

C3.8: PARTICULAR SPECIFICATION

C3.8: PARTICULAR SPECIFICATIONS
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MHLATHUZE WATER
CONTRACT NO MW/72/3/2022/2023/01

BIG 5 HLABISA LM – REFURBISHMENT AND AUGMENTATION OF WATER SUPPLY SCHEME IN WARD 8

C3.8.1 PARTICULAR SPECIFICATION: PA – DAYWORKS

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C3.8.1 PARTICULAR SPECIFICATION: PA DAYWORKS

PA 1 GENERAL

In cases where the Engineer orders any variation in the form, quality or quantity of the work or any extra work to such an extent that the tendered rates for specific items are no longer applicable, or where a combination of tendered rates cannot be applied to compensate for such work, the Engineer may, in terms of the General Conditions of Contract, order that the amended or extra work be carried out as daywork at the cost of labour, plant and materials. For that purpose, provision is made for the Contractor to tender his rates for labour and plant in the Daywork Schedule which forms part of this contract.

No work will be measured as daywork unless:

- (a) the Engineer agrees that the varied work is not in accordance with the specification or scope of a measured item in the contract;
- (b) the Engineer has issued an order in writing for the execution of such varied work; and
- (c) statements of plant and labour are submitted daily to the Engineer for his consideration and approval.

All work valued at the tendered rates in the Daywork Schedule will be subject to contract price adjustment as applicable to the Contract.

PA 2 SALARIES AND WAGES OF WORKMEN

The amount to be paid for labour will be based on the rates tendered in the Daywork Schedule for the workers executing the work. The tendered rates shall be all-inclusive and shall be held to cover all charges for the Contractor's profits, timekeeping, clerical work, insurance, establishment, superintendence, the use of hand tools, etc, and no additional surcharge over and above the tendered rates will be applicable.

PA 3 CONSTRUCTIONAL PLANT

The rates for constructional plant as tendered in the Daywork Schedule shall cover all costs, overheads and profit for the contractor and no further surcharge will be payable on the tendered rates. The cost of operators shall be included in the tendered rates except where otherwise specified in Clause PSAA 5 (Measurement and Payment) hereafter.

Where plant or equipment for which no rates exist in the Daywork Schedule are employed, the cost thereof shall be determined as agreed with the Engineer in terms of the General Conditions of Contract. In such case contract price adjustment will only be applicable if the agreed cost is based on rental rates at the time of the base month before closing of tenders, or if the ruling rates current at the time of the execution of the work are de-escalated to the base month.

The Contractor will be paid for the transport to and from the site of constructional plant not on site and specially ordered by the Engineer to be brought on site. No payment will be made for transport of equipment listed in the Contractor's Schedule of Constructional Plant in the tender document, or for equipment which has been removed from the site on request of the Contractor, or for equipment already on site, regardless of whether it appears on the Schedule of Constructional plant or not.

PA 4 MATERIALS

Materials required for daywork items which cannot be compensated under existing rates and have to be purchased, will be paid for at cost, excluding VAT, plus a surcharge of 15%. The cost of materials provided for daywork at current rates at the time when the work is executed, will not be subject to contract price adjustment unless the prices of the materials are de-escalated to the base month for escalation.

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PA 5: MEASUREMENT AND PAYMENT

	<u>Item</u>	<u>Unit</u>
PA 5.1	Labour	
(a)	Foreman	hour (hr)
(b)	Unskilled labourer	hour (hr)
(c)	Semi-skilled: pipelayer, section leader, survey assistant.....	hour (hr)
(d)	Skilled Artisan	hour (hr)
(e)	Surveyor including assistants and equipment	hour (hr)
	The unit of measurement is the hour or part thereof during which workers were engaged in daywork.	
	The tendered rate shall include full compensation for all salaries, wages, bonuses, pension, insurance, medical aid and other benefits as well as overheads arising from administrative personnel, site agents, supervisors, tools and profit. No surcharge will be paid on the tendered rates	
	The cost of operators included in the rates for constructional plant, will not be measured again under Labour.	
PA 5.2	Constructional Plant	
(a)	Lowbed transport of plant to and from the site	ton-kilometre (t.km)
	(i) (Specify power and mass)	hour (hr)
	(ii) etc. (for other graders)	hour (hr)
(b)	Front-end loaders	
	(i) (Specify type, power and mass).....	hour (hr)
	(ii) etc. (for other front-end loaders)	hour (hr)
(c)	Back-acting excavators	
	(i) (Specify type, power and mass).....	hour (hr)
	(ii) etc. (for other back-acting excavators)	hour (hr)
(d)	Tractors and drawn rollers and trailers	
	(i) Tractor (Specify type, power and mass)	hour (hr)
	(ii) Roller (Specify types, masses)	hour (hr)
	(iii) Tractor with trailer, complete (Specify tractor, and type and capacity of trailer)	hour (hr)
(e)	Compactors	
	(i) (Specify type and mass)	hour (hr)
	(ii) etc. (for other types and masses)	hour (hr)
(f)	Compressors	
	(i) (Specify capacity and number of tools)	hour (hr)
	(ii) etc. (for other compressors and tools)	hour (hr)
	<u>Item</u>	<u>Unit</u>
(g)	Trucks	

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- (i) (Specify type, and capacity) hour (hr)
 - (ii) etc. (for other trucks)..... hour (hr)
- (h) Light delivery vehicles
 - (i) (Specify load capacity)..... kilometre (km)
 - (ii) etc. (for other) kilometre (km)

The unit of measurement for sub-item 5.2(a) is the ton constructional equipment multiplied by the kilometre distance over which the plant has been transported with a lowbed transporter as ordered by the Engineer.

The unit of measurement for sub-items 5.2(b) to (i) is the hour or part thereof during which the item of plant had been in active use for the daywork operation, including stopping time of less than five minutes.

Where applicable travel time to and from the normal parking position on site, or the position of the most recent non-daywork activity, as well as stopping time exceeding five minutes shall be multiplied by a factor of 0,6. Time shall be measured by means of a vibrating clock card.

The unit of measurement for sub-item 5.2(j) is the kilometre travelled to collect or transport small quantities of materials. Kilometres travelled in light delivery vehicles by supervisors in the execution of normal supervisory duties, shall not be measured for payment.

The tendered rates shall include full compensation for the supply, maintenance, service, repairs, depreciation as well as fuel, lubricants, licensing, insurance, overheads and profit. It shall also include the cost of drivers and operators except in the case of sub-item PSAA 5.2(h) where the operators of tools are paid for under labour.

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C3.8.2 PARTICULAR SPECIFICATION: PB – PIPELINE VALVES

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C3.8.2 PARTICULAR SPECIFICATION: PA PIPELINE VALVES

Note: Project Specification PSL: Medium Pressure Pipelines

PB 1 SCOPE

This specification covers the material and constructional requirements for resilient seal, wedge gate, reflux, butterfly and air valves.

PB2 DEFINITIONS

Single small orifice air valve - A valve capable of releasing small accumulations of air at all pressures throughout the working pressure range of the pipeline.

Single large orifice air valve - A valve capable of admitting or expelling large quantities of air during emptying and filling of the pipeline.

Double orifice air valve - A valve capable of satisfactorily carrying out the functions of both a single small orifice air valve and a single large orifice air valve.

PB3 REQUIREMENTS

PB3.1 General

The types, sizes, end connections, pressure ranges and other details of the valves required are detailed on the specification data sheets. Offer data sheets are included to permit tenderers to offer variations to the specification to suit their standard products.

PB3.2 Materials, Workmanship and Construction

PB3.2.1 Wedge Gate Valves

Wedge Gate valves must comply with SABS 664 or SABS 191 as applicable for waterworks pattern valves.

Valves must also be provided with the following:

- a) Fully enclosed gearing, where necessary to limit the maximum torque to be applied at the handwheel spindle or cap top to 120 Nm under an unbalanced pressure equal to the maximum working pressure for the classes scheduled;
- b) The facility to permit re-packing of the gland whilst the valve is under working pressure.
- c) Stainless steel jacking/limiting screws for valves with a nominal bore greater than 600 mm and with metal gates.

PB3.2.2 Resilient Seal Valves (RSV's)

In addition to the requirements of 3.2.1 above, RSV's shall be provided with the following:

- a) Grade 304 stainless or EN57 steel spindles as scheduled.
- b) At least two nitrile rubber "O" sealing rings in a corrosion resistant housing, plus one nitrile rubber wiper ring to prevent the ingress of dirt.

PB3.2.3 Reflux Valves'

Single door reflux valves must be cast iron, spheroidal graphite (SG) iron or cast steel and comply with SANS 1551. Unless otherwise scheduled, gunmetal trim shall be provided for cast iron valves and stainless steel trim for cast steel valves.

Valves with a nominal bore greater than 600 mm must be of the double door or multi-door type and may be fitted with an integral bypass. In other respects they must be in accordance with the specifications for the single door type.

A suitable arrow indicating the flow direction through the valve shall be cast onto the body of the

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valve.

PB3.2.4 Butterfly Valves

The valves must comply with BS 5155 or BS 593 as applicable for tight shut off service for the types, classes and sizes listed in the "specification data sheets" or scheduled.

The basic materials for butterfly valves should be as follows:

Component		Class PN 10	Classes PN 16 + PN 25	Class PN 40
Body, disc handwheel	DN 350 to 600	Cast iron or SG Iron	S G Iron	Cast Steel
	DN over 600 mm	S G Iron	Cast Steel	
Seating Ring	a) Separate	Gun metal or stainless steel	Stainless steel	
	b) Integral	Hard chrome coated	Nylon Coated	
Shaft or stub shafts		Stainless Steel		
Bearings		Vesconite, PTFE coated or other approved self-lubricating non-metallic material		
Seal Clamp Rings		Bronze or stainless steel	Stainless steel	Stainless steel

The bottom of the disc must move in the flow direction when opening. The valve shall be droptight under the maximum pressure rating condition.

The face to face dimensions shall be as set out in BS 5155 or BS 593 as applicable for double flanged valves and for wafer valves.

A suitable arrow indicating the preferred flow direction through the valve, where such preference is applicable, shall be cast onto the body of the valve.

Unless otherwise scheduled a side mounted manual actuator shall be provided. The actuator shall be a separate unit bolted to the main valve body on the side designated in the data sheets when facing in the normal direction of flow. Water must not leak past the main shaft and enter the actuator. An indicator which shows the extent of opening of the valve disc must be fitted.

The designated power source for the operation of a power operated actuator is given in the data sheets. The actuator shall comply generally with AWWA C 504, and shall be capable of withstanding opening and closing torques at least 30% in excess of those necessary under the maximum working condition using the designated power source.

All actuators, whether power operated or not, shall be supplied complete with horizontal handwheel at a height that provides for reasonable operation in each situation shown on the drawings. The handwheel shall comply with the relevant requirements of SABS 664. The hand wheel must be mounted on a vertical shaft and must require not more than 120 Nm of input torque to operate against a maximum unbalanced head equal to the pressure rating of the valve.

All power operated actuators are to be fitted with 'Open' and 'Closed' limit switches and a 4 - 20 mA position transmitter.

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PB3.2.5 *Air Valves*

The materials and workmanship employed in the manufacture of air valves shall be at least equal to the standard required by SABS 664 for waterworks pattern valves.

Air Valves shall be fully stainless steel (including all flanges, bolts, nuts, studs etc), of the double orifice type, and shall be equal or similar to the "Vent-O-Mat" (RBX series) type in which a small orifice, manufactured from Grade 316 stainless steel and having a minimum orifice size of 2,0 mm diameter, shall be capable of releasing accumulations of air at all pressures throughout the specified working pressure range and shall be drop-tight at the specified minimum working pressure. The large orifice shall be suitable for admitting or expelling large quantities of air during emptying and filling of the pipeline. The opening of the valve (to atmosphere) shall be enclosed by a stainless steel mesh which has been fixed into the valve body to prevent the entry of small insects or vermin into the valve.

All welding of stainless steel shall be carried out in workshops dedicated to the fabrication of stainless steel products. Care shall be taken that the correct welding rods and approved welding procedures have been used for each application, and the Engineer shall have the right to request a certificate from the manufacturer in which the weld procedures used for the manufacture of valves supplied are stated.

All welds and weld beads, internal and external, shall be smoothed down by grinding and buffing. All stainless steel shall be pickled and passivated before the valve is assembled and tested.

PB3.2.6 *Altitude Valves*

The Level Control Valve shall shut off at pre-set reservoir high level and fully open in response to an approximately one meter level drop, as sensed by the 3-Way altitude pilot mounted on the main valve.

PB3.2.7 *Main Valve*

The main valve shall be a centre guided, diaphragm actuated globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path, with no stem guides, bearings, or supporting ribs. The body and cover shall be ductile iron. All external bolts, nuts, and studs shall be Duplex® coated. All valve components shall be accessible and serviceable without removing the valve from the pipeline.

PB3.2.8 *Actuator*

The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall be centre guided by a bearing in the separating partition. The replaceable radial seal shall include a resilient seal and shall be capable of accepting a V-Port Throttling Plug by bolting.

PB3.2.9 *Control System*

The control system shall consist of a 3-Way, altitude pilot valve with a covered, centred spring and 200 mm sensing diaphragm, (for 300mm and larger valves, an accelerator shall be added to the solenoid), an isolating cock valve, a 3-way cock valve, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested.

- a. The valve shall be of a type and manufacture approved by the Engineer.
- b. The valve shall be set up on site and commissioned by an experienced representative of the valve supplier.
- c. The valve shall be installed in a horizontal position.
- d. The valve shall have flanged ends to SABS Table 25 except when otherwise specified.

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- e. The valve shall be open and closed end tested in the factory to 1750 and 3500 kPa respectively and shall be drop tight.
- f. The interior faces of the valve shall be coated with an epoxy equal or superior to "Cupon Hicote 151E".
- g. The rates of opening and closing shall be slow enough as to prevent the pressure in the rising main rising more than 10m head (1 bar) above the operating pressure/head.
- h. The valve shall operate automatically and smoothly under all normal operating conditions and it shall not cavitate nor vibrate unduly.

PB3.3 Marking

In addition to the requirement of SANS 1551 regarding marking, all valves must be provided with an identification plate on which the following information shall be indelibly cast or embossed;

- a) The item or tag number;
- b) The size or nominal bore of the valve;
- c) The class or working pressure of the valve.

PB3.4 End Connections

End connections shall be flanged or screwed as scheduled.

- a) Flanges - Where flanged connections are specified the dimensions and drilling of the flanges must comply with SABS 1123 except where otherwise scheduled. The front faces of flanges must be flat and normal to the bore of the valve. The back of the flanges, bonnets etc must be flat and normal to the bore or be spot-faced over an area large enough to freely accommodate the washer and the nut.

Drilled holes for the passage of bolts must be provided where wafer type butterfly valves are scheduled.

Flange gaskets must be CPAF with a minimum thickness of 3 mm. Bolts must comply with SANS 1700. Washers must conform to SANS 1700. All ferrous nuts, bolts and washers must be galvanized to SABS 935.

- b) Screwed ends - Where screwed ends are specified the valve shall be threaded to BSP.

PB3.5 Drawings

The supplier shall provide two paper prints of fully dimensioned drawings for each type of valve and actuator when requested by the Engineer.

PB3.6 Mounting Feet

Valves with a nominal bore of 450 mm or greater must be provided with mounting feet where called for on the specification data sheets.

PB3.7 Lifting Eyes

A lifting eye at the top of the valve body shall be provided, where the combined mass of the valve bypasses and actuator exceeds 75 kg.

PB3.8 Protection prior to Installation

Valves shall be temporarily covered and protected against UV radiation at all times prior to installation.

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PB4 TESTING

PB4.1 Test Certificates

A test certificate shall be provided with each valve wherein it is certified that the valve has been inspected and tested and that it complies with the specification. An independent inspector may be appointed by the Employer to witness the testing, in such case the inspector must also sign the test certificate. The charges made by the independent inspector will be paid by the Employer.

At least three working days written notice must be given of the proposed date and time of the test. In the event that the valve(s) to be tested not being ready the Employer reserves the right to deduct any fruitless inspection costs from moneys due to the Contractor.

PB4.2 Test Requirements

Hydraulic tests shall be carried out at the factory on each valve as follows:

PB4.2.1 Gate Valves

In accordance with SABS 664 or SABS 191 (as applicable).

In addition to the test requirements in the applicable SABS specification all valves with a nominal bore greater than 450 mm shall be subjected to an open-end gate strength test of 1,5 times the working pressure. Drop tightness in respect of this gate strength test is not required.

PB4.2.2 Reflux Valves

In accordance with the requirements of SANS 1551 (as applicable) to the following pressures:

- | | |
|-------------------------------|--|
| a) Body with clack open- | 2,0 times class max working pressure |
| b) Door strength- | 2,0 times class max working pressure |
| c) Seating with doors closed- | 1,1 times class max working pressure, under which pressure the seat must be drop tight |

The door strength must be capable of withstanding the test pressure applied to the body without damage or distortion.

PB4.2.3 Butterfly Valves

Each valve is to be tested at the factory in accordance with the requirements of BS 5155.

PB4.2.4 Air Valves

Each valve is to be tested at the factory as follows:

- a) Body test - The valve shall be filled with water and a pressure equivalent to twice the maximum working pressure shall be applied for 5 minutes. There shall be no loss of water from the valve during the test.
- b) Low head leak test - Lower the pressure to 20 kPa and maintain the pressure for 5 minutes. There shall be no loss of water from the valve during the test
- c) Drop test - One valve taken at random from each batch of ten small orifice and double orifice air valves (or less) shall be subjected to a "drop test". The valve shall be filled with water and pressurised to above the working pressure. While maintaining the pressure at least 200 kPa above the specified working pressure air shall be injected into the inlet of the air valve. Reduce the pressure slowly. The small orifice must open and discharge the air at a pressure not lower than the specified working pressure.

PB5 CORROSION PROTECTION

The cleaning and corrosion protection of valves must be carried out at the factory prior to despatch to the Site. Non-ferrous metal or stainless-steel surfaces must not be painted. The protection to be applied must comply with one internal and one external systems from the following alternatives:

System 1 (Epoxy resin paint) - All cast iron surfaces of every valve, other than RSV's, must be prepared for painting to a thoroughly clean condition free of all grease and deleterious matter. Ferrous surfaces must be prepared in accordance with the Swedish Standard SIS 1971 to an Sa 3 finish. Surfaces must then be coated with a non-toxic epoxy resin paint to give a total minimum dry film thickness of 250µm to be pinhole free over the entire painted surface.

System 2 (Epoxy powder coating) - Electrostatically applied epoxy powder coating (ESPC), of the fully disassembled valves shall be carried out in accordance with SABS 1217 as may be modified by this specification. All RSV's are to be treated with this system.

All surfaces of the fully dis-assembled valve shall be blast cleaned to Sa 3 of Swedish Standard SIS 1971, having an angular profile of 40µm to 60µm.

The coating medium shall be an exterior grade, tinted, non-toxic and non-tainting, suitable for use with potable water and applied strictly in accordance with the manufacturer's instructions in a single application to a minimum film thickness of 300 µm. The coated surface shall be subjected to a standard MEK 50 double rub test. Particular attention shall be given to the thickness and integrity of the coating in the areas where the gate of the RSV is to operate. Low voltage, wet sponge EID detection of pinholes is to be conducted on all surfaces of the valve. A visual inspection, to be carried out by an experienced observer, shall reveal the finished coating to be smooth and glossy, free from excessive runs, sags, "orange peel" finish, occlusions and other visible defects.

The coating shall be subjected to a "hot water soak" adhesive test at the inspector's discretion, and no more than 15 mm disbondment from the point of the "V" (cut at a 30 degree angle) shall be permitted after immersing in water at 78°C for 48 hours, and testing adhesion after cooling to 25°C. Repairs shall be carried out using an approved repair system. (Hi-Cote" or similar approved).

System 3 (external only) - Apply multi coats of an approved epoxy coal tar paint to give a minimum total dry film thickness of 240µm. The paint shall be applied in accordance with the paint supplier's recommendation.

System 4 (external only) - Apply one coat of zinc chromate primer followed by one coat of undercoat tinted where necessary, and a final coat of best quality gloss enamel. The total dry film thickness of the system must be not less than 200µm.

After erection on site all valves must be cleaned and the paintwork refurbished where necessary to restore the condition to that pertaining at the time of leaving the factory.

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C3.8.3 PARTICULAR SPECIFICATION: PC – HDPE PIPES AND FITTINGS

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C3.8.3 PARTICULAR SPECIFICATION: PC – HDPE PIPES AND FITTINGS

Note: Project Specification PSL: Medium Pressure Pipelines

PC1 SCOPE

This specification outlines the requirements for the manufacture and installation of both solid wall and structured wall HDPE (High Density Polyethylene) pipes and fittings.

PC2 QUALITY ASSURANCE

It is the responsibility of the manufacturer/supplier to establish Quality Assurance by means of a contract review meeting and signed off QCPs which shall ensure that the product will meet the requirements of this specification. Records of each weld shall be completed on a welding record sheet. An example of a welding record sheet will be provided during construction.

The manufacturer/supplier shall maintain a quality system that conforms to the requirements of the SANS ISO 9001:2008 or national equivalent. Applicable standard for manufacture of pipe shall be SANS ISO 4427 for pressure pipe and SANS ISO 21138-2 for structured wall pipe.

PC2.1 Inspection

The Employer and/or the Engineer may appoint an inspection agency to carry out pre-delivery audits at the manufacturer's/supplier's works.

The manufacturer/supplier shall allow the inspectors access to his works for the purpose of inspecting either during the course of manufacture, or when completed, and shall afford the inspector all reasonable facilities.

Copies of all test schedules and manufacturer's quality control records shall be available for examination by the inspector and hence the Employer and/or the Engineer.

PC2.2 Documents to be submitted

The following documents are required:

Certificate of Registration – SANS ISO 9001:2008 or National Equivalent

Permit Certification – SANS 4427 for PE 100

Minutes of the Contract review meeting as well as the Quality Control Plan (QCP shall include Raw Material and Product Test Certificates)

SABS or National Equivalent Quality Systems Audit Reports – Last 2 Audits

PC2.3 Requirements

The finished goods shall at all times comply with the requirements of the applicable standards and the requirements of the contract review and signed off QCP – and shall be free from cracks, voids, foreign inclusions and other defects which could impair the overall performance. The finished goods shall be smooth walled inside and out and shall conform to the material requirements outlined below and shall be fit for purpose.

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PC3 MATERIALS

All pipe and fittings are to be PE-100, compliant to SANS ISO 4427 Part 1 otherwise specified. Pipe must be supplied from a SABS and ISO 9001 approved manufacturer and member in good standing with SAPPMA (South African Plastic Pipe Manufacturers Association).

<i>Pipe Characteristics</i>	<i>Applicable Standard</i>
Outer Diameter	ISO 11922-1 (Grade B)
Min Wall Thickness at any point	ISO 11922-1 (Grade U) – ISO 4065
Ovality	ISO 11922-1 (Grade N)

PC4 MARKING

All HDPE Pipes shall be indelibly marked at 1 metre intervals in accordance with the applicable SANS / ISO standard:

TRADE NAME	Manufacturer/Supplier Name
SPECIFICATION	SANS ISO 4427
PIPE OD	e.g. 200
PIPE OD TOLERANCE	Grade B
WALL THICKNESS	e.g. 51.4
NOMINAL PRESSURE	e.g. PN 12.5
MATERIAL DESIGNATION	PE 100
BATCH No.	Manufacturer/Supplier Trace ability
PROJECT NAME	BIG 5 HLABISA LM – REFURBISHMENT AND AUGMENTATION OF WATER SUPPLY SCHEME IN WARD 1, 2, 3 & 4

PC5 CONSTRUCTION

PC5.1 Welding Requirements

PC5.1.1 Applicable Standards

All pipes, fittings, welding processes and equipment are to comply with the relevant standards:

SANS 10270 - Welding of Thermoplastics – Approval of welding Procedures and Welds
SANS 10268-1 – Welding of Thermoplastics – Part 1: Heated Tool welding
SANS 10268-2 – Welding of Thermoplastics – Part 2: Electrofusion welding
SANS 10268-10 – Welding of Thermoplastics – Part 10: Weld defects
SANS 10269 – Welding of Thermoplastics – Testing and approval of welders
SANS 1671-1 – Welding of Thermoplastics – Machines and equipment – Part 1: Heated Tool Welding
SANS 1671-2 – Welding of Thermoplastics – Machines and equipment – Part 2: Electrofusion Welding
SANS 6269 – Welding of Thermoplastics – Test Methods for Welded Joints

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PC5.1.2 General Welding Requirements

Welding must take place in a dry and protect site. Suitable measures must be taken to protect the welding operation from adverse ambient conditions (rain, high humidity, wind). Ambient temperature must be recorded for each weld. . The welding machine and the supports of the pipes must be erected so that they cannot move in any direction during welding.

The contractor must apply for approval of welding procedures and welds in accordance with SANS 10270. The Welding Procedure Specification Qualification Report must be signed by the inspector with one copy handed to the Engineer. The Qualification file as described in Clause 9 of SANS 10270 must be handed to the client prior to commencement of any production / construction site welding activities.

Welding is to be carried out only by welders certified by the National approved training body (Thermoplastics Joining Committee – National Panel of Examiners). The operator's current and valid welding certificate must be presented to the Engineer before any welding commences.

PC5.1.3 Butt Fusion Welding

Butt Fusion Welding may only be used to join pipes of the same SDR (Standard Dimension Ratio).

Only automated, approved, and calibrated welding machinery will be permitted. A calibration certificate must be presented to the Engineer before any welding commences. Every welding machine shall be marked in accordance with Clause 4.7 of SANS 1671-1, with the following items:

- a) The manufacturer's name
- b) Type of welding machine
- c) Manufacture date
- d) Serial number of machine
- e) Safety information for the operation of the machinery

The welding machinery shall allow for control and adjustment of the various welding parameters in accordance with Clause 4.5 of SANS 1671-1.

Instructions for the safe and correct operation, maintenance, servicing and calibration of the welding machinery must be supplied and shall include, as a minimum, the items a) to e) in Clause 4.8. of SANS 1671-1.

Process reports for each weld with the information listed in items a) to m) of Clause 4.5.4.1 of SANS 1671-1 must be compiled and handed to the Engineer prior to commencement of any welding activities.

Heated tools shall comply with Clause 5.4 and the specific requirements of Clause 6 in SANS 1671-1. Surface coatings for heated tools are permitted to allow for easy cleaning with the exception of PTFE spray and galvanic coatings containing copper and cuprous material. The requirements of Clause 5.4.3 in SANS 1671-1 shall be adhered to should PTFE be used as a surface coating. The heating plate shall be cleaned with an appropriate non-oil based cleaning solvent using the method described in Clause 5.1 of SANS 10268-1.

Pipe joint ends shall be prepared using the method described in Clause 5.2 of SANS 10268-1. This includes proper alignment of the joint (maximum offset limited to 10% of pipe wall thickness), machine facing to ensure a smooth joint end and cleaning with an appropriate solvent such as isopropyl alcohol. All measures shall be taken to prevent contamination of the joint surface by grease, dirt and dust.

The Butt Welding jointing process shall comply with Clause 5.4 of SANS 10268-1. Should the pipe manufacturer's specification and instruction differ from Clause 5.4, the

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manufacturer's instructions shall apply.

PC5.1.4 Electrofusion Welding

Electrofusion welding may be used to join pipes of different SDR. Only automated, approved, and calibrated welding machinery is permitted. A calibration certificate shall be presented to the Engineer before any welding activities commence.

Only bar coded fittings and Electrofusion Control Units shall be used. The computerised printouts of the weld parameters and information for each weld shall be compiled and handed to the Engineer upon his/her request. Every welding machine shall be marked in accordance with Clause 8 of SANS 1671-2, with the following items:

- a) Manufacturers name
- b) Serial number of machine
- c) Type of machine
- d) Input and outlet volatages
- e) Frequency
- f) Insulation protection class (to SANS 60529) and
- g) Duty cycle

Instructions for the safe and correct operation, maintenance, servicing and calibration of the welding machinery must be supplied and shall include, as a minimum, the items a) to e) in Clause 9 of SANS 1671-2.

Joint surfaces must be prepared in accordance with Clause 6.1 of SANS 10268-2. The pipe must be cut square and all oxidation shall removed using a purpose made reaming/scraping tool, suitable for the outside diameter of the pipe to be reamed, immediately before welding. The external surfaces of the pipes to be joined and the inside surface of the electrofusion coupling shall be wiped clean with a suitable solvent such as isopropyl alcohol as described in Clause 6.1.4.2 of SANS 10268-2.

The manufacturer's instructions for the electrofusion welding process must be strictly adhered to and only approved, certified and calibrated machinery may be used. Welding is to be carried out only by welders certified under the Thermoplastics Welding Institute of South Africa (TWISA) or the Plastics Federation of South Africa.

The Electrofusion welding jointing process must comply with Clause 6.3 of SANS 10268-2. Should the pipe manufacturer's specification and instruction differ from Clause 6.3, the maufacturers instructions shall apply. All completed welds will be visually inspected and will be recorded on an appropriate weld defects check sheet in accordance with SANS 10268-10. Weld assessment Class III will be applicable

PC5.2 Fittings

PC5.2.1 Tees and Bends

Injection moulded fittings shall be used wherever possible. Where factory fabricated fittings are to be used for tees and bends their pressure class shall be de-rated in accordance with the appropriate standard. Injection moulded fittings are deemed to be fully rated and need not be derated as in the case of fabricated fittings.

PC5.2.2 Compression Fittings

Compression fittings may be used to join pipes with diameter size smaller than DN 110. Compression fittings shall comply with SABS 533 and shall conform to ISO 4427.

PC5.2.3 Mechanical Couplings

Mechanical couplings must be of the tension resisting type to counter the shortening of the pipe and resultant induced longitudinal stresses when pressurised due to Poisson

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effect and thermal contraction. External restraints must be provided for anchorage of the pipes to be joined, and specialist suppliers of pipes and fittings should be consulted for suitable jointing solutions.

The use of flexible couplings ("V.J couplings") is expressly prohibited under all conditions and circumstances.

PC5.2.4 Flanged Connections

Flanged connections comprise of butt welded HDPE stub flanges and steel backing rings which are bolted to other flanges. Bolts are to be numbered and tightened in a criss – cross pattern sequence. Bolt torque must be as per the guidelines of the supplier of the stubs. Bolts are to be re-torqued 24 to 48 hours after initial tightening in accordance with the manufacturer's specification to counteract reduced tension in the tie bolts resulting from visco-elastic relaxation of the HDPE material under stress thus maintaining sealing pressures and ensuring leak free joints. Gaskets are not required provided that the mating faces of the HDPE stub flanges have not been damaged.

PC6 TESTING

PC6.1 Raw Material Acceptance Tests:

The material used for the production of the pipes and fittings shall be a high-density polyethylene PE 100 complying to SANS ISO 4427 Part 1. To ascertain the quality of this product the following tests shall be performed, prior to manufacture of the pipes or fittings.

- Density
- Melt Flow Index
- Carbon Black Content
- Thermal Stability

PC6.2 Testing of Pipes:

Testing as contained in the SANS 4427:1996/ ISO 4427:1996 specification Part 1 and 2 will be used as guidelines. Tests shall also be conducted ad-hoc by a registered and authorised testing authority.

PC7 TESTING

PC7.1.1 Destructive Testing of Welds

The testing of welds shall comply with the requirements of SANS 6269 Edition 1.1.

The standard destructive tests described are as follows:

- Tensile test;
- Tensile-creep test; (not required –chemical high end applications only)
- Bend test; and
- Peel test (for electrofusion joints only).

PC7.1.2 Non-Destructive Testing of Welds

The testing of welds by non-destructive testing will be conducted by the Engineer's Representative on site and before any production weld is made by the contractor on site. The following procedure shall be followed:

- The Contractor shall not undertake any welding without the presence of Engineer's Representative;

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- The testing machinery shall be checked and approved by the Engineer's Representative before testing commences;

PC7.2 Pressure Testing

ISO 1167:1996, Thermoplastics pipes for the conveyance of fluids – Resistance to internal pressure – Test method.

PC7.2.1 Field Pressure Testing Procedure

The method described below describes the procedure to be followed for field pressure testing of HDPE pipe:

- Fill the pipe with water
- Bleed off any trapped air
- Over a period no longer than 10 minutes, increase the pressure at a constant rate to the specified field test pressure (the Field Test Pressure Horizon is shown on the small-scale long section drawing)
- Maintain the test pressure by continuous pumping for 10 minutes, then stop pumping
- Close the shut-off valve to the pipe and monitor the pressure for a period of 60 minutes. Inspect the pipe visually for leaks during this time.
- If the pressure has dropped more than 30% at the end of the 60 minute period, the pipe shall not have passed the pressure test. Continue to look for leaks and repair as necessary.
- If the pressure has dropped less than 30% at the end of the 60 minute period, rapidly decrease the pressure in the pipe by 2,0 bar (200 kPa) by releasing water from the pipe.
- Monitor the pressure for 60 minutes. If the pressure remains constant or increases during this time the pipe is deemed to have passed the pressure test.

If the pipeline does not pass the pressure test:

- Remove the test pressure
- Permit the test section to 'relax' for not less than 8 hours
- Repeat the above procedure.

PC8 PAYMENT

Payment will be in accordance with PSL8.

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C3.8.4 PARTICULAR SPECIFICATION: PD – DISINFECTION OF PIPELINES

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C3.8.4 PARTICULAR SPECIFICATION: PD - DISINFECTION OF PIPELINES

Note: Project Specification PSL: Medium Pressure Pipelines

PD1 INTRODUCTION

The price for testing and disinfecting pipelines and fittings is included in the scheduled items for supply and installation.

On completion of construction, after pressure testing and prior to commissioning the pipeline is to be disinfected by the contractor in accordance with this specification.

PD1.1 Scope of the Code of Practice

This Code of Practice relates to the disinfection of parts used for the disinfection of complete installations.

It includes the requirements for bacteriological sampling and dosage of disinfectants, dose rates of disinfectants, disposal of chlorinated water and quality standards for bacteriological samples.

PD1.2 Definitions

Within this document the term HYPOCHLORITE SOLUTION means a commercial solution of sodium hypochlorite containing 10% to 15% of available chlorine. Also, 10% HYPOCHLORITE SOLUTION means hypochlorite solution diluted one part in ten which thus has approximately 1% of available chlorine.

Within this document AVAILABLE CHLORINE and all chlorine concentrations means FREE CHLORINE available to the water environment for its disinfection.

'Water Supply Personnel' means any employee or contract or casual labour whose work includes, even temporarily, the performance of work concerned with partially or fully treated water and sources of underground water and who must possess a current certificate of medical suitability signed on behalf of the Authority.

PD1.3 Hygiene

Only 'Water Supply Personnel' may undertake the procedures laid out in this Code of Practice.

PD1.4 Safety

This Code of Practice does not cover the safety aspects of the construction or maintenance of installations or apparatus or of disinfection procedures.

Remember always that chlorinating agents are strongly corrosive so protect EYES AND HANDS especially.

PD2 GENERAL REQUIREMENTS FOR DISINFECTION OF POTABLE WATER APPARATUS

PD2.1 Components and Equipment

Clean all pipework components, equipment and tools used for repair and remove all grease or scale from components and equipment before use or assembly.

Where full chlorination and bacteriological testing is impractical, then disinfect all materials, components and equipment which could transmit contamination. Use a solution containing 1% of available chlorine (e.g. 10% chlorox or other commercial hypochlorite solution or 2% solution of bleaching powder. Contact time must exceed 20 minutes. Rinse or flush the equipment with mains water to prevent excessive corrosion.

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PD2.2 Completed Installations

Ensure that all water used for disinfection purposes has a free chlorine residual of at least 20 mg/l. Refer to section PD 4 and Tables 1 and 2 for volumes or dose rates.

During chlorination the pipeline shall be kept full of water.

Whenever possible keep the installation at normal operating pressure or greater during the contact period.

PD2.3 Portable Test Equipment

Portable test equipment which may be used in contact with potable water must be kept clean. Any equipment which is in uncertain condition or which is contaminated must be cleaned and disinfected before use.

PD 3 DISINFECTION OF MAINS

PD 3.1 New Mains

PD 3.1.1 Introduction

Do not connect any new main into supply until the water from designated sampling points, having stood in the main for at least 20 hours, has met the criteria specified herein.

New mains are laid with the intention of ensuring as far as possible, the exclusion of debris and contamination, but presume at the disinfection stage that debris and contamination does exist and that this debris is resistant to disinfection, e.g. compacted soil or detritus in joints.

The disinfection procedures, which should follow pressure testing, include:

- (a) swabbing and flushing of the main
- (b) soaking of the main for a minimum period of **20 hours**, using a minimum concentration of **20 mg/l** of available chlorine in mains water.
- (c) removal of excess chlorine by flushing the main

PD 3.1.2 Pressure Testing

Only use potable quality mains water for pressure testing new mains. Pressure testing normally follows the construction of each section of the pipeline but precedes final connection to supply. Do not rely on a single sluice valve to isolate the new main from the supply network, while the main is under pressure until disinfection and approval are complete.

PD 3.1.3 Swabbing and flushing

Swab all new mains after pressure testing and prior to disinfection.

After insertion of a soft foam swab, which has been soaked in 10% hypochlorite solution, recharge the pipeline at a rate less than 50 mm per second (3 m per minute) to ensure that the swab is not moved.

Open the inlet valve fully and drive the swab along the pipeline, at a velocity less than 0,5 m per second (30 m per minute), by controlling the valve at the discharge end.

When the swab reaches the discharge end of the pipeline, flush the main for at least 5 minutes to remove all excess chlorine and discoloured or dirty water. Where possible open inlet and outlet valves as fully as possible.

If the swab removes excessive amounts of debris then re-swab the main.

PD 3.1.4 Chlorination

Chlorinate all new mains to a minimum of 20 mg/ℓ available chlorine and leave to soak for a minimum of 20 hours, prior to flushing with mains water to a chlorine residual equal to that of the background level in the incoming mains water.

Tables in PD 4 show the required minimum dose rates and volumes.

To chlorinate sections of distribution main, less than about 50 m long not exceeding 150 mm in diameter, use a soft swab which has been soaked in 10% hypochlorite solution and proceed as follows: -

- Pour 1 litre of hypochlorite solution for each 1 m³ of pipeline, into the end of the pipe upstream of the final connection.
- Insert the swab into the end of the upstream pipe to retain the hypochlorite solution.
- Make the final connection.
- Drive the swab past the final connection and along the pipeline, but do not allow the swab to travel at a speed greater than 0,3 metres per second (20 m per minute).
- Remove the swab and flush the main for 25 minutes.
- Close up the main prior to soaking and sampling in accordance with section PD 3.1.6.

The volume of hypochlorite needed is shown in the following Table 1 (PD4.4)

PD 3.1.5 Sampling for Bacteriological Analysis

Once all pressure testing, swabbing and chlorination is complete, fill the main with clean mains water free from excessive chlorine.

Flush all hydrants, washouts and other outlets until the water is clean and free from excessive chlorine. Shut the valves and leave the main to soak for a minimum period of 20 hours.

First check with the laboratory staff to determine a suitable time for collection of samples and delivery of them to the laboratory for analysis.

Then pressurise the main and take samples for bacteriological analysis in accordance with the procedure given in section PD 3.1.6. Take these samples from sampling points agreed with the Engineer's Representative.

Deliver all samples to the laboratory as soon as possible. Analysis must start within six hours but store the samples in a refrigerator if the delay between taking the sample and the start of analysis is likely to exceed four hours.

Then isolate and leave the main until the results of analysis are available. In the event that the samples fail, flush the main and re-sample after a further soak period of at least 20 hours.

Repeat the above process until disinfection criteria have been satisfied.

The costs of all necessary testing are to be borne by the Contractor.

PD 3.1.6 Sampling Points

Sample points should consist of a ferrule connection, with a short length of polythene piping terminating in a ½" BSP gate valve or manual air valve. Protect this sampling outlet by suitable boxing. Attach a sampling standpipe to the gate valve, disinfect the apparatus with hypochlorite solution and then flame the bib tap outlet on the standpipe. Flush out all traces of hypochlorite, check that the residual chlorine level is not greater than the normal level in the incoming mains water.

At scour points and air valves, flush out all trace of hypochlorite, check that the residual chlorine level is not greater than the normal level in the incoming mains water, then take samples.

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PD 3.1.7 Temporary Cross Connections and Final Connections

Where a temporary cross connection supplies mains water to the new main, before making the final connection complete the disinfection procedure of the new main as set out above.

When the new main has been proved bacteriologically satisfactory the cross connection may be removed and isolated after suitable disinfection.

PD 4 DOSAGE OF CHLORINATING AGENTS

PD 4.1 Sodium Hypochlorite Solution

Bulk supplies of sodium hypochlorite solution (Chloros for instance), are supplied at 10 to 15% available chlorine. This fraction declines progressively as the hypochlorite decays to chloride, chlorate and oxygen. Assume in practice that there is only 10% available chlorine.

Assuming 10% available chlorine, and using mains water having a zero-chlorine demand, then the following values give estimates of the dilutions required.

- 10% hypochlorite solution (1 part hypochlorite solution in 10 parts solution) contains 10,000 mg available chlorine per litre of 10 kg available chlorine per cubic metre.
- 20 mg available chlorine per litre is equivalent to 200 ml of hypochlorite solution per cubic metre of water.
- 0,5 mg available chlorine per litre is equivalent to 5 ml of hypochlorite solution per cubic metre of water.

PD 4.2 Chlorine Gas

Chlorine gas, dosed into water by weight, is likely to be about 98% available chlorine. Therefore a direct measurement gives a reasonable estimate.

- Disinfection of replacement parts with chlorine gas is not a practicable possibility.
- 20 mg Chlorine gas (by weight) per litre for disinfection of complete installation is equivalent to 20 grams per cubic metre.
- 0,5 mg Chlorine gas (by weight) per litre of water is equivalent to 0,5 grams per cubic metre.

PD 4.3 Bleaching powder, granules and tablets

Bleaching powders, granules or tablets based on Calcium hypochlorite contains 50% to 70% of available chlorine by weight. These materials must be stored under dry conditions. During storage some available chlorine is lost. Follow the manufacturer's instructions particularly concerning the shelf life of the material and dose rate of the tablets.

For calculation purposes presume a maximum value of 50% available chlorine i.e. 1 gm of powder, granules etc in 1 litre of water provides 500 mg per litre available chlorine.

PD 4.4 Dose rates

Tables 1 and 2 provide estimates of the minimum dose rates of sodium hypochlorite solution, chlorine gas or bleaching powder, tablets or granules to achieve available chlorine levels of 20 mg per litre when dilute with mains water which has a zero-chlorine demand.

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Table 1 - dosage for 1,000 m of pipeline to give 20 mg available chlorine per litre

Pipe Diameter	Volume of 1000 m of pipeline	Weight of bleaching powder granules or tablets to give 20 mg/ℓ	Weight of chlorine to give 20 mg/ℓ	Volume of hypochlorite solution to give 20 mg/ℓ
mm	m ³	gm	gm	litres
50	1,9	80	40	0,4
75	4,4	180	90	0,8
100	7,9	320	160	1,5
150	17,7	700	350	3,5
200	31,4	1,260	630	6,2
250	49,1	2,000	980	9,7
300	70,7	2,800	1400	14,0
350	96,2	3,800	1900	19,0
400	125,6	5,000	2500	24,6
500	196,3	7,800	3900	38,4
600	282,6	11,200	5600	55,4

Table 2 - dose rates for 20 mg available chlorine per litre

Flow rate in pipeline*		Hypochlorite solution injection rate for 20 mg/ℓ		Chlorine injection rate for 20 mg/ℓ
litres/sec	m ³ /hr	litres/hr	mℓ/sec	gm/hour
1	3,6	0,7	0,2	72
2	7,2	1,4	0,4	144
3	10,8	2,2	0,6	216
4	14,4	2,9	0,8	288
5	18,0	3,6	1,0	360
6	21,6	4,3	1,2	430
7	25,2	5,0	1,4	500
8	28,8	5,8	1,6	576
9	32,4	6,5	1,8	650

* For flows greater than 9 litres/sec the dose rates can be calculated by multiplying by an appropriate factor of 10 e.g.

186 litres/sec = 100 + 80+ 6 litres/sec
hypochlorite solution = 70+ 58 + 4.3 = 132,3 litres/hr

PD 5 DISPOSAL OF CHLORINATED WATER

PD 5.1 Introduction

When the pipeline has passed all disinfection criteria it must be drained without causing hazard.

PD 5.2 Methods of Disposal

PD 5.2.1 Overland

Explore the possibility of soaking away disinfection water on adjacent land in rural situation.

PD 5.2.2 Foul sewers

Where disinfection water is discharged into a combined or foul sewer, no de-chlorination is normally necessary but in the former case take care that the rate of discharge of disinfection or flushing water avoids operation of storm sewage overflows and/or the creation of a hazardous

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atmosphere within the sewer.

PD 5.2.3 Watercourses

In rural areas where disinfection water is discharged to watercourses, either directly or through surface water drains, do not permit a free chlorine concentration in the receiving stream in excess of 0,1 mg/l about 50 metres downstream of the point of discharge. If the discharge is into a ditch, which is not a spawning ground or a nursery or a fishing stream, take advantage of that ditch to mop up chlorine provided that in a significant stream the earlier mentioned limit is not exceeded. In these circumstances use flush water to dilute the chlorinated water whenever possible. Avoid discharge of disinfection water to the head of a watercourse because this area is probably a spawning ground.

PD 5.2.4 Disposal of large volumes

When disposing of large volumes of disinfection water from very long lengths of new main, or in any cases of doubt, consult through the Engineer's Representative, the laboratory staff of the Employer.

PD 5.3 De-chlorination

There is no objection to the use of thiosulphate or sulphur dioxide as de-chlorination agents. In some cases, at least partial de-chlorination may be achieved by discharge over land. In all cases consult the Engineer's Representative.

PD 6 QUALITY STANDARDS AND REPORTING PROCEDURES

PD 6.1 New Mains

PD 6.1.1 Bacteriological Standards

No coliform organisms shall be detected in 100 ml of the sample.

The increase in the yeast agar plate count when compared with that of the incoming water shall generally be less than 50 and never more than 150 colonies per ml when incubated at 37°C for 24 hours.

PD 6.1.2 Procedure for Unsatisfactory Samples

Whenever even one E.Coli, or 5 or more coliforms per 100 ml are detected, re-chlorinate the main or serve reservoir. When E.Coli are not detected but the total coliform count is less than 5 per 100 ml flush and re-sample the main.

PD 6.1.3 Physical Standard

If the sample is unusually coloured, turbid or frothy flush the main until acceptable. If this condition is severe, re-sample the main but do not put into service until the samples have passed the required standards.

PD 6.2 Reporting Procedure

Records of disinfection are to be handed to the Engineer's Representative.

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C3.8.5 PARTICULAR SPECIFICATION: PE FENCING

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PE FENCING

PE 1 SECURITY FENCING (RAZOR MESH)

Security fencing shall be in accordance with the Drawings. Fencing shall meet the following specifications: -

- (1) Razor mesh to be 2,1 metres high and fabricated of razor wire with 2,5 mm HT galvanised core and 0,5 mm galvanised Z275 blade strip. Apertures of the mesh to be 150 mm across by 300 mm high welded at intersections.
- (2) Straining wire to comprise 4 strands of 4 mm diameter galvanised wire to SANS 675.
- (3) End, Corner, Gate and Straining Posts to be 100 mm dia x 3.0 mm thick tubular steel to SANS 657. Intermediate straining posts to be provided at intervals not exceeding 28 metres.
- (4) Intermediate posts to be 50 mm dia x 3.0 mm thick tubular steel to SANS 657 and spaced at not more than 3,5 metres apart.
- (5) All posts to be capped and supplied with T-bar welded to bottom end prior to galvanising.
- (6) Stays to be as specified for intermediate posts. Two stays each to be provided for all corner and intermediate straining posts. One stay shall be provided for each gate post.
- (7) Bolts shall be galvanised steel bolts of the required length and diameter, which shall not be less than 12mm. All the necessary bolts together with nuts and washers, shall be supplied with each post.
- (7) Binding wire for binding razor mesh to straining wire to be 1,6 mm diameter galvanised binding wire to SANS 675 spaced at 450 mm intervals on top and bottom straining wires and 960 mm intervals on centre wires.
- (8) Concrete foundations in Grade 20 concrete to be provided for all posts and stays as shown on the Drawings.
- (9) All prefabricated tubular posts and stays to be hot-dip galvanised to SANS 763 after manufacture.
- (10) Gates shall be of welded construction; framed of new 63 mm nominal diameter steel tube to SANS 657, neatly mitred at corners, suitably braced with new 38 mm nominal diameter steel tube to SANS 657, and designed to match the posts; the whole covered with razor mesh, complete with spacing wire ties to match the fencing in all respects; and complete with hinges, one drop bolt to each gate leaf and locking plates to permit of locking from inside and outside the fencing. Gate stops and drop bolt pipes shall be provided for both the open and closed position for each gate leaf, and these shall be suitably embedded in Grade 20 concrete. All gate frames and fittings shall be shotblasted and zinc sprayed to provide a minimum thickness of zinc of 50 microns.
- (11) The bottom of the razor mesh shall at no part be more than 25 mm above finished ground level. To achieve this, the Contractor shall first accurately smooth off the ground to ensure straight lines between straining posts. Any fill shall be thoroughly compacted for 1 metre on either side of the fence centre line.

PE 2 SECURITY FENCING (DIAMOND MESH)

Security fencing shall be in accordance with the Drawings. Fencing shall meet the following specifications: -

- (1) Diamond mesh to be 1,8 metres high and fabricated of heavy-duty galvanised wire of 2,5 mm diameter. Apertures of the mesh to be 63 mm across.

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- (2) Straining wire to comprise 4 strands of 4 mm diameter galvanised wire to SANS 675.
- (3) End, Corner, Gate and Straining Posts to be 100 mm dia x 3.0 mm thick tubular steel to SANS 657. Intermediate straining posts to be provided at intervals not exceeding 28 metres.
- (4) Intermediate posts to be 50 mm dia x 3.0 mm thick tubular steel to SANS 657 and spaced at not more than 3,5 metres apart.
- (5) All posts to be capped and supplied with T-bar welded to bottom end prior to galvanising.
- (6) Stays to be as specified for intermediate posts. Two stays each to be provided for all corner and intermediate straining posts. One stay shall be provided for each gate post.
- (7) Bolts shall be galvanised steel bolts of the required length and diameter, which shall not be less than 12mm. All the necessary bolts together with nuts and washers, shall be supplied with each post.
- (7) Binding wire for binding diamond mesh to straining wire to be 1,6 mm diameter galvanised binding wire to SANS 675 spaced at 450 mm intervals on top and bottom straining wires and 960 mm intervals on centre wires.
- (8) Concrete foundations in Grade 20 concrete to be provided for all posts and stays as shown on the Drawings.
- (9) All prefabricated tubular posts and stays to be hot-dip galvanised to SANS 763 after manufacture.
- (10) Flat wrap razor wire to be 500mm diameter coils and fabricated of razor wire with 2,5 mm HT galvanised core and 0,5 mm galvanised blade strip. Flat wrap coils to be tied at each coil onto the top diamond mesh straining wire and a single 4mm diameter galvanised straining wire tied onto the top of each fence post.
- (11) Gates shall be of welded construction; framed of new 63 mm nominal diameter steel tube to SANS 657, neatly mitred at corners, suitably braced with new 38 mm nominal diameter steel tube to SANS 657, and designed to match the posts; the whole covered with razor mesh, complete with spacing wire ties to match the fencing in all respects; and complete with hinges, one drop bolt to each gate leaf and locking plates to permit of locking from inside and outside the fencing. Gate stops and drop bolt pipes shall be provided for both the open and closed position for each gate leaf, and these shall be suitably embedded in Grade 20 concrete. All gate frames and fittings shall be shotblasted and zinc sprayed to provide a minimum thickness of zinc of 50 microns.
- (12) The bottom of the diamond mesh shall at no part be more than 25 mm above finished ground level. To achieve this, the Contractor shall first accurately smooth off the ground to ensure straight lines between straining posts. Any fill shall be thoroughly compacted for 1 metre on either side of the fence centre line.

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PE 3 SECURITY FENCING (WELD MESH)

Security fencing shall be in accordance with the Drawings. Fencing shall meet the following specifications: -

- (1) Weld mesh to be 1,8 metres high and fabricated of heavy-duty galvanised wire of 3,15 mm diameter to SANS 1024. Apertures of the mesh to be 50mm x 50mm.
- (2) Straining wire to comprise 4 strands of 4 mm diameter galvanised wire to SANS 675.
- (3) End, Corner, Gate and Straining Posts to be 100 mm dia x 3.0 mm thick tubular steel to SANS 657. Intermediate straining posts to be provided at intervals not exceeding 28 metres.
- (4) Intermediate posts to be 50 mm dia x 3.0 mm thick tubular steel to SANS 657 and spaced at not more than 3,5 metres apart.
- (5) All posts to be capped and supplied with T-bar welded to bottom end prior to galvanising.
- (6) Stays to be as specified for intermediate posts. Two stays each to be provided for all corner and intermediate straining posts. One stay shall be provided for each gate post.
- (7) Bolts shall be galvanised steel bolts of the required length and diameter, which shall not be less than 12mm. All the necessary bolts together with nuts and washers, shall be supplied with each post.
- (8) Binding wire for binding diamond mesh to straining wire to be 1,6 mm diameter galvanised binding wire to SANS 675 spaced at 450 mm intervals on top and bottom straining wires and 960 mm intervals on centre wires.
- (9) Concrete foundations in Grade 20 concrete to be provided for all posts and stays as shown on the Drawings.
- (10) All prefabricated tubular posts and stays to be hot-dip galvanised to SANS 763 after manufacture.
- (11) Flat wrap razor wire to be 500mm diameter coils and fabricated of 2,5mm diameter spring steel wire heavy galvanised core and 0,5 mm galvanised blade strip. Flat wrap coils to be tied at each coil onto the top diamond mesh straining wire and a single 4mm diameter galvanised straining wire tied onto the top of each fence post.
- (12) Gates shall be of welded construction; framed of new 63 mm nominal diameter steel tube to BS 1387 Class A, neatly mitred at corners, suitably braced with new 38 mm nominal diameter steel tube to BS 1387 Class A, and designed to match the posts; the whole covered with razor mesh, complete with spacing wire ties to match the fencing in all respects; and complete with hinges, one drop bolt to each gate leaf and locking plates to permit of locking from inside and outside the fencing. Gate stops and drop bolt pipes shall be provided for both the open and closed position for each gate leaf, and these shall be suitably embedded in Grade 20 concrete. All gate frames and fittings shall be shotblasted and zinc sprayed to provide a minimum thickness of zinc of 50 microns.
- (13) The bottom of the diamond mesh shall at no part be more than 25 mm above finished ground level. To achieve this, the Contractor shall first accurately smooth off the ground to ensure straight lines between straining posts. Any fill shall be thoroughly compacted for 1 metre on either side of the fence centre line.

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PE 4 DEMARCATION FENCING

Demarcation fencing shall be in accordance with the Drawings. Fencing shall meet the following specifications: -

- (1) Barbed wire to be double strand galvanised 2.5mm diameter line wires with barbs at 150mm spacing and a breaking strain of 3.5kN.
- (2) End, Corner, Gate and Straining Posts to be 100/125 mm diameter treated timber. Intermediate posts to be provided at intervals not exceeding 20 metres.
- (3) Droppers to be standard steel 1.4m long and spaced at not more than 3,5 metres apart.
- (4) Barbed wire to be fastened to poles by galvanised fencing staples fixed at 45 degrees over wires.
- (5) Binding wire for binding barbed wire to droppers to be 1,6 mm diameter galvanised binding wire to SANS 675.
- (6) Poles to be placed in holes and backfilled with well compacted “soil crete”.
- (7) Gates shall be of welded construction; framed of new 40 mm nominal bore steel tube to SANS 657, neatly mitred at corners, suitably braced with new 25 mm nominal bore steel tube to SANS 657, and designed to match the posts; the whole covered with hinged joint square aperture fencing, complete with spacing wire ties to match the fencing in all respects; and complete with hinges, chain and locking clamp to permit of locking from inside and outside the fencing. All gate frames and fittings shall be shotblasted and zinc sprayed to provide a minimum thickness of zinc of 50 microns.

PE 5 LIVESTOCK FENCING (ON TIMBER POLES)

Livestock fencing shall be in accordance with the Drawings. Fencing shall meet the following specifications: -

- (1) Hinged joint mesh with square apertures to be nominal 1.2 metres high and fabricated of galvanised wire with horizontal galvanised line wires at nominal 150mm spacing and with vertical wires at 150 mm spacing.
- (2) Fencing to be strained as a whole by means of a suitable clamp and wire strainer.
- (3) Barbed wire to be double strand galvanised 2.5mm diameter line wires with barbs at 150mm spacing and a breaking strain of 3.5kN.
- (4) Intermediate poles to be treated timber 2.7m long and spaced at not more than 5 metres apart.
- (5) Fence to be fastened to poles by galvanised fencing staples fixed at 45 degrees over wires.
- (6) Poles to be placed in holes and backfilled with well compacted “soil crete”.
- (7) Gates shall be of welded construction; framed of new 40 mm nominal bore steel tube to SANS 657, neatly mitred at corners, suitably braced with new 25 mm nominal bore steel tube to SANS 657, and designed to match the posts; the whole covered with hinged joint square aperture fencing, complete with spacing wire ties to match the fencing in all respects; and complete with hinges, chain and locking clamp to permit of locking from inside and outside the fencing. All gate frames and fittings shall be shotblasted and zinc sprayed to provide a minimum thickness of zinc of 50 microns.
- (8) The bottom of the fence shall at no part be more than 25 mm above finished ground level. To achieve this, the Contractor shall first accurately smooth off the ground to ensure straight lines between straining posts. Any fill shall be thoroughly compacted for

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1 metre on either side of the fence centre line.

PE 6 LIVESTOCK FENCING (ON STEEL POLES)

Livestock fencing shall be in accordance with the Drawings. Fencing shall meet the following specifications: -

- (1) Hinged joint mesh with square apertures to be nominal 1.2 metres high and fabricated of galvanised wire with horizontal galvanised line wires at nominal 150mm spacing and with vertical wires at 150 mm spacing.
- (2) Fencing to be strained as a whole by means of a suitable clamp and wire strainer.
- (3) Barbed wire to be double strand galvanised 2.5mm diameter line wires with barbs at 150mm spacing and a breaking strain of 3.5kN.
- (4) End, Corner, Gate and Straining Posts to be 100 mm diameter x 3.0 mm thick tubular steel to SANS 657.
- (5) All posts to be capped and supplied with T-bar welded to bottom end prior to galvanising.
- (6) Stays to be 50 mm diameter x 3.0 mm thick tubular steel to SANS 657. Two stays each to be provided for all corner and intermediate straining posts. One stay shall be provided for each gate post.
- (7) All standards to be Y profile of 2.5kg/m.
- (8) Binding wire for binding hinge mesh to straining wire to be 1,6 mm diameter galvanised binding wire to SANS 675 spaced at 450 mm intervals on top and bottom straining wires and 960 mm intervals on centre wires.
- (9) Concrete foundations in Grade 15 concrete to be provided for all posts and stays as shown on the Drawings.
- (10) All prefabricated tubular posts and stays to be hot-dip galvanised to SANS 763 after manufacture.
- (11) Gates shall be of welded construction; framed of new 40 mm nominal bore steel tube to SANS 657, neatly mitred at corners, suitably braced with new 25 mm nominal bore steel tube to SANS 657, and designed to match the posts; the whole covered with hinged joint square aperture fencing, complete with spacing wire ties to match the fencing in all respects; and complete with hinges, chain and locking clamp to permit of locking from inside and outside the fencing. All gate frames and fittings shall be shotblasted and zinc sprayed to provide a minimum thickness of zinc of 50 microns.
- (12) The bottom of the fence shall at no part be more than 25 mm above finished ground level. To achieve this, the Contractor shall first accurately smooth off the ground to ensure straight lines between straining posts. Any fill shall be thoroughly compacted for 1 metre on either side of the fence centre line.

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3.8.6 PARTICULAR SPECIFICATION: PF – CONSTRUCTION HEALTH AND SAFETY SPECIFICATION

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C3.8.6 PARTICULAR SPECIFICATION: PF CONSTRUCTION HEALTH AND SAFETY SPECIFICATION

PF 1 PREAMBLE:

PF 1.1 General Statement

This specification has an objective to ensure that Principal Contractor and Contractor(s) entering into a contract with the Client, to achieve an acceptable level of health and safety performance. These contracts will be for the **BIG 5 HLABISA LM – REFURBISHMENT AND AUGMENTATION OF WATER SUPPLY SCHEME IN WARD 1, 2, 3 & 4**

This document forms an integral part of the (main) contract, and the Principal Contractor must make it part of their contract with their contractors and suppliers.

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to direct all his activities in such a manner that his employees and any other persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety (OHS) Act 85 of 1993 and the Construction Regulations 2014 issued on 07 February 2014. The Contractor is to complete form **Annexure 3** (Appointment of the contractor in accordance with CR 5(1)(k) and **Annexure 3** (OHS ACT Section 37.2 agreement)

For the purpose of this contract the Contractor is required to confirm his status as mandatory to the Employer (Client) and employer in his own right for the execution of the contract, and he shall enter into an agreement in respect of the Occupational Health and Safety Act in the form as included in **Annexure 3**

If the Client is engaging the services of the Client Agent Safety Officer such Agent will be subject to approval by the Employer. The Client Agent Safety Officer shall comply with requirements of **Annexure 2** and forward the report to Client.

PF 1.2 Health and Safety Specifications and Plans to be submitted at Tender Stage

(a) Employer's Health and Safety Specification

The Employer's Health and Safety Specification will be included in the tender documents as part of the Project Specifications.

The Site Specific Health and Safety Specifications are included on the CD attached to the inside back cover of the tender document. If any discrepancy or conflict is found between this Particular Specification (PF) and the Site Specific Specification, the Site Specific Specification shall prevail.

(b) Tenderer's Health and Safety Plan

The Tenderer shall submit with his tender sufficient proof that he has a Health and Safety Plan in place. The Contractor will, however, have to submit his Health and Safety Plan on request by the Client during the tender evaluation stage.

In terms of the OHS Act the tender will be disqualified if the tenderer has no Health and Safety Plan.

The Contractor's Health and Safety Plan will be subject to approval by **Occupational Health & Safety Agent**, or amendment if necessary, before commencement of construction work. The Contractor will not be allowed to commence work, or his work will be suspended if he had already commenced work, before he has obtained the **Occupational Health & Safety Agent** written approval of his Health and Safety Plan.

The Contractor shall not be entitled to claim for extension of time or standing time and the related costs for any delays due to delayed commencement or suspension of the work arising from the lack of approval of or non-compliance with the Health and Safety Plan.

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OCCUPATIONAL HEALTH AND SAFETY ACT 1993 : HEALTH AND SAFETY SPECIFICATION

PF 2 SCOPE

This specification covers the health and safety requirements to be fulfilled by the Contractor to ensure a continued safe and healthy environment for all workers, employees and subcontractors under his control, and for all other persons entering the site of works.

This specification shall be read with the Occupational Health and Safety Act No 85 of 1993, and the corresponding Construction Regulations 2014, and all other safety codes and specifications referred to in the said Construction Regulations.

In terms of the OHS Act Agreement in **Annexure 3**, the status of the Contractor as mandatory to the Employer (Client) is that of an employer in his own right, responsible to comply with all provisions of OHS Act 1993 and the Construction Regulations 2014.

This Health and Safety Specification and the Contractor's own Safety Plan as well as the Construction Regulations 2014, shall be kept on site and made available for inspection by all employees, inspectors, Client Safety Practitioner and any other persons entering the site of works.

PF 3 DEFINITIONS

For the purpose of this contract the following shall apply:

- (a) "Employer" where used in the contract documents and in this specification, means the Employer as defined in the General Conditions of Contract and it shall have the exact same meaning as "Client" as defined in the Construction Regulations 2014. "Employer" and "Client" is therefore interchangeable and shall be read in the context of the relevant document.
- (b) "Contractor", wherever used in the contract documents and in this specification, shall have the same meaning as "Contractor" as defined in the General Conditions of Contract.

In this specification the terms "Principal Contractor" and "Contractor" are replaced with "Contractor" and "Subcontractor" respectively.

For the purpose of this contract the "Contractor" will, in terms of OHS Act 1993, be the mandatory of the Employer, without derogating from his status as an employer in his own right.

- (c) "Engineer/Designer" where used in this specification, means the Engineer as defined in the General Conditions of Contract. In terms of the Construction Regulations the Engineer may act as agent on behalf of the Employer (the Client as defined in the Construction Regulations).
- (d) "Construction Manager" means the competent person responsible for the management of physical construction processes and coordination, administration and management of resources on the construction site.

PF 4 PROJECT DESCRIPTION

The work to be carried out under this contract is as described in the UMkhanyakude Municipality bill of quantity tender document in terms of Project description, location and scope of work.

PF 4.1 TENDERS

The Contractor shall make available the following during the tender evaluation:

- (a) A documented Health and Safety Plan as stipulated in Regulation 7(1) (a) of the Construction Regulations. The Health & Safety Plan must be based on the Construction Regulations 2014 and Health and Safety Specification. Health and Safety Plan will be subject to approval by Occupational Health & Safety Agent (**See annexure 4**)
- (b) A declaration to the effect that he has the competence and necessary resources to carry out the work safely in compliance with the Construction Regulations 2014.

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- (c) The Contractor shall make a provision on the tender documents that the cost for health and safety is covered.

Failure to submit the foregoing with his tender or during tender evaluation, will lead to the conclusion that the Contractor is not able to carry out the work under the contract safely in accordance with the Construction Regulations and will result in his tender being disqualified.

PF 5 NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION WORK AND CONSTRUCTION WORK PERMIT

PF 5.1 NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION WORK

After award of the contract, but before commencement of construction work, the Contractor shall, in terms of Regulation 4, notify the Provincial Director of the Department of Labour in writing at least 7 days before the work is carried out, if the following work is involved:

- (a) the demolition of structure
- (b) the use of explosives;
- (c) excavation work
- (d) working at a height where there is a risk falling.
- (e) construction of single storey dwelling for a Client who is going to reside in such dwelling upon completion

The notification must be done in the form of the pro forma included in Annexure 2 of Construction Regulation 2014.

A copy of the notification form must be kept on site, available for inspection by inspectors, Employer, Engineer, employees and persons on site (**refer to Annexure 5**).

PF 5.2 CONSTRUCTION WORK PERMIT

A Client who intends to have construction work carried out, must at least 30 days before that work is to be carried out apply to the Provincial Director of the Department of Labour in writing for a construction work permit to perform construction work if the intended construction work will:

- (a) exceed 180 days
- (b) will involve more than 1800 person days of construction work, or
- (c) the works contract is of a value equal to or exceeding 13 million rand or CIDB grading level 6

The following documents shall be submitted to Provincial Director of the Department of Labour in order to obtain a Construction Work Permit:

- (a) Client Baseline Risk Assessment issued by Occupational Health Agent
- (b) Client Health and Safety Specification issued by Occupational Health and Safety Unit
- (c) Contractor's Health and Safety Plan
- (d) Contractor's Letter of Good Standing with Compensation Commissioner

The provisions of Regulation 3 of the Construction Regulations shall be followed in every detail

An application contemplated in sub regulation 1 must be done in the form similar to Annexure 1 of Construction Regulation 2014.

A copy of the work permit must be kept on site, available for inspection by inspectors, Employer, Engineer, employees and persons on site.

PF6 GUIDELINES FOR THE DEVELOPMENT OF A HEALTH AND SAFETY PLAN

PF 6.1 Project Background

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In terms of the Construction Regulations Regulation 5 (1)(b) of the Occupational Health and Safety Act, No 85 of 1993, the Client is required to compile an Occupational Health and Safety specification for each of its projects and the Contractor, appointed by the Client in terms of Regulation 5 (1) (k), is required to prepare an Occupational Health and Safety Plan. This plan has to be prepared in terms of Regulation 7 (1)(a). In terms of Regulation and 5 (1) (L), the Occupational Health & Safety Agent and the Contractor are required to agree on the Health and Safety Plan before any work may commence.

PF 6.2 Framework for an Occupational Health and Safety Plan

PF6.2.1 Introduction

The Contractor shall demonstrate to the Occupational Health & Safety AGENT that he has a suitable and sufficiently documented Health and Safety Plan as well as the necessary competencies, experience and resources to perform the construction work safely. The Contractor could be required to submit the following documentation for perusal and verification by the Client:-

- Management Structure
- Environmental Management Plan
- Health and Safety Competencies
- "Letter of good standing" with the Compensation Commissioner or licensed compensation insurer.
- Induction programme
- Incident Management Procedure
- Medical Surveillance Plan

PF 6.2.2 Contents of an Occupational Health and Safety Plan

The Occupational Health and Safety Plan shall include the following: -

PF 6.2.2.1 Occupational Health and Safety Management Programme

- Management of Occupational Health and Safety risks
- Occupational Health and Safety Organogram structures and appointments
- Programme of Occupational Health and Safety inspections
- Occupational Health and Safety Representatives
- Occupational Health and Safety committee

PF 6.2.2.2 Communication and Management of the Work

- Management structure and responsibilities
- Occupational Health and Safety objectives for the project and arrangements for monitoring and review of Occupational Health and Safety performance
- Regular liaison between parties on site
- Consultation with the workforce
- The exchange of design information between the Client, Engineer, supervisors and subcontractors on site
- Handling design changes during the project
- Selection and control of subcontractors
- The exchange of Occupational Health and Safety information between all subcontractors

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- Security
- Site induction and onsite training
- Facilities and first-aid
- The reporting and investigation of accidents and incidents
- The production and approval of risk assessments and method statements
- Site Occupational Health and Safety rules
- Fire and emergency procedures
- Reporting to the Client i.e. results of Occupational Health and Safety inspections, incident and incident investigations and committee meetings
- Reporting of incidents to the Department of Labour and Compensation insurer where appropriate

PF 6.2.2.3 Arrangements for Controlling Significant Site Risks

The following are some examples requiring arrangements for controlling the most significant site risks: -

Safety risks

- Services, including temporary electrical installations
- Preventing employees from falling into excavations, from trucks etc.
- Work with, on or near fragile materials
- Control of lifting operations
- The maintenance of plant and equipment
- Poor ground conditions
- Traffic routes and segregation of vehicles and pedestrians
- Storage of hazardous materials
- Dealing with existing unstable structures/land
- Accommodating adjacent land use
- Other significant safety risks as and when identified

Health risks

- Storage and use of hazardous chemical substances
- Dealing with contaminated land or material
- Manual handling
- Reducing noise and vibration
- Provision of adequate lighting
- Ventilation considerations
- Extreme heat and cold temperature considerations
- Dealing with HIV/Aids and other illnesses
- Provision of and maintaining ablution and eating facilities

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- Other significant health risks as and when identified

PF 7 HEALTH AND SAFETY FILE

The Contractor shall in terms of Construction Regulation 7(1)(b) maintain a Health and Safety File on site at all times. The Health and Safety File is a file or other permanent record containing information on aspects of the construction project - which will be necessary to ensure the health and safety of any person who may be affected by the construction work. The Contractor shall appoint a suitably qualified person who is registered with Statutory Body to prepare the Health and Safety File and to keep it up to date for the duration of the contract. The Health and Safety file shall include the following information: -

- Notification of Construction Work (Construction Regulation 4.) (Annexure 2)
- Application for Construction Work Permit in terms of Construction Regulation 3 (Annexure 1)
- Copy of OH&S Act (updated) (General Administrative Regulation 4.)
- Proof of Registration and good standing with a COID Insurer (Construction Regulation 7 (1)(c)(iv))
- Copy of health and safety plan (construction regulation 7 (1)(a))
- OH&S Programme agreed with Client including the underpinning Risk Assessment and Method Statements (Construction regulation 9 (1))
- Designs/drawings (Construction Regulation 6 (1))
- A list of Contractors (Subcontractors) including copies of the agreements between the parties and the type of work being done by each Contractor (Construction Regulation 7(1)(f))
- All Appointments/Designations forms required by the OHS ACT and Regulations.
- Registers as follows:
 - OH&S Representatives Inspection Register
 - Temporal Works
 - Excavations Inspection registers
 - Lifting Equipment registers
 - Demolition Inspections
 - Designer's Inspection of Structures Record
 - Bulk mixing plant Inspections
 - Arc & Gas Welding & Flame Cutting Equipment Inspections
 - Construction Vehicles & Mobile Plant Inspections
 - Electrical Installation and Machinery Inspections
 - Fire Equipment Inspection & Maintenance
 - First Aid register
 - Hazardous Chemical Substances
 - Lifting Tackle and Equipment Inspections
 - Inspection of Cranes
 - Inspection of Ladders

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- Inspection of Pressure Equipment
- Machinery Inspections
- Drivers/Operators of Mobile Plant/Construction Vehicles Daily Inspections
- Accident/Incident Register

The Health & Safety File shall be handed over to the Client on completion of the contract. It must contain all the documentation handed to the Contractor by any subcontractors together with a record of all drawings, designs, materials used and other similar information concerning the completed project.

PF 8 RISK ASSESSMENT

Before commencement of any construction work during the construction period, the Contractor shall have a risk assessment performed and recorded in writing by a competent person. (Refer Regulation 9 of the Construction Regulations 2014).

Risk is a measure of the likelihood that the harm from a particular hazard will be realized, taking into account the possible severity of the harm. Harm to people includes death, injury (permanent or temporary), physical or mental health or any combination thereof. Risk management in health and safety includes the identification of hazards, assessing risks, taking action to eliminate or reduce the risk, monitoring the effectiveness and performing regular reviews of the entire process. The Contractor shall compile method statements or Written Safe Working Procedures to address or handle the following:

- Hazards particulars to contract
- Identify what could go wrong and how
- Identify the likelihood of this happening
- Identify the persons at risk
- Identify the extent of possible harm
- Measures to eliminate or reduce each risk
- A monitoring plan
- A review plan

Contractors must ensure that all subcontractors conduct risk assessments for their scope of work as well.

The risk assessment shall identify and evaluate the risks and hazards that may be expected during the execution of the work under the contract, and it shall include a documented plan of safe work procedures to mitigate, reduce or control the risks and hazards identified.

The risk assessment shall be available on site for inspection by inspectors, Employer, Engineer, subcontractors, employees, trade unions and health and safety committee members, and must be monitored and reviewed periodically by the Contractor.

PF 9 APPOINTMENT OF EMPLOYEES AND SUBCONTRACTORS

Health and Safety Plan

The Contractor shall appoint his employees and any subcontractors to be employed on the contract, in writing, and he shall provide them with a copy of his documented Health and Safety Plan, or relevant sections thereof. The Contractor shall ensure that all subcontractors and employees are committed to the implementation of his Safety Plan.

PF 9.1 Health and Safety Induction Training

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The Contractor shall ensure that all employees under his control, including subcontractors and their employees, undergo a health and safety induction training course by a competent person before commencement of construction work. No visitor or other person shall be allowed or permitted to enter the site of the works unless such person has undergone health and safety training pertaining to hazards prevalent on site.

The Contractor shall ensure that every employee or visitor on site shall at all times be in possession of proof of the health and safety induction training issued by a competent person prior to commencement of construction work.

PF 9.2 OH&S Training Requirements

(As required by the Construction Regulations and as indicated by the OH&S Specification and the Risk Assessment/s):

- General Induction (Section 8 of the Act)
- Site/Job Specific Induction (also visitors) (Sections 8 & 9 of the Act)
- Construction Manager
- Construction Supervisor
- OH&S Representatives (Section 18 (3) of the Act)
- Training of the Appointees
- Operation of Cranes (Driven Machinery Regulations 18 (11))
- Operators and Drivers of Construction Vehicles & Mobile Plant (Construction Regulation 23).
- Basic Fire Prevention & Protection (Environmental Regulations 9 and Construction Regulation 29)
- Basic First Aid (General Safety Regulations 3)
- Storekeeping Methods & Safe Stacking (Construction Regulation 28)
- Emergency, Security and Fire Co-ordinator

PF 10 APPOINTMENT OF SAFETY PERSONNEL

PF 10.1 Construction Manager

The Contractor must in writing appoint one full-time competent person as the Construction Manager with the duty of managing all the construction work on the single site, including the duty of ensuring the compliance of health and safety, and in the absent of Construction Manager and alternate must be appointed by Contractor.

The Contractor may also have to appoint one or more competent employees to assist the construction manager where justified by the scope and complexity of the works.

PF 10.2 Construction Supervisor

The Construction Manager shall appoint a full-time Construction Supervisor with the duty of supervising the performance of the construction work.

The Construction Manager may also have to appoint one or more competent employees to assist the construction supervisor where justified by the scope and complexity of the works

PF 10.3 Construction Safety Officer or Client Safety Consultant

Subject to the decision by the Inspector of the Department of Labour and taking into consideration the size of the project and the hazards or dangers that can be expected, the Contractor shall

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appoint in writing a full-time or part-time Construction Safety Officer. The appointed Safety Officer shall be registered with a Statutory Body (SACPCMP).

If the Client decided to engage an external Safety Consultant, the Client must first check with Occupational Health and Safety Unit to determine the capacity to handle the proposed project, the Safety Consultant will be appointed by the Client and approved by Client terms of his/her qualifications and experience in the field of Construction.

Provision will be made in the schedule of quantities to cover the cost of a dedicated Construction Safety Officer.

PF 10.4 Health and Safety Representatives

In terms of Sections 17 and 18 of the Act (OHSA 1993) the Contractor shall appoint a Health and Safety Representative whenever he has more than 20 employees in his employ on the works. The health and safety representative must be selected from employees who are employed in a full-time capacity at a specific workplace.

The number of health and safety representatives for a workplace shall be at least one for every 50 employees.

The function of the health and safety representative(s) will be to review the effectiveness of health and safety measures, to identify potential hazards and major incidents, to examine causes of incidents (in collaboration with his employer, the Contractor), to investigate complaints by employees relating to health and safety at work, to make representations to the employer (Contractor) or inspector on general matters affecting the health and safety of employees, to inspect the workplace, plant, machinery etc. on a regular basis, to participate in consultations with inspectors and to attend meetings of the health and safety committee.

PF 10.5 Health and Safety Committee

In terms of Sections 17 and 18 of the Act (OHSA 1993) the Contractor (as employer), shall establish one or more health and safety committee(s). Where there are two or more Health and Safety Representatives at a workplace, the persons selected by the Contractor to serve on the committee shall be designated in writing.

The function of the health and safety committee shall be to hold meetings at regular intervals, but at least once every three months, to review the health and safety measures on the contract, to discuss incidents related to health and safety with the Contractor and the inspector, and to make recommendations regarding health and safety to the Contractor and to keep record of meetings, recommendations and reports made by the committee.

PF 10.6 Competent Persons

In accordance with the Construction Regulations the Contractor shall appoint, in writing, competent persons responsible for supervising construction work for the following work situations that may be expected on the site of the works.

- (a) Risk assessment (Regulation 9);
- (b) Fall protection (Regulation 10);
- (c) Structures (Regulation 11);
- (d) Temporal works (Regulation 12);
- (e) Excavation work (Regulation 13);
- (f) Demolition work (Regulation 14);
- (g) Tunnelling (Regulation 15);
- (h) Scaffolding work (Regulation 16);
- (I) Suspended platform operations (Regulation 17);
- (j) Rope Access Work (Regulation 18);

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- (k) Material Hoists (Regulation 19);
- (l) Bulk Mixing Plant (Regulation 20);
- (m) Explosive actuated fastening device (Regulation 21)
- (n) Cranes (Regulation 22);
- (o) Construction vehicle and mobile plant (Regulation 23
- (p) Electrical installation and machinery on construction site (Regulation 24);
- (q) Use and temporary storage of flammable liquids on construction site (Regulation 25);
- (r) Water environments (Regulation 26);
- (s) Housekeeping on construction sites (Regulation 27)
- (t) Stacking and storage on construction sites (Regulation 28);
- (u) Fire precautions on construction sites (Regulation 29); and
- (v) Construction employee's facilities (Regulation 30).
- (w) Welding, flame cutting, soldering and similar operations (General Safety Regulation 9)
- (x) Accident/Incident Investigator (General Administration Regulation 9)
- (Y) First Aider (General Safety Regulation 3)

A competent person may be appointed for more than one part of the construction work with the understanding that the person must be suitably qualified and able to supervise at the same time the construction work on all the work situations for which he/she has been appointed.

The appointment of competent persons to supervise parts of the construction work does not relieve the Contractor from any of his responsibilities to comply with all requirements of the Construction Regulations.

PF 11 CONTRACTOR'S RESPONSIBILITIES

Before commencement of work under the contract, the Contractor shall enter into an agreement with the Employer (Client) to confirm his status as mandatary (employer) for the contract under consideration. (37.2 agreement)

The Contractor's duties and responsibilities are clearly set out in the Construction Regulations 2014, and are not repeated in detail but some important aspects are highlighted hereafter, without relieving the Contractor of any of his duties and responsibilities in terms of the Construction Regulations.

In addition, the Contractor shall also comply with the requirements of the Compensation of Occupational Injuries and Diseases Act 130 of 1993 (COIDA) and to this effect shall submit a letter of good standing with the compensation Insurer to the Client before work on site commences.

- (a) Contractor's Position in Relation to the Employer (Client) (Regulation 5)

In order for the Client (Employer) to comply with Regulation 5 of the Construction Regulations, the Contractor shall co-operate with the Employer or the Engineer or Occupational Health and Safety Agent to ensure that all requirements of the Regulations 5 are met and complied with.

The provisions of Regulation 5 of the Construction Regulations shall be followed in every detail.

- (b) The Contractor and Subcontractor (Regulation 7)

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Where a contractor appoints a sub-contractor, the contractor and sub-contractor must ensure compliance with the regulation7, where a subcontractor appoints another subcontractor to perform construction work, the duties determined in sub regulation 1(b) to (g) that apply to the contractor apply to the sub-contractor as if he or she were the contractor.

The provisions of Regulation 7 of the Construction Regulations shall be followed in every detail.

(c) Management and Supervision of Construction Work (Regulation 8)

The Contractor must in writing appoint one full time competent person as the construction manager with the duty of managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance. A construction manager may in writing appoint all responsible persons for construction work, activities and ensuring occupational Health and Safety compliance on the construction site.

The provisions of Regulation 8 of the Construction Regulations shall be followed in every detail.

(d) Risk Assessment (Regulation 9)

The Contractor must, before the commencement of any construction work and during construction work, have risk assessment performed by a competent person appointed in writing; the contractor must have a documented plan and applicable safe work procedures to mitigate, reduce or control the risks and hazards that have been identified.

The provisions of Regulation 9 of the Construction Regulations shall be followed in every detail.

(e) Fall Protection (Regulation 10)

The Contractor must designate a competent person to be responsible for the preparation of all protection plan, ensure that Fall protection contemplated in paragraph (a) is implemented, amended where and when necessary and maintained as required; and take steps to ensure continued adherence to the fall protection plan.

The provisions of Regulation 10 of the Construction Regulations shall be followed in every detail.

(f) Structures (Regulation 11)

The Contractor must ensure that all reasonably practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof, which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work; no structure or part of a structure is loaded in a manner which would render it unsafe; and all drawings pertaining to the design of the relevant structure are kept on site and are available on the request to an inspector, other contractors, the client and the client's agent or employee.

In addition, the Contractor shall comply with all aspects of Regulation 11 of the Construction Regulations.

(g) Temporary works (Regulation 12)

The Contractor must appoint a temporary works designer in writing to design, inspect and approve the erected temporary works on site before use. A contractor must ensure that all works operations are carried out under the supervision of a competent person who has been appointed in writing for that purpose.

The provisions of Regulation 12 of the Construction Regulations shall be followed in every detail.

(h) Excavation Work (Regulation 13)

A contractor must appoint a competent person in writing to supervise excavation work, and to evaluate the stability of the ground before excavation work begins.

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The contractor shall comply with all provisions of Regulation 13 of the Construction Regulations 2014.

(l) Demolition Work (Regulation 14)

A contractor must appoint a competent person in writing to supervise and control all demolition work on site

The provisions of Regulation 14 of the Construction Regulations shall be followed in every detail.

(j) Tunnelling (Regulation 15)

No person may enter a tunnel, which has a height dimension of less than 800 millimetres

(k) Scaffolding (Regulation 16)

A contractor must appoint a competent person in writing to ensure that all scaffolding work operations are carried out under his or her supervision and should ensure that all scaffolding works is carried out by competent personnel.

A contractor using scaffolding must ensure that such scaffolding, when in use complies with safety standards incorporated for this purpose into these Regulations under Section 44 of the Act.

(l) Suspended Platforms (Regulation 17)

Wherever suspended platforms will be necessary on any contract, the Contractor shall ensure that copies of the system design issued by a Professional Engineer are submitted to the Engineer for inspection and approval. The Contractor shall appoint competent persons as supervisors and all suspended platform erectors, operators and inspectors and ensure that all work related to suspended platforms are done in accordance with Regulation 17 of the Construction Regulations.

The provisions of Regulation 17 of the Construction Regulations shall be followed in every detail.

(m) Rope access work (Regulation 18)

A contractor must appoint a competent person in writing as a rope access supervisor with the duty of supervising all rope access work on the site, including the duty of ensuring occupational health and safety compliance in relation to rope access work; provided that the appointment of any such person does not relieve the construction manager of any personal accountability for failing in his management duties in terms of this regulation.

The provisions of Regulation 18 of the Construction Regulations shall be followed in every detail.

(n) Material Hoists (Regulation 19)

A contractor must ensure that every material hoist and its tower have been constructed in accordance with the generally accepted technical standards and are strong enough and free from defects.

The provisions of Regulation 19 of the Construction Regulations shall be followed in every detail.

(o) Bulk mixing plant (Regulation 20)

A contractor must ensure that the operation of a bulk mixing plant is supervised by a competent person who has been appointed in writing and is (a) aware of all the dangers involved in the operation thereof; and (b) conversant with the precautionary measures to be taken in the interest of health and safety.

The provisions of Regulation 20 of the Construction Regulations shall be followed in every detail.

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(p) Explosive actuated fastening device (Regulation 21)

No contractor may use or permit any person to use an explosive actuated fastening device, unless the user is provided and uses suitable protective equipment, the user is trained in the operation, maintenance and use of such a device, the explosive actuated fastening device is provided with a protective guard around the muzzle end, which effectively confines any flying fragments or particles, and the firing mechanism is so designed that the explosive actuated fastening device, will not function unless it is held against the surface with a force of at least twice its weight; and the angle of inclination of the barrel to the work surface is not more than 15 degrees from a right angle.

The provisions of Regulation 21 of the Construction Regulations shall be followed in every detail.

(q) Cranes (Regulation 22)

Wherever the use of tower cranes becomes necessary, the provisions of Regulation 22 shall be complied with.

(r) Construction Vehicles and Mobile Plant (Regulation 23)

The Contractor shall ensure that all construction vehicles and plant are in good working condition and safe for use, and that they are used in accordance with their design and intended use. The vehicles and plant shall only be operated by workers or operators who have received appropriate training and have a medical certificate of fitness to operate those construction vehicles and mobile plant, issued by an occupational health practitioner in the form of annexure 3, all in accordance with all the requirements of Regulation 23.

The provisions of Regulation 23 of the Construction Regulations shall be followed in every detail

(s) Electrical Installation and Machinery on Construction Sites (Regulation 24)

The Contractor shall comply with the Electrical Installation Regulations 2009 and Electrical Machinery Regulations 1998 (Government Notice R2920 of 23 October 1992) and the Electrical Machinery Regulations (Government Notice R1593 of 12 August 1998). Before commencement of construction, the Contractor shall take adequate steps to ascertain the presence of, and guard against dangers and hazards due to electrical cables and apparatus under, over or on the site.

All temporary electrical installations on the site shall be under the control of a competent person, without relieving the Contractor of his responsibility for the health and safety of all workers and persons on site in terms of Regulation 24.

The provisions of Regulation 24 of the Construction Regulations shall be followed in every detail

(t) Use of Temporary Storage of Flammable Liquids on Construction Sites (Regulation 25)

The Contractor shall comply with the provisions of the General Safety Regulations, 2003, ensure that where flammable liquids are being used, applied or stored at the workplace concerned, it is done in a manner that does not cause a fire or explosion hazard, and that the workplace is effectively ventilated.

The provisions of Regulation 24 of the Construction Regulations shall be followed in every detail

(u) Water Environments (Regulation 26)

Where construction work is done over or in close proximity to water, the provisions of Regulation 26 shall apply.

(v) Housekeeping and general safeguarding on construction site (Regulation 27)

A contractor must, in addition to compliance with the Environmental regulations for workplace, 1987, promulgated by (Government Notice R2281 of 16 October 1987); ensure that suitable housekeeping is continuously implemented on each construction site.

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The provisions of Regulation 27 of the Construction Regulations shall be followed in every detail

(w) Stacking and Storage on Construction Sites (Regulation 28)

The provisions for the stacking of articles contained in the General Safety Regulations, 2003 (Government Notice R1031 of 30 May 1986) as well as all the provisions of Regulation 28 of the Construction Regulations shall apply.

(x) Fire Precautions on Construction Sites (Regulation 29)

The provisions of the Environmental Regulations for Workplaces (Government Notice R2281 of 16 October 1987) shall apply.

In addition, the necessary precautions shall be taken to prevent the incidence of fires, to provide adequate and sufficient fire protection equipment, sirens, escape routes etc.

The provisions of Regulation 29 of the Construction Regulations shall be followed in every detail

(y) Construction Employee's Facilities (Regulation 30)

The Contractor shall comply with the construction site provisions as in the Facilities Regulations; 2004 (Government Notice R92 of 3 August 2004).

The provisions of Regulation 30 of the Construction Regulations shall be followed in every detail

(z) Non-compliance with the Construction Regulations 2014

The foregoing is a summary of parts of the Construction Regulations applicable to all construction projects. The Contractor, as employer for the execution of the contract, shall ensure that all provisions of the Construction Regulations applicable to the contract under consideration are complied with to the letter. Should the Contractor fail to comply with the provisions of the Regulations 3 to 33 as listed in Regulation 33, he will be guilty of an offence and will be liable, upon conviction, to the fines or imprisonment as set out in Regulation 33.

The Contractor is advised in his own interest to make a careful study of the Act and the Construction Regulations and other applicable Act and Regulations as ignorance of the Act and the Regulations will not be accepted in any proceedings related to non-conformance to the Act and the Regulations.

PF 12 MEDICAL CERTIFICATE OF FITNESS

A Contractor must ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by Occupational Health Practitioner in the form of Annexure 3 as per CR2014. The validity of the medical certificate of fitness shall be determined by Occupational Health Practitioner based on the risk.

PF 13 PROJECT / SITE SPECIFIC REQUIREMENTS

The following is a list of specific activities and considerations that have been identified for the project and the construction site and for which Risk Assessments, Standard Working Procedures (SWP), management and control measures and Method Statements (where necessary) have to be developed by the Principal Contractor.

Refer to sections of the Project Specification that detail the work to be done.

Some examples: -

- Location of Works
- Security of Site Staff
- Accommodation of Traffic

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- Bridge Construction
- Retaining Wall Construction
- Removal of Lateral Support
- Demolition Work
- Existing Services
- Earthworks and Road Construction
- Rehabilitation

PF 14 ARRANGEMENTS FOR MONITORING AND REVIEW

The Occupational health & Safety Agent will conduct a Monthly Audit to audit compliance with Construction Regulation 5 (1) (o) to ensure that the Contractor has implemented and is maintaining the agreed and approved OH&S Plan.

The Client reserves the right to conduct other ad hoc audits and inspections as deemed necessary.

A representative of the Contractor shall accompany the Client on all audits and inspections and may conduct his own audit/inspection at the same time. Each party will, however, take responsibility for the results of his own audit/inspection results.

Annexure1

DESIGNER COMMENTS ON HEALTH AND SAFETY SPECIFICATION

Designer's Health and Safety Checklist

Name and address of Project _____

Item and Legal Reference	Y/N	Comment
CR 6(1) (a) Has the designer familiarised himself with the Construction Regulations 2014 (particularly Regulation 6) and the Safety Standards incorporated into these Regulations?		
CR 6(1) (b) During the design stage, was the Client's Health and Safety Specifications given due consideration?		
CR 6(1) (c) Does the designer's report include the following information?	X	
The structural design aspects that could have an effect on the pricing of construction work?		
The geotechnical-science aspects?		
The weight which the structure is designed to safely withstand?		
CR 6(1)(d) Has the designer communicated all known and anticipated hazards and risks associated with the construction of the designed structure? Furthermore, has the safe method statement been developed to ensure that construction work is safely executed?		
CR 6 (1) (e) As far as is reasonably practicable, are the		

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dangerous processes and materials been eliminated or replaced in the design?		
CR 6(1) (f) Has due consideration been taken during the design stage, for the safe maintenance of the structure after its completion?		

(Please ensure that the checklist is completed in full particularly the comments column)

Name of Designer_____

Designer's Title (e.g. Engineer, Architect)_____

Signature_____

Date_____

Annexure 2

Client Agent Safety Officer Requirements

No.	Information required from PC	Frequency	Res person
1	Safety Officers Qualifications – NADSAM 3yrs experience or SAMTRAC 5yrs experience or any relevant qualification. The Client Safety Agent must be registered with a Statutory Body in terms of CR 5.7(b)		PCSO & CASO
2	Updated list of sub-contractors on site	Monthly	PCSO
3	Number of employees inducted PC, visitors and sub-contractors	Monthly	PCSO
4	Plant and Equipment – number of cranes, TLBs, bobcats, compressors, trailers and mobile cranes etc on site	Monthly	PCSO
5	Incident/Accident Database (LWC, MTC, FAC)	Monthly	PCSO
6	Man-hours or number of days worked by PC employees and subcontractors	Monthly	PCSO
7	Update list of activities/tasks on construction site	Monthly	
8	Updated risk assessment per activity	Monthly	PCSO
9	Updated method statements/WSWP per activity	Monthly	PCSO
10	Training records of risk assessment and method statements per each activity	Monthly	PCSO
11	Sub-contractor's health and safety meeting minutes	Monthly	PCSO
12	PC health and safety meeting minutes	Monthly	PCSO

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14	Number of tool box talks conducted on site	Monthly	PCSO
15	Sub-contractor's monthly health and safety audit reports	Monthly	PCSO
16	Construction site DIFR or DIIR	Monthly	PCSO
17	Serious incidents/DOL matters inform the Client Agent Safety Officer to be part of investigation/process	Ongoing	PCSO
18	Develop on site emergency evacuation plan, appoint & train emergency teams and conduct emergency drills	Ongoing	PCSO
19	Security, access control and environmental issues report	Monthly	PCSO
	Client Agent Safety Officer Job Specification		
1	Conduct daily inspection liaise with site Project Manager, area safety officer regarding deviations, corrective measures and follow-ups.	Daily	CASO
2	Conduct monthly health and safety audits	Monthly	CASO
3	Daily reports regarding the safety status on construction site	Ongoing	CASO
4	Attend safety meetings, management site meetings or other meetings if his/her input is required	Monthly	CASO
5	Daily liaise with PC safety managers or officers if required	Ongoing	CASO
6	Review and approve risk assessment and method statement for each activity and upcoming activity prior to commence.	Ongoing	CASO
7	Generate monthly health and safety status report to OHS Unit and respective Unit management	Monthly	CASO

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Annexure 3



**PRINCIPAL CONTRACTOR LEGAL APPOINTMENT IN TERMS OF CONSTRUCTION
REGULATIONS 2014 SECTION 5(1) (k) & MANDATORY AGREEMENT IN TERMS CLAUSE
37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT 1993**

In terms of provisions of the Construction Regulations Section 5(1) (k), of the Occupational Health and Safety Act 85 of 1993, I, _____ representing

UMkhanyakude District Municipality **as the Client hereby appoint** Name of Contractor **representing the Principal Contractor** Name of Principal Contractor **herein referred to as 'the Mandatory' for the:**

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This legal appointment shall be valid until completion of project.

IN TERMS OF 37(2) OF THE ACT, THIS AGREEMENT WITNESSETH AS FOLLOWS:

- 1 The Mandatory shall execute the work in accordance with the Letter of Appointment pertaining to this contract.
- 2 This Agreement shall hold good from its commencement date, which shall be the date determined in terms of the Letter of Appointment, or other date decided upon and agreed between the parties, until either;
 - a) the date of the final construction payment certificate, or
 - b) the date of the final fee invoice, issued with the final construction report, or
 - c) the date of termination or cancellation of the Agreement, or
 - d) any other date agreed to between the parties.

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- 3 The Mandatory declares himself to be conversant with the following: -
- a) All the requirements, regulations and standards of the Occupational Health and Safety Act (Act 85 of 1993 as updated), hereinafter referred to as "The Act", together with its amendments and with special reference to the following Sections of The Act.
 - i) Section 8: General duties of clients to their employees.
 - ii) Section 9: General duties of clients and self-employed persons to persons other than employees.
 - iii) Section 37: Acts or omissions by employees or mandatories and
 - iv) Sub-section 37(2) relating to the purpose and meaning of this Agreement.
 - b) The Mandatory shall ensure that he familiarises himself with the requirements of the Client's health and safety specifications developed for the project, and that he, his employees and any other Contractor's (Sub-contractors) employed during the project comply with them. The Mandatory shall ensure that all health and safety documentation required in accordance with his own health and safety plan is maintained for the duration of the project.
- 4 In addition to the Client's requirements and all relevant requirements under the OHS Act, the Mandatory agrees to execute all the works forming part of this project, and to operate and utilize machinery, equipment and tools in accordance with the Act.
- 5 The Mandatory is responsible for the compliance with the Act by all his sub-contractors / sub-consultants, whether or not selected and/or approved by the Client.
6. The Mandatory warrants that all his own and his sub-contractors' workmen are covered in terms of the Compensation for Occupational Injuries and Diseases Act 1993 as amended, which cover shall remain in force whilst any such workmen are present on site. A letter of good standing from the Compensation Commissioner to this effect must be produced to the Client upon signature of the agreement.
7. The Mandatory undertakes to ensure that he and/or subcontractors and/or their respective clients will at all times comply with the following conditions:
- a) The mandatory shall assume the responsibility in terms of Section 16.1 of the Occupational Health and Safety Act. The mandatory shall not delegate any duty in terms of Section 16.2 of this Act without the prior written approval of the Client. If the mandatory obtains such approval and delegates any duty in terms of section 16.2 a copy of such written delegation shall immediately be forwarded to the Client.
 - b) All incidents referred to in the Occupational Health and Safety Act shall be reported by the mandatory to the Department of Labour as well as to the Client. The Client must further be provided with copies of all written documentation relating to any incident.
 - c) The Client hereby obtains an interest in the issue of any formal enquiry conducted in terms of section 32 of the Occupational Health and Safety Act into any incident involving the mandatory and/or his employees and/or his sub-contractors.
 - d) The Mandatory shall conduct such risk assessments, method statements and safe work practices as may be necessary during the course of the contract and shall ensure that all staff are informed of these. Proof of this shall be placed in the mandatory's Health and Safety file on site.
 - e) Adherence to the mandatory's Health and Safety plan must be enforced, including the removal from the project of any person or contractor who wilfully disregards the requirements of the H&S Plan.

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- f) The Mandatory undertakes that all subcontractors intending to execute part of the construction work under his jurisdiction, that such a contractor had submitted a Health and Safety Plan, as per provisions of section 5 of the Construction Regulations. The Plan must be approved by the Mandatory and such a Contractor's name be entered onto a project Sub-contractor List.

SIGNED FOR AND ON BEHALF OF THE CLIENT: _____

NAME (IN CAPITALS): _____

WITNESSES: 1..... 2.....

NAMES (IN CAPITALS) 1..... 2.....

ACCEPTANCE OF APPOINTMENT

SIGNED FOR AND ON BEHALF OF THE MANDATORY: _____

NAME (IN CAPITALS): _____

WITNESS: 1..... 2.....

NAME (IN CAPITALS) 1..... 2.....

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Annexure 4

Date:

Our Ref:
Email reply to:
Your Ref:

Attention:

Dear Sir/Madam

CONTRACT NUMBER

RE: HEALTH AND SAFETY PLAN APPROVAL

Your Health and safety has been reviewed upon submission. I am pleased to inform you that your Plan has been **APPROVED** with the following conditions:

1. Copy of section 37.2 agreement to be signed off between the Client and Principal Contractor.
2. Documented proof of transmittal of your Notification of Construction work to the Department of Labour is retained on site.
3. All Legal appointments must be signed as appropriate by appointees with relevant training certificates attached.
4. A Health and Safety File established on site on an index which will be issued to you by OH&S Agent.
5. You shall inform the OH&S Agent in writing on any revisions made on the approved Plan.

All these requirements must be completed by

Yours faithfully

.....

ANNEXURE 5 – Notification of Construction

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993

(ACT NO 85 OF 1993)

REGULATION 4 OF THE CONSTRUCTION REGULATIONS, 2014

NOTIFICATION OF CONSTRUCTION WORK

1.(a) Name and postal address of Principal Contractor:

.....

(b) Name and tel. no of Principal Contractor's contact person:

.....

2. Principal Contractor's compensation registration number:

.....

3.(a) Name and postal address of client:

.....

Name and tel. no of client's contact person or agent:

.....

4.(a) Name and postal address of designer(s) for the project:

.....

(b) Name and tel. no of designer(s) contact person:

.....

5. Name and telephone number of Principal Contractor's construction supervisor on site appointed in terms of regulation 8.(1).....

6. Name/s of principal contractor's sub-ordinate supervisors on site appointed in terms of regulation 8.(2).

.....

7. Exact physical address of the construction site or site office:

.....

8. Nature of the construction work

.....

.....

.....

9. Expected commencement date:

10. Expected completion date:

11. Estimated maximum number of persons on the construction site:

12. Planned number of contractors on the construction site accountable to principal contractor:

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13. Name(s) of contractors already chosen.

.....
.....
.....

Principal Contractor

Date

Client

Date

THIS DOCUMENT IS TO BE FORWARDED TO THE OFFICE OF THE DEPARTMENT OF LABOUR **PRIOR TO COMMENCEMENT** OF WORK ON SITE.

ALL PRINCIPAL CONTRACTORS THAT QUALIFY TO NOTIFY MUST DO SO EVEN IF ANOTHER PRINCIPAL CONTRACTOR ON THE SAME SITE HAD DONE SO PRIOR TO THE COMMENCEMENT OF WORK.

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ANNEXURE 6 – CEO Appointment

CEO ASSIGNMENT IN TERMS OF SECTION 16(2) OF THE OHSA (ACT 85 of 1993)

Section 16 of the Act states:

Every chief executive officer shall, as far as is reasonably practicable, ensure that the duties of his employer as contemplated in this Act; are properly discharged.

Without derogating from his responsibility or liability in terms of sub-section (1), a chief executive officer may assign any duty contemplated in the said sub-section, to any person under his control, which person shall act subject to the control and directions of the chief executive officer.

The provisions of sub-section (1) shall not, subject to the provisions of section 37, relieve an employer of any responsibility of liability under this Act.

For the purpose of sub-section (1) the head of department of any department of State shall be deemed to be the chief executive of that department.

I, (full name of CEO).....do hereby assign my duties in respect of the overall management and control of to (full name of Appointee)

in his/her capacity as to ensure that the duties of the employer are carried out as contemplated in the Act and the Regulations as amended for (division/area/region/premises/project(s)).

SIGNATURE:

DATE:

Designation: Chief Executive Officer

Kindly confirm your acceptance of this appointment by completing the following:

ACCEPTANCE OF ASSIGNATION

I,..... hereby accept this assignation and confirm that I am conversant with the requirements of the OHS Act and regulations as amended and agree to carry out the duties as set out for the employer.

NOTE : Your Attention is Drawn to regulation General Administrative Regulation 5 and Sections 8, 9, 13, 17, 18, 19, 20 and 37 of the Occupational Health and Safety Act No. 85 of 1993, attached hereto.

SIGNATURE:

DATE:.....

Designation :

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ANNEXURE 7 – Appointment of H&S Representatives

APPOINTMENT OF HEALTH AND SAFETY REPRESENTATIVE IN TERMS OF SECTION 17 OF THE OHSA (ACT 85 of 1993)

(APPOINTEE'S NAME)

I, (Appointer's full name) being an employee of
(name of Contractor's organization) and,
having been appointed as (area of responsibility e.g. Responsible Person for the construction of X on site Y)
....., hereby appoint you (Appointee's full name)
..... in
terms of Section 17 of the OHSA as the Health and Safety Representative for (area of responsibility)
.....

In terms of this appointment your functions are as follows:

To represent your employee electorate's interests in terms of occupational health and safety.

To carry out health and safety inspections of your workplace as designated above prior to each appropriate health and safety committee meeting.

To serve on the appropriate health and safety committee.

To bring to the attention of your supervisor any deviations from the safe work procedures any other matters regarding health and safety that come to your attention at any time.

The dates and times of the health and safety committee meetings will be determined by the committee(s). You should attend all meetings of the health and safety committee on which you serve.

You will be required to undergo Health and Safety Representative training in order to ensure that you can complete your tasks successfully.

Your appointment is valid from (start date) to (end date)

.....

Appointer's Signature..... Date.....

Kindly confirm your acceptance of this appointment by completing the following:

ACCEPTANCE

I, (Appointee's full name)
understand the implications of the appointment as detailed above and confirm my acceptance.

Appointee's Signature..... **Date**.....

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ANEXURE 8 – Recording Of Incidents

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993

(ACT NO 85 OF 1993)

REGULATION 9 OF THE GENERAL ADMINISTRATIVE REGULATIONS

RECORDING AND INVESTIGATION OF INCIDENTS

A. RECORDING OF INCIDENT

1.Name of employer

2.Name of affected person.....

3.Identity number of affected person.....

4.Date of incident 5.Time of incident.....

6.Part of body affected

Head or Neck	Eye	Trunk	Finger	Hand
Arm	Foot	Leg	Internal	Multiple

7.Effect on person

Sprains or strains	Contusion or wounds	Fractures	Burns	Amputation
Electric shock	Asphyxiation	Unconsciousness	Poisoning	Occupational Disease

8.Expected period of disablement

0-13 days	2-4 weeks	4-16 weeks	16-52 weeks	52 weeks or permanent disablement	Killed
-----------	-----------	------------	-------------	-----------------------------------	--------

9.Description of occupational disease.....

10.Machine/process involved/type of work performed/exposure**

11.Was the incident reported to the Compensation Commissioner and Provincial Director?

Yes	No
-----	----

12.Was the incident reported to the police?*

Yes	No
-----	----

13.SAPS office and reference

* to be completed in case of a fatal incident.

** in case of a hazardous chemical substance, indicate substance exposed to:

B. INVESTIGATION OF THE ABOVE INCIDENT BY A PERSON DESIGNATED THERETO

1.Name of investigator.....

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2.Date of investigation.....

3.Designation of investigator

4.Short description of incident

.....
.....
.....

5. Suspected cause of incident

.....
.....
.....

6. Recommended steps to prevent a recurrence

.....
.....
.....

Signature of Investigator: Date:

C. ACTION TAKEN BY EMPLOYER TO PREVENT THE RECURRENCE OF A SIMILAR INCIDENT

.....
.....
.....

Signature of Employer: Date:

D. REMARKS BY HEALTH AND SAFETY COMMITTEE

Remarks:

.....
.....
.....

Signature of Chairperson of Health & Safety Committee: Date:

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ANNEXURE 9 – Index of Project Health & Safety File

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993

(ACT NO 85 OF 1993)

REGULATION 7, 8, 9 &10 OF THE CONSTRUCTION REGULATIONS, 2014

PROJECT HEALTH & SAFETY FILE

LEGAL APPOINTMNETS

Updated Legal Appointments Register.

Updated OH&S Organogram.

Legal Appointments.

Client Legal Appointment

37(2) Agreement with Client

COMPANY DOCUMENTATION

Company Health & Safety Policy and other Policies

Current Company Letter of Good Standing (WCA)

Company & Site OH&S Rules

Client Health & Safety Specifications

Health & Safety Plan

Notification of Construction Work (*with proof of transmittal*)

Employee Medical Examination Certificates

Certificates of Competence (CoC)

RISK ASSESSMENTS & SAFE WORK PROCEDURES

Risk Assessments & SOP's Register

Risk Assessments & SOP's

List of Site Mandatory PPE.

Method Statements

TRAINING

Induction Training Manual.

Induction Training Register

Tool Box Talks

First Aiders

Health & Safety Representatives

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Scaffold Erectors & Inspectors

Risk Assessor(s)

Fire Teams

Operators Of Machinery

Etc...

SUB-CONTRACTOR MANAGEMENT

Approved Sub-Contractor List.

Sub-Contractor Legal Appointment

Sub-contractor Letter of Good Standing

Sub-Contractor Health & Safety Plan

Mandatory Agreements with Principal Contractor

Sub-Contractor Audit Reports

Sub-Contractor Medicals

Sub-Contractor Organogram & Legal Appointments

INCIDENT MANAGEMENT

Incident Management/Reporting Procedure

Emergency Procedure

Simulation Drills

Monthly Incident Statistics/Reports

Incident/Accident Investigation Reports

OH&S AUDITS & INSPECTIONS

Client's Audit Reports.

Principal Contractor's Audit Reports

Principal Contractor's Health & Safety Inspections.

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C3.8.7 PARTICULAR SPECIFICATION: PG - TRAINING

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PG3	Training Arrangements	SW174
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C3.8.7 PARTICULAR SPECIFICATION: PG - TRAINING

PG 1 INTRODUCTION

PG 1.1 Scope

This specification covers Accredited On-Site Skills Training for nominated trainees from the local community in skills relating to specific areas related to construction. It is intended that candidates for training will be persons who are undergoing, or who have undergone, training at a University of Technology or FET College. Training is described in Section C3.5.10.

PG 2 EMPLOYMENT ARRANGEMENTS

The Employer will inform the Contractor of the number and names of candidates to be trained and confirm the categories of training to be provided (see PJ4 below) and the required timing (date for start of training and duration). The Contractor shall proceed to timeously employ such candidates for the duration of training and shall claim for salaries and other validated costs incurred, including an agreed mark-up, according to the Training Schedule. The trainees shall be employed under the Contractor's normal conditions of employment for unskilled labour, including registration for Workmen's' Compensation.

The trainees shall be included in the Contractor's Health & Safety Plan for the duration of training. The trainees will however, not be available for deployment on site by the Contractor for the duration of training. Upon completion of training the employment contract with each trainee will cease and the Contractor shall have no obligation towards the trainees in respect of further employment. The Contractor may, however, employ the trainees on a permanent or other basis. The terms of such employment are to be mutually agreed between the Contractor and the trained person.

PG 3 TRAINING ARRANGEMENTS

The Employer will inform the Contractor of the number and names of candidates to be trained and confirm the categories of training to be provided (see PJ4 below). The Contractor shall then obtain three (3) quotations from suitable accredited Skills Training Service Providers on the basis of PJ4 below. The quotations and responses shall be submitted to the employer for approval and appointment.

Upon notice of the Employer's approval, the Contractor shall proceed to appoint the selected firm to provide such Accredited Skills Training Facilitator(s) as are required according to the disciplines of training to be provided. The Contractor shall pay the training fees and charges of the accredited trainer according to the agreed fee scales and according to such validated registers of attendance and certificates of performance as are agreed in the training contract that is to be entered into.

The Contractor shall provide a suitable area for the purpose of training. The area shall be, in proximity to the worksite so as to allow for interaction with the workplace, as and when required, for training purposes. The Contractor shall make available a meeting room, with tables and chairs, for instruction purposes, together with water supply and sanitation facilities for male and female participants.

The Contractor shall be required to provide construction materials for practical training. Any such materials supplied shall be charged as per the Dayworks Schedule.

PG 4 TRAINING CATEGORIES AND OBJECTIVES

PG 4.1 Trench Excavation and Supervision

PG 4.1.1 Training Objective

At the end of training the trainee shall be able to and understand why it is necessary to: -

- i) Remove and preserve topsoil;
- ii) Excavate straight pipe trenches by machine and by manual labour;
- iii) Excavate the trench invert evenly;

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- iv) Excavate vertical trench sides;
- v) Deposit excavated material at a safe distance away from the trench edge;
- vi) Be able to work with boning rods;
- vii) Backfill around the pipe;
- viii) Compact the backfill to the trench;
- ix) Understand and apply the Construction Regulations with regard to trench excavation.

PG 4.2 Pipelaying

PG 4.2.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Understand the principles and function of a pipeline;
- ii) Measure the depth of a trench to establish the degree of bottoming up required;
- iii) Supervise, level and prepare the bedding to receive the pipes;
- iv) Set up a fishline at the bottom of the trench
- v) Excavate a trench to the required depth and width to contain the pipeline;
- vi) Prepare the bedding;
- vii) Lay a pipeline using the correct tools, materials and equipment;
- viii) Make a connection from the pipeline to a branch or house connection;
- ix) Do initial, intermediate and final backfilling and compaction and ensure correct compaction by testing soil density;
- x) Backfill after laying the pipes in such a way that the pipes are protected from movement or damage from external pressure;
- xi) Understand and apply the Construction Regulations with regard to pipelaying.

PG 4.3 Steel Fixing

PG 4.3.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Understand basic structural drawings;
- ii) Recognize the different bar profiles and strengths and their purposes;
- iii) Interpret shape codes and bending schedules;
- iv) Set up steel bars for bending;
- v) Select the correct steel bars for fixing;
- vi) Fix in place steel bars;
- vii) Carry out dimensional checks according to drawings and adjust where necessary;
- viii) Understand and apply the Construction Regulations with regard to steel fixing.

PG 4.4 Formwork and Concreting

PG 4.4.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Understand basic structural drawings;
- ii) Set out work and determine placing of formwork;
- iii) Fix formwork in place;
- iv) Recognize the types of support, propping, etc. and determine the level of support

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requirements for specific formwork;

- v) Understand different prescribed mix and strength concretes;
- vi) Understand various concrete constituents and their requirements;
- vii) Conduct proportioning for a given prescribed mix concrete;
- viii) Mix the concrete and transfer and place on site with minimum wastage;
- ix) Conduct a concrete slump test and interpret the result;
- x) Understand concrete vibration and its function and limitations;
- xi) Understand concrete set – false, initial and final;
- xii) Carry out dimensional checks according to drawing and adjust where necessary;
- xiii) Understand and apply the Construction Regulations with regard to concreting work.

PG 4.5 Basic Construction Hand

PG 4.5.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Demonstrate his/her knowledge of tools and equipment needed for excavation and concreting;
- ii) Excavate and trim foundations according to specifications;
- iii) Mix the concrete to the required proportions and methods, transporting without wasting and place correctly in foundations;
- iv) Set up the floor shutter according to specifications;
- v) Placing the floor concrete according to specifications and using correct procedures and equipment;
- vi) Understand and apply the Construction Regulations with regard to excavation of foundations and concrete work.

PG 4.6 Bricklaying & Blocklaying

PG 4.6.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Interpret basic drawings;
- ii) Demonstrate his/her knowledge of the tools necessary to set up internal dimensions;
- iii) Erect a profile on position and plumb;
- iv) Select and mix the correct mortar for the work;
- v) Build blockwork/brickwork using the correct methods and according to specifications;
- vi) Understand and apply the Construction Regulations with regard to blocklaying/bricklaying.

PG 4.7 Finishing Hand

PG 4.7.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Fix timber supports for roofing according to specifications;
- ii) Erect concrete beams to superstructure according to specifications;
- iii) Measure and cut roof sheets using correct methods and according to specifications;
- iv) Fit a door and align it so that it works correctly;
- v) Construct a South African roof truss to specifications and within tolerances required;
- vi) Erect and align roof trusses in accordance with the specifications;

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- vii) Align and fix purlins to take roof sheets;
- viii) Clad roof with sheeting/tiles in accordance with specifications;
- ix) Understand and apply the Construction Regulations with regard to construction and finishing of buildings.

PG 4.8 Task-based Labour Administration

PG 4.8.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Record tools issued to labourers;
- ii) Determine classification of excavation using trial pits;
- iii) Set out daily tasks;
- iv) Do basic task administration work;
- v) Reconcile monthly task sheets to task sheets;
- vi) Reconcile monthly task sheets to physical measurements;
- vii) Understand and apply the Construction Regulations with regard to labour-intensive construction.

PG 4.9 Understanding the Scope of Works and Engineer's Specifications

PG 4.9.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Read basic plans and maps;
- ii) Understand the Contractor's mobilization requirements;
- iii) Understand statutory duties and requirements in Contractor's mobilization;
- iv) Analyse the scope requirements and produce a construction programme;
- v) Plan tasks according to priorities and specifications;
- vi) Understand and apply the Construction Regulations with regard to contractor's mobilization and requirement for Commencement of Works.

PG 4.10 Labour Recruitment and Management

PG 4.10.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Measure labour requirement using the two factors; time to complete a contract and physical amount of work to be completed;
- ii) Learn how to select and employ reliable staff and labour;
- iii) Administer labour;
- iv) Draw up a simple employment contract for labour;
- v) Complete time sheets and maintain records;
- vi) Administer payroll functions;
- vii) Understand and apply statutory requirements and regulations with regard to employment of staff and labour.

PG 4.11 Contractor's Responsibilities and Requirements

PG 4.11.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Understand the role of the Employer, Contractor, Engineer, Local- and statutory authorities;

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- ii) Read and interpret a construction programme;
- iii) Programme and plan to complete tasks on time;
- iv) Interpret and adhere to specifications;
- v) Manage labour;
- vi) Plan tool requirements;
- vii) Choose correct tools and equipment;
- viii) Have a knowledge of contract management;
- ix) Facilitate and manage good relationships with all parties involved;
- x) Understand and apply the Construction Regulations with regard to construction in general.

PG 4.12 Payroll Management and Implementation

PG 4.12.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Understand and compile payroll data;
- ii) Learn coinage submission;
- iii) Prepare a payroll for electronic payment;
- iv) Implement the pay;
- v) Understand and apply statutory requirements and regulations with regard to employment and payment of staff and labour.

PG 4.13 Basic Tender and Contract Pricing

PG 4.13.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Recognize and understand Fixed and Time-Related costs and charges;
- ii) Read and understand Bills of Quantities;
- iii) Apply rates and accurately extend to quantities;
- iv) Refer and look up statutory rates and price indices;
- v) Accurately Calculate Contract Price Adjustment;
- vi) Place orders and negotiate with suppliers;
- vii) Understand a Health & Safety Plan and Environmental Management plan and recognize the cost implications of compliance;
- viii) Learn contract pricing for future projects;
- ix) Understand tender documentation and demonstrate competence in understanding scope and scale of inputs required to complete the contract.

PG 4.14 Community Liaison and Facilitation

PG 4.14.1 Training Objective

At the end of training the trainee shall be able to: -

- i) Understand the Basic Conditions of Employment and other relevant legislation and regulations;
- ii) Understand the role of the Employer, Contractor, Engineer, local- and statutory authorities;
- iii) Understand the role of the Health & Safety Agent, health & Safety Office and Environmental Control Officer;
- iv) Understand protocols in engaging and responding to Local- and statutory authorities;
- v) Demonstrate competence in engaging and responding to the general public and the local community;
- vi) Demonstrate competence in convening and chairing informal and formal meetings;

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- vii) Lead discussions to a conclusion and take concise and accurate minutes of meeting;
- viii) Complete reporting on labour generation and labour issues to EPWP and National Treasury requirements.