City of Johannesburg

Johannesburg Water SOC Ltd

Turbine Hall
65 Ntemi Piliso Street
Newtown
Johannesburg

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REQUEST FOR PRICING (GOODS AND SERVICES)	Form No: JW SCM Dev MBD1 Revision No: 02 Effective Date: February 2023

RFP NUMBER:	JW RFP 25/07/2023	**CLOSING DATE:**	11 August 2023	**CLOSING TIME:**	12H00
DESCRIPTION:	**Repair and Service of BC06 conveyor belt and associated equipment at Northern Works one (1) month**				
BRIEFING SESSION DATE AND TIME	Monday 07 August 2023 at 10:30am	**BRIEFING SESSION VENUE**	Northern Wastewater Treatment Works		
ISSUE DATE	03 August 2023				

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:			
Bidding procedure enquiries must be sent to the below Official		**Technical enquiries must be directed to**	
CONTACT PERSON	Tshilidzi Takalani	**CONTACT PERSON**	Thabiso Thabeng
TELEPHONE NUMBER	011 688 1772	**TELEPHONE NUMBER**	011 510 2602
E-MAIL ADDRESS (Submissions must be made to this address)	tshilidzi.takalani@jwater.co.za	**E-MAIL ADDRESS**	thabiso.thabeng@jwater.co.za

SUPPLIER INFORMATION				
NAME OF BIDDER				
POSTAL ADDRESS				
STREET ADDRESS				
TELEPHONE NUMBER	**CODE**		**NUMBER**	
CELLPHONE NUMBER				
E-MAIL ADDRESS				

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CSR(CIDB) REGISTRATION) NUMBER				
VAT REGISTRATION NUMBER			**CIDB GRADING**	2ME OR HIGHER
SUPPLIER COMPLIANCE STATUS	**TAX COMPLIANCE SYSTEM PIN:**		**CENTRAL SUPPLIER DATABASE No:**	MAAA
B-BBEE VERIFICATION CERTIFICATE	[TICK APPLICABLE BOX] ☐Yes ☐No		**B-BBEE SWORN AFFIDAVIT** (EMEs OR QSEs)	[TICK APPLICABLE BOX] ☐Yes ☐No

BID SUBMISSION:

- Bids must be submitted by the stipulated time to tshilidzi.takalani@jwater.co.za . Late bids will not be accepted for consideration.
- **All pricing/quotation must be submitted by completing the attached or on the official company letterhead, signed and accompanied by the returnable documents stated below.**
- No bids will be considered from persons in the service of the state, companies with directors who are persons in the service of the state, or close corporations with member's persons in the service of the state.

1. SCOPE OF WORK

1.1. DESCRIPTION

The main objective of the project is to repair and service BC06 conveyor belt and associated equipment at Northern Works in line with the latest Johannesburg Water Particular Generic Specifications and applicable standards.

1.1.1. Overview of the Works

The scope of work to be performed under this contract include mechanical and electrical works. The works shall be executed on existing infrastructure and certain sections of the existing installation may be live during installation. The prospective tenderers shall take into consideration all safety precaution requirement in compliance with the Occupational Health and Safety Act, 1993 with associated Regulations. The work to be carried out at Northern Wastewater Treatment Works, Dewatering and Composting areas.

1.1.2. Electrical Works

- Supply and install rotation monitoring devices for all sludge belt conveyors and restore inter-tripping and commission the system.
- Supply, install and commission field control panel for BC06 conveyor belt.
- Repair and calibrate belt weigher for BC04 and supply calibration certificate
- Repair composting shed lighting system along the BC06 conveyor belt
- Repair BC06 conveyor belt trip wire system
- Repair BC06 MCC panel
- Supply and install LV cables
- Supply, install and commission alarm siren complete with strobe light
- Supply, install and commission cable to be used for BC06 conveyor belt field control

1.1.3. Mechanical Works

- Replace return rollers
- Replace guide and idler rollers
- Replace side guide rollers
- Supply and install scrappers; and perform final adjustments
- Replace bearings and housings on return and tail pulleys
- Replace bearings and housings on drive pulleys
- Supply bearings and housings for the pulleys
- Grease bearings before commissioning
- Diamond rubberise 575mm dia. x 650mm long drive pulley
- Supply and install conveyor belt

1.1.4. Scope of Contract

The scope of work under this project will be on a live, operational site and the proposed tenders must therefore take cognizance of this fact when compiling their respective Occupational Health and Safety Plans and shall accommodate appropriate working procedures. It is considered essential that the final effluent quality shall take precedence over the contractor's rate of progress when performing the work and the contractor shall in the construction programme make adequate allowance, therefore. The scope of work to be performed under this contract shall consist of the electrical and mechanical works as provided above.

1.1.5. Location of the Works

The equipment called for under this Contract will be installed at Northern Wastewater Treatment Works. The Treatment Works is located in Diepsloot, approximately 5 km from R511. Northern Wastewater Treatment Works can be accessed from R114 (adjacent to Northern Farm) or School Road off R511.

1.2. GENERAL

All items supplied must be as follows:

- They must be in accordance with the specified technical requirements and in compliance with JW particular generic specifications where applicable.
- Items offered must be SANS approved where applicable.

1.3. ENGINEERING

1.3.1. Employer's Design

The scope of work shall be executed on existing infrastructure and the design shall be based on compatibility with the existing equipment and technical specifications stipulated in this contract for the purpose of execution of the scope of works in the interest of Service and Repair of BC06 conveyor belt and associated equipment such that they are brought to a reliable operational status and are safe and without risk to health in line with the requirement of Occupational Health and Safety Act, 85 of 1993. Any deviation shall be first approved by the Employer's representative before execution.

The Contractor is responsible for the detail design of the Works where the scope of works includes supply of new item that will interact with existing structures on site. Manufacture of new items shall be provided with shop drawing as part of data documentation or pack.

1.3.2. Drawings

No as-built drawings are available.

1.3.3. Applicable Generic Particular Specifications of JW

Item	Reference Number	Description/Title
1.	ME16	Mechanical Conveyor Equipment
2.	E03	Electrical Isolator Pushbutton Station
3.	E04	Electrical LV DB's and MCC's
4.	E05	Electrical LV Cables
5.	E06	Electrical Cables Installation

1.4. QUANTITIES

The quantities are as per the pricing schedule.

1.5. DURATION OF CONTRACT

One (1) month

2. TENDER FORM AND PRICE SCHEDULES

To: Johannesburg Water (SOC) Ltd.

Having examined the Tender documents including Addenda Nos _____ [insert numbers], the receipt of which is hereby duly acknowledged, we, the undersigned, offer **Repair and Service of BC06 conveyor belt and associated equipment at Northern Works** as specified in conformity with the said RFP documents and as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Tender.

Details of my / our offer are / are as follows:

We undertake, if our Tender is accepted, execute the contract in accordance with the requirements as specified.
We agree to abide by this Tender for a period of ninety (90) days from the date fixed for Tender opening, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal Contract is prepared and executed, this Tender, together with your written acceptance thereof and your notification of award, shall constitute a binding Contract between us.

We understand that Johannesburg Water is not bound to accept the lowest or any tender it may receive, and that the contract may be awarded in whole or in part and to more than one tenderer.

Should my/our tender be successful, it be understood that a contract will come into existence as a once off contract which will commence from the date indicated in the letter of acceptance.

2.1 SCHEDULE OF PRICES:

The evaluation on price alteration will be conducted as follows:

2.1.1 Where the tender award strategy is to evaluate and award per item or category, the following must apply:

(i) If there is an alteration on the rate but no alteration on the total for the item or category, the bidder will not be disqualified

(ii) If there is an alteration on the total for the item/s without authentication, bidders will only be disqualified for alteration per item or category.

2.1.2 Where the tender award strategy is to evaluate and award total bid offer, the following must apply:

(i) If there is an alteration on the rate, total for the line item, sub-total/ sum brought/carried forward for the section but no alteration on the total bid offer, the bidder will not be disqualified.

(ii) If there is an alteration on the total bid offer on form of offer, then the amount in words must be considered or vice-versa.

(iii) If there is an unauthenticated alteration on the total bid offer and the amount in words is not authenticated the bidders will be disqualified for the entire tender.

2.1.3. Where the tender pricing schedule or bill of quantities is requesting rates/price from bidder/s without providing a total, the following will apply:

(i) If there is an unauthenticated alteration on the unit rate/price the bidder must be disqualified.

Tenderer to complete the below Bill of Quantities below:

ITEM	*MILESTONES / LINE ITEMS*	*Units*	*QTY*	*UNIT PRICE*	*TOTAL COSTING*
1	**SECTION 1: PRELIMENARY AND GENERAL**				
1.1	**FIXED CHARGE AND VALUE RELATED ITEMS**				
1.1.1	Compliance with the Health & Safety Specification	Sum	1		
1.1.2	Compliance with the Environmental Management Plan	Sum	1		
1.1.3	Qaulity Control and method statements	Sum	1		
				TOTAL: SECTION 1	
	SECTION 2: ELECTRICAL AND MECHANICAL WORKS				
2.1	**SECTION 2.1 ELECTRICAL SCOPE**				
2.1.1	Supply and install Redler RoCon rotation monitoring devices (IP67) and restore 6off, and restore interpreting of all the sludge belt conveyors (commission system)	sum	1		
2.1.1.1	Supply and install 10mm2, 4 core, Cu, SWA, PVC, PVC, PVC 600/1000V cable	No.	1		rate only
2.1.1.2	Supply and install LV cable splice kit for the cable in 2.1.1	No.	1		rate only
2.1.1.3	Supply and install corrosion-protected Ex e cable grand for the cable in 2.1.1	No.	1		rate only
2.1.2	Supply, install and commission field control panel for BC06 c/w isolator, lockout device, E-stop, LED stop button, LED start button. All suitable for 3ph 7.5kW induction motor. Box must be IP65 and per JW spec (QCP required for this item)	No.	1		
2.1.3	Repair and calibrate BC04 belt weigher (supply certificate)	sum	1		
2.1.4	**Repair composting shed lighting system along the BC06 conveyor belt**				
2.1.4.1	Supply, install and commission 500W LED light fitting IP65 (aluminium cover)	No.	4		
2.1.4.2	Supply and install 6mm2, 4 core, Cu, SWA, PVC, PVC, PVC 600/1000V cable	m	1		rate only
2.1.4.3	Supply and install LV cable splice kit for the cable in 2.1.4.2	No.	1		rate only
2.1.4.4	Supply and install corrosion-protected Ex e cable grand for the cable in 2.1.4.2	No.	4		

ITEM	MILESTONES / LINE ITEMS	Units	QTY	UNIT PRICE	TOTAL COSTING
2.1.4.5	Test and commission	Sum	1		
2.1.5	**Repair BC06 conveyor belt trip wire system**				
2.1.5.1	Supply emergency cable pull switch, single end, slack, CHW53198A	No.	2		
2.1.5.2	Supply emergency cable pull switch, double end, slack, CHW53197A	No.	1		
2.1.5.3	Supply coated steel cable c/w crosby clamps	sum	1		
2.1.5.4	Supply and install control cable 2.5mm2, 4 core, Cu, SWA, PVC, PVC, PVC, 600/1000V	sum	1		
2.1.5.5	Supply and install LV cable splice kit for the cable in 2.1.5.4	No.	1		
2.1.5.6	Supply and install corrosion-protected Ex e cable grand for the cable in 2.1.5.4	No.	6		
2.1.5.7	Test and commission	No.	1		
2.1.6	**Repair BC06 MCC panel**				
2.1.6.1	Supply and install contactor (AC3 11kW 3ph, 220V coil) c/w auxiliaries	No.	1		
2.1.6.2	Supply and install thermal overload relay (range 10A to 15A)	No.	1		
2.1.6.3	Neat up wiring in the panel and make it safe	sum	1		
2.1.6.4	Test and commission	sum	1		
2.1.7	Supply, install and commission alarm siren (200dBA) c/w strobe light (install next to tail pulley)	sum	1		
2.1.8	Supply, install and commission 2.5mm2, 7 core, Cu, SWA, PVC, PVC, PVC 600/1000V cable (used for field control of conveyor belt drive)	m	550		
2.1.9	Supply and install corrosion protectected Ex e cables glands for cable in 2.1.8	No.	4		
2.1.10	Supply and install LV splice kit suitable for item 2.1.8 cable	each	2		
2.1.11	Issue Certificates of Compliance as required for the new electrical installation works	Sum	1		
				TOTAL SECTION 2.1	

ITEM	MILESTONES / LINE ITEMS	Units	QTY	UNIT PRICE	TOTAL COSTING
2.2	**SECTION 2.2: MECHANICAL WORKS**				
2.2.1	**Replace rollers on BC01, BC02, BC03, BC04, BC05, BC06 conveyor belts**				
2.2.1.1	Replace return rollers - size 688x127mm series 25C/E (supply new)	No.	150		
2.2.1.2	Replace guide and idler rollers 240x127mm series 25C/E (supply new)	No.	300		
2.2.1.3	Replace side guide rollers 50mm dia. with 20mm bolt size (supply new)	No.	50		
2.2.2	**Supply and install scrappers and make final adjustments on BC06 conveyor belt**				
2.2.2.1	Rubber scrapper	No.	1		
2.2.2.2	Stainless steel 304L scrapper	No.	1		
2.2.2.3	Tangstan scrapper	No.	1		
2.2.3	Replace bearings and housings on return and tail pulleys (22215ck and ASNH510-608) (supply new) on BC06	No.	4		
2.2.4	Replace bearings and housings on drive pulleys (22217ck and SNU17) (supply new) on BC06	No.	2		
2.2.5	Supply and apply grease for all the bearings on BC06 before commissioning	Sum	1		
2.2.6	Supply and install diamond rubberise 575mm dia. x 650mm long drive pulley on BC06	No.	1		
2.2.7	Supply and operate sky Jack (battery operated) 6m hieght for the elevated work (for both electrical and mechanical works in the contract, not just BC06)	sum	1		
2.2.8	Supply and install 65mm dia. x 1070mm long bright mild steel shaft on BC06	No.	2		
2.2.9	Supply and install locking elements FLK133-65X115 ISO on BC06	No.	4		
2.2.10	Supply, install, align and tension new conveyor belt 315/3PLY 4.2x1.6N x 8.8mm thick rubber conveyor 600mm wide on BC06	m	700		
2.2.11	Perform conveyor belt splicing for BC06 new conveyor belt	No.	4		
2.2.12	**BC03, BC04, BC05 and Emergency Bay Conveyor Belts**				
2.2.12.1	Supply, install, align and tension new conveyor belt 315/3PLY 4.2x1.6N x 8.8mm thick rubber conveyor 600mm wide on BC03, BC04 and BC05	m	302		
2.2.12.2	Perform conveyor belt splicing for BC03, BC04 and BC05 new conveyor belts	No.	3		

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ITEM	MILESTONES / LINE ITEMS	Units	QTY	UNIT PRICE	TOTAL COSTING
2.2.12.3	Supply, install, align and tension new conveyor belt 315/3PLY 4.2x1.6N x 8.8mm thick rubber conveyor 900mm wide on Emergency Bay	m	45		
2.2.12.4	Perform conveyor belt splicing for Emergency Bay new conveyor belt	No.	1		
2.2.12.5	Supply and install diamond rubberise 575mm dia. x 650mm long drive pulley on BC05	No.	1		
2.2.12.6	Supply and install diamond rubberise 450mm dia. x 650mm long drive pulley on BC03	No.	1		
2.2.12.7	Supply and install 65mm dia. x 1070mm long bright mild steel shaft on BC03 and BC05	No.	4		
2.2.12.8	Supply and install locking elements FLK133-65X115 ISO on BC03 and BC05	No.	8		
2.2.12.9	Install emergency conveyor return rollers 950x63mm	No.	10		
2.2.12.10	Install emergency conveyor return rollers 310x63mm	No.	30		
2.2.12.11	Replace scappers on emergency conveyor (supply new)	No.	2		
2.2.12.12	Replace drive chain and sprockets on emergency conveyor (supply new)	No.	1		
				TOTAL SECTION 2.2	
				TOTAL: SECTION 2	
				SUB-TOTAL (SECTION 1 +2)	
				5% Contingencies	
				SUB-TOTAL	
				15% VAT	
				GRAND TOTAL	

Signature of person authorized to sign this tender (Bill of Quantities Sign-off):

Name: _____ **Signature:** _____

Date: _____

3. EVALUATION CRITERIA

3.1. Stage 1: Mandatory Requirements

NO.	MANDATORY CRITERIA	YES
1.	Compulsory briefing session to be attended by all potential tenderers.	Yes
2.	CIDB grading 2ME or above, Tenderer must provide the CIBD registration number and ensure that CIDB status is active at the required grading at evaluation stage.	Active Status of required CIDB grading or higher at the time of Evaluation
3.	Signed Bill of Quantities	Yes

NB: Bidders that fail to comply with the above mandatory requirements will not be evaluated further.

3.2. Stage 2: Administrative Evaluation

NO.	REFERENCE TO TENDER DOCUMENT	DESCRIPTION	REQUIREMENT
1.	Certificate of Authority	Certificate of Authority or Board Resolution granting authority to sign.	Completed and signed certificate of authority to sign or signed board resolution
3.	CSD	Central Supplier Database Registration	Provide proof of CSD registration.
4.	MBD 3.1	Pricing Schedule – Firm Prices (Purchases)	Complete and submit complete and signed MBD 3.1 Form.
5.	MBD 4	Declaration of Interest	Complete and submit complete and signed MBD 4 Form.
6.	MBD 6.1	Preference Points Claim in Terms of The Preferential Procurement Regulations 2022	Complete and submit complete and signed MBD 6.1 Form.
7.	MBD 8	Declaration of Bidder's Past Supply Chain Management Practices	Complete and submit complete and signed MBD 8 Form.

NO.	REFERENCE TO TENDER DOCUMENT	DESCRIPTION	REQUIREMENT
8.	MBD 9.	Certificate of Independent Bid Determination	Complete and submit complete and signed MBD 9 Form.
9.	Annexure – Proof of Specific Goals	Valid BBBEE Certificate or certified copy thereof or a valid sworn affidavit	Submit applicable documentation with the tender submission
10.	Annexure	Municipal statement of account for Director/s (not older than three [03] months from the closing date of tender or a valid lease agreement at time of tender closure).	Submit applicable documentation with the tender submission
11.	Annexure	Municipal statement of account for Company (not older than three [03] months from the closing date of tender or a valid lease agreement at time of tender closure).	Submit applicable documentation with the tender submission
12.	Annexure	Joint Venture Agreement signed by all parties.	Submit applicable documentation with the tender submission

3.3. Stage 3: Functionality/Technical Evaluation Criteria

The functionality or technical evaluation criteria is as follows:

CRITERIA NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE	WEIGHTING	SCORE
1.	**Company's Experience** The Tenderer (Company) is required to have experience in the installation, repairs,	The Tenderer (Company) must provide relevant reference letter(s) with proof that they have executed and successfully completed the required works in rendering services of installation, repairs, refurbishment, or maintenance of conveyor belts.	**Total Number of successful completed projects in respect to relevant experience in conveyor belts**	50	
			Less than one (1) project		0
			One (1) to (3) projects		32
			Four (4) projects or more		50

	refurbishment, or maintenance of conveyor belts.	*This document must be completed by the referee and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. The Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.*			
2.	**Qualifications of Artisan: Fitter**	The tenderer is required to submit the following copy of qualification for Artisan: Fitter who will be assigned for the execution of the work. - Fitting, Fitter, Millwright or Fitter and Turner Trade Test Certificate	**Bidder is to submit proof of relevant specified qualification**	20	
			The bidder did not provide the required qualification		0
			Fitting, Fitter, Millwright or Fitter and Turner Trade Test Certificate		13
			Fitting, Fitter, Millwright or Fitter and Turner Trade Test Certificate plus N3 (NQF 4) or Higher Mechanical Qualification Certificate		20
3.	**Experience of Artisan: Fitter**	The tenderer must submit CVs of their key personnel describing their relevant work experience in installation, repairs, refurbishment, or maintenance of conveyor belts.	**Total Number of projects in respect to relevant experience in conveyor belts**	30	
			Less than three (3) Projects.		0
			Three (3) Projects or more but less than five (5) Projects		20
			Five (5) Projects or more		30
MINIMUM QUALIFYING SCORE				**65**	
TOTAL				**100**	

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CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

I, the undersigned being duly authorized to do so, hereby furnish a reference to Johannesburg Water relative to the **Repair and Service of BC06 conveyor belt and associated equipment at Northern Works**

Name of Tenderer: ……

Description of Goods / Services provided

……

……

……

……..

Duration: Year-Month-Day when the Goods / Services were provided

……

Name of authorised person: ……

Signature: ……..…….. Date ……..……...

Telephone/Mobile: ……

Email: ……..

Completed on behalf (Name of Client) ……...

NB: *This document must be completed by the referee and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.*

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Telephone/Mobile: ……

Email: ……..……..

Completed on behalf (Name of Client) ……...

NB: *This document must be completed by the referee and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.*

City of Johannesburg

Johannesburg Water SOC Ltd

Turbine Hall
65 Ntemi Piliso Street
Newtown
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

Curriculum Vitae of Key Personnel

Provide separate forms for each key personnel as per the position listed in the form:

Artisan: Fitter

Curriculum Vitae	
Name:	**Date of birth:**
Profession (If Applicable):	**Nationality:**
Qualifications:	
Name of Employer (firm):	
Current position:	**Total Months Relevant Experience:**
Employment Record:	
Experience Record Pertinent to Required service:	

START DATE (day/ month/year)	**End DATE (day/month year)**	**COMPANY WHICH PROVES RELEVANT EXPERIENCE**

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

…… ……

Signature of person named in the schedule *Date*

3.3.1. Bidders are required to meet a minimum of 65 points on the functionality evaluation to be further evaluated on the preference points. Bidders that do not meet a minimum of 65 points will be disqualified and will not be evaluated further.

3.4. Stage 3: Price and Preference Points Evaluation

The responses will be evaluated on the **80/20 preference point's principle**. 80 Points Price and 20 Points Specific Goals. Pricing schedule to be completed fully by the bidder. Bidders who failure to quote or complete the pricing schedule as per this requirement will be disqualified.

The required proof for claiming points for specific goals is as follows:

The specific goals allocated points in terms of this tender	**Number of points allocated (80/20 system)**	**Number of points claimed (80/20 system) (To be completed by the tenderer)**
SMME (An EME or QSE) 51% or more Black owned	10	
Business owned by 51% or more- Women	10	
Total	**20**	

SPECIFIC GOALS – ANY ONE OR A COMBINATION OF ANY	**MEANS OF VERIFICATION THAT MUST BE SUBMITTED OR A COMBINATION THEREOF TO PROVIDE POINTS CLAIMED**
Business owned by 51% or more- Women	• Valid BBBEE Certificate issued by SANAS accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR • CIPC registration document showing percentage of ownership and share certificate where applicable • ID copy
SMME (An EME or QSE)51% or more Black owned	• Full CSD report and ID copy of owner/s. • BEE Certificate issued by SANAS accredited verification agency, DTI BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath.

	• CIPC registration document of company or share certificates for all shareholders.

Joint Venture (JV), Consortium or Equivalent **NOTE:** Points for specific goals will be allocated proportionally depending on the percentage ownership/interest of each party.	• JV, Consortium or Equivalent agreement which must indicate percentage ownership/interest of each party, and • Certified copy a valid consolidated BBBEE certificate issued by SANAS accredited verification agency, and

Note: A tenderer failing to submit valid proof of specific goals claimed as per the tender conditions may not be disqualified but only points for price will be allocated and zero points for specific goals.

4. AWARDING STRATEGY

This request for pricing will be awarded to the highest scoring bidder in terms of price and points scored for specific goal

5. RETURNABLE DOCUMENTS

The following documents **must** be returned together with this Request for Pricing:

5.1. This request for pricing document must be completed and submitted with pricing or quotation.

5.2. Proof of points claimed for specific goal must be submitted in order to qualify for Specific Goals points.

5.3. Complete and sign the following Municipal Bidding Documents (MBD).

- **5.3.1.** MBD 3.1 Firm Price(s) Purchase
- **5.3.2.** MBD 4 form (Declaration of Interest).
- **5.3.3.** MBD 6.1 Form (Preference points claim form).
- **5.3.4.** MBD 8 (Declaration of Bidder's Past Supply Chain Management Practices)
- **5.3.5.** MBD 9 (Certificate of Independent Bid Determination).

5.4. Latest municipal account/statement not older than three months or valid lease agreement for both the company and all active Directors.

5.5. The required documentary evidence for functionality or technical evaluation (where Applicable).

5.6. CIDB grading, Tenderer must provide the CIBD registration number and ensure that CIDB status is active at the required grading at evaluation stage.

6. GENERAL TERMS AND CONDITIONS

Price(s) quoted must be valid for at least ninety (90) days from date of your offer.

Price(s) quoted **must** be firm for the duration of the contract and must be inclusive of VAT.

Bidders will be afforded a period of two (2) days to complete the following returnable documents (MBD 4, MBD 6.1, MBD 8 and MBD 9) in instances where such forms are incomplete.

Bidders who did not submit municipal statement of account or valid lease agreement for both the company and all active directors will be afforded a period of two (2) days to submit. In a case where the company or active Directors have municipal commitments overdue for more than 90 days they will be offered three (3) days to settle their overdue amounts or submit proof of an arrangement agreed to between that municipality and that company or Director.

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SPECIAL CONDITIONS

1. DEFINITIONS:

1.1 That "Johannesburg Water (SOC) Ltd" shall herein after be referred to as "JW".

1.2 The "Managing Director" shall mean the Managing Director: Johannesburg Water (Soc) Ltd or his authorised representative.

1.3 "Vat" shall mean Value Added Tax in terms of the Value Added Tax Act 89 of 1991 as amended.

2. PRICE:

2.1 All prices shall exclude Value Added Tax (VAT) at the standard rate as gazetted from time to time by the Minister of Finance in terms of the Value Added Tax Act 89 of 1991 as amended.

2.2 All price(s) tendered shall include the cost of all insurances, services, labour, equipment, materials, etc. and be the net price after all discounts and settlement discount have been deducted. The net price/s shall be without any extra or additional charges to JW whatsoever.

2.3 A firm price will be acceptable.

2.4 Prices must include cost of supply, delivery, installation and commissioning as per technical specification.

3. SURETY BOND:

3.1 No surety bond shall be required in terms of this contract.

4. COMPLIANCE WITH LEGISLATION AND SPECIFICATION:

4.1 The Service Provider shall comply with all Municipal By-laws, and any other Laws, Regulations or Ordinances and shall give all notices and pay all fees required by the provisions of such By-laws and Regulations specified therein.

4.2 The Service Provider shall comply with all the requirements prescribed in the specification.

4.3 Equipment must meet SANS requirements. The service provider must issue Certificate of Compliance for the electrical works in line with SANS 10142-1

5. SAFETY:

5.1 Without derogation from the generality of Clause 4.1, or from any other provision of this contract, the Service Provider shall at all times during the contract, comply in all respects with the safety

and other requirements of the Occupational Health and Safety Act 85 of 1993 and the regulations applicable hereunder.

6. EMPLOYMENT OF LABOUR:

6.1 The Service Provider must ensure that all relevant legislation is complied with in the employment of labour.

7. INSURANCE AND INDEMNIFICA-TION:

7.1 In addition to any insurance required to be held by the Service Provider in terms of the Contract in terms of the Occupational Injuries and Diseases Act no. 130 of 1993, the Service Provider must be fully insured against all accidents, loss or damage arising out of the conditions or operation of the vehicles or execution of any work including all third-party risks. The Service Provider hereby indemnifies and agrees to keep indemnified throughout the period of the contract JW against all claims by third parties or the Service Provider's own employees resulting from the operations carried out by the Service Provider under this contract.

7.2 A current certificate of good standing in terms of the Compensation for Occupational Injuries and Diseases Act, 1993 must be furnished by the Service Provider within 21 days of notification of acceptance of the tender.

7.3 The Service Provider shall be liable for any damages or injury of whatever nature caused directly or indirectly as a result of his operations, to any of JW's or Municipal Government or Private Property or to his own vehicles and personnel.

7.4 Copies of such insurances and indemnifications must be supplied to JW within 21 days of notification of acceptance of the tender.

8. REMEDIES, BREACH, WHOLE AGREEMENT, WAIVER, VARIATION AND INDULGENCES

8.1 If the Service Provider or any person employed or associated with him or in the case of a Company, a Director or shareholder or person also associated with such Company, either directly or indirectly gives or offers to give any gratuity, reward or commission or other bribe to any person in the employ of JW this contract shall be avoidable at the instance of JW.

8.2 If the Service Provider has not complied with the Managing Director's requirements or if he is in breach of any of the Conditions of this contract and:

8.2.1 Fails to remedy such breach within 14 (fourteen) days of receipt of written notice requiring it to do so (or if not

reasonably possible to remedy the breach within 14 (fourteen days), within such further period as may be reasonable in the circumstances, provided that the Service Provider furnishes evidence within the period of 14 (fourteen) days reasonably satisfactory to JW, that it has taken whatever steps are available to it to commence remedying the breach), then the JW shall be entitled, without notice and in addition to any other remedy available to it at law or under this agreement, including obtaining an interdict, to cancel this agreement or to claim specific performance of any obligation whether or not the due date for performance has arrived, in either event without prejudice to JW's right to claim damages.

8.2.2 Should JW elect to cancel the contract then and in such instance a certificate presented by the Managing Director of JW shall constitute proof of the Service Provider's indebtedness to JW.

8.3 This agreement constitutes the entire agreement between the parties relating to the matter hereof.

8.4 No amendment or consensual cancellation of this agreement or any provision or term hereof or of any agreement, bill of exchange or other document issued or executed pursuant to or in terms of this agreement and no settlement of any dispute arising under this agreement and no extension of the time, waiver or relaxation or suspension of any of the provisions or terms of this agreement or of any agreement, bill of exchange or other document issued pursuant to or in terms of this agreement shall be binding unless recorded in a written document signed by the parties. Any such extension, waiver or relaxation or suspension, which is so given or made, shall be strictly construed as relating to the matter in respect whereof it was made or given.

9. DISPUTES:

9.1 In the event of any dispute arising between JW and the Service Provider in connection with or arising out of the contract, it shall be referred to the Managing Director of JW who shall state his decision in writing and give notice of the same to the Service Provider within 28 days of the dispute having been submitted to the Managing Director of JW. Such decision shall be binding upon the Service Provider subject to clause 9.2

9.2 Should the Service Provider be dissatisfied with the decision of the Managing Director he/she may, within 28 days after receiving notice of such decision, require that the issue or issues be

	9.3	referred to a single arbitrator to be agreed upon between the parties or, failing agreement, to be nominated by the Chairman of the Association of Arbitrators and any such reference shall be deemed to be submission to the arbitration of a single arbitrator in terms of the Arbitration Act, 1965. The award of the arbitrator shall be final and binding on both parties. Not later than one week after receipt of notice calling for arbitration, JW may give notice to the Service Provider that the dispute or disputes be settled by Court of Law having jurisdiction.
10. SCOPE OF CONTRACT:	10.1	The main objective of the project is to repair and service BC06 conveyor belt and associated equipment at Northern Works in line with the latest Johannesburg Water Particular Generic Specifications and applicable standards.
	10.2	**The Service Provider shall be required to offer 12-month warranty for all new items, 6-month warranty for all repaired items and on workmanship.**
11. DURATION:	11.1	The tenure of the contract shall be with effect from the date of signing the contract as a once off purchase and completion within one (1) month.
12. QUANTITIES	12.1	Quantities shall be as per Bill of Quantities. Items which are practical to re-measure shall be remeasured for the purposes of payment .
13. PLACE AND TIME OF DELIVERIES:	13.1	Delivery shall be at Northern Wastewater Treatment Works during normal working hours, 08h00 to 15h00 weekdays.
14.SAMPLES:	14.1	Not required
15. TENDER VALIDITY:	15.1	The Tender shall be valid for a period of ninety (90) days from the date of closing of Tenders.
16. ADJUDICATION OF TENDERS:	16.1	The highest, lowest or any tender will not necessarily be accepted by JW. JW reserves the right to adjudicate the Tender to JW's best interest and it is not necessarily intended to award the Contract to only one Service Provider.

17. ACCEPTANCE OF TENDER:

17.1 A valid and binding contract shall be concluded at the time when the Service Provider receives an official appointment letter and sign letter of acceptance at the offices of JW after the Service Provider where he/she will enter into a contract with JW with the term and conditions packaged in this document.

18. COMPLETENESS:

18.1 Failure by the tenderer to complete in full the required information regarding their proposal will render the tender liable to rejection on the grounds of being incomplete.

19 QUALITY AND GUARANTEE

19.1 The Service Provider shall not be relieved of his obligations with respect to the sufficiency of the materials, workmanship and quality of the goods by reason of no obligation having been taken thereto by JW's representative at the time the goods were delivered.

19.2 If at any time, as stipulated in the contract, but not exceeding twelve (12) months after delivery, JW is dissatisfied with the goods or with any part thereof on account of materials being faulty or of inferior quality of workmanship or bad design or on account of the goods not being in strict accordance with the contract specifications; the Service Provider shall immediately remedy the said defects free of cost to JW. Should the Service Provider delay remedial work in excess of the time stipulated by JW's representative, JW may have such remedial work executed at the Service Provider's expense.

19.3 The risk of all goods purchased by JW from the Service Provider under this contract shall remain with the Service Provider until such time the goods have been delivered to JW.

19.4 If any dispute arises between JW and the Service Provider in relation with the quality and guarantee of the goods, either party may give the other a notice in writing of the existence of such dispute as stipulated in Clause 9.1.

20. PENALTIES FOR FAILURE TO DELIVER

20.1 If the Service Provider fails to deliver the required quantity of product by the due date agreed upon: a penalty of 5% (five) shall be applied for the total value of that specific order where delivery conditions were not met. Alternatively Johannesburg Water reserves the right to purchase the product elsewhere and to deduct any extra expense in excess of the tender rates so incurred from any sum due under this tender, or recover the amount from the Service Provider as debt.

20.2 No liability in terms of Clause 20.1 shall attach to the Service Provider if he shall prove to the satisfaction of the Engineer that the delivery has been delayed or become impossible due to fire, war, riot, strikes, Natural Disasters, lockout, accident or other unforeseen occurrences or circumstances beyond the Service Providers control, provided, however, that in all cases the Service Provider has notified Johannesburg Water in writing within 24 (Twenty-four) hours of it first coming to the Service Provider's notices, that delivery will be delayed or become impossible for the abovementioned reasons.

PART B
TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:
1.1. BIDS MUST BE SUBMITTED BY THE STIPULATED TIME TO tshilidzi.takalani@jwater.co.za . LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION
1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED–(NOT TO BE RE-TYPED) OR ONLINE**
1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.
2. TAX COMPLIANCE REQUIREMENTS
2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.
2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.
2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.
2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN

/ CSD NUMBER.

2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES ☐ NO

3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA? ☐ YES ☐ NO

3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? ☐ YES ☐ NO

3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? ☐ YES ☐ NO

3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? ☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.

GENERAL CONDITIONS OF CONTRACT (GCC) WILL BE APPLICABLE TO THIS RFP.

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

SIGNATURE OF BIDDER: ……

CAPACITY UNDER WHICH THIS BID IS SIGNED: ……

DATE: ……

PRICING SCHEDULE – FIRM PRICES (PURCHASES)

NOTE: ONLY FIRM PRICES WILL BE ACCEPTED. NON-FIRM PRICES (INCLUDING PRICES SUBJECT TO RATES OF EXCHANGE VARIATIONS) WILL NOT BE CONSIDERED

Name of Bidder……	Bid Number: JW RFP 25/07/2023
Closing Time: 10:30	Closing Date: 11 August 2023

OFFER TO BE VALID FOR……DAYS FROM THE CLOSING DATE OF BID.

- Required by: … Johannesburg Water ….
- At: … Various sites …….

  ……
- Brand and Model …….
- Country of Origin

  ……..

Note: All delivery costs must be included in the bid price, for delivery at the prescribed destination.

** “all applicable taxes” includes value- added tax, pay as you earn, income tax, unemployment insurance fund contributions and skills development levies.

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

---

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:

- the 80/20 system for requirements with a Rand value not exceeding R50 000 000 (all applicable taxes included).

1.2 The applicable preference point system for this tender is the 80/20 preference point system.

1.3 Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:

a) Price; and
b) Specific Goals.

1.4 **To be completed by the organ of state:**

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	80
SPECIFIC GOALS	20
Total points for Price and SPECIFIC GOALS	**100**

1.5 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.

1.6 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

2. DEFINITIONS

a) **"tender"** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
b) **"price"** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
c) **"rand value"** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
d) **"tender for income-generating contracts"** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
e) **"the Act"** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1 POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 PREFERENCE POINT SYSTEMS

A maximum of 90 points is allocated for price on the following basis:

80/20

$$Ps = 80\left(1 - \frac{Pt - P\,min}{P\,min}\right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

4.1 In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in Table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:

Table 1: Specific goals for the tender and points claimed are indicated per the table below.

***Note to tenderers: The tenderer must indicate how they claim points for each preference point system.*)**

The specific goals allocated points in terms of this tender	Number of points allocated (80/20 system)	Number of points claimed (80/20 system) (To be completed by the tenderer)
SMME (An EME or QSE) 51% or more Black owned	10	
Business owned by 51% or more-Women	10	
Total	**20**	

5. **DECLARATION WITH REGARD TO COMPANY/FIRM**

5.1 Name of company/firm……

5.2 Company registration number: ……...

5.3 TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One-person business/sole propriety
- ☐ Close corporation
- ☐ Public Company
- ☐ Personal Liability Company
- ☐ (Pty) Limited
- ☐ Non-Profit Company
- ☐ State Owned Company

[TICK APPLICABLE BOX]

5.4 I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

i) The information furnished is true and correct;

ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;

iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;

iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –

(a) disqualify the person from the tendering process;

(b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;

(c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

(d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and

(e) forward the matter for criminal prosecution, if deemed necessary.

	.....
	SIGNATURE(S) OF TENDERER(S)
SURNAME AND NAME:	.....
DATE:	.....
ADDRESS:	.....
	.....
	.....
	.....

MBD 4

DECLARATION OF INTEREST

1. No bid will be accepted from persons in the service of the state[1].

2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority.

3 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

3.1 Full Name of bidder or his or her representative:……..

3.2 Identity Number: …….

3.3 Position occupied in the Company (director, trustee, hareholder[2]):……..

3.4 Company Registration Number: …….

3.5 Tax Reference Number:……

3.6 VAT Registration Number: ……

3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.

3.8 Are you presently in the service of the state? **YES / NO**

3.8.1 If yes, furnish particulars. ……

……..

[1]MSCM Regulations: "in the service of the state" means to be –

(a) a member of –
  (i) any municipal council;
  (ii) any provincial legislature; or
  (iii) the national Assembly or the national Council of provinces;

(b) a member of the board of directors of any municipal entity;
(c) an official of any municipality or municipal entity;
(d) an employee of any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999);
(e) a member of the accounting authority of any national or provincial public entity; or
(f) an employee of Parliament or a provincial legislature.

[2] Shareholder" means a person who owns shares in the company and is actively involved in the management of the company or business and exercises control over the company.

3.9 Have you been in the service of the state for the past twelve months? ……**YES / NO**

3.9.1 If yes, furnish particulars.……..……..

……

3.10 Do you have any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid? …… **YES / NO**

3.10.1 If yes, furnish particulars.
……
……

3.11 Are you, aware of any relationship (family, friend, other) between any other bidder and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid? **YES / NO**

3.11.1 If yes, furnish particulars
……
……

3.12 Are any of the company's directors, trustees, managers, principle shareholders or stakeholders in service of the state? **YES / NO**

3.12.1 If yes, furnish particulars.
……
……

3.13 Are any spouse, child or parent of the company's directors trustees, managers, principle shareholders or stakeholders in service of the state? **YES / NO**

3.13.1 If yes, furnish particulars.
……
……

3.14 Do you or any of the directors, trustees, managers, principle shareholders, or stakeholders of this company have any interest in any other related companies or business whether or not they are bidding for this contract. **YES / NO**

3.14.1 If yes, furnish particulars:
……..
……..

4. Full details of directors / trustees / members / shareholders.

Full Name	Identity Number	State Employee Number

…….. ……..

Signature **Date**

…… ……

Capacity **Name of Bidder**

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1 This Municipal Bidding Document must form part of all bids invited.

2 It serves as a declaration to be used by municipalities and municipal entities in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.

3 The bid of any bidder may be rejected if that bidder, or any of its directors have:

a. abused the municipality's / municipal entity's supply chain management system or committed any improper conduct in relation to such system;
b. been convicted for fraud or corruption during the past five years;
c. willfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years; or
d. been listed in the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004).

4 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the *audi alteram partem* rule was applied). **The Database of Restricted Suppliers now resides on the National Treasury's website(**www.treasury.gov.za**) and can be accessed by clicking on its link at the bottom of the home page.**	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.**	Yes ☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court of law outside the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐

4.3.1	If so, furnish particulars:		
Item	**Question**	**Yes**	**No**
4.4	Does the bidder or any of its directors owe any municipal rates and taxes or municipal charges to the municipality / municipal entity, or to any other municipality / municipal entity, that is in arrears for more than three months?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:		
4.5	Was any contract between the bidder and the municipality / municipal entity or any other organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.7.1	If so, furnish particulars:		

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME) ……..……..…… CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM TRUE AND CORRECT.

I ACCEPT THAT, IN addition TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

……... **……..**
Signature **Date**

……. **……..**
Position **Name of Bidder**

MBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1 This Municipal Bidding Document (MBD) must form part of all bids[1] invited.

2 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).[2] Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.

3 Municipal Supply Regulation 38 (1) prescribes that a supply chain management policy must provide measures for the combating of abuse of the supply chain management system, and must enable the accounting officer, among others, to:

a. take all reasonable steps to prevent such abuse;

b. reject the bid of any bidder if that bidder or any of its directors has abused the supply chain management system of the municipality or municipal entity or has committed any improper conduct in relation to such system; and

c. cancel a contract awarded to a person if the person committed any corrupt or fraudulent act during the bidding process or the execution of the contract.

4 This MBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.

5 In order to give effect to the above, the attached Certificate of Bid Determination (MBD 9) must be completed and submitted with the bid:

[1] Includes price quotations, advertised competitive bids, limited bids and proposals.

[2] Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

MBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

_____

(Bid Number and Description)

in response to the invitation for the bid made by:

_____

(Name of Municipality / Municipal Entity)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of:_____that:

(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word “competitor” shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:

    (a) has been requested to submit a bid in response to this bid invitation;
    (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
    (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder

6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium[3] will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
    (a) prices;
    (b) geographical area where product or service will be rendered (market allocation)
    (c) methods, factors or formulas used to calculate prices;
    (d) the intention or decision to submit or not to submit, a bid;
    (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
    (f) bidding with the intention not to win the bid.
8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

[3] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

……	……
Signature	Date
…….	……
Position	Name of Bidder

JOHANNESBURG WATER (SOC) Ltd.

BULK WASTEWATER

PARTICULAR SPECIFICATION

E03 : ELECTRICAL ISOLATOR

PUSHBUTTON STATION

(LOCAL START/STOP) EQUIPMENT

Johannesburg Water

Johannesburg Water (SOC) Ltd.
PO Box 61542
Marshalltown
2107

Revision 5

August 2019

City of Johannesburg
Johannesburg Water (Pty) Ltd

DOCUMENT CONTROL SHEET

Document Title: **Particular Specification – E03 : Electrical Isolator Pushbutton Station (Local Start/Stop) Equipment**

JW Reference: **BWW523C**

Document Ref. No: **E03**

DOCUMENT APPROVAL

ACTION	FUNCTION	NAME	DATE	SIGNATURE
Prepared	Senior Electrical Engineer	B Pieterse	August 2019	
Reviewed	Director	R Baard	August 2019	
Approved	Regional Maintenance Manager	T Thabeng	August 2019	

RECORD OF REVISIONS

Date	Revision	Author	Comments
5	2019-08-20	B Pieterse	Review of Electrical Standards, plus New Design Guidance
4	2014-06-03		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance
3	2012-05-30		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance
2	2010-05-03		Review Electrical Standards
1	2009-05-12		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance

PARTICULAR SPECIFICATION: VOLUME E03: ELECTRICAL ISOLATOR PUSHBUTTON STATION (LOCAL START/STOP) EQUIPMENT

CONTENTS

E03.1 SCOPE

This section covers the requirements for local isolator/start/stop pushbutton stations. Local isolator/start/stop pushbutton stations shall be supplied, delivered, installed and commissioned for each mechanical equipment driven by a motor.

E03.2 STANDARDS

The latest edition, including all amendments up to date of tender of the following particular national specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

(a) SANS 62262 : Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

(b) SANS 60529 : Degrees of protection provided by enclosures (IP code)

(c) SANS 10142-1 : The wiring of premises Part 1 Low-voltage installations

(d) SANS 60439-1 : Low-voltage Switchgear and Control gear Assemblies Part 1 Type-tested and partially type-tested assemblies

(e) SANS 60439-2 : Low-voltage Switchgear and Control gear Assemblies Part 2 Particular requirements for busbar trunking systems (busways)

(f) SANS 60439-3 : Low-voltage Switchgear and Control gear Assemblies Part 3 Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards

(g) SANS 60947-1 : Low-voltage Switchgear and Control gear Part 1 General rules

(h) SANS 60947-2 : Low-voltage Switchgear and Control gear Part 2 Circuit breakers

(i) SANS 60947-3 : Low-voltage Switchgear and Control gear Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

(j) BSI-BS 3858 : Specification for Binding and identification sleeves for use on electric cables and wires

(k) SANS 1091 : National colour standard

E03.3 GENERAL REQUIREMENTS

E03.3.1 Particular specifications to be read in conjunction with this specification

This specification shall be read in conjunction with the following specifications:-
E26: ELECTRICAL SPECIFICATION FOR COLOUR CODES
G02: PARTICULAR SPECIFICATION FOR CORROSION PROTECTION
E08: WIRING

E03.3.2 General Requirements

(a) The enclosure will be manufactured from 3CR12 stainless steel.
(b) The enclosure will be rated IP65 to SANS 60529 and shall be fitted with a canopy.
(c) The enclosure shall be painted electric orange (B26).
(d) The Isolator Pushbutton Station will be equipped with

- A green flush START pushbutton with spring return. In case of a bidirectional drive a START FORWARD and START REVERSE pushbutton will be installed;
- A red flush STOP pushbutton with spring return;
- A red mushroom head EMERGENCY STOP button with mechanical latching, turn to release. The emergency stop pushbutton will be lockable (key reset) and not a padlockable unit. This will not be a lockout point, but will be used for Process use only.
- A three-pole non-fusible disconnect switch complete with a shaft extension and a door interlocked red and yellow padlockable rotary handle mounted on the door. The current rating of the disconnect switch must match the motor rating as specified in the motor equipment schedule (rated for on-load conditions).
- All equipment must be installed in one box (power and control).

(e) The Isolator Pushbutton Station will be clearly labelled with an identity label, engraved with 30mm high black on white characters, and shall be mounted on top of the enclosure. The name of the associated drive will be shown.

(e) All pushbuttons shall be labelled with an identity label, engraved with 10mm high black on white characters and shall be mounted above the pushbutton.

(f) The Isolator Pushbutton Station shall be mounted within a radius of 1000mm maximum from o the associated drive. If this is not possible, the Engineer will indicate the position of the Pushbutton Station.

(g) The station shall be pedestal mounted at least 1100mm above floor level. The pedestal design shall be approved by the Engineer.

(h) The pedestal base plate shall be installed on 10mm of epoxy grout to prevent crack corrosion.

(i) The pedestal material shall be Stainless steel (3CR12) and have minimum thickness of 6mm. The pedestal shall be painted electric orange (B26).

(j) The station enclosure shall be designed to provide adequate space for the following:

- The required pushbuttons, the disconnect switch and the respective labels.
- A single multi-core control cable (including glanding) shall be installed from the MCC to the station, from where the required signals shall be individually wired, as per the cable schedule.
- Power cable/s (including glanding) shall be installed from the MCC to the station, providing power to the associated motor, as per the cable schedule.

E03.4 DIMENSION FOR ISOLATOR STATION

The dimensions of the start/stop isolator pushbutton stations shall allow ample space to accommodate all the equipment, taking into account the bending radius of all cables and minimum clearances. The contractor must supply design drawings of the Isolator Pushbutton Station to Johannesburg Water or their representative for approval prior to manufacturing.

E03.5 FASTENERS

All fasteners in concrete shall be 316 stainless steel. Pedestal bases shall be sealed against the ingress of any crevice corrosion by means of a suitable non-shrink cementitious grout and approved by the Engineer.

E03.6 MEASUREMENT AND PAYMENT

Item	**Unit**
Supply and delivery of local start/stop isolator pushbutton stations	No

The unit of measure shall be the number of stations supplied and delivered.

The tendered rate shall include all costs related to the manufacture, supply and delivery of the local start/stop isolator pushbutton or control stations (as detailed in the schedule of quantities), including support pedestal in accordance with this specification and the additional requirements detailed in the detail specification complete with all mounting brackets.

Separate items will be scheduled in the schedule of quantities for different types and sizes, defined by the kW rating of the driven equipment, of pushbutton / control stations.

Item **Unit**

Install local start/stop isolator pushbutton stations ..... No

The unit of measure shall be the number of stations installed.

The tendered rate shall include full compensation for installing, testing and commissioning of the local start/stop isolator or control stations as specified. The rate shall further include for pedestal support securing and sealing preventing crevice corrosion.

Separate items will be scheduled in the schedule of quantities for different types of pushbutton / control stations.

Separate items will be scheduled in the schedule of quantities for different types and sizes, defined by the kW rating of the driven equipment, of pushbutton / control stations.

JOHANNESBURG WATER (SOC) Ltd.

BULK WASTEWATER

PARTICULAR SPECIFICATION

E04 : ELECTRICAL LOW VOLTAGE DISTRIBUTION BOARDS AND MOTOR CONTROL CENTRES

Johannesburg Water (SOC) Ltd.
PO Box 61542
Marshalltown
2107

Revision 6

August 2019

City of Johannesburg
Johannesburg Water (SOC) Ltd

DOCUMENT CONTROL SHEET

Document Title: **Particular Specification – E04 : Electrical Low Voltage Distribution Boards and Motor Control Centres**

JW Reference: **BWW523C**

Document Ref. No: **E04**

DOCUMENT APPROVAL

ACTION	FUNCTION	NAME	DATE	SIGNATURE
Prepared	Senior Electrical Engineer	B Pieterse	August 2019	
Reviewed	Director	R Baard	August 2019	
Approved	Regional Maintenance Manager	T Thabeng	August 2019	

RECORD OF REVISIONS

Date	Revision	Author	Comments
6	2019-08-20	B Pieterse	Review of Electrical Standards, plus New Design Guidance
5	2014-06-03		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance
4	2012-05-30		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance
3	2011-08-30		Omit Fifa Logo
2	2010-05-30		Review Electrical Standards
1	2009-05-12		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance

PARTICULAR SPECIFICATION: VOLUME E04: ELECTRICAL LOW VOLTAGE DISTRIBUTION BOARDS AND MOTOR CONTROL CENTRES

CONTENTS

E04.1 INTRODUCTION

This specification is for the supply of low voltage (400V) distribution switchboards.

E04.2 SCOPE

E04.2.1 General

The scope of work includes the furnishing of all labour, material and services for the design, supply, manufacture, testing and inspection at works, delivery to site, off-loading and rectification of defects developing during the warranty period for equipment as specified below.

E04.2.2 Work to be Included

The work includes, but shall not be limited to the items listed below.-

(a) All work in E04.2.1 above.

(b) Documentation, as called for in the vendor QA and document requirement list and drawings and data.

(c) The supply of one complete set of any special tools required per switchboard that will be required for operation or maintenance purposes, including three spare sets of each type of fuse.

(d) Recommended spares for one year's operating period and the prices of it.

(e) Technical assistance if requested during checking for operational readiness.

E04.3 STANDARDS

In general, work and materials shall be in accordance with the latest practice and in particular in accordance with the latest revision of the following specifications, and any amendments thereto, the SANS specification taking precedence:

(a) SANS 10142-1 : The wiring of premises Part 1: Low-voltage installations

(b) SANS 60439-1 : Low-voltage switchgear and controlgear assemblies Part 1: Type-tested and partially type-tested assemblies

(c) SANS 60439-2 : Low-voltage switchgear and controlgear assemblies Part 2: Particular requirements for busbar trunking systems (busways)

(d) SANS 60439-3 : Low-voltage switchgear and controlgear assemblies Part 3: Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards

(e) SANS 1973-1 : Low-voltage switchgear and controlgear Assemblies Part 1: Type-tested ASSEMBLIES with stated deviations and a rated short-circuit withstand strength above 10 kA

(f) SANS 60947-1 : Low-voltage Switchgear and Control gear Part 1: General rules

(g) SANS 60947-2 : Low-voltage Switchgear and Control gear Part 2: Circuit-breakers

(h) SANS 60947-3 : Low-voltage Switchgear and Control gear Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

(i) SANS 60947-4.1 : Low-voltage Switchgear and Control gear Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters

(j) SANS 60947-4.2 : Low-voltage Switchgear and Control gear Part 4-2: Contactors and motor-starters - AC semiconductor motor controllers and starters

(k) SANS 60947-4-3 : Low-voltage Switchgear and Control gear Part 4-3: Contactors and motor-starters - AC semiconductor controllers and contactors

			for non-motor loads
(l)	SANS 60947-5-1	:	Low-voltage Switchgear and Control gear Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
(m)	SANS 62262	:	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
(n)	SANS 60529	:	Degrees of protection provided by enclosures (IP code)
(o)	IEC 60228	:	Conductors of insulated cables
(p)	BSS 3858	:	Binding and identification sleeves for use on electric cables and wires
(q)	SANS 1507-1	:	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 1: General
(r)	SANS 1507-2	:	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 2: Wiring cables
(s)	SANS 1574-1	:	Electric Cables – Flexible Cords and Flexible Cables Part 1: General
(t)	SANS 1574-3	:	Electric Cables – Flexible Cords and Flexible Cables Part 3: PVC-insulated cables for industrial use
(u)	SANS 1619	:	Small power distribution units (ready-boards) for single-phase 230 V service connections
(v)	SANS 61643-11	:	Low-voltage surge protective devices Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
(w)	SANS 61643-12	:	Low-voltage surge protective devices Part 12: Surge protective devices connected to low-voltage power distribution systems - Selection and application principles
(x)	SANS 61238-1	:	Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV) Part 1: Test methods and requirements
(y)	SANS 60730-2-7	:	Automatic electrical controls for household and similar use Part 2-7: Particular requirements for timers and time switches
(z)	SANS 62053-61	:	Electricity metering equipment (a.c.) - Particular requirements Part 61: Power consumption and voltage requirements)
(aa)	BSS 1322	:	Aminoplastic Moulding Materials
(bb)	SANS 60076-1	:	Power transformers, Part 1: General
(cc)	SANS 1091	:	National colour standard
(dd)	SANS 61869-1	:	Instrument transformers Part 1: General requirements
(ee)	SANS 61869-2	:	Instrument transformers Part 2: Additional requirements for current transformers
(ff)	SANS 61869-3	:	Instrument transformers Part 3: Additional requirements for inductive voltage transformers
(gg)	IEC 60051/BS 89	:	Direct acting indicating analogue electrical measuring instruments and their accessories. Specification for special requirements for ammeters and voltmeters
(hh)	BS EN 60255	:	Measuring relays and protection equipment. Common requirements
(ii)	SANS 156	:	Moulded-case circuit-breakers
(jj)	SANS 1195	:	Busbars
(kk)	BS159	:	High-voltage busbars and busbar connections

E04.3.1 Particular specifications to read in conjunction with this specification

This specification shall be read in conjunction with the following specifications:-
E26: ELECTRICAL COLOUR CODING OF EQUIPMENT
G02: PARTICULAR SPECIFICATION FOR CORROSION PROTECTION
E06: ELECTRICAL MEDIUM AND LOW VOLTAGE CABLE INSTALLATION
E08: WIRING

E04.3.2 Mandatory Requirements

All equipment and services shall comply with the mandatory requirements of:

(a) Occupational Health and Safety Act 85 of 1993 (as amended).

E04.4 SYSTEM DETAIL

Busbar voltage	400V ±10% as per system voltage on the site
Frequency	50 Hz
Phase rotation	R-Y-B-R
Phases	3Ph+N, with Protective Earth (PE)
Earthing system	TN-S

E04.5 GENERAL REQUIREMENTS

This section will be applicable to the following equipment:

(a) Motor Control Centres (MCC).

(b) Main Distribution Boards (MDB).

(c) Auxiliary Distribution Boards (ADB).

The following is described in separate sections:

(a) Flush Mounted Distribution Boards.

(b) Surface Mounted Distribution Boards

(c) LV Kiosks (Switch Cubicles)

E04.5.1 Manufacturing and Construction Details

E04.5.1.1 General

(a) Electrical panels will be floor standing unless specified differently.

(b) All floor-standing switchboards will be positioned above a cable trench with bottom entry cables.

(c) Electrical switchboards positioned inside Electrical Distribution/MCC rooms shall be manufactured with 2mm thick mild steel.

(d) Electrical switchboards positioned outside Electrical Distribution/MCC rooms shall be manufactured from 2mm thick stainless steel (3CR12) as a minimum. Heaters will be installed in the switchboards to prevent condensation.

(e) In special applications, the Electrical switchboards will be manufactured to the Engineers specification.

(f) All switchboards shall be of ample size to accommodate all the specified switchgear and provide space for future switchgear. For every 4 (or part of 4) circuit breakers of a kind on a switchboard, space for an additional circuit breaker of similar size shall be allowed unless future space requirements are clearly specified.

(g) All specified external dimensions for switchboards shall be strictly adhered to.

(h) The Contractor or Manufacturer shall obtain the opinion of the Engineer before manufacturing any switchboard.

(i) The Contractor shall ascertain the exact position of switchboards and shall arrange timeously for the installation of cable sleeves, openings in the structure, flush draw trays behind switchboards and supports over cable trenches.

(j) In general, flush and surface mounted switchboards shall be mounted 2000mm above finished floor level - measured to the top of the switchboard. The upper ends of switchboards may not be higher than 2100mm above finished floor level.

(k) Unless otherwise agreed or stated in this Specification, all screws, bolts and nuts shall be hexagonal to ISO metric commercial standards and shall be rustproof. Loose ‘bolts and nuts' shall not be used on steelwork. Blind threaded fastening system bushings or equivalent shall be used for thread sizes M5 and above. Studs projecting from the exterior surfaces of the board shall have chrome or cadmium plated dome nuts. Self-tapping screws shall not be utilised for any purpose on any equipment.

(l) The short-circuit current levels as indicated on drawings shall be deemed the maximum fault current occurring at the panel under symmetrical short circuit conditions on the line side of the final limiting device in a circuit. The duration of the maximum short circuit currents shall be deemed a minimum of one second. Evidence (in the form of certificates from testing authorities recognised by Johannesburg Water) of the ability of the 400V switchboards offered to withstand satisfactorily the prospective fault conditions shall be furnished with the tender.

(m) Switchboards shall be designed to confine internal arcing faults and to direct arcs and gases arising from these away from the operator.

(n) The general structure of the panel shall be designed and fabricated to ensure that no excessive vibration caused by the operation of any component is transmitted to any other components, thereby causing spurious tripping of any device.

(o) Measures shall be taken to prevent electrolytic corrosion where dissimilar metals are in contact with each other.

(p) Bolts shall be of the correct size for the holes provided and shall be fitted with matching sizes of washers and lock washers. Where removable covers are provided with bolt fastening, the nuts shall be either welded in position or securely fixed by means of a mechanical fixing device. Self-tapping screws, captive head nuts or cage nuts are not acceptable.

E04.5.1.2 Panel Subdivision

(a) The Electrical panel will be constructed as one or more fully interchangeable modular, rigid, free standing columns, bolted together to form an extensible, composite, vermin proof unit of uniform appearance.

(b) Panels shall be designed to permit the addition of identical columns.

(c) Columns widths will be 600, 700, 800, 900 or 1000 mm for design flexibility. Columns will be 600 or 800mm deep. Increase in depth of certain sections of panels for high current ratings shall be subject to the Engineer's approval.

(d) The overall height of the column may not be more than 2300mm.

(e) Each column shall be divided horizontally into buckets.

(f) Panels will be split into transportable section with lengths not exceeding 3000mm for ease of transportation.

(g) A channel iron frame (minimum 100mm x 50mm) shall be provided under each panel

section of transportable length, which shall be so constructed that it can be used for lifting the transportable section without distortion taking place.

(h) All panel section of transportable length shall be fitted with lifting lugs and shall have sufficient strength to withstand all stresses occurring during transportation, installation and operation without distortion or damage.

E04.5.1.3 Internal Form of Separation

(a) The minimum internal Forms of Separation for any Electrical switchboards shall be Form 3b, as described below:

i. Separation of busbars from all functional units;

ii. Separation of all functional units from one another;

iii. Separation of terminals for external conductors from the functional units, but not from those of other functional units;

iv. The power cable connections are disposed in the same compartment;

v. Maintenance services require extra care, as placed in the same compartment the connections of other units might be powered;

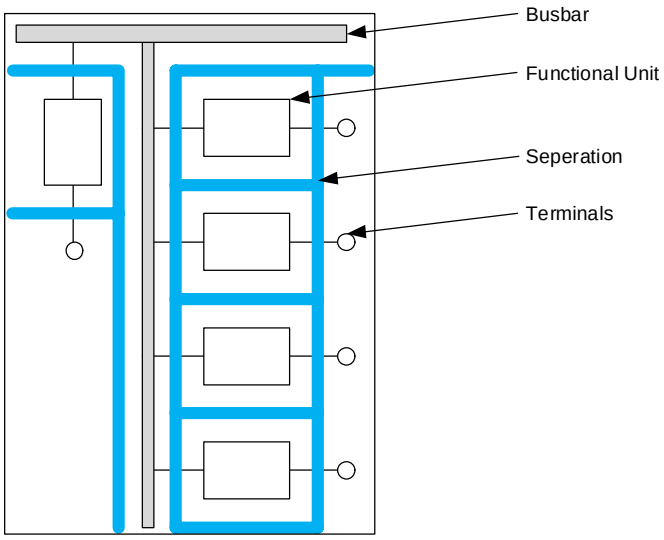

Figure 1: Form 3B

E04.5.1.4 Buckets

(a) Buckets will be equipped and wired as per the drawings issued by the Engineer.

(b) The buckets will be sized to accommodate all components with ease.

(c) Buckets will be fixed pattern with components permanently mounted to the chassis plate of the bucket.

(d) All bucket design and construction shall be based on natural cooling by convection or radiation. Attention shall be given to ventilation to prevent the accumulation of heat in buckets where power electronic drives (soft starters and VSD's) or other heat generating equipment (i.e. control transformers) are contained. Extraction ventilation fans should be installed in these cases to remove heat from the cubicle. The filtered extraction fan should be placed as high as possible in the compartment door with a filtered air inlet opening as low as possible in the compartment door. The fan and opening must be sized to ensure all generated heat is extracted from the bucket. Natural convection cooling will not be accepted.

(e) Spare buckets shall be equipped generally as detailed on the drawings issued by the

Engineer, and shall include all circuit breakers, busbars, wiring, instruments, etc., with the exception that, in the case of withdrawable circuit breakers, only the breaker cradle shall be furnished.

E04.5.1.5 Doors

(a) Buckets shall have doors suitably constructed to ensure rigidity and shall be a neat fit in the framework and around the circuit breaker escutcheon plate.

(b) Doors shall be fitted with robust steel or brass hinges with at least two 6mm square recessed quick close/open latches. Hinges shall be provided at 500mm intervals per door with a minimum of two hinges per door. Each door shall be fitted with an equal number of hinges and latches. At least one of these latches shall be lockable with a padlock.

(c) Doors and covers shall be provided with a high-density neoprene gasket to form a firm seal. The neoprene seal shall be a nominal 5mm thick compressed to 3mm on closing of the door. The entire switchboard shall be effectively dust and splash proof to IP 54.

(d) All hinged doors shall be fitted with a robust mechanism to latch and hold the door in the wide-open position, to minimise inadvertent contact with live parts during maintenance operations.

(e) All hinged doors shall open to a minimum of 135° from the closed position, to facilitate easy access for maintenance.

(f) Doors should be the same width as the MCC column. A single door shall not exceed the width of 800mm. Where the column width exceeds 800mm, two doors must be installed.

(g) The Bucket door shall be interlocked with the circuit breakers to prevent opening of the door when the circuit breaker is in the "ON" position. A non-apparent door interlock defeat shall be provided for the opening of the door with the circuit breaker in the “ON” position for testing and maintenance. In addition, there shall be provision for attaching a padlock to the operating handle in the “OFF” position that prevent the circuit breaker from being operated. Should more than one padlock be fitted, a safety lockout hasp must be used.

(h) All access doors are to be effectively and permanently earthed to the main panel enclosure, by means of a suitable braided copper earth strap, not less than 6mm^2, crimped with properly sized lugs and bolted at each end to the door and enclosure.

(i) All equipment mounted on bucket door will be flush mounted.

E04.5.1.6 Busbar Compartments

(a) The Busbar compartment shall contain the three phases and the neutral busbars, duly marked L1, L2, L3 and N or identifiable by colour coding Red, White, Blue and Black.

(b) The protective earth busbar shall be located in a separate compartment, and shall be duly marked PE.

(c) Provision shall be made for expansion or contraction of the busbars and the housing due to loadings, temperature changes and short circuit conditions. The busbars shall allow for expansion on both the left and right-hand side.

(d) The busbar compartment shall have bolted covers on the front of the panel for access to the busbars, insulators and joints. Removable covers shall be provided with captive screws.

(e) All busbars and droppers shall be securely supported by heavy, high di-electric, non-hygroscopic material with bracing to withstand stresses due to short circuits of one second duration and at least equal to the interrupting rating of the circuit breaker protecting the busbars.

(f) Busbar standoff insulators and support will be injection moulded (Polyamide 66 fibreglass reinforced (30%) (Halogen free)). Threaded inserts will be galvanized steel.

(g) The Busbar shall be supported by insulators made of flameproof and leakage-proof

material. Busbars, insulators and supports shall be braced to withstand the mechanical and thermal effects of fault currents.

(h) Busbar insulators shall be mounted in such a way that they can be easily removed and replaced.

(i) In addition to any support/bracing required by the electrical conditions, the busbars shall also have sufficient support to prevent stresses being transmitted to the circuit breakers or any components by cable terminations. Particular attention must be paid to the termination arrangements of any multiple incoming three-core cables to ensure adequate glanding space.

(j) The following minimum air clearances shall be observed for busbars and other current carrying or live parts:

i. Phase – Earth : 30mm

ii. Phase – Phase : 45mm

Where these clearances cannot be attained, suitable insulating barriers shall be employed In addition, all busbar work (including connections to, from and between equipment) shall have applied solid insulation suitable for the rated voltages. GPO-3 (Glass Polymer laminate) insulation shall be used wherever possible. GPO-3 is constructed with fiberglass-reinforced thermoset polyesters. It must feature a combination of beneficial electrical and mechanical properties. These attributes include Dielectric strength, flame resistance, arc and track resistance, high-flex strength and high-impact strength. They maintain stability, will not melt under heat and have excellent overall electrical properties.

(k) The busbar compartment shall be constructed to ensure that fire or other faults cannot spread between the various sections. All insulation used on electrical conductors/connections and wiring shall be flame retardant types, constructed of low toxicity materials.

(l) The busbar compartment must have suitable sealing arrangement at each end as well as between the busbar compartment and buckets.

E04.5.1.7 Cable termination points

(a) Suitable termination points shall be provided to enable any multiple three-core cables to be terminated without cross-overs of different phases and with minimum lengths of cable "tails".

(b) All cable termination points and associated connections shall be suitably braced to withstand the available fault currents without damage. If necessary cable support clamps shall be provided for the individual cable tails after the cable gland.

E04.5.1.8 Cable Gland Plates

(a) Sectionalised removable gland plates shall be fitted and shall be fixed by means of captive nuts or screws and so located that ample space is available for the satisfactory entry and termination of cables

(b) Cable entry shall be at the bottom of the board.

(c) All gland plates are to be connected to the main panel earth bar via suitably sized copper conductors and unused sections shall be left blank.

(d) Gland plates for three-core cable of cross-sectional area 70mm^2 and above shall be minimum 5mm thickness.

(e) Mild steel gland plates shall be galvanised.

(f) Where single core cables are used, gland plates are to be of non-magnetic material or slit to mitigate effect of eddy currents.

(g) The cable gland compartments shall have removable covers attached with standard 6mm

square recessed quick close/open latches.

E04.5.1.9 Labelling and markings

(a) The panel shall be provided with an identity label, engraved with 30mm high black on white characters and shall be mounted on top of the switchgear.

(b) Each buckets shall be labelled on the left top door corner with the reference letter(s) of that compartment, using durable designation label with 30mm high black letters on a white background. The labels shall have two designation letters, the first referring the column, numbered from A, left to right and the second referring to the bucket, numbered from 1 top to bottom.

(c) All buckets shall be clearly labelled with suitable inscriptions indicating their function. All labels shall have black characters at least 6mm high on white background.

(d) Incomers shall be labelled "Incomer from ……....” as indicated on the drawings issued by the Engineer, using engraved black characters at least 6mm high on white background.

(e) Standby bus coupler (where applicable) shall be labelled "Standby Bus Coupler", using engraved black characters at least 6mm high on white background.

(f) All removable covers protecting live equipment shall be fitted with warning labels as well as ID tags to ensure the covers are replaced in the original position after removal. Warning labels shall be engraved white characters 6mm high on a red background.

(g) All electrical components/equipment shall be labelled (with designations corresponding to those of the Engineer’s schematic diagrams) to facilitate recognition.

(h) The labels for equipment mounted on doors shall be identified with white trifoliate labels having black lettering engraved on them, with a maximum height of 3mm letters.

(i) The equipment labels shall be secured by means of high quality double-sided tape.

(j) The labels for all equipment, installed behind panels, shall be fixed to the chassis close to the equipment.

(k) If this equipment is positioned too close to each other to accommodate descriptive engraved labels, the equipment may be identified by a code or number label, which shall be fixed close to the equipment. The code or number shall be identified on a legend board, which shall be installed on the switchboard behind a protective cover.

(l) The types of labels for equipment behind the doors or covers shall be subject to the Engineer's approval.

(m) Danger labels shall be white lettering 6mm high engraved on a red background.

(n) All labels and label brackets shall be affixed by machine screws. Adhesive labels are not acceptable.

(o) Over and above labelling requirements of this specification, the labelling requirements of SANS 10142-1 must be met.

E04.5.1.10 Insulation Materials

(a) Any insulation, filling putty, etc., used shall be selected such that it can withstand without harmful effect (mechanically or electrically), all temperatures encountered within the MCC.

E04.5.2 Electrical Details

E04.5.2.1 Busbars and Connections

(a) Busbars and connections shall generally comply with SANS 1195 for air clearances. Notwithstanding the contents of the above-mentioned specifications, all solid copper work shall be made of hard drawn high conductivity copper of constant cross-section throughout

their lengths with a maximum design current density of 1,66A/mm².

(b) The Phase and Neutral busbars shall be manufactured with flat copper bars with a standard rectangular conductor profile, of the same cross-section over the whole width of the panel.

(c) Busbar droppers shall be manufactured with flat copper bars with a standard rectangular conductor profile, of the same cross-section over the whole length of the dropper. The use of flexible conductors as droppers from the main busbars to circuit breakers shall not be permitted.

(d) All busbar joints shall be silver plated or tinplated. High pressure bolted lap joints shall be used and all bolts shall be of the high tensile type.

(e) All fixed busbar joints (separation links) between adjacent sections shall be maintenance-free.

E04.5.2.2 Earth Bar

(a) A protective earth bar shall extend the whole length of each Electrical panel and shall be duly marked PE. The earth bar shall at least, be bolted to the switchgear housing at each column.

(b) Stranded clear insulated aluminium earth wire (equal to 70mm^2 copper wire) with crimp type terminals shall be provided at both ends of the protective earth bar for connection to the substation earth bar/earthing system.

E04.5.2.3 Control Wiring

(a) Each Electrical panel shall be equipped and completely wired at the factory and, only after satisfactory testing, be split, if necessary, for transportation.

(b) Control and instrumentation wiring shall be silicone insulated throughout and of flexible, stranded, annealed, untinned copper construction. All wiring shall comply with the table below. Conductors shall comply with SANS 1411, Part 1, Table 4, Class 5.

CT Wiring	-	2.5mm^2 phase coloured, common return black insulated, earth green/yellow
General Control Wiring	-	(AC) 1.0mm^2 grey
	-	(DC) 2.5mm^2 (positive – red, negative – black)
Control Neutral	-	(AC) 1.0mm^2 (same size as phase wiring) – black
LED's and PLC Inputs	-	(AC) 0.75mm^2 grey
	-	(DC) 0.75mm^2 (positive – red, negative – black)

(c) Notwithstanding the above-mentioned requirements, the vendor shall ensure wire size used is amply rated for the applicable current, under ambient conditions.

(d) All control/instrument panel wiring shall terminate by means of suitably sized compression crimp lugs on screw-type terminals. Terminals of the pressure pad type are not accepted. The minimum voltage rating of the control wiring shall be 600/1000V grade to SANS 1507 and SANS 1411 Parts 1 and 3.

(e) Wiring shall be run in plastic trunking. Only where a space problem exists will loomed wiring be acceptable.

Note: Stick-on harness holders are not acceptable.

(f) Conductors passing through holes in compartments shall be protected by means of neoprene grommets. Bevelling of sheet steel will not be accepted as a substitute.

(g) Conductors shall be general-purpose 600/1000V grade PVC-insulated copper wire to SANS 1507 and SANS 1574. Aluminium conductors are not acceptable.

(h) Single or solid conductor wire shall not be used.

(i) Joints or splices in any wiring are not acceptable.

(j) Panel and equipment terminals, labels, etc., shall be accessible after the wiring has been completed.

(k) Connections to equipment on swing doors shall be arranged to give a twisting motion and not a bending motion to the conductor.

(l) Single pole and double pole moulded-case circuit breakers shall be wired in a way that the supply to the switchboard is equally balanced.

(m) Stripping of insulation shall not result in damage to the conductors. The stripping tools used shall be of the type, which permits the length of strip to be pre-set. Control wiring shall be terminated with pre-insulated, crimped or compression type lugs. Crimping tools shall be of the type, which will not release the termination during normal operation until the conductor crimp has been correctly formed. Any damaged wiring will be rejected.

(n) Lugs shall be of the hooked blade type when used in conjunction with screw clamp spring loaded insertion type terminals, ring tongue type when used with stud or direct screw mounted connections and wire pin when used with pinch screw type connections such as indicating lamp fittings.

(o) Not more than two conductors shall be connected to any side of a terminal.

(p) Each terminal strip shall be provided with not less than 10% spare terminals, with a minimum of two, unless otherwise approved.

E04.5.2.4 Power Wiring and Cable Terminations

(a) Power wiring on the "live" side of the circuit breakers (from the busbar dropper to the circuit breaker terminals) shall be as short as possible, sized to carry the maximum current continuously of the frame size of the respective circuit breaker and shall be a flexible copper conductor. The flexible connection shall be provided on all such connections and shall be designed to prevent the transmission of any forces that may arise between the busbar droppers and the circuit breaker. In terms of SANS 60439, this connection is deemed a fault free zone and the design and use of the flexibles shall in no manner compromise this zone.

(b) Power wiring on the "load" side of the circuit breaker terminals to cable termination terminal shall be as short as possible, sized to carry the maximum current continuously of the frame size of the respective breaker and shall be a flexible conductor. The flexible connection shall be provided on all such connections and shall be designed to prevent the transmission of any forces that may arise between the circuit breaker and the cable termination terminal. In terms of SANS 60439, this connection is deemed a fault free zone and the design and use of the flexibles shall in no manner compromise this zone.

(c) Terminals that are on the live side of fuses and isolating switches shall be completely shrouded to prevent accidental contact.

(d) Power circuit wiring and connections in a switchboard shall be rated to the full frame size rating of the associated equipment, i.e. fused switch, contactor, circuit breaker, etc., and not to the circuit or fuse rating.

(e) Power wires shall bear the colour along their entire length of the phase to which they are connected.

(f) Neutral connections shall have the same rating as the phase connections unless otherwise

approved.

(g) Power wiring terminations shall use an appropriate crimped accessory (the pressed tubular type of accessories). Stamped, folded, split-barrel type accessories are not acceptable.

(h) Terminations for power wiring and cabling shall be provided with pressure type clamping connections or bolted connections capable of accepting crimped or compression type lugs on conductors.

(i) In addition, hexagonal die type hydraulic crimping shall be used for all wiring greater than 16mm² in size.

(j) Cables shall be made off directly onto circuit breakers, switches, contractors, thermal-overloads, etc. Terminals or solid copper terminating conductors shall be provided where necessary. Provision shall be made for bracing and fixing of the cable leads to prevent vibration.

(k) A predrilled solid copper bar shall be provided for terminating all external power cables above 70mm, or where three or more cables in parallel are specified. The arrangement shall be suitable for accepting cable lugs of conductors up to 630mm².

E04.5.2.5 Wire Numbering

(a) Each end of every wire shall be marked with a wire number by means of plastic cable ferrules (black lettering on a white or yellow base).

(b) All wires shall be identified on both ends with a wire marker. The wire marker shall consist of a transparent flexible tube that slides over the wire with a wire identification label (black letters on a rigid white PVC tag) which slides into a label pocket on the tube. The tube must be correctly sized for the wire diameter.

(c) Split or open type marking ferrules shall not be used.

(d) Cable/wire marking ferrules shall correlate to the appropriate schematic or wiring diagrams.

(e) For all control wires without lug terminations, the numbered ferrule must not fall off when disconnecting the wire and in this regard, the use of one strand of wire to retain the ferrule is acceptable.

(f) All cables shall be identified on both ends with a cable marker. The cable marker shall consist of printed stainless steel band fixed to the cable with stainless steel strapping.

E04.5.2.6 Terminals and Connections

(a) All terminals will be of the screw-type. Terminals of the pressure pad type are not accepted Minimum rating for terminal blocks shall be 40A. Terminal strips/blocks shall be marked with designations corresponding with the suppliers/buyers drawings. Generally, terminal numbers shall be the same as the relevant wire number. No more than two wires may be connected to any one side of a terminal. Ten percent (10%) additional spare terminals shall be furnished.

(b) Terminals are to be provided for all door-mounted components, diodes, etc.

(c) Power connections on any equipment shall not use "Philips/Star" type screw/socket heads. Hexagon socket head cap screws (Allen type socket heads) are preferred.

(d) Where a large number of control terminals are mounted in close proximity, the terminals shall be in vertical rows with a minimum of 125mm below rows. Spare terminals shall be mounted at the bottom of the row unless the cabling drawing shows otherwise.

(e) Terminals shall be provided for all cores of external control cable as indicated on the drawings whether internally connected or not.

E04.5.2.7 Air Circuit Breakers (ACBs)

(a) ACBs shall be of the withdrawable type with self-aligning disconnecting devices with the disconnecting fingers preferably mounted on the breaker for ease of maintenance. The draw out mechanism shall hold the circuit breaker rigidly in the fully connected, test and fully disconnected positions.

(b) Safety shutters shall be provided to shield the fixed part automatically when the draw out parts removed preventing access to the conductors (main and auxiliary circuits). These shutters shall be clearly labelled indicating busbar and cable sections and in addition "live" section shall be labelled "400V – LIVE". ACBs shall be equipped with inter-phase barriers.

(c) Each Incoming ACB from a transformer and each Bus Section ACB shall be equipped with a protection unit incorporating:

i. Overload protection (IDMT)

ii. Thermal overload protection

iii. Instantaneous short-circuit protection

All protection devices will be delivered with protection settings adjusted to the minimum level. The protection unit shall be fitted with a transparent cover that can be sealed in the closed position to prevent tampering with the settings.

(d) The Contractor shall take particular care to ensure that the ACB protection is correctly co-ordinated with the upstream and downstream protective devices.

(e) Current and time delay set points on ACBs shall be accessible from the front of the ACB without removing the ACB from its cradle and shall only be adjustable when the cubicle door is open.

(f) Interlocks shall be provided to ensure the following:

i. That the main circuit breaker cannot be removed from or to the fully connected position unless the ACB is open;

ii. That the compartment doors cannot be opened should any accessible portion of the ACB frame be energised;

iii. That the ACB cannot be closed unless in the fully connected, test or fully disconnected positions.

(g) Mechanical restrictions shall be provided to inhibit mismatch of ACBs of different ratings.

(h) Provision shall be made for the padlocking of any ACB in any one of the fully connected, test or fully open positions. In addition, all ACBs shall have padlocking facility to prevent the close push button being operated when padlocked.

(i) ACBs employed as incomers and bus-section switches shall incorporate captive key interlocks to prevent paralleling of incoming supplies. Locks with captive keys must be built into the ACB's to prevent both Incomers and the Bus-coupler circuit breakers in the "ON" position at the same time. Padlocks will not be accepted for this application.

(j) The ACBs supplied shall be three pole, magnetic operated. The mechanism shall be of the stored energy type having hand charged spring with mechanical and electrical releases for closing.

E04.5.2.8 Moulded Case Circuit Breakers (MCCBs)

(a) MCCBs shall be of the manually operated type with thermal and instantaneous magnetic protection. Trip functions shall be resettable via the MCCB switching handle.

(b) Each MCCB shall be fitted with a vari-depth operating handle.

(c) Flash barriers shall be furnished to increase creepage distance between phases and shall be furnished on all circuit breaker cradles between the phases on both sides of the MCCB.

(d) The thermal trip elements of each MCCB shall be calibrated for the maximum ambient

temperature at 40°C.

(e) Current ratings of MCCBs shall be detailed in the Single Line Diagram drawings.

(f) MCCBs shall be selected according to rating and the fault level as specified by the Engineer.

(g) The name of the MCCB manufacturer shall be furnished by the tenderer at tender stage.

(h) Each MCCB shall be provided with suitable insulation between the terminals of the MCCB and the back plate/chassis onto which the MCCB is mounted, such that any loose nut, screw, etc., which may fall between the MCCB terminals and back plate cannot cause a short circuit.

(i) Where interlocking is called for between the MCCBs this shall be effected using captive keys in the breaker or a mechanical interlock.

(j) All outgoing circuits shall be equipped with individual core balance earth leakage units arranged to shunt trip each respective outgoing circuit.

(k) Outgoing circuits rated 125A and above shall have IDMT 375 mA earth leakage units EPC type Elsec T. Outgoing circuits rated 100A and below shall have instantaneous 250 mA earth leakage units - EPC type Elsec – X. All earth leakages must be of the manual reset type.

(l) All circuit breakers, except bus couplers, shall be connected with the switched side to the load, i.e. with reference to power flow incoming to "LINE" and outgoing to "LOAD".

(m) The incoming terminals/shutters of all 400V circuit breakers shall be effectively shrouded and marked "400V LIVE" with white characters on a red ground.

E04.5.2.9 Miniature circuit breakers (MCBs)

(a) Miniature circuit breakers (MCBs) shall be confined to auxiliary circuits such as control and indication in which the prospective short-circuit current will not exceed 5kA (3ph at 440Vac), or 7.5kA (1p at 24Vdc). They shall be of the thermal and magnetic trip free type. Where the prospective short-circuit current exceeds the above values, cascaded circuit breakers should be used. All cascaded circuits must be marked with the wording "Warning: This is a cascaded system. Never replace any circuit breaker in the system with another circuit breaker that is not identical in manufacturer, type and rating."

(b) Auxiliary contacts on MCBs

i. Provide the position (open/closed/tripped) remote indication functions of the associated MCB.

ii. Clip on (no tool required) to the left-hand side of the MCB. The type that connects to the MCB operating lever is preferred.

iii. Shall be of good quality and will not interfere with the operation or tripping of the MCB.

E04.5.2.10 Surge Arrestors

(a) All Electrical switchboards shall have a surge arrestor fitted to each phase on the incoming circuit breaker. The surge arrestors shall be fitted to the LIVE side of the circuit breaker.

E04.5.2.11 Instruments and Meters

(a) Incoming CBs shall be equipped with the following as a minimum requirement:

i. A single 96mm x 96mm 5A secondary, combined maximum demand and instantaneous ammeter. The maximum demand portion shall have a thermal movement with 15-minute time lag and drag pointer having a reset facility. It shall have a built-in saturation transformer for increased overload capacity to 90 times

rated current for one second;

ii. A 96mm x 96mm voltmeter connected to measure phase-to-phase voltage and phase to neutral voltage via a multi-position selector switch and a set of fuses suitably rated for voltage and short circuit current;

E04.5.2.12 Current Transformers

(a) All current transformers shall conform to SANS 61869-2. For protection purposes, class 10P CT's are to be used and for indicating purposes class 1 CT's are to be used and for metering purposes class 0.5 CT's are to be used. In general, current transformer mechanical and thermal ratings shall be co-ordinated with the short circuit ratings of the equipment.

E04.5.2.13 Fuses

(a) Fuse protection shall be used in cases were capacitive loads are switched i.e. Power factor correction or static capacitors panels.

(b) Fuses shall not be used for purposes other than voltmeter or kWh meter protection, unless specifically authorised. All short circuit protection shall be provided by means of circuit breakers and fast blow fuses for protecting the incoming side of the devices. In cases where the fault current level is excessively high, HRC fuses in conjunction with CB's should be considered to reduce the fault level and afford better protection for electrical personnel.

E04.5.2.14 Limit Switches

(a) Limit switches shall be metal encapsulated precision switches with robust and compact explosion-proof structures.

(b) Cables shall be equipped with a strain-relief device and safely cast into the enclosure. Switches shall have bottom, side or lateral cable outlets as per the requirement of the application. The integrated basic switch shall have a single-pole changeover contact with a high switching accuracy and a precise repeatability of the switching point.

(c) It shall have high vibration resistance and long mechanical life. It shall have a high protection class that would allow the switch to be used in all processes of Johannesburg Water wastewater treatment plants.

E04.5.3 Mounting of Equipment

E04.5.3.1 Clearance and Access

(a) A minimum clearance of 50mm shall be maintained between items of equipment and the side of the compartment.

(b) Where extra equipment is specified after the design has been finalised, this clearance requirement may be altered subject to the Engineer's approval.

(c) No piece of equipment shall be mounted in any position where it is not visible and accessible to a viewer looking into the compartment through the door opening.

E04.5.3.2 Mounting of Circuit Breakers

(a) All moulded case circuit breakers shall be flush mounted with only toggles protruding.

(b) Miniature circuit breakers may be installed in clip-in trays mounted on the frame.

(c) Special provision shall be made for large main switches.

(d) Circuit breakers shall be installed so that the toggles are in the up position when "ON" and down when "OFF".

E04.5.3.3 Mounting of Contactors

(a) Contactors shall only protrude through the panel in special cases. Plastic covers or other coverings will not be required.

E04.5.3.4 Instrumentation

(a) All metering instruments shall be mounted flush in the front panel unless otherwise specified.

(b) In certain instances it may be required that instruments be mounted flush in the door. In these instances, the back of metres shall be covered by removable covers of isolating material fixed to the door to protect the terminals of instruments and to prevent accidental contact.

(c) Equipment mounted normally on the surface, e.g. time switches and relays shall be mounted behind the front panel. In these cases, hinged access panels shall be provided in the front panel.

E04.5.3.5 Fuse-Links and Carriers

(a) Fuses shall be of the high rupturing capacity type and shall be mounted on insulated draw-out carriers, which shall hold the fuses positively and remain firmly fixed after withdrawal. In all cases, the top terminal shall be the live terminal. This applies also for MCB's.

(b) DC circuits shall have fuses in the positive and negative leads.

(c) Fuses shall be so positioned that they are readily accessible to a person standing on the floor.

(d) Fuses for instrumentation shall be mounted on the outside of the compartment door adjacent to or below the instrument.

(e) Fuses shall be provided with labels giving their rating and duty.

(f) Solid link holders shall be coloured white.

(g) One spare fuse of each type and size used in each board shall be fitted on clip holders on the inside of the front panel.

E04.5.3.6 Control Equipment

(a) All equipment performing control functions, e.g. control relays, transducers, and time relays not requiring adjustment, shall be mounted behind the front panel.

E04.5.3.7 Current Transformers

(a) Current transformers shall be accessible and easily removable.

(b) Secondary windings of current transformers shall be earthed at one point only. Each group of current transformers, i.e. protection, metering, etc., shall be earthed directly to the protective conductor (earth bar).

(c) Current transformers shall be naturally air-cooled, and shall be able to withstand the maximum fault current for the duration of time taken by the functional unit to clear, with protective devices set at the maximum time delay settings.

E04.6 MOTOR CONTROL CENTRE

A Motor Control Centre (MCC) is an assembly of one or more enclosed sections having a common

power bus and principally containing motor control units that serves to govern in some predetermined manner the performance of an electric motor. Motor control centres are in modern practice a factory assembly of several motor starters. A motor control centre can include variable frequency drives, programmable controllers, metering apparatus etc. Motor Control Centre is used for controlling of various motors of a particular plant.

E04.6.1 MCC Buckets

(a) The following types of motor starters will be used:

i. Direct-on-line (DOL) type motor starting;

ii. Star/Delta (S/D) type motor starting;

iii. Forward/Reverse type motor starting;

iv. Soft starting (SS) type motor starting;

v. Variable Speed Drive (VSD) type motor starting.

(b) The main contactors on Star/Delta and Forward/Reverse type starters will be mechanically interlocked. The type of motor starting required shall be project specific and shall be indicated in the MCC schedule/s to be issued by the Engineer.

(c) All the protection devices, i.e. overloads, circuit breakers, motor thermistors, motor heaters, gearbox oil flow switches etc. on mechanical equipment shall be hard wired onto the individual motor starter circuits.

(d) Only one motor will be controlled from any MCC bucket.

E04.6.2 Busbars

(a) Main busbars in MCCs shall be rated for 2000 amps as a minimum.

(b) Busbar droppers in MCCs shall be rated for the maximum possible current (determined by the breaker frame size) in that section with a minimum rating of 1000 amps.

E04.6.3 Earth bar

(a) The earth bar shall be rectangular, with a minimum cross sectional area of 400mm² (10mm x 40mm).

E04.6.4 Power wiring

(a) The minimum MCC power wiring size shall be 25mm².

E04.6.5 Circuit Breakers

(a) Air circuit breaker (ACBs) will be used for Incomer circuit breakers on MCCs.

(b) Bus coupler circuit breakers on MCCs will use an air circuit breaker (ACBs).

(c) Moulded Case circuit breakers (MCCBs) will be used for outgoing feeders on MCCs up to a maximum rating of 800 amps.

E04.6.6 Instruments and Meters

(a) Incoming CBs shall be equipped with an power meter capable of providing multiple parameters of the connection including kWh, kVArh, kW, kVAr, PF, MD, etc. and provide a pulsed output and Ethernet connectivity.

(b) Each bucket shall be equipped with a suitably sized 5A current transformer (CT) operated

96mm x 96mm 90° movement suppressed maximum demand ammeter having an overload rating of 40 times the rated current for one second. The CT primary current rating will match (equal) the outgoing feeder circuit breaker current rating. The CT secondary current rating will be 5A.

E04.7 MAIN DISTRIBUTION BOARD

A Main Distribution Board is a panel from where electrical energy is taken out to distribute power to various consumer points. It has a single incoming power sources from a distribution transformer and includes feeder circuit breakers and protection devices to the consumers.

E04.7.1 Busbars

(a) Main busbars in MDBs shall be rated for 2000 amps as a minimum.

(b) Busbar droppers in MDBs shall be rated for the maximum possible current (determined by the breaker frame size) in that section with a minimum rating of 1000 amps.

E04.7.2 Earth bar

(a) The earth bar shall be rectangular, with a minimum cross sectional area of 400mm² (10mm x 40mm).

E04.7.3 Power wiring

(a) The minimum MDB power wiring size shall be 25mm².

E04.7.4 Circuit Breakers

(a) Air circuit breakers (ACBs) shall be used as Incomer circuit breakers on MDBs.

(b) Moulded Case circuit breakers (MCCBs) will be used for outgoing feeders on MDBs up to a maximum rating of 800 amps.

E04.7.5 Instruments and Meters

(a) Incoming CBs shall be equipped with an power meter capable of providing multiple parameters of the connection including kWh, kVArh, kW, kVAr, PF, MD, etc. and provide a pulsed output and Ethernet connectivity.

(b) Feeder CBs shall be equipped with an power meter capable of providing multiple parameters of the connection including kWh, kVArh, kW, kVAr, PF, MD, etc. and provide a pulsed output and Ethernet connectivity.

E04.8 AUXILIARY DISTRIBUTION BOARD

An Auxiliary Distribution Board is a panel from where electrical energy is taken out to distribute power to various consumer points. It has a single incoming power sources from a Main Distribution Board and includes feeder circuit breakers and protection devices to the consumers.

E04.8.1 Busbars

(a) Main busbars in ADBs shall be rated for 1000 amps as a minimum unless otherwise specified/approved by the engineer.

(b) Busbar droppers in ADBs shall be rated for the maximum possible current (determined by

the breaker frame size) in that section with a minimum rating of 600 amps unless otherwise specified/approved by the engineer.

E04.8.2 Earth bar

(a) The earth bar shall be rectangular, with a minimum cross sectional area of 250mm² (10mm x 25mm) unless otherwise specified/approved by the engineer.

E04.8.3 Power wiring

(a) The minimum ADB power wiring size shall be 16mm² unless otherwise specified/approved by the engineer.

E04.8.4 Circuit Breakers

(a) Air circuit breakers (ACBs) shall be used as Incomer circuit breakers on ADBs unless otherwise specified/approved by the engineer.

(b) Moulded Case circuit breakers (MCCBs) will be used for outgoing feeders on ADBs up to a maximum rating of 800 amps.

E04.8.5 Instruments and Meters

(a) Incoming CBs shall be equipped with an power meter capable of providing multiple parameters of the connection including kWh, kVArh, kW, kVAr, PF, MD, etc. and provide a pulsed output and Ethernet connectivity.

(b) Feeder CBs shall be equipped with a suitably sized 5A current transformer operated 96mm x 96mm 90° movement suppressed maximum demand ammeter having an overload rating of 40 times the rated current for one second. The CT primary current rating will match (equal) the outgoing feeder circuit breaker current rating. The CT secondary current rating will be 5A.

E04.9 FLUSH MOUNTED DISTRIBUTION BOARD

E04.9.1 Internal for of Separation

(a) The internal for of separation will be specified by the Engineer.

E04.9.2 Bonding Tray

(a) Bonding trays for flush mounted switchboards shall be of rigidly constructed 1,6mm thick galvanised steel, braced and reinforced.

(b) Formed gussets shall be provided at the corners. All the tray joints shall be properly welded or securely bolted with a brass or cadmium plated steel earth connecting stud and nut.

E04.9.3 Expanded Metal

(a) Where switchboards are to be built into 116mm thick walls, expanded metal shall be spot welded to the rear of the bonding trays.

(b) The expanded metal shall protrude at least 150mm on each side to prevent plaster from cracking.

E04.9.4 Knock-Outs

(a) Ample knockouts shall be provided in the top and bottom ends of each switchboard tray to allow for the installation of conduits for the specified and future circuits.

(b) Knockouts shall be allowed for any size of specified conduit.

(c) Provision shall however be made for termination of at least 2 x 25mm diameter conduits at top and 2 x 25mm diameter conduits at the bottom of each tray.

E04.9.5 Architrave Frame

(a) The architrave frame shall be of 2,0mm thick sheet steel with bevelled edges.

(b) The architrave frame shall accommodate the chassis, panels and doors.

(c) The architrave shall overlap the bonding tray by at least 25mm on each side.

(d) The architrave frame shall be fixed to the tray in such a fashion to allow for depth adjustment and irregularities of the wall.

E04.9.6 Extension Frames

(a) Semi-flush mounted switchboards shall be equipped with extension frames.

(b) Generally, the frame depths shall be 50mm but may be altered to suit each application.

E04.9.7 Chassis

(a) The chassis for mounting of switchgear and equipment shall be of rigid construction and shall be fixed securely to the architrave frame or bonding tray by means of bolts screwed into tapped holes or bolts and nuts. Self-tapping screws are not acceptable.

(b) The chassis position shall be adjustable in the horizontal plane.

E04.9.8 Panel (Faceplate)

(a) A suitably stiffened panel manufactured of 2,0mm thick sheet steel shall be installed in the architrave frame for flush mounting of switchgear.

(b) The panels shall have machined punched slots for housing the specified and future switchgear, instruments, fuse holders, isolating switches, indicator lamps, etc. In exceptional cases, contractors will be allowed to protrude through the panel.

(c) Blanking plates shall be provided in positions where future switchgear will be installed.

(d) The distance between the inside of the closed doors and the panels shall be not less than 40mm.

(e) No equipment may be mounted on the panel (faceplate) unless it is permanently hinged to the switchboard frame.

E04.9.9 Fixing of Panels

(a) The panel for each switchboard shall be secured to the architrave frame by means of captive fasteners. Alternatively, the panel may be secured to the architrave frame by means of two pins at the bottom and a latch or lock at the top of the panel. Self-tapping screws or dome nuts will not be allowed.

(b) Where it is required that equipment be mounted on the panel, the panel shall be securely hinged to the switchboard frame.

E04.9.10 Panel Handles

(a) Two chromium plated handles shall be provided on each front cover.

(b) The handles shall be mounted at the top and bottom of each panel.

E04.9.11 Hinged Panels

(a) Where hinged panels are specified, the hinges shall be fixed to the architrave frame and the panel shall be secured by means of studs and hexagonal chromium plated nuts or by means of a suitable lock or latch, which can be operated with a screwdriver.

(b) The panel shall be removable when it is in the open position.

E04.10 SURFACE MOUNTED DISTRIBUTION BOARD

This section refers to surface mounted sub-switchboards and not to floor standing main switchboards in substations or sub-main switchboards.

E04.10.1 Internal for of Separation

(a) The internal for of separation will be specified by the Engineer.

E04.10.2 Switchboard Tray

(a) Surface mounted switchboards shall be equipped with a 1,6mm sheet steel reinforced tray.

(b) Securing lugs shall be provided to fix the tray to walls or any other structure.

(c) A solid brass or cadmium plated steel earth connection stud and nut shall be provided.

E04.10.3 Construction

(a) All joints shall be welded or securely bolted.

(b) The tray shall be square and neatly finished without protrusions.

(c) The front tray sides shall be rounded with an edge of at least 20mm to accommodate flush doors.

(d) The requirements for chassis, panels and doors shall be as specified for flush mounted switchboards.

(e) The doors shall be hinged and shall fit flush in the frame in the closed position.

(f) Knockouts shall not be provided unless specifically called for.

E04.11 LV KIOSKS (SWITCH CUBICLES)

LV kiosks shall be of sufficient size to accommodate all the specified equipment.

E04.11.1 Framework

LV kiosks shall be manufactured of mild steel sheet metal with a minimum thickness of 2mm or cold rolled 3CR12 sheet metal with a minimum thickness of 1,6mm. Fibre re-inforced or other corrosion proof material (e.g. glass fibre) may also be used if adequately reinforced.

E04.11.2 Ventilation

Two ventilation slots or grilles, approximately 150 x 125mm and covered on the inside with copper mesh, shall be provided on opposite sides of the cubicle.

E04.11.3 Doors

Doors shall be provided in the front and back panels and shall swivel through 180º. Rigid padlocks and base plates for security latches shall be provided on the doors. Openings for security latches shall be blanked with chromed brass discs.

E04.11.4 Warning Sign

Warning and danger signs shall be mounted on each door in compliance with the requirements.

E04.11.5 Base

The kiosk shall be mounted on a well-finished concrete base, with minimum height of 150mm above ground level in the case of mild steel and any of the other specified acceptable materials. The kiosk can be made for direct mounting into the ground in which case it shall be equipped with a base, forming part of the structure, for this purpose. The switch cubicle shall protrude at least 10mm past the edges of the base to prevent water collecting on the base.

E04.12 STANDBY SUPPLIES

(a) Where standby power from a diesel-generator set or other source is available and has to be connected to some of the equipment on a panel, the panel shall be divided into electrically separate sections with sheet metal division plates to isolate power and mains power sections. The section doors must be appropriately colour coded to provide visual distinguishing.

(b) A means shall be provided to isolate both the standby and mains power supplies simultaneously. For this purpose, either a 6-pole rotary switch or mechanically and electrically interlocked circuit breakers or contactors may be used. Electrical interlocking alone is not sufficient. Rotary switches may only be used on panels where the fault level does not exceed 10kA.

(c) A separate 3-pole circuit breaker shall be provided as main switch for both the standby power section and the mains power section in addition to the isolator of (b) above.

Where a 6-pole rotary switch is used as isolator for the incoming supplies, this switch may be located in the standby section of the switchboard in which case the rotary switch can also serve as the isolator for the standby section. This arrangement is acceptable where the equipment on the mains power section of the switchboard can be turned off whenever it is necessary to work on the standby section of the switchboards.

(d) The main switches to the standby and mains power sections shall be interlocked with the doors providing access to those sections to ensure that the door can only be opened when the switches are in the OFF position.

E04.13 ELECTRICAL SUBSTATION FIRE PROTECTION SYSTEM

It is the duty of the Contractor to appoint a trained and competent fire engineering company to design, supply, install, commission, and test and certify a fire protection system for each electrical substation building forming part of the contract.

Each fire protection system will consist out of a fire detection and an extinguishing system as described below. Both systems will be of the highest quality and latest technology, supplied by a reputable manufacturer. The contractor will submit written proof that local support is available to maintain the system and to supply spare parts as required.

E04.13.1 Fire Detection System

The fire detection system must:

(a) Utilise a sub-micron combustion particle detector that detects a fire at its initial stage, before the presence of smoke. This allows preventative action can be taken before any catastrophic event occurs.

(b) Utilise detectors suitable for dusty plant environments and must be impervious to false alarms caused by dust particles in substation buildings with sheet metal roofs where no ceilings are present.

(c) Cover the substation building, all electrical cabinets and all cable trenches.

(d) Only when there is a second alarm from a second detector the system will trigger the gas.

(e) Double Knock system (Trigger an alarm on the first detector activation and trigger the operation of a fire extinguishing system on a second detector activation).

(f) Alert a control and alarm signalling system in case of a fire or a system fault.

(g) Be designed and installed to conform to SANS/ISO 10139 and SANS 369 Parts 1 and 2.

E04.13.2 Fire Extinguishing System

The fire extinguishing system must:

(a) Utilise an automatic system to flood the substation building with a concentration of a gaseous extinguishing agent to extinguishing a fire burning in Class A, B, and C hazards by lowering the oxygen content below the level that supports combustion as quickly as possible.

(b) Utilise a non-toxic, human friendly extinguishing agent. The use of an extinguishing agent that does not support human life must be approved in writing by the Engineer. In this case, other safety measures such as a lockout system should be integrated to ensure safe entrance into the protected substation.

(c) Utilise an efficient extinguishing agent that is electrically non-conductive and that will not adversely affect the protected electrical equipment. No powder or other residue should remain after actuation of the system.

(d) Audible and visual warnings must alert personnel to vacate the protected substation area before discharging the agent.

(e) Utilise a colourless, odourless environment friendly extinguishing agent that is sustainable against impending global warming regulations.

(f) Utilise an extinguishing agent that has a low refill cost.

(g) Should be fully approved by the local authority to an internationally accepted engineering standard.

E04.13.3 Other measures

(a) All points where cable or other services enter the substation building must be properly sealed with a fire rated medium of at least one-hour or as per local standards and regulations.

(b) All ventilation and air conditioning devices must be tripped in the event of first detection of a fire.

(c) All ventilation openings and doors in the substation building should be sealed in the event of first detection of a fire.

(d) A room integrity test needs to be carried out to validate the hold-time for the extinguishing agent as per the room's natural leakage.

(e) All detection, alarm and extinguishing circuits are to be monitored for system faults.

(f) The substation fire protection system should operate a local audible and visual alarm system and report to a central 24-hour manned operations or security room.

(g) A local handheld fire extinguisher should also be installed within the substation as per local regulations. The type and number should conform to local standards and regulations.

E04.13.4 System Maintenance

(a) The contractor will include a fire protection system maintenance contract for a period of one year after commissioning. A trained and competent fire engineering company must do the maintenance.

(b) Thereafter a trained and competent fire engineering company should be contracted to inspect the system on a three-month basis. It should check that the system is operational in terms of its design and take corrective action in the event of a fault.

(c) The Client should visually check the system once a month for any faults reported on the control panel and anything that might appear out of the ordinary. The Client should immediately report to a competent fire engineering contracting company of any concerns or faults to ensure immediate rectification.

(d) A mandatory annual room integrity test should be carried out as per SANS 1520 Part 1.

(e) Should any physical alterations be made to a substation, a review on the fire protection system must be done to see if its performance has been compromised and appropriate actions should be made to ensure the integrity of the system.

E04.14 QA REQUIREMENTS

The vendor / contractor will be responsible for the following.

TABLE OF CONTENTS			
SECTION	**DESCRIPTION**	**REQUIRED (YES OR NO)**	**WHEN REQUIRED**
DRAWINGS & DESIGN (2 SETS OF EACH)	DESIGN CALCULATIONS		
	GA DRAWINGS	YES	ORDER + 3 WEEKS
	DETAIL DRAWINGS	YES	CONSTRUCTION
	AS BUILT DRAWINGS	YES	COMPLETION
	BROCHURES	YES	CONSTRUCTION
	SKETCHES		
	SCHEMATIC DIAGRAMS	YES	ORDER + 3 WEEKS
	RISK ASSESSMENT BY VENDOR	YES	CONSTRUCTION
	DATA SHEETS	YES	TENDER
	DESIGN CRITERIA	YES	CONSTRUCTION
QUALITY CONTROL DOCUMENTS (2 SETS OF	QUALITY CONTROL PLAN	YES	ORDER + 3 WEEKS
	MANUFACTURING PROGRAM	YES	ORDER + 3 WEEKS

EACH)			
MATERIAL CERTIFICATES		YES	MANUFACTURE
CERTIFICATES OF INSPECTION TESTING AND ACCEPTANCE	PRESSURE TEST CERTIFICATE	YES	DATA BOOK
	ELECTRICAL HAZARD CERTIFICATE		
	ELECTRICAL TEST CERTIFICATES	YES	DATA BOOK
	INSTRUMENT CALIBRATION CERTS.		
	VENDORS CERTIFICATE OF CONFORMANCE	YES	COMMISSIONING
	NON-CONFORMITY / CONCESSION REPORTS	YES	COMMISSIONING
MANUALS	OPERATING / MAINTENANCE MANUAL	YES	COMPLETION
	DATA BOOK	YES	DELIVERY – 1 WEEK
	DRAWINGS	YES	COMPLETION
	WARRANTY/GUARANTEES CERTIFICATES	YES	COMPLETION

E04.15 DRAWINGS AND DATA

(a) The vendor / contractor will supply shop drawings to the Engineer prior to manufacturing.

(b) No switchboard manufacturing may start if the drawings are not approved by the Engineer in writing. Should the vendor / contractor start manufacturing without approved shop drawings, any changes required by the Engineer will be for the vendor / contractor's account.

(c) The following will be included in the shop drawings as a minimum:

i. General arrangement drawings

ii. Schematic diagrams

iii. Equipment lists, including the make, catalogue number and capacity of all equipment such as isolators, circuit breakers, fuses, contractors, etc.

iv. All labelling information on a separate sheet.

(d) The approval of the shop drawings shall not relieve the Contractor of his responsibility to the Client to supply the switchboards according to the requirements of this specification or to the requirements of the Detailed Technical Specification.

(e) The vendor / contractor will supply three hard copies and one soft copy of the equipment data book including all items as specified in the Vendor QA and document requirement list.

(f) Data books will be supplied to Johannesburg Water within 7 days from delivery of equipment. Johannesburg Water will review the data books within 14 days from issue and notify the Vendor of its acceptance or rejection of it.

(g) All drawings and documentation shall be in accordance with Johannesburg Water specifications bound in book format.

(h) A complete set of "As Built" drawings of all switchboards shall be submitted to the Engineer immediately after completion of the installation. The following information shall be presented:

i. Items (i) and (iv) of the previous paragraph.

ii. Terminal strip numbers, numbers and colours of conductors connected to the terminal strips and numbers and colours of the conductors utilised for the internal wiring.

iii. A separate schedule of all equipment.

(i) Where "As Built" drawings are modified during the execution of the contract, the Contractor shall at his own expense modify or replace such drawings. Accurate drawings of the equipment shall be forwarded to the Engineer.

E04.16 PAINTING AND PROTECTIVE COATING

E04.16.1 Powder Coating Systems

(a) Paint system 1: Powder Coating, seven Stage zinc, Phosphate pre-treatment, pure epoxy primer, Polyester finishing coat, and thickness 140 µm.

Paint System	Host Material	Preparation	Primer (70µm)	Finishing Coat (70µm)	Thickness µm
No 1	Mild Steel	7 stage phosphate pre–treatment	Epoxy	Epoxy	140

(b) On completion of the paint job, the powder manufacturer must carry out the following tests on the test panels:

i. SABS 6J impact test

ii. Cross hatch adhesion test

iii. Bend test

(c) The powder manufacturer must issue a Certificate of Compliance for each paint job, which should be included in the contract documentation.

(d) The preferred corrosion protection systems are applied onto cold rolled mild steel plate with a thickness of 2.0mm.

E04.16.2 Epoxy Powder Coat Products

Item	Product Type	Powder - Lak
1	Epoxy Primer	23-007
2	Pure Epoxy / Polyester Finishing Coat.	Series 3000

E04.16.3 General

(a) All chassis plates shall be painted white.

(b) All mild steel gland plates shall be galvanised for improved cable earthing.

(c) All panel doors on equipment supplied from a normal supply must be painted Electric Orange (B26).

(d) All panel doors on equipment supplied from an emergency supply must be painted Signal Red (A11).

(e) All panel doors on equipment supplied from an UPS supply must be painted Dark Violet (F06).

(f) Specific external colours will be provided by Johannesburg Water.

(g) Before the installation is handed over, the Contractor shall ensure that all paint surfaces are clean and undamaged.

E04.17 PERFORMANCE AND GUARANTEE

(a) The performance of the items supplied in terms of this specification, as defined by the order, shall be warranted by the Vendor and, if specified, be tested in accordance therewith.

(b) The vendor shall not be specifically required to conduct a performance test on site.

(c) A minimum warranty period of 12 months is required.

E04.18 INSPECTION AND TESTING

E04.18.1 Factory Acceptance Test

(a) The Johannesburg Water Representative shall have access, at all reasonable times, to those parts of the manufacturing facilities engaged in the manufacturing of items in terms of this specification. He is authorised to witness any stage of manufacture, tests and inspect documentation.

(b) The Johannesburg Water Representative is authorised to reject any items not manufactured to the requirements of the specification.

(c) All equipment shall be inspected at the vendor's works prior to delivery, to ensure compliance with the specification.

(d) No unit shall be considered complete until acceptance by Johannesburg Water.

(e) The minimum testing / pre delivery checklist shall be as follows:

i. The Johannesburg Water representative must carry out a clause-by-clause check of each switchboard, prior to delivery.

ii. This switchboard checklist is intended to assist this process but does not relieve him/her of the responsibility described above.

DETAILED INSPECTION ROUTINE

Order No. : _____

Supplier/Vendor : _____

Project : _____

Motor Control Centre Designation : _____

Inspected by : _____

Date : _____

		Comments
Overall Appearance		
□		
□	**Paint work : Compliance with Annexure A5**	
□	**Paint thickness**	
□	**Door fittings good**	
□	**Dust sealing effective (neoprene seals)**	
□	**Board fully assembled**	
□	**Overall height less than specified height**	
□	**Channel iron base frame (less than 3000m)**	
□	**Lifting lugs provided**	
□	**Equipment supplied in accordance with specification (contractors, overloads, circuit breakers, relays, etc.)**	

		Comments
Busbars		
☐	**Correct cross-section**	
☐	**Correct phasing with incomer/feeders**	
☐	**Rigidly supported/braced**	
☐	**Properly insulated**	
☐	**Joints tightened**	
☐	**Transport section joints supplied (Fishplates, nuts and bolts, control wiring and terminals, etc.)**	
☐	**Droppers from main bars to circuit breakers adequately rated, braced, insulated**	
☐	**Nothing unnecessary mounted on bus bars**	
☐	**Main earth bar, min 70mm²**	
☐	**Control busbars generally as above, separate from power busbars**	
☐	**Air clearances adequate throughout**	
Single Line Diagram Check		
☐	**As per approved single line diagram**	
Outgoing Circuit		
☐	**Correct size/rating for MCCB's**	
☐	**Correct size/rating for ACB's**	
☐	**Correct earth leakage relays**	
☐	**Correct current transformer and associated ammeters**	
☐	**Correct overload relays**	
☐	**Correct setting on overload relays**	
☐	**Reasonable provision for cable termination power and control mounting of equipment**	
☐	**Correct conductor sizing, power and control, and correct colouring**	
☐	**Correct indicator lights and colours**	
☐	**Air clearances correct throughout**	
Incoming Circuits		
☐	**Correct size/rating of ACB's**	
☐	**Correct metering and proper mounting**	
☐	**Connection of power factor meter**	
☐	**Fuses on volt meter, where applicable**	
☐	**Reasonable provision for termination of incoming cable/gland plate**	
☐	**Air clearances correct throughout**	
	Incomer status signal to PLC	
	Interlocks	
Pressure and Injection Tests		
☐	**Primary injection test for correct operation of all protection and overload relays**	
Operational Test		
☐	**Mechanical operation of all circuit breakers, preferably with doors closed**	
☐	**Shunt trip of all circuit breakers**	
☐	**Operation of overload relay**	
☐	**Correct operation of all interlocks**	
☐	**Correct operation of indicator lights**	

		Comments
□	**Correct operation of earth fault/overload alarm system, including general alarm panel**	
	Correct signals to PLC terminals	
	Correct interlocks	
	Door interlocks	
General Checks		
□	**Marking of control wires and power conductors**	
□	**Main Motor Control Centre label**	
□	**Cubicle labels fitted – designation and cubicle number**	
□	**Component labels fitted**	
□	**Warning labels on all removable covers giving access to live 400V conductors**	
□	**Labels for indicator lights, pushbuttons, etc.**	
□	**Terminal strip labels**	
□	**Incoming side of circuit breakers label**	
□	**Incoming circuit label – "FROM _____"**	
□	**No 'Philips' (star) screws**	
□	**No self-tapping screws**	
□	**Grommets fitted on all open holes**	
□	**Correct paint specification**	
□	**All documentation submitted**	
□	**Arc venting arrangements satisfactory**	
□	**Door latches fitted**	

(f) Specific testing and inspection requirements relating to switchgear boards are as follows:

i. Prior to shipment, the switchgear boards shall be completely assembled, wired, adjusted and tested by the supplier in the presence of the engineer and the client representative.

ii. Testing shall include primary injection tests of all current transformers, pressure tests to prove quality of insulation, functional tests of all mechanical and electrical components and electrical circuitry and any other tests required to ensure compliance with this specification.

iii. The supplier shall give one week's notice of readiness for final tests to the Johannesburg Water representative. The vendor shall ensure that the equipment is ready for final testing before requesting the presence of the Johannesburg Water representative at such a test. Repeat inspections necessitated by the lack of readiness of the equipment may be charged to the vendor at the discretion of the Johannesburg Water representative.

E04.18.2 Site Acceptance Test and Commissioning

(a) A Site Acceptance Test (SAT) must be conducted at the place of installation prior to switching the DB on. The test shall include (as a minimum) the following:

i. A visual inspection to ensure all the design specifications are adhered to;

ii. Insulation resistance test;

iii. Function testing of all components.

iv. All switchboards must be thermal imaged a minimum of 1 week after being put on service. The image must be taken in normal operating conditions. The image must be analysed for hot spots and must be part of the Operations and Maintenance

E04.19 MEASUREMENT AND PAYMENT

Item Unit

Supply and deliver Switchboards or Motor Control Centres ..... No

The unit of measurement shall be the number of MCC's or boards supplied and delivered.

The tendered rate shall include full compensation for the manufacture, supply, testing and delivery of the boards as specified in the detailed specification.

Item Unit

Install Switchboards or Motor Control Centres ..... No

The unit of measurement shall be the number of MCC's or boards installed.

The tendered rates shall include full compensation for the installation of the specified boards, including all required installation material to install the MCC or board in the required position including a heavy-duty strut, mounted 400mm below the gland plate. All incoming and outgoing cables shall be attached to this strut by means of K-clamps or approved equivalent clamps.

Item Unit

Commission Switchboards or Motor Control Centres ..... No

The unit of measurement shall be the number of MCC's or boards.

The tendered rates shall include full compensation for the site testing and commissioning of the specified boards including the keeping of all commissioning records in triplicate, including all material, test equipment and labour required for the testing and commissioning.

Item Unit

Supply and install extra circuits on Switchboards and Motor Control Centres ..... No

The unit of measurement shall be the number of circuits supplied and installed.

The tendered rate shall include full compensation for the manufacture, supply, testing and installing of extra circuits in switchboards or motor control centres (spare space being available on the board).

Item Unit

Supply and deliver level control equipment ..... No

The unit of measure shall be the number of level control systems supplied and delivered.

The tendered rate shall include full compensation for the supply, manufacturing, testing and delivery of all the material required for the level control system, including all float level switches, will the required length of cable attached to them, mounting brackets, terminal box and mounting equipment together will all material to facilitate a complete level control system.

Separate items will be measured for systems with different numbers of level switches.

Item Unit

Install level control equipment ..... No

The unit of measure shall be the number of level control systems installed.

The tendered rate shall include full compensation for installing, testing and commissioning of the level control system including the required brackets, junction boxes, cables etc. for a complete working system.

Item Unit

Modify existing motor starter panels ..... No

The unit of measure shall be the number of motor starters to be modified.

The tendered rate shall include full compensation for the supply and delivery of all material and labour required to modify the motor starter panel as detailed in the detail specification.

Item Unit

Supply and install PLC/Scada alarm and status signals ..... No

The unit of measure shall be the number of MCC's for which a siren and alarm light has been installed.

The tendered rate shall include for the full compensation for the supply, delivery, installation and commissioning of the specified siren and alarm light including all required installation material including cables required to render a fully operational system.

JOHANNESBURG WATER (SOC) Ltd.

BULK WASTEWATER

PARTICULAR SPECIFICATION

E05 : ELECTRICAL LOW VOLTAGE POWER AND CONTROL CABLES

Johannesburg Water (SOC) Ltd.
PO Box 61542
Marshalltown
2107

Revision 5 August 2019

City of Johannesburg
Johannesburg Water (SOC) Ltd

DOCUMENT CONTROL SHEET

Document Title: **Particular Specification – E05 : Electrical Low Voltage Power and Control Cables**

JW Reference: **BWW523C**

Document Ref. No: **E05**

DOCUMENT APPROVAL

ACTION	FUNCTION	NAME	DATE	SIGNATURE
Prepared	Senior Electrical Engineer	B Pieterse	August 2019	
Reviewed	Director	R Baard	August 2019	
Approved	Regional Maintenance Manager	T Thabeng	August 2019	

RECORD OF REVISIONS

Date	Revision	Author	Comments
5	2019-08-20	B Pieterse	Review of Electrical Standards, plus New Design Guidance
4	2014-06-03		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance
3	2012-05-30		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance
2	2010-05-03		Review Electrical Standards
1	2010-05-03		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance

PARTICULAR SPECIFICATION: VOLUME E05: ELECTRICAL LOW VOLTAGE POWER AND CONTROL CABLES

CONTENTS

E05.1 SCOPE

This specification covers the requirements with regards to the manufacture, supply, delivery, installation, testing and commissioning of power and control cables rated up to 600/1000V. The term cable shall indicate electrical conductors or carriers manufactured for supplying power for the control and supervision of multipurpose loads.

E05.1.1 Statutory Documents and Standards

Cables shall be strictly manufactured in accordance with the requirements of the latest editions of the following standards:

(a) SANS 1507	:	Electrical cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
(b) SANS 1411	:	Materials of insulated electric cables and flexible cords
(c) SANS 1339		Electric cables - Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,8/6,6 kV to 19/33 kV
(d) SANS 1520	:	Flexible electrical cables for use in mines
(e) SANS 10198		The selection, handling and installation of electric power cables of rating not exceeding 33 kV
(f) SANS 10142-1	:	The Wiring of Premises Part 1 – Low Voltage Installations
(g) IEC 60245	:	Rubber insulated cables
(h) IEC 60287	:	Electric cables - Calculation of the current rating
(i) IEC 60811	:	Electric and optical fibre cables - Test methods for non-metallic materials
(j) DIN VDE 0250-816	:	Cables – Wires and flexible cords for power installation – Heat-resistant silicone rubber insulated flexible cable

The Occupational Health and Safety Act (Act No. 85 of 1993)

E05.1.2 Definitions and Terminology

In general, the following definitions and terminology shall apply:

Armouring	A layer or layers of galvanized steel wires applied to the cable to provide mechanical protection or earth continuity, or both.
Bedding	A layer of extruded compound applied to the cable beneath the armouring.
Cable	A length of core or more cores assembled, that may or may not be provided with an overall mechanical covering.
Core	A single insulated conductor without protective covering.
Direction of lay	The lateral direction of inclination to the axis (either left or right) of the receding helix formed by wire or core in a cable or flexible cord.
PVC	Polyvinyl chloride
Sheath	A solid extruded protective covering applied as the exterior of a cable or a flexible cord.

E05.1.3 Particular Specifications to read in Conjunction with this Specification

This specification shall be read in conjunction with the following specifications:-
E06: ELECTRICAL MEDIUM AND LOW VOLTAGE CABLE INSTALLATION

E05.2 GENERAL SCOPE

E05.2.1 Design and Supply

(a) Conductor sizes

The minimum conductor size for control cables shall be 2.5mm^2.

The minimum conductor size for power cables on plant equipment (excluding small power and lighting) shall be 16mm^2.

(b) Conductor material

In the case of plants with a high risk of cable theft, cables with aluminium conductors must be used where the nominal core diameter exceeding 25mm^2. This must be agreed upon in writing by the Engineer.

E05.3 CONSTRUCTION

The cable shall be constructed as follows:

E05.3.1 Conductor Material

The copper conductors shall be of plain annealed or hard draw wire in accordance with the requirements of the latest edition of SANS 1411.

The aluminium conductors shall be of plain hard drawn aluminium wire in accordance with the requirements of the latest edition of SANS 1411.

E05.3.2 Insulation

The insulation material shall comprise of PVC in accordance with the requirements of the latest edition of SANS 1411.

E05.3.3 Core Colour Identification

The cable cores colour shall be in accordance with the requirements of the latest edition of SANS 1507-3.

E05.3.4 Bedding

The bedding shall consist of a continuous PVC extruded sheath.

E05.3.5 Armour

The armouring shall consist of one layer of round galvanised steel wire in accordance with the requirements of the latest edition of SANS 1411.

E05.3.6 Sheath

The outer sheathing shall be an impermeable, halogen free, reduced smoke emission, flame retardant PVC in accordance with the latest edition of SANS 1411.

E05.4 CABLE MARKINGS

The cables shall be legibly marked in accordance with the requirements of the latest edition of SANS 1507, and shall include the following:

(a) Conductor size in square millimetres
(b) Number of cores
(c) Conductor material (copper)
(d) The specification number (SANS 1507) to which the cable has been manufactured.
(e) The year of manufacture.
(f) Nominal voltage.

E05.5 STORAGE

Cables shall be packed on reeled drums. The moisture content of wooden cable drums shall not exceed 20%.

Each end of the cable shall before being secured to the reeled drum, be sealed by an acceptable

method approved by the Engineer. The outer end shall be secured to the reel drum and the inner end shall be protected in a manner against mechanical damage.

The cable reeled drums shall be capable of taking a round spindle and be lagged with strong, closely fitted battens, at the inner and outer circumference to prevent damage to the cables. The spindle bearing plates shall be steel. The dimensions of the drum shall not exceed 1 100 mm width, 2 000 mm diameter and the spindle bearing plate shall not be less than 9 mm thick. Each drum shall be clearly marked on both sides in accordance with the latest edition of SANS 1507.

The ends of the PVC sheathed cable shall be sealed to avoid penetration of moisture. Each cable drum shall be numbered.

E05.6 CABLE SIZING AND DE-RATING

The cables shall be sized and de-rated in accordance with the requirements of the latest edition of SANS 10142-1.

E05.7 TESTING OF CABLES

E05.7.1 Testing and Commissioning

The contractor shall supply factory test certificates for each drum of cable supplied under the Contract.

After the installation is complete, the contractor and the Engineer shall inspect the installation. The Engineer must be notified in advance of the inspection dates. The contractor will keep a snag list, reflecting all items not acceptable to the Engineer. The contractor will correct the snag items as required to the Engineers approval, updating the snag list as the items are completed and signed off by the Engineer.

On completion of his work, the Contractor will issue an Electrical Certificate of Compliance (CoC). All tests deemed necessary to issue the CoC should be included. The Contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The Contractor shall notify the Engineer timeously so that he may witness the tests.

Each installed cable shall be tested in accordance with:

(a) The Occupational Health and Safety Act (OHSA) 1994;
(b) SANS 1507 (Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V));

SANS 1507 Test Wave	Duration (min)	Commissioning test voltage between conductors (V)			Commissioning test voltage between conductors / earth (V)		
		300/ 500	600/ 1000	1900/ 3300	300/ 500	600/ 1000	1900/ 3300
AC (rms)	15	1000	2000	6000	1000	2000	3500
DC	15	1500	3000	9000	1500	3000	5000

This test will be conducted to the Engineers judgement. The constructer must obtain written approval from the Engineer before conducting any tests.

(a) The requirements of the Local and Supply Authorities.

E05.8 QUALITY ASSURANCE

All the cables supplied under the Scope of Works of this project shall be designed and manufactured under a quality control system, typically to ISO 9000 series. The contractor must supply current compliance certificates on the manufacturers ISO classification.

E05.9 MEASUREMENT AND PAYMENT

Measurement and payment will distinguish between supply/delivery and installation/commissioning of the cabling lengths required.

Item **Unit**

Supply and delivery of low-voltage cable .....metre

The unit of measurement shall be the length of low-voltage cable supplied. It is the responsibility of the Contractor to verify the lengths of cables required on site. The Contractor shall only supply the required length of cables required. The final quantity of installed cable lengths shall determine the final quantity to be paid of the supplied cable lengths.

The tendered rate shall include for the design, manufacture, supply and delivery of the specified cable to the site.

Separate items shall be scheduled under this payment item for each size and type of cable.

JOHANNESBURG WATER (SOC) Ltd.

BULK WASTEWATER

PARTICULAR SPECIFICATION

E06 : ELECTRICAL MEDIUM AND LOW VOLTAGE CABLE INSTALLATION

Johannesburg Water

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ACTION	FUNCTION	NAME	DATE	SIGNATURE
Prepared	Senior Electrical Engineer	B Pieterse	August 2019	
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Approved	Regional Maintenance Manager	T Thabeng	August 2019	

RECORD OF REVISIONS

Date	Revision	Author	Comments
5	2019-08-20	B Pieterse	Review of Electrical Standards, plus New Design Guidance
4	2014-06-03		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance
3	2012-05-30		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance
2	2010-05-03		Review Electrical Standards
1	2009-05-12		Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance

PARTICULAR SPECIFICATION: VOLUME E06: ELECTRICAL MEDIUM AND LOW VOLTAGE CABLE INSTALLATION

CONTENTS

E06.1 SCOPE

This section covers the installation of cables for the distribution of electrical power to be installed in soil trenches, electrical cable ducts, buildings and structures for system voltages up to 11 kV at 50 Hz.

E06.1.1 Statutory Documents and Standards

The installation will be conducted in accordance with the requirements of the following standards. Where any document or standard is referenced, it shall be deemed the latest version of that document.

(a) SANS 10198	:	The selection, handling and installation of electric power cables of rating not exceeding 33 kV
(b) SANS 1507	:	Electrical cables with extruded solid dielectric insulation for fixed installations
(c) SANS 10142-1	:	The wiring of premises Part 1 – Low Voltage installations
(d) SANS 1213	:	Mechanical Cable Glands
(e) DIN EN 50655-2 VDE 0278-655-2	:	Fingerprinting for heat shrinkable components for low and medium voltage applications up to 20,8/36 (42) kV

E06.1.2 Particular Specifications to be read in conjunction with this specifications

This specification shall be read in conjunction with the following specifications:-

(a) E02	:	ELECTRICAL CABLE RACKS
(b) E03	:	ISOLATOR PUSHBUTTON STATIONS
(c) E04	:	MOTOR CONTROL CENTRES
(d) E05	:	ELECTRICAL LOW VOLTAGE POWER AND CONTROL CABLES
(e) E07	:	ELECTRICAL INDUSTRIAL WELDING PLUGS, COUPLERS AND SOCKET OUTLETS
(f) E08	:	WIRING
(g) E12	:	ELECTRICAL MEDIUM VOLTAGE CABLES

E06.2 GENERAL

E06.2.1 Cable theft prevention

Consideration must be given at design stage for the risk posed by cable theft. The routing of cables on site must be so that there is minimum risk of cable theft. This can be effected by avoiding use of bare earth copper cables, burying cables where possible, covering with secured covers, using a concrete paving over a cable route and any other approaches that will reduce probability of cable theft. As each site has different exposure to the risk of cable thefts, the user plant personnel must be involved in a risk assessment exercise to determine measures that may be applied on a site-by-site basis.

Cable runs outside of buildings must be buried. Where cables need to cross, rise onto structures, enter buildings or link structures, cable ladders may be used. In such cases, cable racks must be covered to prevent access. The cover may be bolted, welded in such a way that it is secure and may not be easily removed by simple tools.

E06.2.2 Competence of Personnel

Contractor supervisors overseeing work on or the installation of MV equipment and cables on site

will be authorised under the Operating Regulations for High Voltage Systems (ORHVS). A valid authorisation certificate will be submitted with each tender. All contractor personnel working on medium voltage equipment shall work under the direct supervision of the authorised supervisor.

Cables, cable joints, cable terminations and cable accessories shall be installed in accordance with the manufacturer's installation instructions by competent personnel. The Contractor shall only employ personnel fully conversant with the cable manufacturer's recommendations to lay, joint and terminate cables.

E06.3 CABLE INSTALLATION ON CABLE RACKS AND STRUCTURES

E06.3.1 Installation of Cables

Cables may be installed in one of the following ways:

(a) On horizontal or vertical cable ladders;
(b) Against horizontal or vertical metal supports or brackets;
(c) Fixed to structures.

E06.3.2 Installation of Cable Ladders

Cable ladders shall be installed:

(a) Within Motor Control Centre stations,
(b) On access platforms to the mechanical equipment;
(c) In accessible cable duct.

Cable ladders shall be supported with struts, channels, brackets, clamps, cantilever arms ext. The corrosion protection of the support elements shall be of the same system as that of the cable ladder. Nuts/bolts/washers shall be used as fasteners. Unless otherwise agreed, all screws, bolts and nuts shall be hexagonal to ISO Metric commercial standards. All bolts, nuts, spring washers, etc. shall be stainless steel 316.

On access platforms, the cable ladder will be installed at minimum of 150 mm from the supporting concrete structure. Crevice corrosion of the metal elements in contact with concrete surface shall be eliminated by means of a suitable layer of non-shrink grouting.

In accessible cable duct, cable ladder shall be supported by a 50mm high strut section securely fixed to the wall. The corrosion protection of the strut shall be of the same system as that of the cable ladder

To minimise cable theft, long cable runs on cable ladders should be avoided. For high risk areas where cable racking is used or, such cable racks must be covered with solid covers of the same material and complying with the same paint specification as the racking itself. Such covers must be bolted onto the rack in such a way that either special tools or a disk grinder would be required to remove these covers. If any additional methods to prevent cable theft are required, such requirements will be made clear to the contractor at the time of tender. This will also apply to all areas where cables are exposed or where cables are visible to by passers.

Before any cables are laid, the Engineer or his representative will inspect all cable racks.

E06.3.3 Installation of Cable Supports

Cable supports must be 3CR12-grade stainless steel, 304-grade stainless steel or 316-grade stainless steel and electric orange powder coated as for the cable racks. The size of angle iron supports must be such that no part of a cable projects beyond the support.

E06.3.4 Grouping and Spacing of Cables

Wherever possible cable racks must be mounted in the vertical plane to avoid accumulation of dirt and debris. Only single layers of cable will be allowed on a rack, to reduce de-rating and for ease of replacement and/or repairs. No more than two cables may be run on a single angle profile (3CR12) support.

Cables with a cross-sectional area of more than 16 mm^2 shall, be spaced two outside cable

diameters apart, for which no grouping correction factor need be applied.

Where parallel cable runs are installed at different levels (e.g. on parallel cable trays), and where the spacing of the layers is not specified, a minimum spacing of 300 mm shall be maintained.

Medium voltage cables shall be separated from other cables and services throughout the installation, and shall be installed in separate floor trenches, pipes or metal channels as far as possible. Where this is not feasible, a minimum spacing of 500 mm shall be maintained.

Cables for telephone, communication and alarm systems and all other low voltage systems (less than 50 V), shall be separated from power cables. In building ducts, a physical barrier shall be provided between power cables and cables for other services. Where armoured cables are used for such other services, they shall be at least 500mm away from power cables or shall be installed on separate cable trays. In the case where unarmoured cables are used for these other services, they shall be installed in separate metal channels or conduits.

E06.3.5 Fixing of Cables on Cable Racks and Supports

UV stabilised PVC straps may be used for cables up to 4core x 25mm2. For cables of larger diameter than this (i.e. 30mm diameter and larger), stainless steel strapping must be used. All cables must be individually strapped.

E06.3.6 Spacing of Cable Supports

The most generally known method of supporting cables is the restrained installation where the distance between supports is small enough to prevent any noticeable sag in the cable.

The maximum spacing between cleats (clamps) to which cables are fixed in horizontal and vertical cable routes shall be determined from Table 1 below. Additional cleats shall be installed at each bend or offset in the cable run. The maximum distance between supports or cleats for multi-core control cables shall be 20 times the outside diameter of the cable with a maximum spacing of 500 mm for unarmoured cables and 30 times the outside diameter of the cable with a maximum spacing of 1 m for armoured cables. A minimum of 20 mm ventilation clearance shall be maintained between cables and the wall to which they are cleated. Spacing of supports for cables for high voltage lighting shall be in accordance with Table 8 of SANS 10142.

Table 1: Maximum Spacing of Supports (Cleats) (mm)

FOR RESTRAINED CABLE				
Cross-sectional area of Cable conductors (mm^2)	**Wire Armoured Cables**		**Other than Wire Armoured Cables and Unarmoured Cables**	
	Horizontal Cable Routes	**Vertical Cable Routes**	**Horizontal Cable Routes**	**Vertical Cable Routes**
1,5	500	750	300	400
2,5	500	750	300	400
4,0	600	750	300	400
6,0	600	750	300	400
10,0	750	900	400	500
16,0	750	1 000	400	500
25,0	900	1 000	400	500
35,0	900	1 000	400	500
Above 35,0	900	1 000	400	500

E06.4 CABLE INSTALLATION IN CABLE TRENCHES

E06.4.1 General

The Contractor shall preserve the site as far as possible. Only the minimum of trees, shrubs,

rocks, etc. shall be removed and cleared for the cable route.

The cable trench will be arranged as shown in figure 2 below:

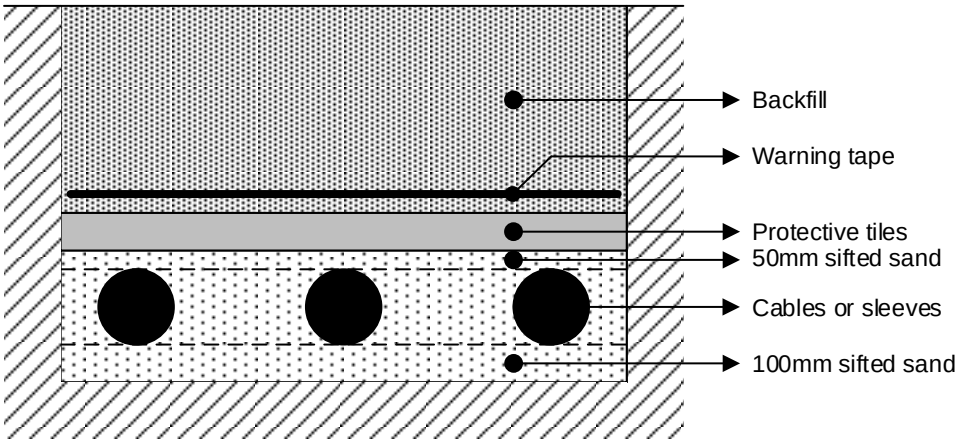

Figure 2: Cable trench arrangement

E06.4.2 Trench Routes

The cable trench shall be excavated along the route indicated on the relevant drawing. The routing should preferably traverse through the lowest theft risk areas as much as is possible.

The trench shall be as straight as possible and shall comply with all requirements. The Engineer shall determine the length of the trench to be excavated, which shall not exceed 300 m, before the cable is installed and the trench backfilled.

If any obstacle or interference should be encountered, which may require alterations to the trench or routes, such alterations shall receive prior written approval from the Engineer.

E06.4.3 Excavation of Cable Trenches

The exact positioning of trenches shall be approved on site by the Engineer and excavations shall not commence until approval has been received.

The trench shall be excavated to a depth indicated on the drawings for the different cables. Where depths are not indicated on the drawings, the following shall apply:

Cable trenches shall be excavated deep enough so that the top layer of the cables is buried a minimum of 600 mm below final ground levels for LV cables and 1000mm for MV cables.

The Contractor shall excavate by hand where he cannot excavate by means of machines due to limited access and the proximity of other services.

The bottom of the trench shall be level and shall follow the contours of the final ground level. Where the excavation is in excess of the required depth, the excavation shall be backfilled and compacted with suitable material to the required depth.

The Contractor shall remove all sharp projections, which could damage the cable where the trench is excavated through rocky formations, and shall remove all loose rocks, material, etc. from the bottom of the trench.

The Contractor shall trim the trenches and clean up the bottom of the trenches after he has completed the required excavation.

E06.4.4 Excavation of Jointing Chambers

Jointing pits shall be excavated to a depth of 1,2 m and shall be rectangular in shape and large enough for the cable jointers to work comfortably and in an efficient manner. Where more than one joint is to be made in the same position the joint pit shall be large and long enough to allow staggered joints to be made. The minimum size of a joint pit shall be as follows:

(a) One joint : 2,5 m long x 1,25 m wide

(b) Two joints : 3,0 m long x 1,5 m wide

E06.4.5 Excavated Material

No excavated material shall be left closer than 300 mm from the side of the excavation. The excavated material shall take up as small an area as possible with the safety of the workers and Works taken into consideration. The excavated material suitable for bedding material shall be placed separately on one side of the trench so that it is available when required.

Where surplus material or material unsuitable for backfilling has to be disposed of, the Contractor shall load and transport the material in the area provided to him, where it will be dumped.

E06.4.6 Inspection of Excavations

All cable excavations will be inspected by the Engineer prior to cable laying and backfilling commences.

The Contractor shall give the Engineer 24 hours' notice to do the inspections. No inspections shall be undertaken on Saturdays, Sundays and public holidays.

E06.4.7 Measurement of Excavations

Full detail of the cable trench dimensions and classification of the type of excavation shall be recorded by the contractor. The report will be presented to the Engineer as the final quantities for such excavations. The Contractor shall be responsible to keep all records as proof of progress and as basis for claims for payment. Inspections and measurements shall be completed before the installation of any bedding or backfilling.

The Contractor shall give the Engineer 24 hours' notice to be present when excavation are measured. No measurements shall be undertaken on Saturdays, Sundays and public holidays.

E06.4.8 Maintenance of Excavations

The Contractor shall maintain the excavation in a good condition, free of water, mud, loose ground, rocks, stones, gravel and other strange material until the cables are installed and the excavation is backfilled and compacted.

E06.4.9 Bedding Sand

A 100mm layer of sifted bedding sand free from sharp objects and rocks shall be laid and levelled at the bottom of each trench after the trench has been approved by the engineer, and prior to cable laying.

If the soil for the sand bed and sand cover has to be sifted, a sieve with holes 6 mm or smaller shall be used. Where this material is not available, the contractor shall import suitable material for such purposes. Where bedding has already been laid, the Engineer may instruct the Contractor to demonstrate that the minimum thickness of bedding has been provided for before authorising cable laying to proceed.

E06.4.10 Cable Laying

After approval of the trench, the cable shall be laid with the minimum of delay so that the trench can be backfilled. The Contractor shall, however, not backfill the trench until each length of cable has been inspected and approved by the engineer.

Only one cable shall be laid at a time and the Contractor shall take precautions that installed cables are not damaged. Cables should be laid with sufficient slack to relieve stresses.

The method to be used for laying cables shall be approved by the Engineer prior to the commencement of the laying of the cables.

Cable rollers shall be used when cables are drawn into trenches. The cable rollers shall be placed so that the cable does not touch the bottom or the sides of the trench. The rollers shall be of an approved construction without any sharp metal parts, which could damage the cables.

If the Contractor intends using a winch to draw the cable into the trench, a cable stocking shall be used or the draw wires shall be soldered to the cable so that the tension is exerted on all the cores, lead sheath and/or steel wire armouring at the same time.

The maximum tension on a cable during laying operations shall not exceed the value specified

by the manufacturer.

Should the Engineer not be satisfied with the manner or method employed to lay the cable he shall have the authority to instruct the Contractor to lay the cable by hand or in accordance with approved standards.

Medium-voltage cables shall overlap by at least 1m, but not more than 1,5m at joints.

Sufficient lengths of cable shall be left at the beginning and end of the cable routes to allow for the termination of the cables. Where necessary the Engineer shall decide on what length of cable is to be left. The Contractor shall take the necessary precautions to protect the cable ends until they are terminated. The cable ends shall be sealed by means of lead or heat-shrink sealing caps to ensure that the cable is waterproof.

Where cables are drawn through sleeves, care shall be taken that they are not kinked or excessively bent. No bend in a cable shall have a radius less than the minimum-bending radius specified by the cable manufacturer.

The Contractor shall keep accurate records of each length of cable laid. The following information shall be recorded:-

(d) Cable drum number
(e) Size of cable
(f) Laid from where to where
(g) Length of cable
(h) Date laid

E06.4.11 Inspection of Cables

The Contractor shall be solely responsible for inspecting all cables before backfilling to ensure that the correct type and number of cables have been installed. All cable installation will be inspected by the Engineer prior to backfilling commences.

The Contractor shall give the Engineer 24 hours' notice to do the inspections. No inspections shall be undertaken on Saturdays, Sundays and public holidays.

E06.4.12 Measurement of Cables

Full detail of the cable length shall be recorded by the Contractor. The report will be presented to the Engineer as the final quantities for such installation. The Contractor shall be responsible to keep all records as proof of progress and as basis for claims for payment. Inspections and measurements shall be completed before the any backfilling commences.

The Contractor shall give the Engineer 24 hours' notice to be present when cables are measured. No measurements shall be undertaken on Saturdays, Sundays and public holidays.

E06.4.13 Sifted Sand topping

A 50mm layer of sifted bedding sand free from sharp objects and rocks shall be laid and levelled on top of the installed cables, prior to laying of the protective concrete tiles. If the soil for the sand bed and sand cover has to be sifted, a sieve with holes 6mm or smaller shall be used. Where this material is not available, the contractor shall import suitable material for such purposes.

E06.4.14 Concrete Protective Slabs

Protective concrete tiles will be installed above the sifted sand topping. Protective concrete tiles in trenches are there to provide protection against hand digging and warning of cables below. These tiles therefore can be paving blocks, precast wall slabs, etc. Requirements are that the tiles are not less than 38mm thick and will not break under their own weight (i.e. when the longest span of the tile or slab is supported on its ends) or when laid in the trenches by commonly accepted means. The tiles must also not break when the soil is compacted. The tiles must cover the entire width and length of the trench. Before purchasing any protective tiles, the contractor must submit details of the proposed tiles to the engineer for approval.

E06.4.15 Cable Warning Tape

Cable warning tape shall be installed on all cable routes (LV and MV) at 300 mm above the

protective concrete slabs. Where a cable route exceeds 600 mm in width, multiple warning tapes shall be run in such a way that the space between adjacent warning tapes does not exceed 185 mm.

The plastic cable warning tape shall consist of a strip of polyethylene of thickness 0,04mm and of nominal width 230 mm. The tape will be completely impregnated with a pigment such that the colour of the tape is yellow, colour No B49 of SANS 1091. A black-triangle and an electric flash symbol and the words "Danger, Gevaar, Ingozi" will be printed on the tape at intervals not exceeding 1m along its length.

E06.4.16 Backfill

When the protective tiles are installed, the trench shall be backfilled with soil containing not more than 40% rock or shale which shall be able to pass through a 100 mm sieve and which is approved by the Engineer.

Where more than 40%, but less than 70% rock occurs, the Contractor shall replace the rock with imported soil. However, should more than 70% rock occur then all the backfilling material shall be imported.

(a) The Contractor may import further stone-free material to the site or sieve the excavated material for sand bedding and cover but payment shall only be compensated for the actual quantity of imported material required as determined by the engineer. The quantity of imported material required shall be calculated from the nominal trench width.

(b) The excavated material shall be backfilled in layers of 150 mm and shall be well compacted and consolidated to 90% MOD AASHTO. Where necessary the Engineer may require that a mechanical vibrator be used for compacting the trench.

(c) The Contractor shall maintain the completed sections of the cable trench in a proper safe condition for the duration of the contract. The Contractor shall refill and compact the trench where subsidence occurs.

(d) After completion of the work, the route of the cable shall be neatly finished off and cleared. All stones bigger than 25 mm as well as all loose organic material and rubble shall be removed.

E06.4.17 Identification and Marking of Cable Routes

Cable route markers, in the form of concrete pre-cast posts, which stand 1.0m above ground level, secured in the ground, must be installed every 50m on straight runs and at every change in direction of the trench. Movable route markers will not be acceptable. The post must be equipped with a stainless steel plate engraved with “ELECTRICAL CABLES”, the cable voltage and the direction indicated in which the cables run. If there are C&I cables in the same trench, there must be a separate label engraved with “C&I CABLES”, and the direction indicated in which the cables run. If there are data communication cables in the same trench, there must be a separate label engraved with “DATA CABLES” and the direction indicated in which the cables run. These labels must be cast into the concrete post so that they cannot be pried off.

At the bottom of the post, a 450 x 450 x 100mm concrete base must be cast to ensure that the route marker can only be removed if it is deliberately dug out of the ground. Steel reinforcing mesh of MRM reference 156, in accordance with SANS 1024 is required in the concrete and the concrete compressive strength of the base must not be less than 15 MPa. (Note: Reinforcing mesh to MRM 156 consists of 3.55mm diameter wire used to create 100 x 100 mm squares).

These route markers must be installed right next to the trench and not over the cables, so that the trench can be re-opened without affecting the route marker. The labels on the route marker must be on the trench side of the route marker.

Cable route markers must be protected in areas of high vehicle traffic.

Figure 1 below provides the required detail of these cable route markers.

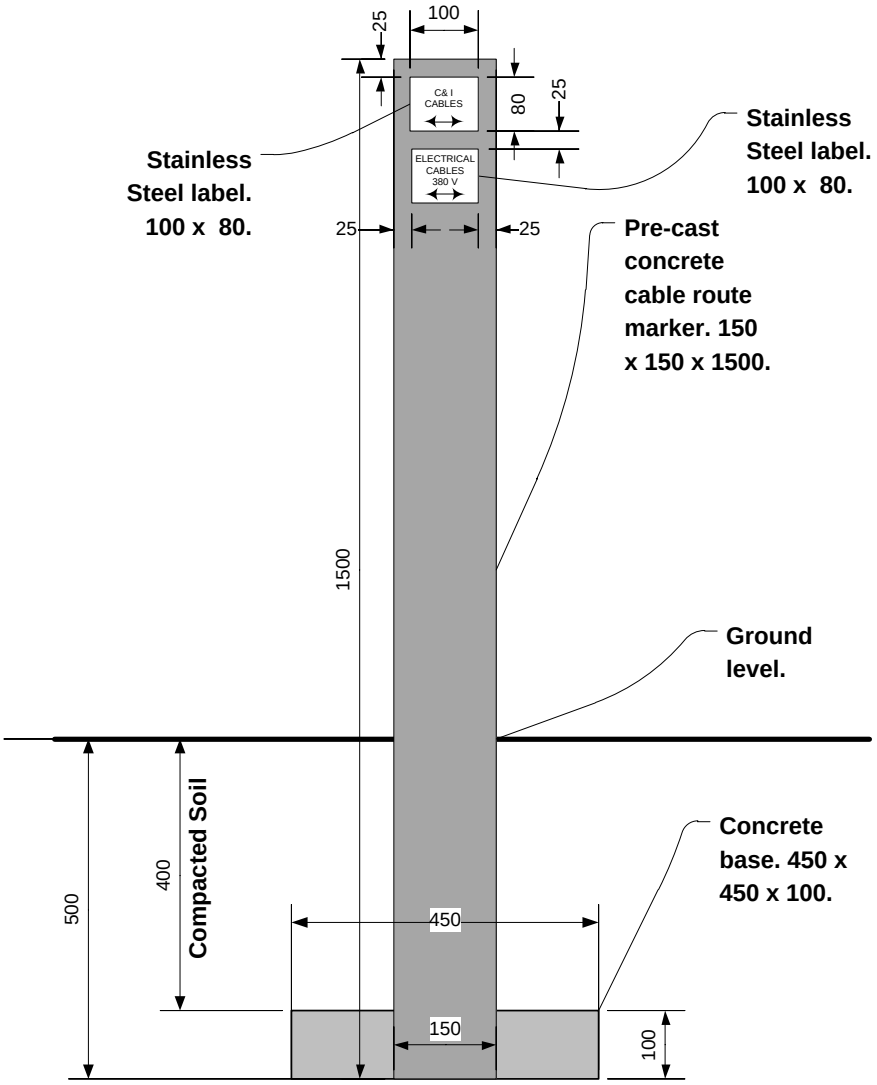

Figure 1: Cable Route Markers

E06.4.18 Road Crossings

The cable sleeves shall be installed 1,5m below ground level to avoid damage when the roads are constructed.

Unless otherwise specified, two additional sleeves shall be installed for future use at each road crossing.

Sleeves used for crossings shall be straight and undamaged. Bends shall not be allowed in road crossings. Sleeves shall be extended for a distance of 1,0m outside the roadway.

After the installation of the sleeves, the sleeves shall be meticulously backfilled so that no air pockets are left. The trench shall thereafter be backfilled in layers of 150 mm and compacted with mechanical vibrators to 95% modified AASHTO density.

The Contractor shall lay and join the cable sleeves and compact the trench to the satisfaction of the engineer. After installation, the sleeves shall be cleaned and a galvanised steel draw wire installed in the sleeve prior to the sleeve ends being sealed by means of plastic plugs.

E06.4.19 Crossing of Services

Where a cable crosses over other services, the cable shall not be installed at a depth less than

800 mm below ground level and if this is not possible, the cable shall be installed underneath the other service and shall be protected in the prescribed manner by means of concrete slabs. The depth of the cable shall be maintained for one metre on either side of the crossing.

If it is not possible to cross over or underneath a service in the prescribed manner, the matter shall be referred to the Engineer for a decision.

The following minimum clearances shall be maintained between electrical cables and other services:-

	Vertical	Horizontal
Water pipes	0,3	1,0
Sewer pipes	0,3	1,0
Storm water pipes	0,3	1,0

E06.5 CABLE INSTALLATION IN CABLE DUCTS

E06.5.1 General

This paragraph covers the installation of cables in build-up trenches, service ducts, etc. inside buildings. The trenches, ducts, etc. will be constructed and installed by others.

The use of this method of cable routing should be avoided where possible as it exposes the cables to high risk of theft. Open channels shall not be used for cable routing on any site.

E06.5.2 Installation

Cables shall be installed in one of the following ways:

(a) On vertical cable trays or.
(b) On metal supports fixed to the side of the trench with suitable clamps.

Cables shall be clamped in position.

Cables shall not be bunched and laid on the floor of purpose built trenches.

E06.5.3 Covers

The covering of concrete trenches shall as a rule fall outside the scope of the electrical installation. However, the Contractor shall be responsible for the cutting or drilling and smoothing of holes for cables through chequer plates, concrete or other coverings as required.

Cables shall enter and exit the trench through sleeves protruding 300 mm beyond the covering. The sleeves shall be permanently secured in position and the open space between the cable and sleeves shall be sealed with a non-hardening, watertight compound.

E06.5.4 Filled Trenches

Where specified herein, floor trenches shall be filled with sand.

If a sand filling is specified, the cables shall be fixed to non-corroding supports.

Sand-filled trenches other than in substations shall be covered in one of the following ways:-

(a) Reinforced concrete covers;
(b) 100mm of 20MPa concrete;
(c) Removable chequer plates. However, this will not be acceptable in open spaces.

Reinforced concrete covers shall be used where vehicular traffic may be encountered over trenches. Unless otherwise specified herein, allowance for a mass of 2 tons shall be made.

E06.6 CABLE JOINTS

E06.6.1 General

Joints in cable runs will not be allowed unless authorized by the Engineer.

Jointing shall be carried out strictly in accordance with the manufacturer's instructions. Only personnel competent in the installation of the specific joint will carry out the work.

During outdoor jointing operations, the joint bays shall be adequately covered by tents of waterproof material suitably supported. When necessary, a trench shall be excavated around the bay to prevent the ingress of moisture. The sides of the excavation shall be draped with small tarpaulin or plastic sheeting to prevent loose earth from falling in during jointing operations.

The crossing of cores in joints shall not be permitted under any circumstances. The electrical continuity of all the conductors, screens and armouring shall not be impaired by the joints and the earth continuity shall be accomplished within the joints, i.e. no external earth continuity conductor that will be subject to corrosion, is acceptable.

Joints shall be waterproof and airtight and shall be free of voids and air pockets. The joint shall not impair the anti-electrolysis characteristics of the cable. In the case of joints in cables with an outer PVC anti-electrolysis sheath, the joints shall be subject to the same electrical insulation test as the outer sheath of the cable.

The Contractor shall notify the Engineer timeously of the day on which jointing is to be carried out in order that an inspection may be arranged if so required. Any cable joint not inspected by the Engineer because of insufficient notice being given, shall be opened for inspection and redone at the discretion of the Engineer at the cost of the Contractor.

E06.6.2 Medium Voltage Cable Joints

Medium voltage cable joints shall be of the heat shrink type.

The joints shall make minimal, if any, use of insulating or stress relieving tapes. The use of electrical stress control and insulating tubing that is heat-shrunk on to the joint is preferred above other methods.

The materials shall comply with VDE 0278 and the supplier shall be called upon to confirm this aspect before acceptance of the materials or installation.

The heat-shrinkable and other materials used for joints shall be of a high quality and shall retain their electrical and mechanical properties without deterioration.

Joint kits shall be of a reputable brand.

E06.6.3 Low Voltage Cable Joints

Low voltage cable joints shall be of the epoxy-resin type.

The resin filled joint kit shall comprise a self-sealing plastic mould of high mechanical strength having sufficient connector space. The exact amount of cold hardening resin shall be provided in a two-compartment plastic bag. The resin shall have absolute minimum shrinkage. The mould and resin shall be waterproof and non-hygroscopic and shall be resistant to ultraviolet radiation.

Joint kits shall be of a reputable brand.

E06.7 CABLE TERMINATION

E06.7.1 General

Connection of cables to switchgear shall always be effected in such a way that the various phases, seen from the front of the switchgear will be in the following positions where practically possible:-

(a) Conductor no 1 : left (red)
(b) Conductor no 2 : centre (white)
(c) Conductor no 3 : right (blue)

Exposed armouring is not acceptable. Glands will be properly fitted with shrouds to cover any bare armouring.

All cable ends shall be supplied with the necessary earth connection.

A strut or other approved means of support shall be provided to remove mechanical stress from the glands.

Cable cores shall be marked with heat-shrunk sleeves where necessary to identify the phases. Refer to SANS 10142.

The current-carrying capacity and breakdown voltage of the cable end shall be the same as for the complete cable.

Cables shall be terminated in accordance with the recommendations laid down by the manufacturers of the cables and glands installed.

E06.7.2 Cable Glands

All cable glands for indoor and outdoor use shall be Ex rated as per SABS 1213 and have corrosion proof guard. It shall have a minimum IP rating of 68.The cable glands shall be suitable for use in hazardous areas classified for zone 1,2,21 and 22.

Cable glands shall be of the adjustable type gland suitable for indoor use and shall be suitable for use with PVC PVC SWA PVC cables complying with the latest edition of SANS 1507. All glands shall be installed with non-deteriorating neoprene shrouds.

Outdoor use cable glands shall be similar to the indoor use cable glands with an additional feature of a nipple gasket and an inner seal kit, rendering the gland suitable for type "EXe" equipment (increased safety equipment).

In high corrosive areas, such as chlorination, chemical dosing and inlet works areas, the cable gland shall

(a) offer a minimum degree of ingress protection of IP 66 according to SANS 60529;

(b) be suitable for type " EXe " equipment;

(c) be corrosion proof;

(d) Have a positive seal internal to the cable gland that seals over the cable outer sheath. For these applications, no shrouds are required.

For all gland installations on armoured cable, the outer sheath of the cable shall be cut back in accordance with the gland manufacturers' recommendations, so that a minimum of armouring is exposed between the gland and the outer sheath after gland installation. The shroud shall seal on the outer sheath of the cable.

E06.7.3 Cable Lugs

Suitable cable lugs shall be used and shall preferably be solidly sweated to cable conductor ends. Lugs may be crimped using mechanical, hydraulic or pneumatic tools specifically designed for this purpose, on condition that evidence is submitted that the system used complies with the performance requirements of BS 4579, Part 1, “Compression joints in copper".

Lugs crimped to cable with a cross-sectional area of more than 16mm² shall entail the use of either pneumatic or hydraulic crimping tools. Under no circumstances may a lug be crimped by means of a hammer and/or punch.

Lugs crimped to aluminium shall be subjected to thorough inspection with relation to the material and quality of crimping by the Engineer. Bi-metallic aluminium-copper lugs shall be used according to the manufacturer's specifications, where solid aluminium conductors are terminated onto copper busbars.

Fixing bolts shall be manufactured of cadmium plated high tensile steel and shall match the lug hole size. Contact surfaces between the lug and the busbar shall be thoroughly cleaned and smoothed.

When cutting away insulation from cable conductors to fit into lugs, care shall be taken that no strands are left exposed. Under no circumstances may any of the conductor strands be cut away to fit into lugs. Care must be taken when cutting the insulation not to damage the conductors.

Cables that are connected to clamp type terminals where the clamping screws are not in direct contact with the conductors need not be lugged, but the correct size terminals shall be used.

Ferrules shall be used where cable conductors are connected directly to equipment with screws against the conductor strands.

E06.7.4 Medium Voltage Cable Terminations

Heat shrinkable termination kits shall be used for all high voltage (above 1 kV) terminations and shall be applied strictly in accordance with the manufacturer's recommendations.

The complete termination kit shall be packed in a container that is marked for the type of cable insulation and construction as well as the voltage range for which the materials are suitable. An illustrated set of instructions for the installation of the materials shall accompany every termination kit.

The terminations shall make minimal, if any, use of insulating or stress relieving tapes. The use of electrical stress control and insulating tubing that is heat-shrunk on to the terminations is preferred above other methods.

The termination kits shall include suitable boots for the covering of the terminal studs on the equipment. The cable ends shall be terminated strictly in accordance with the termination manufacturer's specification. The cable ends shall withstand the same test voltage as the cable.

The materials shall comply with VDE 0278 and the supplier shall be called upon to confirm this aspect before acceptance of the materials or installation.

The heat-shrinkable and other materials used for the terminations shall be of a high quality and shall retain their electrical and mechanical properties without deterioration.

Terminations shall be made of a material that gives lasting protection against ultra-violet radiation.

The cores of all cables terminated outdoors and the cores of 3,3 kV and higher voltage cables terminated indoors, shall be completely covered with a shrunk-on protective layer against surface tracking, ultra-violet radiation and weathering.

Outdoor terminations shall be designed to prevent flashover under wet or contaminated conditions and to ensure additional mechanical strength. This shall be achieved with shrunk- on insulating spacers and rain sheds.

E06.7.5 Cable Identification

Cables shall be identified at all terminations (both ends). The identification of MV cables installed in cable ladders, ducts or to structures shall be to SANS 10142-1.

Both ends of the cable shall be marked with the cable number in accordance with the cable schedule. The cable tag shall comprise of a punched stainless steel strap that shall be tied onto the cable by means of a thin stainless steel tape

The use of PVC tape with punched characters or punched metallic bands or tabs is not acceptable.

The identification number of cables shall be shown on the "as built' drawings of the installation.

E06.8 TESTING OF THE INSTALLATION

The contractor shall supply factory test certificates for each drum of cable supplied under the Contract.

After the installation is complete, the contractor and the Engineer shall inspect the installation. The Engineer must be notified in advance of the inspection dates. The contractor will keep a snag list, reflecting all items not acceptable to the Engineer. The contractor will correct the snag items as required to the Engineers approval, updating the snag list as the items are completed and accepted/signed off by the Engineer.

On completion of his work, the Contractor will issue an Electrical Certificate of Compliance (CoC). All tests deemed necessary to issue the CoC should be included. The Contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The Contractor shall notify the Engineer timeously so that he may witness the tests.

Each installed cable shall be tested in accordance with:

(a) The Occupational Health and Safety Act (OHSA) 1994;

(b) SANS 97 (Electric cables - Impregnated paper-insulated metal-sheathed cables for rated voltages 3,3/3,3 kV to 19/33 kV)

SANS 97 Test Wave	Duration (min)	Commissioning test voltage between conductors (V)			Commissioning test voltage between conductors / sheath (V)		
		3300/ 3300	3800/ 6600	6350/ 11000	3300/ 3300	3800/ 6600	6350/ 11000
AC (r.m.s)	15	7000	13000	22000	7000	8000	13000
DC	15	9000	19000	31000	9000	11000	19000

(c) SANS 1339 (Electric cables - Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,8/6,6 kV to 19/33 kV)

SANS 1339 Test Wave	Duration (min)	Commissioning test voltage between conductors (V)			
		6600	11000	22000	33000
VLF (0.1 Hz)	60	11000	19000	38000	57000
Power frequency	60	8000	13000	25000	38000
DC	10	6000	10000	20000	30000

DC voltage testing is likely to cause irreversible damage to XLPE-insulated cable systems. The voltage and duration should be limited to the appropriate values given in the table above. The contractor shall use a DC test set to apply the test voltage. After completion of the DC test, the contractor shall soft-discharge the cable, using either the DC test set or a discharge stick where after the cable will be fully discharged by solidly earthing it for at least 8 h but preferably for 24 h. DC testing shall only be carried out with written permission from the Engineer,

(d) SANS 1507 (Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V));

SANS 1507 Test Wave	Duration (min)	Commissioning test voltage between conductors (V)			Commissioning test voltage between conductors / earth (V)		
		300/ 500	600/ 1000	1900/ 3300	300/ 500	600/ 1000	1900/ 3300
AC (rms)	15	1000	2000	6000	1000	2000	3500
DC	15	1500	3000	9000	1500	3000	5000

E06.9 COMPLETION

The Engineer reserves the right to inspect the installation at any stage during the course of construction. However, such inspections will not deem the portions inspected as being complete or accepted and the Contractor shall remain responsible to complete the installation fully in accordance with this specification.

The Contractor shall carry out a final “as built" survey of the cable routes and present to the Engineer “as built" route plans of the complete installation.

The following information shall be reflected on the plans or submitted as separate schedules with the plans:

(a) Overall length of each cable;

(b) Locations of all joints (if any) in relation to permanent reference points. Dimensions shall be shown and the method of triangulation i.e. two dimensions shall be used to each joint;

(c) The location of all cable markers in relation to permanent reference points;

(d) Identification numbers of all cables.

The Works will be deemed incomplete until all tests have been conducted and certified successfully and all "as built" drawings and schedules have been handed to the Engineer.

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PARTICULAR SPECIFICATION

M16: MECHANICAL CONVEYOR EQUIPMENT

4	2013-10-23	Minor updates and re-issued	J Ritchie	
3	2012-07-30	General review	T Wellard	
2	2010-02-16	General review	J Ritchie	
1	2009-05-12	Review of Mechanical / Electrical and Control / Instrumentation Standards, plus New Design Guidance		
Rev	**Date**	**Description**	**Signature: JW Wastewater Partnership**	**Signature: Approval from Johannesburg Water**

PARTICULAR SPECIFICATION M16: MECHANICAL CONVEYOR EQUIPMENT

CONTENTS

M16.1 SCOPE

This specification covers the detailed design criteria, manufacture, supply, installation, test and commissioning of mechanical belt conveyor systems for the conveyance processed sludge at a waste water treatment works.

M16.2 INTERPRETATIONS

M16.2.1 Abbreviations

In this Specification the following abbreviations will apply:-

ANSI	:	American National Standards Institute
ASTM	:	American Society for Testing and Materials
BS	:	British Standards Institution
SANS	:	South African Bureau of Standards
SIS	:	Swedish Institute of Standards
DIN	:	Deutsch Industry Normen
ISO	:	International Organisation for Standardization
ASME	:	American Society of Mechanical Engineers
SAECC	:	South African Electrolytic Corrosion Committee

M16.2.2 Standards

All design standards for the conveyor systems shall be subject to the latest amendments and editions of the following standard specifications:-

SANS 1168, 1313 and 1173	:	Conveyor equipment
ISO 5048	:	Design of Conveyors
ISO 5048	:	Continuous mechanical handling equipment, Belt conveyors with carrying idlers, Calculations of operating power and tensile forces
SABS 400: 1990	:	National Building Regulations
BS 5304: 1988	:	Code of practice for safeguarding of machinery
SABS 044 Part lll to lv: 1993	:	Testing of welders, where applicable to the type of welding required
BS 292 Part 1: 1987	:	Dimensions of ball bearings, cylindrical and spherical roller bearings
SIS 05 59 00	:	Pictorial Surface Preparation Standards for Painting Steel Surface

M16.2.3 General Requirements

This specification must be read in conjunction with the following specifications:-

G01: Particular Specification for Colour Codes

G02: Particular Specification for Corrosion Protection

M16.3 DESIGN OF CONVEYOR EQUIPMENT

M16.3.1 General Design Parameters

Equipment shall be designed:

- To facilitate manufacture, inspection, installation, maintenance, cleaning and repairs.
- To ensure safe and satisfactory operation for an acceptable life expectation of 12 years under the conditions prevailing at the site.
- To prevent undue stresses being produced by expansion due to temperature changes.
- To keep maintenance costs to a minimum.
- To facilitate inter-changeability of units and/or sub-parts throughout the contract works with regards to new equipment and equipment and/or sub-parts currently being used on the existing Johannesburg Water Sites.
- To operate without undue vibration and excessive noise. Maximum of 84dBA measured at 1 metre from operating equipment.
- To comply with the legal requirements in respect of safety as well as the prevention of water and air pollution.
- To satisfy any specific requirement contained in the statutory codes and legislation.
- To be suitable for operation 365 days per year, 24 hours per day under specified design conditions.
- As a minimum, components shall be selected with a service factor of 1.5 applied to the maximum operating power to be transmitted or otherwise as per the manufacturer's recommendations.

M16.3.2 Belt Conveyors Design of Parameters

All plant and equipment shall be designed to operate satisfactory under atmospheric, ambient and other conditions specified in the Project Specifications.

All conveyors shall be designed for a surcharge angle of 0º and a troughing angle of 35º.

Design tonnage and maximum tonnage for belt conveyors shall be for a digested sludge cake of 18 – 22 % dewatered from a belt press process. No additional percentage shall be applied to the maximum feed tonnage to obtain a maximum design tonnage.

The maximum belt speed for a conveyor system shall be 0.75 m/s. Conveyors shall be capable of starting up under full load.

Inclination of conveyors shall be such that no runback of material occurs when the belt is loaded. The maximum inclination of any conveyor will be 14º.

Where transfer points are located outside a building then the transfer point is to be covered with a steel structure with roof sheeting and side sheeting to the top 50% of the side height to facilitate maintenance.

Gearboxes shall be standardised as far as is possible. Integral holdbacks shall be provided for conveyors where required. Speed reducers shall be of the helical geared, shaft-mounted types. Gear unit ratios shall be based on 4 pole, 50Hz motors with the minimum gear unit service factors being 2.0 based on installed motor power. Thermal and mechanical service factors shall be selected such that the gearbox shall be able to operate effectively without the risk of excessive heat build-up under all operating and ambient conditions specified.

A spare gearbox for each size of gearbox used in the conveyor system installation shall be supplied for storage in the client's stores.

All conveyor equipment will comply with SANS 1173. In the design of the equipment, special consideration shall be given to the standardisation of such parts as pulleys, gearboxes, hold-backs, couplings, shafts, bearings, electric motors, etc. reducing spare equipment to a minimum.

Belt widths, belt speeds and transfer points shall be designed with particular attention to the prevention of spillage. The maximum belt loading capacity shall be 85% of theoretical loading capacity.

M16.3.3 Starting Equipment

Accelerating and braking forces shall be taken into account in the calculations of belt tensions and counterweights. Starting equipment shall be designed that the belt is not over-stressed when started under a full load.

M16.3.4 Pulleys

The diameter of driving, tail and tripper pulleys as well as pulley shafts shall be as specified in SANS 1169 and shall be calculated for belt tensions between 100 - 150% of the maximum operating working tensions.

Pulley bearings shall be of the spherical roller bearing type with a $L10_h$ life rating of 100,000 hours. Pulleys shall be of the fabricated type, bearings and pulleys shall be standardised.

The driving and tail pulley shall be rubber lined after manufacture

M16.3.5 Idlers

Outer surfaces shall be smooth and corners chamfered. Each assembly of roll, shaft, bearings, seals, etc. shall be concentric. Rolls shall be no less than 125 mm outside diameter.

Bearings shall be high-grade anti-friction type and shall have a minimum $L10_h$ life rating of 100,000 hours. Idler bearings shall be of the life lubricated type. The bearings shall be protected by an effective sealing arrangement.

Troughing idler assemblies shall be of the three-roll type, in accordance with SANS 1313.

Parts exposed to dirt accumulation shall be designed and constructed for self-cleaning. Idler spacing shall comply with the spacing specified in SANS 1173. Return idlers shall be subject to the same basic design principles as the toughing idlers shall also apply to impact idlers.

At the loading points, closely spaced troughing idlers shall be used. The same provisions regarding bearings, etc. applicable to troughing idlers shall apply to impact idlers.

M16.3.6 Loading and Transfer Points

Loading and transfer points shall be designed with the primary objective of reducing belt wear to a minimum and to eliminate spillage. Feed presentation from belts to equipment in parallel via trouser leg chutes will be central to the chute to avoid preferential feed to the equipment.

Feed presentation to the belt shall be central to avoid training problems. Chutes shall be designed to utilise the most suitable and economical wear resistant materials available and shall be made large enough to facilitate access for maintenance purposes.

Chute valley angles shall be a minimum of 60º from vertical.

New chutes and hoppers shall be provided with replaceable liners. All surfaces to be lined shall be covered over the full surface area that may be subject to wear.

Sideliners shall be made of not less than 4.5 mm thick VRN 500 plate. Impact liners shall be made of no less than 4.5 mm thick VRN 500 plate.

The liners shall be sized to facilitate ease of replacement and inter-changeability.

Chutes shall be provided with inspection hatches to allow for ease of inspection and block chute detection if required.

M16.3.7 Take-ups

Gravity type take-ups shall be provided on all conveyors exceeding 40m between centres of the drive and tail pulley. Take-ups for conveyors shorter than 40m shall be screw type.

M16.3.8 Walkways and Gantries

Walkways shall be open grid flooring suitably corrosion protected and shall be 750mm wide. All inclined walkways on conveyor gantries shall be of sloped construction and not stepped. All conveyors are to be supplied with only one walkway.

Where weight meters are to be installed on conveyors, a straight section of at least 6m will be allowed for the installation.

Where conveyors interface with buildings at ground level, external access to the gantry shall be allowed for without having to enter the gantry through the building.

M16.3.9 Belting

Belting shall conform to SANS 1173. All splices shall be hot vulcanised.

M16.3.10 Belt Cleaning

Scorpio type (or similar approved by the Engineer) primary and secondary scrapers shall be used for belt cleaning of all conveyors.

M16.3.11 Return Belt Ploughs

All conveyors shall be fitted with Scorpio type (or similar approved by the Engineer) belt ploughs on return belts situated at the tail end.

M16.3.12 Skirts

Skirts shall be provided at all feed points.

M16.3.13 Deck Plates

Deck plates shall be provided at head, take-up and tail terminal points, including areas where conveyors cross access roads or buildings. All deck plates shall be of mild steel construction and painted to the paint specification requirements.

M16.3.14 Protection

Suitable protection shall be provided for slippage and in the event of an obstruction causing the conveyor operation to be interrupted. The protection provided shall interrupt the operation of the conveyor.

The protection device shall be of an Intelligent Motor Protection Relay type with built in phase angle protection. As a backup device a torque overload coupling with a limit switch shall be provided. The limit switch must have at least one SPDT contact or one normally open and one normally closed contact capable of switching at least 500mA at 230 Volts AC. The contractor shall provide details of the proposed system at the time of tendering.

All conveyor equipment shall have a trip switch operated by a switch wire on both sides of the conveyor for emergency tripping. The trip wire must be operational along the full length of the conveyor.

Suitable protection shall be provided for belt tracking/alignment. The contractor shall provide details of the proposed system at the time of tendering.

It is a requirement of this specification that the above malfunction in operation be reflected on the works SCADA system.

M16.4 DESIGN SERVICE FACTORS

M16.4.1 Service Factors Specified

Where special requirements exist, these shall be stated in the individual equipment specifications/data sheets and design service factors shall exceed these values.

M16.4.2 Service Factors Unspecified

For continuous duty and heavy shock loads, service factors shall be individually considered and shall be approved. For medium duty and light shock loads, the following service factors shall apply. Consideration must also be given to the individual starting conditions in the selection of these components.

In selecting the capacity of electric motors, gears, gearboxes, power transmissions, couplings, pulleys, shafts, belts, etc., the design theoretical kilowatt ratings shall be increased by 20%.

In selecting the capacity of electric motors, couplings, shafts, vee-belts, and vee-belt drives, etc. for pumps, the designed theoretical kilowatt rating shall be increased by 25% to 50%, and for agitators (not stirrers) by 50%, to allow for possible overloading produced by pumps delivering larger quantities or at specific gravities higher than specified by the process requirement.

The factors of 25% to 50% and 50% shall be additional to the design factors used to obtain the theoretical kilowatt rating.

M16.4.3 Overload Capacities

Machinery and equipment, excluding motors, shall be designed to withstand a starting overload based on a minimum of 100% momentary overload, 50% overload allowance for 15 minutes and 25% overload allowance for periods not exceeding 2 hours. Refer to individual equipment specifications for variations.

M16.4.4 Transmission

Chain drives shall be in accordance with BS 228: 1984 – Transmission Roller Chains, Chain Wheels and Cutters.

Sufficient take-up allowance shall be provided on the motor mounting to take up two full chain pitches. Where take-up allowance is not possible due to fixed shaft centres, an adjustable chain wheel idler shall be incorporated.

All chain drives shall be adequately guarded and lubricated.

Unless otherwise specified, V-belt drives shall be standard sections and of the Space-Saver type. Belts shall be furnished in matched sets. Sheaves shall be accurately balanced and fitted with keyed 'Taper-Lock' bushings.

Drive motors shall be mounted on slide or pivoted bases allowing sufficient adjustment for correct belt tensioning according to the manufacturer's requirements. Bases shall incorporate jack screws with lock nuts. All V-belt drives shall be adequately guarded.

Gearboxes

Gearing shall be in accordance with the appropriate AGMA standards as revised. All gearing shall be machine cut to high commercial grade and shall be suitably heat treated before final machining.

Gearing not enclosed in an oil bath shall be adequately guarded and provision shall be made for safe lubrication.

Speed reduction units shall be of approved design and manufacture. Allowance for efficiency, cooling and lubrication shall conform to the manufacturer's recommendations.

Gearboxes shall be of rigid construction manufactured either from cast steel or fabricated from mild steel plate.

Gearboxes shall be dustproof and equipped with inspection covers, drain and filler plugs, breathers with suitable filters, oil level indicators or dip sticks and lifting lugs as required.

Fabricated gearboxes shall be guaranteed against distortion when in service.

Foot mounted gearboxes shall be assembled together with the prime mover on a common baseplate and accurately doweled in position. Shaft mounted gearboxes shall be mounted according to the manufacturer's recommendations.

NOTE: A spare gearbox for each size of gearbox used in the conveyor system installation shall be supplied for storage in the client's stores.

All rotating equipment shall be clearly marked with an arrow showing the direction of rotation.

Bearings

Where required by design considerations, well lubricated non-ferrous bushings and bearings may be used.

Where phosphor bronze bearings are used the quality shall be to SAE 64 or equivalent. The supplier shall be required to provide details of specification number and analysis of metals used. This requirement shall also apply to the use of white metal.

Self-lubricating graphite or compound bearings shall not be used unless specifically requested.

For heavy duty and continuous service, Plummer blocks shall be anti-friction spherical roller type with split housing rated to suite the application. All Plummer blocks shall be fully self-aligning with one fixed and one floating type for each shaft assembly. With parallel shafts, inner ring adapter sleeves may be used.

For lighter duty, 80mm diameter and less, ball bearing Plummer blocks may be used.

Unless otherwise specified, the basic rated life for all anti-friction bearings shall be 75,000 hours

($L10_h$ as defined by SKF).

Plummer blocks shall be mounted on accurately machined sole plates equipped with lugs and jack screws with lock nuts for proper horizontal alignment.

All Plummer blocks shall be installed such that the loads pass through the base and not the cap. Deviations from this arrangement for practical reasons shall be subject to approval and accompanied by design calculations.

Bearing housings shall be of cast steel, good quality cast iron or fabricated to specification and accurately machined where necessary. Housings shall be mounted on machined surfaces and located and fixed by permanent devices.

Design allowance shall be made for keyways and combined bending and torsion stress. Suitable fillet radii shall be provided at changes in diameter and shaft ends shall be chamfered. Changes in diameter and keyways shall not coincide.

Light duty shafting shall be hot rolled polished mild steel or cold rolled mild steel. Cold rolled shafting shall be subject to approval.

All shafts shall be metric and shall be supplied with key seats and keys or feathers in accordance with BS 4235 Part 1: 1986 unless a fastening method other than by key is used. Any such proposed fastenings shall be submitted to the responsible Engineer together with design calculations for approval.

All couplings shall be fitted with a removable guard unless the machine is already guarded in such a manner as to make a separate guard unnecessary.

Brakes shall be adequately sized for the load characteristics and heat dissipation.

M16.5 LUBRICATION

Lubricants and lubrication fittings shall be in accordance with the following standards:-

- SANS 053:1972 : Viscosity Classification of Industrial Lubricating Oils
- SANS 344:1974 : Calcium Base Lubricating Grease
- SANS 351:1974 : Sodium Base Lubricating Grease
- SANS 406:1974 : Lithium Base Lubricating Grease
- SANS 1014:1974 : Multi-Purpose Lubricating Grease
- BS 1486:1982 : Lubricating Nipples Parts 1 & 2
- BS 1399 Parts 1 to 3:1970 : Rotary Shaft Oil Seal Units

All equipment supplies shall submit a specification of the lubrication requirements for their equipment, which shall include the following:-

(i) Approximate quantities required for the initial fill.

(ii) The expected rate of consumption of the lubricant and the recommended intervals for a complete change of lubricant.

(iii) A lubrication chart indicating all lubricating points, periods for lubrication, oil and filter changes.

(iv) A list of South African based suppliers of the recommended lubricants.

All Plummer blocks shall be sealed against the ingress of moisture or dirt by means of a double

lip seal or a Labyrinth seal.

Where wet or extremely dirty conditions occur, a flinger shall be used in addition to seals.

For vertical shafts, a flinger shall be installed above the upper bearing seal. Lubrication of equipment, such as gearboxes, compressors, etc. shall conform to the recommendation of the equipment manufacturer.

All equipment, which normally contains lubricant and is despatched without such lubricant, shall be sprayed internally with a suitable moisture inhibitor to prevent deterioration during transport and storage. All machinery and equipment shall be checked for cleanliness and lubrication prior to testing or start-up.

Any special requirements for flushing and cleaning shall be stated by the manufacturer.

Such equipment shall carry clear legible tags indicating that there is no lubricant contained therein.

Gearing and chain drives shall have fully enclosed oil bath lubrication except where a low peripheral velocity requires grease lubrication. Where the peripheral velocity of gearing exceeds 750 m/min, forced feed lubrication shall be provided.

All lubrication points shall be easily accessible from the normal maintenance/operating zones of the equipment. If necessary, lubrication points shall be extended by means of pipes or tubing to a location that is both convenient and safe for access during normal equipment operation.

M16.6 BASEPLATES

Baseplates shall be designed to prevent undue deflection or failure under any conditions of loading likely to be encountered.

Baseplates shall be rigidly constructed, generally of cast steel or fabricated steel. For light duty, cast iron bases may be used.

Where practical, the prime mover and the gears, bearings, or other equipment shall be mounted on a common base plate.

Mounting pads and base plate feet shall be machined true and parallel. Allowance shall be made on the prime mover mounting pad for 5 mm maximum and 1 mm minimum shimming.

Where baseplates are fabricated they must be stress relieved before machining.

Baseplates shall incorporate jack screws with lock nuts to assist with aligning of the prime mover in relation to the gearbox, bearings or other equipment.

M16.7 PLATEWORK

Where bins, chutes, liners and skirts are supplied as an integral part of mechanical equipment they shall be designed such that:-

(a) They allow for the fast, smooth flow of material and avoid abrupt changes of direction which invite material build-up and subsequent plugging.

(b) They have a minimum of throat constrictions.

(c) They are firmly supported, manufactured from a minimum of 6 mm plate to SANS 1431 Gr. 300 WA and are suitably stiffened and supported to deal with loads and forces

imposed on them.

(d) Their valley angles are conservative and suitable for the materials handled.

(e) Falling material does not impact directly on sensitive receiving equipment but rather on the sloping bottom of chutes.

(f) Chutes and hoppers shall be provided with bolted flange connections in order to simplify installation and maintenance.

(g) All nozzles to be fabricated from scheduled piping, wall thickness to match plate work thickness. Flanges will be specified on the relative data sheets.

(h) All plate work and chutes to be trial assembled and match marked by the fabricator before delivery to site.

(i) Bins, chutes, etc. and support structure (where required) shall be designed for a maximum static load when all full of mineral sand or slurry at a design bulk density as specified. Subassemblies or components shall be fitted with lifting lugs designed with adequate safety factors to lift the subassembly or components. Travelling members to be fitted (where required) to avoid distortion. Fabricator to supply spreader bars for components requiring such.

(j) Where equipment such as scrapers, rappers and squeezers, spray units, etc. are housed within the chutes, they must be able to be removed without disturbing the main assembly.

(k) Where material is in contact with the chutes, suitable liner plates shall be installed which shall be fastened by means of nib head countersunk bolts and waterproofed where necessary. Such liner plates shall be designed to allow for interchange ability and not to exceed 30 kg in mass.

(l) Equipment subject to abrasive slurry particle contact shall be protected against such abrasive materials by a minimum 6 mm thick natural rubber lining. All lining is to be returned around flange faces for sealing. Rubber lining shall be done in accordance with BS 6375-5: 1985 and SANS 1198: 1978.

(m) The maximum deflection of any plate shall be less than 1 mm in 300 mm.

UNLESS OTHERWISE STATED ON THE DRAWING, LINER PLATES SHALL BE ARRANGED IN A BRICK PATTERN WITH A GAP OF NOT MORE THAN ONE LINERPLATE THICKNESS OR 10 mm (WHICHEVER IS THE LEAST) BETWEEN ADJACENT LINERS

M16.8 DUCTING AND SHEET METALWORK (DUST COLLECTION AND VENTILATION)

Ducting, flanges, gates, etc. shall conform to details shown by the Industrial Ventilation Manual of Recommended Practice issued by the American Conference of Governmental Industrial Hygienists.

Ducting shall be checked after fabrication to ensure that:-

- No pin-holes or slag inclusions which would cause leaks during service are present in any welds.
- Inside diameters are to drawing, and ducts are concentric within 5 mm on diameter.
- Supports shall be designed and spaced so that sagging does not occur, allowing for a normal dust load, and shall be structurally adequate allowing for a dust filled plugged duct.
- After erection of ducting and the installation of dust extraction units, the complete system

shall be tested, balanced and blast gates locked or tack-welded in place.

- All ducting and bends shall be manufactured from mild steel with a minimum thickness of 3 mm.
- All ducting shall have flanges welded to each end of each piece; such flanges shall be of a suitable thickness for the diameter but shall not be less than 3 mm.
- All flanged connections shall be complete with matching gaskets made from material suitable for the needs of the process.

M16.9 WIRE ROPE, CHAINS AND FITTINGS

All ropes, whether fixed suspension or for general use, shall comply with all relevant Acts and Statutory Regulations.

Hoist ropes and fittings shall comply with the regulations of the Mines and Works Act and the Machinery and Occupational Safety Act of the Republic of South Africa.

Rope fittings shall be securely attached to the ropes, preferably with terminal splicing standard spelter fittings or approved swaged fittings. All rope slings shall be tested to twice the required working strength. Spelter fittings shall not be used for high temperature applications. Where rope clips are specified, a minimum of three rope clips and a thimble shall be correctly fitted to make the connection.

All lifting tackle shall be supplied with test certificates.

Rope slings for general use shall be fitted with a metal tag indicating the safe working load.

Sockets, thimbles, rigging screws, stretching screws, eyebolts, etc., shall have a safe working load of no less than that for the attached rope or chain. Wire rope and fittings that are a stationary part of a machine, and fixed guys shall be galvanized.

Chains shall comply with all relevant Acts and Statutory Regulations and shall be stamped indicating the safe working load.

M16.10 FASTENERS

When bolting onto parallel surfaces, all nuts shall be fitted with plain parallel washers except where the machinery is subject to vibration or movement. Then, springs washers, nylon insert locknuts or tack welding shall be used as indicated by the design. Adjustable nuts (e.g. bearing take-up), castellated nuts with split cotter pins shall be used. For thread diameters of 10 mm and under, the use of tab washers is permitted.

High strength friction grip bolts shall be installed in accordance with:-

- SANS 094:1982 Bolted Friction-Grip Joints
- BS 3294 Part 1:1960 Structural Steelwork (Metric Units)

Precision bolts and nuts shall be supplied in accordance with:-

- SANS 136:1985 ISO Metric Precision Hexagon-Head Bolts, Screws and Nuts (Metric Units)
- SANS 646:1962 Precision Bolts, Screws and Nuts

Black bolts and nuts shall be supplied in accordance with:-

- SANS 135:1985 ISO Metric Black Bolts, Screws and Nuts Hexagon and Square (Metric

Units)

- SANS 1143:1977 Mushroom and Countersunk Head Bolts and Nuts

Washers shall be supplied in accordance with SANS 1149 – Flat and Tapered Steel Washers.

Black bolts shall be installed in accordance with the following assembly requirements:-

(a) All bolt heads and nuts shall make contact, bearing on parallel plan surfaces perpendicular to the bolt axis.

(b) A tapered washer shall be correctly positioned under the bolt head or the nut whenever the surfaces contacted are not parallel and perpendicular to the bolt axis. It shall be used against the sloping surface.

(c) A flat washer or a tapered washer shall be used under the bolt head or nut, whichever is to be rotated during tightening operations. Washers shall be of adequate size and thickness to prevent their distortion, for any reason, during tightening.

(d) After assembly and proper tightening, bolts shall project through nuts for a minimum distance of three (3) full threads.

When assembled, all HSFG bolted joint surfaces shall be free of dirt, loose scale, burrs and other defects that would prevent solid seating of the parts. All contact surfaces shall be free of oil, paint and lacquer or galvanising.

All HSFG bolts shall be torqued using load-indicating washers of an approved type to ensure correct tension is achieved.

Plate liners, unless otherwise specified, shall be fitted with nib-headed countersunk bolts, and spring washers shall be used under the nuts.

M16.11 OPERATION AND MAINTENANCE

Operation and maintenance of mechanical equipment shall be carried out strictly in accordance with the Equipment Manufacturer's recommendations.

The Equipment Manufacturer shall supply Operation and Maintenance instructions which shall include full details and recommended frequencies of periodic maintenance checks, adjustments, running clearances and lubrication requirements.

M16.12 PLANT LAYOUT

The following criteria shall apply for plant layouts:-

Buildings and conveyor transfer towers shall be positioned to make use of the natural slope of the contours at the site where possible, i.e. to minimise building heights and conveyor lifts.

Major mechanical equipment shall be positioned to facilitate removal with overhead cranes in the event of breakdown or maintenance. For smaller equipment, or where equipment cannot be reached by cranes, due to the nature of the plant layout, hoists and crawl beams will be used for maintenance purposes.

All sump pumps shall be suitably guarded for personal safety, as well as protection against the ingress of large objects.

The layout of the plant shall allow sufficient access for personnel engaged in operational and

maintenance duties.

M16.12.1 Platforms and walkways

Platforms and walkways shall be provided wherever access is required for regular inspection, lubrication or operation of machinery or equipment.

Walkways shall be clear 600 mm wide as a minimum.

Access to all valves, instruments and equipment lubrication points will be provided either from the ground floor or from a platform.

A minimum clearance of 2100mm shall be provided under equipment and steelwork.

Stairways shall be provided rather than ladders except in extreme cases where space is not available or usage will be very infrequent.

Stairway slope shall be between 38º and 42º, maximum slope.

A walkway will be provided along one side of each belt conveyor.

Access ladders shall be provided to all crane bridges.

Vendors to specify maintenance clearance requirements for equipment supplied, these clearances to e incorporated into layouts.

M16.13 ROTATING EQUIPMENT

The direction of rotation of all rotating non-reversing equipment will be clearly and indelibly marked on the casing or nameplate.

M16.14 STAIRWAYS AND PLATFORMS

Stairways, platforms, access ladders and landings shall be provided as necessary and shall conform to relevant Building Regulations, or International Design Standard. Stairway slope shall be between 38º and 42º maximum.

M16.15 HANDRAILS

Handrails shall be provided around all permanent openings, the edges of elevated platforms and access ways abutting edges to all internal side wall sheeting and walls, and to each stairway stringer and where required for safety.

M16.16 EQUIPMENT ERECTION

All equipment shall be erected in accordance with the requirements of the Mechanical Erection Specification, and in accordance with Equipment Manufacturer's Installation Instructions.

M16.17 EQUIPMENT NAME PLATES

All equipment shall have permanent nameplates of material suitable for corrosive conditions on which the equipment number and description shall be clearly marked. This will facilitate equipment identification during construction and commissioning.

M16.18 OVERHEAD CRANES, LIFTING BEAMS AND HOISTS

Overhead cranes shall be sized for maintenance duties as apposed to installation duties. The overhead cranes will be sized for the heaviest regular maintenance lift required.

Lifting beams, hoists and cranes shall be provided for ease of servicing and removal of equipment. Adequate space shall be provided for rigging, removal and set down. Lifting beams and crane rails shall be designed to the relevant standards and test certificates shall be provided. Beams shall be stamped with the appropriate SWL. Lifting beams shall be equipped with a trolley from which to attach the hoists.

M16.19 SAFETY

M16.19.1 General

All mechanical designs shall ensure that the relevant regulatory and statuary requirements are met.

M16.19.2 Guards

All rotating parts that are accessible shall be guarded. Shield guards or guard railing shall be provided at all belts, pulleys, gears, or moving parts.

Handrails, toe boards, and nonslip surfaces shall be provided on all elevated platforms, walkways, stairways and ramps.

All nip points shall be adequately guarded to prevent injuries

M16.19.3 Signs

Signs shall be provided to alert all personnel of the need for protective clothing such as steel caped boots, hard hats, and safety glasses.

Signs shall be provided where a specific exists, such as live conductors, high noise levels, low head clearance, trip hazards, hot surface prevails.

M16.19.4 Clothing

Special footwear, masks and clothing for areas with high dust levels or surface area contamination shall be used.

Non-slip footwear, gloves, helmets, face protection, leggings and other protective equipment, as necessary, for work near high temperature materials shall be used.

Where there is a risk of flying chips or sparks, or where intense light is generated, eye protection shall be used.

Protective clothing and goggles shall be used in areas where highly corrosive materials are handled.

Emergency eyewash stations and safety showers shall be installed as required.

The mechanical design shall ensure that priority is given to all project safety and ergonomic aspects, including plant layout, constructability, maintainability and operability.

M16.20 SPARES AND TOOLS

The Tenderer must submit on the appropriate schedule a priced list of spare parts which nit is recommended should be kept by the water treatment plant for maintenance of the plant. Spares which the Management decides to order must be manufactured simultaneously with the rest of the equipment and be subject to the same tests for dimensions, tolerances, strength, etc. All spares must be packed separately and the cases appropriately marked. All spares must be new and unused.

A full range of spares must be kept available for not less than 15 years.

Tenderers must submit a provisional price (where applicable) for a complete set of spanners, keys and tools required for the operation, adjustment and overhaul of the plant supplied. All spanners, keys and tools shall be new and unused.

M16.21 PROOF OF MAINTENANCE

The period of maintenance will extend over a period of 12 months calculated from the Completion as defined in the Appendix. However, should a portion or all of the plant and equipment fail / or require rectification during this period, the Engineer reserves the right to extend the Period of Maintenance in respect of such portion or all of the plant and equipment for a further period of not more than 12 months calculated from the date of Commissioning of such plant and equipment after rectification

M16.22 METAL PREPARATION AND CORROSION PROTECTION

Refer to Particular Specification G02: Corrosion Protection

M16.23 COLOUR CODES

The standard final colour codes for equipment supplied under this Contract shall be in accordance with Particular Specification G01: Colour Codes.

M16.24 QUALITY MANAGEMENT (QM) AND QUALITY ASSURANCE

QM shall be categorised as ‘critical and major’ for this section of the Project.

M16.24.1 Manufacture

Tenderers shall submit with their tender a detailed Project Quality Plan, stating how they control the flow of paperwork from commencement of the Project through final handover to the Client, a sample of their Quality Control Plan, (QCP) and Project Quality Plan, (PQP) both during the course of the Project, manufacture and finally, installation.

The successful Tenderer shall submit a QCP covering all aspects of the manufacturing process, indicating held points to allow the Engineer opportunities to evaluate the equipment for compliance to this specification.

All items of equipment shall be subject to inspections by the Engineer during design and manufacture per these QCP’s.

In general, it is anticipated that this Project shall be in accordance with the relevant ISO 9000 requirements.

M16.24.2 Installation

The successful Tenderer shall submit a QCP covering all aspects of the installation of each item of equipment to be installed under this Project. The Engineer shall be afforded every opportunity to certain stages of completion of the installation to ascertain compliance with the Specifications and to witness the Contractor's site activities at the Engineer's discretion.

M16.25 SYSTEM PERFORMANCE

M16.25.1 Works testing

Each item of equipment shall be subject to inspection and testing prior to despatch from the works. All performance test results shall be made available to the Engineer for verification or when the QCP's require intervention or hold points for inspection.

In the case of gearboxes, they shall be subject to testing under operating conditions for at least 12 hours on the test bed. All results shall be available for inspection

M16.25.2 Before commissioning

- Check for correct oil level in gearboxes and that motors are greased properly.
- Ensure all HD bolts are torqued down correctly.
- The alignment and levelling of each assembly shall be checked and the results shall be available for inspection by the Engineer.
- The electrical functions and control shall be checked by a responsible inspector prior to attempting to start any motor on this Project.

M16.25.3 After Initial Commissioning

- Ensure all oil pumps and flow or pressure switches are functional
- Ensure that all transfer points are operating satisfactory with no spillage.

M16.25.4 Before Expiry of the Defects Liability Period

The Engineer requires the Contractor to visit the site every quarter to inspect for the correct operation of the installed equipment. A report after each visit shall be submitted in writing

M16.26 MEASUREMENT AND PAYMENT

Payment under scheduled items shall be made per complete installation as specified, electrical connections, civil preparation, coring and grouting, etc. Measurement and payment will distinguish between supply / delivery and installation / commissioning of the conveyor equipment required.

The tendered rates or sums shall cover the cost of design, drawings, manufacture, supply, testing at the manufacturers works, delivery to site, off loading, installation, site testing, setting into operation, the supply of O & M manuals, commissioning and maintenance during the warranty period of all equipment specified and also for anything not specifically mentioned but obviously required, (e.g. all ancillaries, including all bolts, fastenings and brackets, safety guards and any work or material required for the proper installation of such equipment) to enable the equipment to be installed and/or function safely and correctly as specified. No claims whatsoever for extras will be allowed on the grounds that a necessary piece of equipment or a part thereof is not specifically mentioned.

ANNEXURE 1:

BASELINE RISK ASSESSMENT

ANNEXURE 2:

MEDICAL SCREENING POLICY

ANNEXURE 3: ENVIRONMENTAL MANAGEMENT PLAN

ANNEXURE 4:

JW 6.4 (RETURNABLE ANNEXURE A)

ANNEXURE 5:

SIGN OFF FORM

	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT	
Johannesburg Water	PROJECT NUMBER:	RFP 24/07/2023
	PROJECT LOCATION:	Northern WWTW – Dewatering & Composting areas
	PROJECT DESCR:	Repair and service BC06 conveyor belt and associated equipment at Northern Works

POSSIBLE RISKS FOR THIS PROJECT

Task	Hazard	Risk	Consequence	Rating	Controls
Transportation of material to site	✓ Unsafe road conditions ✓ Un-road worthy vehicles ✓ Equipment and material not safely secured ✓ Incompetent drivers ✓ Driving under the influence of alcohol ✓ Inclement weather ✓ Speeding ✓ Slippery road	✓ Overturning vehicles ✓ Vehicle collisions	✓ Injuries ✓ Property damages ✓ Third party liability	**M**	✓ Adherence to the speed limit ✓ Only competent/ authorised drivers should operate the vehicle ✓ Inspection of vehicles ✓ Equipment and material to be properly secured ✓ Alcohol testing to be done ✓ The road to be paved to prevent accidents ✓ Traffic control to be implemented to avoid collisions
Offloading of material	✓ Faulty lifting machinery & equipment ✓ Suspended load ✓ Poor housekeeping	✓ Malfunctioning ✓ Falling on employees ✓ Obstructed walkways by materials	✓ Injuries	**M**	✓ Inspect lifting equipment prior to use. ✓ Ensure the safe working load prior to use ✓ Train the employees in manual lifting ✓ Ensure proper housekeeping ✓ The correct PPE must be worn

					✓ Designate the stacking areas and put signs ✓ Stacking and storage inspector must be appointed and in charge
Site establishment	✓ Sharp objects/ wires ✓ Uneven surface ✓ Faulty connection ✓ Poor ergonomics ✓ Falling objects ✓ Inadequate security services ✓ Not enough welfare facilities e.g. toilets, change rooms and lockers	✓ Cuts ✓ Slips and trips ✓ Damage to services ✓ Using the environment as ablution facilities	✓ Injuries ✓ Back strains and injuries ✓ Crime, theft, fights ✓ Contracting of communicable diseases ✓ Soil, water pollution	**M**	✓ Supervisors to plan during site set up and induct employees ✓ A competent electrician must be appointed to connect electrical wires to the site offices and Distribution Board. ✓ Ensure there are welfare facilities on site for health and hygiene purposes ✓ Awareness on hygiene and use of ablution facilities ✓ Detailed Risk Assessment must be drawn before any work commences on site.
Installing containers	✓ Using lifting equipment ✓ Faulty equipment ✓ Faulty slings / chains	✓ Wind ✓ Incompetent personnel ✓ Heavy load ✓ Failing of lifting equipment ✓	✓ Serious injuries ✓ Property damage	**H**	✓ Check wind speed prior to using the crane. ✓ Inspect the crane, slings and chains before use. ✓ Load test the crane before use ✓ Only carry loads certified to be carried by the crane
Electrical installation	✓ Electricity ✓ Incompetent personnel ✓ Wrong tools ✓ Damaged cables	✓ Contact with live electricity ✓ Incompetent person connecting electricity ✓ Electric shocks	✓ Electrocution ✓ Serious injuries	**H**	✓ Follow lock out procedure ✓ Ensure that equipment are earthed to an approved earthing point ✓ Ensure a zero potential test is performed for electricity is isolated ✓ Inspect all tools ✓ Use correct tools for the job

					✓ Appoint a competent electrician/ technician ✓ Wear task specific PPE ✓ Ensure that there are no exposed wires on the cables
Entry and exit	✓ No access control	✓ Unauthorised entry into the construction site	✓ Injuries ✓ Theft of tools and material	**M**	✓ Appoint a full time, registered security guard on site
Stacking and storage	✓ Unsafe stacks of materials or pallets	✓ Falling of pallets and material on employees ✓	✓ Injuries ✓ Property damage	**M**	✓ Supervision of all stacking of materials on site ✓ Materials of same base and heights stacked together ✓ Barricade the stacking area ✓ Unsafe stacks to be removed immediately ✓ Never stack materials during knocking off time or late at night ✓ Use task specific PPE
Working in confined spaces	✓ Confined space	✓ No procedure ✓ Inappropriate entry and exit	✓ Fatality ✓ Serious injuries	**H**	✓ Develop a confined space entry procedure including rescue. ✓ Ensure that there is a suitable entry and exit point ✓ Provide employees with safety harnesses
Working at heights	✓ Heights ✓ Unfit employees ✓ Using hand tools ✓ Unsecured tools and equipment	✓ Falls ✓ Unfit for the job ✓ Damaged hand tools ✓ Falling onto employees	✓ Injuries	**M**	✓ Employees to use proper PPE including safety harnesses when working at heights. ✓ Inspect all tools prior to use. ✓ Provide training for using safety harnesses correctly. ✓ Employees working at heights must be certified fit to work. ✓ Hand tools must be attached to lanyards when working at heights. ✓ Use tool bags

					✓ Use netting system below each level. ✓ No work should be done on the ground when work at heights is in progress. ✓ Proper signage to be displayed.
Mechanical Works – Lifting practices	✓ Crane operation	✓ No SWL displayed ✓ Incompetent operator ✓ Employees standing around ✓ Unfavourable weather conditions	✓ Serious injuries ✓ Property damages	**M**	✓ Load testing of lifting equipment ✓ Inspection of lifting tackle and equipment prior to use ✓ Display SWL ✓ Only competent people to operate the lifting equipment ✓ Access control to the lifting area ✓ Do not use during unfavourable weather conditions
Installation of equipment	✓ Manual handling	✓ Poor ergonomics ✓ Hands stuck between equipment	✓ Back sprains ✓ Pinch point injuries	**L**	✓ Two employees to carry heavy equipment ✓ Use the correct lifting techniques ✓ Train employees on the correct lifting techniques ✓ Use hand gloves
	✓ Use of hand tools	✓ Usage of the wrong tool for the task ✓ Using damaged tools ✓ Lack of skill	✓ Injuries to person ✓ Cuts ✓ Loss of services ✓ Damage to property	**L**	✓ Damaged tools ✓ All tools are visually inspected before use. ✓ Specific equipment/tools are only used by competent users
Cutting and drilling	✓ Drilling ✓ Drill pit ✓ Drill sharp metal fibres ✓ High Noise Levels ✓ Cutting Grinder/Disc	✓ Vibration ✓ Cutting edges ✓ Eye penetration ✓ Finger cuts ✓ Expose to high noise level area ✓ Uncontrolled disc	✓ Damaged hearing ✓ Carpal tunnel syndrome ✓ Cuts/ injuries ✓ Eye irritation / blindness	**M**	✓ Use hearing protection when exposed to excessive noise levels (greater than 85 dB over an 8-hour work period) ✓ Assess noise level with sound level meter if possibility exists that level may exceed 85dB

		✓ Electrical equipment failure ✓ Sharp window edges	✓ Minor cuts resulting into injury ✓ Injuries to persons operating ✓ Eye injuries		✓ Rotate drilling tasks to minimize worker exposure to equipment vibration ✓ Use right size of a drill to drill different layers of the ground ✓ Assess manual guide carefully to ensure correct usage of portable electrical devices.
Electrical – MCC panel	✓ Lifting equipment	✓ No SWL displayed ✓ Faulty equipment ✓ Employees standing around	✓ Serious injuries ✓ Property damages	**M**	✓ Load testing of lifting equipment ✓ Inspection of lifting tackle and equipment prior to use ✓ Display SWL ✓ Only competent people to operate the lifting equipment ✓ Access control to the lifting area
Cabling	✓ Live electric cables	✓ Electric Shock	✓ Serious injuries	**H**	✓ Ensure that electricity supply is switched off during installation ✓ Implement lockout procedures
	✓ Inadequate wiring	✓ Electric fault ✓ Fire	✓ Serious injuries ✓ Property damages	**H**	✓ Only competent persons to do the electrical work
	✓ Use of faulty cables	✓ Fire ignition	✓ Burns/ damages	**M**	✓ Visual inspection of cable before use
	✓ Cutting	✓ Eye penetration	✓ Eye injuries/ blindness	**M**	✓ Safety goggles shall be worn by employees when cutting steel
	✓ Unit activation	✓ Struck by equipment	✓ Injuries	**M**	✓ Lock out/ Tag out
	✓ Live Yard	✓ Electrocution Injury ✓ Working unauthorized ✓ Mis-communication	✓ Injury or death	**H**	✓ Obtain a permit ✓ Follow cardinal rules ✓ Strict supervision ✓ Fire extinguisher must always be on site ✓ Obtain a permit and follow all procedures listed

		between employees			✓ Strict supervision ✓ Competent technician operation ✓ Issue test certificate for every testing and inspection done
	✓ Electrical connection ✓ Extension cords	✓ Explosion ✓ Faulty cord failure	✓ Injuries / damage to employees and equipment ✓ fire	**L**	✓ Emergency stop button must always be serviceable ✓ Fire extinguishers must always be kept on site
	✓ Electrical equipment ✓ Portable electrical appliances	✓ Use of faulty electrical equipment; ✓ Faulty equipment could also start a fire.	✓ All workers could suffer potentially fatal shocks or burns. ✓ Electric shock/ burns ✓ injuries	**M**	✓ All tools to be checked and tagged before bringing onto site; ✓ Portable electrical appliances examined and where necessary, tested by a competent person within the recommended time limit; ✓ Defective appliances and leads are removed from use and kept secured until they can be repaired or removed from the site; ✓ Electric tools and installations to be in good condition; ✓ Inspect electric tools before use; ✓ Do not use electric tools in wet / damp conditions; ✓ Use personal protective equipment such as insulated gloves.
Commission & testing	✓ Testing ✓ Inspection	✓ Electrocution Injury /Damage to equipment ✓ Chocking ✓ Electrocution Injury ✓ Working unauthorized ✓ Miss-communication	✓ Fatalities ✓ Property damages	**H**	✓ Authorized person with C.O.C must do all the installation ✓ Emergency stop button must always be serviceable ✓ Ensure communication between employees ✓ Technical Skills ✓ Fire extinguisher must always be on site ✓ Implement lockout procedure

		between employees			✓ Strict supervision ✓ Competent technician operation ✓ Issue test certificate for every testing and inspection done
Install generator	✓ Lifting equipment	✓ No SWL displayed ✓ Faulty equipment ✓ Employees standing around	✓ Serious injuries ✓ Property damages	**M**	✓ Load testing of lifting equipment ✓ Inspection of lifting tackle and equipment prior to use ✓ Display SWL ✓ Only competent people to operate the lifting equipment ✓ Access control to the lifting area
Fueling	✓ Spillages	✓ Slips, trips, falls	✓ Injuries	**L**	✓ Prevent spillages ✓ Use drip trays ✓ Use funnels for fuelling
		✓ Fire	✓ Injuries	**M**	✓ No smoking allowed near the generator
	✓ Diesel fumes	✓ Inhalation	✓ Respiratory problems	**L**	✓ Provide employees with respirators
		✓ Skin contact	✓ Skin irritation	**L**	✓ Provide employees with gloves, safety boots and overalls
	✓ Running engine	✓ Explosion	✓ Injuries	**M**	✓ Switch engine off before refueling and make sure fuel cap is replaced. ✓ No smoking allowed near the generator
Running the engine	✓ Noise	✓ Over-exposure	✓ Noise-induced hearing loss	**M**	✓ Provide employees with hearing protection ✓ Provide rest periods for employees
	✓ Vibration	✓ Over exposure	✓ Raynaud's Syndrome	**L**	✓ Provide employees with vibration gloves. ✓ Rotate employees or provide rest periods.

	✓ Fumes	✓ Inhalation	✓ Respiratory problems	**L**	✓ Provide employees with respirators ✓ Never use indoors
Electricity	✓ Voltage	✓ Contact with live electricity	✓ Electrocution	**M**	✓ Ensure that power is switched off when servicing the generator ✓ The frame of the generator and any external conducting parts should have proper grounding / earthing wiring. ✓ Do not touch with wet hands
Install a skip **& Wash water storage tank**	✓ Lifting equipment	✓ No SWL displayed ✓ Faulty equipment ✓ Employees standing around	✓ Serious injuries ✓ Property damages	**M**	✓ Load testing of lifting equipment ✓ Inspection of lifting tackle and equipment prior to use ✓ Display SWL ✓ Only competent people to operate the lifting equipment ✓ Access control to the lifting area
Welding	✓ Fumes	✓ Inhalation	✓ Respiratory problems	**M**	✓ Wear respiratory protection
	✓ Sparks	✓ Contact with skin	✓ Skin burns	**L**	✓ Personal Protective Equipment to include face, eye and skin protection
	✓ Sparks	✓ Fire	✓ Damage to property ✓ Fatalities	**H**	✓ Provide fire extinguisher ✓ Provide screens ✓ Remove all sources of combustion and hazardous chemicals from welding area
	✓ Welding arc	✓ Starring welding arc	✓ Eye irritation	**L**	✓ Safety goggles to be worn
Working at heights	✓ Heights ✓ Unfit employees ✓ Using hand tools	✓ Falls ✓ Unfit for the job ✓ Damaged hand tools ✓ Falling onto employees	✓ Injuries	**M**	✓ Employees to use proper PPE including safety harnesses when working at heights. ✓ Inspect all tools prior to use. ✓ Provide training for using safety harnesses correctly.

	✓ Unsecured tools and equipment				✓ Employees working at heights must be certified fit to work. ✓ Hand tools must be attached to lanyards when working at heights. ✓ Use tool bags ✓ Use netting system below each level. ✓ No work should be done on the ground when work at heights is in progress. ✓ Proper signage to be displayed.

RISK ASSESSMENT MATRIX

Likelihood	**Consequences**				
	Insignificant (minor problem easily handled by normal day to day processes	Minor (Some disruption possible e.g. Damage equal to R150k	Moderate (significant time / resources required. E.g., damage equal to R500k	Major (Operations severely damaged. E.g., damages equal to R1m	Catastrophic (business survival is at risk. Damage equal to R5m – 10m
Almost certain (90% chance)	High	High	Extreme	Extreme	Extreme
Likely (between 50-90%)	Moderate	High	High	Extreme	Extreme
Moderate (between 10-50%)	Low	Moderate	High	Extreme	Extreme
Unlikely (between 3-10%)	Low	Low	Moderate	High	Extreme
Rare (<3%)	Low	Low	Moderate	High	High

	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION	
Johannesburg Water	TENDER NUMBER:	RFP 24/07/2023
	PROJECT LOCATION:	Northern WWTW – Dewatering & Composting areas
	PROJECT DESCRIPTION:	Repair and service BC06 conveyor belt and associated equipment at Northern Works

Returnable Annexure A: Acknowledgement of SHE Specification & Annexures

DECLARATION BY CONTRACTOR

I, the undersigned, and representing the tenderer as indicated hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and confirm compliance thereto in the event of being successful:

- OHS Specification (Volume 2)
- Annexure 1: Baseline Risk Assessment
- Annexure 2: Medical Screening Policy
- Annexure 3: Sign off form
- Annexure 4: Environmental Management Plan

We furthermore commit to:

- Comply with all applicable SHE related legal and other requirements.
- Inform all staff of their role in managing environmental impacts and safety hazards on site.

Signed at …… on this …….. Day of …… 20……..

Name of tenderer	
Name of Authorized person	
Authorized Signature*	

Signature must be as per form JW 3.3 as applicable

	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION	
Johannesburg Water	PROJECT NUMBER:	RFP 24/07/2023
	PROJECT LOCATION:	Northern WWTW – Dewatering & Composting areas
	PROJECT DESCR:	Repair and service BC06 conveyor belt and associated equipment at Northern Works

VOLUME 2

Occupational Health & Safety Specification

RFP 24/07/2023

REPAIR AND SERVICE BC06 CONVEYOR BELT AND ASSOCIATED EQUIPMENT AT NORTHERN WORKS

Prepared by: OHS Department PO Box 61542 Marshalltown 2107 Tel: +27 11 688 1476	**PRINCIPAL CONTRACTOR:**	
	CEO (16.1 APPOINTEE):	
	TELEPHONE NUMBER:	
	FAX NUMBER	
	E-MAIL ADDRESS:	
	SIGNATURE:	

General Notification

This document forms an integral part of the Contract Specification and, in particular, shall constitute the Client's (Johannesburg Water SOC Ltd.) Occupational Health, Safety & Environmental (SHE) Specification, as required by the Construction Regulations, 2014, as promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993). The Specification shall furthermore be applied for the management of Mandatories performing activities for or on behalf of Johannesburg Water SOC Ltd, irrespective whether the contract work constitutes construction work or not.

The Contract Specification is contained in Volume 1 of the contract documents in Part 3: Scope of Work.

Acknowledgements

This Occupational Health, Safety & Environmental (SHE) Specification was developed by the internal OHS Department for the sole use by Johannesburg Water SOC Ltd. The issue date of this SHE Specification is September 2016.

ABBREVIATIONS

Abbreviation	Description
CR	Construction Regulations
COID	Compensation for Occupational Injuries and Diseases
DoL	Department of Labour
GAR	General Administrative Regulations
GMR	General Machinery Regulations
GSR	General Safety Regulations
HCS	Hazardous Chemical Substances
HIRA	Hazard Identification and Risk Assessment
JW	Johannesburg Water (SOC) Ltd
MSDS	Material Safety Data Sheet
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
PER	Pressure Equipment Regulations
SANS	South African National Standards
SABS	South African Bureau Standard
SHE	Safety, Health & Environment
SOC	State Owned Company

DEFINITIONS

Word / Phrase	Definition
"WCL 1", "WCL 2" and "WCL 22"	Means the prescribed forms for reporting of incidents and occupational diseases referred to in the Compensation for Occupational Injuries and Diseases Act.
Competent Person	A person who has in respect of the work or task to be performed the required knowledge, training, experience and, where applicable, qualifications specific to that work or task: provided that where appropriate, qualifications and training are registered in terms of the provisions of the National Qualification Framework Act, 2000 (Act 67 of 2000).
Construction work	Any work in connection with: a) The construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure b) the construction, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system or any similar civil engineering structure; or the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work
Contractor (inclusive of Principal Contractor)	Any organization, person, entity performing activities for or on behalf of Johannesburg Water SOC Ltd.
Corrective Action	Action to eliminate the cause of a detected nonconformity or other undesirable situation.
Employee	Any person who is employed by or works for an employer and who receives or is entitled to receive any remuneration or who works under the direction or supervision of an employer or any other person
Employer	Any person who employs or provides work for any person and remunerates that person or expressly or tacitly undertakes to remunerate him, but excludes a labour broker as defined in section I (1) of the Labour Relations Act, 1956 (Act No. 28 of 1956)
Hazard	Means a source of or exposure to danger.
Hazard identification	The identification and documenting of existing or expected hazards to the health and safety of persons, which are normally associated with the type of construction work being executed or to be executed.
Incident	Means an incident as contemplated in section 24 (1) of the OHS Act 85 of 1993.
Machinery	means any article or combination of articles assembled, arranged or connected and which is used or intended to be used for converting any form of energy to performing work, or which is used or intended to be used, whether incidental thereto or not, for developing, receiving, storing, containing, confining, transforming, transmitting, transferring or controlling any form of energy
Mandatory	Includes an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or a user
Medical surveillance	Means a planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner or, in prescribed cases, by an occupational medicine practitioner.
Method Statement	A document detailing the key activities to be performed in order to reduce as reasonably as practicable the hazards identified in any risk assessment.
Principal Contractor	Any employer who performs work and is appointed by the Client to be in overall control and management of the contract work (inclusive of Mandatories).
SHE File	A file or other record in permanent form, containing the information required as contemplated in the S.H.E Specification Document and legal requirements applicable to work activities.
SHE Plan	A documented plan which seeks to address all hazards identified means and ways to control and eliminate such to ensure compliance to the S.H.E Specification.
Workplace	Any physical location in which work related activities are performed under the control of the organization.

1. Introduction

In terms of Section 37 of the Occupational Health and Safety Act (Act no. 85 of 1993), Johannesburg Water SOC Ltd is required to control persons/organizations conducting activities for or on their behalf (Mandatories) and the Construction Regulations promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993), is requiring Johannesburg Water SOC) Ltd. to compile an occupational health and safety specification for any intended project classified as construction work and to provide the specification to prospective tenderers / Mandatories.

The dual objective of this specification is to ensure that the Mandatories and Principal Contractors (herein after called Principal Contractor (including Mandatories)) entering into a contractual agreement/relationship with Johannesburg Water SOC Ltd. achieves and maintains an acceptable level of occupational health, safety and environmental performance whilst conducting activities to perform the contract work.

This document forms an integral part of the Contract Specification and, in particular, shall be the OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENTAL (SHE) SPECIFICATION FOR CONSTRUCTION WORK. The Contract Specification is contained in Volume 1 of the contract documents. The principal and other contractors shall ensure that this specification is included with any contract/s that they may have with other contractors and/or suppliers that are engaged for the provision of labour, goods or services for this project. The Principal Contractor and its Contractors shall furthermore implement any reasonable practicable means to ensure compliance to this Occupational Health, Safety and Environmental (SHE) Specification and any other applicable legislation on their organization and/or activities performed by or for them. This SHE Specification will be read in conjunction, where issued and applicable, with the Environmental Specification issued for listed activities requiring environmental authorization by a relevant authority.

Compliance with this SHE specification does not absolve the Principal Contractor from complying with any other applicable minimum legal requirement and the Principal Contractor remains responsible for the sustainable integrity of the environment and the health and safety of its employees, mandatories as well as any persons affected by activities conducted for or on behalf of Johannesburg Water SOC Ltd (SOC) Ltd..

1.1 Johannesburg Water SOC Ltd's commitment to Occupational Health, Safety & Environmental (SHE) Management

Johannesburg Water SOC Ltd is committed to responsible occupational health, safety and environmental management. This commitment is essential to protect the environment, employees, Mandatories, visitors and provide a work environment conducive to health and safety. Principal Contractors and their Contractors shall demonstrate their commitment and concern by:

- Ensuring that decisions and practices affecting occupational health, safety and environmental performance are consistent with the issued SHE specification;
- Ensuring adequate resources are made available for the effective implementation of occupational health, safety and environmental control and mitigation measures;
- Participating in hazard identification and risk assessments and design safety reviews;
- Communicating occupational health, safety and environmental management processes, strategies and control measures with all levels of employees, contractor and/or visitors;
- Ensuring visible leadership at all sites;
- Promoting and enforcing the use of correct types of Personal Protective Equipment (PPE);
- Reporting and investigation of incidents and accidents and ensuring actions are identified and implemented to prevent similar types of incidents reoccurring;
- Participating in Client audits and meetings and ensuring required actions are implemented within reasonable time frames on the site/project;
- Recognizing and commending safe work practices and coaching employees who require guidance;
- Applying and enforcing consequence management from deviations and transgressions of/from compliance to this SHE Specification noted and/or observed, where applicable;

- Carrying out safety observations, implement corrective and preventative actions and giving immediate feedback;
- Encouraging employee participation in the formulation of work instructions and safety rules.

1.2 Scope of Occupational Health, Safety and Environmental (SHE) Specification

The scope of this Occupational Health, Safety and Environmental (SHE) Specification is to address the reasonable and foreseeable aspects of occupational health, safety and environmental management, which will be affected by the contract work.

The specification will provide the requirements that the Principal Contractor and other Contractors shall comply with in order to reduce the risks associated with the contract work, and that may lead to incidents causing injury and/or ill health or degradation of the environment, to a level as low as reasonably practicable and possible.

In particular, Johannesburg Water SOC Ltd will ensure that it shall not appoint any Principal Contractor unless it is reasonably satisfied that the contractor which it intends to appoint has the necessary competencies and resources to carry out the work safely.

1.3 Omissions from SHE Specification

Where any omission from the SHE Specification is identified, applicable legal requirements will constitute the minimum standard for compliance to the relevant omission. The responsibility will be on the Principal Contractor to provide assurance to Johannesburg Water SOC Ltd on compliance to the applicable legal requirements related to the activity / task / process.

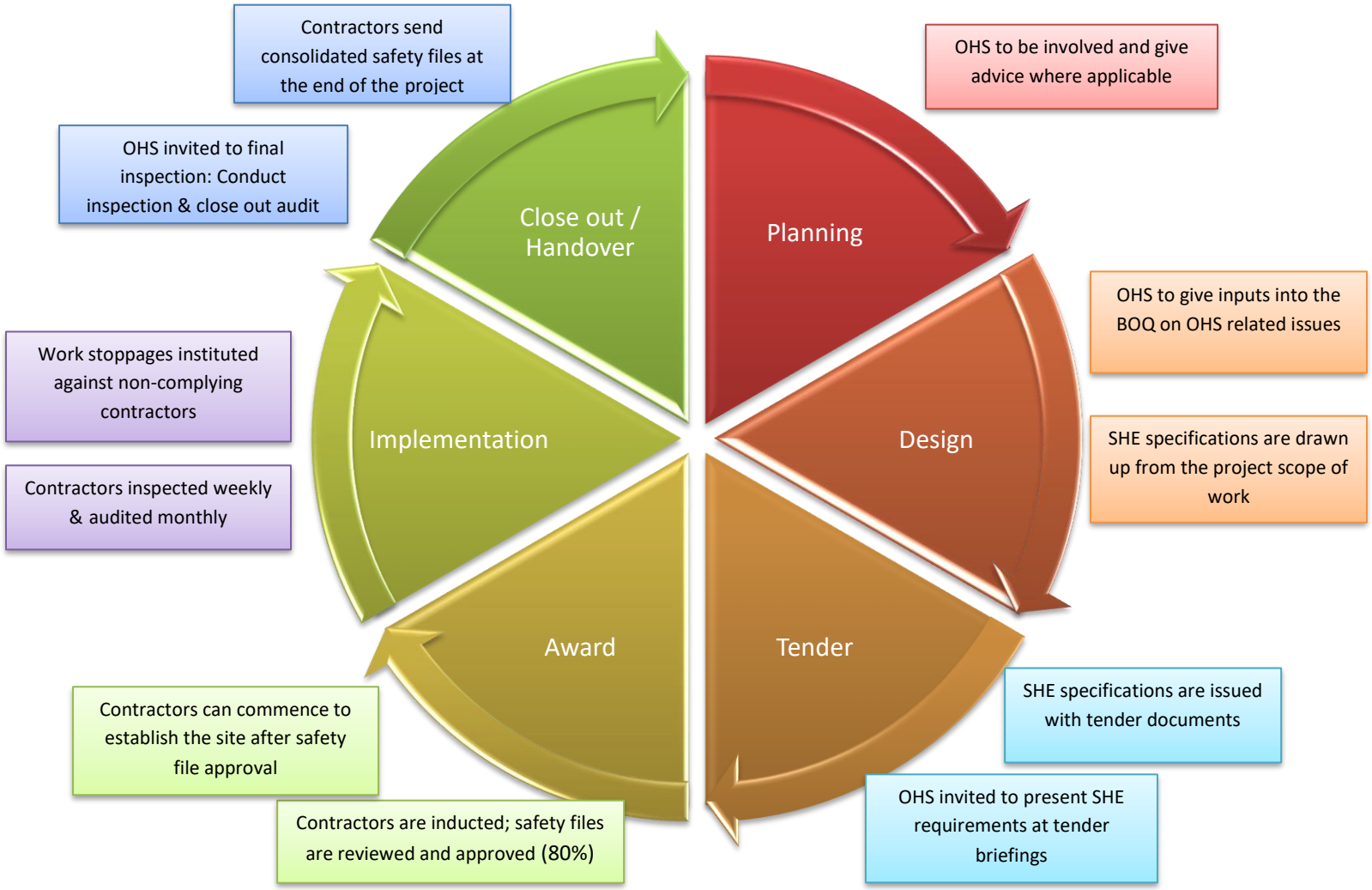
1.4 Change management

Whenever Johannesburg Water SOC Ltd identifies the need to change or review the SHE Specification, approved changes and revisions will be communicated to the Principal Contractor. A cost analysis on the implementation of the proposed changes / revisions will be calculated through a collaborative processes between Johannesburg Water SOC Ltd and the Principal Contractor – where the approved changes and/or revisions has no cost implication for the Principal Contractor the Principal Contractor will be required to accept the approved changes / revisions and ensure implementation within the SHE Plan / File framework.

2 Overview of contractor management process

The contractor management process consists of the following phases:

- Tender briefing and tender documentation;
- Competency evaluation of Principal Contractors (integrated into Supply Chain Management processes);
- Appointed contractor to attend SHE system induction;
- Preparation of SHE File by Principal Contractor;
- Evaluation of SHE File;
- Principal Contractor engagement phase;
- Project close-out and submission of consolidated Health & Safety File.


Contractors send consolidated safety files at the end of the project
OHS invited to final inspection: Conduct inspection & close out audit
Close out / Handover
OHS to be involved and give advice where applicable
Planning
OHS to give inputs into the BOQ on OHS related issues
Design
SHE specifications are drawn up from the project scope of work
Work stoppages instituted against non-complying contractors
Contractors inspected weekly & audited monthly
Implementation
Tender
SHE specifications are issued with tender documents
OHS invited to present SHE requirements at tender briefings
Award
Contractors can commence to establish the site after safety file approval
Contractors are inducted; safety files are reviewed and approved (80%)

2. SHE DOCUMENTATION

2.1 Safety file

The Principal Contractor will prepare a SHE File containing the processes / procedures and templates to be applied during the project period for the scope of work. The Principal Contractor will be evaluated during the contract period against the submitted SHE File.

Ata minimum the SHE File will contain the following documentation:

- Notification of construction work to the relevant Department of Labour (stamped on each page / no faxed copies);
- Scope of work to be performed;
- Personnel list (Principal Contractor employees);
- OH&S / SHE Policy and other Policies;
- Updated copy of the Occupational Health and Safety Act (Act no. 85 of 1993) and its Regulations; COID Act.
- Proof of valid registration and good standing with the Compensation Commissioner or another licensed Insurer;
- SHE Plan agreed with Johannesburg Water SOC Ltd.
- Approved risk assessments, review and monitoring plans and safe work procedures (method statements);
- A list of contractors (sub-contractors) including copies of the agreements between the parties and the type of work being done by each contractor;
- All written designations and appointments for project scope of work (CV and competency copies);
- Management structure (inclusive of OH&S responsibility & meeting structure);
- Induction training and site SHE rules;
- Occupational health and safety training matrix / plan;
- Arrangements with contractors and/or mandatories;
- Description of security measures;
- The following registers (as applicable to contract scope of work):
    - Accident and/or incident notifications, investigation & control register;
    - Occupational health and safety representatives inspection register;
    - Template for entry into confined space;
    - Toolbox talks pro-forma;
    - Fall protection inspections template;
    - First-aid box content template;
    - Record of first-aid treatment template;
    - Fire equipment inspection and maintenance template;
    - Ladder inspection template;
    - Machine safety inspections template (including machine guards, lock-outs etcetera);
    - Inspection templates for lifting machines and –tackle (including daily inspections by drivers/operators);
    - Inspection templates of scaffolding;
    - Inspections templates of structures;
    - Templates of issuing of Personal Protective Equipment;
    - Monthly reporting and recording of statistics templates;
    - Keeping of any other record in terms of applicable legislation falling within the scope of SHE Legislation applicable to the project and the Principal Contractor / Contractor's activities and organization.
- Emergency preparedness and response programmes;
- Medical examination tests
- Vaccination records

2.2 Principal contractor appointment

- The principal contractor will be appointed in terms of Construction Regulations 2014, Reg 5(1) k

- All responsibilities imposed on the contractor by the Regulations will be applicable
- The duties will include:
  a) Prepare a site specific SHE file based on client SHE specification and project scope.
  b) Have an updated Letter of Good standing.
  c) Ensure the necessary legal appointment letters are compiled and signed by affected parties.
  d) Ensure SHE file submitted before work commences to Johannesburg Water for evaluation and approval.
  e) Must ensure an organizational medical programme for its employees is in place. This must address pre-employment, periodic examination, and exit examinations.
  f) Ensure all employees undergo medical examination and are declared fit for the job they are employed for by a Medical Practitioner.
  g) All employees undergo his control undergo company specific induction and Johannesburg water induction.
  h) Ensure before work commences employees are trained on the health and safety risks associated with the work they are conducting.
  i) Ensure employees are trained on company procedures, policies, method statements and informed of the Johannesburg Water SHE requirements as per the specification.
  j) Ensure legislative requirements are complied with during the duration of the contract and ensure that their employees comply also.
  k) Sign the 37 (2) Agreement between Johannesburg Water and themselves before any work commences and kept on their SHE file.
  l) Ensure that 37(2) Agreement(s) are signed between themselves and their sub-contractors.
  m) Ensure that sub-contractors have valid Compensation Commissioner Letter of Good Standing.
  n) Have a disciplinary procedure to address those found to be transgressing requirements of SHE specification, SHE plan, site rules or any other OHS act and its Regulation requirement.
  o) Prevent any employee or visitor who is under the influence of any alcohol or drugs (in state of intoxication) from being allowed to site.
  p) Ensure the safety of employees who are taking legal medication.
  q) Must hand over a consolidated SHE file at the end of the contract.
  r) Stop his/her employees who are doing unsafe acts or who are creating an unsafe environment.
  s) Investigate all incidents and report to Johannesburg water and ensure all reportable incidents as per the legislative requirement are complied with.
  t) Ensure work is supervised by competent personnel and that work is done by competent employees.
  u) Ensure pre-task risk assessment is done by a competent person and that employees are informed of the pre-task risks and the risk control measures.
  v) Ensure tool box talks are conducted to communicate SHE issues in connection to the work being done and any other aspects.
  w) Ensue that appointed personnel as per the SHE file are executing their duties as per the legal appointment.
  x) Ensure first aid kit is made available in case of any emergency.
  y) Ensure that housekeeping is maintained in good condition and that materials are store/stacked properly is designated areas.
  z) Have sufficient waste receptacles and ensure the correct disposal of the different wastes.
  aa) Proof of hazardous waste disposal to be requested from disposal site and to be kept inside SHE file.
  bb) Take reasonable steps to ensure that each appointed sub-contractor health and safety plan is implemented and maintained on the site and SHE File documentation is up to date.
  cc) Stop any work from being executed which is not in accordance with the client's health and safety specification and the principal contractor's health and safety plan for the site or which poses a threat to the health and safety of persons.
  dd) Must maintain an up to date list of all the sub-contractors on site accountable to the principal contractor, the agreements between the parties and the type of work being done; and
  ee) Ensure that all his or her employees have a valid medical certificate of fitness.

2.3 37.2 Agreement

- Johannesburg Water will enter into a 37(2) Agreement with all the appointed contractors

- A copy of the 37(2) Agreement must be kept in the SHE file of the contractor at all times.
- It is the responsibility of the contractor to ensure that there are 37(2) agreements between themselves and all their appointed sub-contractors.

2.4 SHE Plan

- The contractor shall prepare a SHE plan to address and manage all applicable sources of risk that are identified during the execution of the project. The SHE plan shall incorporate the requirements as listed in the SHE specification.
- A copy of the SHE plan shall be submitted together with SHE file for review and approval.
- It is the contractor responsibility to ensure they sub-contractor compiles a SHE plan that in line with the SHE specification requirement of Johannesburg Water.

2.5 Legislative framework

All contractors shall comply with legislation pertaining to this contract, including but not limited to:

- Constitution of the Republic of South Africa
- Occupational Health and Safety Act and its associated Regulations
- National Environmental Management Framework Legislation
- National Road Traffic Act
- Applicable South African National Standards (SANS)
- Compensation of Occupational Injuries and Diseases Act (COID)
- Local by-laws and provincial ordinances

2.6 SHE Policy

A SHE policy is a statement of intent and a commitment by the organization Chief Executive or Managing Director (OHS Act 16(1) appointee) in relation to requirements applicable to their Safety, Health and Environmental legal obligation, relevant SHE roles and responsibilities, and contractual obligations to the Client.
The contractor and their sub-contractor companies shall each have a documented SHE Policy authorized by their Chief Executive/Managing Director (OHS Act Section 16 (1) Appointee). The SHE Policy must meet the following minimum requirements;

- Organizational Mission and Goal.
- State the overall SHE objectives within the project.
- Show commitment to the prevention of injuries and ill-health.
- Show commitment to the protection of environment and the conservation of natural resources.
- Must be reviewed at predetermined intervals, or when there is change in work process, serious incident occurs.
- The SHE Policy must be in line with OHSAS 18001 and ISO 14001 requirements and guidance documentation.
- Must be authorized by contractor CEO.

2.7 Appointments and competencies

- The contractor and its appointed sub-contractor must make the relevant legislative and non-statutory appointments, which must be maintained valid for the entire contract duration.
- All appointees shall be suitably trained and certified competent for the responsibilities they are assigned for.
- Copies of all relevant appointments and the relevant competence certificates must be kept in the relevant SHE file.

2.8 Supervision of construction work

- The principal contractor shall ensure that the construction manager and construction health and safety officer are appointed for a ***single site*** on a full time basis.
- JW should be informed in writing of the absence of the above-mentioned on site.

Appointment index

Appointment	Legislative Ref	Competency requirements (Min)
Alternate Construction Manager	CR 8.1	N.Dip Eng + 4yrs exp
Assistant Construction Manager	CR 8.2	N.Dip Eng + 4yrs exp
Assistant Construction Supervisor	CR 8.8	-
Bulk mixing plant	CR 20	Certificate
Confined Space Supervisor	GSR 5	Certificate + Proven experience
Construction Manager	CR 8.1	N.Dip Eng + 4yrs exp Full time on site
Construction Health , Safety & Environmental Officer	CR 8.5 & JW Requirement	N.Dip Safety + 2yrs exp; OR N.Dip Enviro + 3yrs exp; OR NEBOSH / SAMTRAC + 4yrs exp Register with SACPCMP Full time on site Experience in enviro / certificate
Construction supervisor	CR 8.7	3 yrs experience
Construction vehicle & mobile plant supervisor	CR 23.1	Certificate
Electrical installation and appliances inspector	CR 24	
Emergency, security and fire coordinator	CR 29	Certificate
Excavation supervisor (including piling)	CR 13	3yrs exp / N.Dip building
Fall protection supervisor	CR 10.1	Certificate
First-aiders	GSR 3	Certificate
Fire fighting equipment inspector	CR 29	Certificate
General Machinery Supervisor	GMR 2.1/7	GCC (GMR 2.1)/ 3yrs exp (GMR 2.7)
Temporary work supervisor (Formwork)	CR 12.2	N.Dip building + 4yrs exp
Hazardous chemical substances supervisor	HCS Regs	Certificate
Incident investigator	GAR 9.2	Certificate
Ladder inspector	GSR 13A	-
Lifting machines and equipment inspector	DMR 18.5	Certificate + 3yrs experience
Materials hoist inspector	CR 19.8	Certificate
Occupational health and safety committee	OHS Act 19	-
Occupational health and safety representatives	OHS Act 17	Certificate
Risk assessor	CR 9.1	Certificate
Stacking and storage supervisor	CR 28	Certificate
Structures supervisor	CR 11.2	N.Dip building + 4yrs exp

Suspended platform supervisor	CR 17.1	Certificate
Welding supervisor	GSR 9	Certificate

2.9 Insurances

- The principal contractor and all his appointed contractors shall be registered with an appropriate compensation commissioner and have available a valid letter of good standing at all times.
- The obligation lies with the contractor to ensure that the Letter of Good Standing remains valid throughout the entire duration of the project.
- A copy of the said letter must be filed in all SHE files and made available during inspections and audits.

2.10 Costing for SHE

The contractor is responsible for ensuring that SHE costing is taken into consideration for the entire project/contract as this will ensure they comply with the SHE legislative requirements.

2.11 Sub-contractors

- Whenever the Principal Contractor appoints contractors or sub-contractors, it is a requirement that an Occupational Health and Safety Act (Act no. 85 of 1993) Section 37(2) agreement (i.e. Agreement with Mandatory) is entered into between the Principal Contractor and Contractors.
- The Principal Contractor will ensure that all appointed contractors comply with the Johannesburg Water SOC Ltd SHE Specification requirements.
- The Principal Contractor will establish a procedure on sub-contractor management and assurance on compliance to the established procedure will be provided to Johannesburg Water SOC Ltd on a monthly basis.
- Principal Contractors are required to formally notify Johannesburg Water SOC Ltd before appointing subcontractors.
- Johannesburg Water SOC Ltd shall approve all specialist subcontractors to be appointed and/or engaged by the Principal Contractor.

The Principal Contractor shall:

- Ensure prior to work commencing on the site that every contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993;
- Appoint each contractor in writing for the part of the project on the construction site;
- Take reasonable steps to ensure that each contractor's health and safety plan is implemented and maintained on the construction site;
- Ensure that the periodic site audits and document verification are conducted at intervals mutually agreed upon between the principal contractor and any contractor, but at least once every 30 days;
- Stop any contractor from executing construction work which is not in accordance with the client's health and safety specifications and the principal contractor's health and safety plan for the site or which poses a threat to the health and safety of persons;
- Include and make available a comprehensive and updated list of all the contractors on site accountable to the principal contractor, the agreements between the parties and the type of work being done; and
- 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 an occupational health practitioner in the form of Annexure 3.

2.12 Notification of construction work

- The Principal Contractor shall, before carrying out any work, notify the relevant Department of Labour of the intention to carry out construction work and use the form (*Annexure 2 in the Construction Regulations 2014*) for this purpose.
- Only a certified copy stamped (each page) by the Department of Labour will be acceptable. No faxed or emailed notifications will be accepted.
- No work shall commence before the Principal Contractor has submitted notification of construction work to the relevant Department of Labour.

- Johannesburg Water SOC Ltd will not approve the SHE File if no original stamped / certified copy of the notification of construction work has been done.

2.13 Construction work permit

- There will be a requirement for a construction work permit for this based on the number of days on site.
- The permit can only be applied for after a contractor has been appointed, and the process will take approximately 30 days or more if requirements are not met.
- The Client will appoint a PrCHSA (Professional Construction Health and Safety Agent) registered with the SACPCMP to oversee the permit application process, and the contractor will be required to provide supporting documents for the application of the permit.

3. ORGANISATIONAL STRUCTURE

- The contractor shall develop and submit together with SHE file an organizational organogram related to the contractor, listing all the levels of responsibility from the Chief Executive down to the supervisor(s) responsible for the project.
- The organogram diagram must list all relevant positions, names of appointees and legal appointments.
- The contractor is responsible for updating the organogram timeously when there are changes to the appointments.
- All appointed sub-contractors are also required to compile their own organograms.

4. COMMITMENT TO SHE

- Visible commitment is essential to providing a safe working environment.
- Managers, supervisors and employees at all levels must demonstrate their commitment by being proactively involved in the day to day SHE operations.
- Legislation requires that each employee takes reasonable care of themselves and their fellow workers

5. HIRA

Annexure 1: List of possible hazards emanating from projects and activities conducted for or on behalf of Johannesburg Water SOC Ltd includes an assessment of site specific health and safety hazards and risks and environmental aspects and impacts that have been identified by Johannesburg Water SOC Ltd as possibly applicable to the contract work for this project. It is by no means exhaustive and is offered as assistance to the tenderers and contractors.

Development of risk assessments

Every Contractor performing construction work shall, before the commencement of any construction work or work associated with the construction work, and during construction work, ensure that a risk assessment is undertaken by a competent person, appointed in writing, and the risk assessment shall form part of the SHE plan to be applied on the site. Risk assessments shall identify occupational health and safety hazards and risks and environmental aspects and impacts emanating from the activity to be performed by the Principal Contractor / Contractor.

The risk assessment (inclusive of impact assessment) shall include (at a minimum):

- Identification of the relevant Johannesburg Water SOC Ltd Project with regard to JW Number, Project name and area;
- Date on which risk assessments were conducted / reviewed;
- The identification of the risks / hazards and aspects / impacts to which persons may be exposed to per activity;
- The analysis and evaluation of the risks / hazards and aspects / impacts identified;
- Existing control measures and proposed corrective measures;
- A plan to review the risk assessments as the work progresses and changes are introduced;
- Identification of significant risks (e.g. high; exceeding 75%);

- A documented plan of Safe Working Procedures (SWP)', and its relevance to the risk assessment, inclusive of method statements, to mitigate, reduce or control the risks and hazards that have been identified;
- A plan to monitor the application of the Safe Working Procedures (SWP);
- Signature of appointed competent person conducting risk assessment; and
- Signature of approval by Principal Contractor management and employees involved in risk assessment.

Based on the risk assessments, the Principal Contractor must develop a set of site-specific occupational SHE rules that will be applied to regulate the health, safety and environmental hazards/aspects of the construction work.

The risk assessments, together with the site-specific occupational health and safety rules, must be submitted to Johannesburg Water SOC Ltd before mobilisation on site commences. These will be included in the SHE plan. The Contractor shall ensure through his risk management process the hierarchy of controls stipulated as follows, are implemented:

- ***Eliminate*** - The complete elimination of the hazard.
- ***Substitute*** - Replacing the material or process with a less hazardous one.
- ***Redesign*** - Redesign the equipment or work process.
- ***Separate*** - Isolating the hazard by guarding or enclosing it.
- ***Administrate*** - Providing control such as training, procedures etc.
- ***Personal Protective Equipment (PPE)*** - Use of appropriate and properly fitted PPE where other controls are not practical. (PPE as the last resort)

The Principal Contractor will be required to carry out the following three forms of risk assessment:

- Baseline risk assessment;
- Issue based risk assessment;
- Continuous risk assessments.

Baseline risk assessments

The Principal Contractor is required to develop a baseline risk assessment taking the resources, competency levels, nature and scale of their organization into consideration for submission during SHE File evaluation phase. The hazards and risks to which persons, plant, vehicles and facilities may be exposed during the construction should be identified and evaluated. The aspects and impacts resulting in environmental pollution or degradation should also be identified and evaluated. Measures to reduce or control these risks or hazards should be defined during this assessment. The effectiveness of the measures defined and the baseline risk assessment prepared shall be monitored and reviewed from time to time to ensure that it remains relevant and accurate.

Issue based risk assessments

The Contractor will be required to carry out separate risk assessments during construction of the project when methods and procedures are varied, for example when:

- Designs are amended;
- New machines are introduced;
- Plant is periodically cleaned and maintained;
- Plant is started-up or shut-down;
- Systems of work change or operations alter;
- Indents or near-misses occur; or
- Technological developments invalidate prior risk assessments.

Continuous risk assessments

The Occupational Health and Safety Act (Act no. 85 of 1993) specifically requires that employers shall provide and maintain working environments that are safe and without risk to health. The general awareness of hazards needs to be raised as work ethic to maintain a safe and risk free environment on an on-going basis. This is achieved by continuous risk assessments, a form of risk assessment that takes place as an integral part of day-to-day management. Examples of continuous risk assessments include:

- Maintaining general hazard awareness, and
- Pre-work risk assessments / Daily Safety Task Instructions.

Occupational health and safety risks or environmental impacts that are identified during the risk assessment process shall be communicated before the commencement of the said activity to every employee whose work is associated with the risk. Each employee shall sign to confirm understanding of the safety, health or environmental risks in the tasks.

Review of risk assessments

The Principal Contractor is required to review the hazards identified, the risk assessments and the Safe Work Procedures as the contract work develops and progresses and each time changes are made to the designs, plans and construction methods and/or processes. Revisions to the approved risk assessments and Safe Work Procedures will be presented at each production planning and progress meeting.

Risk assessments are to be reviewed whenever there is change on the scope of work, process, and accidents or when required by Johannesburg Water SOC Ltd

The Principal Contractor must provide Johannesburg Water SOC Ltd, other contractors and all other concerned or affected parties with copies of any changes, alterations or amendments to risk assessments and Safe Work Procedures within 14 days of such changes.

6. SAFE WORK PROCEDURES / METHOD STATEMENTS

Method statements or written safe work procedures shall be documented for all high risk activities:

- Design change or scope change/addition
- Change in job or task
- Introduction of new machinery, equipment or substance.

Method statements or written safe work procedures shall identify following:

- Tasks that are to be undertaken
- The hazards and associated risks of the task(s)
- The control measures for the task(s)
- The equipment and substances that are associated with task(s)
- Any training or qualification needed to do the task
- Personal protective equipment to be worn.

7. INCIDENT MANAGEMENT

7.1 Reporting of accidents and incidents

The Principal Contractor must report all incidents where an employee is injured on duty to the extent that he:

- Dies
- Becomes unconscious
- Loses a limb or part of a limb
- Is injured or becomes ill to such a degree that he is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he was usually employed

Or where -

- A major incident occurred
- The health or safety of any person was endangered
- Where a dangerous substance was spilled
- The uncontrolled release of any substance under pressure took place
- Machinery or any part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects
- Machinery ran out of control

to Johannesburg Water SOC Ltd within two days and to the Provincial Director of the Department of Labour within seven days from date of incident (Section 24 of the Occupational Health and Safety Act (Act no. 85 of 1993) and General Administrative Regulations), except that, where a person has died, has become unconscious for any reason or has lost a limb or part of a limb or may die or suffer a permanent physical defect, the incident must be reported to both Johannesburg Water SOC Ltd and the Provincial Director of the Department of Labour forthwith by telephone, telefax or e-mail.

- All other reports required by this specification must also be completed. Reporting of accidents / incidents to Johannesburg Water SOC Ltd will be on the prescribed format.
- The Principal Contractor is required to provide Johannesburg Water SOC Ltd with copies of all statutory reports required in terms of the Occupational Health and Safety Act (Act no. 85 of 1993) within 7 days of the incident occurring.
- The Principal Contractor is required to provide Johannesburg Water SOC Ltd with copies of all internal and external accident/incident investigation reports, within 7 days of the incident occurring.

7.2 Accident and incident investigation

- The Principal Contractor is responsible for the investigation of all accidents and/or incidents where employees and non-employees were injured to the extent that they had to receive medical treatment other than first aid.
- The results of the investigation are to be entered into the accident and/or incident register. The Principal Contractor is responsible for the investigation of all incidents, including those described in Section 24 (1) (b) and (c) of the Occupational Health and Safety Act (Act no. 85 of 1993) and for keeping a record of the results of the investigations including the steps taken to prevent similar accidents in future.
- The Principal Contractor is responsible for the investigation of all road traffic accidents, related to the construction activities, and for keeping a record of the results of the investigations including the steps taken to prevent similar accidents in future.
- Johannesburg Water SOC Ltd reserves the right to hold its own investigation into an incident or call for an independent external investigation.

7.3 Close out

- All incident investigation reports will be closed out once all the recommendations to prevent further incidents have been implemented.
- A copy of the investigation report must be handed to JW Safety Officer conducting the investigation.

8. MEDICAL SCREENING REQUIREMENTS

- The Principal Contractor shall ensure that a medical surveillance programme is implemented for all employees.
- An initial health evaluation shall be carried out by an occupational health practitioner immediately, before after a person commences employment, where any exposure exists or may exist, which comprises:
  - an evaluation of the employees medical and occupational history;
  - a physical examination; and
  - any other essential examination which in the opinion of the occupational health practitioner is desirable in order to enable the practitioner to do a proper evaluation.
- Medical surveillance and immunisation shall be done accredited at / by institutions or occupational health personnel, including, but not limited to:
  - Audiograms.
  - A cardio-respiratory examination / Lung function test;
  - Chest X-rays
  - Eye/ sight tests.
  - A general physical examination;

- A review of previous medical history.
- Glucose levels
- Blood pressure

- An entry medical certificate shall be obtained for all workers prior to commencing with site activities from approved medical institution. Copies of all medical certificates shall be retained in the SHE File prior to site establishment and before an employee is allowed to come onto site.
- Specific attention shall be given to the physical and psychological fitness of people who will be required to work in elevated positions and operators of mobile machinery.
- An exit medical certificate shall be obtained for all workers at the end of the contract and for all workers who leave the employment of the Contractor before the end of the Project. Copies of all exit medical certificates shall be submitted to the Johannesburg Water SOC Ltd Project Specialist or Appointed OHS Agent.

9 EMERGENCY MANAGEMENT

The Principal Contractor must appoint a competent person to act as emergency controller and/or coordinator.

The Principal Contractor must conduct an emergency identification exercise and establish what emergencies could possibly develop. He must then develop detailed contingency plans and emergency procedures, taking into account any emergency plan that Johannesburg Water SOC Ltd may have in place.

In the event where a contractor incorporates the services of a 3rd party service provider for the provision of Emergency Response Services, the following criteria must be met:

- Identification of 3rd party emergency response services (organization & contact details);
- Notification of contractor to 3rd party emergency response service of incorporation of services into contractor's emergency response plan (written agreement / signed letter).

The Principal Contractor and the other contractors must hold regular practice drills of contingency plans and emergency procedures to test them and familiarise employees with them.

First-aid

The Principal Contractor must provide first-aid equipment (including a stretcher) and have qualified first-aider(s) on site as required by General Safety Regulations promulgated in terms of the Occupational Health and Safety Act (Act no. 85 of 1993).

The contingency plan of the Principal Contractor must include arrangements for the speedy and timeous transporting of injured and/or ill person(s) to a medical facility or of getting emergency medical aid to person(s) who may require it.

The Principal Contractor must have written arrangements in place with his other contractors regarding the responsibility of the other contractors towards their own injured and/or ill employees.

10 SHE TRAINING

All employees in jobs requiring training in terms of the Occupational Health and Safety Act (Act no 85 of 1993) and any other applicable legislative requirements are to be in possession of valid proof of training. Other occupational health, safety and environmental training requirements of the Occupational Health and Safety Act (Act no 85 of 1993) and Construction Regulations can include:

- General induction;
- Site and job specific induction, including visitors;
- Occupational health and safety representatives;
- Training of the legal and nominated appointees;
- Operators and drivers of construction vehicles and mobile plant;
- Basic fire prevention and protection;
- Basic first-aid;

- Storekeeping methods and safe stacking; and
- Emergency planning and coordination
- Incident investigation
- Risk Assessment
- Planned job observations (supervisors)

All operators, drivers and users of construction vehicles, mobile plant and other equipment are to be in possession of valid proof of training and, where applicable, valid licenses.

12.1 General Job training

The contractor is required to ensure that before an employee commences work their direct supervisor or line manager who is responsible for the employee has informed the employees of his scope of authority, hazards and risks associated with the work to be performed as well as the safety control measure(s). This will involve discussion in connection with ay work standard, job description or company policy or procedure.

12.2 Awareness and promotion

The Principal Contractor is required to have a promotion and awareness programme in place to create an occupational health and safety culture within employees. The following are some of the methods that may be used:

- Toolbox talks;
- Posters;
- Videos;
- Competitions;
- Suggestion schemes;
- Participative employee activities such as “occupational health and safety circles”.

The Principal Contractor is, at a minimum, required to provide awareness programmes to employees on the following:

- General Health and Safety Awareness
- Environmental Awareness;
- HIV / AIDS awareness.

12.3 General competence requirement

The Principal Contractor shall ensure that his personnel and other contractors’ personnel are trained and competent to carry out work safely and without risk to health has been completed before work commences. The Principal Contractor shall ensure that follow-up and refresher training is conducted as the work progresses and whenever the scope or nature of the work changes.

A “**competent person**” in relation to construction work, means any person having the knowledge, training and experience specific to the work or task being performed: Provided that where appropriate qualifications and training are registered in terms of the provisions of the South African Qualifications Authority Act, 1995 (Act No. 58 of 1995), these qualifications and training shall be deemed to be the required qualifications and training. It is the responsibility of the Contractor to determine whether any appropriate qualifications and training are registered in terms of the provisions of the South African Qualifications Authority Act.

Records of all training must be kept in the SHE File. The contents of the file will be audited from time to time.

At a minimum, the Principal Contractor will provide training on Safe Work Procedures / Safe Operating Standards to personnel responsible for performing the related task. Records of training on Safe Work Procedures / Safe Operating Standards will be retained. Competence and skill levels by the employees responsible for performing the task on the

implementation of the Safe Work Procedures / Safe Operating Standards will be measured through Planned Job Observations.

12.4 Site-specific induction training

The Principal Contractor will be required to develop a project specific induction-training course based on the baseline risk assessment for the contract work. He will ensure that all his employees and other contractors and their employees have received training on the submitted induction-training programme.

All employees of the principal and other contractors are to be in possession of proof (on person) that they have attended a site-specific occupational health and safety induction-training course.

No contractor shall allow or permit any employee, visitor or any other person to enter the site, unless such employee or person has undergone health, safety and environmental induction training pertaining to the hazards prevalent on the site at the time of entry.

Where the Principal Contractor is required to operate within Johannesburg Water SOC Ltd Depot's the Principal Contractor will ensure that all employees undergo the Johannesburg Water SOC Ltd induction.

11 PPE REQUIREMENTS

- The Principal Contractor is required to continuously identify the hazards in the workplace and deal with them. He must either remove them or, where impracticable take steps to protect workers and make it possible for them to work safely and without risk to health under the hazardous conditions.
- The Principal Contractor will establish a Personal Protective Equipment Policy and a Personal Protective Equipment study will be conducted to determine the types of Personal Protective Equipment (PPE) to be supplied related to the hazards and risks emanating from the tasks.
- Cognisance shall be given to the gender of individuals required to where PPE; size required by the employee and size issued.
- Personal protective equipment should, however, be the last resort and there should always first be an attempt to apply engineering and other solutions to mitigating hazardous situations before the issuing of personal protective equipment is considered.
- Where it is not possible to create an absolutely safe and healthy workplace the Principal Contractor is required to inform employees regarding this and issue, free of charge, suitable equipment to protect them from any hazards being present and that allows them to work safely and without risk to health in the hazardous environment.
- It is a further requirement that the Principal Contractor maintains the equipment, instructs and trains the employees in the use of the equipment and ensures that the employees use the prescribed equipment.
- Employees do not have the right to refuse to use and/or wear the equipment prescribed by the employer and, if it is impossible for an employee to use or wear the prescribed protective equipment through health or any other reason, the employee cannot be allowed to continue working under the hazardous condition(s) for which the equipment was prescribed. An alternative solution has to be found that may include relocating the employee.
- The Principal Contractor may not charge any fee for protective equipment prescribed by him but may charge for equipment under the following conditions:
    - Where the employee requests additional issue in excess of what is prescribed;
    - Where the employee has patently abused or neglected the equipment leading to early failure; and
    - Where the employee has lost the equipment.

All employees shall, as a minimum, be required to wear the following personal protective equipment on any of Johannesburg Water SOC Ltd's projects:

- Protective overalls;
- Protective footwear;
- Protective headwear; and
- Eye, face and ear protection.
- NO SHORTS OR DRESSES WILL BE ALLOWED ON SITE!!!

All Personal Protective Equipment will clearly display the branding components of the Principal Contractor's organization (e.g. Name of Organization, logo).

12 DISCIPLINARY PROCESSES

- The contractor is required to implement disciplinary process in order to enforce compliance with requirements.
- All sub-contractors are required to have the same.

13 SITE RULES

- The Principal Contractor must develop a set of site-specific OH&S rules that will be applied to regulate the Health and Safety Plan and associated aspects of the construction.
- When required for a site by law, visitors and non-employees upon entering the site shall be issued with the proper Personal Protective Equipment (PPE) as and when necessary**.**

14 PUBLIC HEALTH AND SAFETY

The Principal Contractor is responsible for ensuring that non-employees affected by the construction work are made aware of the dangers likely to arise from the construction work as well as the precautionary measures to be observed to avoid or minimise those dangers. This includes:

- Non- employees entering the site for whatever reason;
- The surrounding community; and
- Passers-by the site.

- The Principal Contractor shall organize the site in such a manner that pedestrians and vehicles can move safely and without risks to health, including sufficient and suitable traffic routes and safe walkways with relevant signage.
- Appropriate signage must be posted to this effect and all employees on site must be instructed to ensure that non-employees are protected at all times.
- All non-employees entering the site must receive induction into the hazards and risks of the site and the control measures to be observed.
- The Principal Contractor shall recognize that the Community Liaison Officer (CLO) is the link between Johannesburg Water SOC Ltd and the community and provide all reasonable support to the Community Liaison Officer to ensure relevant responsibilities are fulfilled and positive relationships with the community are maintained.
- Where activities are performed close to public routes, the Principal Contractor will establish a traffic management plan incorporating the requirements of relevant by-laws. At a minimum, barricading, warning signage and flagmen will be provided to ensure the protection of workers from vehicles in transit. Where required, the Principal Contractor will interact with the local traffic department to establish minimum requirements to be implemented on public routes.

15 REFUSAL TO WORK

- Section 14 of the OHS Act states that employees shall carry out any lawful orders given to them, suggesting that they have the right to refuse to obey any unlawful order or work instruction.
- In terms of legal and JW requirements, if an employee has reasonable belief that the work to be carried out is likely to endanger themselves or other persons in any way, he/she has the right to refuse to work.
- An employee may also refuse to work in term of Section 29 of NEMA, if the work would result in imminent and serious threat to the environment.

- All contractors shall ensure that their employees are conversant with hazards associated with their work and work environment, and be aware of the precautionary measures to take.
- The contractor must ensure that all refusals to work are investigated promptly and resolved timeously.

16 SECURITY

The Principal Contractor must establish site access rules and implement and maintain these throughout the construction period. Access control must, amongst other, include the rule that non-employees will not be allowed on site unaccompanied.

The Principal Contractor must develop a set of security rules and procedures and maintain these throughout the construction period.

The Principal Contractor shall:

- Provide a guardhouse for security personnel. The guardhouse should be in good condition and at-least meet minimum requirements as per Environmental Regulations for Workplaces as promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993).
- Supply an access card containing the name, surname, employee number and photograph for all appointed employees (full or part time) for the site.
- Ensure that no person enters the construction site without wearing the necessary Personal Protective Equipment (PPE).
- Ensure that no children are allowed on the construction site.
- Ensure that no family members are sleeping over on the construction site.
- Ensure that no pets are allowed on the construction site.

17 ACCOMMODATION ON SITE

No employees shall be accommodated on site.

18 WELFARE FACILITIES

The provision of toilets for each sex is required in terms of the National Building Regulations and Construction Regulation 28. Chemical toilets are allowed instead of the water borne sewerage type. Toilets have to be provided at a ratio of 1 toilet per 30 workers. The Principal Contractor shall provide flushing toilets on the construction premises.

- At least cold-water showers for each sex have to be provided at a ratio of 1 shower per 15 workers.
- Some form of screened off changing facility must be provided separately for each sex.
- Some form of eating facility sheltered from the sun, wind and rain must be provided.

The employer needs to provide his employees with the following:

- Potable water for drinking;
- Water and soap for hand washing
- Toilet paper

19 COMPLIANCE MONITORING

20.1 Inspections

- Contractors will be inspected at least once per week by the JW Project Inspectors.
- Feedback of the inspections will be issued immediately on work instructions, and a formal report sent within 7 days of conducting the inspection to all relevant stakeholders.

- Johannesburg Water SOC Ltd. reserves the right to conduct other ad-hoc assessments and inspections as deemed necessary.
- This may include, amongst other measures, site safety walks. Corrective actions will be identified by Johannesburg Water SOC Ltd. and the Principal Contractor's representative and implemented by the Principal Contractor (at no cost to Johannesburg Water SOC Ltd.) to ensure SHE Performance improvement.

20.2 Monthly audits

- Monthly audits will be conducted within periods not exceeding 30 days.
- The Principal Contractor is to conduct his own monthly internal audits and inspections to verify compliance with his own occupational health and safety plan and management system as well as compliance with the requirements of the Johannesburg Water SOC Ltd. SHE Specification.
- The Principal Contractor will also assess and inspect the compliance of other contractors under its control. Management members of the Principal Contractor will be involved in the internal assessments and inspections.

20.2.1 Monthly compliance rating

A monthly compliance rating will be calculated for each Principal Contractor as per a formula determined by Johannesburg Water SOC Ltd focussing on or incorporating outcomes of assurance (e.g. monthly audit), operational (e.g. behavioural based safety inspection) assessments and other requirements, as necessary. Johannesburg Water SOC Ltd reserves the right to adjust the monthly compliance calculation formula as and when required – each revision of the monthly compliance calculation formula will be communicated to the Principal Contractor before implementation.

Each Principal Contractor is required to maintain a minimum compliance rating of 93% (Ninety Three Percent).

Scoring	Classification	Classification description
93% -100%	Good	Substantial compliance
80% -92%	Average	Compliance status needs to be improved
60% - 79%	Poor	Methods to ensure compliance require substantial improvement - operations with substantial non-compliance risks
<60%	Very poor	Methods to ensure compliance failed completely - troubled operation with severe non-compliance risks

20.3 Work stoppages

Work stoppages will be identified for 2 (two) types of work stoppages to be implemented:

- Overall work stoppage – the Principal Contractor and its Contractors are not allowed to continue with any type of construction / site work up until the work stoppage has been closed-out;
- Activity work stoppage – The Principal Contractor and its Contractors are not allowed to continue with the specific activity / task / job up until the work stoppage has been closed-out.

Overall work stoppages will be issued where non-conformances are identified against the criteria in the following table.

NR	DESCRIPTION OF AUDIT NON-CONFORMANCE / NON-COMPLIANCE
1	**NOTIFICATION OF CONSTRUCTION WORK**
1.1	Local Department of Labour not notified of construction work before commencement of construction activities
1.2	Notification of construction work not stamped by local Department of Labour (no faxed copies)
1.3	Copy of notification of construction work not available on site
2	**PROOF OF REGISTRATION WITH COMPENSATION COMMISSIONER**
2.1	Proof of registration with Compensation Commissioner or other insurer not available
2.2	Registration with Compensation Commissioner or other insurer not valid and up-to-date
3	**POLICY COMMITMENT & SHE SPECIFICATION**
3.1	SHE Plan not compiled, approved by contractor management and available on site
4	**SECTION 37(2) AGREEMENT**
4.1	Signed section 37(2) Agreement not signed and available on site
5	**RISK ASSESSMENTS**
5.1	Risk assessments not developed/ not applicable to scope of work issued by Client
6	**CONSTRUCTION MANAGER**
6.1	No construction manager appointed / available on site
6.2	Appointed construction manager does not meet requirements
6.3	Proof of competency not available on-site
7	**SITE SAFETY OFFICER**
7.1	No safety officer appointed/ available on site
7.2	Safety officer does not meet requirements
8	**SHE FILE**
8.1	No file on site

Activity work stoppages will be issued where non-conformance are identified per activity where the health and safety of employees or the public is compromised.

20.4 Non-compliance management process

The following actions will be instituted where non-conformances are identified in terms of compliance to relevant legislative requirements and the Johannesburg Water SOC Ltd SHE Specification.

CRITERIA	ACTION TO BE INSTITUTED	RESPONSIBLE PARTY
Compliance rating: 93-100%	Non-conformance closure	Principal Contractor / Contractor
Compliance rating: 80-92%	Letter of compliance improvement to Principal Contractor	Johannesburg Water SOC Ltd
	Non-conformance closure	Principal Contractor / Contractor
Compliance rating: 60-79%	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
Compliance rating: <60%	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
	Supply Chain Management to be informed of non-compliance standing	Johannesburg Water SOC Ltd
3 x Work stoppages	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
	Supply Chain Management to be informed of non-compliance standing	Johannesburg Water SOC Ltd
3 x Non-conformance to <93% monthly compliance rating	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
	Supply Chain Management to be informed of non-compliance standing	Johannesburg Water SOC Ltd
3 x consecutive repeat findings	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
	Escalation to SCMU & CAPEX	Johannesburg Water SOC Ltd

21 OPERATIONAL REQUIREMENTS

21.1 CONFINED SPACE ENTRY

- Enclosed space work necessitates a Confined Space Permit. This may only be obtained from the authorized person nominated in writing.

- The responsibility for safe procedure, both at the time of entry and during the entire operation of entering and working in confined spaces, rests with the Contractor.
- The Contractor shall be sure that adequate steps have been taken to eliminate or control hazards.
- Before working in an area that contains dust, the area is to be ventilated and hosed down to settle and dampen the dust.
- The Contractor shall provide all necessary equipment to manage confined spaces, including all necessary monitoring and rescue equipment (such as tripods, breathing equipment and the like).
- The Contractor shall ensure all persons working in a confined space or managing entry to a confined space are appropriately trained.
- Compulsory - Continuous monitoring, trained rescue teams, radio communication & adequate ventilation.

Pump sumps & valve chambers

Ventilation

- All available manholes or ventilation covers must be removed and the compartment ventilated for 10 (ten) to 15 (fifteen) minutes, using compressed air or a portable blower.
- Such ventilation must be continued while personnel are in the compartment.
- Ensure that exhaust fumes from blower do not enter the confined space.
- Before entering any sump or compartment, the atmosphere must be tested by the Principal Contractor's competent person (trained by the supplier of the gas monitoring equipment) by lowering the gas monitoring equipment to the bottom of the sump or compartment by means of a rope.
- A register must be kept indicating that the atmosphere has been tested and that the sump or compartment is fit to work in.
- The Principal Contractor's construction supervisor must check and co-sign this register each time he visits a site to ensure that the atmosphere is continuously being monitored.

Entering sump

- When entering a sump the person entering the sump must wear the safety harness, gas detector as well as a self-rescuer.
- A lifeline must be attached to the safety harness and a person on the surface must be in continuous contact with the person in the sump.
- At least one person on the surface must be trained in basic first aid and CPR and a first aid kit with resuscitation equipment must be available outside the entrance of the confined space for emergencies.
- Should the alarm sound when a person is in the confined space, the area must be evacuated immediately and the atmosphere re-tested and certified safe before re-entry into the confined space.
- In no circumstance shall any person remain within a sump for a period of more than one hour at a time.
- A five-minute rest on the surface must be taken after this period before re-entering.
- No naked lights, smoking or unprotected electrical apparatus which may cause sparks, shall be permitted in any sump or in their vicinity.

Safety equipment

- All teams must be issued with gas monitoring equipment and safety harnesses and self-rescuers where applicable.
- All employees must be trained in the use thereof.

21.2 BARRICADING

- Barricading plans are to be presented by the Principal Contractor for any major operations involving site works for approval by Johannesburg Water SOC Ltd. Where areas are unsafe, they should be enclosed with barricading. Examples are people working overhead, welding splatter etc.
- Where there is a risk of injury, the area should be barricaded off with secure solid barricades.

- Barricading for the prevention of access into areas with a potential risk of injury shall as a minimum be constructed of a handrail, knee-rail and appropriately supported as to prevent any person from falling into the restricted/risk area.
- Appropriate signage shall be affixed to the barricade indicating the risk associated (i.e. deep excavation, lifting operations etc.) and the responsible Supervisor and contact details shall be displayed. All barricading shall have a "No Entry" signs on all sides and at each change of direction. Signage shall be placed at 20 m intervals where lengths exceed. All signage shall be a minimum size of 290 mm x 290 mm.
- Danger tape shall not be utilised to prevent personnel from entering into areas.
- Where no risk exists of injury to personnel such as stacking and storage areas, the use of wire for hand and knee rails netting shall be acceptable to demarcate the area.
- All barricades will have a dedicated entrance where it is required that personnel enter the areas.
- Appropriate signage shall be placed at the entrance indicating which Contractor has right of entry.
- It is the Contractor's responsibility to remove all redundant barricades directly after use. The Contractor's Safety Officers will maintain a marked-up site plan indicating where barricades are erected.
- It will be a requirement that the contractor protects employees against contact with exposed rebar and poles by the installation of rebar-caps on all exposed areas where there is a potential that an employee could be injured.

21.3 SYMBOLIC SIGNGAGE

Contractors shall use mandatory and prescribed symbolic safety signs at their lay down and site areas. The display of the following signs is mandatory:

- "Radio-Active Material" symbolic signs at radioactive storage areas.
- "Eye Protection" symbolic signs shall be displayed at all grinding machines and at any area where it is mandatory to wear eye protection or where there is danger of an eye injury being sustained.
- "Ear Protection" symbolic signs shall be displayed at all areas where there is a danger of noise induced hearing loss being sustained.
- Every separate room of a workplace shall be consecutively numbered.
- All toilets or urinals shall be marked in a conspicuous place with painted or stencilled letters to indicate the sex for which they are intended.
- The location of every first aid box is to be clearly indicated by means of a sign.
- In any room, cabinet or enclosure where flammable substances are used or stored shall be fixed a suitable and conspicuous sign prohibiting smoking or the use of naked flames in the area.
- At the entrance to premises where machinery is used
- Restricted access on "Authorised Person Only" signs on entry. "No person shall enter the workplace or premises without the permission of the employer or user of the machinery".
- At every place where machinery is used a notice (English & Pictograms) shall be posted.
- Explosive Power Tool shall have a sign warning people when it is in use.
- Electrical Control Gear. A notice shall be posted so as to warn against the re-closing of a switch of control gear whilst a person is working on such equipment.
- Emergency contact telephone numbers.
- Adequate scaffolding signs. (When applicable).
- Adequate fire fighting equipment signs.
- Speed limit signs.
- Warning notices at openings through which people may fall.
- Risk based signage depending on the task being performed e.g.:
    - "Men working above", "Men working below', "Road closed – detour", "Excavation in progress", "No walkway" etc.;

- No-entry signs to incomplete platforms

The Principal Contractor shall install a notification board indicating the following information at the site entrance:

- Johannesburg Water SOC Ltd project number;
- Principal Contractor identification details (name, telephone number)
- Name and contact details of Construction Supervisor;
- Name and contact details of site safety officer;
- Monthly compliance rating;
- Lost Time Injury Rate;

The Principal Contractor will ensure that information on the notification board is kept up-to-date.

21.4 USE AND STORAGE OF FLAMMABLES

The Principal Contractor to ensure that:

- No person is required or permitted to work in a place where there is the danger of fire or an explosion due to flammable vapours being present unless adequate precautions are taken;
- No flammable material is used or applied e.g. in spray painting, unless in a room or cabinet or other enclosure specially designed and constructed for the purpose unless there is no danger of fire or explosion due to the application of adequate ventilation;
- The workplace is effectively ventilated. Where this cannot be achieved:
    - Employees must wear suitable respiratory equipment
    - No smoking or other source of ignition is allowed in the area
    - The area is conspicuously demarcated as “flammable”
- Flammables stored on a construction site are stored in a well-ventilated, reasonably fire-resistant container, cage or room that is kept locked with access control measures in place. Sufficient fire fighting equipment is installed and fire prevention methods practiced. Proper housekeeping may achieve this;
- Flammables stored in a permanent flammable store are stored so that no fire or explosion is caused.
- Stored in a locked and well-ventilated reasonably fire resistant container, cage or room conspicuously demarcated as “Flammable Store – No Smoking or Naked Lights”
- The flammables store to be constructed of two-hour fire retardant walls and roof and separated from adjoining rooms or workplaces by means of a two-hour fire retardant fire wall
- Adequate and suitable fire fighting equipment installed around the flammables store and marked with the prescribed signs
- All electrical switches and fittings to be of a flameproof design
- Any work done with tools in a flammable store or work areas to be of a non-sparking nature
- No Class A combustibles such as paper, cardboard, wood, plastic, straw and the like to be stored together with flammables
- The flammable store to be designed and constructed such that in the event of spillage of liquids the store is able to contain the full quantity + 10% of the liquids stored
- A sign indicating the capacity of the store to be displayed on the door
- Only one day’s quantity of flammable is to be kept in the workplace;
- Containers (including empty containers) to be kept closed to prevent fumes/vapours from escaping and accumulating in low lying areas;
- Metal containers to be bonded to earth whilst decanting to prevent build-up of static forces; and
- Welding and other flammable gases to be stored segregated according to the type of gas and empty and full cylinders.

21.5 HAZARDOUS CHEMICAL SUBSTANCES

The Principal Contractor must ensure that:

- Employees receive the necessary information and training to be able to use and store hazardous chemical substances safely;

- Employees obey lawful instructions regarding:
  - The wearing and use of protective equipment
  - The use and storage of hazardous chemical substances
  - The prevention of the release of hazardous chemical substances
  - The wearing of exposure monitoring and measuring equipment
  - The cleaning up and disposal of materials containing hazardous chemical substances
  - Housekeeping, personal hygiene and the protection of the environment
- The risk assessments required in terms of Construction Regulation include employee exposure to hazardous chemical substances and that the necessary measures be taken to protect persons from being detrimentally affected by hazardous chemical substances present or used in the workplace;
- Suppliers provide the necessary information in the form of a material safety data sheet regarding a hazardous chemical substances required to ensure the safe use and storage of that substances;
- An up-to-date list is kept on site of hazardous chemical substances stored and used together with the material safety data sheet of the hazardous chemical substances;
- Hazardous chemical substances containers be clearly marked with the contents and main hazardous category e.g. “Flammable” or “Corrosive” and the reference number of the hazardous chemical substances on the list indicated above;
- Hazardous chemical substances, for example asbestos dust, are not cleared by using compressed air but should be vacuumed;
- No person eats or drinks in a hazardous chemical substances workplace; and
- Hazardous chemical substances waste is disposed of safely in terms of hazardous waste disposal requirements.
- MSDS’s to be in 16 point format- available on site

21.6 FIRE PREVENTION AND PROTECTION

The Principal Contractor must ensure that:

- The risk of fire is avoided;
- Sufficient and suitable storage for flammables is provided;
- Sources of ignition are removed wherever flammable or highly combustible material is present in the workplace, for example:
  - Notices prohibiting smoking are displayed and enforced
  - Welding and flame cutting is only allowed under controlled conditions that includes written hot work permits
  - Only spark-free hand and power tools are used
  - No grinding, cutting and shaping of ferrous metals is allowed using electrically driven power tools that produce sparks
  - Flameproof switches and fittings are to be used in the flammable atmosphere
  - Good housekeeping is maintained to prevent the accumulation of unnecessary combustibles
  - Adequate ventilation is maintained
  - Adequate and suitable fixed and portable fire fighting equipment is provided and maintained in good working order.
- Maintenance must include:
  - Regular inspection of fire equipment by a competent person appointed in writing and keeping a register
  - Annual inspection and service by an accredited service provider
- All employees are instructed in the use of the fire fighting equipment and know how to attempt to extinguish a fire;
- A sufficient number of employees are appointed and trained to act as an emergency team to deal with fires and other emergencies;
- Employees are informed regarding emergency evacuation procedures and escape routes;
- Emergency escape routes are kept clear at all times and clearly marked;

- Evacuation assembly points are demarcated;
- Evacuation is practiced to ensure that all persons are evacuated timeously;
- Roll call is held after evacuation to account for all personnel and ensure that no-one has been left behind; and
- A siren or alarm is fitted which is clearly audible to all persons on site.

21.7STACKING AND STORAGE

The Principal Contractor must ensure that:

- A competent person is appointed in writing to supervise all stacking and storage on a construction site;
- Adequate storage areas are provided and demarcated;
- The storage areas are kept neat and under control;
- The base of any stack is level and capable of sustaining the weight exerted on it by the stack;
- The items in the lower layers can support the weight exerted by the top layers;
- Cartons and other containers that may become unstable due to wet conditions are kept dry;
- Pallets and containers are in good condition and no material is allowed to spill out;
- The height of any stack does not exceed 3 times the base unless stepped back at least half the depth of a single container at least every fifth tier or the approval of an inspector has been obtained to build the stacks higher with the aid of a machine. The operator of the machine must be protected against items falling from overhead off the stack and no items may overhang;
- The articles that make up a single tier are consistently of the same size, shape and mass;
- Structures for supporting stacks are structurally sound and able to support the mass of the stack;
- No articles are removed from the bottom of the stack first but from the top tier first;
- Anybody climbing onto a stack must do it in a safe manner, taking reasonable safety precautions, and ensuring that the stack is stable and capable of supporting him or her
- Stacks that are in danger of collapsing are broken down and restacked;
- Stability of stacks are not threatened by vehicles or other moving plant and machinery;
- Stacks are built in a header and stretcher fashion and that corners are securely bonded;
- Stacks are stepped back at least half the depth of a single container at least every fifth tier; and
- Persons climbing onto stacks do not approach unguarded moving machinery or electrical installations.
- Laydown area is allocated for Contractor-supplied items.
- At all times, the Contractor shall be responsible for the safe and adequate storage of all materials and equipment on site which he is to install, whether they are supplied by himself or others.
- The safe handling, unloading and loading of material receipts and dispatches at site or storage areas shall be the Contractors' responsibility.

The Contractor shall provide a suitable and adequate lock-up store for the storage of items of equipment and material, which would be damaged or pilfered if stored in the open. The Principal Contractor shall provide all facilities required for weather-proofing, dust proofing or vermin proofing.

The Contractor is responsible for the proper storage and maintenance of all equipment until issue of the Certificate of Practical Completion.

All equipment and materials will be stored on suitable wood poles or pallets which will not protrude more than a meter from any of the stored material. Safe access ways shall be maintained between all stored items preventing employees from having to climb over or under equipment to retrieve the necessary.

21.8 HOUSEKEEPING

The Principal Contractor to ensure that:

- Housekeeping is continuously implemented and maintained;
- Materials and equipment are properly stored;
- Scrap, waste and debris is removed regularly;

- Materials placed for use are placed safely and not allowed to accumulate or cause obstruction to the free-flow of pedestrians and vehicular traffic;
- Waste and debris not to be removed from heights by throwing but rather by chute or crane;
- Where practicable, construction sites are fenced off to prevent entry of unauthorised persons;
- Catch platforms or nets are erected over entry and exit ways or over places where persons are working to prevent them being struck by falling objects;
- An unimpeded work space is maintained for every employee;
- Every workplace is kept clean, orderly and free of tools, materials and the like that are not required for the work being done;
- As far as is practicable, every floor, walkway, stair, passage and gangway is kept in good state of repair, skid-free and free of obstruction, waste and materials;
- The walls and roof of every indoors workplace sound and leak-free; and
- Openings in floors, hatchways, stairways and open sides of floors or buildings are barricaded, fenced, boarded over or provided with protection to prevent persons from falling.

21.9 PUBLIC HEALTH AND SAFETY

The Principal Contractor is responsible for ensuring that non-employees affected by the construction work are made aware of the dangers likely to arise from the construction work as well as the precautionary measures to be observed to avoid or minimise those dangers. This includes:

- Non- employees entering the site for whatever reason;
- The surrounding community; and
- Passers-by the site.

- The Principal Contractor shall organize the site in such a manner that pedestrians and vehicles can move safely and without risks to health, including sufficient and suitable traffic routes and safe walkways with relevant signage.
- Appropriate signage must be posted to this effect and all employees on site must be instructed to ensure that non-employees are protected at all times. All non-employees entering the site must receive induction into the hazards and risks of the site and the control measures to be observed.
- The Principal Contractor shall recognize that the Community Liaison Officer (CLO) is the link between Johannesburg Water SOC Ltd and the community and provide all reasonable support to the Community Liaison Officer to ensure relevant responsibilities are fulfilled and positive relationships with the community are maintained.

21.10 TRAFFIC MANAGEMENT

- Where activities are performed close to public routes, the Principal Contractor will establish a traffic management plan incorporating the requirements of relevant by-laws.
- At a minimum, barricading, warning signage and flagmen will be provided to ensure the protection of workers from vehicles in transit.
- Where required, the Principal Contractor will interact with the local traffic department to establish minimum requirements to be implemented on public routes.

21.11 HAND TOOLS

The Principal Contractor must inspect all hand tools before it is brought onto the site.

- As far as possible all hand tools must be numbered and placed on register to be inspected monthly by a person designated to do so.
- Any tools found to be in an unsafe condition must immediately be removed from service and either discarded or rectified.

- No chisels with “mushroomed” heads must be used.
- No hammer shall be used with a cracked or damaged handle.
- All files must be fitted with handles.
- All trolleys, pushcarts, etc. used on site must be identifiable, placed on register and inspected at least once every month.
- Non-sparking tools must be used in areas where the risk of fire or explosion is present.
- No homemade hand tools are allowed on the project.
- All tools shall be attached to a suitable lanyard when utilised in elevated positions

21.12 PORTABLE ELECTRICAL EQUIPMENT

Portable electrical tools and equipment includes every unit that takes electrical power from a 15 ampere plug point and is moved around for use in the workplace for example; drills, saws, grindstones, portable lights, etcetera. Other electrical appliances such as fridges, hotplates, heaters, and etcetera must be inspected and maintained to the same standards as portable electrical tools and appliances.

The use, inspection and maintenance of portable electrical tools and equipment shall be as follows:

- Periodical inspections must be carried out by a competent person appointed in writing;
- Inspection results must be recorded in a register;
- Only competent authorised persons are allowed to use portable electrical tools and equipment; and
- The correct protective equipment must be worn or used whilst operating portable electrical tools and equipment.

This equipment:

- Must be maintained in good condition at all times to prevent an electrical shock to the user;
- The main power source should incorporate an earth leakage protection device or receive power through a double wound transformer or be double insulated and clearly marked as such; and
- All equipment must be fitted with a switch to allow for safe and easy starting and stopping.

The following requirements apply to portable lights:

- Must be fitted with a robust non-hygroscopic non-conducting handle;
- Live metal parts or parts which may become live must be protected against contact;
- The lamp must be protected by a strong guard;
- The cable lead-in must withstand rough handling;
- Inspections must be undertaken that concentrate on plug, cord, switch and any obvious faults;
- A register be kept for each piece of equipment with findings of regular inspections undertaken to evaluate the condition of these lights; and
- When used in wet/damp/metal container conditions, the lamp must be protected.

21.13 LIFTING EQUIPMENT & MACHINERY

Lifting equipment must be designed and constructed in accordance with the manufactures/designers specifications as well as generally accepted technical standards and operated, used, inspected and maintained in accordance with the manufactures requirements as well as that of the of Driven Machinery Regulations promulgated in terms of the Occupational Health and Safety Act (Act no 85 of 1993).

The Driven Machinery Regulations requires that:

- Lifting equipment is clearly and conspicuously marked with the maximum mass load (MML) that it is designed to carry safely. When the MML varies with the conditions of use a table showing the maximum mass load with respect to every variable condition shall be posted up by the user in a conspicuous, place easily visible to the operator and the table shall be used by the driver/operator;
- Each winch on a lifting machine must at all times have, at least, three full turns of rope on the drum when the winch has been run to its lowest limit;

- Lifting equipment shall be fitted with a brake or other device capable of holding the MML. This brake or device shall automatically prevent the downward movement of the load when the lifting power is interrupted;
- Lifting equipment shall be fitted with a load limiting device that automatically arrest the lift when the load reaches its highest safe position or when the mass of the load is greater than the MML;
- Every chain or rope on a lifting machine that forms an integral part of the machine must have a factor of safety as prescribed by the manufacturer of the machine. Where no standard is available the factor of safety must be:
    - chains – 4 (four)
    - steel wire ropes 5 (five)
    - fibre ropes- 10 (ten)
- Every hook or load attaching device must be designed to prevent the load from slipping off or disconnecting;
- Every lifting machine must be inspected and load tested by a competent person every time it has been dismantled and re-erected and every 12 months after that. The load test must be in accordance with the manufacturer's requirements or to 110% of the MML. In addition, all ropes, chains, hooks or other attaching devices, sheaves, brakes and safety devices forming an integral part of a lifting machine must be inspected every 6 months by a competent person;
- All maintenance, repairs, alterations and inspection results must be recorded in a log book and each lifting machine must have its own log book; and
- No person may be lifted by a lifting machine not designed for lifting persons unless in a cradle approved by the inspector of the Department of Labour.

General requirements for cranes and lifting equipment

All documentation must be provided to the Johannesburg Water SOC Ltd Project Engineer prior to mobilisation. Failure to do so and the resulting cost of any delays and/or remedial activities will be for the Contractor's account.

All crane operators must be authorised by the relevant Engineer before they may operate a crane or lifting machine. The Load charts must be displayed at the crane.

Daily pre-use inspections of the cranes must be done and be kept on the file. The inspections must be logged in a logbook. The area in which a lift is performed must always be barricaded to prevent employees from entering.

A crane or lifting machine must not be left unattended and the keys may never be left in the ignition when the operator is not present. Properly constructed out rigger pads must be used when soil is uneven or unstable. (Only sleepers or appropriately designed steel plate pads may be used for this purpose).

Only a competent rigger may direct a lift of any kind unless the following requirements are met. Rigger assistants used for performing lifting operations shall be limited to lifts with all of the following requirements:

- Lifts lower than 5 tons
- Easy lifts that does not require the load to be lifted over structures, equipment or machinery
- Equipment that is not critical
- Rigging configuration that requires the attachment of several parts of lifting equipment such as chain blocks to adjust the angle of loads.
- All safety devices on a crane or lifting machine must be functional.

Certification will be required for record purpose, and shall cover the following:

- A Brake or other device capable of holding the maximum mass should the power fail, or which is such that it shall automatically prevent the uncontrolled downward movement of the load when the raising effort is interrupted; and
- A Limiting device which shall automatically arrest the driving effort when:
- The Hook or Load attachment point of the Power Driven lifting machine reaches its highest safe position; and
- In the case of a Winch Operated lifting machine with a lifting capacity of 5000kg or more, the load is greater than the rated mass load of such machine.

The user shall ensure that every lifting machine is operated by an Operator specifically trained for a particular type of lifting machine; the user shall not require or permit a person to operate such lifting machine unless the operator is in possession of a certificate of training, issued by an accredited person or organisation.

No Crane shall be used at arrival on site before copies of all documentation have been handed over to the Johannesburg Water SOC Ltd and the Crane have been checked by a person duly authorised and signed off as acceptable. Copies of all documentation shall be kept in the SHE File at all times.

No Crane shall be used without a pre-use check and findings entered on an approved checklist. Before any cranes are established on site the following must be inspected and approved:

- Operator's licences
- Training certificates
- Medical fitness certificate.
- The cranes load test certificate.
- Rope test certificates including Mill / Destructive test.
- The lifting gear load test certificates.
- The load limiting device calibration certificate.
- Proof that the hooks have been measured for spreading.
- The service inspection history.
- Monthly comprehensive inspection certificate
- Operation and maintenance Manuals and crane condition.

Cranes and Lifting Machines

A contractor shall ensure that where tower cranes are used:

- Account is taken of the effects of wind forces on the structure;
- Account is taken of the bearing capacity of the ground on which the tower crane is to stand;
- The bases for the tower cranes and tracks for rail-mounted tower cranes are firm and level;
- The tower cranes are erected at a safe distance from excavations;
- There is sufficient clear space available for erection, operation and dismantling;
- The tower crane operators are competent to carry out the work safely; and
- The tower crane operators are physically and psychologically fit to work in such an environment by being in possession of a medical certificate of fitness."

No user shall use or permit any person to use a Jib-Crane with a lifting capacity of 5000kg or more at a minimum Jib radius, unless it is provided with:

- A load indicator that shall indicate to the operator of the Jib-Crane the mass of the load being lifted, provided that such a device shall not require manual adjustment from the application of the load, to the Jib-Crane, until the release of the load.
- A Limiting Device, which shall automatically arrest the driving effort whenever the load is lifted, is greater than the rated mass load of the Jib-Crane.

Mobile Crane near Power Lines

No mobile cranes are to be used near overhead power lines until the Johannesburg Water SOC Ltd representative has been notified and provided safe access conditions and a valid permit to work is obtained. Mobile cranes shall be effectively earthed when working in the vicinity of electrical wires. Assume that all electrical equipment and wires are live and avoid them.

Lifting tackle

The following requirements will apply to lifting tackle:

- Manufactured of sound material, well-constructed and free from patent defects;
- Clearly and conspicuously marked with an identity number;
- MML factor of safety:

- Natural fibre ropes - 10(ten)
- Man-made fibre ropes and woven webbing - 06(six)
- Steel wire ropes – single rope - 06(six)
- Steel wire ropes – combination slings - 08(eight)
- Mild Steel chains - 05(five)
- High tensile/alloy steel chains - 04(four)

- Steel wire ropes must be examined by a competent person every three months and the results recorded in a designated logbook. The ropes must be discarded (not used any further for lifting purposes) when wear and corrosion is evident.

21.14 LADDERS

The following requirements for ladders will apply:

- All ladders used on the site shall be constructed and used in compliance with the OH&S Act and Regulations.
- Ladders, which provide access to a working platform, shall extend one metre above the platform where it provides access, and shall be secured to prevent slipping.
- Timber ladders shall not be painted other than with clear preserving oils, clear varnishes or clear plastics.
- Ladders, which are in a damaged condition, shall not be used and shall be labelled accordingly and removed from the Premises.
- All Ladders shall be numbered, logged in a register, and inspected monthly.
- A ladder in use shall be held by an assistant and/or properly tied down in position.
- Only ladders that do not conduct electricity shall be used in live electrical sub-stations and switching rooms.
- Ladders shall be removed after use and stored in an appropriate facility as to not expose them unnecessarily to the elements or potential damage by surrounding activities.

21.18 Fall protection (Working in elevated positions)

A pre-emptive risk assessment will be required for any work to be carried out above **two metres** from the ground or any floor level. This work will be classified as “work in elevated positions”.

As far as is practicable, any person working in an elevated position will work from a platform, ladder or other device that is at least as safe as if he is working at ground level. Whilst working in this position he shall be wearing a single belt with lanyard to prevent the person falling from the platform, ladder or other device. This safety belt will be, as far as is possible, secured to a point away from the edge over which the person might fall and the lanyard must be of such a length and strength that the person will not be able to move over the edge.

Alternatively, any platform, slab, deck or surface forming an edge over which a person may fall may be fitted with suitable guard rails at two different heights as prescribed in the relevant South African National Standard for the design, erection, use and inspection of access scaffolding.

Where the requirement in the paragraph above is not practicable, the person will be provided with a full body harness that will be worn at all times and shall be attached above the wearer’s head at all times. The lanyard must be fitted with a shock-absorbing device or the person must be attached to a fall arrest system (anchorage connector; body wear; and connecting device) approved by Johannesburg Water SOC Ltd.

Where the requirements in the paragraph above are not practicable, a suitable catch net must be erected.

Employees working in elevated positions must be trained to work without risk to their health and safety or to the health and safety of others and be declared medically and psychologically fit to perform work at elevated positions.
Where work on roofs is carried out, the risk assessment must take into account the possibility of persons falling through fragile material, i.e. skylights and openings in the roof.

Access scaffolding

Access scaffolding must be erected, used and maintained safely in accordance with Construction Regulations and relevant SA Bureau of Standards Code of Practice.

Detailed consideration must be given to all scaffolding to ensure that it is properly planned to meet the working requirements, designed to carry the necessary loadings and maintained in a sound condition. Sufficient material must be available to erect the scaffolding properly.

Scaffolding must only be erected, altered or dismantled by persons who have adequate training and experience and are competent in this type of work and under the continuous supervision of such a person.

21.19 Structures

The Principal Contractor must ensure that:

- Only skilled employees are allowed to erect structures and that the skills of these employees are verified at regular intervals.
- Steps are taken to ensure that no structure becomes unstable or collapses due to construction work being performed on it or in the vicinity of it.
- No structure is overloaded to the extent that it becomes unsafe.
- He has received from the designer the following information:
    - Information on known or anticipated hazards relating to the construction work and the relevant information required for the safe execution of the construction work.
    - A geo-scientific report (where applicable).
    - The loading the structure is designed to bear.
    - The methods and sequence of the construction process.

All drawings relating to the design are on site and available for inspection.

21.20 Explosive powered tools

Every explosive powered tool must be:

- Provided with a guard around the muzzle to confine flying fragments or particles; and
- Must be fitted with a firing mechanism that will prevent the explosive powered tool from firing unless it is pushed against the surface and at the right angle. Where the explosive powered tool is fitted with an intermediate piston between the charge and the nail this requirement is waived.

The Principal Contractor or user must ensure that:

- Only the correct type of cartridge is used;
- The explosive powered tool is cleaned and inspected daily before use by an appointed competent person. The competent person will keep a register with the findings of his inspection and the details of cleaning, service and repairs;
- The safety devices are in good working order before the explosive powered tool is used;
- When the explosive powered tool is not being used it is stored in an unloaded condition together with the cartridges in a safe and secure place inaccessible to unauthorised persons;
- A warning notice is displayed at the point where the explosive powered tool is in use;
- The issue and return of cartridges must be by issue/returns register signed by both issuer and user and empty cartridge cases must be returned with unspent cartridges;
- Users and operators of the explosive powered tool have received the necessary training and has been authorised as competent to use/operate the explosive powered tool; and
- Users and operators must wear the prescribed personal protective equipment whilst using and/or operating the tool.

21.21 Electrical installations

The installation of temporary electricity for construction shall be in accordance with Construction Regulations and the Electrical Installation Regulations. The Principal Contractor must ensure that:

- Existing services are located and marked before construction commences and the markings maintained during construction;
- Electrical installations and -machinery are sufficiently robust to withstand normal working conditions on site;
- Temporary electrical installations must be inspected at least once a week by a competent person and a record of the inspections kept in the SHE File;
- Electrical machinery used on a construction site must be inspected daily before start-up by the competent driver/operator or any other competent person and a record of the inspections kept in the SHE File; and
- A competent person appointed in writing must control and be responsible for all temporary electrical installations.
- An employer or user shall provide free of charge and maintain in good condition such protective equipment as may be necessary to prevent incidents, for use by persons engaged in working on or in close proximity to live electrical machinery or dead electrical machinery which may become live.

21.21.1 Electrical control gear

- The contractor shall ensure that all electrical machinery are provided with controlling apparatus and protective devices which shall, as far as is reasonably practicable, be capable of automatically isolating the power supply in the event of a fault developing on such machinery.
- The contractor shall place a switch, circuit breaker or fuse in the neutral conductor of a polyphase alternating current or three-wire direct current distribution system unless such switch, circuit breaker or fuse is so arranged as to isolate all phase conductors and the neutral conductor simultaneously: Provided that this shall not include an isolating link on the neutral conductor installed for test purposes or to prevent circulating currents.
- The contractor shall, whenever reasonably practicable, provide switchgear with an interlocking device so arranged that the door or cover of the switch cannot be opened unless the switch is in the 'off position and cannot be switched on unless the door or cover is locked.
- The contractor shall mark or label all controlling apparatus permanently so as to identify the system or part of the system or the electrical machinery which it controls, and where such control apparatus is accessible from the front and the back these markings shall be on both the front and the back.
- The contractor shall post a notice at switchgear or control gear which has been switched off or locked out to enable persons to work on electrical machinery or other machinery operated by electricity and controlled by. Such switchgear or control gear, warning against reclosing such switchgear or control gear.

21.21.2 Work on disconnected electrical machinery

- Without derogating from any specific duty imposed on employers or users of machinery by the Act, an employer or user shall, whenever work is to be carried out on any electrical machinery which has been disconnected from all sources of electrical energy, but which is liable to acquire or to retain an electrical charge, as far as is practicable, cause precautions to be taken by earthing or other means to discharge the electrical energy to earth from such electrical machinery or any adjacent electrical machinery if there is danger there from before it is handled and to prevent any electrical machinery from being charged or made live while persons are working thereon

21.21.3 Portable electric tools

No person shall use or permit the use of a portable electric tool with an operating voltage that exceeds 50 V to earth unless-

- It is connected to a source of electrical energy incorporating an earth leakage protection device, the construction of which meets the requirements of the relevant health and safety standard incorporated into these Regulations under section 44 of the Act; or

- It is connected to a source of electrical energy through the interposition between each tool and the source of an individually double-wound isolating transformer, the secondary winding of which is not earthed at any point and the construction of which meets the requirements of the relevant health and safety standard incorporated into these Regulations under section 44 of the Act; or
- It is connected to a source of high frequency electrical energy derived from a generator which is used solely for supplying energy to such portable electric tool and which arrangement is approved by the chief inspector; or it is clearly marked that it is constructed with double or reinforced insulation.

No person shall sell a portable electric tool constructed with double or reinforced insulation unless-

- It is clearly marked that it is constructed with such insulation; and Its insulation is constructed in accordance with the relevant health and safety standard incorporated into these Regulations under section 44 of the Act.
- No employer or user shall use or permit the use of a portable electric tool which is not fitted with a switch to allow for easy and safe starting and stopping of the tool.
- The employer or user shall maintain every portable electric tool, together with its flexible cord and plug, in good working order.

21.21.4 Switchboards

The contractor shall ensure that an unobstructed space for operating and maintenance staff is provided at the back and front of all switchboards, and the space at the back shall be kept closed and locked except for the purpose of inspection, alteration or repair: Provided that the requirements of this regulation with respect to the unobstructed space at the back of the switchboard shall not apply in the case of-

- switchboards which have no uninsulated conductors accessible from the back;
- switchboards, the switchgear of which is of a totally enclosed construction;
- switchboards, the backs of which are only accessible through an opening in the wall or partition against which they are placed, such openings being kept closed and locked; and
- switchboards which can be safely and effectively maintained from the front and which have all parts accessible from the front.

21.21.5 Electrical machinery in hazardous locations

- No person may use electrical machinery in locations where there is danger of fire or explosion owing to the presence, occurrence or development of explosive or flammable articles, or where explosive articles are manufactured, handled or stored, unless such electrical machinery, with regard to its construction relating to the classification of the hazardous locations in which it is to be used, meets the requirements of a safety standard incorporated for this purpose in these regulations under section 36 of the Act.
- Every user of electrical machinery shall be in possession of a certificate in a form acceptable to the chief inspector which has been issued by an approved inspection authority, in which it is certified that the electrical machinery has been manufactured and tested for the groups of dangerous articles in terms of the safety standard which has been incorporated in these regulations for this purpose under section 36 of the Act: Provided that in lieu of such certificate an inspector may approve permanent labeling on such machinery which contains all the relevant information.
- When diverse items of electrical machinery such as motors, cables and control apparatus are used together to form an electrical installation, the user shall ensure that the selection, arrangement, installation, protection, maintenance and working thereof results in no less a degree of safety than when the individual items of such machinery are used separately.
- The user shall use electrical machinery to which this regulation applies only under such conditions and in such surroundings as are prescribed in the safety standard incorporated in these regulations for this purpose under section 36
- No person shall effect repairs or adjustments to or otherwise work on electrical machinery under conditions (bullet 1) unless such machinery has been rendered dead and effective measures have been taken to ensure that such machinery remains dead.

- Wherever there is a possibility of the formation of static electricity under working conditions, the user shall earth all metallic structures, machine parts, pneumatic conveyor ducts and pipelines conveying flammable articles and the like, or take such other measures as may be necessary to effectively prevent the formation of electric sparks.
- The user shall cause all electrical machinery to which this regulation applies to be examined and tested at intervals not exceeding two years by a person who is competent to express an opinion on the safety thereof.
- The person carrying out the examination shall enter, sign and date the results of each such examination in a record book which shall be kept by the user for this purpose: Provided that where such machinery is subject to adverse climatic or physical conditions the frequency of such examinations shall be increased to intervals of no longer than one year or such shorter period as circumstances may necessitate.

21.21.6 Design and construction

- No person shall authorize, design, install or permit or require the installation of an electrical installation, other than in accordance with a health and safety standard incorporated into these regulations under section 44 of the Act: Provided that the components within an electrical installation shall comply with the standards referred to in the incorporated standard and proof of compliance shall be identifiable on the components or certification shall be available from the supplier or manufacturer of the components: Provided further that items of an electrical installation not covered by such incorporated safety standard, and the conductors between the point of supply and the point of control, shall be installed in accordance with the by-laws or regulations of the supplier concerned.
- A registered person shall exercise general control over all electrical installation work being carried out, and no person shall allow such work without such control: Provided that where the voltage exceeds 1kV, the installation shall be designed and supervised by a person deemed competent in terms of paragraphs (b), (c) or (d) of the definition of a competent person in regulation 1 of the General machinery Regulations, 1998.
- No supplier shall restrict the application of a health and safety standard referred to in sub-regulation (1) when an electrical installation is installed, except where the distribution system of the supplier may be adversely affected by the application thereof.

21.21.7 Electrical contractor

- Any person, including a juristic person, who intends to do installation work as an electrical contractor shall register annually with the chief inspector in the form prescribed in annexure 1 of the Electrical Installations Regulations.

21.21.8 Commencement and permission to connect installation work

- No person shall commence with installation work which would require a new supply or an increase in electricity supply capacity unless the supplier has been notified thereof in the form of Annexure 3: Provided that the supplier may waive this requirement in respect of such types of work as it may specify.
- No person shall connect or permit the connection of any completed or partially completed electrical installation to the electricity supply unless it has been inspected and tested by a registered person and a certificate of compliance for that electrical installation has been issued: Provided that the supplier may on request connect the supply to the installation for the purpose of testing and completion of the certificate of compliance by a registered person: Provided further that this sub-regulation shall not apply in the case where the electricity was disconnected for the non-payment of the electricity account or where there has been a change of tenant but not of ownership.
- Where the supply to an electrical installation is 25kVA or above, the user shall appoint an approved inspection authority or a competent person who shall ensure the compliance from the commencement to the commissioning of the installation.

21.21.9 Issuing of certificate of compliance

Only registered person may issue a certificate of compliance in the form of annexure 4 and which shall be accompanied by a test report in the format approved by the chief inspector, after having satisfied himself or herself by means of an inspection and testing that—

- a new electrical installation complies with the provisions of regulation 7 (1) of the Electrical Installation Regulations (EIR); or
- an electrical installation which existed prior to the publication of the current edition of the health and safety standard incorporated into these regulations in terms of regulation 7 (1) (EIR), complies with the general safety principles of such standard; or
- an electrical installation which existed prior the publication of the current edition of the health and safety standard incorporated into these regulations in terms of regulation 7 (1) and to which extensions or alterations have been affected, that–
    - ting part of the installation, complies with the general safety principles of such standard and is reasonable safe, and
    - extensions or alterations affected comply with the provisions of regulation 7 (1) of the Electrical Installation Regulations (EIR).

- If at any time prior to issuing a certificate of compliance any fault or defect is detected in any part of the installation, the registered person shall refuse to issue such certificate: Provided that if such fault or defect in the opinion of the registered person constitutes an immediate danger to persons in the case where electricity is already supplied, he or she shall forthwith take steps to disconnect the supply to the circuit in which the fault or defect was detected and notify the chief inspector.

- Any person who undertakes to do electrical installation work shall ensure that a valid certificate of compliance is issued for that work.
- No person shall amend a certificate of compliance issued by a registered person.

22. Monthly reporting

- The Principal Contractor is required to provide Johannesburg Water SOC Ltd. with a monthly report in the format provided on the last working day of the month.
- The report will include the monthly man-hours, incidents, training, inductions, audits, etc

23. Project close out

- Upon completion of the project, the contractor is required to hand over a consolidated project file to the Client with all the working documents for retention.

Returnable Annexure A: Acknowledgement of SHE Specification & Annexures

CONTRACTOR:	

I, the undersigned, hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates its commitment to compliance of the requirements contained within the following provided documentation:

- Johannesburg Water SOC Ltd, Safety, Health & Environmental (SHE) Specification, Volume 2;
- Annexure 1: List of possible hazards emanating from projects and activities conducted for or on behalf of Johannesburg Water SOC Ltd;

Signed at …… on this …….. Day of …… 20……..

CONTRACT MANAGER			
NAME	DESIGNATION	DATE	SIGNATURE
CONTRACT SUPERVISOR			
NAME	DESIGNATION	DATE	SIGNATURE
WITNESS (1)			
NAME	DESIGNATION	DATE	SIGNATURE
WITNESS (2)			
NAME	DESIGNATION	DATE	SIGNATURE

JOHANNESBURG WATER (SOC) LTD

MEDICAL SCREENING POLICY

RFP 24/07/2023: Repair and service BC06 conveyor belt and associated equipment at Northern Works

NOTICE

It is the Contractor's responsibility to ensure that medical surveillance requirements specified in the Occupational Health and Safety Act (85/1993) and Regulations and any other applicable legal and Johannesburg Water's requirements are fully complied with.

This document is meant to facilitate the Contractor's compliance to applicable requirements and does not replace the applicable legal requirements.

This document may be revised at any time to include applicable legal requirements not currently included that may come to the attention of Johannesburg Water in future. The Contractor will accordingly be responsible to comply with the revised requirements as might be necessary.

Where methods to ensure legal compliance have been specified in this document, Contractors may submit alternative detailed method statements for consideration and approval by Johannesburg Water. Johannesburg Water may, at its sole discretion, reject or accept such alternative methods.

1 PURPOSE OF THE MEDICAL SURVEILLANCE REQUIREMENTS PROCEDURE

The purpose of this Medical Surveillance Requirements Procedure is to facilitate the achievement of legal compliance relating to medical surveillance by all Consultants, Contractors, Subcontractors and suppliers that will be working on the Johannesburg Water project and to ensure that employees are fit to work in the roles that they have been employed to execute and remain so for their duration on the project site.

This document represents the minimum requirements for medical surveillance and does not replace applicable legal requirements.

2 MEDICAL SURVEILLANCE OBJECTIVES

The Johannesburg Water main objectives for medical surveillance are:

a) To ensure compliance with all applicable medical surveillance legal requirements.
b) To ensure compliance with all Johannesburg Water's requirements regarding medical surveillance.
c) To ensure that employees are fit to execute the work for which they have been employed.
d) To prevent employees from acquiring occupational diseases or illnesses.
e) To ensure early detection and treatment of occupational diseases and to prevent the aggravation of existing medical conditions.
f) To ensure that employees on departure from the project have not contracted any occupational diseases and to enable any such condition that arises to be suitably addressed.

All contractors are required to demonstrate total commitment towards the achievement of these objectives.

3 GENERAL REQUIREMENTS

3.1 The Principal Contractor shall ensure that a medical surveillance programme is implemented for all employees.

3.2 An initial health evaluation shall be carried out by an occupational health practitioner immediately after a person commences employment, where any exposure exists or may exist, which comprises:

- an evaluation of the employees medical and occupational history;
- a physical examination; and
- any other essential examination which in the opinion of the occupational health practitioner is desirable in order to enable the practitioner to do a proper evaluation.

3.3 Medical surveillance & Immunization shall be done accredited institutions or occupational health doctor, including, but not limited to:

a) Audiograms.
b) A cardio-respiratory examination, including full size chest x-rays (***If lung function tests are abnormal)***
c) Lung function tests.
d) Eye/ sight tests.
e) A general physical examination.
f) A review of previous medical history.
g) Blood pressure tests
h) Glucose tests

Copies of all medical certificates shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent to prior to site establishment and before an employee is allowed to come onto site.

Specific attention shall be given to the physical and psychological fitness of people who will be required to work in elevated positions and operators of mobile machinery.

An exit medical certificate shall be obtained for all workers at the end of the contract and for all workers who leave the employment of the Contractor before the end of the Project. Copies of all

exit medical certificates shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent.

Medical surveillance shall address all occupational health risks to which the employee is exposed, identified through the risk assessment referred to in section 4 below.

Retention monies will be withheld if the exit medical is not complete for all employees.

The cost of all medical examinations will be borne by the Contractor as provision is made on the bill of quantities.

4 OCCUPATIONAL HEALTH RISK ASSESSMENT

4.1 The Contractor shall conduct an occupational health risk assessment prior to site establishment.

4.2 The Contractor shall ensure that, as far as is reasonably practicable, ergonomic related hazards are analyzed, evaluated and addressed in the risk assessment.

4.3 The methodology used by the contractor to assess occupational health risks associated with their activities shall be submitted to Johannesburg Water for approval by the Johannesburg Water Project Specialist or Appointed OHS Agent prior to site establishment. The methodology should take the following into consideration, among others:

a) Legal requirements.
b) Normal activities undertaken by the contractor.
c) Abnormal situations (e.g. unanticipated breakdown of equipment etc).
d) Emergency situations (e.g. fires, exposure to chemicals).
e) Changes in work procedures and methods.
f) Previous experience.

4.4 A risk register that will include the following shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent before site establishment.

a) All occupational health risks identified during the occupational health risk assessment.
b) A list of the occupational health risks that have been identified as being significant.

c) Reference to the method statements, measures or procedures that will be followed to either eliminate or reduce the significant risks to tolerable levels.

4.5 The Contractor shall, in writing, clearly explain how each occupational health risk assessed to be significant will be addressed to eliminate or reduce it to a tolerable level and submit it for approval by the Johannesburg Water Project Specialist or Appointed OHS Agent before site establishment. This may be through method statements or written operational control procedures. Associated responsibilities and authorities shall be clearly defined. All method statements shall reflect at least:

a) When the activities relating to the method statement will be conducted (timing).
b) Materials to be used.
c) Equipment and staffing requirements.
d) The proposed construction procedure designed to implement the relevant requirements.
e) The system to be implemented to ensure compliance with the method statement.
f) Any other information deemed to be necessary by the Johannesburg Water Project Specialist or Appointed OHS Agent and/or the contractor's responsible person.

4.6 For significant occupational health risks identified after site establishment, method statements shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent at least 10 working days before the start of the associated activity, when possible.

4.7 All changes to approved method statements or procedures shall be approved in writing by the Johannesburg Water Project Specialist or Appointed OHS Agent.

4.8 The contractor's Responsible Person shall retain records of any amendments and shall ensure that only the most current approved version of any method statement or procedure is used.

4.9 Every occupational health risk that is identified during the risk assessment process shall be conveyed to every employee whose work is associated with the risk. This may be done in the form of a toolbox talk but does not replace the toolbox talk entirely. Each employee shall sign to confirm an understanding of the occupational health risks in the tasks.

4.10 Occupational health risk assessments may be combined with safety and environmental risk assessments, but the consideration of occupational health issues shall be clearly reflected in the records generated and maintained.

4.11 The occupational health risk assessment process and effective implementation of measures to eliminate or reduce identified risks is the responsibility of the Contractor. Johannesburg Water will closely monitor the effectiveness of implemented measures.

Acknowledgement of JW Medical Screening Policy

Name of Contractor

I, the undersigned, hereby acknowledge that I have obtained copies of JW Medical Screening Policy and confirm that I fully understand them and the consequences of non-compliance.

Signed at …… on this …….. Day of …… 20……..

Signature of Contractor / Mandatory	**Date**
----------	**----------**
Signature of 16.2 / Construction Manager	**Date**
----------	**----------**
Witness 1 ……	**Witness 2 ……**

OHS CONTRACTORS' MANAGEMENT SYSTEM				
TENDER DOCUMENT SHE SPECS SIGN-OFF FORM				Johannesburg Water
REQUESTED BY	**T. THABENG**	**DATE**	**21/07/2023**	**RFP 24/07/2023**

RFP 24/07/2023: ***Repair and service BC06 conveyor belt and associated equipment at Northern Works***

LIST OF SHE SYSTEM ATTACHED TO THE TENDER DOCUMENT

SHE SYSTEM ATTACHED	Y/N	VERSION	NO PAGES	REMARKS
Volume 2 SHE Specification & Acknowledgement Form	Y	V2 – 05/15	42	For info
Baseline Risk Assessment	Y	V01 – 05/15	9	For info
Medical Screening Policy	Y	V01 – 05/15	8	For info
Returnable Annexure A	Y	V02 - 02/20	1	Return with tender document