shall be hydraulically sized in accordance with the relevant South African National Standards documentation. c) <i>Fire Hydrants</i> | | A | |
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| <p>Fire hydrants shall be supplied in accordance with SANS 10400 "Part T" of the National Building Regulations, i.e.:</p> <ul style="list-style-type: none"><input type="checkbox"/> fire hydrants shall be provided within the buildings, at the rate of one (1) per 1,000m² or part thereof, together with the requisite number of hoses, couplings and 16 mm diameter nozzles. Pipework feeding fire hydrants shall not be less than 75mm diameter.<input type="checkbox"/> all pipework shall be hydraulically sized in accordance with the relevant South African National Standards documentation. <p><i>d) Fire Appliance Piping and Fittings</i> The fire appliance piping shall be galvanized steel to relevant South African Standards, and shall include red bands every 6 m lengths. The dropper pipes to relevant fire hydrants / fire hose reels shall be cleaned, primed and painted with red oxide and signal red enamel paint on completion of installation. All piping shall be hydraulically designed and pressure tested in sections, in accordance with the Contractor's construction Programme. The testing thereof shall be witnessed by the Contractor's responsible Personal, and the relevant pressure test certificates prepared accordingly. All pipe-work is to include galvanized / stainless steel hangers / fittings and must be adequately and neatly supported in both the horizontal and vertical direction. Welded sections of piping shall have flange / coupling joints at suitable intervals to facilitate removal. All fittings shall be groove type systems in accordance with SANS 1109 / BS21 and ASIB.</p> <p><i>e) Fire Protection of Storage Tanks and Associated Filling / Dispensing Stations w.r.t. Liquid Fuels and Gases</i> Where applicable, the respective Tenant shall be responsible for the design, supply, installation, testing, commissioning and certification of any storage tanks and associated filling / dispensing stations, as are necessary for their liquid fuel and gas installations, including any approvals required from the Local Authority and relevant Regulatory Authority. The positioning, and fire requirements, of any storage tank and associated filling / dispensing stations shall be determined in accordance with the relevant regulations, i.e. but not limited to:</p> <ul style="list-style-type: none"><input type="checkbox"/> The South African National Standard : Code of Practice for "The Application of the National Building Regulations" i.e. those included in the "National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977)", as published in the Government Gazette, number 31084, dated 30 May 2008, which became effective as of 01 October 2008, and known as "SANS 10400 - 2010"<input type="checkbox"/> The South African National Standard : The Handling, Storage, Distribution and Maintenance of Liquefied Petroleum Gas in Domestic, Commercial and Industrial Installations, and known as "SANS 10087" <p>The Contractor shall take note of the requirements of the respective storage tanks and associated filling / dispensing stations and shall determine the relevant safety distances, the fire protection requirements (of the particular structures and of the surrounding buildings) and shall allow for the necessary connections of the fire protection appliances as will be required by the Tenant in carrying out their respective installation.</p> | | | |
| <p>11.6.3.3 Sprinkler Installation The sprinkler system shall be designed, installed and commissioned in accordance with the Automatic Sprinkler Inspection Bureau (ASIB) 12th Edition Rules, and parts thereof. The sprinkler heads are to be the latest design-technology, and shall be approved by the Automatic Sprinkler Inspection Bureau, (ASIB). Due to the nature of the Tenants process and Cold Store areas (refrigerated areas) careful attention shall be given to the type of sprinklers being supplied and installed. The sprinkler heads provided shall be compatible with cold room environments where necessary (4°C). The ceiling scope of Works under this Contract shall be shown by the Client's Tender Drawings, inclusive of the ceilings to be installed by the Contractor and therefore sprinkler requirements. Additional drawings shall be issued by the Client showing the proposed Tenant ceiling and division walls for information, and therefore the Contractor is to take note thereof for future connections and adjustments to accommodate the Tenants layout. The Tenants Products stored within the facility are:</p> <ul style="list-style-type: none"><input type="checkbox"/> Maas<input type="checkbox"/> Milk<input type="checkbox"/> Yogurt<input type="checkbox"/> Cheese<input type="checkbox"/> Butter <p>The Tenants Products are generally stored in plastic cartons on pallets wrapped in shrink-wrap and stored as follows :</p> <ul style="list-style-type: none"><input type="checkbox"/> Free standing and block storage to a height of 3m<input type="checkbox"/> Rack and post pallet storage to a height of 3m <p><i>a) Office Block Sprinkler Installation</i> The above system is to be based on an Ordinary Hazard system and shall be able to provide a discharge density of minimum 5 mm / min. Ceiling void sprinkler heads shall be brass upright, pendant or conventional type using the "Glass Bulb" fusible element, as suited to the installation position, and shall be rated at a minimum of 68 °C (K factor = 8). Ceiling-mounted sprinkler heads shall be 15 mm brass pendant type, white powder coated with white rosettes, and shall be rated at a minimum 68 °C (K factor = 8).</p> <p><i>b) Ceiling Process Areas Sprinkler Installation</i> The above system is to be based on a High Hazard system, and the design requirements shall be determined by the fire risk of the respective area (minimum discharge density of 20 mm / min over an assumed maximum area of discharge 300 m²).</p> | | A | |
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| <p>Sprinkler heads shall be brass upright, pendant or conventional type, as suited to the installation position. The rating and K-factor thereof shall be as is required by the determined fire risk of the respective area.</p> <p><i>c) Factory Roof Sprinkler Installation (Including Canopy Areas)</i> The above system is to be based on a High Hazard system, and the design requirements shall be determined by the fire risk of the respective area (minimum discharge density of20 mm / min over an assumed maximum area of discharge 300 m²). Sprinkler heads shall be brass upright, pendant or conventional type, as suited to the installation position. The rating and K-factor thereof shall be as is required by the determined fire risk of the respective area.</p> <p><i>d) Valve Chamber</i> The valve chamber shall be supplied with a Ø250mm supply main from the fire booster system, as detailed above. The valve chamber shall comprise of Ø200mm sprinkler control valve assemblies (or as determined by the design carried out by the Contractor), complete with alarm gongs, gauges, test and drain, chamber protection, by-pass loop, etc. all in compliance with the relevant ASIB Rules. An additional 4 off Ø200 mm spare flanges, blanked off, shall be allowed on the sprinkler manifold for the Tenant’s respective installation requirements.</p> <p><i>e) Control Valves</i> The control valves within the valve chamber shall be of the wet type, as per ASIB Twelfth (12th) Edition. Each control valve is to be equipped with all ancillary items, as required for ASIB approval, and shall comprise, but not limited to, the following items:</p> <div><div><input type="checkbox"/></div><div>Gear operated wafer-type monitored stop valves, with pointer to indicate whether open or shut</div></div> <div><div><input type="checkbox"/></div><div>Approved patent automatic alarm valve with special seating designed to retain water in the pipework, and to pass water to the alarm motor under flow conditions</div></div> <div><div><input type="checkbox"/></div><div>Bourdon type pressure gauges, to indicate water supply and installation pressure respectively. All pressure gauges shall be of the glycerin filled type, and shall have a range of 0-1600 kPa. Each gauge shall be mounted remotely from the main pipe by means of a 100mm long extension pipe, complete with an isolating ball valve mounted in its line</div></div> <div><div><input type="checkbox"/></div><div>Hydraulically driven alarm motor and gong assembly, connected to the alarm valves (The alarm valve shall not be connected directly to the isolating stop valve)</div></div> <div><div><input type="checkbox"/></div><div>One off fiberglass / galvanized cabinet, containing spare sprinkler heads and spanner</div></div> <div><div><input type="checkbox"/></div><div>One off block plan (non-fade material), giving all details as per the ASIB requirements</div></div> <div><div><input type="checkbox"/></div><div>Test pipe</div></div> <div><div><input type="checkbox"/></div><div>Drain pipe</div></div> <div><div><input type="checkbox"/></div><div>A bypass test loop of same diameter as the feed main</div></div> <div><div><input type="checkbox"/></div><div>One pressure operated micro switch will be provided within the valve chamber, mounted in the alarm gong line</div></div> <div><div><input type="checkbox"/></div><div>Booster pump installation</div></div> <div><div><input type="checkbox"/></div><div>Flow switch to be interfaced with the fire detection system</div></div> <p><i>f) Sprinkler Piping and Fittings</i> All sprinkler pipe-work (including mains) installed within the facility shall be galvanized steel to relevant South African Standards (due to nature of production / storage facility - Highly corrosive and damp). All pipework and fittings fabricated shall be de-greased with a suitable de-greasing agent. After de-greasing the pipework and fittings, they shall immediately be painted with red oxide (PA10) self-etching primer. All pipe-work to be painted with red oxide and signal red enamel. All piping shall be hydraulically designed and pressure tested in sections, in accordance with the Principal Contractor’s Construction Programme. The testing thereof shall be witnessed by the Contractor’s representatives and the relevant pressure test certificates prepared accordingly. Terminal points shall be installed at the extremities of the distribution pipe at each level to prove that the water is accessing all points of the system. These points must be accessible for demonstration at commissioning of the installation. All pipe-work is to include galvanized / stainless steel hangers / fittings and must be adequately and neatly supported in both the horizontal and vertical direction. Welded sections of piping shall have flange / coupling joints at suitable intervals to facilitate removal. All fittings shall be groove type systems in accordance with SANS 1109 / BS21 and ASIB.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>11.6.4 Dock Levellers Dock levelers shall be designed supplied and installed in accordance with relevant SANS regulations, and shall include the following, but not limited to :</p> <table><tr><td>Material and Finish</td><td>:</td><td>Galvanized Steel</td></tr><tr><td>Frame</td><td>:</td><td>Solid Base Frame</td></tr><tr><td>Components</td><td>:</td><td>Robust Mechanical Lip Activation with override protection</td></tr><tr><td></td><td>:</td><td>Toe Guards (To slide away into outer skin of deck)</td></tr><tr><td></td><td>:</td><td>Hydraulic Actuator including motor etc.</td></tr><tr><td></td><td>:</td><td>Side Dust Seals (6 mm Flexible Neoprene Rubber mounted to the dock leveler including mounting strip)</td></tr><tr><td>Capacity</td><td>:</td><td>Minimum 10 Tons (Electro Hydraulic Type)</td></tr><tr><td>Size (L x W x D)</td><td>:</td><td>2,845 x 2,110 x 500mm</td></tr><tr><td>Working Range</td><td>:</td><td>Minimum 350 mm above and minimum 200mm below</td></tr><tr><td>Control</td><td>:</td><td>Control Panel including Push Buttons positioned adjacent the dock leveler (Conduit to be recessed in the floor and rise below respective control panel)</td></tr></table> | Material and Finish | : | Galvanized Steel | Frame | : | Solid Base Frame | Components | : | Robust Mechanical Lip Activation with override protection | | : | Toe Guards (To slide away into outer skin of deck) | | : | Hydraulic Actuator including motor etc. | | : | Side Dust Seals (6 mm Flexible Neoprene Rubber mounted to the dock leveler including mounting strip) | Capacity | : | Minimum 10 Tons (Electro Hydraulic Type) | Size (L x W x D) | : | 2,845 x 2,110 x 500mm | Working Range | : | Minimum 350 mm above and minimum 200mm below | Control | : | Control Panel including Push Buttons positioned adjacent the dock leveler (Conduit to be recessed in the floor and rise below respective control panel) | | <table><tr><td>A</td><td></td></tr><tr><td>C</td><td></td></tr><tr><td>E</td><td></td></tr><tr><td>L</td><td></td></tr><tr><td>M</td><td></td></tr><tr><td>S</td><td></td></tr></table> | A | | C | | E | | L | | M | | S | | |
| Material and Finish | : | Galvanized Steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Frame | : | Solid Base Frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Components | : | Robust Mechanical Lip Activation with override protection | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | Toe Guards (To slide away into outer skin of deck) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | Hydraulic Actuator including motor etc. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | Side Dust Seals (6 mm Flexible Neoprene Rubber mounted to the dock leveler including mounting strip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacity | : | Minimum 10 Tons (Electro Hydraulic Type) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Size (L x W x D) | : | 2,845 x 2,110 x 500mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Working Range | : | Minimum 350 mm above and minimum 200mm below | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Control | : | Control Panel including Push Buttons positioned adjacent the dock leveler (Conduit to be recessed in the floor and rise below respective control panel) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Pit Size | : The pit shall be sized according to suppliers requirements including pit frame | | | | |
| Pit Frame | : The pit frame shall be hot dip galvanized and shall be sized according to suppliers' requirements and tolerances | | | | |
| Dock Height | : Proposed 1,350mm, to be confirmed by Client / Tenant | | | | |
| Approach to Dock | : Level and Square | | | | |
| Fittings and Fasteners | : All fasteners, anchors, fittings etc. shall be heavy duty type and hot dip galvanized | | | | |
| Additional Items | : The installation shall include two off heavy duty rubber bumpers below the dock leveler (mounted to the wall), and two off heavy duty rubber bumpers on either end the pit frame (D-Type Heavy Duty Bumpers) | | | | |
| | : Any holes and welding requirements shall be completed prior galvanizing (No welding and drilling of the system shall be allowed after galvanizing) | | | | |
| Cushion Seal | : The dock leveler system shall allow for contact cushion frame seals around the perimeter of the wall opening, to seal between the truck backs and walls | | | | |
| | : The cushion shall allow a drop down curtain in the event a non-standard vehicle being used | | | | |
| | : The cushion shall be purpose made for refrigerated loading | | | | |
| Guarantee | : Minimum 2 Years | | | | |
| Manufactures drawings are to be supplied and approved by the Client before manufacture / supply of the dock leveler system including cushion frame seals. | | | | | |
| The above shall also include the testing and commissioning thereof, including certification, for a complete working dock leveler system. | | | | | |
| 11.6.5 Kitchen, Laundry and Refrigeration Systems | | | | | |
| No allowances have been made for the provision of any kitchen, laundry and refrigeration systems within the respective buildings. | | | | | |
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| 11.6.6 Water Services | | | | | |
| <i>a) Domestic Cold Water</i> | | | | | |
| The Contractor shall provide a single, metered water connection to each building facility (site) separating into domestic water and manual firefighting systems (one water meter per site). | | | | | |
| The external domestic water reticulation shall enter and terminate within the respective buildings with a flanged copper steel pipe. The pipework entry point to the respective building is to be limited to one, or as agreed with the ELIDZ. | | | | | |
| All services, including drainage / water supplies, are to be reticulated into the service ducts, or are to be exposed (where permitted) for maintenance purposes. | | | | | |
| The factory floor shall be provided with an internal cold water ring, with connection points for the Tenant's production-related domestic water requirements. Where applicable, an allowance is to be made for the domestic water connection to the Tenant's chiller plant systems. | | | | | |
| The cold-water reticulation within the buildings shall comprise “half hard”, class 2 copper pipework and fittings, in accordance with the relevant South African National Standards documentation. | | | | | |
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| <i>b) Domestic Hot Water</i> | | | | | |
| Hot water generation to the facility shall be in the form of a suitably-sized, highly efficient, high temperature (55 °C) solar water geyser system (in accordance with relevant SANS requirements), sized in accordance with the hot water requirements of the ablutions and locker rooms. The solar panels or tubes shall be placed on the roof of the office block, correctly positioned for maximum sun exposure. | | | | | |
| The hot water generation system shall include the necessary pressure and temperature gauges on incoming (return) and outgoing (feed) hot water lines, hot water circulating pumps, pipework, fittings, valves and insulation providing an energy efficient system. | | | | | |
| Where the roof space is shaded and solar water generation is not feasible, heat pump systems can be considered as agreed and approved with the ELIDZ. | | | | | |
| The hot-water reticulation within the buildings shall be “half hard”, class 2 copper pipework and fittings, in accordance with the relevant South African National Standards documentation. | | | | | |
| Where long hot water pipe runs are required, the piping shall be reticulated in a ring form in order to eliminate dead legs and water wastage. | | | | | |
| The insulation of all the hot water piping shall have a thermal resistance (R-Value) of 1, using k-value data of 40°C or higher. | | | | | |
| 11.6.7 Conduit / Cable Tray / Trunking | | | | | |

| ELIDZ Design Specifications | Contractor’s Proposal | Notes A=Architect,C=Civil,E=Electrical,L=Land ,M=Mechanical,S=Structural | |
|---|-----------------------|--|--|
| 11.6.7.1 General Electrical Works (Air-conditioning, Ventilation, etc.) All exposed air-conditioning and ventilation-related electrical conduit / cable tray / trunking shall be galvanized, orange powder-coated, including relevant bushes, locknuts, couplings, galvanized saddles, etc. Conduit and conduit accessories / cable support systems / wire duct and mesh installations shall comply with the requirements as detailed in the Electrical Specification. | | A | |
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| | | S | |
| 11.6.7.2 Fire Related Works (Smoke Ventilation, Fire Detection / Protection, etc.) All exposed air-conditioning and ventilation-related electrical conduit / cable tray / trunking shall be galvanized, yellow powder-coated, including relevant bushes, locknuts, couplings, galvanized saddles, etc. Conduit and conduit accessories / cable support systems / wire duct and mesh installations shall comply with the requirements as detailed in the Electrical Specification. | | A | |
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| 11.6.8 Builder’s and Related Works The Contractor shall be responsible for the necessary co-ordination and timing of the builder’s and related Works pertaining to this Contract. All rooms shall be constructed with the necessary floor trenches for the installation of all associated mechanical services. | | A | |
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| 11.6.9 Trench Excavations The Contractor shall undertake all trench excavations, including backfilling and compaction, required for the mechanical installation. Where possible, all routes should be either parallel or perpendicular to the nearest building and / or structure, maintaining a minimum distance of 0.5mm from the edge of the foundation of the boundary wall and or building walls. The Client / Employer should be notified immediately should any deviations to the routes be required. 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 piping, equipment, etc. 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. Any subsidence, either during the construction period, or the guarantee period, shall be remedied. The backfilling of all post-mounted, or similar, luminaires shall be done with a 10:1 sand / cement mix. | | A | |
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| 11.6.10 Ducts The Contractor shall be responsible for the provision of all ducts necessary for the mechanical associated installations. In summary, ducts shall be installed beneath (across) all walkways, driveways, and finished surfaces. All ducts intended for future use shall be sealed. | | A | |
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| 11.7 Staff Training | | | |
| The Contractor shall provide comprehensive training of male and female operational staff and nominated maintenance personnel, to the approval of the Client / Employer. Training shall be comprehensive, covering all aspects of systems installed as part of these Works. The Contractor shall provide a detailed training programme and a copy of the training documentation to the Client / Employer, for comment and review, no less than 4 weeks prior to the commencement of training. No training will commence on site prior to the written approval of the Client / Employer. Should the Client / Employer not approve the training programme and documentation, the training programme and documentation will be referred back to the Contractor for re-evaluation and re-submission to the Client / Employer. The number of staff to be trained is to the full discretion of the Client / Employer. However, the Contractor shall allow for 4 groups, each of up to 4 personnel. Each group shall receive a minimum of two 2-hour training sessions. One of these sessions shall be held prior to the commissioning of the electrical engineering services installation, and the other of these sessions, upon expiry of the defects liability period. Training shall be adequate to ensure that the groups trained are: <input type="checkbox"/> competent in the operation of systems <input type="checkbox"/> adequately trained to carry out on-going training <input type="checkbox"/> fully aware of the location of all equipment installed as part of this Contract within their area of responsibility The names of personnel attending the training shall be recorded and submitted to the Client / Employer at the conclusion of training. Maintenance staff shall demonstrate a complete understanding of the location and connectivity of the various elements of the electrical engineering services installation. All training aids and course notes necessary to conduct effective operational and maintenance training shall be supplied by the Contractor. The training venue will be made available on site by the Client / Employer. | | A | |
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| 12 PROJECT CLOSE OUT | | | | | | | |
| 12.1 ELIDZ Asset/Equipment Information Requirements | | | | | | | |
| The format of the information is to be adequately structured and developed for inclusion in asset register: | | | | A | | | |
| Water Meters | a) Location b) Type, make, size, serial number | | | C | | | |
| Sump and Pump Details | a) Location b) Type and make c) Pumping capacity d) Motor type and make e) Motor rating f) Control method g) Control equipment details h) Monitoring equipment: type, make, capacity etc i) Supplier j) Guarantee expiry dates (Pumps, Motors, Control equipment, Monitoring equipment) | | | E | | | |
| Electrical Equipment Details | a) Location b) Transformer capacity c) Maximum demand design provision d) Size of incoming mains e) Make, type and rating of main LV protection on owner's mainboard f) Trip settings on lv protection g) Size and ratings of mains supplying sub distribution boards h) Serial number of transformer i) Transformer ratings j) HT switch ratings k) Type of power skirting l) Make of light fittings m) Standby electrical supply system (type and make, capacity/rating, kVA rating, alternator (type and make), fuel tank capacity, fuel consumption at full load, serial number, supplier) n) UPS system (make, capacity/rating, serial number) o) Electrical meter (make, capacity/rating, serial number, CT ratio and calibration certificate where relevant) p) Guarantee expiry dates (Distribution boards, Main boards, HT equipment, Standby generator, UPS system) | | | L | | | |
| | | | | M | | | |
| | | | | S | | | |
| | | | | Air Conditioning Systems | a) Contractor b) Location c) Designed load d) Installed load e) Type of A/C system f) Make of A/C system g) Make of chillers h) Type of chillers i) Tonnage of chillers j) Chiller refrigerant k) Maximum operating pressure l) Condenser type m) Type and rating of driving unit n) Details of after Coonan o) Details of air handling units, fan sizes, capacity and make, p) Chilled water pump details q) Condenser water pump details r) Details of cooling tower, design capability, make and motor ratings s) Water treatment details t) Heating provision u) Schematic control layouts v) Air conditioning electrical load w) Guarantee expiry dates (Air-conditioners, Chillers, Condensers, Fans, Motors) | | |
| | | | | | | | |
| Sprinkler Details | a) Provide a complete set of as built floor plans, control schematic showing piping layouts, sizes, isolation points and Sprinkler positions | | | | | | |
| Fire Protection 1: Booster Pump Details | a) Location b) Make c) Supplier d) Driver motor capacity e) Non-return valves | | | | | | |
| Fire Protection 1: Standby Booster Pump Details | a) Location b) Make c) Supplier d) Driver motor capacity | | | | | | |

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| | e) Operation details | | | | |
| Fire Protection 1: Fire Hose Reels | a) Provide a complete set of floor plans showing the position of all fire hose reels | | | | |
| Fire Protection 1: Guarantee Expiry Dates | a) Sprinkler installation b) Booster pump c) Standby booster pump d) Hose reels e) Date of ASIB inspection and clearance (ASIB clearance certificate to be attached where applicable) | | | | |
| Fire protection 2: Fire Extinguishers | a) Contractor b) Location: provide a complete set of floor plans, indicating the position and type of all extinguishers installed c) Guarantee expiry date | | | | |
| Fire protection 3: Fire Detection | a) Contract b) Type of detection system c) System design: provide a complete set of drawings indicating the position of all detection units and sensors as well as full schematics layouts d) Guarantee expiry date e) Earthing report enclosed? | | | | |
| Dock Levellers | a) Location b) Make, capacity, guarantee expiry date | | | | |
| Lifts and Escalators | a) Contractor b) Make of equipment c) Number of units d) Serial numbers e) Lift loading per (Lift, Stretcher lifts, Escalators, Hoists, Other) f) Electrical drawings: provide a complete set of as built drawings and control schematics of all electrical details g) Certification certificate h) Features (Standard car finishes, Non-standard car finishes, Power failure homing) | | | | |
| Kitchen Equipment | a) Contractor b) Make and description of equipment c) Guarantees | | | | |
| Access Control Systems | a) Provide a complete set of as built drawings and schematics showing all access control points b) Location c) Make, type, controller unit, battery backup rating d) Lock type (e.g. mag lock, strike lock etc) e) Guarantee expiry date | | | | |
| CCTV systems | a) Location b) Make, type and description of equipment c) Guarantee expiry date | | | | |
| Irrigation System | a) Sprinkler heads (type, make, capacity/size) b) Controller units (location, type, make) c) Pump (location, type, make, capacity, rating) d) Set of as built drawings and schematic showing all irrigation points, meters, valves, piping, pumps, controller units and cabling routes | | | | |
| 12.2 ELIDZ Operating and Maintenance Manuals Requirements | | | | | |
| General | a) Colour coded Bantex 40mm plastic Lever Arch (code1451) files are to be used, dividers are not required, however an A4 Index page is to be fixed to the inside face of the file which clearly depicts the project name and description, Consultant and/or responsible person name and contact details, and file content. b) Files should contain suitably folded hard copies of “As Built” drawings as well as electronic copies on clearly labelled CD-R disks. | | | A | |
| Architectural Input (Black Colour-Coded File) | a) Introduction and Location of works. b) Project Description: Detailed description of intent and built structure, JBCC PBA, project value, date of Practical Completion and latent defects period. c) Project directory: Names and contact details of all consultants, project manager, contractor, sub- contractors and suppliers. d) Health and Safety: Significant residual hazards and safety requirements. e) Drawing schedules: Listed and incorporated in file. f) Component schedules: doors, windows etc. g) Specifications, guarantees, warranties and maintenance contracts, BCM approvals. h) Priced Bill of Quantities. i) Certificate of Occupancy. | | | C | |
| | | | | E | |
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| Civil Engineer (Black Colour-Coded File) | a) Project Description: Detailed description of intent and built structure, JBCC PBA, project value, date of Practical Completion and latent defects period. b) Health and Safety: Significant residual hazards and safety requirements. c) Drawing schedules: Listed and incorporated in file. | M | | | |
| | | S | | | |

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| | d) Component schedules: doors, windows etc. e) Specifications, guarantees, warranties and maintenance contracts, BCM approvals. | | | |
| Structural Engineer(Black Colour-Coded File) | a) Project Description: Detailed description of intent and built structure, JBCC PBA, project value, date of Practical Completion and latent defects period. b) Health and Safety: Significant residual hazards and safety requirements. c) Drawing schedules: Listed and incorporated in file. d) Component schedules: doors, windows etc. e) Specifications, guarantees, warranties and maintenance contracts, BCM approvals. f) Engineers certificate. | | | |
| Electrical Engineer (Blue Colour-Coded File) | a) Project Description: Design intent and description of installation. b) Health and Safety: Simplistic guide to working with the installation safely. c) Drawing schedules: Listed and incorporated in file. d) Certificate of Compliance. e) Authorities certificates for all installations. f) Component schedules. g) Specifications and guarantees for each item of equipment where applicable. h) are Maintenance requirements and agreements, maintenance manuals etc. i) Emergency contact details. | | | |
| Mechanical Engineer (Green Colour-Coded File) | a) Project Description: Design intent and description of installation. b) Health and Safety: Simplistic guide to working with the installation safely. c) Drawing schedules: Listed and incorporated in file. d) Authorities certificates for all installations. e) Component schedules. f) Specifications and guarantees for each item of equipment where applicable. g) Maintenance requirements and agreements, maintenance manuals etc. h) Emergency contact details. | | | |
| Fire detection and prevention consultant (Red Colour-Coded File) | a) Project Description: Design intent and description of installation. b) Health and Safety: Simplistic guide to working with the installation safely. c) Drawing schedules: Listed and incorporated in file. d) Authorities certificates for all installations. e) Component schedules. f) Specifications and guarantees for each item of equipment where applicable. g) Maintenance requirements and agreements, maintenance manuals etc. h) Emergency contact details. | | | |
| 12.3 ELIDZ CAD and GIS Specification / Requirements | | | | |
| 12.3.1 CAD Record drawings a. CAD Record Drawings are to be provided in the following format: i. REVIT is to be used for all record drawings and disciplines. All coordinated services drawings are to be produced in this format and the file is to form part of the close out pack. The file ownership will have to be transferred to the ELIDZ. ii. Electronic format – dwg, dxf and pdf (each pdf drawing size to suit the scale shown on the drawing) formats. If the native file format of the CAD package utilized is not dxf or dwg, then the native file format is also to be included Note that the ELIDZ has been experiencing trouble in reading some dxf files provided from some CAD programs, and it would be appreciated if consultants could run all dxf drawings through AutoCAD to check that they actually contain legible information - when viewed in AutoCAD - prior to forwarding. Note also, that scanned PDF drawings, containing marked-up images but not containing vector information (as sometimes provided by contractors) are not an acceptable electronic format. b. Consultants using CAD programs which utilise plot style tables (or equivalent) are to provide all their plot style tables utilised on the project. c. Drawings require to contain information in separate layers, as per ELIDZ's GIS requirements and specification. Each layer is to be discreetly and individually accessible, and is to have a logical name, which easily defines its content. d. Attached is a listing of layers within the GIS system. Record drawing layers are to parallel these layers where relevant. e. Where possible, all rooms within buildings should have a unique number assigned to them (such numbers to be placed in a separate layer on the CAD drawing). All equipment subsequently provided in each room is to be linked to these unique room numbers. | | | A | |
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| 12.3.2 GIS Drawing Requirements Typically, engineers and other building professionals prepare as built/record drawings using CAD technology, primarily for presentation purposes. As long as the drawing looks correct when presented in this 2D format, little regard is often paid to how the drawing is structured. Because of this lack of structure within the CAD file as well as a lack of line congruency between features (such as valves along a pipe, or cables on either side of a Street light), the task of transforming this CAD data into GIS is a time-consuming exercise. In order to introduce standards and consistency into how the ELIDZ is provided with GIS data, this specification details the basic requirements of how such data is to be supplied to the ELIDZ. The requirements of this specification must not be confused with, or replaced by, the requirements relating to the provision of CAD record drawings as described above. a) Layout drawings only - For the purposes of GIS drawings, only layouts/plans require to be provided. Details, elevations, sections etc are not required to be provided for GIS purposes. b) The CAD file must be simplified into its simplest components i.e. no complex entities, library elements etc e.g. "explode objects" (AllvCAD). "drop complex" (MicroStation) and "explode" (AutoCAD) | | | A | |
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|---|-----------------------|--|
| <p>c) Line intersections: all line data must be properly intersected, with no dangles or overhangs or duplicate lines. All lines must intersect with zero tolerance. This includes line intersections through valves or other objects. Lines should meet perfectly at the centre of the object, ignoring the edge of the object circle or symbol.</p> <p>d) Text placement: text pertaining to data, for example the diameter or material type of a pipe, should be placed over the item to which it refers - rather than some distance away with an arrow pointing to the pipe.</p> <p>e) One drawing per service - For AutoCAD (or other CAD software) users that use "viewports" in the digital document, please save a separate .dwg file for each layout, as other software packages are not capable of reading more than one layout per digital document.</p> <p>f) One layer – only one service per layer. For example: all wastewater pipes should be placed in a layer called "wastewater pipes"; all electricity cables should be placed in a layer called "electricity cables", etc.</p> <p>g) Absolutely clean layers - there cannot be roads/north arrows/trees/contours/cables etc in a "sewer pipes" layer. The GIS operator will have to assume whatever is in the "sewer pipes" layer is indeed sewer pipes. In order to achieve such clean layers, it is recommended that the following procedure is adopted:</p> <ul style="list-style-type: none"> • Isolate each layer by turning all other layers off and see that there are no stray drawing elements or features that belong on other layers. • Erase those elements that do not belong on the layer, or cut and paste them into their proper layer. • Repeat for all the layers in the drawing. <p>(Note: layer 0 and "defpoints" are inherent in all CAD drawings. These layers cannot be deleted but should contain no objects.)</p> <p>h) Georeferenced - the CAD file is to be correctly referenced in real-world coordinates. To check that real-world coordinates have been used, when moving the mouse cursor cross the CAD file, coordinates should read something like: XY = 79,000, -3,660,000 The coordinate system to be used is a Transverse Mercator projection with central meridian of 27 and based on WGS84 datum. In other words, the ideal solution would be that CAD drawings should be geo-referenced.</p> <p>i) Coordinate marks - If the above is not possible then at least four coordinate marks (crosses with labels) must be provided on the drawing.</p> <p>j) When handing over CAD drawings/data the consultant should provide the following information (metadata):</p> <ul style="list-style-type: none"> • Title/Drawing number • Digital filename of CAD drawing (if different from hardcopy title/drawing number) Version/status/revision of CAD drawing (final version? Surveyed or planned?) A clear indication if it is an "as built" drawing. • Construction date of data displayed on CAD drawing (when were the services on the drawing finally constructed) This is NOT the drawing date. • Name of CAD operator/responsible/contact person if any further queries need to be made. <p>k) Data is to be supplied on compact disc (CD) or DVD. Each disc must be clearly labelled as to the project represented by the data, together with the relevant consultant's name.</p> | | |