Transnet Port Terminals

an Operating Division **TRANSNET SOC LTD**

[Registration Number 1990/000900/30]

REQUEST FOR PROPOSAL (RFP)

DESCRIPTION OF THE WORKS: FOR THE PROVISION & CONTRUCTION OF THE DUST SUPPRESSION SYSTEM TO TRANSNET SOC LTD (REG.NO.1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS HEREIN AFTER REFERRED TO AS "TPT" AT THE BULK TERMINAL OF SALDANHA, FOR A PERIOD OF TWELVE (12) MONTHS

RFP NUMBER	**: TPT/2026/10/0002/115142/RFP**
ISSUE DATE	**: 30 October 2026**
COMPULSORY BRIEFING	**: 10 November 2026**
CLOSING DATE	**: 18 November 2026**
CLOSING TIME	**: 10:00am**
TENDER VALIDITY PERIOD	**: 12 weeks from closing date**

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T1.1 TENDER NOTICE AND INVITATION TO TENDER

SECTION 1: NOTICE TO TENDERERS

1. INVITATION TO TENDER

Responses to this Tender [hereinafter referred to as a **Tender**] are requested from persons, companies, close corporations or enterprises [hereinafter referred to as a Tenderer].

DESCRIPTION	**FOR THE PROVISION & CONTRUCTION OF THE DUST SUPPRESSION SYSTEM TO TRANSNET SOC LTD (REG.NO.1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS HEREIN AFTER REFERRED TO AS "TPT" AT THE BULK TERMINAL OF SALDANHA, FOR A PERIOD OF TWELVE (12) MONTHS**
TENDER DOWNLOADING	**This Tender may be downloaded directly from the National Treasury eTender Publication Portal at www.etenders.gov.za and the Transnet website at https://transnetetenders.azurewebsites.net (please use Google Chrome to access Transnet link) FREE OF CHARGE.**

COMPULSORY TENDER CLARIFICATION MEETING	A Compulsory Tender Clarification Meeting will be conducted at the Port of Saldanha **on the 10 November 2026,** at **10:00am [10 O'clock]** for a period of ± 6 (six) hours. [Tenderers to provide own transportation and accommodation]. The Compulsory Tender Clarification Meeting will start punctually and information will not be repeated for the benefit of Tenderers arriving late. **A Site visit/walk will take place, tenderers are to note**: • Tenderers are required to wear safety shoes, goggles, long sleeve shirts, high visibility vests and hard hats. • Tenderers without the recommended PPE will not be allowed on the site walk. • Tenderers and their employees, visitors, clients and customers entering Transnet Offices, Depots, Workshops and Stores will have to undergo breathalyser testing. • All forms of firearms are prohibited on Transnet properties and premises. • The relevant persons attending the meeting must ensure that their identity documents, passports or drivers licences are on them for inspection at the access control gates. Certificate of Attendance in the form set out in the **Returnable Schedule T2.2-02** hereto must be completed and submitted with your Tender as proof

<table>
<tr><td></td><td>of attendance is required for a compulsory site meeting and/or tender briefing.
Tenderers are required to bring this Returnable Schedule T2.2-02 to the Compulsory Tender Clarification Meeting to be signed by the Employer's Representative.
Tenderers failing to attend the compulsory tender briefing will be disqualified.</td></tr>
<tr><td>B.U.I.L.D PROGRAMME CONDITIONS</td><td>This tender will apply the following BUILD Programme conditions:

<table>
<tr><th></th><th>Tick</th></tr>
<tr><td>Payable Fee</td><td></td></tr>
<tr><td>Standard for Skill Development - Contract Skill Development Goals (CSDG</td><td></td></tr>
<tr><td>Standard for Enterprise Development [Indirect Targeting-Contract Participation Goals (CPG)]</td><td></td></tr>
</table>

The successful Tenderer will be required to adhere to the requirements of the selected BUILD Programme as a condition of contract.

It is required that tenderers must have a CIDB contractor grading designation of 7CE or higher.

This project will be implemented under the Construction Industry Development Board Contract Skills Development Goal (CSDG) programme, and the successful Tenderer will be required to adhere to the requirements of the CIDB Standard for Developing Skills Through Infrastructure Contracts is obtainable from the CIDB's website www.cidb.org.za

• The contractor will be required to sub-contract a minimum of 30% of the tender value to targeted enterprise/s as per the Standard for Indirect Targeting for Enterprise Development through Construction Works Contracts, published in Gazette Notice No. No. 54575 of 24 April 2026.

• Transnet has determined an amount to be paid for the development, monitoring and reporting aligned to the Standard; this amount shall be</td></tr>
</table>

	stated under the section Enterprise Development as a Provisional Sum in the Preliminaries and Generals (P&Gs). (Indirect Targeting). Pro-Forma Documents – attached as example documents **Form A1 List of Recognised Skills Development Agencies,** **Form A2 Baseline Training Plan,** **Form A3 Project Interim Report,** **Form A4 Supervisor Agreement, Form A5 Project Completion Report**
CLOSING DATE	**10:00am on** (2026/11/18) Tenderers must ensure that tenders are uploaded timeously onto the system. **If a tender is late, it will not be accepted for consideration**.

2. TENDER SUBMISSION

Transnet has implemented a new electronic tender submission system, the e-Tender Submission Portal, in line with the overall Transnet digitalization strategy where suppliers can view advertised tenders, register their information, log their intent to respond to bids and upload their bid proposals/responses on to the system.

a) The Transnet e-Tender Submission Portal can be accessed as follows:

Log on to the Transnet eTenders management platform website (https://transnetetenders.azurewebsites.net);

- Click on "ADVERTISED TENDERS" to view advertised tenders;
- Click on "SIGN IN/REGISTER – for bidder to register their information (must fill in all mandatory information);
- Click on "SIGN IN/REGISTER" - to sign in if already registered;
- Toggle (click to switch) the "Log an Intent" button to submit a bid;
- Submit bid documents by uploading them into the system against each tender selected.
- **Tenderers are required to ensure that electronic bid submissions are done at least a day before the closing date to prevent issues which they may encounter due to their internet speed, bandwidth or the size of the number of uploads they are submitting. Transnet will not be held liable for any challenges experienced by bidders as a result of the technical challenges. Please do not wait for the last hour to submit. A Tenderer can upload 30mb per upload and multiple uploads are permitted.**

b) Each company must register its profile using its company details and use the corresponding registered profile to log an intent to bid as well as submitting any bid.
c) Transnet will not accept a bid or will disqualify a bidder who submits a bid in the Transnet e-tender submission through another bidders'/Company's profile. In other words, each bidder must register the intent to bid and submit its bid through its own profile under the same company name that will eventually bid for the tender. No company shall submit a bid on behalf of another company regardless of the company being a subsidiary or holding company.
d) In case of a Joint Venture, any of the parties/companies to the Joint Venture may use its registered profile to submit a bid on behalf of the Joint Venture.
e) The tender offers to this tender will be opened as soon as possible after the closing date and time. Transnet shall not, at the opening of tenders, disclose to any other company any confidential details pertaining to the Tender Offers / information received, i.e. pricing, delivery, etc. The names and locations of the Tenderers will be divulged to other Tenderers upon request.
f) Submissions must not contain documents relating to any Tender other than that shown on the submission.

3. CONFIDENTIALITY

All information related to this RFP is to be treated with strict confidentiality. In this regard Tenderers are required to certify that they have acquainted themselves with the Non-Disclosure Agreement. All information related to a subsequent contract, both during and after completion thereof, will be treated with strict confidence. Should the need however arise to divulge any information gleaned from provision of the Works, which is either directly or indirectly related to Transnet's business, written approval to divulge such information must be obtained from Transnet.

4. DISCLAIMERS

Tenderers are hereby advised that Transnet is not committed to any course of action as a result of its issuance of this Tender and/or its receipt of a tender offer. In particular, please note that Transnet reserves the right to:

4.1. Award the business to the highest scoring Tenderer/s unless objective criteria justify the award to another tenderer.

4.2. Not necessarily accept the lowest priced tender or an alternative Tender;

4.3. Go to the open market if the quoted rates (for award of work) are deemed unreasonable;

4.4. Should the Tenderers be awarded business on strength of information furnished by the Tenderer, which after conclusion of the contract is proved to have been incorrect, Transnet reserves the right to terminate the contract;

4.5. Request audited financial statements or other documentation for the purposes of a due diligence exercise;

4.6. Not accept any changes or purported changes by the Tenderer to the tender rates after the closing date;

4.7. Verify any information supplied by a Tenderer by submitting a tender, the Tenderer/s hereby irrevocably grant the necessary consent to the Transnet to do so;

4.8. Conduct the evaluation process in parallel. The evaluation of Tenderers at any given stage must therefore not be interpreted to mean that Tenderers have necessarily passed any previous stage(s);

4.9. Unless otherwise expressly stated, each tender lodged in response to the invitation to tender shall be deemed to be an offer by the Tenderer. The Employer has the right in its sole and unfettered discretion not to accept any offer.

4.10. Not be held liable if tenderers do not provide the correct contact details during the clarification session and do not receive the latest information regarding this RFP with the possible consequence of being disadvantaged or disqualified as a result thereof.

4.11. Transnet reserves the right to exclude any Tenderers from the tender process who has been convicted of a serious breach of law during the preceding 5 [five] years including but not limited to breaches of the Competition Act 89 of 1998, as amended. Tenderers are required to indicate in tender returnable on T2.2-26], [**Breach of Law**] whether or not they have been found guilty of a serious breach of law during the past 5 [five] years.

4.12. Transnet reserves the right to perform a risk analysis on the preferred tenderer to ascertain if any of the following might present an unacceptable commercial risk to the employer*:*

- *unduly high or unduly low tendered rates or amounts in the tender offer;*
- *contract data of contract provided by the tenderer; or*
- *the contents of the tender returnables which are to be included in the contract.*

5. Transnet will not reimburse any Tenderer for any preparatory costs or other work performed in connection with this Tender, whether or not the Tenderer is awarded a contract.

6. NATIONAL TREASURY'S CENTRAL SUPPLIER DATABASE

Tenderer are required to self-register on National Treasury's Central Supplier Database (CSD) which has been established to centrally administer supplier information for all organs of state and facilitate the verification of certain key supplier information. The CSD can be accessed at https://secure.csd.gov.za/. Tenderer are required to provide the following to Transnet in order to enable it to verify information on the CSD:

Supplier Number…… and Unique registration reference number……(Tender Data)

Transnet urges its clients, suppliers and the general public

to report any fraud or corruption to

TIP-OFFS ANONYMOUS: 0800 003 056 OR Transnet@tip-offs.com

T1.2 TENDER DATA

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Engineering and Construction Works Contracts. The Standard for Uniformity in Construction Procurement was first published in Board Notice 62 of 2004 in Government Gazette No 26427 of 9 June 2004. It was subsequently amended in Board Notice 67 of 2005 in Government Gazette No 28127 of 14 October 2005, Board Notice 93 of 2006 in Government Gazette No 29138 of 18 August 2006, Board Notice No 9 of 2008 in Government Gazette No 31823 of 30 January 2009, Board Notice 86 of 2010 in Government Gazette No 33239 of 28 May 2010, Board Notice 136 of 2015 in Government Gazette 38960 of 10 July 2015 and Board Notice 423 of 2019 in Government Gazette No 42622 of 8 August 2019.

This edition incorporates the amendments made in Board Notice 423 of 2019 in Government Gazette 42622 of 8 August 2019. (see www.cidb.org.za).

The Standard Conditions of Tender make several references to Tender data for detail that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender.

Each item of data given below is cross-referenced in the left-hand column to the clause in the Standard Conditions of Tender to which it mainly applies.

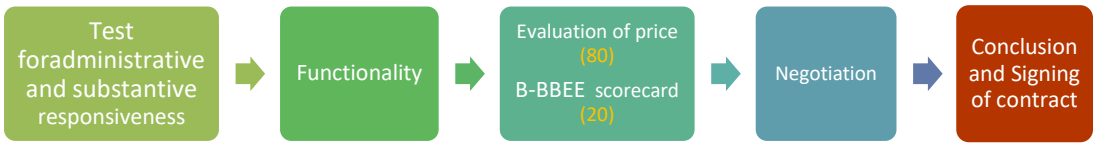
Clause		**Data**
C.1.1	The *Employer* is	**Transnet SOC Ltd** **(Reg No. 1990/000900/30)**
C.1.2	The tender documents issued by the *Employer* comprise:	
	Part T: The Tender	
	Part T1: Tendering procedures	T1.1 Tender notice and invitation to tender T1.2 Tender data
	Part T2 : Returnable documents	T2.1 List of returnable documents T2.2 Returnable schedules
	Part C: The contract	
	Part C1: Agreements and contract data	C1.1 Form of offer and acceptance C1.2 Contract data (Part 1 & 2) C1.3 Form of Securities
	Part C2: Pricing data	C2.1 Pricing instructions C2.2 Bill of Quantities

	Part C3: Scope of work	C3.1 Works Information
	Part C4: Site information	C4.1 Site information
C.1.4	The Employer's agent is:	Strategic Sourcing Specialist
	Name:	Thulile Ngcobo
	Address:	202 Anton Lembede Street, Durban, 4001
	Tel No.	031 308 8347
	E – mail	Thulile.Ngcobo@transnet.net

C.2.1 Only those tenderers who satisfy the following eligibility criteria are eligible to submit tenders:

EVALUATION METHODOLOGY

Transnet will utilise the following methodology and criteria in selecting a preferred Supplier/Service provider:



1. Step One - Test for Administrative Responsiveness:

The test for administrative responsiveness will include the following:

Administrative responsiveness check	RFP Reference
• Whether the Bid has been lodged on time	*T.1.1 Section1 / E-tender Management System*
• Whether all Returnable Documents and/or schedules [where applicable] were completed and returned by the closing date and time	*Part T2*
• Verify the validity of all returnable documents	*All Sections*
• Verify if the Bid document has been duly signed by the authorised respondent	*All sections*
• Entity's financial stability	*T2.2-31 Three (3) years audited financial statements*

The test for administrative responsiveness [Stage One] must be passed for a Respondent's Proposal to progress to Stage Two for further Evaluations.

2. Stage Two - Test for Substantive Responsiveness to RFP:

The test for substantive responsiveness to this RFP will include the following:

Check for substantive responsiveness	RFP Reference
• Whether the Bid contains a priced offer as prescribed in the pricing and delivery schedule	Part. C2.2 / C1.1
• Whether the Bid materially complies with the scope and/or specification given	*All Sections*
• Eligibility with regards to attendance at the compulsory clarification meeting	An authorised representative of the tendering entity or a representative of a tendering entity that intends to form a Joint Venture (JV) must attend the compulsory clarification meeting in terms C2.7
• Eligibility in terms of the Construction Industry Development Board:	Only those tenderers who are registered with the CIDB, or are capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations, designation of 7CE or higher class of construction work, are eligible to have their tenders evaluated

The test for substantive responsiveness [Stage Two] must be passed for a Respondent's proposal to progress to Stage Three for further evaluation.

3. Eligibility with regards to attendance at the compulsory clarification meeting:

An authorised representative of the tendering entity or a representative of a tendering entity that intends to form a Joint Venture (JV) must attend the compulsory clarification meeting in terms C2.7

4. Eligibility in terms of the Construction Industry Development Board:

a) Only those tenderers who are registered with the CIDB, or are capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations, designation of **7CE or higher** class of construction work, are eligible to have their tenders evaluated.

b) Joint Venture (JV)

Joint ventures are eligible to submit tenders subject to the following:

1. every member of the joint venture is registered with the CIDB;
2. the lead partner has a contractor grading designation of not lower than one level below the required class of construction works under consideration and possesses the required recognition status; and
3. the combined Contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a Contractor grading designation determined in accordance with the sum tendered for a 7CE or higher class of construction work or a value determined in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations

   The tenderer shall provide a certified copy of its signed joint venture agreement

Any tenderer that fails to meet the stipulated eligibility criteria will be regarded as an unacceptable tender.

5. Stage Three - Functionality:

Only those tenderers who obtain the minimum qualifying score for functionality will be evaluated further in terms of price and the applicable preference point system. The minimum qualifying for score for functionality is 60 points.

The evaluation criteria for measuring functionality and the points for each criteria and, if any, each sub-criterion are as stated in C.3.11.3 below.

Any tenderer that fails to meet the stipulated pre-qualifying criteria will be regarded as an unacceptable tender.

C.2.7	The arrangements for a compulsory clarification meeting are as stated in the Tender Notice and Invitation to Tender. **Tenderers must complete and sign the attendance register.** Addenda will be issued to and tenders will only be received from those tendering entities including those entities that intends forming a joint venture appearing on the attendance register. Tenderers are also **required to bring their RFP document to the briefing session and have their returnable document T2.2-02 certificate of attendance** signed off by the Employer's authorised representative.
C.2.12	No alternative tender offers will be considered.
C.2.13.3	Each tender offer shall be in the **English Language.**
C.2.13.5 C2.15.1	The *Employer*'s details and identification details that are to be shown on each tender offer are as follows: Identification details: The tender documents must be uploaded with: ▪ Name of Tenderer: (insert company name) ▪ Contact person and details: (insert details) ▪ The Tender Number: ▪ The Tender Description Documents must be marked for the attention of: ***Employer*'s Agent:**
C.2.13.9	Telephonic, telegraphic, facsimile or e-mailed tender offers will not be accepted.
C.2.15	The closing time for submission of tender offers is: Time: **10:00am**on the **18 November 2026** Location: The Transnet e-Tender Submission Portal: (https://transnetetenders.azurewebsites.net); **NO LATE TENDERS WILL BE ACCEPTED**
C.2.16	The tender offer validity period is **12 weeks** after the closing date. Tenderers are to note that they may be requested to extend the validity period of their tender, on the same terms and conditions, if Transnet's internal evaluation and governance approval processes has not been finalised within the validity period.
C.2.23	The tenderer is required to submit with his tender: 1. A valid Tax Clearance Certificate issued by the South African Revenue Services. **Tenderers also to provide Transnet with a TCS PIN to verify Tenderers compliance status**. 2. A **valid B-BBEE Certificate** from a Verification Agency accredited by the South

African Accreditation System [**SANAS**], or a **sworn affidavit** confirming annual turnover and level of black ownership in case of all EMEs and QSEs with 51% black ownership or more together with the tender;

3. A valid CIDB certificate in the correct designated grading;
4. Proof of registration on the Central Supplier Database;
5. Letter of Good Standing with the Workmen's compensation fund by the tendering entity or separate Letters of Good Standing from all members of a newly constituted JV.

Note: Refer to Section T2.1 for List of Returnable Documents

C3.11 The minimum number of evaluation points for functionality is: **60**

The procedure for the evaluation of responsive tenders is Functionality, Price and Preference:

Only those tenderers who attain the minimum number of evaluation points for Functionality will be eligible for further evaluation, failure to meet the minimum threshold will result in the tender being disqualified and removed from any further consideration.

Functionality Criteria

The functionality criteria and maximum score in respect of each of the criteria are as follows:

Functionality criteria	Sub-criteria	Sub-criteria points	Maximum number of points
T2.2-03 Management & CVs of Key Persons	**Organisation chart**	5	**30**
	Construction Manager	5	
	Site Agent/Supervisor (fulltime on-site)	5	
	Project Planner	2	
	Quantity Surveyor	2	
	Environmental Officer/Manager/Specialist	3	
	SACPCMP Registered SHE Officer	5	
	Quality Assurance Representative	3	

T2.2-04 Previous Experience	**Bulk Civil, Structural/Building, Eletrical/Electronics Works. (30 points)** Tenderers are required to demonstrate their past experience in the execution and completion of similar project as outlined in the Works Information. Key consideration will be given to the complexity, nature and financial magnitude of the projects. Tenderers are required to provide sufficient information about the reference work previously undertaken because only references that are similar to the scope of work of this contract will be considered for evaluation. In summary, tenders to submit references of at least five (5) projects as a minimum, that have been executed and completed in the past 10 years (between 2016 and 2026) under similar conditions and circumstances as described in the Works Information and in reference to the scope areas. The previous work should coverer as a minimum Bulk Civil, Structural/Building, Electrical/Electronic Works. For reference verification purposes, the signed reference letters should indicate the following information (among others) as a minimum: 1. Name of the project 2. Total budget of the project (Contract Value) 3. Starting date 4. Completion date 5. Client information (Client Name, contact details), signed completion certificate for each executed and completed project. NB: Brief description of each project executed will provide valuable information	**Score=100%** Information submitted by the tenderer shows outstanding experience in projects of similar nature as detailed in the Works Information. Information submitted on all five (5) completed projects that cover as a minimum; Bulk Civil works, Structural/Building works, Electrical/Electronic works that were executed and completed in the past 10 years. Signed completion certificates of all five (5) projects have been submitted, as evidence. **Score=80%** Information submitted on four (4) completed projects that cover as a minimum; Bulk Civil works, Structural/Building works, Electrical/Electronic works that were executed and completed in the past 10 years. Signed completion certificates of four (4) projects have been submitted, as evidence. **Score=60%** Information submitted on three (3) completed projects that cover as a minimum; Bulk Civil works, Structural/Building works, Electrical/Electronic works that were executed and completed in the past 10 years. Signed completion certificates of three (3) projects have been submitted, as evidence. **Score=40%** Information submitted on two (2) completed projects that cover as a minimum; Bulk Civil works, Structural/Building works, Electrical/Electronic works that were executed and completed in the past 10 years. Signed completion certificates of two (2) projects have been submitted, as evidence.

		Score=20% Information submitted on one (1) completed project that cover as a minimum; Bulk Civil works, Structural/Building works, Electrical/Electronic works that was executed and completed in the past 10 years. Signed completion certificates of one (1) project have been submitted, as evidence. **Score=0%** Information submitted shows no experience in projects of similar nature (Bulk Civil works, Structural/Building works, Electrical/Electronic works).
T2.2-05 Method Statement	**Method Statement (10 points)** The tenderers are required to demonstrate their understanding of the project scope (Works Information) by submitting a detailed method statement that outlines how the work is going to be executed from start to finish. The method statement will need to cover key focus areas within the execution process of the project. The Tenderers must provide a Method Statement which cover the following key focus areas of the project: 1. Site Establishment, site clearing and ground preparation. 2. Ordering of construction material 3. Civil & associated works 4. Structural & associated works 5. Mechanical & associated works 6. Electrical & associated works 7. Electronics/Instrumentation & associated works 8. Testing & commissioning work 9. Final completion & hand-over activities	**Score = 100%** The Method Statement demonstrates a clear understanding of the project scope. The Method Statement is detailed enough (All 9 key focus areas as indicated on this returnable schedule are covered). **Score = 80%** The Method Statement demonstrates some understanding of the project scope. The Method Statement contains some detailing that covers the key focus areas of the project (Between 8 and 7 key focus areas as indicated on this returnable schedule document are covered). **Score =60%** The Method Statement demonstrates high-level understanding of the project scope. The Method Statement contains some high-level detailing that covers the key focus areas of the project (Between 6 and 5 key focus areas as indicated on this returnable schedule document are covered). **Score =40%** The Method Statement demonstrates less understanding of the project scope. The Method Statement has no details that covers the key focus areas of the project (Between 4 and 3 key focus areas as indicated on this

		returnable schedule document are covered). **Score =20%** The Method Statement does not demonstrate any understanding of the project scope. The Method Statement has no details that cover the key focus areas of the project (Between 2 and 1 key focus areas as indicated on this returnable schedule document are covered). **Score = 0%** The Tenderer has submitted no information or inadequate information or irrelevant information to determine a score.
T2 2-06 Quality Management	**Project specific Quality Control Plan. (10 points)** Tenderers must submit a Quality Control Plan (QCP) which is specific for this project. The Quality Control Plan should outline the specific quality processes and testing requirements to ensure that the work will be executed within the required quality framework in compliance with the applicable national and iinternational quality standards. The Quality Control Plan should cover work activites as outlined in the Works Information for this project, with a particulat focus on the following key areas: 1. Inspection and Testing Plans 2. Material Testing Protocols 3. Applicable Regulations (SANS, CIDB etc) 4. Non-Conformance Reporting (NCR) 5. Roles & Responsibilities	**Score = 100%** QCP provide detail information for each key area and, all five (5) key areas are covered. **Score = 80%** QCP provide detail information for each key area however, only four (4) key areas are covered. **Score = 60%** QCP provide detail information for each key area however, only three (3) key areas are covered. **Score = 40%** QCP provide detail information for each key area however, only two (2) key areas are covered. **Score = 20%** QCP provide detail information for each key area however, only one (1) key area is covered. **Score = 0%** No QCP submitted or information submitted is non-compliance such that, no score can be determined.

T2.2-07 Programme	**Programme (20 points)** The Tenderers must demonstrate their ability to execute the work in terms of the Employer's requirements in reference to the Works Information, by indicating the order and timing of all activities that will take place in order to provide the work safely and within in the shortest possible duration. A level 3 programme indicating all milestones, activities & information related to the following key items: 1. Float 2. Time Risk Allowances, 3. Health and safety requirements, 4. Procedures set out in this contract, 5. Work by the Employer and Others, 6. Access to a part of the site later than its access date, 7. Acceptances, 8. Plant & Materials and other things to be provided by the employer, 9. Information by Others, 10. Starting date, access dates, Key Dates and Completion Date 11. Planned Completion for each Key Date for each option and the complete works 12. Shows how each activity on the Activity Schedule relates to the operations on each programme NB: The programme should be presented on Micro-Soft Project (MS Project) or Primavera and should clearly show the logical arrangement of the work activities.	**Score = 100%** **A level 3 programme** submitted as a minimum, on the acceptable programming software (MS Project or Primavera). The tenderer has addressed all data requirements as listed in this returnable. Between 10 to 12 key items are addressed. **Score = 80%** A level 3 programme submitted as a minimum, on the acceptable programming software (MS Project or Primavera). The tenderer has addressed most but not all data requirements as listed in this returnable. Between 9 to 8 key items are addressed. **Score = 60%** A level 3 programme submitted as a minimum, on the acceptable programming software (MS Project or Primavera). The tenderer has addressed most but not all data requirements as listed in this returnable. Between 7 to 6 key items are addressed. **Score = 40%** A level 3 programme submitted as a minimum, on the acceptable programming software (MS Project or Primavera). The tenderer has addressed some but not all data requirements as listed in this returnable. Between 5 to 4 key items are addressed. **Score = 20%** A level 3 programme submitted as a minimum, on the acceptable programming software (MS Project or Primavera). The tenderer has addressed some but not all data requirements as listed in this returnable. Between 3 to 2 key items are addressed. **Score = 0%** 1 and less item addressed and/or the tenderer has submitted no information or information submitted is inadequate such that a score cannot be determined.

Maximum possible score for Functionality	**100**

Functionality shall be scored independently by not less than 3 (three) evaluators and averaged in accordance with the following schedules:

- T2.2-03 Management & CVs of Key Persons
- T2.2-04 Previous Experience
- T2.2-05 Method Statement
- T2.2.06 Quality Control
- T2.2-07 Programme

Each evaluation criteria will be assessed in terms of scores of 0, 20, 40, 60, 80 The scores of each of the evaluators will be averaged, weighted and then totalled to obtain the final score for functionality, unless scored collectively. (See CIDB Inform Practice Note #9).

Note: Any tender not complying with the above mentioned requirements, will be regarded as non-responsive and will therefore <u>not</u> be considered for further evaluation. This note must be read in conjunction with Clause C.2.1.

C.3.11. Only tenders that achieve the minimum qualifying score for functionality will be evaluated further in accordance with the 80/20 preference points systems as described in Preferential Procurement Regulations.

80 where the financial value of one or more responsive tenders received have a value equal to or below R50 million, inclusive of all applicable taxes,

Up to 100 minus W_1 tender evaluation points will be awarded to tenderers who complete the preferencing schedule and who are found to be eligible for the preference claimed. **Should the BBBEE rating not be provided, tenderers with no verification will score zero points for preferencing.**

Note: Transnet reserves the right to carry out an independent audit of the tenderers scorecard components at any stage from the date of close of the tenders until completion of the contract.

C.3.13 Tender offers will only be accepted if:

1. The tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector;

2. the tenderer does not appear on Transnet's list for restricted tenderers and National Treasury's list of Tender Defaulters;

3. the tenderer has fully and properly completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the Employer or potentially compromise the tender process and persons in the employ of the state.

4. Transnet reserves the right to award the tender to the tenderer who scores the highest number of points overall, unless there are **objective criteria** which will justify the award of the tender to another tenderer. Objective criteria include but are not limited to the outcome of a due diligence exercise to be conducted. The due diligence exercise may take the following factors into account inter alia;

   the tenderer:

   a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement,

   b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract,

   c) has the legal capacity to enter into the contract,

   d) is not insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act, 2008, bankrupt or being wound up, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of any of the foregoing,

   e) complies with the legal requirements, if any, stated in the tender data and

   f) is able, in the option of the employer to perform the contract free of conflicts of interest.

C.3.17	The number of paper copies of the signed contract to be provided by the Employer is 1 (one).

T 1.3 Standard Conditions of Tender

T.1 General

All Bid Documents and subsequent contracts and orders shall be subject to the following general conditions as laid down by Transnet and are to be strictly adhered to by any Respondent to this RFP

T.1.1 Actions

The *Employer* and each Tenderer submitting a tender offer shall comply with these Conditions of Tender. In their dealings with each other, they shall discharge their duties and obligations as set out in T.2 and T.3, timely and with integrity, and behave equitably, honestly and transparently.

T.1.2 Tender Documents

The documents issued by the *Employer* for the purpose of a tender offer are listed in the tender data.

T.1.3 Interpretations

T.1.3.1 The tender data and additional requirements contained in the tender schedules that are included in the Mandatory returnable documents are deemed to be part of these Conditions of Tender.

T.1.3.2 These Conditions of Tender, the tender data and those tender schedules which are only required for tender evaluation purposes (as detailed in schedule T1.2 - T3.11.3), shall not form part of any contract arising from the invitation to tender.

T.1.3.3 For the purposes of these Conditions, the following definitions apply:

a) comparative offer means the Tenderer's financial offer after the factors of non-firm prices, all unconditional discounts and any other tendered parameters that will affect the value of the financial offer have been taken into consideration
b) corrupt practice means the offering, giving, receiving or soliciting of anything of value to influence the action of the *Employer* or his staff or agents in the tender process; and
c) fraudulent practice means the misrepresentation of the facts in order to influence the tender process or the award of a contract arising from a tender offer to the detriment of the *Employer*, including collusive practices intended to establish prices at artificial levels
d) quality (functionality) means the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs

T.1.4 Communication and *Employer's* agent

Each communication between the *Employer* and a tenderer shall be to or from the *Employer's* agent only, and in a form that can be read, copied and recorded. Writing shall be in the English language. The *Employer* shall not take any responsibility for non-receipt of communications from or by a tenderer. The name and contact details of the *Employer's* agent are stated in the tender data.

T.1.5 The *Employer's* right to accept or reject any tender offer

The *Employer* may accept or reject any variation, deviation, tender offer, or alternative tender offer, and may cancel the tender process and reject all tender offers at any time before the formation of a contract. The *Employer* shall not accept or incur any liability to a tenderer for such cancellation and rejection, but will give written reasons for such action upon written request to do so.

T.2 Tenderer’s obligations

T.2.1 Eligibility

Submit a tender offer only if the tenderer satisfies the criteria stated in the tender data and the tenderer, or any of his principals, is not under any restriction to do business with *Employer*.

T.2.2 Cost of tendering

Accept that the *Employer* will not compensate the tenderer for any costs incurred in the preparation and submission of a tender offer, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.

T.2.3 Check documents

Check the tender documents on receipt for completeness and notify the *Employer* of any discrepancy or omission.

T.2.4 Confidentiality and copyright of documents

Treat as confidential all matters arising in connection with the tender. Use and copy the documents issued by the *Employer* only for the purpose of preparing and submitting a tender offer in response to the invitation.

T.2.5 Reference documents

Obtain, as necessary for submitting a tender offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the tender documents by reference.

T.2.6 Acknowledge addenda

Acknowledge receipt of addenda to the tender documents, which the *Employer* may issue, and if necessary apply for an extension to the closing time stated in the tender data, in order to take the addenda into account.

T.2.7 Compulsory Briefing Session

Attend, where required, a briefing session at which tenderers may familiarize themselves with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the tender data.

T.2.8 Seek clarification

Request clarification of the tender documents, if necessary, by notifying the *Employer* at least ten working days before the closing time stated in the tender data.

T.2.9 Insurance

Be aware that the extent of insurance to be provided by the *Employer* (if any) might not be for the full cover required in terms of the conditions of contract identified in the contract data. The tenderer is advised to seek qualified advice regarding insurance.

T.2.10 Pricing the tender offer

T.2.10.1 Include all duties, taxes (except South African Value Added Tax (VAT)), and other levies payable by the successful tenderer in the rates, prices, and the tendered total of the prices. All duties, taxes and levies that are applicable 14 days before the closing time as stated in the tender data, to be included in the prices.

T.2.10.2 Show VAT payable by the *Employer* separately as an addition to the tendered total of the prices.

T.2.10.3 Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.

T.2.10.4 State the rates and prices in South African Rand (ZAR) unless instructed otherwise in the tender data.

T.2.10.5 The delivery place for the Works is as per Part 3 Scope of works in South Africa

T.2.10.6 The *Contractor* shall be responsible for all costs for the transportation of the Works from place of manufacture to the *Employer's* nominated place of delivery in South Africa, including the clearance of the Works through South African Customs, payment of Customs VAT, local testing and onward delivery to Transnet's nominated destination, which costs (excluding the payment of Customs VAT) shall be separately identified in its Tax Invoices henceforth. The *Contractor* will endeavour to reduce exposure to liability for Duty on importation of the works and where not, to capture same. The Inco Term Required is (DDP Incoterms 2010).

T.2.11 Alterations to documents

Not make any alterations or additions to the tender documents, except to comply with instructions issued by the *Employer*, or necessary to correct errors made by the tenderer. All signatories to the tender offer shall initial all such alterations. Erasures and the use of masking fluid are prohibited.

T.2.12 Alternative tender offers

T.2.12.1 Submit alternative tender offers only if a main tender offer is also submitted, strictly in accordance with all the requirements of the tender documents. The alternative tender offer is to be submitted with the main tender offer together with a schedule that compares the requirements of the tender documents with the alternative requirements the tenderer proposes.

T.2.12.2 Accept that an alternative tender offer may be based only on the criteria stated in the tender data or criteria otherwise acceptable to the *Employer*.

T.2.13 Submitting a tender offer

T.2.13.1 Submit a tender offer to provide the whole of the works, services or supply identified in the contract data and described in the scope of works, unless stated otherwise in the tender data.

T.2.13.2 Return all mandatory returnable documents to the *Employer* after completing them in their entirety.

T.2.13.3 Submit the parts of the tender offer communicated on paper as an original plus the number of copies stated in the tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the *Employer*.

T.2.14 Information and data to be completed in all respects

Accept that tender offers, which do not provide all the data or information requested completely and in the minimum issued format required, will be regarded by the *Employer* as non-responsive.

T.2.15 Closing date and time

T.2.15.1 Ensure that the *Employer* receives the tender offer at the location specified in the tender data not later than the closing time stated in the tender data. The *Employer* shall not accept tender offers submitted by telegraph, facsimile, e-mail or tenders submitted by post.

T.2.15.2 Accept that, if the *Employer* extends the closing time stated in the tender data for any reason, the requirements of these conditions of tender apply equally to the extended deadline.

T.2.16 Tender offer validity

T.2.16.1 Hold the tender offer(s) valid for acceptance by the *Employer* at any time during the validity period stated in the tender data after the closing time stated in the tender data.

T.2.16.2 If requested by the *Employer*, consider extending the validity period stated in the tender data for an agreed additional period.

T.2.17 Clarification of tender offer after submission

Provide clarification of a tender offer in response to a request to do so from the *Employer* during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the competitive position or substance of the tender offer is sought, offered, or permitted during this stage of the tender process. The total of the prices stated by the tenderer shall be binding upon the tenderer.

Note: Sub-clause T.2.17 does not preclude the negotiation of price and the final terms of the contract during the post tender negotiation, should the *Employer* elect to do so.

T.2.18.2 Dispose of samples of materials provided for evaluation by the *Employer*, where required.

T.2.19 Inspections, tests and analysis

Provide access during working hours to premises for inspections, tests and analysis as provided for in the tender data.

T.2.20 Submit securities, bonds, policies, etc.

If requested, submit for the *Employer's* acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

T.2.21 Check final draft

Check the final draft of the contract provided by the *Employer* within the time available for the *Employer* to issue the contract.

T.2.23 Certificates

Include in the tender submission or provide the *Employer* with any certificates as stated in the tender data.

T.3 The *Employer's* undertakings

T.3.1 Respond to clarification

Respond to a request for clarification received up to five working days before the tender closing time stated in the Tender Data and notify all tenderers who drew procurement documents.

T.3.2 Issue Addenda

If necessary, issue addenda that may amend or amplify the tender documents to each during the period from the date that tender documents are available until seven days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the *Employer* may grant such extension and, shall then notify all tenderers who drew documents.

T.3.4 Non-disclosure

Not disclose to tenderers, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of tender offers, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful tenderer.

T.3.5 Test for responsiveness

T.3.5.1 The *Employer* will determine before detailed evaluation, whether each tender offer is properly received, namely:

a) meets the laid-down grounds for eligibility;
b) complies with the requirements of these Conditions of Tender;
c) has been properly and fully completed and signed; and
d) is responsive to all other requirements of the tender documents, including the return of all Mandatory returnable Schedules and documentation, as specified.

T.3.5.2 A responsive tender is one that conforms to all the terms, conditions, and specifications of the tender documents without material deviation or qualification. A material deviation or qualification is one which, in the *Employer's* opinion, would:

a) detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work,
b) change the *Employer's* or the tenderer's risks and responsibilities under the contract, or
c) affect the competitive position of other tenderers presenting responsive tenders, if it were to be rectified.

T.3.5.3 Reject a non-responsive tender offer, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

T.3.6 Arithmetical errors

T.3.6.1 Check responsive tender offers for arithmetical errors, correcting them in the following manner:

a) Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern.
b) If bills of quantities (or schedule of quantities or schedule of rates) apply and there is an error in the line item total resulting from the product of the unit rate and the quantity, the line item total shall govern and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate shall be corrected.
c) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern and the tenderer will be asked to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices.

T.3.7 Clarification of a tender offer

Obtain clarification from a tenderer on any matter that could give rise to ambiguity in a contract arising from the tender offer

T.3.8 Principles for Awarding Business

As is elsewhere also provided in the Tender, Tenderers are advised and should note that any final award of business is entirely conditional upon and subject to the successful conclusion of a written contract between the preferred Tenderer(s) and the *Employer*, which contract will include such terms and conditions as the *Employer's* management and Acquisitions Council may require or prescribe.

T.3.9 Insurance provided by the *Employer*

If requested by the proposed successful tenderer, submit for the tenderer*'s* information the policies and / or certificates of insurance which the conditions of contract identified in the contract data, require the *Employer* to provide.

T.3.10 Acceptance of tender offer

T.3.10.1 Accept tender offer only if the tenderer complies with the legal requirements stated in the Tender data

T.3.10.2 Notify the successful tenderer of the *Employer's* acceptance of his tender offer by completing and returning one copy of the form of offer and acceptance before the expiry of the validity period stated in the tender data, or agreed additional period. Providing the form of offer and acceptance does not contain any qualifying statements, it will constitute the formation of a contract between the *Employer* and the successful tenderer as described in the form of offer and acceptance.

T.3.10.3 The *Employer* reserves the right to conduct post-tender negotiations.

T.3.11 Notice to unsuccessful Tenderers

After the successful tenderer has acknowledged the *Employer's* notice of acceptance, notify other tenderers that their tender offers have not been accepted.

T.3.12 Prepare contract documents
If necessary, revise documents that shall form part of the contract and that were issued by the *Employer* as part of the tender documents to take account of:
addenda issued during the tender period,

inclusion of some of the mandatory returnable documents,
other revisions agreed between the *Employer* and the successful tenderer, and
the schedule of deviations attached to the form of offer and acceptance, if any.

T.3.13 Issue final contract

Prepare and issue the final draft of contract documents to the successful tenderer for acceptance as soon as possible after the date of the *Employer's* signing of the form of offer and acceptance (including the schedule of deviations, if any). Only those documents that the conditions of tender require the tenderer to submit, after acceptance by the *Employer*, shall be included.

T.3.14 Complete adjudicator's contract

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the main contract is signed.

T.3.15 Provide copies of the contracts

Provide to the successful tenderer the number of copies stated in the Tender Data of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

T.3.16 Disclaimers

a) The *Employer* reserves the right to request audited financial statements for the purposes of the due diligence exercise.
b) The *Employer* reserves the right to accept the whole or any part of a tender
c) Changes or purported changes by the Tenderer to the Tender prices will not be permitted after the closing date.
d) The person(s) signing the Tender must be legally authorised by the Tenderer to do so by way of an appropriate written resolution, as also the person(s) authorised to negotiate on the Tenderer's behalf.
e) The *Employer* reserves the right to verify any information supplied by a Tenderer. By submitting a Tender, the Tenderers hereby irrevocably grant the necessary consent to the *Employer* to do so.
f) The *Employer* reserves the right to undertake post-tender negotiations with those persons appearing on the list of preferred Tenderers, once such list is approved by the Divisional Acquisitions Council.
g) Unless otherwise expressly stated, each Tender lodged in response to the invitation to Tender shall be deemed to be an offer by the Tenderer. The *Employer* has the right in its sole and unfettered discretion not to accept any offer without assigning any reason therefor.
h) The *Employer* will not reimburse any Tenderer for any preparatory costs, travelling and/or accommodation costs, or for other work performed in connection with the Tender, whether the Tenderer is awarded any business arising out of the Tender, or not.
i) The successful tenderer will be subject to the conclusion of a final NEC 3 Engineering and Construction Contract.
j) Tenderers must note that the *Employer* is not committed to any irrevocable course of action as a result of it issuing the Tender and/or its receipt of any Tender documents. Without limitation to the *Employer's* rights elsewhere contained herein, and in addition thereto, the *Employer* may accordingly in its sole and unfettered discretion:
k) change all services stipulated for in the Tender and re-issue the Tender in an amended form;

l) reject any Tender which does not conform strictly with the stipulations and requirements which are set out in these documents;
m) disqualify late Tenders received after the stated submission deadline;
n) not necessarily accept the lowest priced Tender;
o) award a contract in connection with this Tender at any time to any person(s) or company;
p) make no award of business; and
q) withdraw the Tender on good cause at any stage of the Tender process upon written notification to the Tenderers.
r) The Purchaser reserves the right to use Supplier Development, People with Disabilities, Black Women Owned and Black youth owned as objective criteria

T.3.17 Compliance

a. Tenderers must be fully compliant with any and all the statutory and common law that is applicable to the tender.
b. Tenderers shall comply with all applicable South African laws, including without limitation, the following:
c. Occupational Health & Safety Act 85 of 1993 ("OHSA");
d. International Health Regulation Act 28 of 1974;
e. National Environmental Management ACT No. 107 of 1998;
f. National Environmental Management Waste Act No. 59 of 2008;
g. Environment Conservation Act No. 73 of 1989;
h. Hazardous Substances Act 15 1973;
i. The Compensation for Occupational Injuries and Disease Act, 1993 (Act No.130 of 1993);
j. All material aspects of all applicable legislation, provincial ordinances and local authority by-laws, including all relevant regulations promulgated in terms thereof, which affects the Maritime business;
k. The Basic Conditions of Employment Act No. 75 of 1997;
l. Criminal Procedure Act No. 51 of 1977;
m. National Ports Act No. 12 of 2005 ("NPA") and enabling legislation thereto, including the Port Rules; Harbour Master's Written Instructions and Regulations promulgated in terms of the NPA.
n. Control of Access to Public Premises and Vehicle Act, No. 53 of 1985;
o. Legal Succession to the South African Transport Services Act No. 9 of 1989 (but excluding any tariff provided for in such regulations);
p. Customs and Excise Act No 91 of 1964;
q. The National Railway Safety Regulator Act No 16 of 2002;
r. The Labour Relations Act No. 66 of 1995 and the Regulations thereto, and
s. Broad-Based Black Economic Empowerment (B-BBEE) Act 53, of 2003.
t. Competition Act 89 of 1998.

FAILURE TO OBSERVE ANY OF THE AFOREMENTIONED REQUIREMENTS

MAY RESULT IN A PROPOSAL BEING REJECTED

T2.1 List of Returnable Documents

2.1.1 These schedules are required for eligibility purposes:

T2.2-01 **Stage One as per CIDB: Eligibility Criteria Schedule -** CIDB Registration

T2.2-02 **Stage Two as per CIDB: Eligibility Criteria Schedule -** Certificate of attendance at Compulsory Tender Clarification Meeting

2.1.2 Stage Three as per CIDB: these schedules will be utilised for evaluation purposes:

T2.2-03 **Evaluation Schedule:** Management & CV's

T2.2-04 **Evaluation Schedule:** Previous experience

T2.2-05 **Evaluation Schedule:** Method Statement

T2.2-06 **Evaluation Schedule:** Quality Management

T2.2-07 **Evaluation Schedule:** Programme

2.1.3 Returnable Schedules:

General:

T2.2-08 Authority to submit tender

T2.2-09 Record of addenda to tender documents

T2.2-10 Letter of Good Standing

T2.2-11 Risk Elements

T2.2-12 Availability of equipment and other resources

T2.2-13 Site Establishment requirements

T2.2-14 Valid proof of Respondent's compliance to Specific Goals evidence (Preference Claim Form) requirements stipulated in SBD6.1.

T2.2-15 RFP Clarification Request forms

T2.2-16 RFP Declaration Form CPM 2020 Rev 01

T2.2-17 Certificate of Acquaintance CPM 2020 Rev 01

T2.2-18 POPIA

T2.2-19 Form A1 Recognised Skills Development Agencies

T2.2-20 Form A2 Baseline Training Plan

T2.2-21 Form A3 Interim Compliance Training Report

T2.2-22 Form A4 Supervisor Agreement

Agreement and Commitment by Tenderer:

T2.2-23 SUPPLIER DECLARATION FORM

T2.2-24 Supplier Code of Conduct

T2.2-25 CIDB SFU ANNEX G Compulsory Enterprise Questionnaire

T2.2-26 Non-Disclosure Agreement CPM 2020 Rev 02 ECC

T2.2-27 RFP - Breach of Law CPM 2020 Rev 01

T2.2-28 Supplier Integrity Pact CPM 2020 Rev 02

1.3.2 Bonds/Guarantees/Financial/Insurance:

T2.2-29 Insurance provided by the Contractor

T2.2.30 Three years audited financial statements

T2.2-31 CIDB Skills development

1.3.3 Transnet Vendor Registration Form:

T2.2-32 Transnet Vendor Registration Form

2.2 C1.1 Offer portion of Form of Offer & Acceptance

2.3 C1.2 Contract Data

2.4 C1.3 Forms of Securities

2.5 C2.1 Pricing Instructions (Bill of Quantities)

2.6 C2.2 Bill of Quantities

T2.2-01: CIDB Registration

CIDB (Construction Industry Development Board) LEVEL 7 CE or higher (level 7 or higher Civil Engineering Class of Work registration

Tenderers need to be registered with CIDB 7 CE or higher (level 7 or higher Civil Engineering Class of Work registration) with the CIBD is a pre-qualification criteria. Tenderers are required to submit valid proof that they are registered with CIDB in 7 CE or higher (grade level 7 or higher Civil Engineering Class of Work). The registration with CIDB within the required Class of Work will be verified by Transnet.

NB: Failure to submit the above requested document will lead to disqualification of Tenderers.

Eligibility	**YES**	Valid Proof of CIDB 7CE or higher registration as per the criteria submitted.
	NO	The tenderer failed to address the question / issue. No information.

Comment:.....
.....
.....

Company's Name: _____

Signed _____ Name_____Position _____ Date:_____

ELIGIBILITY CRITERIA

T2.2-02: Eligibility Criteria Schedule:

Certificate of Attendance at Tender Clarification Meeting

This is to certify that

..... (Company Name)

Represented by: ..... (Name and Surname)

Was represented at the compulsory tender clarification meeting

Held at:	Transnet Port Terminals Port of Saldahna	
On (date)	**10 November 2026**	**Starting time: 10am**

Particulars of person(s) attending the meeting:

Name ..... Signature .....

Capacity ..... Email:

Attendance of the above company at the meeting was confirmed:

Name ..... Signature .....

Capacity **For and on Behalf of the** *Employers Agent.* Date .....

T2.2-03: Management & CVs of Key Persons

Evaluation Criteria	Scoring Principal	Guidelines for Scoring/Evaluating	Points Allocation
Organization chart	The tender must describe the management arrangements for the Works to be performed/Services to be provided. The tender must be able to demonstrate that the project personnel have sufficient knowledge, experience and qualifications to provide the required services. Submit the following information with your tender document: An organizational chart (Organogram) that shows the management structure and composition involved in the works, inclusive of the Seven (7) key staff/professional members: The Seven (7) Key Professional Personnel required for this Contract are as follows: 1. Construction Manager 2. Site Agent/Site Supervisor 3. Project Planner 4. Quantity Surveyor (QS) 5.Environmental Officer/Manager/Specialist 6.SACPCMP Registered SHE Officer/Specialist 7. Quality Assurance Representative	An organization chart is included, that shows the management structure and composition to be involved in works. All Seven (7) key staff/professional members are included in the organizational chart, with the relevant information requested for each Key member.	**Score=100%**
		An organization chart is included, that shows the management structure and composition to be involved in works. Six (6) key staff/professional members are included in the organizational chart, with the relevant information requested for each Key member.	**Score = 80%**
		An organization chart is included, that shows the management structure and composition to be involved in works. Five (5) key staff/professional members are included in the organizational chart, with the relevant information requested for each Key member.	**Score = 60%**
		An organization chart is included, that shows the management structure and composition to be involved in works. Four (4) key staff/professional members are included in the organizational chart, with some relevant information requested for each Key member.	**Score = 40%**
		High-level organization chart included, that shows some management structure arrangement and composition to be involved in works. Three (3) key staff/professional members are included in the organizational chart, with some relevant information requested for each Key member.	**Score = 20%**
		No submission or information submitted is not relevant to the requirement. Two (2) or less information of the Key staff/professional members is included in the organizational chart.	**Score = 0%**

Construction Manager	CVs to present details of the experience of the staff who will be providing this specific service with respect to: - Experience with the Contract Option chosen for this Contract. - General experience relevant to the nature of the Work to be carried out in relation **Construction Management.** - Adequacy for the assignment. - Extiensive knowledge of issues pertinent to the Scope, e.g. local conditions, affected communities, legislation, techniques, etc. - The education, training and skills of the assigned staff in the specific sector, field, subject, etc. which is directly linked to the Works to • be performed/Services to be provided. Proof of education and training must be attached to the CV. · Comprehensive CVs should be attached to this schedule and as a minimum, each CV should address the following, but not limited to: - Personal particulars: ▸ Name. ▸ Place(s) of tertiary education and dates associated therewith. ▸ Professional awards (if any) - Qualifications (degrees, diplomas, grades of membership of professional societies and professional registrations). - Name of current employer and position in enterprise. - Overview of post graduate experience (year, organization and position). - Outline of recent assignments/experience that has a bearing on the Works/Services. NB: A minimum of 10 years relevant working expereince in a role as a Construction Manager on silimar projects is required.	Key staff have outstanding levels of relevant experience, skills and knowledge of issues pertinent to the project: Construction Manager has ≥ 10 years relevant experience.	**Score = 100%**
		Key staff have extensive levels of relevant experience, skills and knowledge of issues pertinent to the project: Construction Manager has ≥ 5 but < 10 years relevant experience.	**Score = 80%**
		Key staff have reasonable and acceptable levels of relevant experience, skills and knowledge of issues pertinent to the project: Construction Manager has ≥ 3 but < 5 years relevant experience	**Score = 60%**
		Key staff have limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Construction Manager has ≥ 1 but < 3 years relevant experience.	**Score = 40%**
		Key staff have very limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Construction Manager has < 1 year relevant experience.	**Score = 20%**
		The Tenderer has either submitted no information or information submitted is not relevant such that a score cannot be determined.	**Score = 0%**
Site Agent/Supervisor	CVs to present details of the experience of the staff who will be providing this specific Key Role service with respect to: - Experience with the Contract Option chosen for this Contract. (If experience of these matters is	Key staff have outstanding levels of relevant experience, skills and knowledge of issues pertinent to the project: Site Agent/Supervisor has ≥ 10 years relevant experience.	**Score = 100%**

	limited, an indication of relevant training that they have attended should be submitted). - General experience relevant to the nature of the Work to be carried out in relation to Site Agen/Site Supervision. - Adequacy for the assignment. - Extensive knowledge of issues pertinent to the Scope, e.g. local conditions, affected communities, legislation, techniques, etc. - The education, training and skills of the assigned staff in the specific sector, field, subject, etc. which is directly linked to the Works to • be performed/Services to be provided. Proof of education and training must be attached to the CV. · Comprehensive CVs should be attached to this schedule and as a minimum each CV should address the following, but not limited to: - Personal particulars: ▸ Name. ▸ Place(s) of tertiary education and dates associated therewith. ▸ Professional awards. - Qualifications (degrees, diplomas, grades of membership of professional societies and professional registrations). - Name of current employer and position in enterprise. - Overview of post graduate experience (year, organization and position). - Outline of recent assignments/experience that has a bearing on the Works/Services. NB: A minimum of 10 years relevant working experience in a role as a Site Agent/Site Supervisor on similar projects is required.	Key staff have extensive levels of relevant experience, skills and knowledge of issues pertinent to the project: Site Agent/Supervisor has ≥ 5 but < 10 years relevant experience.	**Score = 80%**
		Key staff have reasonable and acceptable levels of relevant experience, skills and knowledge of issues pertinent to the project: Site Agent/Supervisor has ≥ 3 but < 5 years relevant experience.	**Score = 60%**
		Key staff have limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Site Agent/Supervisor has ≥ 1 but < 3 years relevant experience.	**Score = 40%**
		Key staff have very limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Site Agent/Supervisor has < 1 years relevant experience.	**Score = 20%**
		The Tenderer has either submitted no information or information submitted is not relevant such that a score cannot be determined.	**Score = 0%**
Project Planner	CVs to present details of the experience of the staff who will be providing this specific Key Role service with respect to: - Experience with the Contract Option chosen for this Contract. (If experience of these matters is	Key staff have outstanding levels of relevant experience, skills and knowledge of issues pertinent to the project: Project Planner has ≥ 10 years relevant experience.	**Score = 100%**

	limited, an indication of relevant training that they have attended should be submitted). - General experience relevant to the nature of the Work to be carried out in relation to Project Planning - Adequacy for the assignment. -Extensive knowledge of issues pertinent to the Scope, e.g. local conditions, affected communities, legislation, techniques, etc. - The education, training and skills of the assigned staff in the specific sector, field, subject, etc. which is directly linked to the Works to • be performed/Services to be provided. Proof of education and training must be attached to the CV. · Comprehensive CVs should be attached to this schedule and as a minimum each CV should address the following, but not limited to: - Personal particulars: ▸ Name. ▸ Place(s) of tertiary education and dates associated therewith. ▸ Professional awards. - Qualifications (degrees, diplomas, grades of membership of professional societies and professional registrations). - Name of current employer and position in enterprise. - Overview of post graduate experience (year, organization and position). - Outline of recent assignments/experience that has a bearing on the Works/Services. NB: A minimum of 10 years relevant working experience in a role as a Project Planner on similar projects is required.	Key staff have extensive levels of relevant experience, skills and knowledge of issues pertinent to the project: Project Planner has ≥ 5 but < 10 years relevant experience.	**Score = 80%**
		Key staff have reasonable and acceptable levels of relevant experience, skills and knowledge of issues pertinent to the project: Project Planner has ≥ 3 but < 5 years relevant experience.	**Score = 60%**
		Key staff have limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Project Planner has ≥ 1 but < 3 years relevant experience.	**Score = 40%**
		Key staff have very limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Project Planner has < 1 years relevant experience.	**Score = 20%**
		The Tenderer has either submitted no information or information submitted is not relevant such that a score cannot be determined.	**Score = 0%**
Quantity Surveyor	CVs to present details of the experience of the staff who will be providing this specific Key Role service with respect to: - Experience with the Contract Option chosen for this Contract. (If experience of these matters is limited, an indication of relevant training that they have attended should be submitted).	Key staff have outstanding levels of relevant experience, skills and knowledge of issues pertinent to the project: Quantity Surveyor has ≥ 10 years relevant experience.	**Score = 100%**
		Key staff have extensive levels of relevant experience, skills and knowledge of issues pertinent to the	**Score = 80%**

	- General experience relevant to the nature of the Work to be carried out in relation to Quantity Surveying - Adequacy for the assignment. - Eztensive knowledge of issues pertinent to the Scope, e.g. local conditions, affected communities, legislation, techniques, etc. - The education, training and skills of the assigned staff in the specific sector, field, subject, etc. which is directly linked to the Works to • be performed/Services to be provided. Proof of education and training must be attached to the CV. · Comprehensive CVs should be attached to this schedule and as a minimum each CV should address the following, but not limited to: - Personal particulars: ‣ Name. ‣ Place(s) of tertiary education and dates associated therewith. ‣ Professional awards. - Qualifications (degrees, diplomas, grades of membership of professional societies and professional registrations). - Name of current employer and position in enterprise. - Overview of post graduate experience (year, organization and position). - Outline of recent assignments/experience that has a bearing on the Works/Services. NB: A minimum of 10 years relevant working experience in a role as a Quantity Surveyor on similar projects is required.	project: Quantity Surveyor has ≥ 5 but < 10 years relevant experience.	
		Key staff have reasonable and acceptable levels of relevant experience, skills and knowledge of issues pertinent to the project: Quantity Surveyor has ≥ 3 but < 5 years relevant experience.	**Score = 60%**
		Key staff have limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Quantity Surveyor has ≥ 1 but < 3 years relevant experience.	**Score = 40%**
		Key staff have very limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Quantity Surveyor has < 1 years relevant experience.	**Score = 20%**
		The Tenderer has either submitted no information or information submitted is not relevant such that a score cannot be determined.	**Score = 0%**
Environmental Officer/Manager/Specialist	CVs to present details of the experience of the staff who will be providing this specific Key Role service with respect to: - Experience with the Contract Option chosen for this Contract. (If experience of these matters is limited, an indication of relevant training that they have attended should be submitted).	Key staff have outstanding levels of relevant experience, skills and knowledge of issues pertinent to the project: Environmental Officer/Manager/Specialist has ≥ 10 years relevant experience.	**Score = 100%**
		Key staff have extensive levels of relevant experience, skills and knowledge of issues pertinent to the project: Environmental	**Score = 80%**

	- General experience relevant to the nature of the Work to be carried out in relation to Environmental Management.. - Adequacy for the assignment. - Extensive knowledge of issues pertinent to the Scope, e.g. local conditions, affected communities, legislation, techniques, etc. - The education, training and skills of the assigned staff in the specific sector, field, subject, etc. which is directly linked to the Works to • be performed/Services to be provided. Proof of education and training must be attached to the CV. · Comprehensive CVs should be attached to this schedule and as a minimum each CV should address the following, but not limited to: - Personal particulars: ‣ Name. ‣ Place(s) of tertiary education and dates associated therewith. ‣ Professional awards. - Qualifications (degrees, diplomas, grades of membership of professional societies and professional registrations). - Name of current employer and position in enterprise. - Overview of post graduate experience (year, organization and position). - Outline of recent assignments/experience that has a bearing on the Works/Services. NB: A minimum of 10 years relevant working experience in a role as a Environmental Officer/Manager/Specialist on similar projects is required.	Officer/Manager/Specialist has ≥ 5 but < 10 years relevant experience.	
		Key staff have reasonable and acceptable levels of relevant experience, skills and knowledge of issues pertinent to the project: Environmental Officer/Manager/Specialist has ≥ 3 but < 5 years relevant experience.	**Score = 60%**
		Key staff have limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Environmental Officer/Manager/Specialist has ≥ 1 but < 3 years relevant experience.	**Score = 40%**
		Key staff have very limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Environmental Officer/Manager/Specialist has < 1 years relevant experience.	**Score = 20%**
		The Tenderer has either submitted no information or information submitted is not relevant such that a score cannot be determined.	**Score = 0%**
SACPCMP Registered SHE Officer	CVs to present details of the experience of the staff who will be providing this specific Key Role service with respect to: - Experience with the Contract Option chosen for this Contract. (If experience of these matters is limited, an indication of relevant training that they have attended should be submitted).	Key staff have outstanding levels of relevant experience, skills and knowledge of issues pertinent to the project: SHE Officer/Specialist has ≥ 10 years relevant experience.	**Score = 100%**
		Key staff have extensive levels of relevant experience, skills and knowledge of issues pertinent to the project: SHE Officer/Specialist has ≥ 5 but < 10 years relevant experience.	**Score = 80%**

	- General experience relevant to the nature of the Work to be carried out in relation to Health & Safety management. - Adequacy for the assignment. - Extensive knowledge of issues pertinent to the Scope, e.g. local conditions, affected communities, legislation, techniques, etc. - The education, training and skills of the assigned staff in the specific sector, field, subject, etc. which is directly linked to the Works to • be performed/Services to be provided. Proof of education and training must be attached to the CV. · Comprehensive CVs should be attached to this schedule and as a minimum each CV should address the following, but not limited to: - Personal particulars: ‣ Name. ‣ Place(s) of tertiary education and dates associated therewith. ‣ Professional awards. - Qualifications (degrees, diplomas, grades of membership of professional societies and professional registrations). - Name of current employer and position in enterprise. - Overview of post graduate experience (year, organization and position). - Outline of recent assignments/experience that has a bearing on the Works/Services. NB: A minimum of 10 years relevant working experience in a role as a SACPCMP Pr. Registered SHE Officer on similar projects is required.	Key staff have reasonable and acceptable levels of relevant experience, skills and knowledge of issues pertinent to the project: SHE Officer Specialist has ≥ 3 but < 5 years relevant experience.	**Score = 60%**
		Key staff have limited levels of relevant experience, skills and knowledge of issues pertinent to the project: SHE Officer/Specialist has ≥ 1 but < 3 years relevant experience.	**Score = 40%**
		Key staff have very limited levels of relevant experience, skills and knowledge of issues pertinent to the project: SHE Officer/ Specialist has < 1 years relevant experience.	**Score = 20%**
		The Tenderer has either submitted no information or information submitted is not relevant such that a score cannot be determined.	**Score = 0%**
Quality Assurance Representative	CVs to present details of the experience of the staff who will be providing this specific Key Role service with respect to: - Experience with the Contract Option chosen for this Contract. (If experience of these matters is limited, an indication of relevant training that they have attended should be submitted).	Key staff have outstanding levels of relevant experience, skills and knowledge of issues pertinent to the project: Quality Assurance Representative has ≥ 10 years relevant experience.	**Score = 100%**
		Key staff have extensive levels of relevant experience, skills and knowledge of issues pertinent to the project: Quality Assurance	**Score = 80%**

	- General experience relevant to the nature of the Work to be carried out in relation to Quality Management - Adequacy for the assignment. - Extensive knowledge of issues pertinent to the Scope, e.g. local conditions, affected communities, legislation, techniques, etc. - The education, training and skills of the assigned staff in the specific sector, field, subject, etc. which is directly linked to the Works to • be performed/Services to be provided. Proof of education and training must be attached to the CV. · Comprehensive CVs should be attached to this schedule and as a minimum each CV should address the following, but not limited to: - Personal particulars: ▸ Name. ▸ Place(s) of tertiary education and dates associated therewith. ▸ Professional awards. - Qualifications (degrees, diplomas, grades of membership of professional societies and professional registrations). - Name of current employer and position in enterprise. - Overview of post graduate experience (year, organization and position). - Outline of recent assignments/experience that has a bearing on the Works/Services. NB: A minimum of 10 years relevant working experience in a role as a Quality Assurance Representative on similar projects is required.	Representative has ≥ 5 but < 10 years relevant experience.	
		Key staff have reasonable and acceptable levels of relevant experience, skills and knowledge of issues pertinent to the project: Quality Assurance Representative has ≥ 3 but < 5 years relevant experience.	**Score = 60%**
		Key staff have limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Quality Assurance Representative has ≥ 1 but < 3 years relevant experience.	**Score = 40%**
		Key staff have very limited levels of relevant experience, skills and knowledge of issues pertinent to the project: Quality Assurance Representative has < 1 years relevant experience.	**Score = 20%**
		The Tenderer has either submitted no information or information submitted is not relevant such that a score cannot be determined.	**Score = 0%**

Total weight of **30 points**

Company's Name: _____

Signed _____ Name_____Position _____ Date:_____

T2.2-04: Previous Experience

Evaluation Criteria	Scoring Principal	Guidelines for Scoring/Evaluating	Points Allocation
Bulk Civil, Structural/Building, Electrical/Electronic Works.	Tenderers are required to demonstrate their past experience in the execution and completion of similar projects as outlined in the Works Information. Key consideration will be given to the complexity, nature and financial magnitude of the projects. Tenderers are required to provide sufficient information about the reference work previously undertaken because only references that are like the scope of work of this contract will be considered for evaluation. In summary, tenders submit references of at least five (5) projects as a maximum, that have been executed and completed in the past 10 years (between 2016 and 2026) under similar conditions and circumstances as described in the Works Information and in reference to the scope areas. The previous work should coverer as a minimum Bulk Civil, Structural/Building,Electrical/Electronic Works. For reference verification purposes, the signed reference letters should indicate the following information (among others) as a minimum: 1. Name of the project 2. Total budget of the project (Contract Value) 3. Starting date 4. Completion date 5. Client information (Client Name, contact details), signed completion certificate for each executed and completed project. NB: Brief description of each project executed will provide valuable information on the nature of the works that was undertaken and completed.	Information submitted by the tenderer shows outstanding experience in projects of similar nature as detailed in the Works Information. Information submitted on all five (5) completed projects that cover as a maximum; Bulk Civil works, Structural/Building works, Electrical/Electronic works that were executed and completed in the past 10 years. Signed completion certificates of all five (5) projects have been submitted, as evidence.	**Score=100%**
		Information submitted on four (4) completed projects; Bulk Civil works, Structural/Building works, Electrical/Electronic works that were executed and completed in the past 10 years. Signed completion certificates of four (4) projects have been submitted, as evidence.	**Score = 80%**
		Information submitted on three (3) completed projects. Bulk Civil works, Structural/Building works, Electrical/Electronic works that were executed and completed in the past 10 years. Signed completion certificates of three (3) projects have been submitted as evidence.	**Score = 60%**
		Information submitted on two (2) completed projects; Bulk Civil works, Structural/Building works, Electrical/Electronic works that were executed and completed in the past 10 years. Signed completion certificates of two (2) projects have been submitted, as evidence.	**Score = 40%**
		Information submitted on one (1) completed project; Bulk Civil works, Structural/Building works, Electrical/Electronic works that was executed and completed in the past 10 years. Signed completion certificates of one (1) project have been submitted, as evidence.	**Score = 20%**
		Information submitted shows no experience in projects of similar nature (Bulk Civil works, Structural/Building works, Electrical/Electronic works). No signed completion certificates for the completed projects has been submitted, as evidence.	**Score = 0%**

		Information submitted is non-compliance such that no score can be determined.	

Total weight of **30 points**

Company’s Name: _____

Signed _____ Name_____Position _____ Date:_____

T2.2-05: Method Statement

Evaluation Criteria	Scoring Principal	Guidelines for Scoring/Evaluating	Points Allocation
Method Statement	The tenderers are required to demonstrate their understanding of the project scope (Works Information) by submitting a detailed method statement that outlines how the work is going to be executed from start to finish. The method statement will need to cover key focus areas within the execution process of the project. The Tenderers must provide a Method Statement which cover the following key focus areas of the project: 1. Site Establishment, site clearing and ground preparation. 2. Ordering of construction material 3. Civil & associated works 4. Structural & associated works 5. Mechanical & associated works 6. Electrical & associated works 7. Electronics/Instrumentation & associated works 8. Testing & commissioning work 9. Final completion & hand-over activities	The Method Statement demonstrates a clear understanding of the project scope. The Method Statement is detailed enough (All 9 key focus areas as indicated on this returnable schedule are covered).	**Score=100%**
		The Method Statement demonstrates some understanding of the project scope. The Method Statement contains some detailing that covers the key focus areas of the project (Between 8 and 7 key focus areas as indicated on this returnable schedule document are covered).	**Score = 80%**
		The Method Statement demonstrates high-level understanding of the project scope. The Method Statement contains some high-level detailing that covers the key focus areas of the project (Between 6 and 5 key focus areas as indicated on this returnable schedule document are covered).	**Score = 60%**
		The Method Statement demonstrates less understanding of the project scope. The Method Statement has no details that covers the key focus areas of the project (Between 4 and 3 key focus areas as indicated on this returnable schedule document are covered).	**Score = 40%**
		The Method Statement does not demonstrate any understanding of the project scope. The Method Statement has no details that cover the key focus areas of the project (Between 2 and 1 key focus areas as indicated on this returnable schedule document are covered).	**Score = 20%**
		The Tenderer has submitted no information or inadequate information or irrelevant information to determine a score.	**Score = 0%**

Total weight of **10 points**

Company's Name: _____

Signed _____ Name____Position _____ Date:_____

T2.2-06: Quality Management

Evaluation Criteria	Scoring Principal	Guidelines for Scoring/Evaluating	Points Allocation
Project specific Quality Control Plan	Tenderers must submit a Quality Control Plan (QCP) which is specific for this project. The Quality Control Plan should outline the specific quality processes and testing requirements to ensure that the work will be executed within the required quality framework in compliance with the applicable national and international quality standards. The Quality Control Plan should cover work activities as outlined in the Works Information for this project, with a particular focus on the following key areas: 1. Inspection and Testing Plans 2. Material Testing Protocols 3. Applicable Regulations (SANS, CIDB etc) 4. Non-Conformance Reporting (NCR) 5. Roles & Responsibilities	QCP provides detail information for each key area and, all five (5) key areas are covered.	**Score=100%**
		QCP provide detailed information for each key area, however, only four (4) key areas are covered.	**Score = 80%**
		QCP provides detailed information for each key area however, only three (3) key areas are covered	**Score = 60%**
		QCP provides detailed information for each key area, however, only two (2) key areas are covered.	**Score = 40%**
		QCP provide detailed information for each key area, however, only one (1) key area is covered.	**Score = 20%**
		No QCP submitted or information submitted is non-compliance such that no score can be determined.	**Score = 0%**

Total weight of **10 points**

Company's Name: _____

Signed _____ Name_____Position _____ Date:_____

T2.2-07: Programme

Evaluation Criteria	Scoring Principal	Guidelines for Scoring/Evaluating	Points Allocation
Programme	The Tenderers must demonstrate their ability to execute the work in terms of the Employer's requirements in reference to the Works Information, by indicating the order and timing of all activities that will take place in order to provide the work safely and within in the shortest possible duration. A level 3 programme indicating all milestones, activities & information related to the following key items: 1. Float 2. Time Risk Allowances, 3. Health and safety requirements, 4. Procedures set out in this contract, 5. Work by the Employer and Others, 6. Access to a part of the site later than its access date, 7. Acceptances, 8. Plant & Materials and other things to be provided by the employer, 9. Information by Others, 10. Starting date, access dates, Key Dates and Completion Date 11. Planned Completion for each Key Date for each option and the complete works 12. Shows how each activity on the Activity Schedule relates to the operations on each programme NB: The programme should be presented on Micro-Soft Project (MS Project) or Primavera and should clearly show the logical arrangement of the work activities.	A level 3 programme submitted as a minimum, on the acceptable programming software (*MS Project or Primavera*). The tenderer has addressed all data requirements as listed in this returnable. Between 10 to 12 key items are addressed.	**Score=100%**
		A level 3 programme submitted as a minimum, on the acceptable programming software (*MS Project or Primavera*). The tenderer has addressed most but not all data requirements as listed in this returnable. Between 9 to 8 key items are addressed.	**Score = 80%**
		A level 3 programme submitted as a minimum, on the acceptable programming software (*MS Project or Primavera*). The tenderer has addressed most but not all data requirements as listed in this returnable. Between 7 to 6 key items are addressed.	**Score = 60%**
		A level 3 programme submitted as a minimum, on the acceptable programming software (*MS Project or Primavera*). The tenderer has addressed some but not all data requirements as listed in this returnable. Between 5 to 4 key items are addressed.	**Score = 40%**
		A level 3 programme submitted as a minimum, on the acceptable programming software (*MS Project or Primavera*). The tenderer has addressed some but not all data requirements as listed in this returnable. Between 3 to 2 key items are addressed.	**Score = 20%**
		1 and less item addressed and/or the tenderer has submitted no information or information submitted is inadequate such that a score cannot be determined.	**Score = 0%**

Total weight of **20 points**

Company's Name: _____

Signed _____ Name_____Position _____Date:_____

T2.2-08: Authority to submit a Tender

Indicate the status of the tenderer by ticking the appropriate box hereunder. The tenderer must complete the certificate set out below for his category of organisation or alternatively attach a certified copy of a company / organisation document which provides the same information for the relevant category as requested here.

A - COMPANY	B - PARTNERSHIP	C - JOINT VENTURE	D - SOLE PROPRIETOR

A. Certificate for Company

I, _____ chairperson of the board of directors _____ _____, hereby confirm that by resolution of the board taken on _____ (date), Mr/Ms _____, acting in the capacity of _____, was authorised to sign all documents in connection with this tender offer and any contract resulting from it on behalf of the company.

Signed		Date	
Name		Position	Chairman of the Board of Directors

B. Certificate for Partnership

We, the undersigned, being the **key partners** in the business trading as _____ _____ hereby authorise Mr/Ms _____ acting in the capacity of _____, to sign all documents in connection with the tender offer for Contract _____ and any contract resulting from it on our behalf.

Name	Address	Signature	Date

NOTE: This certificate is to be completed and signed by the full number of Partners necessary to commit the Partnership. Attach additional pages if more space is required.

C. Certificate for Joint Venture

We, the undersigned, are submitting this tender offer in Joint Venture and hereby authorise Mr/Ms _____, an authorised signatory of the company _____, acting in the capacity of lead partner, to sign all documents in connection with the tender offer for Contract _____ _____ and any contract resulting from it on our behalf.

This authorisation is evidenced by the attached power of attorney signed by legally authorised signatories of all the partners to the Joint Venture.

Furthermore we attach to this Schedule a copy of the joint venture agreement which incorporates a statement that all partners are liable jointly and severally for the execution of the contract and that the lead partner is authorised to incur liabilities, receive instructions and payments and be responsible for the entire execution of the contract for and on behalf of any and all the partners.

Name of firm	**Address**	**Authorising signature, name (in caps) and capacity**

D. Certificate for Sole Proprietor

I, _____, hereby confirm that I am the sole owner of the business trading as _____.

Signed	.....	Date	.....
Name	.....	Position	Sole Proprietor

T2.2-09: Record of Addenda to Tender Documents

This schedule as submitted confirms that the following communications received from the *Employer* before the submission of this tender offer, amending the tender documents, have been taken into account in this specific tender offer:

	Date	**Title or Details**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Attach additional pages if more space is required.

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-10: Letter/s of Good Standing with the Workmen's Compensation Fund

Attached to this schedule is the Letter/s of Good Standing.

1.

2.

3.

4.

Name of Company/Members of Joint Venture:

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.....
.....

Name ..... Signature .....

Capacity .....

T2.2-11: Risk Elements

Tenderers to identify and evaluate the potential risk elements associated with the Works and possible mitigation thereof. The risk elements and the mitigation as identified thereof by the Tenderer are to be submitted.

If No Risks are identified "No Risks" must be stated on this schedule.

Tenderers are also to evaluate any risk/s stated by the *Employer* in Contract Data Part C1, and provide possible mitigation thereof.

Tenders to note: Notwithstanding this information, all costs related to risk elements which are at the Contractor's risk are deemed to be included in the tenderer's offered total of the Prices.

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-12: Site Establishment Requirements

Tenderers to indicate their Site establishment area requirements:

Signed ..... Date .....

Name

Position .....

Tenderer .....

T2.2-13: Availability of Equipment and Other Resources

The Tenderer to submit a list of all Equipment and other resources that will be used to execute the *works* as described in the Works Information.

Equipment Type and Availability – Description	Hourly Rate	Number of Equipment	Details of Ownership

Signed ..... Date .....

Name .....

Position .....

Tenderer .....

T2.2-14 Preferential Procurement – Specific Goals

Priority will be given to the specific goals to advance areas or categories of persons or groups who were previous disadvantaged or falling into Reconstruction and Development Programme (RDP). The following specific goals will be applicable for this tender:

1. Promotion of Broad-Based Black Economic Empowerment Status level 1 or 2;
2. Promotion of supplier development through sub-contracting of a minimum of 30% of the value of the contract to EMEs or QSEs 51% owned by black people

a) Broad-Based Black Economic Empowerment Status

Tenderers are to indicate their B-BBEE status by filling in the table below and a valid B-BBEE Certificate from an accredited verification agency (e.g. SANAS)/ Sworn Affidavit must be attached;

B-BBEE Level	% black ownership	Expiry Date	Valid B-BBEE Certificate from an accredited verification agency (e.g. SANAS)/Sworn Affidavit Attached	
			Yes	No
----------	----------	----------		

Company registration documents and Identity Document copies of the Directors of the company are to be attached in order to verify the B-BBEE Certs or Sworn Affidavits attached.

b) Sub-contracting

The estimated cost of the project meets the threshold for subcontracting. The value of the project is above R30 million which is within threshold for sub-contracting. Sub-contracting 30% to designated group is feasible, therefore:

The tenderer is required to sub-contract a minimum of 30% of the total value of the contract to South African companies that are:

- **B-BBEE Level 1 or 2**
- **51% Black Owned EME's and QSE's**

Tenderers to note that Subcontractors declared here at tender stage form part of evaluations. Any deviations such Sub-contractors after award shall be subject to prior written approval and shall not alter the basis of the tender evlaution and will be subject to acceptance by the Project Manager in terms of the Conditions of Contract

Provide **detailed information** of the Sub-contractors below:

	Name of Subcontractor	**Address and Region**	**Nature and extent of work**	**B-BBEEE Certificates or Sworn Affidavit attached behind this schedule? Yes/No**	**Percentage (%) of the sub-contracted works in terms of the tendered total of the prices.**
1.					
2.					
3.					
4.					
5.					

The Tenderer is to submit the following document or copy thereof for each of the sub-contractor(s) with this schedule:

- Valid B-BBEE Sworn Affidavit or B-BBEE Certificate of each of the sub-contractor(s).

Transnet has identified opportunities of economic transformation and empowerment for this project as indicated in Clause 4 of the RFP Document, Tender number iCLM HQ 916/TPT Therefore, Transnet will incorporate a contractual obligation to service provider to execute the identified transformation objective as a condition of contract.

It is a contractual obligation for the service provider to contract on and implement the following transformation initiatives as determined and outlined in the RFP document

SIGNED at _____ on this _____ day of _____20___

_____
SIGNATURE OF TENDERER

T2.2-15: RFP Clarification Request Form

RFP No: ICLMHQ916/TPT

RFP deadline for questions / RFP Clarifications: **Before 15h00 on 13 October 2026** Any further requests/clarifications to be strictly directed as below

ATTENTION: Thulile Ngcobo

EMAIL Thulile.Ngcobo@transnet.net

DATE: _____

FROM: _____

_____

RFP Clarification No *[to be inserted by Transnet]* .....

REQUEST FOR RFP CLARIFICATION

_____

_____

_____

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T2.2-16: RFP DECLARATION FORM

NAME OF COMPANY: _____

We _____ do hereby certify that:

1. Transnet has supplied and we have received appropriate tender offers to any/all questions (as applicable) which were submitted by ourselves for tender clarification purposes;
2. we have received all information we deemed necessary for the completion of this Tender;
3. at no stage have we received additional information relating to the subject matter of this tender from Transnet sources, other than information formally received from the designated Transnet contact(s) as nominated in the tender documents;
4. we are satisfied, insofar as our company is concerned, that the processes and procedures adopted by Transnet in issuing this tender and the requirements requested from tenderers in responding to this tender have been conducted in a fair and transparent manner; and
5. furthermore, we acknowledge that a direct relationship exists between a family member and/or an owner / member / director / partner / shareholder (unlisted companies) of our company and an employee or board member of the Transnet Group as indicated below: *[Respondent to indicate if this section is not applicable]*

   FULL NAME OF OWNER/MEMBER/DIRECTOR/
   PARTNER/SHAREHOLDER: ADDRESS:

   _____

   _____

   _____

   Indicate nature of relationship with Transnet:

   _____

   _____

   _____

   _____

   [Failure to furnish complete and accurate information in this regard may lead to the disqualification of your response and may preclude a Respondent from doing future business with Transnet]

We declare, to the extent that we are aware or become aware of any relationship between ourselves and Transnet (other than any existing and appropriate business relationship with

Transnet) which could unfairly advantage our company in the forthcoming adjudication process, we shall notify Transnet immediately in writing of such circumstances.

6. We accept that any dispute pertaining to this tender will be resolved through the Ombudsman process and will be subject to the Terms of Reference of the Ombudsman. The Ombudsman process must first be exhausted before judicial review of a decision is sought. (Refer "Important Notice to respondents" below).

7. We further accept that Transnet reserves the right to reverse a tender award or decision based on the recommendations of the Ombudsman without having to follow a formal court process to have such award or decision set aside.

8. We have acquainted ourselves and agree with the content of T2.2-20 "Service Provider Integrity Pact".

For and on behalf of ..... duly authorised thereto
Name:
Signature:
Date:

T2.2-17 Certificate of Acquaintance with Tender Documents

NAME OF TENDERING ENTITY:

_____

1. By signing this certificate I/we acknowledge that I/we have made myself/ourselves thoroughly familiar with, and agree with all the conditions governing this RFP. This includes those terms and conditions of the Contract, the Supplier Integrity Pact, Non-Disclosure Agreement etc. contained in any printed form stated to form part of the documents thereof, but not limited to those listed in this clause.

2. I/we furthermore agree that Transnet SOC Ltd shall recognise no claim from me/us for relief based on an allegation that I/we overlooked any tender/contract condition or failed to take it into account for the purpose of calculating my/our offered prices or otherwise.

3. I/we understand that the accompanying Tender will be disqualified if this Certificate is found not to be true and complete in every respect.

4. For the purposes of this Certificate and the accompanying Tender, I/we understand that the word "competitor" shall include any individual or organisation, other than the Tenderer, whether or not affiliated with the Tenderer, who:

   a) has been requested to submit a Tender in response to this Tender invitation;

   b) could potentially submit a Tender in response to this Tender invitation, based on their qualifications, abilities or experience; and

   c) provides the same Services as the Tenderer and/or is in the same line of business as the Tenderer

5. The Tenderer has arrived at the accompanying Tender independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium will not be construed as collusive Tendering.

6. In particular, without limiting the generality of paragraph 5 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

a) prices;

b) geographical area where Services 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 Tender;

e) the submission of a tender which does not meet the specifications and conditions of the tender; or

f) Tendering with the intention not winning the tender.

7. 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 Services to which this tender relates.

8. The terms of the accompanying tender have not been, and will not be, disclosed by the Tenderer, directly or indirectly, to any competitor, prior to the date and time of the official tender opening or of the awarding of the contract.

9. I/We am/are aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to tenders and contracts, tenders 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. In addition, Tenderers that submit suspicious tenders may be restricted from conducting business with the public sector for a period not exceeding 10 [ten] years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

Signed on this _____ day of _____20___

_____

SIGNATURE OF TENDERER

FORM A5: FINAL TRAINING REPORT

Section A: Employer Information

cidb Employer Number

Employer Name

Section B: Contract Data

cidb Contract Number

Contract Title

Tender Value (R)

Contract Skills Development Goal (R)

SIP Number (If Applicable)

SIP Project Code (If Applicable)

SECTION C:Definitions and Beneficiary Information

Training Methods:

Method 1(M1): structured workplace learning opportunities for learners towards the attainment of a part or a full occupational qualification;
Method 2(M2): structured workplace learning opportunities for apprentices or other artisan learners towards the attainment of a trade qualification leading to a listed trade subject to at least 60% of the artisan learners being holders of public TVET college qualifications;
Method 3(M3): work integrated learning opportunities for University of Technology or Comprehensive University students completing their national diplomas;
Method 4(M4): structured workplace learning opportunities for candidates towards registration in a professional category by a statutory council listed in Table 1 in the CIDB Standard for Developing Skills Through Infrastructure Contracts Gazette No. 43495

Learner/Candidates Full Name and Surname	Gender		Ethnic Group					Identity Number													Training Method (Please tick)				Placement Start Date	Placement End Date	Placement Duration	Occupation/Trade Description	Description of Practical Task Completed (as per logbook or POE)	Status	Supporting documents available on request (Yes,No or N/A)											
	Male	Female	Black	White	Coloured	Indian	Other														M1	M2	M3	M4							Training Plan	Attendance Register	Signed Logbooks/POE	Entry Medical Assessments	Exit Medical Assessments	Conducted Sumative Assessment	Site Induction	Health and Safety Induction	Registered with Relevant SETA	PPE Register	Register Beneficiaries with CIDB SDA
Eg. Xolani Smith	1				1			1	2	3	4	5	6	7	4	5	6	8	9	1		X			2021/06/01	2021/09/31		Bricklaying	Read and interpret drawings Set out building as per drawing Transfer levels using dumpy level Batch and mix concrete	Completed In progress In progress Completed	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	No	Yes	Yes

Section D: Declaration; Contractor Representative

Name of Contractor Rep Title Initials Surname

Designation

e-mail

Mobile 0 - - -

Office Telephone 0 - - -

Date Y Y Y Y - M M - D D

I, the undersigned warrant that:
- I am duly authorised to submit this notice on behalf of the Contractor
- The contents of this notice are within my personal knowledge, and are to the best of my belief both true and correct.

Signature

Date completed Y Y Y Y - M M - D D

Section E: Declaration; Employer's Representative

Name of Representative Title Initials Surname

Designation

e-mail

Mobile 0 - - -

Office Telephone 0 - - -

Date Y Y Y Y - M M - D D

I, the undersigned warrant that:
- The contents of this notice are within my personal knowledge, and are to the best of my belief both true and correct.

Signature

Date completed Y Y Y Y - M M - D D

T2.2-18 Agreement in terms of Protection of Personal Information Act, 4 of 2013 ("POPIA")

1. PREAMBLE AND INTRODUCTION

1.1. The rights and obligation of the Parties in terms of the Protection of Personal Information Act, 4 of 2013 ("POPIA") are included as forming part of the terms and conditions of this contract.

2. PROTECTION OF PERSONAL INFORMATION

2.1. The following terms shall bear the same meaning as contemplated in Section 1 of the Protection of Person information act, No. of 2013 "(POPIA"):

consent; data subject; electronic communication; information officer; operator; person; personal information; processing; record; Regulator; responsible party; special information; as well as any terms derived from these terms.

2.2. The Operator will process all information by the Transnet in terms of the requirements contemplated in Section 4(1) of the POPIA:

Accountability; Processing limitation; Purpose specification; Further processing limitation; Information quality; Openness; Security safeguards and Data subject participation.

2.3. The Parties acknowledge and agree that, in relation to personal information of Transnet and the information of a third party that will be processed pursuant to this Agreement , the Operator is (_____) hereinafter Operator and the Data subject is "Transnet". Operator will process personal information only with the knowledge and authorisation of Transnet and will treat personal information and the information of a third party which comes to its knowledge as confidential and will not disclose it, unless so required by law or subject to the exceptions contained in the POPIA.

2.4. Transnet reserves all the rights afforded to it by the POPIA in the processing of any of its information as contained in this Agreement and the Operator is required to comply with all prescripts as detailed in the POPIA relating to all information concerning Transnet.

2.5. In terms of this Agreement, the Operator acknowledges that it will obtain and have access to personal information of Transnet and the information of a third party and agrees that it shall only process the information disclosed by Transnet in terms of this Agreement and

only for the purposes as detailed in this Agreement and in accordance with any applicable law.

2.6. Should there be a need for the Operator to process the personal information and the information of a third party in a way that is not agreed to in this Agreement, the Operator must request consent from Transnet to the processing of its personal information or and the information of a third party in a manner other than that it was collected for, which consent cannot be unreasonably withheld.

2.7. Furthermore, the Operator will not otherwise modify, amend or alter any personal information and the information of a third party submitted by Transnet or disclose or permit the disclosure of any personal information and the information of a third party to any third party without prior written consent from Transnet.

2.8. The Operator shall, at all times, ensure compliance with any applicable laws put in place and maintain sufficient measures, policies and systems to manage and secure against all forms of risks to any information that may be shared or accessed pursuant to the services offered to Transnet in terms of this Agreement (physically, through a computer or any other form of electronic communication).

2.9. The Operator shall notify Transnet in writing of any unauthorised access to personal information and the information of a third party , cybercrimes or suspected cybercrimes, in its knowledge and report such crimes or suspected crimes to the relevant authorities in accordance with applicable laws, after becoming aware of such crimes or suspected crime. The Operator must inform Transnet of the breach as soon as it has occurred to allow Transnet to take all necessary remedial steps to mitigate the extent of the loss or compromise of personal information and the information of a third party and to restore the integrity of the affected personal information as quickly as is possible.

2.10. Transnet may, in writing, request the Operator to confirm and/or make available any personal information and the information of a third party in its possession in relation to Transnet and if such personal information has been accessed by third parties and the identity thereof in terms of the POPIA.

2.11. Transnet may further request that the Operator correct, delete, destroy, withdraw consent or object to the processing of any personal information and the information of a third party

relating to the Transnet or a third party in the Operator's s possession in terms of the provision of the POPIA and utilizing Form 2 of the POPIA Regulations .

2.12. In signing this addendum that is in terms of the POPIA, the Operator hereby agrees that it has adequate measures in place to provide protection of the personal information and the information of a third party given to it by Transnet in line with the 8 conditions of the POPIA and that it will provide to Transnet satisfactory evidence of these measures whenever called upon to do so by Transnet.

The Operator is required to provide confirmation that all measures in terms of the POPIA are in place when processing personal information and the information of a third party received from Transnet:

YES		**NO**	

2.13. Further, the Operator acknowledges that it will be held liable by Transnet should it fail to process personal information in line with the requirements of the POPIA. The Operator will be subject to any civil or criminal action, administrative fines or other penalty or loss that may arise as a result of the processing of any personal information that Transnet submitted to it.

2.14. Should a Tenderer have any complaints or objections to processing of its personal information, by Transnet, the Tenderer can submit a complaint to the Information Regulator on https://www.justice.gov.za/inforeg/, click on contact us, click on complaints.IR@justice.gov.za

3. SOLE AGREEMENT

3.1. The Agreement, constitute the sole agreement between the parties relating to the subject matter referred to in paragraph 1.1 of this and no amendment/variation/change shall be of any force and effect unless reduced to writing and signed by or on behalf of both parties.

Signed at _____ on this _____day of _____ 2021

Name: _____

Title: _____

Signature: _____

(Operator)

Authorised signatory for and on behalf of _____ who warrants that he/she is duly authorised to sign this Agreement.

AS WITNESSES:

1. Name: _____ Signature: _____

2. Name: _____ Signature: _____

Construction Industry Development Board

DEVELOPMENT THROUGH PARTNERSHIP

CIDB SKILLS STANDARD

CIDB RECOGNISED SKILLS DEVELOPMENT AGENCIES

CIDB Recognised Skills Development Agencies

No	Name of SDA	SDA Registration Number	Status	Recognition Date End	Province	Contact Person	Contact Number	Email Address
01	CIDB SDA	SDA/ZA/16/00001	Active	01/04/2025	National	Pranveer Harriparsadh	012 482 7230	pranveerh@cidb.org.za
02						Thabelo Ramaru	012 482 7249	thabelor@cidb.org.za
03								
04								
05								
06								
07								
08								
09								
10								

CIDB SKILLS STANDARD

BASELINE TRAINING PLAN

CIDB SKILLS STANDARD

BASELINE TRAINING PLAN

Contractor Details						
Contractor Name:	123Building and construction					
CRS Number:	0000000					
Estimated start date	1 April 2021					
Estimated Completion date	2 May 2022					
Size of Organisation	Small (1-49 employees)		Medium (50-149 employees)		Large (≥150 employees)	
				✓		

Contractor Contact Details	
Name of Contact Person	Mr Xolani Smith
Designation of Contact Person	Construction Manager
Contact Details	Cell Number: XXX XXXX XXX
	Landline Number: XXX XXXX XXX
	Email address: Smith@123building.co.za

Contract Data				
Project Name	JHB Central Homes			
CIDB Contract Number	#ZZ ZZZZ ZZ			
Name of Client:	Gauteng Department of Infrastructure Development			
Project Description	Recreational Centre			
Final Tender Sum (at tender award)	R65 700 000			
Project Location	Johannesburg Central 1234 Main Street Plot 879			
Project duration	12 months			
Estimated start date	1 April 2021			
Estimated Completion date	2 May 2022			
Description	**Designation**	**Project Value**	**CSDG %**	**Min CSDG Target**
Civil Eng.	CE		0.25	
General Building	GB	R65 700 000	0.50	R328 500
Civil & General Building	CE & GB		0.375	
Electrical Eng.(Building)	EB		0.25	
Electrical Eng.(Infrastructure)	EP		0.25	
Mechanical Eng.	ME		0.25	
Specialist	SW		0.25	
Total		R65 700 000		R328 500

Construction Skills Development Goal (CSDG) Baseline Training Plan					
Training Method	Number of Employed Learners	Number of Unemployed Learners	Area/s of Specialisation/Trade	Duration of Placement	Total Notional Cost
Method 1: Skills Programme	1	3	Scaffolding	3 months	R57 000
Method 2: FET College Graduates/ Apprenticeship	0	2	Bricklaying and Plastering	12 months	R92 000
Method 3: P1 and P2 learners or a 240 credit qualification	0	0	-	-	-
Method 4: Candidacy with 360 credit qualification	0	1	Project Management	9 months	R184 500
Total	**1**	**6**			**R333 500**

Note: Refer to Table 3 in the Standard for Developing Skills through Infrastructure Contracts Government Gazette 43495 of 3 July 2020 for the notional costs

Contractor's Representative Name: _____ Designation: _____

Signature: _____ Date: _____

Employer's Representative Name: _____ Designation: _____

Signature: _____ Date: _____

For Office Use for SDA				
Action	**Status**			
Project verified on CIDB Register of Projects (RoP)	Yes		No	
Training plans developed	Yes		No	
Appropriate learners available	Yes		No	
Target learners sent to contractor	Yes		No	
SDA processes explained to contractor	Yes		No	
Placement plan developed	Yes		No	
Training Method	Percentage (%) contribution to the CSDG			
Method 1				
Method 2				
Method 3				
Method 4				
Total				

CIDB SDA Contact Person: Mr Pranveer Harriparsadh or Thabelo Ramaru
Email address: pranveerh@cidb.org.za or thabelor@cidb.org.za Tel. 012 482 7230/7249

SDA Representative Name: _____ Designation: _____

Signature: _____ Date: _____

FORM A3: PROJECT INTERIM TRAINING REPORT

Section A: Employer Information

cidb Employer Number

Employer Name

Section B: Contract Data

cidb Contract Number

Contract Title

Tender Value (R)

Contract Skills Development Goal (R)

SIP Number (If Applicable)

SIP Project Code (If Applicable)

SECTION C:Definitions and Beneficiary Information

Training Methods:
Method 1(M1): structured workplace learning opportunities for learners towards the attainment of a part or a full occupational qualification;
Method 2(M2): structured workplace learning opportunities for apprentices or other artisan learners towards the attainment of a trade qualification leading to a listed trade subject to at least 60% of the artisan learners being holders of public TVET college qualifications;
Method 3(M3): work integrated learning opportunities for University of Technology or Comprehensive University students completing their national diplomas;
Method 4(M4): structured workplace learning opportunities for candidates towards registration in a professional category by a statutory council listed in Table 1 in the CIDB Standard for Developing Skills Through Infrastructure Contracts Gazette No. 43495

Learner/Candidates Full Name and Surname	Gender		Ethnic Group					Identity Number												Training Method (Please tick)				Placement Start Date	Placement End Date	Occupation/Trade Description	Description of Practical Task Completed (as per logbook or POE)	Status	Supporting documents available on request (Yes,No or N/A)									
	Male	Female	Black	White	Coloured	Indian	Other													M1	M2	M3	M4						Training Plan	Attendance Register	Signed Logbooks/POE	Entry Medical Assessments	Exit Medical Assessment	Conducted Sumative Assessment	Site Induction	Health and Saftey Induction	Registered with Relevant SETA	PPE Register	Register Beneficiaries with CIDB SDA
Eg. Xolani Smith	1				1			1	2	3	4	5	6	7	4	5	6	8	9	1		X			2021/06/01	2021/09/31	Bricklaying	Read and interpret drawings	Completed	Yes	Yes	Yes	Yes	N/A	No	Yes	Yes	No	Yes	Yes
																												Set out building as per drawing	In progress										
																												Transfer levels using dumpy level	In progress										
																												Batch and mix concrete	Completed										

Section D: Declaration; Contractor Representative

Name of Contractor Rep Title Initials Surname

Designation

e-mail

Mobile 0 - - -

Office Telephone 0 - - -

Date Y Y Y Y - M M - D D

I, the undersigned warrant that:
- I am duly authorised to submit this notice on behalf of the Contractor
- The contents of this notice are within my personal knowledge, and are to the best of my belief both true and correct.

Signature

Date completed Y Y Y Y - M M - D D

Section E: Declaration; Employer's Representative

Name of Representative Title Initials Surname

Designation

e-mail

Mobile 0 - - -

Office Telephone 0 - - -

Date Y Y Y Y - M M - D D

I, the undersigned warrant that:
- The contents of this notice are within my personal knowledge, and are to the best of my belief both true and correct.

Signature

Date completed Y Y Y Y - M M - D D

SUPERVISOR/LEARNER AGREEMENT

Memorandum of understanding between Supervisor and Learner

The Contractor is responsible for the effective management of the learning opportunities provided through the cidb *Standard for the Development of Skills through Infrastructure Contracts* (cidb Skills Standard). The attainment of successful learning outcomes and professional development of the learners is largely dependent on the relationship between the assigned Supervisor and the Learner . As a participant in the implementation of the cidb Skills Standard you agree to the Supervisor relationship and commit to endeavour through the challenges of a construction project to give value to the training programme.

The Responsibilities of a Supervisor to the Learner include:

- stimulating a passion for construction
- sharing technical and practical knowledge
- fostering the development of technical and leadership skills
- facilitating networking within the working community
- instilling an expectation of personal growth and learning by the Learner
- developing knowledge and understanding in the areas of health, safety, environment, quality and production
- inculcating professionalism and a desire for continual improvement by the Learner
- creating a nurturing relationship that instils a sense of discipline and professional pride
- giving constructive feedback and
- signing the Learners logbook.

Supervisor's name _____

Signature: _____Date:_____

The Responsibilities of a Learner are:

- adhere to the Host Employer's onsite rules and policies
- have an expectation of personal growth and learning
- to be enthusiastic and motivated
- to be open and accept supervision from the Supervisor and other colleagues

- to develop a thorough understanding of health, safety, environment, quality and production
- to have a positive attitude
- to display a strong sense of discipline and to be conscious of time
- to operate within the team
- to take the time to learn and practice new skills
- to make time to fill in your logbook and obtain the Supervisor's signature for completed tasks

Intern's Name: _____ ID No: _____

Signature:_____Date:_____

T2.2-23 SUPPLIER DECLARATION FORM

Transnet Vendor Management has received a request to load / change your company details onto the Transnet vendor master database. Please return the completed Supplier Declaration Form (SDF) together with the required supporting documents as per Appendix A to the Transnet Official who is intending to procure your company's services / products, to enable us to process this request. Please only submit the documentation relevant to your request.

Please Note: all organisations, institutions and individuals who wish to provide goods and/or services to organs of the State must be registered on the National Treasury's Central Supplier Database (CSD). This needs to be done via their portal at https://secure.csd.gov.za/ **before applying to Transnet**.

General Terms and Conditions:

Please Note: Failure to submit the relevant documentation will delay the vendor creation / change process.

Where applicable, the respective Transnet Operating Division processing your application may request further or additional information from your company.

The Service Provider warrants that the details of its bank account ("the nominated account") provided herein, are correct and acknowledges that payments due to the Supplier will be made into the nominated account. If details of the nominated account should change, the Service Provider must notify Transnet in writing of such change, failing which any payments made by Transnet into the nominated account will constitute a full discharge of the indebtedness of Transnet to the Supplier in respect of the payment so made. Transnet will incur no liability for any payments made to the incorrect account or any costs associated therewith. In such an event, the Service Provider indemnifies and holds Transnet harmless in respect of any payments made to an incorrect bank account and will, on demand, pay Transnet any costs associated herewith.

Transnet expects its suppliers to timeously renew their Tax Clearance and B-BBEE certificates (Large Enterprises and QSEs less than 51% black owned) as well as sworn affidavits in the case of EMEs and QSEs with more than 51% black ownership as per Appendices C and D.

In addition, please take note of the following very important information:

1. **If your annual turnover is R10 million or less,** then in terms of the DTI Generic Codes of Good Practice, you are classified as an Exempted Micro Enterprise (EME). If your company is classified as an EME, please include in your submission a sworn affidavit confirming your company's most recent annual turnover is less than R10 million and percentage of black ownership and black female ownership in the company (Appendix C) OR B-BBEE certificate issued by a verification agency accredited by SANAS in terms of the EME scorecard should you feel you will be able to attain a better B-BBEE score. It is only in this context that an EME may submit a B-BBEE verification certificate. These EME sworn affidavits must be accepted by the . Government introduced this mechanism specifically to reduce the cost of doing business and regulatory burden for these entities and the template for the sworn affidavit is available at no cost on the website www.thedti.gov.za or EME certificates at CIPC from www.cipic.co.za.

The B-BBEE Commission said "that only time an EME can be verified by a SANAS accredited verification professional is when it wishes to maximise its B-BBEE points and move to a higher B-BBEEE recognition level, and that must be done use the QSE Scorecard".

2. **If your annual turnover is between R10 million and R50 million,** then in terms of the DTI codes, you are classified as a Qualifying Small Enterprise (QSE). A QSE which is at least 51% black owned, is required to submit a sworn affidavit confirming their annual total revenue of between R10 million and R50 million and level of black ownership (Appendix D). QSE 'that does not qualify for 51% of black ownership, are required to submit a B-BBEE verification certificate issued by a verification agency accredited by SANAS their QSEs are required to submit a B-BBEE verification certificate issued by a verification agency accredited by SANAS.

Please Note: B-BBEE certificate and detailed scorecard should be obtained from an accredited rating agency (e.g. SANAS Member).

3. **If your annual turnover exceeds R50 million,** then in terms of the DTI codes, you are classified as a Large Enterprise. Large Enterprises are required to submit a B-BBEE level verification certificate issued by a verification agency accredited by SANAS.

Please Note: B-BBEE certificate and detailed scorecard should be obtained from an accredited rating agency (e.g. SANAS Member).

4. **The supplier to furnish proof to the procurement department as required in the Fourth Schedule of the Income Tax Act. 58 of 1962** whether a supplier of service is to be classified as an "employee", "personal service provider" or "labour broker". Failure to do so will result in the supplier being subject to employee's tax.

5. **No payments can be made to a vendor until the** vendor has been registered / updated, and no vendor can be registered / updated until the vendor application form, together with its supporting documentation, has been received and processed**.** No payments can be made to a vendor until the vendor has met / comply with the procurement requirements.

6. It is in line with PPPFA Regulations, only valid B-BBBEE status level certificate issued by an unauthorised body or person OR a sworn affidavit as prescribed by the B-BBEE Codes of Good Practice, OR any other requirement prescribed in terms of the Broad- Based Black Economic Empowerment Act.

7. The B-BBEE Commission advises entities and organs of state to reject B-BBEE certificates that have been issues by verification agencies or professionals who are not accredited by South African National Accreditation Systems ("SANAS) as such B-BBEE certificates are invalid for lack of authority and mandate to issue them. A list of SANAS Accredited agencies is available on the SANAS website at www.sanas.co.za.

8. Presenting banking details. Please note: Banks have decided to enable the customers and provide the ability for customers to generate Account Confirmation/Bank Account letters via their online platform; this is a digital approach to the authentication of banking details.

SUPPLIER DECLARATION FORM

Supplier Declaration Form

Important Notice: all organisations, institutions and individuals who wish to provide goods and/or services to organs of the State must be registered on the National Treasury Central Supplier Database (CSD). This needs to be done via their portal at https://secure.csd.gov.za/ **before applying to Transnet**.	
CSD Number (MAAA xxxxxxx):	

Company Trading Name						
Company Registered Name						
Company Registration No Or ID No If a Sole Proprietor						
Company Income Tax Number						
Form of Entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
	Non-profit (NPO's or NPC)	Personal Liability Co	State Owned Co	National Govt	Provincial Govt	Local Govt
	Education al Institution	Specialise d Profession	Financial Institution	Joint Venture	Foreign International	Foreign Branch Office

Did your company previously operate under another name?	Yes		No	
If **YES** state the previous details below:				
Trading Name				
Registered Name				
Company Registration No Or ID No If a Sole Proprietor				

Form of Entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
	Non-profit (NPO's or NPC)	Personal Liability Co	State Owned Co	National Govt	Provincial Govt	Local Govt
	Education al Institution	Specialise d Profession	Financial Institution	Joint Venture	Foreign International	Foreign Branch Office

Your Current Company's VAT Registration Status	
VAT Registration Number	
If **Exempted from VAT registration,** state reason and	

submit proof from SARS in confirming the exemption status	
If your business entity is not VAT Registered, please submit a current original sworn affidavit (see example in Appendix I). Your Non VAT Registration must be confirmed annually.	

Company Banking Details		Bank Name	
Universal Branch Code		Bank Account Number	

Company Physical Address			
		Code	
Company Postal Address			
		Code	
Company Telephone number			
Company Fax Number			
Company E-Mail Address			
Company Website Address			

Company Contact Person Name	
Designation	
Telephone	
Email	

Is your company a Labour Broker?			Yes			No			
Main Product / Service Supplied e.g. Stationery / Consulting / Labour etc.									
How many personnel does the business employ?	Full Time			Part Time					
Please Note: Should your business employ more than 2 full time employees who are not connected persons as defined in the Income Tax Act, please submit a sworn affidavit, as per Appendix II.									

Most recent Financial Year's Annual Turnover	<R10Million **EME**		>R10Million <R50Million **QSE**		>R50Million **Large Enterprise**	

Does your company have a valid proof of B-BBEE status?				Yes			No		
Please indicate your Broad Based BEE status (Level 1 to 9)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Majority Race of Ownership									

% Black Ownership		% Black Women Ownership		% Black Disabled person(s) Ownership		% Black Youth Ownership	

% Black Unemployed		% Black People Living in Rural Areas		% Black Military Veterans			

Please Note: Please provide proof of B-BBEE status as per Appendix C and D:

- Large Enterprise and QSEs with less than 51% black ownership need to obtain a B-BBEE certificate and detailed scorecard from an accredited rating agency;
- EMEs and QSEs with at least 51% black ownership may provide an affidavit using the templates provided in Appendix C and D respectively;
- Black Disabled person(s) ownership will only be accepted if accompanied with a certified letter signed by a physician on the physician's letterhead confirming the disability;
- A certified South African identification document will be required for all Black Youth Ownership.

Supplier Development Information Required	
EMPOWERING SUPPLIER An Empowering Supplier is a B-BBEE compliant Entity which complies with at least three criteria if it is a large Entity, or one criterion if it is a Qualifying Small Enterprise ("QSE"), as detailed in Statement 400 of the New Codes. In terms of the requirements of an Empowering Supplier, numerous companies found it challenging to meet the target of 25% transformation of raw materials or beneficiation including local manufacturing, particularly so, if these companies imported goods or products from offshore. The matter was further compounded by the requirement for 25% of Cost of Sales, excluding labour cost and depreciation, to be procured from local producers or suppliers.	YES ○ NO ○
FIRST TIME SUPPLIER A supplier that we haven't as yet Traded within Transnet and will be registered via our database for the 1st time.	YES ○ NO ○
SUPPLIER DEVELOPMENT PLAN Supplier Development Plan is a plan that when we as Transnet award a supplier a long term contract depending on the complexity of the Transaction. We will negotiate supplier development obligations that they must meet throughout the contract duration. e.g. we might request that they (create jobs or do skills development or encourage procurement from designated groups. (BWO, BYO & BDO etc.).	YES ○ NO ○
DEVELOPMENT PLAN DOCUMENT	YES ○ NO ○

Agreed plan that will be crafted with the supplier in regards to their development (It could be for ED OR SD in terms of their developmental needs they may require with the company.	*If Yes- Attach supporting documents
ENTERPRISE DEVELOPMENT BENEFICIARY A supplier that is not as yet in our value chain that we are assisting in their developmental area.	YES ○ NO ○
SUPPLIER DEVELOPMENT BENEFICIARY A supplier that we are already doing business with or transacting with and we are also assisting them assisting them in their developmental area e.g. (They might require training or financial assistance etc.)	YES ○ NO ○
GRADUATION FROM ED TO SD BENEFICIARY When a supplier that we assisted with as an ED beneficiary then gets awarded a business and we start Transacting with.	YES ○ NO ○
ENTERPRISE DEVELOPMENT RECIPIENT A supplier that isn't in our value chain as yet but we have assisted them with an ED intervention	YES ○ NO ○

By signing below, I hereby verify that I am duly authorised to sign for and on behalf of firm / organisation and that all information contained herein and attached herewith are true and correct			
Name and Surname		Designation	
Signature		Date	

APPENDIX B

Affidavit or Solemn Declaration as to VAT registration status

Affidavit or Solemn Declaration

I, _____ solemnly swear/declare that _____ is not a registered VAT vendor and is not required to register as a VAT vendor because the combined value of taxable supplies made by the provider in any 12 month period has not exceeded or is not expected to exceed R1million threshold, as required in terms of the Value Added Tax Act.

Signature: _____

Designation: _____

Date: _____

Commissioner of Oaths

Thus signed and sworn to before me at _____ on this the _____ day of _____ 20_____,

the Deponent having knowledge that he/she knows and understands the contents of this Affidavit, and that he/she has no objection to taking the prescribed oath, which he/she regards binding on his/her conscience and that the allegations herein contained are all true and correct.

_____
Commissioner of Oaths

APPENDIX C

SWORN AFFIDAVIT – B-BBEE QUALIFYING SMALL ENTERPRISE – GENERAL

I, the undersigned,

Full name & Surname	
Identity number	

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.

2. I am a Member / Director / Owner of the following enterprise and am duly authorised to act on its behalf:

Enterprise Name:	
Trading Name (If Applicable):	
Registration Number:	
Enterprise Physical Address:	
Type of Entity (CC, (Pty) Ltd, Sole Prop etc.):	
Nature of Business:	
Definition of "Black People"	As per the Broad-Based Black Economic Empowerment Act 53 of 2003 as Amended by Act No 46 of 2013 "Black People" is a generic term which means Africans, Coloureds and Indians – (a) who are citizens of the Republic of South Africa by birth or descent; or (b) who became citizens of the Republic of South Africa by naturalisationi- i. before 27 April 1994; or ii. on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalization prior to that date;"

Definition of "Black Designated Groups"	Black Designated Groups means: (a) unemployed black people not attending and not required by law to attend an educational institution and not awaiting admission to an educational institution; (b) Black people who are youth as defined in the National Youth Commission Act of 1996; (c) Black people who are persons with disabilities as defined in the Code of Good Practice on employment of people with disabilities issued under the Employment Equity Act; (d) Black people living in rural and under developed areas; (e) Black military veterans who qualifies to be called a military veteran in terms of the Military Veterans Act 18 of 2011;"

3. I hereby declare under Oath that:

- The Enterprise is _____% Black Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Female Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Designated Group Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,

- Black Designated Group Owned % Breakdown as per the definition stated above:
- Black Youth % = _____%
- Black Disabled % =_____%
- Black Unemployed % =_____%
- Black People living in Rural areas % = _____%
- Black Military Veterans % =_____%

- Based on the Financial Statements/Management Accounts and other information available on

  the latest financial year-end of _____, the annual Total Revenue was between

  R10,000,000.00 (Ten Million Rands) and R50,000,000.00 (Fifty Million Rands),

- Please confirm on the table below the B-BBEE level contributor, **by ticking the applicable box.**

100% Black Owned	**Level One** (135% B-BBEE procurement recognition level)	
At Least 51% black owned	**Level Two** (125% B-BBEE procurement recognition level)	

4. I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the owners of the enterprise which I represent in this matter.

5. The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

Deponent Signature

……

Date **……**

_____

Commissioner of Oaths
Signature & stamp

APPENDIX D

SWORN AFFIDAVIT – B-BBEE EXEMPTED MICRO ENTERPRISE – GENERAL

I, the undersigned,

Full name & Surname	
Identity number	

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.

2. I am a Member / Director / Owner of the following enterprise and am duly authorised to act on its behalf:

Enterprise Name:	
Trading Name (If Applicable):	
Registration Number:	
Enterprise Physical Address:	
Type of Entity (CC, (Pty) Ltd, Sole Prop etc.):	
Nature of Business:	

Definition of "Black People"	As per the Broad-Based Black Economic Empowerment Act 53 of 2003 as Amended by Act No 46 of 2013 "Black People" is a generic term which means Africans, Coloureds and Indians – (a) who are citizens of the Republic of South Africa by birth or descent; or (b) who became citizens of the Republic of South Africa by naturalisationi- i. before 27 April 1994; or ii. on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalization prior to that date;"
Definition of "Black Designated Groups"	"Black Designated Groups means: (a) unemployed black people not attending and not required by law to attend an educational institution and not awaiting admission to an educational institution; (b) Black people who are youth as defined in the National Youth Commission Act of 1996; (c) Black people who are persons with disabilities as defined in the Code of Good Practice on employment of people with disabilities issued under the Employment Equity Act; (d) Black people living in rural and under developed areas; (e) Black military veterans who qualifies to be called a military veteran in terms of the Military Veterans Act 18 of 2011;"

3. I hereby declare under Oath that:

- The Enterprise is _____% Black Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Female Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,

- The Enterprise is _____% Black Designated Group Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,

- Black Designated Group Owned % Breakdown as per the definition stated above:
- Black Youth % = _____%
- Black Disabled % =_____%
- Black Unemployed % =_____%
- Black People living in Rural areas % = _____%
- Black Military Veterans % =_____%

- Based on the Financial Statements/Management Accounts and other information available on the latest financial year-end of _____, the annual Total Revenue was R10,000,000.00 (Ten Million Rands) or less

- Please Confirm on the below table the B-BBEE Level Contributor, **by ticking the applicable box.**

100% Black Owned	**Level One** (135% B-BBEE procurement recognition	
At least 51% Black Owned	**Level Two** (125% B-BBEE procurement recognition level)	
Less than 51% Black Owned	**Level Four** (100% B-BBEE procurement recognition level)	

4. I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the Owners of the Enterprise which I represent in this matter.

5. The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

Deponent Signature

.....

Date **.....**

_____

Commissioner of Oaths

Signature & stamp

VENDOR REGISTRATION DOCUMENTS CHECKLIST

Please note that you will have to provide the first two documents on the list (highlighted in red) and the rest will be provided by the supplier:

	Yes	No
1. Complete the "Supplier Declaration Form" (SDF) (commissioned). See attachment.		
2. Complete the "Supplier Code of Conduct" (SCC). See attachment.		
3. Copy of cancelled cheque OR letter from the bank verifying banking details (with **bank stamp not older than 3 Months & sign by Bank Teller**).		
4. Certified (**Not Older than 3 Months**) copy of Identity document of Shareholders/Directors/Members (where applicable).		
5. Certified copy of certificate of incorporation, CM29 / CM9 (name change).		
6. Certified copy of share Certificates of Shareholders, CK1 / CK2 (if CC).		
7. A letter with the company's letterhead confirming both **Physical** and **Postal** address.		
8. Original or certified copy of SARS Tax Clearance certificate and Vat registration certificate.		
9. BBBEE certificate and detailed scorecard from a **SANAS** Accredited Verification Agency and/or Sworn Certified Affidavit.		

10. Central Supplier Database (CSD) Summary Registration Report.		

T2.2-24 : Supplier Code of Conduct

Transnet SOC Limited aims to achieve the best value for money when buying or selling goods and obtaining services. This however must be done in an open and fair manner that supports and drives a competitive economy. Underpinning our process are several acts and policies that any supplier dealing with Transnet must understand and support. These are:

- The Transnet Procurement Policy – A guide for Tenderers.
- Section 217 of the Constitution - the five pillars of Public PSCM (Procurement and Supply Chain Management): fair, equitable, transparent, competitive and cost effective;
- The Public Finance Management Act (PFMA);
- The Broad Based Black Economic Empowerment Act (BBBEE)
- The Prevention and Combating of Corrupt Activities Act (PRECCA); and
- The Construction Industry Development Board Act (CIDB Act).

This code of conduct has been included in this contract to formally appraise Transnet Suppliers of Transnet's expectations regarding behaviour and conduct of its Suppliers.

Prohibition of Bribes, Kickbacks, Unlawful Payments, and Other Corrupt Practices

Transnet is in the process of transforming itself into a self-sustaining State Owned Enterprise, actively competing in the logistics industry. Our aim is to become a world class, profitable, logistics organisation. As such, our transformation is focused on adopting a performance culture and to adopt behaviours that will enable this transformation.

1. ***Transnet SOC Limited will not participate in corrupt practices. Therefore, it expects its suppliers to act in a similar manner.***

    - Transnet and its employees will follow the laws of this country and keep accurate business records that reflect actual transactions with, and payments to, our suppliers.
    - Employees must not accept or request money or anything of value, directly or indirectly, from suppliers.
    - Employees may not receive anything that is calculated to:
        - Illegally influence their judgement or conduct or to ensure the desired outcome of a sourcing activity;

- Win or retain business or to influence any act or decision of any person involved in sourcing decisions; or
- Gain an improper advantage.

- There may be times when a supplier is confronted with fraudulent or corrupt behaviour of Transnet employees. We expect our Suppliers to use our "Tip-offs Anonymous" Hot line to report these acts. (0800 003 056).

2. ***Transnet SOC Limited is firmly committed to the ideas of free and competitive enterprise.***

- Suppliers are expected to comply with all applicable laws and regulations regarding fair competition and antitrust practices.
- Transnet does not engage with non-value adding agents or representatives solely for the purpose of increasing BBBEE spend (fronting).

3. Transnet's relationship with suppliers requires us to clearly define requirements, to exchange information and share mutual benefits.

- Generally, suppliers have their own business standards and regulations. Although Transnet cannot control the actions of our suppliers, we will not tolerate any illegal activities. These include, but are not limited to:
  - Misrepresentation of their product (origin of manufacture, specifications, intellectual property rights, etc);
  - Collusion;
  - Failure to disclose accurate information required during the sourcing activity (ownership, financial situation, BBBEE status, etc.);
  - Corrupt activities listed above; and
  - Harassment, intimidation or other aggressive actions towards Transnet employees.
- Suppliers must be evaluated and approved before any materials, components, products or services are purchased from them. Rigorous due diligence is conducted and the supplier is expected to participate in an honest and straight forward manner.

- Suppliers must record and report facts accurately, honestly and objectively. Financial records must be accurate in all material respects.

Conflicts of Interest

A conflict of interest arises when personal interests or activities influence (or appear to influence) the ability to act in the best interests of Transnet SOC Limited.

- Doing business with family members.
- Having a financial interest in another company in our industry

Where possible, contracts will be negotiated to include the above in the terms of such contracts. To the extent such terms are not included in contractual obligations and any of the above code is breached, then Transnet reserves its right to review doing business with these suppliers.

I, _____ of _____

(insert name of Director or as per Authority Resolution from Board of Directors)

(insert name of Company)

hereby acknowledge having read, understood and agree to the terms and conditions set out in the "Transnet Supplier Code of Conduct."

Signed this on day _____ at _____

_____

Signature

T2.2-25 : ANNEX G Compulsory Enterprise Questionnaire

The following particulars hereunder must be furnished.

In the case of a Joint Venture, separate enterprise questionnaires in respect of each partner/member must be completed and submitted.

Section 1: Name of enterprise: _____

Section 2: VAT registration number, if any: _____

Section 3: CIDB registration number, if any: _____

Section 4: CSD number: _____

Section 5: Particulars of sole proprietors and partners in partnerships

Name	Identity number	Personal income tax number

* Complete only if sole proprietor or partnership and attach separate page if more than 3 partners

Section 6: Particulars of companies and close corporations

Company registration number _____

Close corporation number _____

Tax reference number: _____

Section 7: The attached SBD4 must be completed for each tender and be attached as a tender requirement.
Section 8: The attached SBD 6 must be completed for each tender and be attached as a requirement.

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise:

i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are in order;

ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004;

iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption;

iv) confirms that I / we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest; and

v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

Signed _____ Date _____

Name _____ Position _____

Enterprise name _____

SBD 6.1

PREFERENCE POINTS CLAIM FORM

This preference form must form part of all bids invited. It contains general information and serves as a claim for preference points for Broad-Based Black Economic Empowerment [**B-BBEE**] Status Level of Contribution.

Transnet will award preference points to companies who provide valid proof of their B-BBEE status using either the latest version of the generic Codes of Good Practice or Sector Specific Codes (if applicable).

---

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to all bids:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and

1.2 The value of this bid is estimated to not exceed R50 000 000 (all applicable taxes included) and therefore the 80/20 preference point system shall be applicable. Despite the stipulated preference point system, Transnet shall use the lowest acceptable bid to determine the applicable preference point system in a situation where all received acceptable bids are received outside the stated preference point system.

1.3 Preference points for this bid shall be awarded for:

(a) Price; and

(b) B-BBEE Status Level of Contribution.

1.4 The maximum points for this bid are allocated as follows:

	POINTS
PRICE	**80**
B-BBEE LEVEL OF CONTRIBUTOR (1 AND 2) =10 **EMEs or QSEs 51% Black Owned = 10**	**20**
Total points for Price and B-BBEE must not exceed	**100**

1.5 Failure on the part of a bidder to submit proof of B-BBEE status level of contributor together with the bid will be interpreted to mean that preference points for B-BBEE status level of contribution are not claimed.

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

2. DEFINITIONS

(a) **"all applicable taxes"** includes value-added tax, pay as you earn, income tax, unemployment insurance fund contributions and skills development levies;

(b) **"B-BBEE"** means broad-based black economic empowerment as defined in section 1 of the Broad-Based Black Economic Empowerment Act;

(c) "**B-BBEE status level of contributor"** means the B-BBEE status received by a measured entity based on its overall performance using the relevant scorecard contained in the Codes of Good Practice on Black Economic Empowerment, issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;

(d) **"bid"** means a written offer in a prescribed or stipulated form in response to an invitation by an organ of state for the supply/provision of services, works or goods, through price quotations, advertised competitive bidding processes or proposals;

(e) **"Broad-Based Black Economic Empowerment Act"** means the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

(f) **"EME"** means an Exempted Micro Enterprise as defines by Codes of Good Practice under section 9 (1) of the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

(g) **"functionality"** means the ability of a bidder to provide goods or services in accordance with specification as set out in the bid documents

(h) **"Price"** includes all applicable taxes less all unconditional discounts.

(i) **"Proof of B-BBEE Status Level of Contributor"**

i) the B-BBBEE status level certificate issued by an authorised body or person;

ii) a sworn affidavit as prescribed by the B-BBEE Codes of Good Practice; or

iii) any other requirement prescribed in terms of the B-BBEE Act.

(j) **"QSE"** means a Qualifying Small Enterprise as defines by Codes of Good Practice under section 9 (1) of the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

(k) **"rand value"** means the total estimated value of a contract in South African currency, calculated at the time of bid invitations, and includes all applicable taxes and excise duties.

3. POINTS AWARDED FOR PRICE

3.1 THE 80/20 PREFERENCE POINT SYSTEMS

A maximum of 80 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 comparative price of bid under consideration

Pt = Comparative price of bid under consideration

Pmin = Comparative price of lowest acceptable bid

4. POINTS AWARDED FOR B-BBEE STATUS LEVEL OF CONTRIBUTION

4.1 preference points must be awarded to a bidder for attaining the B-BBEE status level of contribution in accordance with the table below:

B-BBEE Status Level of Contributor	Number of points (80/20 system)
1	20
2	18
3	14
4	12
5	8
6	6
7	4
8	2
Non-compliant contributor	0

4.2 The table below indicates the required proof of B-BBEE status depending on the category of enterprises:

Enterprise	B-BBEE Certificate & Sworn Affidavit
Large	Certificate issued by SANAS accredited verification agency
QSE	Certificate issued by SANAS accredited verification agency Sworn Affidavit signed by the authorised QSE representative and attested by a Commissioner of Oaths confirming annual turnover and black ownership (only black-owned QSEs - 51% to 100% Black owned) [Sworn affidavits must substantially comply with the format that can be obtained on the DTI's website at www.dti.gov.za/economic_empowerment/bee_codes.jsp.]
EME[1]	Sworn Affidavit signed by the authorised EME representative and attested by a Commissioner of Oaths confirming annual turnover and black ownership Certificate issued by CIPC (formerly CIPRO) confirming annual turnover and black ownership Certificate issued by SANAS accredited verification agency only if the EME is being measured on the QSE scorecard

[1] In terms of the Implementation Guide: Preferential Procurement Regulations, 2017, Version 2, paragraph 11.11 provides that in the Transport Sector, EMEs can provide a letter from accounting officer or get verified and be issued with a B-BBEE certificate by SANAS accredited professional or agency as the Transport Sector Code has not been aligned to the generic Codes. EMEs in the Transport Sector are not allowed to provide a sworn affidavit as the generic codes are not applicable to them.

4.3 A trust, consortium or joint venture (including unincorporated consortia and joint ventures) must submit a consolidated B-BBEE Status Level verification certificate for every separate bid.

4.4 Tertiary Institutions and Public Entities will be required to submit their B-BBEE status level certificates in terms of the specialized scorecard contained in the B-BBEE Codes of Good Practice.

4.5 A person will not be awarded points for B-BBEE status level if it is indicated in the bid documents that such a bidder intends sub-contracting more than 25% of the value of the contract to any other enterprise that does not qualify for at least the points that such a bidder qualifies for, unless the intended sub-contractor is an EME that has the capability and ability to execute the sub-contract.

4.6 A person awarded a contract may not sub-contract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBEE status level than the person concerned, unless the contract is sub-contracted to an EME that has the capability and ability to execute the sub-contract.

4.7 Bidders are to note that the rules pertaining to B-BBEE verification and other B-BBEE requirements may be changed from time to time by regulatory bodies such as National Treasury or the DTI. It is the Bidder's responsibility to ensure that his/her bid complies fully with all B-BBEE requirements at the time of the submission of the bid.

5. BID DECLARATION

5.1 Bidders who claim points in respect of B-BBEE Status Level of Contribution must complete the following:

6. B-BBEE STATUS LEVEL OF CONTRIBUTION CLAIMED IN TERMS OF PARAGRAPHS 1.4 AND 6.1

6.1 B-BBEE Status Level of Contribution: . = ……(maximum of 20 points)

(Points claimed in respect of paragraph 6.1 must be in accordance with the table reflected in paragraph 4.1 and must be substantiated by relevant proof of B-BBEE status level of contributor.

7. SUB-CONTRACTING

7.1 Will any portion of the contract be sub-contracted?

(*Tick applicable box*)

YES		NO	

7.1.1 If yes, indicate:

i) What percentage of the contract will be subcontracted……%
ii) The name of the sub-contractor……..
iii) The B-BBEE status level of the sub-contractor……..
iv) Whether the sub-contractor is an EME or QSE.
(Tick applicable box)

YES		NO	

8. DECLARATION WITH REGARD TO COMPANY/FIRM

8.1 Name of company/firm:.....

8.2 VAT registration number:.....

8.3 Company registration number:.....

8.4 TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One person business/sole propriety
- ☐ Close corporation
- ☐ Company
- ☐ (Pty) Limited

[TICK APPLICABLE BOX]

8.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

.....

.....

.....

8.6 COMPANY CLASSIFICATION

- ☐ Manufacturer
- ☐ Supplier
- ☐ Professional Service provider
- ☐ Other Service providers, e.g. transporter, etc.

[*TICK APPLICABLE BOX*]

8.7 Total number of years the company/firm has been in business:.....

8.8 I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBE status level of

contribution indicated in paragraphs 1.4 and 6.1 of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I / we 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 paragraph 1.4 and 6.1, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;

iv) If a bidder submitted false information regarding its B-BBEE status level of contributor,, which will affect or has affected the evaluation of a bid, or where a bidder has failed to declare any subcontracting arrangements or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have

(a) disqualify the person from the bidding 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) if the successful bidder subcontracted a portion of the bid to another person without disclosing it, Transnet reserves the right to penalise the bidder up to 10 percent of the value of the contract;

(e) recommend that the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury 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

(f) forward the matter for criminal prosecution.

WITNESSES 1. …….. 2. ……	…… SIGNATURE(S) OF BIDDERS(S) DATE: ……..

BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability,

impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest2 in the enterprise, employed by the state? **YES/NO**

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	**Identity Number**	**Name of State institution**

2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES/NO**

2.2.1 If so, furnish particulars:

……
……

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any

[2] the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

interest in any other related enterprise whether or not they are bidding for this contract? **YES/NO**

2.3.1 If so, furnish particulars:

……

……

3 DECLARATION

I, the undersigned, (name)…… in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

3.1 I have read and I understand the contents of this disclosure;

3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;

3.3 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 consortium3 will not be construed as collusive bidding.

3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.

3.4 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.

3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.

3.6 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.

[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.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.
I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

…… ……
Signature Date

…… ……
Position Name of bidder

T2.2-27: REQUEST FOR PROPOSAL – BREACH OF LAW

NAME OF COMPANY: _____

I / We _____ do hereby certify that ***I/we have/have not been*** found guilty during the preceding 5 (five) years of a serious breach of law, including but not limited to a breach of the Competition Act, 89 of 1998, by a court of law, tribunal or other administrative body. The type of breach that the Tenderer is required to disclose excludes relatively minor offences or misdemeanours, e.g. traffic offences.

Where found guilty of such a serious breach, please disclose:

NATURE OF BREACH:

_____
_____
_____

DATE OF BREACH:
_____

Furthermore, I/we acknowledge that Transnet SOC Ltd reserves the right to exclude any Tenderer from the tendering process, should that person or company have been found guilty of a serious breach of law, tribunal or regulatory obligation.

Signed on this _____ day of _____ 20____

_____

SIGNATURE OF TENDER

T2.2-28: Service Provider Integrity Pact

Important Note: All potential tenderers must read this document and certify in the RFP Declaration Form that that have acquainted themselves with, and agree with the content.

The contract with the successful tenderer will automatically incorporate this Integrity Pact and shall be deemed as part of the final concluded contract.

INTEGRITY PACT

Between

TRANSNET SOC LTD

Registration Number: 1990/000900/30

("Transnet")

and

The Contractor (hereinafter referred to as the "Tenderer/Service Providers/Contractor")

PREAMBLE

Transnet values full compliance with all relevant laws and regulations, ethical standards and the principles of economical use of resources, fairness and transparency in its relations with its Tenderers/Service Providers/Contractors.

In order to achieve these goals, Transnet and the Tenderer/Service Provider/Contractor hereby enter into this agreement hereinafter referred to as the "Integrity Pact" which will form part of the Tenderer's/Service Provider's/Contractor's application for registration with Transnet as a vendor.

The general purpose of this Integrity Pact is to agree on avoiding all forms of dishonesty, fraud and corruption by following a system that is fair, transparent and free from any undue influence prior to, during and subsequent to the currency of any procurement and/or reverse logistics event and any further contract to be entered into between the Parties, relating to such event.

All Tenderers/Service Providers/Contractor's will be required to sign and comply with undertakings contained in this Integrity Pact, should they want to be registered as a Transnet vendor.

1 OBJECTIVES

1.1 Transnet and the Tenderer/Service Provider/Contractor agree to enter into this Integrity Pact, to avoid all forms of dishonesty, fraud and corruption including practices that are anti-competitive in nature, negotiations made in bad faith and under-pricing by following a system that is fair, transparent and free from any influence/unprejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:

a) Enable Transnet to obtain the desired contract at a reasonable and competitive price in conformity to the defined specifications of the works, goods and services; and

b) Enable Tenderers/Service Providers/Contractors to abstain from bribing or participating in any corrupt practice in order to secure the contract.

2 COMMITMENTS OF TRANSNET

Transnet commits to take all measures necessary to prevent dishonesty, fraud and corruption and to observe the following principles:

2.1 Transnet hereby undertakes that no employee of Transnet connected directly or indirectly with the sourcing event and ensuing contract, will demand, take a promise for or accept directly or through intermediaries any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the Tenderer, either for themselves or for any person, organisation or third party related to the contract in exchange for an advantage in the tendering

process, Tender evaluation, contracting or implementation process related to any contract.

2.2 Transnet will, during the registration and tendering process treat all Tenderers/ Service Providers/Contractor with equity, transparency and fairness. Transnet will in particular, before and during the registration process, provide to all Tenderers/ Service Providers/Contractors the same information and will not provide to any Tenderers/Service Providers/Contractors confidential/additional information through which the Tenderers/Service Providers/Contractors could obtain an advantage in relation to any tendering process.

2.3 Transnet further confirms that its employees will not favour any prospective Tenderers/Service Providers/Contractors in any form that could afford an undue advantage to a particular Tenderer during the tendering stage, and will further treat all Tenderers/Service Providers/Contractors participating in the tendering process in a fair manner.

2.4 Transnet will exclude from the tender process such employees who have any personal interest in the Tenderers/Service Providers/Contractors participating in the tendering process.

3 OBLIGATIONS OF THE TENDERER / SERVICE PROVIDER

3.1 Transnet has a '**Zero Gifts'** Policy. No employee is allowed to accept gifts, favours or benefits.

a) Transnet officials and employees **shall not** solicit, give or accept, or from agreeing to solicit, give, accept or receive directly or indirectly, any gift, gratuity, favour, entertainment, loan, or anything of monetary value, from any person or juridical entities in the course of official duties or in connection with any operation being managed by, or any transaction which may be affected by the functions of their office.

b) Transnet officials and employees **shall not** solicit or accept gifts of any kind, from vendors, suppliers, customers, potential employees, potential vendors, and suppliers, or any other individual or organisation irrespective of the value.

c) Under **no circumstances** should gifts, business courtesies or hospitality packages be accepted from or given to prospective suppliers participating in a tender process at the respective employee's Operating Division, regardless of retail value.

d) Gratuities, bribes or kickbacks of any kind must never be solicited, accepted or offered, either directly or indirectly. This includes money, loans, equity, special privileges, personal favours, benefit or services. Such favours will be considered to constitute corruption.

3.2 The Tenderer/Service Provider/Contractor commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its Tender or during any ensuing contract stage in order to secure the contract or in furtherance to secure it and in particular the Tenderer/Service Provider/Contractor commits to the following:

a) The Tenderer/Service Provider/Contractor will not, directly or through any other person or firm, offer, promise or give to Transnet or to any of Transnet's employees involved in the tendering process or to any third person any material or other benefit or payment, in order to obtain in exchange an advantage during the tendering process; and

b) The Tenderer/Service Provider/Contractor will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any employee of Transnet, connected directly or indirectly with the tendering process, or to any person, organisation or third party related to the contract in exchange for any advantage in the tendering, evaluation, contracting and implementation of the contract.

3.3 The Tenderer/Service Provider/Contractor will not collude with other parties interested in the contract to preclude a competitive Tender price, impair the transparency, fairness and progress of the tendering process, Tender evaluation, contracting and implementation of the contract. The Tenderer / Service Provider further commits itself to delivering against all agreed upon conditions as stipulated within the contract.

3.4 The Tenderer/Service Provider/Contractor will not enter into any illegal or dishonest agreement or understanding, whether formal or informal with other Tenderers/Service Providers/Contractors. This applies in particular to certifications, submissions or non-submission of documents or actions that are restrictive or to introduce cartels into the tendering process.

3.5 The Tenderer/Service Provider/Contractor will not commit any criminal offence under the relevant anti-corruption laws of South Africa or any other country. Furthermore, the Tenderer/Service Provider/Contractor will not use for illegitimate purposes or for restrictive purposes or personal gain, or pass on to others, any information provided by Transnet as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

3.6 A Tenderer/Service Provider/Contractor of foreign origin shall disclose the name and address of its agents or representatives in South Africa, if any, involved directly or indirectly in the registration or tendering process. Similarly, the Tenderer / Service Provider / Contractor of South African nationality shall furnish

the name and address of the foreign principals, if any, involved directly or indirectly in the registration or tendering process.

3.7 The Tenderer/Service Provider/Contractor will not misrepresent facts or furnish false or forged documents or information in order to influence the tendering process to the advantage of the Tenderer/Service Provider/Contractor or detriment of Transnet or other competitors.

3.8 Transnet may require the Tenderer/Service Provider/Contractor to furnish Transnet with a copy of its code of conduct. Such code of conduct must address the compliance programme for the implementation of the code of conduct and reject the use of bribes and other dishonest and unethical conduct.

3.9 The Tenderer/Service Provider/Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

3.10 The Tenderer/Service Provider/Contractor confirms that they will uphold the ten principles of the United Nations Global Compact (UNGC) in the fields of Human Rights, Labour, Anti-Corruption and the Environment when undertaking business with Transnet as follows:

a) Human Rights

- Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and
- Principle 2: make sure that they are not complicit in human rights abuses.

b) Labour

- Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- Principle 4: the elimination of all forms of forced and compulsory labour;
- Principle 5: the effective abolition of child labour; and
- Principle 6: the elimination of discrimination in respect of employment and occupation.

c) Environment

- Principle 7: Businesses should support a precautionary approach to environmental challenges;
- Principle 8: undertake initiatives to promote greater environmental responsibility; and

• Principle 9: encourage the development and diffusion of environmentally friendly technologies.

d) Anti-Corruption

• Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

4 INDEPENDENT TENDERING

4.1 For the purposes of that Certificate in relation to any submitted Tender, the Tenderer declares to fully understand that the word "competitor" shall include any individual or organisation, other than the Tenderer, whether or not affiliated with the Tenderer, who:

a) has been requested to submit a Tender in response to this Tender invitation;
b) could potentially submit a Tender in response to this Tender invitation, based on their qualifications, abilities or experience; and
c) provides the same Goods and Services as the Tenderer and/or is in the same line of business as the Tenderer.

4.2 The Tenderer has arrived at his submitted Tender independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium will not be construed as collusive tendering.

4.3 In particular, without limiting the generality of paragraph 5 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

a) prices;
b) geographical area where Goods or Services 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 Tender;
e) the submission of a Tender which does not meet the specifications and conditions of the RFP; or
f) tendering with the intention of not winning the Tender.

4.4 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 Goods or Services to which his/her tender relates.

4.5 The terms of the Tender as submitted have not been, and will not be, disclosed by the Tenderer, directly or indirectly, to any competitor, prior to the date and time of the official Tender opening or of the awarding of the contract.

4.6 Tenderers are aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to Tenders and contracts, Tenders 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 10 [ten] years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

4.7 Should the Tenderer find any terms or conditions stipulated in any of the relevant documents quoted in the Tender unacceptable, it should indicate which conditions are unacceptable and offer alternatives by written submission on its company letterhead, attached to its submitted Tender. Any such submission shall be subject to review by Transnet's Legal Counsel who shall determine whether the proposed alternative(s) are acceptable or otherwise, as the case may be.

5 DISQUALIFICATION FROM TENDERING PROCESS

5.1 If the Tenderer/Service Provider/Contractor has committed a transgression through a violation of section 3 of this Integrity Pact or in any other form such as to put its reliability or credibility as a Tenderer/Service Provider/Contractor into question, Transnet may reject the Tenderer's / Service Provider's / Contractor's application from the registration or tendering process and remove the Tenderer/Service Provider/Contractor from its database, if already registered.

5.2 If the Tenderer/Service Provider/Contractor has committed a transgression through a violation of section 3, or any material violation, such as to put its reliability or credibility into question. Transnet may after following due procedures and at its own discretion also exclude the Tenderer/Service Provider /Contractor from future tendering processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, which will include amongst others the number of transgressions, the position of the transgressors within the company hierarchy of the Tenderer/Service Provider/Contractor and the amount of the damage. The exclusion will be imposed for up to a maximum of 10 (ten) years. However, Transnet reserves the right to impose a longer period of exclusion, depending on the gravity of the misconduct.

5.3 If the Tenderer/Service Provider/Contractor can prove that it has restored the damage caused by it and has installed a suitable corruption prevention system, or taken other remedial measures as the circumstances of the case may require, Transnet may at its own discretion revoke the exclusion or suspend the imposed penalty.

6 TRANSNET'S LIST OF EXCLUDED TENDERERS (BLACKLIST)

6.1 The process of restriction is used to exclude a company/person from conducting future business with Transnet and other organs of state for a specified period. No Tender shall be awarded to a Tenderer whose name (or any of its members, directors, partners or trustees) appear on the Register of Tender Defaulters kept by National Treasury, or who have been placed on National Treasury's List of Restricted Suppliers. Transnet reserves the right to withdraw an award, or cancel a contract concluded with a Tenderer should it be established, at any time, that a tenderer has been restricted with National Treasury by another government institution.

6.2 All the stipulations on Transnet's restriction process as laid down in Transnet's Supply Chain Policy and Procurement Procedures Manual (CPM included) are included herein by way of reference. Below follows a condensed summary of this restriction procedure.

6.3 On completion of the restriction procedure, Transnet will submit the restricted entity's details (including the identity number of the individuals and registration number of the entity) to National Treasury for placement on National Treasury's Database of Restricted Suppliers for the specified period of exclusion. National Treasury will make the final decision on whether to restrict an entity from doing business with any organ of state for a period not exceeding 10 years and place the entity concerned on the Database of Restricted Suppliers published on its official website.

6.4 The decision to restrict is based on one of the grounds for restriction. The standard of proof to commence the restriction process is whether a "*prima facie*" (i.e. on the face of it) case has been established.

6.5 Depending on the seriousness of the misconduct and the strategic importance of the Goods/Services, in addition to restricting a company/person from future business, Transnet may decide to terminate some or all existing contracts with the company/person as well.

6.6 A Service Provider or Contractor to Transnet may not subcontract any portion of the contract to a blacklisted company.

6.7 Grounds for blacklisting include: If any person/Enterprise which has submitted a Tender, concluded a contract, or, in the capacity of agent or subcontractor, has been associated with such Tender or contract:

a) Has, in bad faith, withdrawn such Tender after the advertised closing date and time for the receipt of Tenders;
b) has, after being notified of the acceptance of his Tender, failed or refused to sign a contract when called upon to do so in terms of any condition forming part of the Tender documents;
c) has carried out any contract resulting from such Tender in an unsatisfactory manner or has breached any condition of the contract;
d) has offered, promised or given a bribe in relation to the obtaining or execution of the contract;
e) has acted in a fraudulent or improper manner or in bad faith towards Transnet or any Government Department or towards any public body, Enterprise or person;
f) has made any incorrect statement in a certificate or other communication with regard to the Local Content of his Goods or his B-BBEE status and is unable to prove to the satisfaction of Transnet that:

(i) he made the statement in good faith honestly believing it to be correct; and

(ii) before making such statement he took all reasonable steps to satisfy himself of its correctness;

g) caused Transnet damage, or to incur costs in order to meet the contractor's requirements and which could not be recovered from the contractor;
h) has litigated against Transnet in bad faith.

6.8 Grounds for blacklisting include a company/person recorded as being a company or person prohibited from doing business with the public sector on National Treasury's database of Restricted Service Providers or Register of Tender Defaulters.

6.9 Companies associated with the person/s guilty of misconduct (i.e. entities owned, controlled or managed by such persons), any companies subsequently formed by the person(s) guilty of the misconduct and/or an existing company where such person(s) acquires a controlling stake may be considered for blacklisting. The decision to extend the blacklist to associated companies will be at the sole discretion of Transnet.

7 PREVIOUS TRANSGRESSIONS

7.1 The Tenderer/Service Provider/Contractor hereby declares that no previous transgressions resulting in a serious breach of any law, including but not limited to, corruption, fraud, theft, extortion and contraventions of the Competition Act 89 of 1998, which occurred in the last 5 (five) years with any other public sector undertaking, government department or private sector company that could justify its exclusion from its registration on the Tenderer's/Service Provider's/Contractor's database or any tendering process.

7.2 If it is found to be that the Tenderer/Service Provider/Contractor made an incorrect statement on this subject, the Tenderer/Service Provider/Contractor can be rejected from the registration process or removed from the Tenderer/ Service Provider/Contractor database, if already registered, for such reason (refer to the Breach of Law Returnable Form contained in the document.)

8 SANCTIONS FOR VIOLATIONS

8.1 Transnet shall also take all or any one of the following actions, wherever required to:

a) Immediately exclude the Tenderer/Service Provider/Contractor from the tendering process or call off the pre-contract negotiations without giving any compensation the Tenderer/Service Provider/Contractor. However, the proceedings with the other Tenderer/ Service Provider/Contractor may continue;
b) Immediately cancel the contract, if already awarded or signed, without giving any compensation to the Tenderer/Service Provider/Contractor;
c) Recover all sums already paid by Transnet;
d) Encash the advance bank guarantee and performance bond or warranty bond, if furnished by the Tenderer/Service Provider/Contractor, in order to recover the payments, already made by Transnet, along with interest;
e) Cancel all or any other contracts with the Tenderer/Service Provider/Contractor; and
f) Exclude the Tenderer/ Service Provider/Contractor from entering into any Tender with Transnet in future.

9 CONFLICTS OF INTEREST

9.1 A conflict of interest includes, inter alia, a situation in which:
a) A Transnet employee has a personal financial interest in a tendering / supplying entity; and
b) A Transnet employee has private interests or personal considerations or has an affiliation or a relationship which affects, or may affect, or may be perceived to affect his / her judgment in action in the best interest of Transnet, or could affect the employee's motivations for acting in a particular manner, or which could result in, or be perceived as favouritism or nepotism.

9.2 A Transnet employee uses his / her position, or privileges or information obtained while acting in the capacity as an employee for:

a) Private gain or advancement; or

b) The expectation of private gain, or advancement, or any other advantage accruing to the employee must be declared in a prescribed form.

Thus, conflicts of interest of any Tender committee member or any person involved in the sourcing process must be declared in a prescribed form.

9.3 If a Tenderer/Service Provider/Contractor has or becomes aware of a conflict of interest i.e. a family, business and / or social relationship between its owner(s)/ member(s)/director(s)/partner(s)/shareholder(s) and a Transnet employee/ member of Transnet's Board of Directors in respect of a Tender which will be considered for the Tender process, the Tenderer/Service Provider/ Contractor:

a) must disclose the interest and its general nature, in the Request for Proposal ("RFX") declaration form; or

b) must notify Transnet immediately in writing once the circumstances has arisen.

9.4 The Tenderer/Service Provider/Contractor shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any committee member or any person involved in the sourcing process, where this is done, Transnet shall be entitled forthwith to rescind the contract and all other contracts with the Tenderer/Service Provider/Contractor.

10 DISPUTE RESOLUTION

10.1 Transnet recognises that trust and good faith are pivotal to its relationship with its Tenderer / Service Provider / Contractor. When a dispute arises between Transnet and its Tenderer / Service Provider / Contractor, the parties should use their best endeavours to resolve the dispute in an amicable manner, whenever possible. Litigation in bad faith negates the principles of trust and good faith on which commercial relationships are based. Accordingly, following a blacklisting process as mentioned in paragraph 6 above, Transnet will not do business with a company that litigates against it in bad faith or is involved in any action that reflects bad faith on its part. Litigation in bad faith includes, but is not limited to the following instances:

a) **Vexatious proceedings**: these are frivolous proceedings which have been instituted without proper grounds;

b) **Perjury:** where a Tenderer / Service Provider / Contractor make a false statement either in giving evidence or on an affidavit;

c) **Scurrilous allegations:** where a Tenderer / Service Provider / Contractor makes allegations regarding a senior Transnet employee which are without proper foundation, scandalous, abusive or defamatory; and

d) **Abuse of court process:** when a Tenderer / Service Provider / Contractor abuses the court process in order to gain a competitive advantage during a Tender process.

11 GENERAL

11.1 This Integrity Pact is governed by and interpreted in accordance with the laws of the Republic of South Africa.

11.2 The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the law relating to any civil or criminal proceedings.

11.3 The validity of this Integrity Pact shall cover all the tendering processes and will be valid for an indefinite period unless cancelled by either Party.

11.4 Should one or several provisions of this Integrity Pact turn out to be invalid the remainder of this Integrity Pact remains valid.

11.5 Should a Tenderer/Service Provider/Contractor be confronted with dishonest, fraudulent or corruptive behaviour of one or more Transnet employees, Transnet expects its Tenderer/Service Provider/Contractor to report this behaviour directly to a senior Transnet official/employee or alternatively by using Transnet's "Tip-Off Anonymous" hotline number 0800 003 056, whereby your confidentiality is guaranteed.

The Parties hereby declare that each of them has read and understood the clauses of this Integrity Pact and shall abide by it. To the best of the Parties' knowledge and belief, the information provided in this Integrity Pact is true and correct.

I …….. duly authorised by the tendering entity, hereby certify that the tendering entity are **fully acquainted** with the contents of the Integrity Pact and further **agree to abide by it** in full.

Signature ……

Date ……..

T2.2-29: Insurance provided by the *Contractor*

Clause 84.1 in NEC3 Engineering & Construction Contract (June 2005)(amended June 2006 and April 2013) requires that the *Contractor* provides the insurance stated in the insurance table except any insurance which the *Employer* is to provide as stated in the Contract Data.

Please provide the following details for insurance which the *Contractor* is still to provide. Notwithstanding this information all costs related to insurance are deemed included in the tenderer's rates and prices.

Insurance against (See clause 84.2 of the ECC)	**Name of Insurance Company**	**Cover**	**Premium**
Liability for death of or bodily injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract			
Motor Vehicle Liability Insurance comprising (as a minimum) "Balance of Third Party" Risks including Passenger and Unauthorised Passenger Liability indemnity with a minimum indemnity limit of R10 000 000.			
Insurance in respect of loss of or damage to own property and equipment.			
Professional Indemnity Insurance with a minimum indemnity limit of R5 000 000.00			
(Other)			

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-30: Three (3) years audited financial statements

Attached to this schedule is the last three (3) years audited financial statements of the single tenderer/members of the Joint Venture.

NAME OF COMPANY/IES and INDEX OF ATTACHMENTS:

.....

.....

.....

.....

.....

.....

.....

.....

.....

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-31: CIDB Standard for Contract Skills Development Goals

The contractor shall achieve, in the performance of the contract, the Contract Skills Development Goal (CSDG) established in the CIDB Standard for Developing Skills through Infrastructure Contracts, published in Gazette Notice No. 54575 of 24 April 2026.

This standard is applicable to a contract, or an order issued in terms of a framework that has a duration of 12 months or more and a contract amount exceeding R20 million in the case of an engineering and construction works, or design and build contract or an order issued in terms of such contract. The Standard is applicable to all CIDB Classes of Works.

The contractor will be required to sub-contract a minimum of 30% of the tender value to targeted enterprise/s as per the Standard for Indirect Targeting for Enterprise Development through Construction Works Contracts, published in Gazette Notice No. No. 54575 of 24 April 2026

This standard establishes a minimum contract skills development goal to be achieved in the performance of a contract in relation to the provision of different types of workplace opportunities, linked to work associated with a contract culminating in or leading to:

a) a part or full occupational qualification registered on the National Qualification Framework;

b) a trade qualification leading to a listed trade (GG No. 54575 of 24 April 2026)

c) a national diploma registered on the National Qualification Framework; and

d) registration in a professional category by one of the professional bodies listed in the standard

The standard is obtainable from the CIDB's website www.cidb.org.za

The following construction skills development goals (%) for different classes of engineering and construction works contracts will apply:

Class of construction works as identified in terms of the cidb regulation		**Construction skills development goal (%)**
Designation	Description	
CE	Civil Engineering	0.25
CE and GB	Civil Engineering and General Building	0.375
EB	Electrical Engineering work (buildings)	0.25
EP	Electrical Engineering works (infrastructure)	0.25
GB	General Building	0.5
ME	Mechanical Engineering	0.25
	Specialist works	0.25

In the case of the Standard there are no returnable documents notwithstanding the Employer shall provide the proforma documents that shall be completed by the contractors after award of the contract within the stipulated period. (Form A1 List of Recognised Skills Development Agencies, Form

A2 Baseline Training Plan, Form A3 Project Interim Report, Form A4 Supervisor Agreement, Form A5 Project Completion Report)

PRO-FORMA DOCUMENTS ARE ATTACHED AS ANNEXURE A

T2.2-32 VENDOR REGISTRATION FORM

Transnet Vendor Management has received a request to load / change your company details onto the Transnet vendor master database. Please return the completed Supplier Declaration Form (SDF) together with the required supporting documents as per Appendix A to the Transnet Official who is intending to procure your company's services / products, to enable us to process this request. Please only submit the documentation relevant to your request.

Please Note: all organisations, institutions and individuals who wish to provide goods and/or services to organs of the State must be registered on the National Treasury's Central Supplier Database (CSD). This needs to be done via their portal at https://secure.csd.gov.za/ **before applying to Transnet**.

General Terms and Conditions:

Please Note: Failure to submit the relevant documentation will delay the vendor creation / change process.

Where applicable, the respective Transnet Operating Division processing your application may request further or additional information from your company.

The Service Provider warrants that the details of its bank account ("the nominated account") provided herein, are correct and acknowledges that payments due to the Supplier will be made into the nominated account. If details of the nominated account should change, the Service Provider must notify Transnet in writing of such change, failing which any payments made by Transnet into the nominated account will constitute a full discharge of the indebtedness of Transnet to the Supplier in respect of the payment so made. Transnet will incur no liability for any payments made to the incorrect account or any costs associated therewith. In such an event, the Service Provider indemnifies and holds Transnet harmless in respect of any payments made to an incorrect bank account and will, on demand, pay Transnet any costs associated herewith.

Transnet expects its suppliers to timeously renew their Tax Clearance and B-BBEE certificates (Large Enterprises and QSEs less than 51% black owned) as well as sworn affidavits in the case of EMEs and QSEs with more than 51% black ownership as per Appendices C and D.

In addition, please note of the following very important information:

1. **If your annual turnover is R10 million or less,** then in terms of the DTI Generic Codes of Good Practice, you are classified as an Exempted Micro Enterprise (EME). If your company is classified as an EME, please include in your submission a sworn affidavit confirming your company's most recent annual turnover is less than R10 million and percentage of black ownership and black female ownership in the company (Appendix C) OR B-BBEE certificate issued by a verification agency accredited by SANAS in terms of the EME scorecard should you feel you will be able to attain a better B-BBEE score. It is only in this context that an EME may submit a B-BBEE verification certificate.

2. **If your annual turnover is between R10 million and R50 million,** then in terms of the DTI codes, you are classified as a Qualifying Small Enterprise (QSE). A QSE which is at least 51% black

owned, is required to submit a sworn affidavit confirming their annual total revenue of between R10 million and R50 million and level of black ownership (Appendix D). QSE 'that does not qualify for 51% of black ownership, are required to submit a B-BBEE verification certificate issued by a verification agency accredited by SANAS their QSEs are required to submit a B-BBEE verification certificate issued by a verification agency accredited by SANAS.

Please Note: B-BBEE certificate and detailed scorecard should be obtained from an accredited rating agency (e.g. SANAS Member).

3**. If your annual turnover exceeds R50 million,** then in terms of the DTI codes, you are classified as a Large Enterprise. Large Enterprises are required to submit a B-BBEE level verification certificate issued by a verification agency accredited by SANAS.

Please Note: B-BBEE certificate and detailed scorecard should be obtained from an accredited rating agency (e.g. SANAS Member).

4. **The supplier to furnish proof to the procurement department as required in the Fourth Schedule of the Income Tax Act. 58 of 1962** whether a supplier of service is to be classified as an "employee", "personal service provider" or "labour broker". Failure to do so will result in the supplier being subject to employee's tax.

5. **No payments can be made to a vendor until the** vendor has been registered / updated, and no vendor can be registered / updated until the vendor application form, together with its supporting documentation, has been received and processed**.** No payments can be made to a vendor until the vendor has met / comply with the procurement requirements.

6. It is in line with PPPFA Regulations, only valid B-BBBEE status level certificate issued by an unauthorised body or person OR a sworn affidavit as prescribed by the B-BBEE Codes of Good Practice, OR any other requirement prescribed in terms of the Broad- Based Black Economic Empowerment Act.

7. As per the communique dated 04 March 2016 addressed to the **Members of the IRBA**, as of **30 September 2016**, the IRBA will no longer be the 'Approved Regulatory Body' as per Code Series 000, Statement 005 of the Codes of Good Practice. Any entity that seeks to apply for B-BBEE Accreditation to issue B-BBEE Verification Certificates post 30 September 2016 or wishes to participate in the B-BBEE Verification Industry must thus follow the Code Series 000, Statement 005, Section 5 of the Codes of Good Practice application process to the Accreditation Body (SANAS).'

APPENDIX A

Supplier Declaration Form

Important Notice: all organisations, institutions and individuals who wish to provide goods and/or services to organs of the State must be registered on the National Treasury Central Supplier Database (CSD). This needs to be done via their portal at https://secure.csd.gov.za/ **before applying to Transnet**.	
CSD Number (MAAA xxxxxxx):	

Company Trading Name						
Company Registered Name						
Company Registration No Or ID No If a Sole Proprietor						
Company Income Tax Number						
Form of Entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
	Non-profit (NPO's or NPC)	Personal Liability Co	State Owned Co	National Govt	Provincial Govt	Local Govt
	Educational Institution	Specialised Profession	Financial Institution	Joint Venture	Foreign International	Foreign Branch Office

Did your company previously operate under another name?	Yes		No	
If **YES** state the previous details below:				
Trading Name				
Registered Name				
Company Registration No Or ID No If a Sole Proprietor				

Form of Entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
	Non-profit (NPO's or NPC)	Personal Liability Co	State Owned Co	National Govt	Provincial Govt	Local Govt
	Educational Institution	Specialised Profession	Financial Institution	Joint Venture	Foreign International	Foreign Branch Office

Your Current Company's VAT Registration Status	
VAT Registration Number	
If **Exempted from VAT registration,** state reason and submit proof from SARS in confirming the exemption status	
If your business entity is not VAT Registered, please submit a current original sworn affidavit (see example in Appendix I). Your Non VAT Registration must be confirmed annually.	

Company Banking Details	Bank Name	

Universal Branch Code		Bank Account Number	

Company Physical Address			
		Code	
Company Postal Address			
		Code	
Company Telephone number			
Company Fax Number			
Company E-Mail Address			
Company Website Address			

Company Contact Person Name	
Designation	
Telephone	
Email	

Is your company a Labour Broker?		Yes		No			
Main Product / Service Supplied e.g. Stationery / Consulting / Labour etc.							
How many personnel does the business employ?	Full Time		Part Time				
Please Note: Should your business employ more than 2 full time employees who are not connected persons as defined in the Income Tax Act, please submit a sworn affidavit, as per Appendix II.							

Most recent Financial Year's Annual Turnover	<R10Million		>R10Million <R50Million		>R50Million	

Does your company have a valid B-BBEE certificate?				Yes		No			
Please indicate your Broad Based BEE status (Level 1 to 9)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Majority Race of Ownership									

% Black Ownership		% Black Women Ownership		% Black Disabled person(s) Ownership		% Black Youth Ownership	
% White Ownership		% Indian Ownership		% Coloured Ownership			

Please Note: Please provide proof of B-BBEE status as per Appendix C. If you qualify as an EME or QSE then provide an affidavit following the templates provided in **Appendix C and D** respectively. If you have indicated Black Disabled person(s) ownership, then provide a **certified** letter signed by a physician, on the physician's letterhead, confirming the disability. A certified South African Identification Document will be required for all Black Youth Ownership.

Supplier Development Information Required		
EMPOWERING SUPPLIER	YES ○	NO ○
FIRST TIME SUPPLIER	YES ○	NO ○

SUPPLIER DEVELOPMENT PLAN	YES NO
DEVELOPMENT PLAN DOCUMENT	* If Yes- Attach supporting documents
ENTERPRISE DEVELOPMENT BENEFICIARY	YES NO
SUPPLIER DEVELOPMENT BENEFICIARY	YES NO
GRADUATION FROM ED TO SD BENEFICIARY	YES NO
ENTERPRISE DEVELOPMENT RECIPIENT	YES NO

By signing below, I hereby verify that I am duly authorised to sign for and on behalf of firm / organisation and that all information contained herein and attached herewith are true and correct			
Name and Surname		Designation	
Signature		Date	

APPENDIX B

Affidavit or Solemn Declaration as to VAT registration status

Affidavit or Solemn Declaration

I, _____ solemnly swear/declare that _____ is not a registered VAT vendor and is not required to register as a VAT vendor because the combined value of taxable supplies made by the provider in any 12 month period has not exceeded or is not expected to exceed R1million threshold, as required in terms of the Value Added Tax Act.

Signature: _____

Designation: _____

Date: _____

Commissioner of Oaths

Thus signed and sworn to before me at _____ on this the _____ day of _____ 20_____,

the Deponent having knowledge that he/she knows and understands the contents of this Affidavit, and that he/she has no objection to taking the prescribed oath, which he/she regards binding on his/her conscience and that the allegations herein contained are all true and correct.

_____
Commissioner of Oaths

APPENDIX C

SWORN AFFIDAVIT – B-BBEE EXEMPTED MICRO ENTERPRISE

I, the undersigned, _____

Full name & Surname	
Identity number	

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.
2. I am a Member / Director / Owner of the following enterprise and am duly authorised to act on its behalf:

Enterprise Name:	
Trading Name (If Applicable):	
Registration Number:	
Enterprise Physical Address:	
Type of Entity (CC, (Pty) Ltd, Sole Prop etc.):	
Nature of Business:	
Definition of "Black People"	As per the Broad-Based Black Economic Empowerment Act 53 of 2003 as Amended by Act No 46 of 2013 "Black People" is a generic term which means Africans, Coloureds and Indians – (a) who are citizens of the Republic of South Africa by birth or descent; or (b) who became citizens of the Republic of South Africa by naturalisations - i. before 27 April 1994; or

	ii. on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalization prior to that date;"
Definition of "Black Designated Groups"	"Black Designated Groups means: a) unemployed black people not attending and not required by law to attend an educational institution and not awaiting admission to an educational institution; b) Black people who are youth as defined in the National Youth Commission Act of 1996; c) Black people who are persons with disabilities as defined in the Code of Good Practice on employment of people with disabilities issued under the Employment Equity Act; d) Black people living in rural and under developed areas; e) Black military veterans who qualifies to be called a military veteran in terms of the Military Veterans Act 18 of 2011;"

3. I hereby declare under Oath that:

- The Enterprise is _____% Black Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Female Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Designated Group Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- Black Designated Group Owned % Breakdown as per the definition stated above:
    - Black Youth % = _____%
    - Black Disabled % =_____%
    - Black Unemployed % =_____%
    - Black People living in Rural areas % = _____%
    - Black Military Veterans % =_____%
- Based on the Financial Statements/Management Accounts and other information available on the latest financial year-end of _____, the annual Total Revenue was R10,000,000.00 (Ten Million Rands) or less

- Please Confirm on the below table the B-BBEE Level Contributor, **by ticking the applicable box.**

100% Black Owned	**Level One** (135% B-BBEE procurement recognition level)	
At least 51% Black Owned	**Level Two** (125% B-BBEE procurement recognition level)	
Less than 51% Black Owned	**Level Four** (100% B-BBEE procurement recognition level)	

4. I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the Owners of the Enterprise which I represent in this matter.
5. The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

Deponent Signature

……

Date **……**

_____

Commissioner of Oaths
Signature & stamp

APPENDIX D

SWORN AFFIDAVIT – QUALIFYING SMALL ENTERPRISE – GENERAL

I, the undersigned, _____

Full name & Surname	
Identity number	

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.
2. I am a Member / Director / Owner of the following enterprise and am duly authorised to act on its behalf:

Enterprise Name:	
Trading Name (If Applicable):	
Registration Number:	
Enterprise Physical Address:	
Type of Entity (CC, (Pty) Ltd, Sole Prop etc.):	
Nature of Business:	
Definition of "Black People"	As per the Broad-Based Black Economic Empowerment Act 53 of 2003 as Amended by Act No 46 of 2013 "Black People" is a generic term which means Africans, Coloureds and Indians – a) who are citizens of the Republic of South Africa by birth or descent; or b) who became citizens of the Republic of South Africa by naturalisation. i. before 27 April 1994; or ii. on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalization prior to that date;"
Definition of "Black Designated Groups"	"Black Designated Groups means: a) unemployed black people not attending and not required by law to attend an educational institution and not awaiting admission to an educational institution; b) Black people who are youth as defined in the National Youth Commission Act of 1996; c) Black people who are persons with disabilities as defined in the Code of Good Practice on employment of people with disabilities issued under the Employment Equity Act; d) Black people living in rural and under developed areas; e) (e) Black military veterans who qualifies to be called a military f) veteran in terms of the Military Veterans Act 18 of 2011;"

3. I hereby declare under Oath that:

- The Enterprise is _____% Black Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,

- The Enterprise is _____% Black Female Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Designated Group Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- Black Designated Group Owned % Breakdown as per the definition stated above:

    - Black Youth % = _____%
    - Black Disabled % =_____%
    - Black Unemployed % =_____%
    - Black People living in Rural areas % = _____%
    - Black Military Veterans % =_____%

- Based on the Financial Statements/Management Accounts and other information available on the latest financial year-end of _____, the annual Total Revenue was between R10,000,000.00 (Ten Million Rands) and R50,000,000.00 (Fifty Million Rands),

- Please confirm on the table below the B-BBEE level contributor, **by ticking the applicable box.**

100% Black Owned	**Level One** (135% B-BBEE procurement recognition level)	
At Least 51% black owned	**Level Two** (125% B-BBEE procurement recognition level)	

4. I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the owners of the enterprise which I represent in this matter.
5. The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

Deponent Signature

.....

Date .....

_____

Commissioner of Oaths
Signature & stamp

VENDOR REGISTRATION DOCUMENTS CHECKLIST

Please note that you will have to provide the first two documents on the list and the rest will be provided by the supplier:

	Yes	No
1. Complete the "Supplier Declaration Form" (SDF) (commissioned). See attachment.		
2. Complete the "Supplier Code of Conduct" (SCC). See attachment.		
3. Copy of cancelled cheque OR letter from the bank verifying banking details (with **bank stamp not older than 3 Months & sign by Bank Teller**).		
4. Certified (**Not Older than 3 Months**) copy of Identity document of Shareholders/Directors/Members (where applicable).		
5. Certified copy of certificate of incorporation, CM29 / CM9 (name change).		
6. Certified copy of share Certificates of Shareholders, CK1 / CK2 (if CC).		
7. A letter with the company's letterhead confirming both **Physical** and **Postal** address.		
8. Original or certified copy of SARS Tax Clearance certificate and Vat registration certificate.		
9. BBBEE certificate and detailed scorecard from a **SANAS** Accredited Verification Agency and/or Sworn Certified Affidavit.		

10. Central Supplier Database (CSD) Summary Registration Report.		

C1.1: Form of Offer & Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:

For the provision & construction of the dust suppression system to Transnet Soc Ltd (reg.no.1990/000900/30) operating as Transnet Port Terminals herein after referred to as "TPT" at the bulk terminal of Saldanha, for a period of twelve (12) months

The tenderer, identified in the Offer signature block, has

either	examined the documents listed in the Tender Data and addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Tender.
or	examined the draft contract as listed in the Acceptance section and agreed to provide this Offer.

By the representative of the tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance the tenderer offers to perform all of the obligations and liabilities of the *Contractor* under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the *conditions of contract* identified in the Contract Data.

The offered total of the Prices exclusive of VAT is	**R**
Value Added Tax @ 15% is	**R**
The offered total of the Prices inclusive of VAT is	**R**
(in words)	

This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, whereupon the tenderer becomes the party named as the *Contractor* in the *conditions of contract* identified in the Contract Data.

Signature(s) .....

Name(s) .....

Capacity .....

For the tenderer:

.....

(Insert name and address of organisation)

Name & signature of witness .....

Date .....

Tenderer's CIDB registration number:

Acceptance

By signing this part of this Form of Offer and Acceptance, the *Employer* identified below accepts the tenderer's Offer. In consideration thereof, the *Employer* shall pay the *Contractor* the amount due in accordance with the *conditions of contract* identified in the Contract Data. Acceptance of the tenderer's Offer shall form an agreement between the *Employer* and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part C1	Agreements and Contract Data, (which includes this Form of Offer and Acceptance)
Part C2	Pricing Data
Part C3	Scope of Work: Works Information
Part C4	Site Information

and drawings and documents (or parts thereof), which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The tenderer shall within two weeks of receiving a completed copy of this agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the *conditions of contract* identified in the Contract Data at, or just after, the date this agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any).

Unless the tenderer (now *Contractor*) within five working days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the Parties.

Signature(s)			
Name(s)			
Capacity			
for the Employer	Transnet SOC Ltd		
	(Insert name and address of organisation)		
Name & signature of witness		Date	

Schedule of Deviations

Note:

1. To be completed by the Employer prior to award of contract. This part of the Offer & Acceptance would not be required if the contract has been developed by negotiation between the Parties and is not the result of a process of competitive tendering.
2. The extent of deviations from the tender documents issued by the Employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender.
3. A tenderer's covering letter must not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid be the subject of agreement reached during the process of Offer and Acceptance, the outcome of such agreement shall be recorded here and the final draft of the contract documents shall be revised to incorporate the effect of it.

No.	Subject	Details
1		
2		
3		
4		
5		

By the duly authorised representatives signing this Schedule of Deviations below, the Employer and the tenderer agree to and accept this Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules, as well as any confirmation, clarification or changes to the terms of the Offer agreed by the tenderer and the Employer during this process of Offer and Acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Form shall have any meaning or effect in the contract between the parties arising from this Agreement.

	For the tenderer:	**For the Employer**
Signature	.....	.....
Name	.....	.....
Capacity	.....	.....
On behalf of	*(Insert name and address of organisation)*	Transnet SOC Ltd
Name & signature of witness	.....	.....
Date	.....	.....

PART 2: PRICING DATA

Document reference	Title	No of pages
C2.1	Pricing instructions: Option B	8
C2.2	The *bill of quantities*	49

C2.1 Pricing instructions: Option B

1. The *conditions of contract*

1.1. How the contract prices work and assesses it for progress payments

Clause 11 in NEC3 Engineering and Construction Contract, June 2005 (ECC3) Option B states:

Identified and defined terms 11 11.2

(21) The Bill of Quantities is the *bill of quantities* as changed in accordance with this contract to accommodate implemented compensation events and for accepted quotations for acceleration.
(22) Defined Cost is the cost of the components in the Shorter Schedule of Cost Components whether work is subcontracted or not excluding the cost of preparing quotations for compensation events.
(28) The Price for Work Done to Date is the total of

- the quantity of the work which the *Contractor* has completed for each item in the Bill of Quantities multiplied by the rate and
- a proportion of each lump sum which is the proportion of the work covered by the item which the *Contractor* has completed.

Completed work is work without Defects which would either delay or be covered by immediately following work.

(31) The Prices are the lump sums and the amounts obtained by multiplying the rates by the quantities for the items in the Bill of Quantities.

This confirms that Option B is a re-measurement contract and the bill comprises only items measured using quantities and rates or stated as lump sums. Value related items are not used. Time related items are items measured using rates where the rate is a unit of time.

1.2. Function of the Bill of Quantities

Clause 55.1 in Option B states, "Information in the Bill of Quantities is not Works Information or Site Information". This confirms that instructions to do work or how it is to be done are not included in the Bill, but in the Works Information. This is further confirmed by Clause 20.1 which states, "The *Contractor* Provides the Works in accordance with the Works Information". Hence the *Contractor* does **not** Provide the Works in accordance with the Bill of Quantities. The Bill of Quantities is only a pricing document.

1.3. Guidance before pricing and measuring

Employers preparing tenders or contract documents, and tendering contractors are advised to consult the sections dealing with the bill of quantities in the NEC3 Engineering and Construction Contract (June 2005) Guidance Notes before preparing the *bill of quantities* or before entering rates and lump sums into the *bill*.

Historically bill of quantities based contracts in South Africa have been influenced by the different approaches of the civil engineering and building sectors of the industry through their respective discipline based standard forms of contract and methods of measurement. This is particularly apparent in the approach to the Preliminary and General bill. On the other hand, because ECC3 caters for a number of disciplines in the same contract, including electrical works, a different approach not currently found in local methods of measurement to the Preliminary & General bill items may have been used.

The NEC approach to the P & G bill assumes use will be made of method related charges for Equipment applied to Providing the Works based on durations shown in the Accepted Programme, fixed charges for the use of Equipment that is required throughout the construction phase, time related charges for people working in a supervisory capacity for the period required, and lump sum charges for other facilities or services not directly related to performing work items typically included in other parts of the bill.

1.4 Contract Skills Development Goal (CSDG)

The contractor shall determine the contract skills participation goals, expressed in Rand, which shall not be less than the contract amount multiplied by a percentage (0.25%) factor given in the final tender summary of the Bill of Quantities below.

The contractor shall achieve the measurable contract skills development goal by providing opportunities to learners requiring structured workplace learning using one or a combination of any of the following in relation to work directly related to the contract or order:

Method 1: structured workplace learning opportunities for learners towards the attainment of a part or a full occupational qualification;

Method 2: structured workplace learning opportunities for apprentices or other artisan learners towards the attainment of a trade qualification leading to a listed trade (GG No. 35625, 31 August 2012) subject to at least 60% of the artisan learners being holders of public TVET college qualifications;

Method 3: structured workplace experience for University of Technology or Comprehensive University students requiring work integrated learning as part of their national diploma or degree programme, and/or learners that have completed N4, N5 and N6 that require 18 months of relevant workplace experience to convert their qualification into a National Diploma.

Method 4: structured workplace learning opportunities for candidates towards registration in a professional category by a statutory council listed in Table 1 below.

Table 1: Categories of registration

Profession	Category of registration	Act
Architectural	Architect, Senior Architectural Technologist, Architectural Technologist or Architectural Draughtsperson	Architectural Profession Act of 2000 (Act No. 44 of 2000)
Construction Health and Safety	Construction Health and Safety Agent, Construction Health and Safety Manager or Construction Health and Safety Officer	Project and Construction Management Professions Act of 2000 (Act No. 48 of 2000)
Construction Project Management	Construction Project Manager	
Construction Management	Construction Manager	
Engineering	Engineer, Engineering Technologist, Engineering Technician or Certificated Engineer	Engineering Profession Act of 2000 (Act No. 46 of 2000)
Landscape Architectural	Landscape Architect, Landscape Technologist, Landscape Technician or Landscape Assistant	Landscape Architectural Profession Act of 2000 (Act No. 45 of 2000)
Planning	Planner or Technical planner	Planning Profession Act, 2002. (Act No. 36 of 2002)

Quantity Surveying	Quantity Surveyor	Quantity Surveying Profession Act of 2000 (Act No. 49 of 2000)
Scientists	Natural Scientists	Natural Scientific Professions Act (Act No. 27 of 2003)
Surveying	Land Surveyor, Engineering Surveyor or Technician Engineering Surveyor	Professional and Technical Surveyors' Act (Act No. 40 of 1984)
Valuers	Valuer or Associate Valuer	Property Valuers Profession Act (Act No. 47 of 2000)

Employed learners may not account for more than 33 percent of the contract skills development goal.

Not more than one method may be applied to any individual concurrently in the calculation of the contract skills development goal.

The Employer may determine the skills Methods to be implemented on the contract or the Employer may elect the contractor to determine the skills Methods to be implemented as per the Standard, provided the CSDG is achieved. The pricing for the skills Methods to be implemented is provided in Table 3 of the Standard for the applicable class of construction works.

Table 3: The notional cost of providing training opportunities per month

Type of Training Opportunity	Provision for stipends (Unemployed learners only)	Provisions for mentorship	Provisions for additional costs*	Total costs	
				Unemployed learners	Employed learners
Method 1					
Occupational qualification	R5 000	N/A	R3 000	R8 000	R3 000
Method 2					
TVET College graduates	R7 000	N/A	R3 000	R10 000	N/A
Apprenticeship	R7 000	N/A	R4 000	R11 000	R4 000
Method 3					
P1 and P2 learners, or a 240 credits qualification	R9 000	R7 000	R2 000	R18 000	N/A
Method 4					
Candidates with a 360 credits qualification	R13 000	R7 000	R2 000	R22 000	R7 000
Candidates with 480 or more credits qualification	R16 000	R7 000	R2 000	R25 000	R7 000

***Provision for additional Costs include provisions for personal protective equipment, insurance, medical assessments, course fees and trade tools (where applicable), assessment, reporting, monitoring and other related costs.**

NOTE: i) the contractor shall pay the stipend directly to learners, employed learners receive a salary/wage therefore the stipend is not applicable. The notional cost of providing training opportunities will be reviewed as and when required. The new, revised costs will be published as revised in a Gazette notice.

Example: Training Target Calculation for a R65,7m GB contract

Final Summary Sub-total R65 700 000
Contract duration 12 Months
Percentage Factor 0,50%
Minimum CSDG target 0,50% x R65 700 000

R328 500

In order to determine the number of training opportunities to be provided on the above budget allocation of R328 500. Where the client/contractor preference is Method 4 for a duration of 12 months. The notional cost of training will be calculated as follows:

Method 4 (360 credits):
St - Stipend per month : R13 000
Mt – Mentorship per month : R7 000
PaC - Provision for additional cost : R2 000
NCT – Notional Cost of Training : Duration x (St + Mt +PaC)
Duration in this case is 12 months.

NCT = 12 x (R13 000 + R7 000 + R2 000)
= R 264 000

Therefore R328 500 divided by R264 000 = 1,24, so the budget can only provide 1 opportunity for Method 4 for a duration of 12 months. This will leave you with a balance of R 64 500, you can then utilize that to train one person for a period of 7 months on Method 2.

Method 2:
St - Stipend per month : R7 000
PaC - Provision for additional cost : R3 000
NCT – Notional Cost of Training : Duration x (St + PaC)
Duration in this case is 7 months.

NCT = 7 x (R7 000 + R3 000)
= R 70 000

Note:- The contractor must attain or exceed the contract skills development goal in the performance of the contract or the execution of an order. In this example the contractor needs to spend a minimum of R 328 500. Therefore, the total notional cost of training for Method 4 and Method 2 is equal to R334 000. The contractor must initiate a negotiation process with the Client to increase the budget or reduce the placement duration to suit the available CSDG budget.

Skills Method	Number of learners	Notional Cost / Learner / month	Placement Duration in months	Total Notional Cost over 12 months Contract
Method 4: Candidacy for an unemployed learner with a 3-year qualification (360 credit)	1	R22 000	12	R264 000
Method 2: Workplace learning opportunities, with unemployed TVET graduates	1	R10 000	7	R 70 000
Total	2			R334 000

Based on the agreed skills methods, the employer shall make provision for payment to the contractor for learner and candidate stipends for unemployed persons and a provision for additional cost such as medical assessments, personal protective equipment, tools and course fee for example skills programmes, pre trade test training and registration support programmes as indicated in Table 3 in the Standard as provided in the Final Tender Summary section for the CSDG.

Provision of payment to Mentors

Payment to the contractor for Mentorship to accommodate Work Integrated Learners (Method 3) and Candidates for professional registration (Method 4) only.

The contractor shall be paid as follows:
Should Work Integrated Learners and/or Candidates for professional registration form part of the agreed skills Method, the Employer shall make provision for payment of the mentor as indicated in Table 3 in the Standard.
Mentoring associated with structured workplace learning for candidates shall be in accordance with the prescripts of the relevant professional body or statutory council.

The contractor shall carry out all the requirements under clause 4.3 Structured Workplace Learning for Candidates in the Standard. The contractor shall:
a) Identify a suitable mentor for the candidate.
b) Issue each candidate with a portfolio of evidence file.
c) Ensure the mentor provides an updated workplace training plan for a candidate.

2. Measurement and payment

2.1. Symbols

The units of measurement described in the Bill of Quantities are metric units abbreviated as follows:

Abbreviation	Unit
%	percent
h	hour
ha	hectare
kg	kilogram
kl	kilolitre
km	kilometre
km-pass	kilometre-pass
kPa	kilopascal
kW	kilowatt
l	litre
m	metre
mm	millimetre
m^2	square metre
m^2-pass	square metre pass
m^3	cubic metre
m^3-km	cubic metre-kilometre
MN	meganewton
MN.m	meganewton-metre
MPa	megapascal
No.	number
Prov sum[1]	provisional sum

[1] Provisional Sums should not be used unless absolutely unavoidable. Rather include specifications and associated bill items for the most likely scope of work, and then change later using the compensation event procedure if necessary. This is because tenderers cannot programme effectively for unknown

PC-sum	prime cost sum
R/only	Rate only
sum	Lump sum
t	ton (1000kg)
W/day	Workday

2.2. General assumptions

2.2.1. Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance has been made in the quantities for waste.

2.2.2. The Prices and rates stated for each item in the Bill of Quantities shall be treated as being fully inclusive of all work, risks, liabilities, obligations, overheads, profit and everything necessary as incurred or required by the *Contractor* in carrying out or providing that item.

2.2.3. Clause 63.13 in Option B provides that these rates and Prices may be used as a basis for assessment of compensation events instead of Defined Cost.

2.2.4. Where this contract requires detailed drawings, designs or other information to be provided, and no rates or prices are included in the *bill* specifically for such matters, then the *Contractor* is deemed to have allowed for all costs associated with such requirements within the tendered rates and Prices in the Bill of Quantities.

2.2.5. An item against which no Price is entered will be treated as covered by other Prices or rates in the *bill of quantities*. If a number of items are grouped together for pricing purposes, this will be treated as a single lump sum.

2.2.6. The quantities contained in the Bill of Quantities may not be final and do not necessarily represent the actual amount of work to be done. The quantities of work assessed and certified for payment by the *Project Manager* at each assessment date will be used for determining payments due and not the quantities given in the Bill of Quantities.

2.2.7. The short descriptions of the items of payment given in the *bill of quantities* are only for the purposes of identifying the items. More detail regarding the extent of the work entailed under each item is provided in the Works Information.

2.3. Departures from the *method of measurement*

2.3.1. None

2.4. Amplification of or assumption about measurement items

2.4.1. In the event of any ambiguity or inconsistency between the statements in the method of measurement and this section, the interpretation given in section 2 above sh

scopes of work.

C2.2 The *Bill of Quantities*

Please see attached Bill of quantities as a spreadsheet format

PART C3: WORKS

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	This cover page	1
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1 DESCRIPTION OF THE WORKS

1.1 Background

The Bulk Terminal of Saldanha is an Iron Ore Terminal, which is responsible for offloading, storing and exporting different grades of Iron Ore.

Iron ore is offloaded at the Tipplers, from the Tipplers, it can be transported via conveyor belts to the Stacker / Reclaimers where the ore is stacked and stored in the stockyard in the form of a stockpile, or it can be directly transported to the Ship Loaders where it is loaded directly onto a vessel for exporting purposes. The Iron Ore can also be reclaimed from the stockpiles through the Stacker / Reclaimers from where it is transported by conveyor belts to the Ship Loaders to be exported.

A common problem associated with handling iron ore is dust generation. Dust is intrinsic to all grades of iron ore currently being handled by the Bulk Terminal of Saldanha. Transnet has initiated the project of upgrading the existing dust suppression system in the Saldanha Terminal. The upgrade of the dust suppression system/chemical dosing plants is one of the primary projects for limiting dust emissions on the conveyor routes within Bulk Terminal of Saldanha.

There are two wet systems to control fugitive dust during the materials handling process, which are the following dust prevention techniques / methods:

- Dust suppression
- Dust prevention

Dust suppression: Moisture is added to the air to capture dust particles that are already airborne. Dust suppression is applied close to the handling process (like offloading) with a water / chemical mixture by suppressing the dust (lower volumes of water at high pressure).

Dust prevention: Moisture content in the material is increased to prevent dust from being airborne.Dust prevention is a treatment method, a water / chemical mixture used after the apron extractor that acts as a binder (higher volumes of water at lower pressure). Being low pressure, the droplets are muchcoarser, so this is more accurately described as a wetting system rather than a misting system. This willensure the dust is bound with the larger particles when it gets stored at the stockpiles. This also has theadvantage that iron ore particles remain bound and do not vanish off site.

These systems use spray nozzles to apply water and/or chemicals such as wetting, foaming and binding agents to dust particles. However, the system configuration varies depending on the goal – dust prevention or airborne dust suppression. Most operations require both prevention and suppression for the effective control of dust. The purpose of the wetting sprays and atomiser sprays is to trap the dust particles by bonding them with the water particles and increase their mass in the surrounding atmosphere at the transfer chutes. This causes the dust particles to settle.

The aim of this project is to address one of the Terminal’s main sources of dust generation. The project intends to equip the terminal with effective dust suppression and prevention systems that will allow the Terminal to minimise or eliminate dust incidences that occur while handling iron ore.

1.2 Employer’s Objectives

Transnet is implementing this project with the intention of achieving key objectives. The key objectives which Transnet (the *Employer*) intends to achieve can be summarised as following:

- To reduce and eventually eliminate the spread of the airborne iron ore dust within the Saldanha Terminal and within the surrounding nearby towns.
- To comply with the environmental authorities in relation to dust containment in the terminal.
- To ensure that the safety of Transnet employees, customers, external port users and visitors are well taken care of at all times.
- To improve the efficiency of the existing dust suppression systems of the terminal.
- To eliminate water wastage by installing water monitors in key areas of the plant.

1.3 Terminology and Abbreviations

The following terminology is used in this Works Information:

Table 1: Terminology

Employer	The Employer in this document refers to Transnet Port Terminal (TPT). The Employer is the sponsor of the project and shall provide all the necessary support for the project team.
Project Manager	The Project Manager refers to the manager appointed by the Employer to manage the planning, designing, execution, controlling & commissioning of the project in-line with Transnet Project Lifecycle Process (PLP).
Main Contractor	The Main Contractor refers to the construction company appointed, responsible for the execution of the entire project scope of Upgrading the Dust Suppression System for Saldanha terminal as outlined in this Works Information.
Sub-Contractor	A person, contractor or organization appointed by the Main Contractor to supply, design, install or construct some or parts of the Works.
Works	This refers to the actual work, which the Main Contractor is required to perform as outlined in the scope of works.
Work Information	Information which specifies and describes the actual Works which need to be executed by the Main Contractor.
Programme	It outline practical approach to the execution of the Works and contain information such as among others; timelines associated with procurement events, phase completion, key delivery dates, acceleration and project completion.
Engineering Consultant	The Engineering Consultant are the external engineers that will provide technical resources to ensure that the project is execution in-accordance to the approved designs and in-line with the project scope.
Delivery Place	This is the construction site of the Dust Suppression System. Delivery place can also refer to a specific delivery place within the terminal around the construction site.
Works	This refers to the actual work, which the Main Contractor is required to perform as outlined in the scope of works.

The following abbreviations are used in this Works Information:

Table 2: Abbreviations

Abbreviation	Meaning given to the abbreviation
BTS	Bulk Terminal Saldanha
EO	Environmental Officer
IR	Industrial Relation
Native	Original electronic file format of documentation
PHA	Preliminary Hazard Assessment
CM	Construction Manager
QA	Quality Assurance
SANS	South African National Standards
HDPE	High-density polyethylene
PLC	Programmable Logic Controller
SES	Standard Environmental Specifications
CSHEO	Contractor’s Safety, Health and Environmental Officer
DWG	Drawings
SHE	Safety, Health and Environment
SIP	Site Induction Programme
AEL	Atmospheric Emissions License
IOT	Iron Ore Terminal
PLP	Project Lifecycle Process
CCR	Central Control Room
EMD-S	Environmental Management Dust Suppressant
ROP	Reserve Osmosis Plant
BOM	Bill of Material
TPT	Transnet Port Terminal
MEI	Mechanical, Electrical and Instrumentation

MCC	Motor Control Center

1.4 Existing Infrastructure and Equipment

1.4.1 Wagons & Rail

Iron ore rakes approaching the Tipplers consist of 116 wagons (CR13/CR14) pulled by a diesel locomotive. Each wagon has a tare weight of approximately 20 tons and are loaded with approximately 100 tons of iron ore.

1.4.2 Tipplers

The Bulk Terminal of Saldanha (BTS) has two dual tandem rotary tipplers to unload iron ore from train wagons (collectively called the rake). A Positioner is used to position the wagons in the Drum. The Drum rotates to unload the iron ore into Hopper Bins below the Drum. Apron Feeders control the flow ofiron ore from the Hoppers onto the conveyor belts.

1.4.3 Conveyors

Conveyor belts are used to transport various grades of iron ore from the Tipplers to the Stacker/Reclaimers for stacking onto stockpiles, which is then reclaimed by the Stacker/Reclaimers at a later stage and transported via the conveyor belts to the Ship Loaders for offloading onto the vessels for export.

1.4.4 Stacker Reclaimers

The Bulk Terminal of Saldanha has four (4) Stacker/Reclaimers that are used to stack iron ore received from the Tipplers onto the various stockpiles and reclaim the iron ore at a later stage for export to the Ship Loaders. The Stacker/Reclaimer routes can also be used for direct loading between the Tipplers and the Ship Loaders.

1.4.5 Ship Loaders

The Bulk Terminal of Saldanha has two Ship Loaders that receive iron ore directly from the Tipplers or from the Stacker/Reclaimers that are then loaded onto vessels for export.

1.5 Scope of Works

The key project objective is to implement improved dust suppression (and prevention) systems at the Bulk Terminal in the Port of Saldanha.

1.5.1 Scope Summary

The project scope is summarised below. However, scope of work breakdown is provided in Section The Scope Summary should be read in conjunction with the Scope of Works Breakdown as reflected in Section 1.6.

- Supply and construct One (1) separate dosing plant with the open pond next to Siyaphambili to apply chemical dosing at the conveyor transfer points.
- Supply and install the required pipes (above ground and buried), fittings and supports as part of construction of the one dosing plant next to Siyaphambili.
- Replacing of damaged/none functioning Atomizing Sprayers at the transfer points.
- Replacing of damaged/none functioning flow meters at the stockpile area.
- Installation of PLC and control equipment, including all require communication cabling.
- Connecting controls of the new dosing plant to enable feedback to the Central Control Room (CCR).
- Installation of new local control stations (shipside) for manually adjusting the chemical injection rates.
- Installation of Bulk Electrical Supply, including all electrical equipment and cabling.

- Installation of Main Control Panel for the new dosing plant next to Siyaphambili.
- Minor refurbish the existing dosing plants in order to reduce maintainable equipment.
- Testing & commissioning the dosing system as well as training of nominated Transnet employees.

1.6 Scope of Works Breakdown

The Project has two components under one contract, as follows:

- Civil & Building Works.
- Mechanical, Electrical and Instrumentation (MEI) Works.

The objective of the Civil & Building Works will be to do the building civil works and construct the building required to contain water tanks and pump station equipment and bunded area for the chemical tanks. The objective of the MEI Works will be to install the pump station, pipework and chemical dosing system. This includes the installation of the electrical equipment and instrumentation. This should be read in conjunction with the specifications, drawings, Bill of Quantities (BOQ), etc. contained in the annexures.

1.6.1 Activities Breakdown

1.6.1.1 1st Activity: Contractor's Laydown Area:

- The area south of the iron ore stockyard area will be allocated to the contractor/s for site establishment.
- This area is closer to the working site for the proposed shipside dosing plant, near Siyaphambili.

1.6.1.2 2nd Activity: Topographical Survey/Field Investigations:

- The Contractor shall undertake/perform the necessary field investigations in key areas of contraction activities. The topographical survey/field investigation should check for any underground services at the proposed construction site.
- The objective of the field investigations is to verify the existing underground information or conditions but also to check for any unknown possible obstacles that can hinder the successful completion of this project.

1.6.1.3 3rd Activity: Construction of the new shipside Dosing plant

- The shipside dosing plant will be the first to be constructed.
- The proposed dosing plant will be constructed on a vacant land on the open pond, next to Siyaphambili.
- A small underground camera cable was dictated during cable dictating exercise.
- The cable is not a risk since its small and will be easily re-routed by the contractor prior construction.

1.6.1.4 4th Activity: Minor Refurbish the existing Dosing plants

- Assess the conditions of all the dosing plants and identify all parts that require replacement.
- Engagement of key stakeholders on refurbishment strategy.
- Undertake minor refurbishment of the dosing plants.

1.6.1.5 5th Activity: Replacement & Installation of new flow meters and atomising sprayers.

- Assess the condition of all Flow Meters & Atomising sprayers
- Remove damaged Flow Meters & Atomising sprayers
- Install new Flow Meters & Atomising sprayers.

1.6.1.6 6th Activity: Commissioning the New Dosing Systems:

- Endurance testing will be conducted to the newly installed dust suppression system.
- The final commissioning of the system will take place when other activities associated with the refurbishment of the existing dosing plants have been completed.

1.6.1.7 7th Activity: Handover and Close Out:

- Prior to hand-over, the project team will ensure that all construction & design documents are in place and that all completed works have been verified.
- Contractor to submit hand-over pack to the Project Manager.
- Project Manager to ensure that the project close-out both practically & administratively.

1.6.2 Civil & Building Works

1.6.2.1 Construction of Pump Buildings

Site Investigations

- Geotechnical & Topographical

Civil Works

- Site preparation and levelling
- Raise building level and address storm water
- Installation of bulk water supply and drainage systems

Building and Structural Works

- Building foundations
- Concrete works and slabs
- Concrete wall and plinths
- Structural support frame
- Building roof structure
- Building cladding, sheeting and roof
- Doors, platforms and stairs

1.6.3 Mechanical, Electrical and Instrumentation (MEI)

1.6.3.1 Installation of Mechanical Systems

Pump Station

- Design and workshop drawings for pump station
- Installation of internal pipes and tanks
- Installation of valves and fittings
- Installation of water and dosing pumps

Pipe Lines

- Design and workshop drawings for pipework
- Installation of external pipes and fittings
- Installation of fittings, valves and nozzles
- Setting and fine tuning of mechanical system

1.6.3.2 Installation of Electrical Systems

Electrification

- Installation of Bulk Electrical Supply
- Installation of Main Control Panel
- Installation of wire ways, cable ladders and trunking
- Electrical reticulation to various pumps and equipment
- Earthing of building, MCC and all equipment
- Testing and commissioning

Instrumentation

- Installation of sensors and monitoring equipment
- Cabling and interconnection of control equipment
- Settings and fine tuning for optimisation
- Testing and commissioning

Control Systems and Integration

- Installation of PLC and control equipment
- Cabling and interconnection of control systems

- Installation of fibre optic cable and signal conversion equipment
- Check functionality and response
- Testing and commissioning

The scope breakdown is further detailed in the Bill of Quantities (BOQ), which is supplied together with this Works Information. The scope breakdown provides a high-level view of the supplied BOQ. The BOQ provides detailed quantities and specification for each item listed in the scope breakdown.

1.7 Construction Activities

1.7.1 Civil & Building Construction Activities

1.7.1.1 Above-ground Piping

It is anticipated that approximately 600m of piping will be installed above ground. The pipe will be HDPE as specified in the BOQ. The pipes will be mounted against the conveyor structure or rest on concrete plinths and galvanised pipe supports. Underground services will have to be considered when constructing the shallow excavation for the concrete plinth supports. Installation of the pipes on top of the concrete plinth supports will be relatively simple. Pipes mounted against the conveyor structures must be installed as such that it is not impeding maintenance activities and it must be protected from damage as a result of conveyor maintenance activities.

1.7.1.2 Underground Piping

It is anticipated that approximately 300m of piping will be installed below ground. The pipe will also be HDPE as specified in the BOQ. Prior to excavating with excavation plant, the contractor should firsthand excavate to locate all services indicated on the drawings. The Contractor shall also make allowance for scanning for existing underground services wherever there will be excavation. Thereafter the contractor will excavate a longitudinal trench for the installation of the pipe and it shall not exceed a length in which the pipe can readily be installed, tested and backfilled. The excavations will not be left open for long periods of time, where the integrity of the excavation deteriorates to a point where it becomes a safety hazard for the workers inside the trench. All open trenches shall be barricaded whilst open. Manholes should be included for easy access to valves and other components.

The contractor will make use of imported bedding material for the cradle of the pipe. Thereafter the pipe will be tested to the design pressures to ensure that there are no leaks on the pipe. All leaks detected will be fixed and the test repeated to verify that leaks were fixed successfully before backfilling the remainder of the trench with sorted in-situ material. All backfilled layers will be tested to comply with the project specifications.

Thrust blocks, joints, valves and other additional installations will be installed as indicated on the construction drawings.

1.7.1.3 Construction of Pump Station and Pump Station Building

The proposed chemical dosing plant building will accommodate the water storage tanks, water pumps, dosing pumps, pipe work, chemical tanks over a bunded area, and electrical and instrumentation equipment. The building structure will have a shallow strip footing foundation with a concrete superstructure. The founding material wherein the structure will be built will be tested by the contractor to ensure that it complies with the design bearing capacity. The whole area is reclaimed land on which other buildings and machines with relatively simple foundations have already been built. Therefore, this provision is just an allowance to confirm that the design inputs are valid, it is not expected that the designs will have to be changed however, wherever the necessity arises, the designs shall be updated accordingly. It is anticipated that contractor shall be an experienced contractorin construction and building works and shall be able to sub-contractor some of the works where necessary.

The contractor shall install the pump station equipment in the constructed building structure, after completion and handover. The Pumpstation must be constructed as such that pumps and other components can be easily removed for maintenance or replacements through the used of overhead service hoists or vehicle/forklift access.

The contractor shall install the water storage tanks, water pumps, dosing pumps, required pipework and all electrical and instrumentation equipment in order to operate the chemical dosing plant. The electrical and instrumentation works may be sub-contracted under the main contractor however; the main contractor shall take full responsibility for works sub-contracted under this project.

1.7.1.4 Installation of the Front-End Piping System

Pipework in pump houses and supplying the spray nozzles

All pipework surrounding equipment (e.g. pumps) in the pump houses and supplying the nozzles will be Stainless Steel 316 as specified in the BOQ. To summarise, the following pipes and accessories will be used with the nozzles:

Installation of the nozzles

Constructability constraints play a major role in the design of this chemical dosing system. The installation of the nozzles in strategic positions should be included in the constructability. It is also anticipated that the front-end piping system of the nozzles will be prefabricated and assembled before installation at the transfer points.

Where nozzles are installed under a hood to ensure the moisture is contained close the product, the hood must be designed to:

- Provide easy access to pipes and nozzles for maintenance/inspection of pipes and nozzles.
- The hood can be easily removed for hood maintenance repairs/replacement.
- The material for the hood must be selected so that it resist any corrosive characteristics of the dosing chemical.

Strategic locations

Spray nozzles being used for dust suppression should be placed as close to the beginning of the transfer point as possible. The force of the moving material helps the water penetrate the material as it moves through the transfer point.

Nozzles in airborne dust suppression systems treat the air around the material and are generally placed at the end of transfer points so the material load can settle. Nozzles are positioned so they are spraying above the material and not on it.

The chemical dosing will consist of spray nozzles strategically located inside the transfer chute to optimally apply the chemical dosing at strategic locations. The main supply pipeline will be bolted against the steel conveyor belt structure supplying the water / chemical mixture from the back-end piping system to the nozzles. Nozzles will be installed at transfer head and feed to suppress the dust where it originates.

1.7.2 Installation of Electrical System and Instrumentation

1.7.2.1 General Infrastructure

It is the intention that the proposed dust suppression system be capable of integration into the existing site-wide SCADA installation, located inside the Central Control Room (CCR). All field instrumentation will be connected to a localised “field service panel”. The “field service panels” will be connected to the CCR by fibre optic cable (housed in sleeves) which may be above ground or below ground, depending on the simplest route available. The “field service panels” will be connected to a low voltage power source from surrounding existing infrastructure.

1.7.2.2 Electrical System

The electrical infrastructure consists of the Bulk LV supply, the Motor Control Centre (MCC), the Control Switchgear, PLC and electrical cables to the various loads

.

Bulk Electrical Supply

Bulk electricity is fed to the chemical dosing plant via a three-phase 400V supply cable, fed from a mini sub-station to the MCC. The MCC will be rated for a coastal and corrosive environment, to the specification of Transnet.

Motor Control Centre (MCC)

The Motor Control Centre will accommodate all the electrical protection and control equipment in order to control the pumps. The MCC itself is a cubical arrangement, manufacture from 3CR12 steel and painted with epoxy powder paint to the specification of the Transnet. The MCC will be wall mounted type. The MCC will generate some heat as the variable speed drives for the pumps are housed within. Amongst others, the MCC will house the following equipment:

- Main Switchgear;
- Variable Speed Drives (VSD`s);
- Control Equipment;
- Programmable Logic Controller (PLC);
- Uninterruptible Power Supply (UPS).

1.7.2.3 Pump Control Philosophy (Instrumentation)

The variable speed drive pumps deliver the spray nozzles the required flow rate at the desired pressure in order to apply the wetting and chemical dosing.

The systems will rely on feedback from field sensors to initiate and stop treatment when required. This will ensure that all material is treated and that the systems will not run unnecessarily.

Ultrasonic sensing devices will relay “rail car tipping” and “material moving on belt” events that will activate the individual systems while the PLC controls will maintain treatment activity for the optimum period of time.

The pumps will stop in auto if one of the following conditions occur.

- Low level in sump
- Should a no-flow situation arise
- High reading of flow meter (pipe burst conditions)

Pumps must start in alternating sequence, and will be alternated between starts, or daily alternating between the duty pumps, depending on the requirements from the pump manufacturer. Pumps should also trip/stop when a motor overload condition and abnormal pressure readings are detected.

The aim is for the dust suppression systems to operate completely independent of other operations and controls, and without the need for operator intervention.

The systems will utilize its internal Programmable Logic Control (PLC) to interpret the permissive signals related to plant equipment conditions and thereby activating/de-activating the systems and treatment manifolds. The PLC’s will also control all other parameters of the dust suppression systems, such as start-up and shut down sequences, pressures, dosing initiation, treatment timing, safetyinterlocks, etc.

The stockyard transfer system will maintain an “inactive standby” mode whereby only the material moving on belt sensor will continue its function of monitoring the movement of material. As soon as the sensor reports that treatment is required, the system will become active and start treatment. All functions, conditions and statuses will be reflected at the Central Control Room (Tower) via the PLC system. All systems can either work in automatic or manual mode by switching a selector switch as required by Transnet.

1.8 Offsite Material transportation

The scrap material will be transported offsite using applicable skips. The scrap is Transnet property and therefore the Transnet reverse logistics department will be involved and shall ensure that the correct process is followed.

Clearing the site

Once the scrap material has been removed offsite, the contractor will clear the site. Compacting and levelling will be done.

1.8.1 Outage Plan

- The execution of this project should not interrupt operational activities.
- The normal working hours and weekly maintenance windows will be used to carry out non-critical activities, which will not necessary impact production within the terminal.

These are some of the non-critical activities that can be carried-out outside the annual shut windows:

- Relocating of underground and above ground communication cables (e.g. fibre optic).
- Doing foundations and construction of the new dosing plant at the shipside.
- Construction of the new dosing plant.
- Refurbishment of the existing dosing plants.
- Doing minor electrical & electronic installation works.
- Doing preparation work on the critical activities in preparation for the annual shutdown.

Critical works that may be executed during weekly maintenance windows and/or annual shutdown period includes:

- Minor refurbishing the existing dosing units.
- Doing major connection of piping, electrical & electronic activities.

Construction effect on operations

The possibility of operational disruptions could take place during the switchover from the old dust system to the new system. A construction sequence methodology will be developed by the main contractor (*together with the rest of the project team) prior the de-commissioning works.*

Construction precautions

All constructional activities will be closely supervised to ensure that there are no deviations from the approved planned. The project team will work closely with operations and maintenance throughout the project. The *Project Manager* and some key technical personnel will also attend the planning and production meetings in-order to give feedback on key areas of construction within the terminal and obtained critical information on planned & unplanned operational and maintenance activities.

1.9 Infrastructure and Temporary Services

1.9.1 Infrastructure (Facilities) required by the *Main Contractor*

- **Water supply** – The *main contractor* shall provide a metered water take-off point and supply line to the site from an existing water main to be identified by the *Project Manager*.
- **Electrical Supply** – The *main contractor* shall provide a metered electrical supply to his site offices and other facilities, if so required. This electrical supply shall be a mini-substation identified by the *Project Manager*.
- **Telephones** – The *main Contractor* shall make his own arrangements for the installation of telephone, for his use during construction, if so required.
- **Waste Management** – The *main contractor* shall be allocated a single area for the collection/assembling of excavated waste material. The material will be store a short period and will to be transported off-site at an approved dumping site.

1.9.2 Temporary Services

- Site access permits will have to be arranged for all staff working on site.

1.9.3 Material Supply

- There is no material supply from TPT. The main contractor will be allocated a laydown area.
- The contractor will be expected to supply all material which will enable the completion of the work as per the scope requirement.

1.10 Site Project Controls and Reporting

Effective management of a construction site is achieved through a sound framework of controls of all the input elements of construction activities. The site Construction Management team shall be organised and be responsible for collecting information to report on:

- Cost control
- Schedule deviations and manpower performance
- Labour relations overview
- Safety status / IR and health issues
- Material procurement and expediting status
- Quality of Workmanship

1.11 Health, Safety, Environment and Community Management

For the purposes of the health, safety and the environment, the Construction Manager and the rest of the construction team will comply with the same rules and regulations applicable to construction contractors and their subcontractors. This includes compliance with the Occupational Health and Safety Act of 85/1993, as well as the Health and Safety Specification, which is a guidance to comply with the *Employer*’s best Health and Safety practices and OHSA. Safety on a construction site is the responsibility of each participant.

The below mentioned items are extracts from the Health and Safety Management Plan and Standard and are highlighted as applicable to the Construction Management Plan.

1.12 Legal Requirements and Regulations for Health and Safety

The Contractor must be aware of the Occupational Health and Safety Act of 85/1993 and its regulations, and where applicable, develop and implement Method Statements and risk Assessments for work to be carried out. The contractor must ensure that its personnel and subcontractors have been informed of these legal requirements and regulations.

1.13 Contractor’s Health and Safety Plan

The requirements for the contractors H&S Management Plan are stated in the employees’ H&S Management Plan and must be completed by the Contractor before permission will be granted to the Contractor to mobilise to site.

1.14 Site Supervision

The Contractor must nominate and appoint a person on site to whom the *Employer* may refer in connection with the works. The Contractor must also nominate a Construction Supervisor who is sufficiently qualified and competent in the specified work to supervise the construction works. Inspectors will be appointed as per the Construction Regulations requirements.

1.15 Environmental Compliance

The contractor will comply with the Environmental Management Programme (EMPr), which is an environmental management tool that is used as to manage methods to prevent or reasonably avoid adverse environmental impacts and strengthen the positive environmental benefits of a development. It also places a Duty of Care on those who cause, have cause or may in the future cause significant pollution or degradation of the environment.

1.16 Environmental and Health and Safety Officer

The Environmental Officer and the Health Safety Officer must be appointed by the Contractor. He is primarily responsible for the managing the day-to-day on-site implementation of the environmental aspects of the EMPr and for the compilation of the weekly environmental monitoring reports. The Environmental Officer shall be a full time dedicated member of the Contractors Team and must be approved by the *Employer*.

The appointed Health and Safety Officer reports to the Construction Manager on site and will be present on-site whenever construction work is taking place.

1.17 Community Management

Construction will take place inside the Port of Saldanha and therefore there will be limited interaction with the adjacent communities. The Project management team will however frequently engage with tenants and affected stakeholders inside the Port.

Management of the local workforce is dealt with in Section 1.18 – Industrial Relations.

1.18 Industrial Relations / Workforce Studies

Industrial relations usually imply good and positive relations between the employees and employers. A properly managed and stable labour environment is a critical factor in the successful implementation of projects. Positive community relations are also integral to managing the project labour environment successfully. Any apparent and potential industrial relation matters are to be reported to the *Project Manager* immediately in order to effectively address the matter before it potentially escalates.

1.19 Materials Management

All materials that are required to comply with a standard specification shall, where applicable, bear the official mark of the appropriate standard. All alternative materials proposed by the Contractor shall be tested for acceptability by the Contractor and the results of the tests made available to the *Project Manager*. All such materials then require the approval of the *Project Manager*.

The Contractor shall submit to the *Project Manager* samples of all materials to be used in the works and which are to be supplied by the Contractor for the approval of the *Project Manager* prior to their incorporation into the work. If approved, the samples so submitted will be kept by the *Project Manager* as standards for the duration of the Contract. No materials inferior in quality, workmanship or appearance to the approved samples shall be used.

The Contractor shall inform the *Project Manager* of any control testing to be done at least 48 hours before such tests are required and must allow in his program for the time necessary for the tests and the processing of the results thereof.

1.20 Training

Training of 50 terminal employees will be required. The training will be divided into two stages. Tables 4 & 5 provide the breakdown of the required training.

Table 4: Training Requirements Stage 1: Before & During Commissioning

Method	Whom	When
Training Manuals & Practical	15 x Maintenance staff 10 x Operations staff	Before and During Commissioning

Table 5: Training Requirements Stage 2 (Post Commissioning)

Method	Whom	When
Training Manuals & Practical	15 x Maintenance staff 10 x Operations staff	Guarantee & Warrantee Period

1.21 Key Scope Requirement

1.21.1 Construction of the New Dosing Plant for the shipside.

The new dosing plant is located at the conveyor belts, on the open pond next to Siyaphambili. The dosing plant applies a mixture of water and surfactant chemical to the Iron ore. The purpose of the surfactant is to lower the surface tension threshold of the water in order to increase the waters properties as a wetting agent. The proposed dosing plant apply dust surfactant and prevention techniques.

1.21.2 Installation of Atomizing Sprayers

The purpose of the wetting sprays and atomizer sprays is to trap the dust particles by bonding them with the water particles and increase their mass in the surrounding atmosphere at the transfer chutes. This causes the dust particles to settle. The wetting sprays inject water into the iron ore to increase the moisture content thereof on the conveyor belts when required.

1.21.3 Installation of Flow Meters

The flow meters will give feedback the operators from a SCADA screen upon which the command has been given to open the solenoid valves. The indication for opening the valves will ensure that the current dust suppression systems work effectively and efficiently.

1.22 Project Contribution to Society

The project intent is to contribute to the overall terminal initiatives to drastically reduce the iron ore dust inside the terminal environment and, as well as outside the terminal. Transnet has a standard agreement with the affected communities within the nearby towns to paint their houses continuously within the period of 5 years. This project will not entire eliminate the current problem but will significantlycontribute to the dust reduction initiatives undertaken by the terminal. The major dust reduction will be realized over a period of time when all the AEL projects have been fully implemented.

The iron ore arrives at the tipplers via train wagons. The train wait outside the tipplers for few minutes to allow the wetting of the iron (water sprayers) to suppress the dust. Each wagon is sprayed with sufficient water. As the train slowly enters the tippler hopper, two wagons enter the tippler drum and the drum rotate and tip the iron onto the underneath conveyor belt. While the iron ore is being tipped down onto the underneath conveyor belt, the dust extraction plant is automatically activated to extraction the iron dust.

2 DESIGN AND CONSTRUCTION

2.1 Engineering Design

Design work has been completed for this project. The Employer will supply all designs to the Main Contractor before construction work starts.

The Main Contractor will be required to submit Workshop Drawings to the Engineering Consultant representing the Employer for approval prior work execution.

2.2 General Construction Arrangement

2.2.1 Scope Clarifications and Pricing Assumptions

The Contractor shall be deemed to have included in the tender price all work necessary to complete the Works as described in this document, whether explicitly stated or reasonably inferred.

The Contractor shall be deemed to have allowed for:

- Verification of all existing site information, surveys and services
- Work execution and coordination
- All temporary work and construction methodologies required
- All interfaces with existing infrastructure and ongoing operations
- All constraints associated with working within an operational environment

No claims for additional costs arising from omissions, assumptions, interpretation of the Scope of Work,, except where such changes are instructed by the Employer.

2.2.2 Temporary *works*, Site services & Construction Constraints

(a) *Employer’s* Site entry and security control, permits, and Site regulations:

- All employees for the contractors will be required to produce their identification cards at the main entrance gate.
- All employees for the contractors are subjected for testing of alcohol and drugs at the main gate.

(b) The contractors complies with the following requirements of the *Employer*:

- All contractors shall undertake TPT safety induction before entering the terminal.
- All contractors must obtain a permit for the vehicles before entering the terminal.
- Zero tolerance of any form of substance abuse, alcohol, drug etc. Random testing will be conducted.
- All contractors shall ensure that the person/s delivering the material have all the required PPE.

2.2.3 Cooperating with and obtaining acceptance of others

During the course of the contract, departments of Transnet and other contractors may be operating within the general area surrounding the working area. The Contractor shall plan, coordinate, and execute the Works to accommodate such interfaces and ensure safe access and working conditions at all times. The Contractor shall take all necessary steps to ensure that the execution of the Works does not interfere with ongoing operations and that normal traffic flow within the operational terminal is maintained. The Contractor shall be deemed to have allowed in the tender for all coordination, sequencing, and constraints associated with interfacing with other contractors and operational activities, except where otherwise stated in the Risk Allocation Schedule. The Contractor shall cooperate with all parties on site and, where required, shall coordinate activities and programme details with the Project Manager to ensure effective execution of the Works, except where otherwise stated in the Risk Allocation Schedule.”

2.2.4 Restrictions to Site Access

All contractors working on this project should be aware of the following:

- The terminal operates 24 hours.
- The project may compete with operational activities. Alignment between operations and the project teams will be crucial.
- For this project, working during the night will not be allowed due to the risk associated with such endeavour.

2.2.5 Health and Safety Facilities on Site

- The *Main Contractor* keeps daily records of his people engaged on the Site and Working Areas (including Sub-contractors) with access to such daily records available for inspection by the *Project Manager* at all reasonable times.

The *Main Contractor* performs the *works* and co-operates with:

- TPT Projects
- TPT Operations
- TPT Maintenance

2.2.6 Ease of Operation and Maintenance

The Site is located within an operational area of the Employer and the Contractor shall ensure the safe passage of traffic to and around the Site at all times. This shall entail the provision of flagmen, protective barriers, lanterns, signs, etc. for protection, direction and control of traffic.

The Contractor shall organise the work to cause the least possible inconvenience to other construction activities or operations at the Site. Access for Others to adjacent areas shall be maintained at all times.

The Site is located within a designated Secure Area, and accordingly all access into the area will be through a gate with access control.

The Contractor shall obtain the necessary entry permits for all staff working within the area in accordance with the access control requirements of the Employer and shall issue each personnel member with an appropriate identification card.

All costs incurred in providing construction personnel with ID cards and access permits shall be borne by the Contractor.

The site establishment area shall be clearly sign posted and be compliant with the relevant safety regulations and restrictions that might be in place until the Contractor has de-established from site and comply with OHS Act 85 of 1993.

The Contractor is responsible for the security of the Works until completion and hand-over and must make his own arrangements for security and the safekeeping of his property. The Contractor's watchmen are allowed on Site for this purpose.

If the working area is situated within a Customs-controlled area, the Contractor and his people shall observe all Customs regulations.

The fullest collaboration between the Contractor, the Employer’s Operations Manager and the Project Manager is essential in regard to the continued operations of the Employer.

Housing of the Contractor's people on site is not permitted.

All work on, over, under or adjacent to railway lines and near high voltage equipment shall comply with Transnet SOC Limited codes of conduct.

2.2.7 Health, Safety and Environmental Requirements

(a) The contractors shall comply with all applicable health, safety and environmental regulations and requirements for all persons entitled to be on the Site. These shall include, but not be limited to, the Acts, regulations and standards listed in this document.

(b) The contractors shall be responsible for the precautions and measures to ensure the health and safety of all individuals on the Site and temporary areas (if applicable) outside of the Site, but utilised bythe contractors, with the prior approval by the *Employer*.

(c) The *Main Contractor* shall ensure that his management, supervisors and the general workforce, as well as all suppliers and visitors to Site have attended the Induction Programme prior to commencing any work on Site. If new personnel commence work on the Site during construction, the *MainContractor* shall ensure that these personnel undergo the Induction Programme and are made aware ofthe environmental specifications on Site.

(d) The *Main Contractor* shall be responsible for the adequacy, stability and safety of all Site and Temporary Areas operations, methods of installation, all the contractor’s Equipment, Temporary Works and structures.

(e) The *Main Contractor* shall provide and/or install for all necessary safety protection equipment (e.g. rotating parts guards, hot surface insulation/guards, railings) and necessary Contractor’s Personnel, in accordance with the applicable legislation in South Africa, including but not limited to the Occupational Health and Safety Act (1993) of South Africa. The Contractor shall take special note of the requirements of the Construction Regulations, 2003.

2.2.8 Warrantees and Guarantees

The *Main Contractor* shall provide warrantees and guarantees in compliance with the minimums as specified in the Transnet Specifications (on applicable material items).

2.3 Plant and Materials Standards and Workmanship

2.3.1 Investigation, Survey and Site Clearance

- The Main Contractor should ensure the existing services & infrastructure around the area of project execution are protected.
- The Main Contractor will be liable for any damage to service or infrastructure as a result of the *Main Contractor*’s employee/s, equipment or sub-contractors appointed by the *Main Contractor*.

2.3.2 Transnet Specifications

The *Main Contractor* shall be responsible for compliance of all works with Transnet Specifications, including but not limited to the following:

Table 6: Transnet General Specifications

Document Number	Description
EEAM-Q-006	Structural Steelwork
EEAM-Q-008	Corrosion Protection

EEAM-Q-009	Quality Specification
EEAM-Q-010	Reinforced Concrete and Structural Steel Structures
EEAM-Q-016	General Requirements
N/A	SPECIFICATIONS FOR ELECTRICAL WORKS
N/A	SPECIFICATIONS FOR MECHANICAL WORKS

2.3.3 National and International Standards

The *Main Contractor* shall be responsible for compliance of all works with National and International Standards, including but not limited to the following:

Table 7: National and International Standards

Document Number	Description
OHS Act	Occupational Health and Safety Act, No. 85 of 1993
SANS 1200H	Structural Steelwork
SANS 1200HA	Structural Steelwork (sundry items)
SANS 2001-CS1	Structural Steelwork Construction Works
SANS 10160	The General Procedures and Loadings to be Adopted in the Design of Buildings
SANS 10162	The Design of Structural Steelwork
SANS 1431	Weldable Structural Steels
SANS 10142	The Wiring of Premises
SANS 10198	The Selection, Handling and Installation of Electric Power Cables of rating not Exceeding 33 kV
SANS 10114	Interior Lighting
SANS 10389	Exterior Lighting
SANS 475	Luminaires for Interior Lighting, Street Lighting, Floodlighting

3 MANAGEMENT AND START UP

3.1 Management Meetings

Regular meetings of a general nature may be convened and chaired by the *Project Manager* as follows:

Item	Programme/Report	Due
1.	first programme for acceptance	Latest 2 weeks after award
2.	Fortnightly progress updated programme & project progress report	Fortnightly, 1 (one) full day prior to progress meetings. Note: Where fortnightly and monthly reports and updates clashes/aligns in cycle only the monthly report will take precedence.
3.	monthly progress updated programme & project progress report	Monthly, submitted a week before the last Friday of each month
4.	revised programmes (for acceptance)	Any time as requested by Employer and/or anytime material changes to the scope justifies a need and supported by the Employer or at the intervals as indicated in the Contract Data
5.	Occupation programme &/or tracking sheets	Daily, issued after morning work planning meetings, for the duration of each occupation period.

(a) It is the *Employer*’s specific intention that the Parties and their agents use the techniques of partnering to manage the contract by holding meetings designed to pro-actively and jointly manage the administration of the contract with the objective of minimising the adverse effects of risks and surprises for both Parties.

(b) The *Main Contractor* attends management meetings at the *Project Manager*’s request. These meetings are to be held fortnightly or as regularly as may be determined by the *Project Manager*. At these meetings the *Main Contractor* presents all relevant data including safety, health and environmental issues, progress, quality plans, Sub-contractor management, as may be required.

(c) Meetings of a specialist nature may be convened as specified elsewhere in this Works Information, or if not so specified, be convened by persons at times and locations to suit the Parties, the nature and the progress of the *Works*. Within five days of the meeting the person convening the meeting shall submit records of the meeting to the *Project Manager*.

(d) All meetings shall be recorded in a register, using minutes prepared and circulated by the person who convened the meeting. Such minutes (or register) shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

3.2 Documentation Control

- Transnet uses a document controlling system to track, record and control documentation circulated.
- All formal communication should be submitted to TPT Document Controller.
- This include among others, circulation of minutes, drawings, claims etc.
- TPT Document Controller shall work with the Service Provider’s Document Controller (if available).

3.3 Safety Risk Management

- The *Main Contractor* must submit a safety file to TPT SHEQ department for approval after

being appointment.

- The *Main Contractor* may not commence with *Works* unless the safety file has been approved by TPT SHEQ.
- The *Main Contractor* shall submit a Method Statement to TPT for approval with all the necessary holding points.
- The *Main Contractor* shall compile the risk register and share it with the TPT *Project Manager* and for endorsement.

3.4 Risk Allocation Schedule

The following Risk Allocation Schedule sets out the intended allocation of key project risks between the Employer and the Contractor. The Contractor shall be deemed to have allowed for all risks allocated to the Contractor in this Schedule.

Risk Allocation Schedule			
Risk Area	Employer (Transnet)	Contractor	Notes / Clarification
Design Responsibility	Yes		The Designing Engineer is, that is appointed by the Employer responsible for detailed design
Design Changes (Employer scope change)	Yes		Compensation event
Incomplete Scope	Yes		Employer risk for missing info
Ground Conditions	Baseline	Normal conditions	Abnormal conditions = Employer risk
Survey Data Accuracy	Yes		Employer provides baseline data
Damage to Existing Services		Yes	Contractor liable for damage caused
Site Access	Yes		Employer provides access
Operational Delays	Yes		Employer risk if operations impact work
Interface Risks	Shared	Shared	Depends on cause
Construction Method		Yes	Contractor manages execution
Health & Safety	Shared	Shared	Each party responsible for own area
Environmental Compliance		Yes	During construction
Permits (Employer)	Yes		Approval/regulatory risk
Permits (Contractor methods)		Yes	Method statements etc.
Material Price Changes		Yes	Unless escalation allowed
Programme Delivery		Yes	Contractor responsible
Force Majeure	Shared	Shared	As per NEC

3.5 Environmental Constraints and Management

The *Main Contractor* shall ensure that the execution of the *Works* complies with all the environmental standards and regulations. The TPT Environmental Manager shall work closely with the project team and the *Main Contractor* to ensure that all environmental standards and regulations are well understandby everybody.

3.6 Quality Management (Assurance Requirements)

The *Contractor* shall submit his Quality Assurance (QA) proposal(s) for the contract. This proposal shall detail the *Contractor’s* quality management system as it applies to all aspects of supply or service provision including Procurement, Manufacturing, Installation/Erection and Commissioning. Additionally, the *Contractor* shall include for the provision of suitably qualified quality control staff to

manage and carry out inspection on all Supplier/Subcontractor activities in all disciplines included within the Works Information.

a) The Quality Policy is a concise document, approved by the *Contractor’s* executive management that defines organisational goals and objectives regarding quality, a commitment to meeting stated requirements and an undertaking to drive continuous improvement throughout the organisation’s activities. It must be suitable for the organisation and provide a framework for stabling, communicating, and monitoring performance against agreed quality objectives.

b) The *Contractor* shall provide a full-time resident quality manager for all aspects of the works including Site activities, with a staff adequate to perform the requirements of his quality plan and quality management system.

c) The nominated individual shall be fully conversant with quality management on major construction projects and the maintenance of an appropriate ISO 9001 Quality Management System.

d) The *Contractor* develops and maintains a comprehensive register of documents that will be generated throughout the contract including all quality related documents as part of its Quality Plan.

e) The *Project Manager* indicates those documents required to be submitted either for information, review or acceptance and the *Contractor* indicates such requirements within his register of documents. The register shall indicate the dates of issue of the documents with the *Project Manager* responding to documents submitted by the *Contractor* for review or acceptance within the period for reply prior to such documents being used by the *Contractor.*

f) The requirements for a PQP are detailed in the project standard QAL-STD-0001 Rev0 and shall include but not be limited to the following:

- Include all quality activities relevant to the works, identifying all procedures, reviews, audits, controls, and records used to control and verify compliance with the specified contractual requirements
- Include a listing of all special processes (e.g., welding, and non-destructive testing, cube testing etc.) envisaged for use, including confirmation of personnel certification as required
- Include a list of all proposed method statements (for Site based work activities)
- Include a description of the Supplier/Contractor’s project organisation, with key positions and responsibilities identified and individuals named. The organisation structure shall also indicate the resources committed to the management / coordination of QA / QC activities both within the main Contractor’s organisation and that of his Sub-Contractors and Suppliers
- Include a listing of all pre- approved Quality Control Plans (QCP’s), Quality Inspection Test Plans (QITPs) and associated Field Inspection Checklists (FIC’s), as applicable

- The index of procedures shall contain a list of the *Contractor's* quality management system procedures to be applied during the project including any relevant work instructions or 3rd tier quality system documentation. Where aspects of the works are to be subcontracted, the *Contractor* shall include procedures for the management of Suppliers and Sub-Contractors.

A schedule of internal and external audits during the contract means a schedule provided by the *Contractor* detailing the location, frequency, and extent of internal and external quality system audits to be carried out on during the contract period. The schedule shall include all locations including construction Site and supplier/service providers.

3.7 Programming Constraints

(a) The indicative timelines for the project are as follows:

(b) The *Main Contractor* and the *Employer* shall agree on the programme for the execution of the project. The *Project Manager* shall compile a programme and present to the *Main Contractor*. In relationto the programme drawn by the *Project Manager*, the *Main Contractor* should provide a programme anduse standard NEC Scope Document programme clauses in the template.

(c) The *Main Contractor*’s Programs is evaluated by the *Project Manager* to assess the *Main Contractor*’s ability to plan his portion of the project to the extent necessary for the high degree ofmutual co-ordination demanded by the Project.

(d) The *Main Contractor* submits a program within 1 weeks of the date on which he was notified of having been awarded the contract / order.

(e) The *Main Contractor* shows on his Accepted Programme and all subsequently revised programmes schedules showing the critical path or paths and all necessary logic diagrams demonstrating sequence of operations.

(f) Progress Reporting:

- The *Main Contractor* updates the program and supplies the progress reports to show actual and expected progress compared to the latest agreed Contract Program. Progress information may be verified by the *Project Manager* at any stage.
- The methodology to define work content in the progress curves needs to be agreed to between the *Main Contractor* and *Employer* within 5 days of Contract Award.

- The work content needs to be specifically designed to suit the type of work and to effectively indicate actual progress against planned progress.
- Progress reports are submitted in line with the requirements as specified in the table below.

Table 8: Progress Reporting Requirements

Item	Description	Frequency
1.	General Planning Report and revised network if logic has changed since the previous report.	Weekly
2.	Critical Activities Report. (Look ahead)	Bi-Weekly
3.	Milestone Report.	Bi-Weekly
4.	Updated Bar Charts.	Bi-Weekly
5.	Updated Program Graphs.	Bi-Weekly
6.	Progress S-Curves.	Bi-Weekly
7.	Expediting Report	Bi-Weekly
8.	Milestones of Deliverables	Bi-Weekly

- The *Main Contractor* uses the latest version Microsoft Projects (MS Project), Primavera or other applicable project software for his programme submissions or a similar programme software package equivalent to the latest version of MS Project subjected to and with the prior written notification and acceptance by the *Project Manager*.

(g) Reporting and Monitoring:

- The *Main Contractor* completes an assessment of all activities in progress and to completion to determine percentage complete, forecast completion dates, deviations from the Accepted Programme and proposes remedial actions to rectify deviations.

3.8 Contractor’s Management, Supervision and Key People

- The *Main Contractor* provides an Organogram and Curriculum Vitae of all his Key people (both as required by the *Employer* and as independently stated by the *Main Contractor* underContract Data Part Two) and shows how such Key people communicate with the *Engineering Consultant* representing the *Employer*, the Supervisor and their delegates (Where applicable).

3.9 Contractor Liability

a) The Contractor warrants that it will be liable to the Employer for any loss or damage caused by strikes, riots, lockouts or any labour disputes by and/or confined to the Contractor’s employees, which loss will include any indirect or consequential damages.
b) The Contractor warrants that no negotiations or feedback meetings by the Contractor’s employees shall take place on the Employer’s premises, whether owned or rented by the Employer.
c) The Contractor shall give notice to the Employer of any industrial action by the Contractor’s employees immediately upon becoming aware of any actual or contemplated action that is or may be carried out on the Employers premises, whether owned or rented, and shall notify the Employer of all matters associated with such action that may potentially affect the Employer.
d) The Contractor is responsible for educating its employees on relevant provisions of the Labour Relations Act which deal with industrial action processes and the risks of non-compliance.
e) The Contractor is required to develop a contingency strike handling plan, which plan the Contractor is obliged to update on a three-monthly basis. The Contractor must provide the Employer with this plan and all updates to the plan. The Contractor is responsible to communicate with its employees on Site details of the plan.

3.10 Training Workshops and Technology Transfer

- The *Main Contractor* shall supply all the training manuals relevant to all the approved scales which will be installed, verified and calibrated. The Service Provider must ensure that information is shared (where applicable) between the *Engineering Consultant* representing the *Employer* throughout the duration of the project to ensure skill transfer.
- The *Main Contractor* must also make provision for TPT staff training. The number of TPT staff to be trained will be determined by the *Project Manager* but will not exceed 50 people. The training will be around Operational philosophy and Maintenance of the dust suppression system.
- The *Main Contractor* shall make allowance/provision for 12 months continuous maintenance of the entire dust suppression system apart from the guarantee/warrantee period. The maintenance of the systems shall take place post project commissioning. Key engineering and technological skills and knowledge on operation and maintenance shall be transferred during this stage.

3.11 Contract Change Management

a) For ease of communication standard templates shall be used for contract change management. The *Contractor* forwards all correspondence with respect to contract change management, i.e. Early Warnings and notifications of Compensation Events, on the standard templates provided.

b) For avoidance of doubt, the following shall not be considered Compensation Events:

- Working in an operational environment
- Restricted or shared access
- Coordination with other contractors and Transnet operations
- Phased execution of the Works
- Normal construction constraints within the Site

The Contractor shall be deemed to have included for these conditions in the tendered price.

3.12 Compensation Event Clarifications

For avoidance of doubt, the following shall not be considered Compensation Events:

- Working in an operational environment
- Restricted or shared access to the Site
- Coordination with other contractors and Transnet operations
- Phased execution of the Works
- Normal construction constraints within the Site

The Contractor shall be deemed to have included for these conditions in the tendered price

3.13 Compensation Event Clarifications

For avoidance of doubt, the following shall not be considered Compensation Events:

- Working in an operational environment
- Restricted or shared access to the Site
- Coordination with other contractors and Transnet operations
- Phased execution of the Works
- Normal construction constraints within the Site

The Contractor shall be deemed to have included for these conditions in the tendered price.

3.14 Procurement Code of Conduct

a) The Employer aims to achieve the best value for money when buying or selling goods and obtaining services. This, however, must be done in an open and fair manner that supports and drives a competitive economy. Underpinning our process are several acts and policies that any supplier dealing with Transnet must understand and support. These are:

i. The Transnet Procurement Procedures Manual (PPM);
ii. Section 217 of the Constitution - the five pillars of Public PSCM (Procurement and Supply Chain Management): fair, equitable, transparent, competitive and cost effective;
iii. The Public Finance Management Act (PFMA);
iv. Specific goals; and
v. The Anti-Corruption Act.

b) This code of conduct has been included in this contract to formally apprise Transnet Suppliers of Transnet’s expectations regarding behaviour and conduct of its Suppliers.

c)

3.15 The Main Contractor’s Invoices

a) The *Contractor* is paid by electronic bank transfer within the period stated in the Contract Data.
b) The Contractor provides the *Employer* with his correct banking information to make the transfer.
c) All payments are provisional and subject to audit.
d) When the *Project Manager* certifies payment following an assessment date, the *Contractor* complies with the *Employer’s* procedure for invoice and statement submission.
e) Timing and procedure for submitting invoices will be presented at the kick-off meeting following the award.
f) The invoice and statement must correspond to the *Project Manager’s* assessment of the amount due to the *Contractor* as stated in the payment certificate.
g) All other procurement related issues will be handled by the Supply Chain Management (SCM) department of the Employer.

3.16 Contractor Skills Development Goal (CSDG)

a) The *contractor* shall achieve in the performance of the contract the Contract Skills Development Goal (CSDG) established in the CIDB Standard for Developing Skills through Infrastructure Contracts, as per the latest published Gazetted Notice.

b) The *contractor* shall determine the contract skills participation goals, expressed in Rand, which shall not be less than the contract amount multiplied by a percentage (0.25%) factor.

c) The contractor will be required to sub-contract a minimum of 30% of the tender value to targeted enterprise/s as per the Standard for Indirect Targeting for Enterprise Development through Construction Works Contracts, published in Gazette Notice No. No. 54575 of 24 April 2026

4 ANNEXURES

4.1 Annexure A: Bills of Quantity (*unpriced*)

4.2 Annexures B: Engineering Drawings

4.3 Annexure C: Saldanha BTS Layout (*SBH 4009*)

4.4 Annexure D: Transnet Structural Steelwork (*EEAM-Q-0006*)

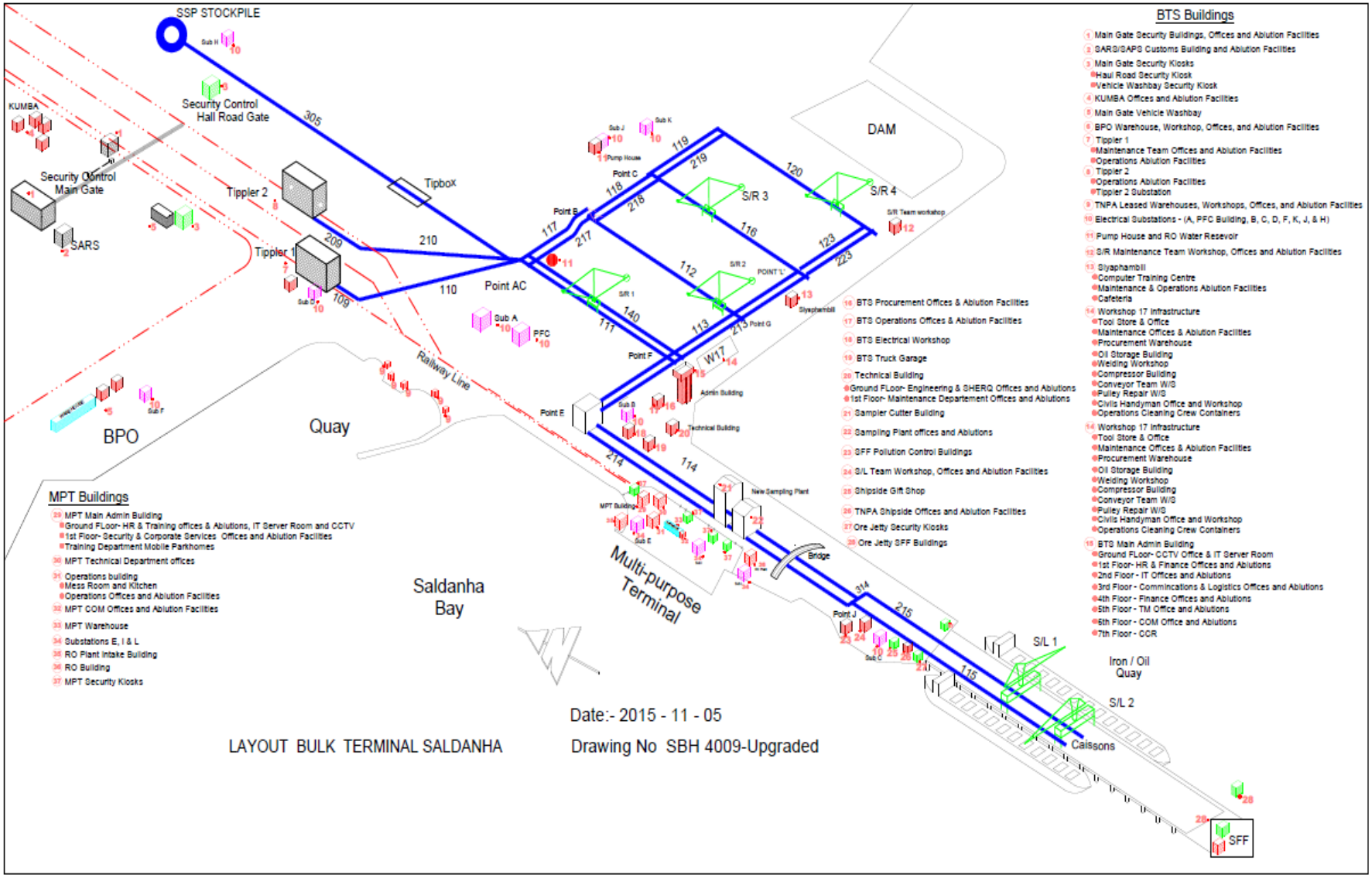
4.5 Annexure E: Transnet Corrosion Protection (*EEAM-Q-0008*)

4.6 Annexure F: Transnet Quality Specification (*EEAM-Q-0009*)

4.7 Annexure G: Transnet General Requirements (*EEAM-Q-0016*)

4.8 Annexure H: GENERSL SPECIFICATIONS FOR ELECTRICAL WORKS

4.9 Annexure I: GENERAL SPECIFICATIONS FOR MECHANICAL WORKS


SSP STOCKPILE
Security Control
Hall Road Gate
KUMBA
Security Control
Main Gate
SARS
Tippler 2
Tippler 1
Tipbox
305
209
210
110
109
Point AC
Sub A
PFC
Railway Line
Quay
BPO
Saldanha
Bay
Point E
Point F
Point G
Point C
Point D
Point J
Admin Building
Technical Building
W17
Pump House
DAM
S/R 1
S/R 2
S/R 3
S/R 4
S/R Team workshop
Siyaphambili
New Sampling Plant
MPT Building
Bridge
Multi-purpose
Terminal
S/L 1
S/L 2
Iron / Oil
Quay
Caissons
SFF
Date:- 2015 - 11 - 05
LAYOUT BULK TERMINAL SALDANHA
Drawing No SBH 4009-Upgraded
MPT Buildings
29 MPT Main Admin Building
Ground FLoor- HR & Training offices & Ablutions, IT Server Room and CCTV
1st Floor- Security & Corporate Services Offices and Ablution Facilities
Training Department Mobile Parkhomes
30 MPT Technical Department offices
31 Operations building
Mess Room and Kitchen
Operations Offices and Ablution Facilities
32 MPT COM Offices and Ablution Facilities
33 MPT Warehouse
34 Substations E, I & L
35 RO Plant Intake Building
36 RO Building
37 MPT Security Kiosks
BTS Buildings
1 Main Gate Security Buildings, Offices and Ablution Facilities
2 SARS/SAPS Customs Building and Ablution Facilities
3 Main Gate Security Kiosks
Haul Road Security Kiosk
Vehicle Washbay Security Kiosk
4 KUMBA Offices and Ablution Facilities
5 Main Gate Vehicle Washbay
6 BPO Warehouse, Workshop, Offices, and Ablution Facilities
7 Tippler 1
Maintenance Team Offices and Ablution Facilities
Operations Ablution Facilities
8 Tippler 2
Operations Ablution Facilities
Tippler 2 Substation
9 TNPA Leased Warehouses, Workshops, Offices, and Ablution Facilities
10 Electrical Substations - (A, PFC Building, B, C, D, F, K, J, & H)
11 Pump House and RO Water Reservoir
12 S/R Maintenance Team Workshop, Offices and Ablution Facilities
13 Siyaphambili
Computer Training Centre
Maintenance & Operations Ablution Facilities
Cafeteria
14 Workshop 17 Infrastructure
Tool Store & Office
Maintenance Offices & Ablution Facilities
Procurement Warehouse
Oil Storage Building
Welding Workshop
Compressor Building
Conveyor Team W/S
Pulley Repair W/S
Civils Handyman Office and Workshop
Operations Cleaning Crew Containers
14 Workshop 17 Infrastructure
Tool Store & Office
Maintenance Offices & Ablution Facilities
Procurement Warehouse
Oil Storage Building
Welding Workshop
Compressor Building
Conveyor Team W/S
Pulley Repair W/S
Civils Handyman Office and Workshop
Operations Cleaning Crew Containers
15 BTS Main Admin Building
Ground FLoor- CCTV Office & IT Server Room
1st Floor- HR & Finance Offices and Ablutions
2nd Floor - IT Offices and Ablutions
3rd Floor - Commincations & Logistics Offices and Ablutions
4th Floor - Finance Offices and Ablutions
5th Floor - TM Office and Ablutions
6th Floor - COM Office and Ablutions
7th Floor - CCR
16 BTS Procurement Offices & Ablution Facilities
17 BTS Operations Offices & Ablution Facilities
18 BTS Electrical Workshop
19 BTS Truck Garage
20 Technical Building
Ground FLoor- Engineering & SHERQ Offices and Ablutions
1st Floor- Maintenance Departement Offices and Ablutions
21 Sampler Cutter Building
22 Sampling Plant offices and Ablutions
23 SFF Pollution Control Buildings
24 S/L Team Workshop, Offices and Ablution Facilities
25 Shipside Gift Shop
26 TNPA Shipside Offices and Ablution Facilities
27 Ore Jetty Security Kiosks
28 Ore Jetty SFF Buildings

REVISION	REFERENCE	
VER 10	**EEAM-Q-006**	TRANSNET port terminals

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TITLE: **SPECIFICATION FOR STRUCTURAL STEEL WORK**	PAGE **1 of 11**

COMPILED BY:	**REVIEWED BY:**	**REVIEWED BY:**
EQUIPMENT ENGINEERING AND ASSET MANAGEMENT (GENERAL MANAGER)	**SENIOR MANAGER (PROJECT MANAGER)**	**SENIOR MANAGER (ASSET MANAGER)**

ACCEPTED BY:	**AUTHORIZED BY:**
CHIEF FINANCIAL OFFICER	**CEO**

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			21/02/2005
-2-	5.0 FASTNERS		

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KEYWORDS
SPECIFICATION

DATE OF LAST REVIEW: N/A

DATE OF NEXT REVIEW: 18/06/2008

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STRUCTURAL STEELWORK **SPECIFICATION HE9/2/6 [Version 10] June 2008**

1. SCOPE

1.1. This specification covers Transnet Port Terminals requirements for the design, manufacture and erection of structural steelwork for dynamic structures like cranes, including associated components.

2. GOVERNING CODES AND STANDARDS

ANSI/AWS D1.1 :	Structural Welding Code - Steel
BS-EN 287 Part 1 :	Approval testing of welders/fusion welding
BS-EN 288 Part 3 :	Specification and approval of welding procedures for metallic materials
BS 5135 :	Metal arc welding of carbon and carbon manganese steels
BS 4360/SABS 1431:	Weldable structural steel
BS 2573 : Part 1 :	Classification, stress calculations and design of structures
BS 3923 :	Methods for ultrasonic examination of welds
BS 2600 :	Radiographic examination of fusion welded butt joints in steel
DIN 1026	Metric channels
ISO R657	Angles
SABS 094	The use of high strength friction grip bolts and nuts
SABS 135	ISO metric bolts, screws and nuts (hexagon and square) (coarse thread free fit series)
SABS 136	ISO metric precision hexagon-head bolts and screws, and hexagon nuts (coarse thread medium fit series)
SABS 435	Mild steel rivets

3. STRUCTURAL STEELWORK

3.1. The design of all structural steelwork shall be such as to provide a robust and rigid structure requiring the minimum of maintenance and providing a long service life.

3.2. In the design of steel structures, due cognisance shall be taken of environmental and wind load conditions as specified in the main specification.

3.3. Due to the highly corrosive conditions experienced in South African Ports, the permissible stresses shall not exceed those set out in British Standard No. 2573. The minimum thickness of steel for load bearing members shall be 15mm for gussets, 10mm for angles, tees, plates and flats and 9mm for webs of channels and joists. Punching of holes over and above that permitted in BS 2573, shall not be permitted. Other structural steel shall be of not less than 6 mm thickness.

3.4. The design of mobile structures shall be such that the induced von Mises stress (effective stress in triaxial loading) will not exceed 90% of the elastic limit strength of the steel when the equipment is travelling at maximum speed and colliding with either other stationary equipment or fixed stop blocks. In calculating von Mises stresses, due cognisance must be taken of stress concentrations. If the elastic limit strength of the steel is not known, it will be determined by using a 0,5% strain offset on the stress-strain curve of the material.

3.5. Where applicable, the design may be in bolted, riveted or welded box construction except that no site welding will be permitted in the final erection at the port except with the approval of TPT.

3.5.1. Alternatively, a welded hollow section lattice type structure will be acceptable, subject to the following requirements:

3.5.1.1. The members must be structural sections manufactured from grade 43C/grade 300W weldable structural steel complying with BS4360/SABS1431. The hollow sections can either be seamless for all sizes (BS6323HFS) or welded for sizes above 114.3mm outside diameter (BS 6323HFW).

3.5.1.2. Tube wall thickness must not be less than 6mm.

3.5.1.3. All joints must be completely seal welded in accordance with BS 5135. Special care must be taken to prevent the ingress of moisture into hollow section members by ensuring that each member is airtight.

3.5.1.4. Bolted or screwed attachments which require drilled holes through a hollow section will not be permitted.

3.5.1.5. Non-hollow structural sections and plate used on the structure, in conjunction with the hollow section framework, must comply with the relevant requirements of this specification.

3.6. All steel sections shall be manufactured in accordance with the following standards: -

Weldable structural steel :	BS 4360/SABS 1431
I and H sections :	BS 4 Part 1
Metric channels :	DIN 1026
Structural steel, hot rolled sections :	BS 4 Part 1
Angles :	ISO - R657
Hot finished hollow sections :	BS 4848 Part 2
Cold formed sections :	BS 6363
Forgings :	BS 29
Steel castings :	BS 3100
Cast iron :	BS 1452

3.7. All steel plates and rolled steel sections used in the construction of the structures shall be of steel made by the open hearth process (acid or basic) and shall comply in every respect with BS 4360, "A" quality Structural Steel for Bridges and General Building Construction, Grade 43A or Grade 50B. That is, the percentage of phosphorous and sulphur shall not exceed 0,06.

3.7.1. The above is laid down as a standard, but tenders will also be considered for rolled steel not conforming strictly to the above standard. Full particulars of the guaranteed properties of the steel tendered for should in this case be furnished, i.e. chemical composition, tensile strength, yield point, reduction in area, bend tests, etc.

3.8. Forgings and drop forgings shall be free from flaws and surface defects of any kind and be accurately finished to the prescribed dimensions.

3.9. Steel castings shall be sound, clean and free from all defects and distortion of any kind and should, except where otherwise specified, conform with the conditions and tests specified in B.S. No. 3100/Latest Edition, for grades A, B and C according to requirements. They shall be thoroughly annealed and all working parts and bearing surfaces shall be machined and turned accurately with correct finish.

3.10. Cast iron used throughout must be close grained, tough and free from all defects, and shall conform with the conditions and tests specified in B.S. 1452/Latest Edition, for grades 12 to 14 according to requirements.

This applies to functional components only. A lower grade is acceptable for portal and machinery house ballast. Tenderers to state grade of cast iron proposed.

3.11. The dimensional and out-of-square tolerance as specified in the above Standards shall also apply to built-up components. Edge preparations, welding techniques, straight beds and material fit-up shall be considered when welded joints are designed.

3.12. The shape of all members and connections must allow easy accessibility for maintenance painting of all surfaces. No members shall comprise a double member which cannot be painted and maintained.

3.13. Structural details must be so designed as to eliminate or seal off any cavities or pockets where water or condensation could collect and promote corrosion. Horizontal members with upstanding flanges require special drainage.

3.14. All hollow sections shall be completely closed and airtight, and all welding is to be of such size and quality as to ensure complete airtightness. No tapping or drilling of holes into sealed sections will be permitted.

4. WELDING

4.1. All the provisions of BS 5135 shall be complied with as far as applicable.

4.2. Design of weld joints shall be such that crevices, overlaps, pockets, arc strikes and dead ends do not exist.

4.3. All joints shall be completely seal welded in accordance with BS 5135. Special care must be taken to prevent the ingress of moisture into the tubular members by ensuring that each such tubular member is airtight. “Stitch” welding will not be permitted. Only continuous welding will be accepted.

4.4. Weld cracks, undercut, or pock marks will not be accepted.

4.5. All welds on the load bearing frame structure, containers, piping, pipe line flanges, etc., shall be continuous and shall be visually inspected for cracks and other discontinuities.

4.6. Welds on the main chords must be tested ultrasonically in accordance with BS 3923 or X-rayed in accordance with BS 2600 and those on minor joints by the dye-penetrant method. The equipment required for these tests must be supplied by the Contractor and the testing done at his cost.

4.7. Steel, except in minor details, which has been partially heated, shall be properly annealed. (Electrically welded structural members excepted.)

4.8. All brackets, clamps, lugs, straps, suspenders, etc. required for attaching mechanical and electrical equipment must be welded on prior to erection and special precautions must be taken not to damage welds or puncture tubes during erection.

4.9. The welding of all rails shall be done by an approved method.

4.10. Welding shall only be carried out by a coded welder according to SABS 044, BS-EN 287 Part 1 and BS-EN 288 Part 3 or ANSI/AWS D1.1.

4.11. All parts to be welded shall be thoroughly cleaned and dried before welding. The welding will only be done in dry surroundings and all steps taken to prevent hydrogen embrittlement.

4.12. Where materials of different compositions are joined by welding, especially carbon steel to chrome steel, the filler welding method and post welding treatment shall be such that embrittlement and other degradation of both steel and filler are prevented.

4.13. It must be ensured that welded joints are ductile.

5. FASTENERS

5.1. All bolts, nuts and rivets shall be manufactured in accordance with the following standards: -

Commercial bolts and nuts Grade 4,6:	SABS 135
Precision bolts and nuts Grade 8,8:	SABS 136
Friction Grip Bolts and nuts Grade General:	SABS 094
Rivets:	SABS 435

5.2. All fasteners (excluding friction grip) shall be hot dipped galvanised (and their nuts and washers).

5.2.1. All holding down bolts and nuts and brackets, as well as all bolts, fixing studs and nuts and washers shall be of stainless steel M12 and under.

5.3. Bolts and setscrews shall be locked in an approved manner and shall not be stressed in tightening to beyond the recommended loads.

5.4. The quality of friction grip bolts, nuts and washers, bolt lengths, sizes of holes, tightening standards, surface condition of clamped components, shop and site assembling and acceptance inspection of friction grip joints shall comply with the latest edition of SABS 094. Certificates shall be supplied for all bolts of grade 8.8 and 10.9.

5.5. All bolt and rivet holes must be accurate to size and location, the centres of holes shall not be placed nearer the edge of a plate than 1,5 diameters with an extra allowance of 3mm for sheared edges. All holes in the structural work shall be drilled or otherwise punched to a diameter not exceeding 1,5mm less than the diameter of the finished hole on the die side, and afterward reamed out to the exact size

Where possible the adjoining parts forming a connection shall be drilled or reamed together, with holes not exceeding 1,5 mm diameter the rivet or bolt for which it is made. No rough or broken edge shall be left around any of the holes.

5.6. For turned and fitted bolts, the holes shall be accurately drilled or reamed, the diameter of the hole shall not exceed the finished diameter of the bolt by more than 0,25mm.

5.7. The holes, after assembly of the parts, shall be true throughout the thickness of all the parts and perpendicular to the axis of the member.

5.8. Rivets shall be cup-headed or countersunk as required, unless otherwise specified. No rivet head shall contain less metal than does a length of the rivet equal to 1,25 times its diameter. All loose and defective rivets shall be cut and replaced by sound ones; also others when required for the purpose of examining the work. Rivets shall be driven with pressure tools whenever possible and pneumatic hammers shall be used in preference to hand driving.

5.9. All field rivets must be supplied with shanks of suitable length for pneumatic riveting.

5.10. Bolts shall be of such length as to accommodate a full nut and washer when tightening up, and protrude a maximum of 3 thread pitches beyond the nut. Excessive projection of threads beyond the nut must be avoided. Bolts that are flush or under top of nut are not acceptable.

5.11. All bolts having countersunk heads shall have strong feathers forged on the neck and head to prevent turning and the bolt holes shall be cut to receive same. All nuts and bolts (excluding countersunk bolts) shall be furnished with circular washers of sufficient thickness, the outside diameter being at least twice the nominal diameter of the bolt, and washers fitted correctly.

5.12. Where bolt heads or nuts are seated on bevelled surfaces of beams or channel flanges, bevelled washers must be inserted.

6. JOINTS AND MATING SURFACES OF MEMBERS

6.1. Mating surfaces of members to be joined by high tensile steel bolts in friction grip shall be cleaned and primed as specified for the rest of the steelwork. Mating surfaces shall lay flat against each other to eliminate gaps which may allow ingress of water. After joining, the edges shall be sealed with an approved brand of Butyl/ Rubber sealing compound by means of a suitable caulking gun, or shall be seal welded.

6.2. Other joints shall be formed by one of the following methods:

6.2.1. The mating surfaces of members shall be blast cleaned, primed and protected prior to sub-assembly by the liberal application of caulking compound. While the compound is still wet, the members shall be bolted together and caulking compound which is squeezed out shall be completely removed.

6.2.2. The mating surfaces shall be protected with the full corrosion protection system as specified, the surfaces joined together and the joint so formed shall be sealed with butyl rubber sealer.

6.2.3. After being cleaned and primed the surface shall be joined together and the joint so formed shall be seal welded.

6.3. The primer coating on mating surfaces must be applied not more than 4 hours after cleaning and the edges must be sealed within 3 weeks of assembly of the part.

7. FABRICATED PARTS

7.1. All fabricated parts shall be properly fitted during assembly to result in properly aligned equipment having a neat appearance. Fabrications of load bearing members shall have no abrupt changes in cross section and regions of severe stress concentration. All sharp corners accessible by personnel during erection or operation shall be ground, rounded, or removed by other methods. Burrs, welding spatter and stubs of welding wire shall be removed.

8. BALLAST OR COUNTER MASS

8.1. Tenderers must include for the supply of all necessary ballast or counter mass.

8.2. These must preferably be of cast iron and be removable for maintenance of structural steelwork.

8.3. Concrete ballast is not recommended but will be accepted provided the Tenderer satisfies Portnet that it will not cause corrosion of any steel parts.

8.4. Fastenings used for removable pieces must be of non-corrosive material.

8.5. Ballast must be in suitable shapes to be secured in position against movement but in sizes easily removable for maintenance.

8.6. Lifting hooks or eyes of non-corrosive material and of adequate strength must be provided in the removable ballast pieces.

8.7. Concrete ballast must be reinforced so as to prevent cracking or breaking, and must be coated with an approved corrosion protection system for concrete.

9. STAIRS, LADDERS, PLATFORMS AND WALKWAYS

9.1. Platforms, stairways, walkways, hatches and ladders, shall be provided where necessary to give easy access to all parts of the equipment for inspection, maintenance and lubrication purposes (including the insides of all box sections if inspection covers are provided).

9.2. The hand rails and ladders shall be complete with stanchions, knee rails, back hoops, mounting brackets etc. and shall be manufactured in

sections which are hot-dipped galvanized and painted and bolted onto the structure.

9.2.1. The handrail shall have a minimum diameter of 25mm and shall not be less than 1 050mm above the platform level. Toe boards shall not be less than 150mm high.

9.3. Stairs shall be inclined at 45° to the horizontal and shall be broken at suitable intervals by platforms.

9.4. Stairs and walkways shall not be less than 700 mm wide (unless approved by TPT) and working areas around drives etc. shall be of sufficient size to allow for ease of maintenance.

9.5. Vertical ladders must be provided with back hoops.

9.6. Trap doors and hatches must be of light, but robust, construction, suitably hinged with stainless steel hinges and provided with a catch to keep them in the open position, if necessary. Trap door openings are to be protected by means of toe boards and removable handrails.

9.7. All external platforms, stair treads and walkways shall be hot dipped galvanised open grating construction, similar to Andrew Mentis "Rectagrid" type RS40 to allow for free drainage and avoid the accumulation of water and dust. Bearer bar thickness shall not be less than 4,5 mm. The top surface shall provide for adequate grip to avoid underfoot slipping.

9.8. TPT's prior approval is required for all external platforms and walkways where open grating cannot be used. This will only be permitted where the primary purpose of the walkway/platform is for maintenance purposes. All such surfaces are to be provided with a non slip surface coating.

9.9. No obstructions or sudden changes in levels will be permitted on walkways.

10. MACHINERY AND ELECTRICAL HOUSES AND OPERATOR'S CABINS

10.1. Where required, separate, self contained fully weather proof machinery and electrical houses as well as operators cabins shall be provided. The houses shall be of the steel framed metal clad type, and shall allow ample space and strength for all equipment and control panels housed therein, permitting unrestricted access to all equipment for routine service and maintenance. Headroom shall not be less than 2,13 metres. A minimum of 700mmm working space must be provided around all machinery and in front of all panels.

10.2. The major items of machinery, electrical equipment and panels shall be so arranged that it can be removed for repairs or replacement without disturbing the walls, roof, floor or structural framework and furthermore shall be so arranged that full access to all holding down bolts is provided from inside the house.

10.3. For electrical houses both the inner and outer cladding must be stainless steel, unless otherwise approved. Side cladding plates are to be joined with butting joints with butt cover straps where required (no lap joints), and the plates must be in as large sizes as practicable to reduce the number of vertical joints, and to eliminate horizontal joints. Alternatively cladding may be welded to the frame and all joints completely seal welded. All angles around windows are to be suitably joggled to obtain a waterproof and flat surface butting on the side sheets. The whole of the framing shall be well stayed and fixed on its base. Air-conditioned electrical houses shall be provided with thermal insulation material of an approved type between the cladding.

10.4. Machinery houses must be cladded with prepainted Aluminium sheeting, minimum thickness 0.8 mm, colour coated with the appropriate colour. The profile and fastenings must be suitable for the spans and wind uplift forces corresponding to the windspeeds stated in the main specification. Flashing, corner trim, closure pieces ridge cappings etc. shall consist of prepainted Aluminium of minimum thickness 1.2mm

10.4.1. Sheeting fasteners shall be 6.3 mm grade 304 stainless steel self-tapping screws with hexagonal washer heads.

10.4.2. Galvanic isolation rubber strips shall be used between the metal frame and Aluminium cladding.

10.5. Both machinery and electrical houses shall be provided with two access doors, sealed to suit pressurisation and/or air-conditioning, one on each side of the house, arranged for external locking, but allowing exit from the inside without a key. Rain guards must be provided above external doors.

10.6. Operator's cabins shall be fully constructed from 3CR12 or similar type stainless steel. Cladding shall be welded to the frame and shall be smoothed over to provide an aesthetic appearance. The cabin shall be insulated from the heat of the sun with an approved material. A stainless steel or similar material door with a robust industrial type door lock shall be provided. The door must be lockable from the outside, but must allow exit without a key from the inside.

10.7 All windows shall be of solar heat reducing shatterproof safety glass.

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END OF SPECIFICATION HE9/2/6 [Version 10]
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REVISION	REFERENCE	
Ver. 17	EEAM-Q-008	TRANSNET port terminals

DOCUMENT TYPE: SPECIFICATION	AUTHORISATION DATE: Date signed by CEO

TITLE: SPECIFICATION FOR CORROSION PROTECTION	PAGE 0 of 13

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EQUIPMENT ENGINEERING AND ASSET MANAGEMENT (GENERAL MANAGER)	SENIOR MANAGER (PROJECT MANAGER)	SENIOR MANAGER (ASSET MANAGER)

ACCEPTED BY:	AUTHORIZED BY:
CHIEF FINANCIAL OFFICER	CEO

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1. SCOPE

1.1. This specification covers Transnet Port Terminals requirements for protective coating of iron and steel structures, electrical motors, gear boxes etc. against corrosion and must be read in conjunction with the main specification as well as the following (latest editions):-

SABS 064 "Preparation of steel surfaces for coating"

SABS 763 "Hot-dip (galvanized) zinc coatings"

SABS 1091 "National colour standards for paint"

BS 5493 "Code of practice for protective coating of iron and steel structures against corrosion"

2. TYPES OF CORROSION PROTECTION TO BE USED

2.1. The coatings specified in this specification are chosen according to BS 5439, Table 3, part 9, to ensure that the condition of the surface will be at least RE2 on the European scale of degree of rust, after 10 years in a environment of frequent salt spray, chemicals and polluted coastal atmosphere. During the 10 years, the normal maintenance painting will be done.

2.2. The paint manufacturer shall guarantee the paint for at least 10 years.

2.3. Should a tenderer wish to offer coating systems other than those specified, as an alternative, he shall submit full technical details and a list comparing all appropriate details of the alternatives proposed, with the original specified.

2.4. Tenderers must ensure that the different coats they offer in their tenders are compatible with each other.

2.5. The coating of proprietary items must be done according to Clause 3.

2.6. All galvanized components including bolts and nuts but excluding walkway gratings, must be painted with the specified system, unless otherwise approved.

The following coating systems must be used unless otherwise specified in the main specification:-

Substrate	Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
3CR12 steel	1	Surface tolerant epoxy primer	DULUX /SIGMA Sigmacover primer INTERNATIONAL (PLASCON) Intergard 269 STONCOR (CHEMRITE COATINGS) Carboline 193 Primer	65-75
	2	Two component recoatable, polyurethane finish (Gloss)	DULUX / SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75
Galvanized Steel	1	Surface tolerant epoxy primer	DULUX /SIGMA- Sigmacover primer INTERNATIONAL (PLASCON) Intergard 269 STONCOR (CHEMRITE COATINGS) Carboline 193 Primer	65-75
	2	Two component recoatable, polyurethane finish (Gloss)	DULUX /SIGMA- Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

Substrate	Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
Mild steel	1	Two component self curing inorganic zinc ethyl silicate OR two component zinc rich polyamide cured	DULUX /SIGMA- Sigma MC60 OR Sigma-cover primer	65-75

		epoxy primer	INTERNATIONAL (PLASCON) Interzinc 233 OR Interzinc 52 or 53 STONCOR (CHEMRITE COATINGS) Carbo Zinc 11 OR Carbo-line 658 Primer	
	2	Flexible recoatable high build polyamide cured MIO epoxy	DULUX/SIGMA – Sigmacover CM MIO INTERNATIONAL (PLASCON) Interseal 010 MIO STONCOR (CHEMRITE COATINGS) Carboline 190 HB M.I.O. or Carboline 193 M.I.O.	125-150
	3	Two component recoatable, polyurethane finish (Gloss)	DULUX/SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

2.7. The paint manufacturer's recommendations for the application of the different coating systems, curing time before handling or application of subsequent coats, health and safety recommendations etc. must be carefully adhered to.

2.8. Paint contractors must have a quality management system which must be submitted to the Engineer for approval before commencement of the work.

2.9. Galvanizing shall be done to SABS 763 heavy duty hot dip galvanizing to a thickness of at least 85μm. Electroplated components in zinc or cadmium are not acceptable.

2.10. All mounting bolts, nuts, washers and brackets as well as all fixing bolts, studs nuts and washers shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.

2.11. High tensile bolts for friction grip joints must not be galvanised and must be primed and painted after installation. High tensile bolts must be certified.

2.12. The full paint system shall be applied to all surfaces which are to be covered with wear pads, linings etc.

2.13. For steelwork which will be transported over long distances and erected on site the two pack epoxy primers is preferred.

3. PROPRIETARY ITEMS

3.1. Proprietary items such as gearboxes, motors, brakes etc. must either be painted according to this specification or where the coating system is equal to or exceeds this specification sufficient proof of the coating system applied must be provided. Items which are nearly equal to this specification shall be given a finishing coat according to this specification's thicknesses and final colours and to the following procedure:-

3.1.1. A cross cut test must be done to SABS SM159 to determine if the original coating adheres correctly to the substrate;

3.1.2. The original coating shall be rubbed down to remove any smooth finishing to form a suitable key for the finish coat and any damaged areas prepared and patch primed with a suitable primer;

3.1.3. The item must then be detergent washed to remove any foreign matter, taking care that no dust, solvent etc. contaminates any working part of the item;

3.1.4. A test shall be done on the existing coat to ensure that the finish coat will not react with and cause undue dissolving and lifting of the existing coat. This can be done by applying a small quantity of the finishing coat thinners.

3.1.4.1. Should any undue dissolving or lifting occur, a suitable intermediate or barrier coat must be applied before the finishing coat is applied.

3.1.5. Proprietary items which failed the cross cut test and which generally have inadequate protection shall be dismantled and the full corrosion protection specification applied.

4. SURFACE PREPARATION

4.1. All steel surfaces shall be detergent washed and fresh water rinsed to remove all oil, grease and surface contaminates before shot blasting.

4.2. Sharp edges shall be radiused and major roughness of welds shall be removed by grinding. Welding spatter and flux shall be removed.

4.3. Components manufactured from hot rolled steel sections and steel plate shall be blast cleaned to base metal in accordance with SABS 064 grade SA2½ - very thorough blast cleaning, to remove all mill scale, rust, weld spatter etc.

4.3.1. "Sharp" chilled iron shot, chilled iron grit, or granular abrasive slag is to be used to produce a proper degree of surface roughness.

4.3.2. Blast profile shall be determined by micrometer profile gauge, Keane-Tator surface profile comparator or Testex press-o-film.

4.3.3. The profile height shall be between 40 and 50μm at any point.

4.4. Good quality blast cleaning and spray painting equipment shall be used. Air used for spraying and blast cleaning shall be free from all traces of oil, water and salinity. Water and oil traps must be fitted to all equipment.

4.5. Wheel abrading equipment shall not be used unless an angular profile the same as clause 4.3.3 is achieved.

4.6. When wet blasting is done the primer shall be applied before oxidization starts or surface contamination occurs.

4.7. Components manufactured from 3CR12 steel shall be lightly abraded. The components shall then be passivated by using a mixture of 10 - 15% nitric acid in water which is rinsed off after 10 - 15 minutes. The surface shall be neutralized to pH 7 before it is coated.

4.8. Hot-dip galvanized components, galvanized bolts and nuts etc. shall be lightly abraded with a galvanizing pre-cleaner. The components shall then be washed with detergent and water and washed down with clean water until a water break free surface is achieved. Allow to dry thoroughly.

5. JOINTS AND MATING SURFACES OF MEMBERS

5.1. Mating (faying) surfaces of members which have to be joined by high tensile steel bolts in friction grip shall be cleaned according to Clause 4 and painted with primer only.

5.1.1. After being assembled joints so formed shall be seal welded and painted or after the intermediate coat was applied the edges shall be sealed with an approved brand of paintable flexible sealant or mastic (e.g. Butyl rubber, polyurethane sealer or two component epoxy), by means of a suitable caulking gun.

5.2. All rivets, bolts, welds, sharp edges etc. must be covered with a "stripe coat" of the primer or intermediate coat specified to ensure the correct dry film thickness on sharp edges, as well as sealing of bolt threads to head etc.

5.3. All other mating surfaces must be sealed with an approved brand of flexible Butyl rubber, paintable Silicone, polyurethane sealer or two component epoxy sealer, and joined while still wet. All excess compounds must be completely removed.

6. PAINTING PROCEDURES

6.1. Directly before the application of paint, the area to be painted shall be degreased with a suitable degreaser and left to dry.

6.2. Paint shall only be applied under the following conditions:-

6.2.1. There is adequate light.

6.2.2. The steel temperature is between 5 and 50°C and at least 3°C above the dew point of the air.

6.2.3. The relative humidity of the air is between the limits specified by the paint supplier.

6.2.4. Wind does not interfere with the method used and sand and dust cannot be blown onto wet paint.

6.3. Steelwork shall be supported on trestles, at least 900 mm off the ground for painting purposes.

6.4. An adequate number of test readings shall be taken per square meter in order to determine the dry film thickness.

6.4.1. The paintwork shall be acceptable if the average of the test readings taken falls within or exceeds the ranges given.

6.4.2. Paintwork shall not be acceptable if any single test reading is less than the specified minimum thickness.

6.5. An ultrasonic or electronic magnetic flux thickness measurement gauge shall be used, but in case of dispute, destructive testing shall be applied. He painted steelwork shall present a clean, neat appearance of uniform colour and gloss as applicable to the paint used. Each coat of paint shall be applied as a continuous, even film of uniform thickness. More than one application of paint may be required to achieve the dry film thicknesses specified or to obliterate the colour of the previous coating.

6.6. The use of thinners or solvents at any stage of the work is prohibited, unless specified by the paint manufacturer.

6.7. Precautions shall be taken to prevent coatings from being applied to equipment nameplates, instrument glasses, signs etc.

7. COLOUR CODES

Machinery and equipment shall be painted in the following final colours:-

	Area	Colour	Code No. [SABS 1091 and International No's]
7.1.1	Mobile equipment (cranes, loaders etc.)		
	a) Structure, machinery and electrical houses, operator's cabins, chutes, hoppers etc.	Transnet Red	RAL 3020
	b) Undercarriage, travel bogies, rubber tyred rims	Transnet Red	RAL 3020
7.1.2	Industrial buildings, conveyor structures		
	a) Roofs and canopies	Pantone cool grey 10	RAL 7037 (Staubgrau)
	b) Painted walls	Pantone cool grey 3	RAL 7035 (Lightgrau) or SABS 1091 G62 (Pale grey)
	c) Steel columns, rafters, trusses	Pantone cool grey 5	RAL 7004 (Signalgrau)
7.1.3	General		
	a) Guards	Golden yellow	SABS 1091-B49 RAL 1003
	b) Sheaves	Orange	RAL 2008
	c) Cable reels (Stainless steel	Orange	RAL 2008
	Machine buffers and parts of machine which could constitute a serious hazard	Golden Yellow (High Gloss) with Luminous green stripes in chevron pattern	SABS B49 and Luminous green

Area	Colour	Code No. [SABS 1091 and International No's]
e) Any exposed rotating part of machinery, electrical Switch-gear (other than starting and stopping devices and emergency stop control), electrical services e.g. conduit and allied fittings	Light Orange (High Gloss)	SABS 1091 B26 BS 381C-557
f) Low voltage switchgear panels where orange is not aesthetically acceptable	Light grey	SABS 1091-G29 BS 381C-631
g) Medium voltage cable trays, switchgear and motors (3,3 kV and up)	Oxford Blue	SABS FO2 BS 381C-105 RAL5003
h) Starting devices, low voltage cable trays and switchgear	Mid brunswick green (high gloss)	BS 381C-228 SABS1091-EO4 RAL6005
i) Portnet Logo	Transnet White	RAL 3012
j) Parts of stationary machinery (Electrical, motors, gearboxes, brakes, transformers, etc.])	Light Grey	SABS G29 BS 381C-631
k) Hand levers, hand wheels, oiling points, handrails on walkways, ladders	Golden Yellow (High Gloss)	SABS 1091 B49 BS 381C-356
l) Stopping devices, grease points, motor fan covers and danger signs (not symbolic safety signs for which see SABS 1186)	Signal red (High Gloss)	SABS 1091 A11 BS 381C-537 RAL3001
m) Walkways (non slip surfaces) (galvanized gratings not to be painted)	Shop floor green	
n) Informatory signs and notices (not symbolic safety signs for which see SABS 1186)	White on Emerald Green (High Gloss)	White on SABS 1091 E14 BS 381C- 228

	Area	Colour	Code No. [SABS 1091 and International No's]
7.1.4	Pipe lines		
	a) Reclaim water piping	Aluminium	
	b) Slurry pipe lines	Dark admiralty grey	SABS 1091-G12
	c) Fire protection piping	Signal red	SABS 1091-A11
	d) Washwater drain pipes	Light grey	SABS 1091-G29
	e) Instrument air	White with Strong blue band	White and SABS 1091-F11
	f) Plant air	White with Flag blue band	White and SABS 1091-FO4
	g) Potable water	Grass green	SABS 1091-D14

7.1.5 Colour bands for pipes shall be 75 mm wide for pipe sizes up to 150 mm diameter and 100 mm wide for 150 mm and above. The colour bands shall be applied to the pipe flanges, valves, junctions, walls or structures etc. in such a manner that the pipe may be easily identifiable. On straight sections the maximum spacing shall be 100 x the pipe diameter.

8. FIELD TOUCH-UP PAINTING

8.1. Damaged and unpainted areas, fasteners, welds, etc. shall be cleaned by wire brushing with hand tool or power tool in a manner which will minimize damage to sound paint. Grinding will not be allowed. Rust spots shall be cleaned to bright metal. Thick edges of old paint abutting on bare metal surfaces shall be feathered by scraping and sanding.

8.1.1. Where welding is required on areas already coated with the coating system, the coat should be stepped back for ± 30mm around the weld area.

8.2. The paint shall be applied to match the original coats in accordance with the manufacturer's recommendations for the specific paint system.

Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.

8.3. Areas of damaged galvanizing shall be repaired with an approved cold galvanizing product or metal sprayed by the wire spraying process with Zinc, and then touched up with the specific paint system.

9. GENERAL

9.1. All walkways, floors, maintenance platforms etc. must be painted with a durable, non skid coating of the appropriate colour.

9.2. Exposed machined surfaces must be coated with a strippable corrosion inhibitor (e.g. Tectyl).

9.3. Where different materials will be in contact with each other and galvanic corrosion can occur the contact areas of the materials must be isolated from each other or the joints made water proof to prevent ingress of moisture.

9.4. All components must be designed with corrosion prevention in mind and specifically the following:-

9.4.1. No entrapment of dirt, product, moisture etc.

9.4.2. No areas must be inaccessible for maintenance such as too narrow gaps etc.

9.4.3. Large flat areas rather than complicated shapes and profiles.

9.4.4. No sharp corners and discontinuous welds.

9.5. Parts of equipment which are exposed to high temperatures must be coated with the following system:-

Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
1	Two component self curing inorganic zinc ethyl silicate	DULUX /SIGMA-Sigma MC60 INTERNATIONAL (PLASCON) Interzinc 233 STONCOR (CHEMRITE COATINGS) Carbo Zinc 11	65-75
2	Single component high temperature moisture curing silicone with aluminuim flakes	DULUX/SIGMA – Sigmatherm Silicate INTERNATIONAL (PLASCON) Intertherm 50 STONCOR (CHEMRITE COATINGS) Carboline 1248	40

10. MAINTENANCE PAINTING OF STRUCTURES

10.1. Areas which are only lightly corroded must be cleaned by means of high pressure water blasting or wire brushing by power tool and the following system applied:-

Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
1	Surface tolerant two pack epoxy primer with aluminuim pigments	Dulux/SIGMA Aluprimer STONCOR (CHEMRITE COATINGS) Carbomastic 15 INTERNATIONAL (PLASCON) Intergard 468,	125-150
2	Same as first coat OR micaceous iron oxide (MIO) epoxy	DULUX/SIGMA – Sigmacover CM MIO	125-150

		INTERNATIONAL (PLASCON) Interseal 010 MIO STONCOR (CHEMRITE COATINGS) Carboline 190 HB M.I.O. or Carboline 193 M.I.O.	
3	Two component recoatable, polyurethane finish (Gloss)	DULUX/SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

10.1.1. Alternatively, the Noxyde paint system can be used, consisting of two to three coats of water based Noxyde paint to achieve a DFT of 350 to 400 microns. Where the Noxyde system is used on areas other than slightly corroded structural areas, the following additional requirements must be observed:

10.1.1.1. Very smooth surfaces (e.g. 3CR12, stainless steel or hot-dip galvanized components, bolts, nuts and fittings, and HT bolts): Parts must be thoroughly degreased using OptiDegreaser, washed down with potable water, and immediately when dry, a single coat of OptiPrimeAqua applied.

10.1.1.2. Paintable flexible sealant/mastic: Only sealant approved by the paint manufacturer may be used, and an initial coat of OptiPrimeAqua applied over it before the further coats of Noxyde are applied.

10.1.1.3. Bolted/rivited connections: After blasting or and/or cleaning as required, apply a coat of OptiPrimeAqua and an additional stripe coat of Noxyde, in contrasting colour, to all bolt/nut and plate edges and crevices.

10.2. The adhesion of old coatings must be verified by doing a cross cut adhesion test on selected areas.

10.3. The compatibility of the new paint system on the old coating must be tested and guaranteed in writing by the paint supplier.

10.4. The work and coating system must be guaranteed for a minimum of 12 months.

10.5. All heavily corroded areas must be shot blasted to minimum SA2 and the three coat system indicated in clause 2.6 applied.

10.6. Areas where the old coating is still sound need only be high pressure cleaned with a suitable solvent and coated with one of the primers suggested in clause 10.2 (as tie coat) and then with one of the top coats suggested in clause 2.6 to get the appropriate colour and finish. The minimum dry film thickness of this tie coat must be 75 microns and top coat must be 50 microns, but the previous coating colour shall be completely obliterated to present a uniform colour.

Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.

10.7. Repairs to the insides of all the enclosed sections of the booms as well as the insides of the crane legs, sill beams, cross beams, pylon cross bracing members etc. shall be done as above but the top coat need not be applied.

****** END OF SPECIFICATION HE 9/2/8 [Version 17] ******

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COMPILED BY: **SENIOR MANAGER (QUALITYMANAGER)**	**REVIEWED BY:** **SENIOR MANAGER (PROJECT MANAGER)**	**REVIEWED BY:** **SENIOR MANAGER (GENERAL MANAGER)**

ACCEPTED BY: **CHIEF FINANCIAL OFFICER**	**AUTHORIZED BY:** **CEO**

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1.0 QUALITY MANAGEMENT SPECIFICATION FOR SUPPLIER/CONSTRUCTION

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1. Introduction

This Specification outlines the minimum requirements to ensure that products and services supplied to Transnet Port Terminals are manufactured, provided, constructed or installed in accordance with all specified requirements as defined in the Contract, all associated specifications, drawings, codes and standards.

2. Definitions

Term, Abbreviation	Meaning
Data	All drawings/documents/data/information and DP's required to be supplied under the Contract
Data Pack (DP)	A compilation of manufacturing data, certification, inspection and testing records prepared by the Supplier/Contractor to verify compliance with the Contractual requirements.
Employer	For the purposes of this document, the term Employer has the same meaning as applied to the term Client.
Field Inspection Checklist (FIC)	A document that details the checks, requirements and test parameters for each type of equipment to permit field installation and pre- commissioning of the equipment.
TPT	Transnet Port Terminals is the Employer's Nominated Agent in terms of the Conditions of Contract.
Inspection Release Report (IRR)	A document issued to the Supplier/Contractor by TPT advising release of the Materials for shipment. This does not relieve the Supplier/Contractor of its obligations in accordance with the Terms and Conditions of the Contract.
Inspection Waiver Report (IWR)	A document issued to the Supplier/Contractor by TPT advising that TPT has waived final inspection for the materials listed in this document. The issue of this Report does not preclude further inspection by TPT, is issued without prejudice and does not relieve the Supplier/ Contractor from the guarantees and obligations included in the Contract/ Contract. A document prepared by the Supplier/Contractor providing relevant information applicable to the installation and maintenance of the specific equipment, including consumables (eg. oils etc)
Project Quality Plan (PQP)	A document that outlines the Supplier/Contractor's strategy, methodology, resources allocation, Quality Assurance and Quality Control coordination activities to ensure that Goods and Services supplied meet or exceed the requirements defined in the Contract, drawings, codes and standards.
Quality Control Plan (QCP*	A document outlining specific manufacturing / construction inspection and testing requirements, including responsibilities, test acceptance criteria, nomination of witness and hold points. For the purposes of this document, the term Supplier/Contractor has the same meaning as applied to the term Sub-Supplier/Sub-Contractor
Supplier/Contractor	This refers to the documentation required to be submitted by the relevant Supplier / Contractor in terms of the Contract.
Supplier/Contractor Data Requirements	These requirements are generally tailored to suit the particular Scope of Work, although it also addresses the manner in which the documentation is required to be submitted, eg Hard copy, Electronic copy etc
Technical Query Note (TQN)	This refers to a document used by the Supplier/Contractor to formally clarify a Technical Query related to the scope of supply. This should not be used where a non-conformance has already been initiated.

3. Applicable Documents

3.1 General

All work performed shall comply with the requirements of this Specification, the documentation referenced in the Contract and the latest revision/edition of the relevant Codes and Standards referenced herein.

3.2 Statutory Regulations

Occupational Health & Safety Act, Act No 85, of 1993 and Regulations as amended.

3.3 Codes and Standards

Document No.	Title
ISO 9001	International Standard Series Quality Systems
EEAM-Q-013	Punch Listing Standard

4. Quality System

4.1 General

The Supplier/Contractor shall be responsible for all quality activities necessary to ensure the Work meets the requirements specified in the Contract, and shall manage and coordinate all Quality aspects of Work in accordance with the requirements of this Specification, and the Supplier/Contractor's PQP and QCP's once reviewed and approved by TPT.

The Supplier/Contractor shall ensure that all Sub-Suppliers/Sub-Contractors also conform with the requirements of this Specification.

4.2 Supplier/Contractor Quality System Requirements

The Supplier/Contractor shall have, maintain and demonstrate its use to TPT, it's documented Quality Management System. The Supplier/Contractors Quality Management System should be in accordance with the International Standard ISO 9001.

The Supplier/Contractor shall submit its Quality System documentation to TPT at the time of tender and at Contract Phases as detailed below:

- Project Quality Plan
- Quality Policy
- Index of Procedures to be used
- Programme of internal and external audits

4.3 Supplier/Contractor Documentation Requirements

The Supplier/Contractor shall develop and maintain a comprehensive register of documents that will be generated throughout the project, and shall include all quality related documents. The register shall be submitted to TPT for review.

TPT shall indicate those documents required to be submitted for information/review and/or acceptance and this shall be indicated in the Supplier/Contractors' Document Register. The register shall indicate the dates of issue of the documents taking into account sufficient time to allow TPT review/acceptance cycle prior to the document being required for use.

5. Quality Assurance

5.1 Project Quality Plan

Where specified, the Supplier/Contractor shall submit a PQP to TPT within 28 days after the Contract start date. The PQP shall detail how the Supplier/Contractor's Quality System will be applied to the Scope of Work specified in the Contract, and shall address the following:

- Satisfying the technical and quality requirements of the Supplier/Contractor's Scope of Work, and relevant elements of the applicable ISO 9001 standard
- include all quality activities relevant to the Scope of Work, identifying all procedures, reviews, audits, controls and records used to control and verify compliance with the specified Contractual requirements

Include a listing of all special processes (eg. welding and non-destructive testing, cube testing etc) envisaged for use, including confirmation of personnel certification as required

- Include all proposed method statements (for site based work activities)
- Include a description of the Supplier/Contractor's project organisation, with key positions and responsibilities identified and individuals named. The organisation structure shall also indicate the resources committed to the management / coordination of QA / QC activities
- Include a listing of all Quality Control Plans (QCP's), and associated Field Inspection Checklists (FIC's), as applicable
- Identify in the Project Quality Plan any Sub-Supplier/Sub-Contractor work. Sub-Supplier/Sub-Contractor plans shall be approved by the Supplier/Contractor, and a copy forwarded to the TPT
- Include the proposed Authorised Inspection Authority (where applicable - for pressurised equipment and systems)
- Include a schedule of proposed quality records

The PQP shall be controlled and re-submitted for approval when required to incorporate any change necessary during the Contract duration to ensure that the document is maintained as an effective control, change management and records. The change management will be done to an agreed policy or procedure.

Note: Where the Supplier/Contractor is required to provide a PQP, no work shall commence until the PQP is approved by TPT.

5.2 Procedures

The Supplier/Contractor's PQP and procedures shall address the system elements and activities appropriate to the Scope of Work, in compliance with the specified Quality Standard.

Where specified, the Supplier/Contractor shall submit copies of Quality Procedures for review. In addition, the Supplier/Contractor shall ensure that copies of all Procedures relevant to the Scope of Work are available for reference by TPT at each work location.

These will include, as applicable, the following:

5.2.1 Document Control

The Supplier/Contractor's Project Quality Plan shall provide a description of how TPT provided, Supplier/Contractor and Sub-Supplier/Sub-Contractor documents are to be managed. The description shall address as a minimum:

- Management tools and databases
- Receipt, registration and maintenance
- Internal and external distribution to Employer, third parties and Sub-Contractors
- Management of Codes, Standards and Specifications

- Internal review and approval routines and authorities
- How it is ensured that the correct revisions of documents are available at the point of use including retention periods for all documentation.

5.2.2 Design Control

Where the Supplier/Contractor is responsible for any aspect of design related to their Scope of Work, the Quality Plan shall describe the Supplier/Contractor's methods and procedures for the control of these design activities.

5.2.3 Procurement

Where the Supplier/Contractor is responsible for any aspect of procurement related to their Scope of Work, the Quality Plan shall describe the Supplier/Contractor's methods and procedures for the control of these activities.

5.3 Supplier/Contractor Audits

The Supplier/Contractor shall:

- Carry out audits in accordance with its Quality System at its own and Sub-Supplier/Sub-Contractor's facilities to ensure project quality requirements are being achieved
- Include a QA Audit Schedule in the Supplier/Contractor PQP submitted to TPT prior to commencement of the Scope of Work. The Audit Schedule shall include all audits to be implemented by the Supplier/Contractor and Sub-Supplier/Sub-Contractor during the execution of the Contract
- Where stipulated in the Contract, perform an audit within three months after the Contract start date and thereafter at a minimum frequency of three months. Audit reports shall be submitted to TPT at the completion of each Audit. Where unsatisfactory performance is evident, additional audits shall be performed by the Supplier/Contractor as directed by TPT.

5.4 Transnet Port Terminals Audit

TPT reserves the right to perform quality audits or participate as an observer in Supplier/Contractor audits to verify compliance with the Contractual requirements. The Supplier/Contractor shall within a time frame as agreed upon, correct any adverse audit finding advised by TPT.

6. Inspection and Testing

6.1 General

TPT may, at its discretion perform surveillance inspection at the Supplier/Contractor's premises, SubSupplier/Sub-Contractor's premises or at the location of the Scope of Work.

Dependent on the nature of the Scope of Work and the frequency of inspections TPT may elect to have inspection personnel resident at the place of manufacture, fabrication, or assembly.

The Supplier/Contractor shall ensure free entry and access is given to TPT, certifying authorities and statutory authorities to inspect the Scope of Work and review procedures and quality records at all parts of the Supplier/Contractor's and Sub-Supplier/Sub-Contractor's premises, or at the location of the Scope of Work while any work or test is in progress.

The Supplier/Contractor shall provide TPT with all necessary tools, calibrated measuring equipment, safety equipment and workspace to verify or witness tests in progress.

While TPT is at the Supplier/Contractor's premises, the Supplier/Contractor shall provide, free of charge, reasonable facilities including office facilities and reasonable access to a telephone, facsimile machine and computer connection point.

The Supplier/Contractor shall provide notice in writing in within a time frame time as agreed upon, to allow the attendance of TPT and other representatives at nominated witness and hold points.

6.2 Quality Control Plans

The Supplier/Contractor shall prepare and submit QCP's to TPT for review in accordance with the requirements of the Contract and PQP.

QCP's shall identify all inspection, test and verification requirements to meet the Contractual obligations, specifications, drawings and related details including destructive and non-destructive testing, witness and hold points.

The Supplier/Contractor shall not commence fabrication or manufacture prior to review and approval of the applicable QCP by the TPT.

QCP's shall include reference to all tests specified in the Contract Document.

A typical format for an QCP is shown in Appendix A. The Supplier/Contractor may use its own format providing all information shown in Appendix A is included.

6.3 Inspection Points

The QCP shall identify points in the fabrication, manufacturing and/or installation process that are selected for inspection and shall be denoted by the following inspection codes:

- Hold Point (H) — Inspection point in the manufacturing cycle, beyond which work shall not proceed without the specified activity, work or function being witnessed. Holding points require written notification to TPT.
- Witness Point (W) — An inspection point in the manufacturing cycle that will be witnessed or verified. If TPT confirms it is unable to attend after being provided with the written notification then manufacture may proceed. Witness points require written notification to TPT.
- Review Point (R) — A point at which products and quality records are verified and endorsed. Review points are not notifiable points.
- Surveillance (S) — An inspection point in the manufacturing cycle during which any activity, work or function is observed. No formal notification is required.

The Supplier/Contractor shall maintain the status of testing and inspection by progressively having the QCP's signed off.

6.4 Revision to Quality Control Plans

Revision of the QCP shall be subject to the same submission, review and acceptance routines as described for the original QCP issue

6.5 Kick Off Meeting

After the Contract start date, and prior to manufacture, TPT will require a Kick Off Meeting with the Supplier/Contractor to discuss fully the implications of meeting TPT quality requirements. This meeting may be held as part of the Contract kick-off meeting for each package or may be a separate meeting, subject to the critical or complex nature of the work. This requirement for a pre-inspection meeting may be repeated when sub-Supplier/Contractors of key equipment are engaged.

After mobilization of the Contractor, and prior to the commencement of any construction activities, TPT will arrange for a Quality kick-off meeting to discuss fully the implications of meeting the projects' quality requirements. This meeting may be held as part of the formal kick-off meeting for each contractor, or may be a separate meeting subject to the critical or complex nature of the work.

6.6 Schedule of Inspection

The Supplier/Contractor shall submit a Schedule showing the proposed dates for inspections and tests nominated in the QCP where witness and hold points are required. The Schedule shall be regularly updated with progress and issued to TPT to show the current inspection and test status.

6.7 Field Inspection Checklists

For site installation and construction activities, the Supplier/Contractor shall prepare Field Inspection Checklists (FIC's) to permit inspection and testing of installed equipment and constructed facilities in accordance with the respective QCP's.

FIC's shall be provided to TPT for initial review, and shall be used to record the results of inspection and testing (where applicable), and on completion be submitted to TPT to confirm satisfactory completion of the tests and inspections at nominated QCP witness and hold points.

6.8 Inspection Notification

The Supplier/Contractor shall notify TPT in writing at least two calendar weeks prior to the advent of inspections or tests that require witnessing.

For inspections or tests within the country, arrangements shall be confirmed at least two working days before the event. For inspection and tests outside of the country, arrangements shall be confirmed at least seven working days before the event.

Inspection notifications shall include the following essential information:

- Contract Number
- Location of Inspection or Test
- Nature of Inspection or Test
- Date and Time of Inspection or Test
- Name and telephone number of the Supplier/Contractor's Representative.

6.9 Inspection and Testing

The Supplier/Contractor is responsible for the conduct of all Supplier/Contractor inspections and tests, and includes:

- Documenting inspection and tests result in the QCP's and relevant FIC's
- Progressively inspecting the quality of the Scope of Work performed, including that of all Sub-Supplier/Sub-Contractors
- Inspecting to meet all Contractual requirements, in number, type and form
- Inspecting day to day activities, material receipts, issue of material for installation, in-process inspections, and final inspections.

Completed original QCP's and FIC's shall be submitted to TPT in the DP

6.10 Inspection Release

At completion of the Scope of Work, either in total or in phases, TPT may issue an Inspection Release Report (IRR) or a waiver of inspection.

The issue of either an inspection release or waiver of inspection does not relieve the Supplier/Contractor of its obligations under the Contract. The Supplier/Contractor shall ensure a copy of the release note and final expediting release note for transport, where appropriate, is attached to the delivery docket and accompanies the Work to the designated destination indicated in the Contract. Items delivered to TPT without a copy of these documents may not be accepted.

A copy of the inspection release or waiver of inspection shall be included in the DP.

6.11 Special Processes

It is the Supplier/Contractor's responsibility to ensure that all processes which require prequalified procedures and/or work methods are tested and qualified before work begins. This typically covers such activities as welding, non-destructive testing, special fabrication techniques and painting. Unless specified such procedures are the Supplier/Contractor's responsibility and do not require submission to TPT before work begins. When such procedures are requested, no work shall commence until procedures are approved by TPT.

It is the Supplier/Contractor's responsibility to ensure all operators are qualified for the processes in accordance with the procedure and/or applicable standards. Records of qualification of operators shall be maintained by the Supplier/Contractor and made available to TPT when requested.

Records of qualification of procedures and processes shall be maintained by the Supplier/ Contractor in accordance with the applicable procedure or code.

6.12 Welding Procedures

Where the Supplier/Contractor's Scope of Work includes fabricated weldments, Welding Procedure Specifications (WPS) defining the method, preparation and sequences to be adopted to achieve a satisfactory welded joint shall be provided for all weld types required in the execution of the Supplier/Contractor's Scope of Work. The procedure shall only be submitted to TPT when requested in the Contract.

WPS shall include all welding essential and non-essential variables for each process used, including appropriate test results and shall comply with the standard or code pertaining to welding required in the execution of the Supplier/Contractor's Scope of Work.

When requested in the Contract a suitably marked "weld map" shall be completed by the Supplier/Contractor for all items to be fabricated. A summary of WPS shall be prepared and when used, shall be identified on the weld map.

Where TPT approval is required, fabrication shall not commence until written approval of WPS and Welding Procedure Qualification Records (WPQR) is received by the Supplier/Contractor. No welding fabrication will be accepted that is not covered by an TPT approved WPS/WPQR.

Welding Procedure Qualification (WPQ) tests may be witnessed by TPT and/or an independent inspection authority. Testing of the specimens prepared during the WPQ Tests shall be carried out by an independent approved testing laboratory independent of the Supplier/Contractor. In certain instances, a certificate to EN 10204 3.1 B may be required which will be clarified at Tender review and clarification stage.

Where actual weld deposit analysis and weld metal physical properties are required for procedure qualification, the information shall be taken from the procedure qualification tests. Data listed in the catalogues of the manufacturer of welding consumables is not acceptable.

Welders/welding operators shall be qualified in accordance with the relevant welding code prior to commencing production fabrication. Specific Welder Qualifications (WQ's) records will be reviewed by TPT in the Supplier/Contractor's works and should NOT be submitted for review.

A register of welders qualified to work shall be maintained by the Supplier/Contractor.

6.13 Material Traceability

Where, and to the extent that material traceability is required, the Contractor shall provide its procedures for the maintenance of material identification throughout all phases of manufacture. Methods of identification, routines for re-stamping or stencilling as appropriate shall be defined and agreed with the Employer.

Adequate records shall be maintained throughout construction enabling traceability of key materials from final product back to original material certificates. The material traceability records shall form part of the DP

The Contractor shall prepare a schedule of materials and equipment that are subject to traceability requirements.

6.14 Material Certification

Where specified in the Contract the following certificates shall be provided to TPT and included in the DP.

Type A:	A Supplier/Contractor's certificate of compliance with the Contract. This certifies that the goods or services are supplied in compliance with the Contract without mention of any test results (EN10204 certificate 2.1).
Type B:	A certificate issued by a laboratory or test facility independent of the Supplier/Contractor'sworks. It shall quote test results carried out on the product supplied and state whether compliance with the relevant technical standard, code etc has been complied with. (EN 10204 certificate 3. I B).
Type C:	The same as Type B, the tests are to be witnessed by a third party (EN 10204 certificate 3.1C).

7. Non Conforming Products

7.1 General

The Supplier/Contractor shall establish and maintain procedures to control material or products that do not meet the specified requirements.

All Supplier/Contractor product and/or materials identified as not conforming to requirements shall be dealt with promptly as follows:

- If the Supplier/Contractor discovers material or product which is not in accordance with the requirements of the Contract, i.e. a non conformance (NCR), the Supplier/Contractor shall promptly initiate the non-conformance procedure in terms of the Supplier/Contractor's Quality Management System, advise TPT promptly, and provide a copy of the NCR to TPT
- If TPT or it's agent identifies a non conformance an TPT NCR may be raised.
- Originals of all closed out NCR's shall be included in the DP.

7.2 Corrective and Preventative Action

If the Supplier/Contractor proposes a disposition of any non conforming materials or product which varies from the requirements of the Specification or Contract, such a proposal shall be submitted in writing to TPT whose decision on the proposal shall be obtained in writing before the non conforming material or product is covered up or incorporated into the Works, or is the subject of any other disposition.

The disposition of non-conformances which do not vary the requirements of the Contract, specification or drawings may be approved by the Supplier/Contractor following discussion and agreement with TPT.

8. Concession Requests and Technical Queries

8.1 Concession Requests

Where a Supplier/Contractor requests a Concession to deviate from the requirements of the Contract or specified requirements, the Supplier/Contractor shall raise the request with TPT using the format as shown in Annexure B.

The Concession Requests shall clearly identify all elements of the proposed deviation together with any resulting technical, commercial and/or schedule impacts.

Completed original Concession Requests shall be included in the DP.

8.2 Technical Queries

For clarification of technical issues (only), Supplier/Contractor may submit a Technical Query Note (TQN) to TPT in accordance with the Contract.

The TQN shall clearly identify all elements of the query, and all supporting documentation and/or drawings shall be attached where appropriate.

Completed original TQN's shall be included in the DP.

9. Inspection, Measuring and Test Equipment

9.1 Calibration

The Supplier/Contractor, including its Sub-Supplier/Sub-Contractors shall ensure the calibration of test and measuring equipment is performed and maintained in accordance with the relevant Supplier/Contractor procedures and/or the equipment manufacturer's specifications.

Where calibration is required by an external laboratory, the Supplier/Contractor shall ensure that the facility selected for calibration possesses current certification. Calibration certificates shall contain a statement that the test equipment is accurate to within specified tolerances.

The Supplier/Contractor should establish the frequency of calibration for each item of equipment (including jigs, fixtures or templates) and record the details in a 'Measuring and Test Equipment Register' (or similar).

9.2 Use of Inspection, Measuring and Test Equipment

The Supplier/Contractor shall ensure that authorised equipment users:

- Use the equipment in accordance with manufacturers instructions, and accepted industry practices
- Ensure the equipment is covered by a current calibration certificate
- Conduct the measurements or tests in accordance with the equipment manufacturer's specifications or other relevant specification
- Prior to commencement of each inspection or test activities:
- Identify the measurements to be made
- Determine the accuracy required
- Select the appropriate inspection, measuring or test equipment for the scope of work.

9.3 Verification of Previous Test Results

Where the calibration status of the equipment is unknown, expired or has doubtful accuracy, the equipment shall immediately be quarantined, and tagged according to Supplier/Contractor's Quality System procedures. The Supplier/Contractor shall then arrange for either in-house or external calibration, and:

- review all previous test results associated with the suspect equipment
- identify the inspections, measurements or tests required to re-validate the results
- ensure that suitable re-testing is performed with calibrated equipment
- document the results of the re-testing on the respective inspection and test documentation.

10. Quality Records

Supplier/Contractors shall maintain Quality Records necessary to provide objective evidence that demonstrates and verifies achievement of the QA / QC requirements associated with the Scope of Work. All Quality Records, including original source material test certificates and non destructive test reports, shall be retained by the Supplier/Contractor during the project, and be provided to TPT at the times, and in the quantities specified in the Contract.

The Supplier/Contractor shall collate all quality records in the DP and submit the DP to TPT in accordance with the Contract and all referenced standards and specifications. This DP shall be compiled progressively, and shall be available for review at all phases of manufacture or construction activities.

The Scope of Work shall not be complete until the Supplier/Contractor's DP including the quality records from Sub-Supplier/Sub-Contractors have been reviewed and accepted by TPT.

The DP shall be compiled progressively during the execution of the Scope of Work and shall be made available for review by TPT as required.

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Annexure A - Sample Quality Control Plan

Quality Control Plan No.: _____ Rev: _____ Date Issued: _____

Contract No.: _____ Description: _____ Item No.: _____

Supplier / Contractor: _____ Location: _____

Activity No.	Activity Description	Procedure Ref./Code Specification	Specification Acceptance Criteria	Verifying Doc/Report Certification	Verification / Witness					
					Supplier / Contract or		TPT		Employer	
					Action	Sign	Action	Sign	Action	Sign

Rev.	Date	Reason for Revision	Drawn	Checked

Action:

H - Hold, Mandatory Hold Point

R - Review (Verify) Only

W - Witness

S - Surveillance

NOTE: H&W points require formal notification to TPT.

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Annexure B - Request for Concession

Request for Concession No: *of 2*

A.SUPPLIER/CONTRACTOR SUPPLIED INFORMATION

SUPPLIER/CONTRACTOR NAME: CONTRACT NO.:

SUPPLIER/CONTRACTOR CONCESSION NO.: DATE:

Required concession applicable to: (Item/Material/Equipment/Area)

Description of Concession — Revised Requirements:

Justification:

(NOTE: This concession will be rejected if the following information is not provided):

(i) VALUE OF BENEFIT TO CLIENT S/R	(ii) AGREE TO AN EXTENSION OF THE WARRANTY	YES	NO	(i i i) ANY IMPACON SCHEDULE?	NO	YES
	IF "YES" WHAT PERIOD?			CF "YES" \ VHAT PERIOD?		

References:

Original reference:

Requirements Rev.: Specification No.: Rev.:

Drawing No.: Rev.: Specification Rev.:

Drawing No.: Rev.: Specification Rev.:

Attached documentation: applicable N

Requested by:

(Supplier/Contractor) Name: Signature: D

Note: Sections B to F on Page 2

Request for Concession No:				
B. SITE ADMINISTERED CONTRACT?	Yes		Nn	Go to "D"
Possible QC implications:				
Recommendations Recommende		Rejected		
Site Construction Manager:		Signature:		Date:
Site Engineer:		Signature:		Date:
C. RECOMMENDATION BY CONTRACT ADMINISTRATOR: Name: Signature Date:				
D. RECOMMENDATION BY ENGINEERING:				
Recommended		Rejected		Conditional, with the following
recommendations:				
Package Engineer:		Signature:		Date:
Lead Discipline Engineer:		Signature:		Date:
Engineering Manager:		Signature:		Date:
Comments:				
E. PROJECT MANAGER DISPOSITION: Accepted			Rejected	
Name:		Signature		Date:
F. EMPLOYER DISPOSITION: Accepted			Rejected	

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Specification approval:

Title:	General requirements and conditions
Specification ref no:	SBH 9/2/9 Version 9
Site:	Bulk Terminal Saldanha
Date:	March 2012

Amended by:	
Name:	PJ Swart
Signature	
Date	14 March 2012
Approved by:	
Name:	N Strydom
Signature	
Date	14 March 2012

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port terminals

Title:	General requirements and conditions
Specification ref no:	SBH 9/2/9 Version 9
Site:	Bulk Terminal Saldanha
Date:	March 2012

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1. Scope

1.1. This specification covers Transnet Port Terminals (TPT) at Bulk Terminal Saldanha (BTS) general requirements and conditions for the design, supply, erection and commissioning of equipment and structures and must be read in conjunction with the main specification.

2. General

2.1. Each Tenderer shall provide BTS with sufficient proof of having suitable experience regarding the designing and/or manufacturing of similar equipment, proven in practise and applied in circumstances similar to those intended by BTS. To this end, complete and detailed reference lists shall be submitted with the tender.

2.2. The equipment in general and the intended operation of the equipment to be supplied shall be in full compliance with the Occupational Health and Safety Act, Act 85 of 1993, as amended.

2.3. The tenderer must submit an offer in accordance with the main specification, and may only then submit alternative offers. Full details as requested in these tender documents shall be submitted for each alternative offer. Full details of the differences or deviation from the main offer shall also be submitted.

2.4. The Tenderer shall submit a complete list of proposed sub-contractors and suppliers of major components with his tender.

2.4.1. The list of sub-contractors must contain sufficient detail to enable BTS to grant approval for the respective sub-contracting.

2.5. A complete list of major components shall be submitted with the tender, containing sufficient details like make, description, rating, standard of design and manufacture, etc. to enable BTS Engineers to decide about its suitability in terms of local conditions, availability, past experiences, etc.

2.6. To enable BTS to apply life-cycle costing in comparison of offers, a complete list of major components to be replaced during the life of the equipment shall be submitted, indicating

for each item the expected mean time between failures, based on past experience, and total cost of replacement, including labour and material. Any additional material that can assist BTS to apply life-cycle costing can be submitted by the Tenderer.

2.7. The equipment as made and supplied shall be complete in every respect, of modern design using most advanced technology extensively supported by reputable local companies, and be designed and built to applicable recognised standards and good engineering practices.

2.8. All components to be fitted shall have been tested for reliability and extended lifetime in conditions to be expected.

2.9. The Tenderer shall complete the Schedule of Prices. The lump sum quoted for each category shall be deemed to cover all costs of the design, materials, plant and labour of each item to complete the work according to the drawings and specifications.

2.10. All special tools, software and devices essential for the effective operation and/or maintenance of the plant and equipment, shall be listed, detailed and quoted for separately in the Schedule of Prices.

2.11. The Contractor shall comply with all Municipal regulations regarding the inspection of any portion of the Works. The Contractor shall further provide the Engineer with documented proof of compliance when so requested by the Engineer. (If required)

2.12. All handbooks, training manuals, wording on drawings and equipment designation labels shall be in English and the Contractor shall ensure that the correct and accurate translation of English is used throughout.

2.13. The works will only be accepted (and the certificate of acceptance issued) when the works has been successfully commissioned and tested, and all final drawings, manuals and other documents required in terms of the contract has been delivered to BTS and accepted by BTS.

2.14. Where "tone", "ton" or the abbreviation "t" is used, it shall be taken as meaning "metric ton" which is equivalent to 1 000kg or approximately 2 204.62 pound mass.

3. Statement of compliance

3.1. All tenders are to be accompanied by a separate clause by clause statement of compliance to the requirements of the Works Instruction (main specification), as well as to all its annexure, completed and signed by the Tenderer. A general statement that equipment offered is in compliance with the specification is not acceptable.

3.2. Every statement of non-compliance or partial compliance shall be fully defined by the Tenderer.

3.3. Where a simple statement of compliance against a particular clause could be insufficient to describe exactly what is being offered, a description, fully explaining the Tenderer's offer, shall be submitted with the tender.

4. Copyright of plans, diagrams and documents

4.1. The contractor will grant to BTS a non-exclusive license, in accordance with the provisions of section 22 of the Copyright Act 1978 (Act 98 of 1978), (a) to copy any plan, diagram, drawing, specification, bill of quantities, design calculation or other similar document made other than under the direction or control of BTS, by the Contractor in connection with the installation, (b) to make free and unrestricted use thereof for its own purposes, (c) to provide copies thereof to consultants to be used by them for the purpose of the consultancy and (d) to provide other parties with copies for tenders invited by it. The Contractor, furthermore, if any plan, diagram, drawing, specification, bill of quantities, design calculations or other similar document made, other than under the direction or control of BTS, by any principal or sub-contractor of the Contractor, is used in connection with the installation, shall cause such principal or sub-contractor to grant to BTS a similar non-exclusive license in respect of such plan, diagram, drawing, specification, bill of quantities, design calculation or other similar document. The provisions of this clause shall not apply to documents made, in the case of equipment to be supplied in connection with the manufacturing process of the equipment supplied but only to the equipment supplied itself. No separate or extra payment shall be due by BTS in respect of any non-exclusive license granted in terms of this clause.

5. Design calculations

5.1. Tenders must be accompanied by a preliminary design analysis and drawings for structural work. The design calculations and drawings shall be sufficiently comprehensive for BTS Engineers to make a fair and accurate assessment of the essential details and general qualities of the scheme offered. The various loading combinations used for the analysis of the structure must be detailed and submitted with the tender.

5.2. At the completion of the Works, the Contractor shall supply as part of the contract, one set of clearly set out, edited and bound, final complete design, stability and stress analysis for all structural items.

5.3. Designs based on computer analysis must include properly drawn up, indexed and reference diagrams of all bending moments, shear and axial forces and deflections for all the loading cases. A number reference drawing to facilitate reading of computer printouts must be included.

6. Certification

6.1. Where applicable, the Contractor shall for each piece of equipment fully completed and taken over by BTS, submit the necessary certificate of classification and/or certification by a recognised testing authority in compliance with requirements of applicable standards and rules.

7. Contract management

7.1. The Tenderer shall submit a full set of financial statements, as required in terms of the Companies Act, for the last three financial years. This shall include the financial statements, auditor's report and chairman's report of the Tenderer and proposed main sub-contractors.

7.2. The Tenderer shall submit an Organogram of the company with his tender which shall show all posts down to supervisory level for all personnel who will be directly involved with this contract and down to managerial level for all other posts in the Tenderer's organisation.

7.3. The Tenderer shall submit a C.V. of all personnel who will be directly involved with the management and execution of this contract down to supervisory level. This shall include qualifications and past experience.

7.4. The successful Tenderer shall be prepared to commit himself in writing to providing BTS with an adequate, experienced and stable project team for the duration of the contract. Every effort must be exercised by the Contractor to minimise replacement of individual project members in order to ensure optimum contract management continuity. Prior advice and full motivation must be submitted to BTS before the replacement of any of the Contractor's key personnel involved with the project.

7.5. The Tenderer shall submit a detailed bar chart showing all major activities and identifying all major milestones to be achieved in this contract. This bar chart will be critically analysed by BTS as it will show whether Tenderers are able to plan the project efficiently. This bar chart will be taken into account when evaluating offers received.

7.6. The Contractor shall submit a fully detailed schedule within two weeks after the official contract showing all activities from a Work Breakdown Structure commencing from date of contract to the final commissioning and acceptance based on the initial bar chart submitted with the tender.

7.7. The Tenderer shall submit details of resource management which will be applied to this contract for:

7.7.1. Manpower

7.7.2. Finance

7.7.3. Equipment

7.7.4. Material supply

7.8. This should be in sufficient detail to establish where the above resources will be obtained and how they will be managed during the duration of the contract.

7.9. It is a requirement of this contract that the Contractor will employ a full time, fully experienced site manager who has been delegated sufficient authority to manage the contract efficiently on site during erection and commissioning.

8. Quality management

8.1. The Contractor shall be required to install and operate a quality management system which conforms to the requirements of SABS ISO 9001/9002.

8.2. The Tenderer must submit a detailed statement of his quality system with this tender which shall include the following:-

8.2.1. Statement of quality management policy and objectives.

8.2.2. Statement of the design control system with emphasis on design review procedures and customer requirements evaluation.

8.2.3. Statement of the documentation and change control procedures.

8.2.4. Statement of the quality control procedures that will apply to purchased materials.

8.2.5. Statement of the quality control plan for all components manufactured or supplied so that inspection is carried out to ensure conformance to the specification.

8.2.6. Statement of the quality control procedure that will apply to installation and painting on site.

8.3. The sole responsibility for ensuring that the components supplied conform to the specification shall rest with the Contractor.

8.4. The Contractor shall notify the Engineer of all inspections at least 3 working days in advance of such inspections. The Engineer reserves the right to have an inspector present at such inspections. The Contractor shall have the relevant quality control plans available at such inspections. The Engineer shall give the Contractor 24 hour notice in writing of his intention to attend the inspections.

8.4.1. Where the contract provides for tests on the premises of the Contractor or of his sub-contractor, the Contractor shall provide such assistance, labour, materials, electricity, fuel, stores, apparatus and instruments as may be a requisite and as may be reasonable demanded to carry out such tests efficiently. All gauges, templates, tools and other equipment required to check the accuracy of the work shall be calibrated at regular intervals by a laboratory approved by the National Calibration Services of the Council for Scientific and Industrial Research of South Africa, or by the respective authority in the country of origin of the equipment

8.4.2. As and when the equipment has passed these tests, the Engineer shall furnish the Contractor a certificate in writing to this effect.

8.4.3. If as a result of such an inspection, examination or test the Engineer decides that such equipment is defective or not in accordance with the requirements, he shall notify the Contractor accordingly, stating in writing his objections and reasons therefore. The Contractor shall timorously make good the defect to ensure that the equipment complies with the requirements. Thereafter, if required by the Engineer, the tests shall be repeated under the same terms and conditions save that all reasonable expenses to which BTS may be put by the repetition of the tests will be deducted from the contract sum.

8.4.4. Unless the Engineer otherwise directs, no equipment or materials are to be delivered to site until the Engineer issues an inspection certificate in respect of such equipment. The Contractor shall be responsible for the reception on site of all equipment delivered for the purpose of the contract.

8.5. BTS reserves the right to conduct a quality assurance audit on the Contractor's quality control system at regular intervals.

8.6. If required by the Engineer the Contractor shall produce evidence to show that both his welding procedures and welders have passed all the relevant tests required in terms of BS 5135 and SABS 044 Parts III and IV.

8.7. The Contractor shall hold design review meetings during the planning phases of this contract. This will be to establish all customer requirements and to provide approval in

principle for design interfaces for all designs and specifications to ensure that quality is designed into the final product.

8.8. The Contractor shall not change any design or specification feature which has any of the following impacts without formal approval by the Engineer:

8.8.1. Financial

8.8.2. Interface with other equipment or installations

8.8.3. Safety

8.8.4. Departure from customer requirements

9. Site survey by contractor

9.1. Immediately after award of the contract, and prior to final design, the successful Tender shall survey the complete site of final operation of the equipment tendered for. This survey shall serve to confirm dimensions and for relative positions of all items and equipment that will interface with the equipment tendered for, e.g. rail gauges, conveyor position relative to rails, location of electrical power supply points, location and dimensions of any obstacle protruding into the operations envelope, etc.

9.2. It will be the contractor's responsibility to ensure that equipment supplied in terms of the contract will interface successfully with existing items and equipment.

9.3. Any major deviation from data supplied by BTS in the tender documents shall be brought under the attention of the Engineer. Any potential impact of a commercial or technical nature shall be discussed and finalised with the Engineer, prior to final design of the equipment.

9.4. The Tenderer shall allow in all respects in his tender for this requirement to survey the operation site and confirm tender data.

10. Drawings and schematics

10.1. On the contract being placed, the Contractor shall at once prepare and must submit two copies of black line paper prints of the general arrangements, working drawings and schematics for approval by the Engineer. These drawings and schematics must be submitted in a systematic manner, accompanied by an index sheet of all the drawings and schematics in question. Approval in principle by the Engineer must be obtained prior to commencement of fabrication or construction. Time required for preparation and approval of these drawings must be included in the Tenderer's program.

10.2. Drawings which are submitted for the Engineer's formal approval shall bear the signature and designation of the Tenderer's "responsible professional Engineer".

10.3. General arrangement drawings shall show the complete structural layout arrangements with plan views, elevations, cross sections, location and sizes of members, erection details, cladding details, services where applicable, etc.

10.4. Notwithstanding any formal approval in principal of drawings and schematics submitted to BTS, the sole responsibility for the adequacy of the design, fabrication and installation or erection as well as accuracy of workmanship and quality of all materials shall rest entirely with the Contractor who will be required to rectify any defects.

10.5. The Contractor's fabrication shop drawings and detailed drawings are not required for approval except when the Engineer request such drawings specifically for approval or to assist him in the inspection of the structure at any stage.

10.6. At the completion of the Works, the Contractor shall supply as part of the contract one set of paper prints and one set (electronic) of CAD files in the DXF format of the general arrangement, manufacturing and detailed working drawings and schematics, showing every portion of the work as actually made for the equipment, giving all wording in English and all dimensions in Metric units.

10.7. The drawings and schematics shall comply with the applicable SABS, British, VDE or ISO standards. The official BTS title block with the BTS serial No. and numbering system must be included in the lower right hand corner.

10.7.1. The Contractor will be advised regarding numbering and detailing of drawings.

10.8. The paper prints and CAD files must be delivered not later than 2 months after completion of the commissioning of the equipment.

11. Site books

11.1. The Contractor shall supply and have available at the site office at all times, the following site books:

11.1.1. Site instruction book:

This shall be a suitable carbon copy book, size A4, with two detachable sheets for receiving and recording instructions in triplicate issued by the Engineer or his authorized representative.

11.1.2. Site diary book:

This shall be a suitable carbon copy book, size A4, with two detachable sheets for a page to a day and all events affecting the Works, such as arrivals of plans, breakdown of machinery, weather conditions etc., must be entered. The plant, labour and material on site must be recorded as well as work performed. Entries will be made by the Contractor (or his appointed agent) and signed by both parties daily. The diary may be used to establish the validity of claims for extension of time.

11.2. These site books will remain the property of BTS and will be used for reference purposes and during the guarantee period.

12. Co-operation with other parties

12.1. Departments of Transnet and other contractors may be working in the confines of the contract work site and in the general area surrounding it during the course of the contract. The Contractor shall make reasonable allowance in all tendered rates for the necessity to interface with the activities of other contractors and Transnet, and to allow for access and safe working conditions.

12.2. The success of the project depends on the effective co-operation of all contractors on site, and the Contractor will if necessary be required to discuss his programme on a day to day basis with the Engineer's Deputy to ensure effective co-ordination.

13. Customs and port regulations

13.1. The Works are situated within a Customs controlled area and the Contractor and his staff shall observe all Customs regulations within the port area.

13.2. The Works are situated within a promulgated port area and the Contractor and his staff shall observe all Port Regulations within the port area. Copies of the Harbour Regulations are obtainable from the Port admin offices.

13.3. The fullest collaboration between the Contractor, BTS and the Engineer is essential in regard to the working of the port.

14. Instruction of BTS personnel

14.1. BTS personnel concerned with operating, and maintenance will be made available for instruction by the Contractor in their various functions at the Port concerned.

14.2. The necessary formal lecturing on the working, adjustment, maintenance and fault finding procedures shall be arranged for at the Port concerned.

14.3. Details of alternative and additional official courses offered shall be specified at tender stage i.e. full procedures, duration, and place of training, competence and qualifications of personnel to be trained.

15. Operating and maintenance instruction manuals and parts catalogues

15.1. The Contractor will be required to furnish three final copies of each manual/handbook supplied in terms of the contract.

15.2. One copy of the preliminary set of manuals/handbooks must be available on site one month prior to commissioning.

15.3. One copy of the final set of handbooks will be kept in the workshop and the Contractor must cover every page of this set with translucent plastic.

15.4. The following manuals shall be supplied as part of the contract:

15.4.1. Maintenance Instruction Manual.

15.4.2. Workshop Reference Manual.

15.4.3. Operator's Manual.

15.4.4. Parts Catalogue.

15.4.5. Training Manual.

15.5. The *Maintenance Instruction Manual* shall include:

15.5.1. Safety instructions to be observed by maintenance and operating personnel.

15.5.2. A general description with illustrations and flow diagrams of the works, indicating all major items, with a functional description of these items.

15.5.3. Full detail of all faultfinding procedures (electrical and mechanical).

15.5.4. Detailed periodic maintenance programmes in respect of the whole of the works, including electrical components and structural work.

15.5.5. Comprehensive data and procedure descriptions (suitably illustrated) on routine maintenance, including intervals, tasks, wear tolerances and lubrication detail.

15.5.6. A list of all equipment that requires lubrication must be compiled under the following headings.

15.5.7. Name, description, location.

15.5.8. Recommended lubricant.

15.5.9. Frequency of lubrication.

15.5.10. A list of all PLC fault codes and their probable causes.

15.5.11. Diagrams of all electrical, pneumatic and hydraulic circuits.

15.6. The *Workshop Reference Manual* shall include:

15.6.1. Safety instructions to be observed by maintenance and operating personnel.

15.6.2. Complete data and procedures on the repair and overhaul of all items of the works.

15.6.3. Detailed diagrams of all electrical, pneumatic and hydraulic circuits.

15.6.4. A list of all PLC fault codes and their probable causes.

15.6.5. A complete listing of the PLC programs.

15.6.6. Data necessary for condition monitoring purposes, like the number of teeth on gears, number of balls/rollers in bearings etc.

15.6.7. Detailed Supplier data sheets on all standard equipment that forms part of the works.

15.6.8. Design, installation, inspection and performance or load test certificates as required by law (including Act 85 of 1993).

15.6.9. Completed commissioning document for the works.

15.7. The *Operator's Manual* must detail the safe and efficient operation of the works, and must include the following:

15.7.1. Safety instructions to be observed by the operating personnel.

15.7.2. Start-up procedure.

15.7.3. Shut-down procedure.

15.7.4. Storm anchoring procedure if applicable.

15.7.5. Diagram showing the lay-out of controls and operator meters and displays.

15.7.6. Detail of the use of the controls and interpretation of the meters and displays.

15.7.7. Detailed check-lists for the daily, weekly and monthly inspections to be performed by the operator.

15.7.8. A list of all fault codes that could be displayed at operator, with a description and detail of what action should be taken by operator when such a code is displayed.

15.8. The *Parts Catalogue* shall comprehensively list all parts of the works with full descriptions, locations, re-order numbers and supplier, and will include illustrated diagrams of assemblies showing all parts of the assembly. A list of suppliers and their contact detail shall also be included.

15.9. The *Training Manual*:

15.9.1. Comprehensive pictures and test shall be provided to enable BTS Training department to compile final training manuals for operator training, including first line maintenance.

15.9.2. Pictures and text shall be in digital format supplied on CD Rom to enable BTS to edit the content.

15.9.3. To assist the Contractor in compiling the necessary information, the following requirements must be complied with for all major parts of the equipment.

15.9.3.1. Identify (i.e. description and picture of) the part and describe where the part can be found on the equipment.

15.9.3.2. Explain the function of the part; and

15.9.3.3. Describe what the operator has to do to keep the part in good working order.

15.10. All final manuals shall be supplied by the Contractor as soon as possible after the works has been successfully commissioned, in order for the works to be accepted (see clause 2.13).

16. Recommended spares

16.1. A complete priced list of recommended mechanical and electrical spares to enable BTS to operate and maintain the installation efficiently for it's useful life and to obtain spares as required must be submitted by the Contractor not later than one month after the finalization of the design. This list of recommended spares must include full details on the source or supplier in each and every case.

16.2. Spares for the equipment must be classified as:

16.2.1. Initial spares which are the major assemblies and critical single items that have been established from experience as being necessary to maintain the installation fully operational after commissioning for a period of twelve months.

16.2.2. Recommended maintenance spares which are the spares that the Contractor recommends as necessary for the maintenance of the installation over and above the initial spares described above, and include all wearing items and slow moving contingency (insurance) spares.

16.3. Each spare part must be comprehensively described, and Contractors must furnish the manufacturer's part number as well as any applicable international item number.

16.4. Tenderers shall state:

16.4.1. Whether all essential renewable parts for all equipment will be readily available in the Republic of South Africa.

16.4.2. What after service and operational instruction can be offered to BTS.

17. Guarantee and guarantee period

17.1. The Contractor shall guarantee that all components and material supplied are new and fit the specified purpose for which they are purchased and are free from any defects in design, workmanship and material and are in strict accordance with the specifications and drawings, unless otherwise agreed in writing by BTS.

17.2. The Contractor shall agree to replace without charge to BTS any defective items discovered within 12 months from the date of acceptance, provided that the equipment has been operated and maintained in accordance with the Contractor's written operating instructions; normal wear and tear excluded.

17.3. During the guarantee period the Contractor shall have a branch or local agent at or near the Port with full time personnel available for guarantee repairs. Spare parts and equipment must also be available from the branch or agent.

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End of Specification SBH 9/2/9 Version 9

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TRANSNET PORT TERMINALS

BULK TERMINAL, SALDANHA IRON ORE HARBOUR

THE IMPLEMENTATION OF A DUST PREVENTION AND SUPPRESSION SYSTEM

SPECIFICATIONS FOR ELECTRICAL WORKS

JUNE 2020

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1 GENERAL

1.1 SCOPE OF WORKS

The Scope of Works shall be as per this Detailed Electrical Specification.

1.2 SITE CONDITIONS

The Tenderer shall take cognisance of the fact that the plant is currently in operation and a minimum disruption to the operation is required.

Motor manufacturers, switchboard manufacturers, electrical equipment manufacturers, are all warned that the motor and associated control equipment are to be installed in an extremely corrosive and often damp environment. The motor and allied equipment shall therefore be adequately protected

2 STATUTORY REGULATIONS PERTAINING TO ELECTRICAL WORK

Except where otherwise specified or implied the contract work and equipment supplied shall comply with the latest revisions of the standard specifications listed, including generally:

□ SANS 10142-1:2012 (Edition 1.8) installations	The wiring of Premises, Part 1: Low voltage
□ SANS 10400-A:2010 (Edition 3)	The Application of the National Building Regulations, Part A: General principles and requirements

- □ Local Fire Regulations
- □ The Regulations of the Local Supply Authority
- □ The Regulations of the Department of Posts and Telecommunications

Where a SANS Standard does not exist or if not applicable, the relevant IEC or BS Standard shall be applicable.

The equipment supplied and work carried out shall fully meet and comply with the requirements of the Occupational Health and Safety Act (Act 85 of 1993) and the Construction Regulations 2003 issued in terms of Section 43 of the Act, Standards South Africa (a Division of the South African Bureau of Standards {SABS}) and all other statutory regulations and laws insofar as they may apply to an electrical installation of the type contemplated.

In the event of discrepancy between any of the specifications, regulations and codes of practice, the SANS 10142-1 Code of Practice for Wiring of Premises shall take precedence.

All references to “SABS” specifications shall be read as “SANS” in light of the recent changes by the South African Bureau of Standards.

Additionally, the following specifications, whether specifically mentioned within the tender document or not, shall also apply:

□ SANS 10111-1:2011 (Edition 3.2) Principles	Engineering Drawings, Part 1:General
□ SANS 1091:2012 (Edition 2.1)	National colour standards
□ SANS 156:2007 (Edition 3.3) & VC8036:06 Oct 2006 (Edition 3)	Moulded case circuit breakers Compulsory specification for circuit breakers

□	SANS 60269-1:2010 (Edition 3.1) requirements	Low-voltage fuses, Part 1: General
□	SANS 60269-4:2012 (Edition 3.1)	Low-voltage fuses, Part 4: Supplementary requirements for fuse-link for the protection of semiconductor devices
□	SANS 950:2014 (Edition 2.3) and fittings for	Unplasticised polyvinyl chloride rigid conduit use in electrical installations
□	SANS 1507-1:2007 (Edition 1.1)	Electrical cables with extruded solid dielectric insulation for fixed installations (300/500V to 1900/3300V), Part 1: General
□	SANS 1195:2010 (Edition 1.3)	Cover plate
□	SANS 60439-1:2004 (Edition 3.1)	Low voltage switchgear and controlgear assemblies, Part 1: Type-tested and partially type-tested assemblies
□	SANS 60439-2:2006 (Edition 2.1)	Low voltage switchgear and controlgear assemblies, Part 2: Particular requirements for busbar trunking systems (busways)
□	SANS 1973-1:2007 (Edition 1)	Low voltage switchgear and controlgear assemblies, Part 1: Type-tested assemblies with stated deviation and a short-circuit withstand strength above 10kA
□	SANS 1973-3:2008 (Edition 1)	Low voltage switchgear and controlgear assemblies, Part 1: Safety of assemblies with a rated protective short-circuits up to and including 10kA
□	BS 4070	Performance of A.C. control gear equipment rated up to 660 V for use on high prospective fault-current systems
□	BS 587	Motor starters and controllers
□	SANS 60947-1:2012 (Edition 5.1)	Low voltage switchgear and controlgear assemblies, Part 1: General rules
□	SANS 60947-2:2014 (Edition 4.2)	Low voltage switchgear and controlgear assemblies, Part 2: Circuit-breakers
□	SANS 60947-3:2012 (Edition 3.1)	Low voltage switchgear and controlgear assemblies, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
□	SANS 60947-4-1:2013 (Edition 3.1)	Low voltage switchgear and controlgear assemblies, Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters
□	SANS 60947-4-2:2012 (Edition 3)	Low voltage switchgear and controlgear assemblies, Part 4-1: Contactors and motor-starters – AC semiconductor motor controllers and starters

□	SANS 475:2013 (Edition 1.2)	Luminaires for interior lighting, streetlighting and floodlighting – Performance requirements
□	SANS 10114-1:2005 (Edition 3)	Interior lighting, Part 1: Artificial lighting of interiors
□	SANS 10222-5-1-3:2007 (Edition 1.1)	Electrical security installations, Part 5-1-3: CCTV installations - CCTV surveillance systems for use in security applications - Installation, planning and implementation requirements.
□	SANS 60793-1-1:2008 (Edition 3)	Optical fibres, Part 1-1: Measurement methods and test procedures - General and guidance
□	SANS 60794-1-1:2001 (Edition 2)	Optical fibres cables, Part 1-1General specification – General
□	SANS 675:2011 (Edition 4.1)	Zinc-coated fencing wire
□	SANS 1373:2008 (Edition 1.1)	Chain-link fencing and its wire accessories
□	SANS 10131:2004 (Edition 1)	Above-ground storage tanks for petroleum products
□	SANS 780:2009 (Edition 1)	Transformer Testing
□	SANS 1084-1/2 : 2014	Electric Motor Standards
□	SANS 10131:2004	Fuel Tank Design and Construction
□	SANS 1200:2014	Painting Requirements
□	SANS 10198:2014	Cable Trenching

3 ENGINEER'S DRAWINGS

The Engineer‟s drawings shall be as listed in the Project Specification.

3.1 Contractor's Drawings

Workshop drawings of proposed Motor Control Centres, Field Control Stations, Local Distribution Boards, as well as any other switchboards are required for approval by the Engineer prior to fabrication.

Record drawings (previously termed "as-builts") of the installation indicating cable routes, sleeve positions and circuit wiring details are required on completion. All these record drawings must be checked and signed by the sub-contractor before submission to the Engineer.

A full set of schematic drawings and wiring diagrams shall be handed over at the end of the Contract; including all switchboards, motor control centres, distribution boards, field control stations etc.

The Contract will be deemed incomplete until the Contractor has handed all these drawings over to the Engineer who shall provide his final acceptance in writing.

4 LOCKOUT PROCEDURE/PERMIT TO WORK FORM

The Directorate: Transnet Port Terminal has implemented a system whereby any party entering and/or proposing to undertake any electrical works on any of its premises or sites, is to be issued with a permit to undertake work, which is available from the respective Plant Manager etc. Work MAY NOT be undertaken in any form or context if this permit is not issued and validated by the Authorised personnel onsite.

Any and all low voltage (below 1000 Volts) work onsite at any of this Transnet‟s premises requires a written Permit to Work to be issued by the Transnet or his duly appointed representative.

NO MEDIUM VOLTAGE ELECTRICAL SWITCH OPERATION shall be permitted at all by any non-Transnet personnel. Only Transnet personnel, as permitted in writing by the Engineer or the Directorate: Transnet Port Terminal, may perform Medium Voltage Switch Operation.

Any work onsite at any of this Transnet‟s premises requiring excavation (for example excavation of cable trenches) requires a Wayleave to be issued by the relevant Electrical Supply Authority i.e. Eskom or the Transnet Port Terminal Electricity Department. This Wayleave shall be reviewed and endorsed by the Engineer or his duly appointed representative (Control Officer).

5 LOCKS

The Tenderer shall supply locks whilst completing the work at hand. Transnet shall supply locks for all the equipment on completion of commissioning.

6 PERMISSIBLE VOLTAGE DROP

Unless otherwise stated, the permissible voltage drop within low voltage installations from the Point of Common Coupling (PCC) shall be calculated as follows:

“1V plus 2% of the voltage at the end of the circuit when the entire circuit is fully loaded”.

The PCC on low voltage installations shall be the respective transformer low voltage terminals.

7 CONTROL VOLTAGES

Control Voltages within Switchboards shall be deemed to be 110 - 240 V AC / 24V DC (Or as detailed in Project specification). Control voltages for remote field equipment, for example Start/Stop stations, shall be 230V AC. If an existing installation is to be expanded, the existing control voltage shall remain.

8 SWITCHBOARD STANDARDS (MOTOR CONTROL CENTERS, DISTRIBUTION BOARDS, TRAYS, BOXES, ETC.)

8.1 GENERAL

The manufacture of LV Switchgear and Control gear ASSEMBLIES also referred to as motor control centres (MCC"s) and distribution boards (DB"s) {both collectively referred to as in this specification as “ASSEMBLIES” or “switchboards”}, shall be “Type Tested” modular type distribution boards and shall strictly comply with the latest revisions of the following standards:

SANS 60439-1	„LV Switchgear and Control gear ASSEMBLIES Part One: Type-tested, Partially Type-tested ASSEMBLIES".
SANS 60439-2	„LV Switchgear and Control gear Part Two: Busbar Trunking"
SANS 1973-1	„LV Switchgear and Control gear ASSEMBLIES Part 1: Type-tested, ASSEMBLIES with stated deviations and rated short-circuit withstand strength above 10kA.
SANS 1973-3	„LV Switchgear and Control gear Part 3: Safety of ASSEMBLIES with a rated prospective short-circuit current of up to and including 10kA.

For ASSEMBLIES equal to or greater than a 10kA rating, switchboard manufacturers shall be in possession of a minimum of the test reports required as defined in SANS 1973-1.

Only authorized holders of these test reports may design and construct the ASSEMBLIES.

Copies of relevant test reports shall be made available to the Engineer immediately upon request.

Should this information not be presented to the Engineer upon request, Engineer reserves the right to call for another manufacturer to supply equipment that complies with this requirement and no compensation in any form shall be granted to the non-compliant party.

Notwithstanding any requirements of SANS 1973-1, the manufacturer of the ASSEMBLY (including the busbar assembly and mounting), shall re-torque the busbars onsite once fully populated and connected-up, prior to switch-on, and shall issue a certificate to the Engineer detailing that the bus-bar arrangement is still to the same standards as at the time of initial construction and is safe for operation.

Suppliers/Manufacturers of switchboards shall be in possession of a Permit to Apply the Certification Mark, issued by the South African Bureau of Standards, in terms of the Specific Permit Conditions of SANS 1973-1 and SANS 1973-3.
ASSEMBLIES shall be fitted with a metal label, clearly displayed, detailing the information required by SANS 1973-1 and SANS 1973-3 as applicable.

8.1.1 MCC Preferred Design Requirements

The following switchboard requirements shall be assumed as correct unless altered in the Project Specification:

Mounting:	Floor standing
Access:	Front and rear access
Sectioning:	Multi-section, Form 3b or Form 4 to SANS IEC 60439
Manufacture:	2.0 mm and 1.6 mm 3CR12 (see Fabrication below)
Finish:	Painted Light Orange – B26 (SANS 1091:2012) external, White arc-free internal (see Painting and Finishing below)

Cable Entry:	Incoming & Outgoing – bottom MCC gland plates shall be 3CR12 sheet steel, unpainted or aluminium (see Glanding Section below)
Base:	Single 100x50x6mm thick channel iron base with mitred corners and cross-bracing between every 2nd tier, hot-dipped galvanised.
Doors:	Lockable (see Doors and Covers below)
Protection:	IP44 (panels fixed); IP12 (panels removed)
Functional Units:	Removable but not fully withdrawable
Electrical Details:	400V, 50Hz, 3 Phase with full Neutral (see Busbars and Wiring below).
Earthing Details:	Full length, rear of switchboard (see Earthing below). All earthing bars to be tinned copper.
Electrical Ratings:	MCC Fault level to be to Transformer Secondary Output Symmetrical fault level, 3 second rating, applicable to Main and Distribution busbars. (See Project Specification for specific values and electrical loading requirements)
Dimensions:	Height: 2100mm (max) Depth: 400mm/600mm (standard)/800mm Cubicle Size: 600mm (width) x 400mm (height) (MINIMUM) Or 800mm (width) x 400mm (height) (MINIMUM) Cubicle/Door Panel Spacing: 40mm horizontal 20mm vertical

Note that cubicle height may be 385mm provided that the width is greater than 600mm.

An 800mm wide cubicle may be divided into 2 x 400mm cubicles (minimum 600mm cubicle height). (Cubicle sizes may vary but only subject to written approval by the Engineer)

Positioning and Clearances: Switchboards (free standing) are to be positioned within existing or proposed switch rooms such that the following

Clearances are maintained:

At rear of switchboard = 1000mm
At each end of the switchboard = 1000mm
In front of switchboard = 2000mm
On top of switchboard = 700mm (bottom entry panels)
On top of switchboard = 900mm (top entry panels)

The Engineer shall be the sole arbitrator in disputes relating to adherence to these and the general technical specification standards.

8.1.2 Hold Points During Manufacture

The following hold points require action and shall be adhered to prior and during the manufacturing process. Each step shall be completed in turn, requiring an inspection of the switchboard at the manufacturer"s premises and requiring the written acceptance of the Engineer for each step, prior to acceptance:

- □ Distribution Board Design
- □ After manufacture of metal work, prior to painting
- □ After painting, prior to installation of equipment (switchgear etc.).

□ Prior to delivery to site (at the sole discretion of the Engineer who may call for on-load testing in the manufacturer"s workshop)

Should these points not be followed and the item in question proves to be incorrect, it shall be for the manufacturer/tenderer/contractor to undertake to repair the situation at his own cost.

8.1.3 Switchboard Preferred Tier Arrangement/Layouts

□ Switchboards are to generally comply with the following, but these guidelines may be altered due to the specifics of the installation:

□ For switchboards with a single incomer, this cubicle and tier shall be positioned on the entrance side of the switch room

□ For switchboards with a single incomer and a generator incomer, these cubicles and tiers shall be positioned in the middle of the switchboard.

□ For switchboards with two incoming mains feeders as well as optional and generator supplies, these cubicles and tiers shall be position in the middle of the switchboard.

□ PLC and Instrumentation dedicated Tiers shall be positioned within the switchboard on the side furthest from the entrance.

□ Bus-section switches shall be position in the middle of the switchboard adjacent to incomer tiers and cubicles.

□ Redundant/duplicated equipment shall be positioned on either side of a bus-section where practical.

8.1.4 Grouping of Equipment

Each motor circuit shall be individually protected by a circuit breaker dedicated to the respective motor circuit. A single circuit breaker protecting multiple motor circuits will not be permitted.

Only one motor drive per cubicle is required. Where motors operate as a single group, these shall be controlled as a single motor.

A motor drive cubicle which houses multiple motor drives shall only be permitted, when all the motor drives in the group are dedicated to a single item of equipment and all the motors operate as a group. When a single motor, within any one group of motors which has been selected for automatic operation, trips or is isolated, all the motors within the group shall stop and shall be prevented from being restarted by electrical interlocking.

8.1.5 Door Interlocking on Switchboards

A circuit breaker shall provide the means of isolation to each motor drive cubicle, or a cubicle housing a group of motor drives which forms part of the MCC. The operating lever, of the circuit breaker mounted within the cubicle, shall be coupled to an operating handle fitted to the cubicle door and interlocked such that the door may not be opened with the circuit breaker in the “on” position. The operating handle shall be padlockable in the “off” position. Auxiliary contacts shall be provided, on the circuit breaker, to isolate the control circuit.

Refer to OHS Act (Act 85 of 1993), Section 14 “ Electrical Machinery Regulations,”, Clause 6(3) “Electrical Control Gear”, which states:

“The user 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”.

8.1.6 Interlocking

Further to Clause above entitled “Switchboard Preferred Tier Arrangement/Layouts”, the following electrical interlocking example, with 2 x Incomers and 1 x Generator, depicts the preferred arrangement to avoid paralleling of equipment:

SWITCH	A	B	C	D
Incomer Transformer No 1	Closed	Closed	Open	Open
Bus-Section No 1	Open	Closed	Closed	Closed
Incomer Standby Generator	Open	Open	Open	Closed
Bus-Section No 2	Open	Closed	Closed	Closed
Incomer Transformer No 2	Closed	Open	Closed	Open

Note this arrangement shall preferably be electrically implemented via a PLC or mechanically via the use of keys. However, should the electrical option be implemented, each circuit breaker shall be fitted with a separate lock out key. The preferred systems for key locking equipment shall be Keyguard, Ronis or Keymaster (Allen Bradley) or equivalent and approved Key Interlocking systems.

These combinations will provide the following, and only the following, arrangements:
A Busbar 1 fed from Transformer No 1; Busbar 2 fed from Transformer No 2
B All busbars fed from Transformer No 1
C All busbars fed from Transformer No 2
D All busbars fed from Standby Generator

Refer to project specification for specific details as to circuit breakers being motorized or not. √

8.1.7 Fabrication

All electrical motor control centres (MCC‟s), distribution boards (DB‟s), sub-distribution boards (SDB‟s), boxes, trays, covers or any other enclosure housing electrical apparatus supplied, shall be fabricated from AISI SX 3CR12 sheet steel only unless stated to the contrary.

The tenderer/contractor/manufacturer shall take cognisance that MCC‟s and DB‟s shall in their entirety be manufactured from 3CR12 sheet steel. This shall include all framework used to form the structure of the panel. Angle iron or tubular structures shall not be permissible.

Outer panels, doors, covers, rails, distribution board framework etc. shall be manufactured from 2mm thick 3CR12 sheet metal and 1.6mm thick 3CR12 sheet metal for internal partitions.

The sheet steel shall be suitably bent, braced and welded where necessary to form a rigid structure (this sheet metal shall be 3CR12 only). Holes, doors, covers, rails, framework, etc. shall be accurately formed to present a true to line and plumb structure when completed. Where welding is necessary the inevitable excess material shall be ground down to the parent surfaces to present a blemish free surface for painting.

All screws employed in the manufacture of the electrical cubicles shall be in AISI 316 material with machine threads. No self-threading screws or self-setting rivets (pop rivets) will be permitted. Where the thickness of material for screw tapping is less than 5 x screw pitch, an externally knurled, threaded insert shall be installed to accept the machine screw. The insert shall be fitted with a hydraulically operated tool, and properly clinched, to ensure it will not rotate in the sheet steel, even when subjected to a torque of 200% of the torque required to shear the fitted screw. The inserts shall also be manufactured from AISI 316 stainless steel.

Alternative methods of providing suitable screw anchorages in sheet steel may be considered, such as captured or welded nuts, but the detailed alternatives shall be submitted for consideration at the time of tendering.

Each tier shall be divided into compartments to accommodate equipment for motor drives, instrumentation, and switch gear for main and sub-main feeder switches.

Each compartment of MCC"s or larger DB"s shall be totally separated from adjacent compartments with 1.6mm sheet steel (3CR12) barriers welded or bolted into position and where wiring is required to pass through these barriers, brass brushed holed shall be provided.

Panel tiers to be bolted together and not welded.

Accessible PVC wire ways shall be provided to afford routes for conductors between the various compartments of each switchboard/MCC. Internal wiring shall be kept separated from external wiring and as far as possible the internal serving of PVC PVC SWA PVC cables entering the switchboard/MCC shall be left around the conductors until the cable enters the compartment to which it is to be connected.

Low current and instrumentation/signal cables shall be kept separate from other cables right up to the point where the conductors are connected to the required terminals on the apparatus. Accordingly, where required, separate sheet steel (3CR12) wire ways shall be provided in each board to ensure this separation.

All instrumentation and signal cabling shall be routed via galvanised conduit within the MCC. √

8.1.8 Busbars and Busbar Chambers

Totally enclosed busbar chambers shall be provided though out the length of the MCC or DB. The busbar chamber shall have front, back, top and end covers.

The front and back covers shall be secured with square hatch keys, with one catch per cover lockable by padlock. The top and end covers shall be bolted.

The busbar chambers shall be so positioned in the MCC or DB at the top that each and every connection is easily accessible and sufficient space is provided to easily operate a torque wrench on each and every bolt/nut.

Dielectric barriers shall be provided in the busbar chamber at 2 x tier module. The dielectric may not be split and offered into position as separate parts but shall instead be slotted to allow the busbars to pass through. The slotted holes shall be fitted with U-shaped rubber gasketting to ensure the busbar is snugly fitted to the dielectric. These dielectric barriers may not be employed to support the busbars. The dielectric shall be bolted to the sheet metal at the periphery of the busbar chamber.

The penetrations for circuit into or out of the busbar chamber shall also be provided with dielectric material at the point of penetration, as for the busbar chamber barriers.

Busbar supports shall comprise moulded epoxy insulators mounted on robust steel brackets arranged in stepped formation with the red-phase busbar at the top rear of the chamber and the neutral busbar at lower front position.

All busbars shall be tinned over the full length using only resin-based flux and fitted with phase colour co-ordinated identification markings.

Joints in busbars shall be avoided as far as possible, but where they are necessary the joint shall be formed by offsetting one of the bars, by an amount equal to its own thickness, to overlap the other. The length shall be equal to twice the width of the bar, and the joint shall be secured with a minimum if 4 Hexagon headed set screws nuts and washers (plain and spring).

All busbar joints shall be torque tightened before the switchboard (MCC or larger DB) is delivered, and torque checked (and tightened if necessary) just prior to commissioning.

Each joint or point of connection shall be properly tinned. Only resin based fluxes shall be employed during the tinning process.

The busbar riser sections, onto which cables terminate, shall be considered as part of busbar system as a whole and shall be equally subject to all the specifications detailed.

Busbars shall be capable of carrying the full rated current along their entire lengths. Reduced section busbars will not be permitted. Busbars shall be designed for a maximum temperature of
700C (ie a 400C temperature rise in an ambient of 300C). Where a transformer feeds directly to the busbar (via a main circuit breaker), the copper busbar shall be designed for 125% of the transformer output (in kVA) and shall be rated to withstand an internal or external fault for 3 seconds without incurring any damage.

The neutral busbar in the MCC or any DB shall be equal in size to the busbars and shall be considered as part of the busbar system.

Busbars shall be manufactured from 99% electrolytic copper that has been hard drawn to the finished sizes. The copper shall be rectangular in cross section, shall be solid, and the cross section shall be maintained throughout the busbar system. Where the copper is delivered with rounded corners the copper shall be suitably de-rated for thermal emmissivity. The copper shall be supported on SANS approved insulators at centres which are commensurate with the fault level to which the busbar system has been designed, but in no instance shall they be greater than 500mm apart. Where it becomes necessary to employ more than 1 copper bar per phase the copper bars shall be of equal cross section and shall be properly spaced by an equal thickness spacer between the copper bars. Only copper having a cross section of 100mm x 6mm, or greater, may be employed in parallel, per phase.

The spacers shall be bolted into position at points of attachment for lugged conductors or droppers. Where joints in the copper bar are inevitable they shall be made by offsetting one bar by the thickness of the copper such that the copper bars overlap one another, at the joint, by the width of the copper. Joints shall be properly fastened together with hexagon headed bolts, full size nuts, spring and flat washers. At least 2 and not more than 3 threads shall be visible beyond the nut once the final torque has been applied to each fastener. Where copper is punched or drilled the inevitable burr shall be removed and the copper shall be lightly chamfered at each hole.

The busbars shall be provided with holes at either end of the switchboard to allow for an extension to the copper bar at some future time, together with centrally located holes in the copper bars, between the insulting supports to allow for future loads to be added where required. At least two such sets of holes shall be provided, between consecutive supports along the busbar length. If more than one copper bar per phase is being employed then a copper spacer shall be provided between the copper bars and a bolt shall be provided to secure the spacer at each of the "spare hole" positions. All copper shall be tinned with S6 solder using resin based flux, after all the drilling, bending and cutting has been completed. The finished, tinned copper, shall be free of solder lumps and shall be as smooth as the copper under the solder.

8.1.9 Wiring, Cable Terminations and Glanding

All wiring within panels may be enclosed in PVC slotted ducting. The exception is signal and instrumentation cabling passing through power compartments or cubicles, which shall be in galvanised screwed conduit. Wiring outside of panels and switchboards shall be run within galvanised ducting or conduit.

Alternatively, signal and instrumentation wiring may be run in a channel at either the front or the rear of the busbar chamber, accessible from that respective side of the switchboard within the busbar chamber. The channel shall be manufactured of 3CR12 and shall be welded into position. The channel shall contain a cover that is screwed into position.

All wiring and terminations shall be labelled with identification tags corresponding to the wiring diagrams. Cable terminations shall be marked with an identification label externally to the switchboard indicating the source of supply as well as the equipment being fed for feeder cables. For example: “FED FROM MCC 1” and “SUPPLY TO SUMP PUMP”.

All glands for cable shall be nickel-plated brass, and fitted with waterproof neoprene shrouds.

8.1.10 Earth Bars

The earth bar shall be mounted at the rear of the MCC or DB and shall be accessible along its length from all tiers (where applicable). The earth bar cross-section shall be as specified, or, where not specified, shall be installed as per the minimum specified in SANS 10142-1 or SANS IEC 60439. Notwithstanding these requirements, the earth bar shall be not less than 70mm x 8mm in cross-section.

A one-piece copper earthing bar shall be installed from one end of the board to the other and shall be provided with earthing studs (nuts, bolts and washers) in each tier

The copper bar shall be bolted to the framework of the board in at least 10 positions with 10mm bolts. The copper bar shall be mounted 100mm above the top edge of the channel iron base and approximately 100mm from the backplate. Holes shall be provided in the copper bar in each cubicle along the length, for the termination of the earthing conductors associated with the circuits deriving a supply from the respective cubicles. Spare studs amounting to 10% of the Contractors requirements, shall also be provided. Bunching of earthing conductors on a single stud will not be permitted. √

8.1.11 MCC and DB Bases

The floor mounted MCC or DB, shall be mounted to a hot dipped galvanised channel iron base, located at the position indicated in the transformer room. The base shall be fabricated from 100 mm x 50 mm x 6 mm (10,57 kg/m) channel iron. The corners of the base shall be mitred and welded whilst cross bracing shall be provided on centres coincident with the cubicle modules along the length of the base.

Each cubicle shall be secured to the base with at least four 10 mm diameter bolts, washers and nuts whilst the base shall be anchored to the concrete with a bolt in each corner and two bolts at every even numbered cubicle module. (One at the front of the base and one at the rear). The anchor bolts shall be 12 mm diameter and shall be entered at least 80 mm into the concrete.

The widths shall be uniform throughout their heights and the plan view of the switchboard shall be uniformly rectangular in shape.

8.1.12 Paint and Finishing

All metalwork in excess of 5 mm thick shall be sandblasted to a profile of 40-80 microns, prior to painting. This finish shall be carried out carefully to provide the necessary "key" for the paint coats.

Where the material is less than 5 mm thick, it shall be, lightly sanded, de-greased, washed and forced air dried prior to painting.

The paint coat shall be a high quality polyurethane based powder coat to the acceptance of the Engineer. The sprayed powder coat shall be baked in an oven at a temperature of approximately 200oC for a period of 10 min or as specified by the paint manufacturers.

The dry film coat shall be as uniform as possible but shall not be less than 40 microns nor more than 90 microns. The finish shall be high gloss with a minimum of surface defects.

Distribution boards, boxes, trays, covers, ducts, or any other enclosure housing electrical apparatus shall be coloured white internally, whilst externally the colour shall be Light Orange to SANS 1091 or to the approval of the Engineer.

Switchboards connected for dedicated emergency supplies shall be coloured red externally.

8.1.13 Glanding Sections and Cable Gland Plates

Gland plates shall be fitted in cubicles for termination of cables and shall be mounted 400mm above the final floor level. The cables shall be fitted with glands anchored to the respective gland plates. The glands shall be adequately spaced to permit the locknuts to be tightened with normal tools.

The gland plates shall be at least 2mm thick, 3CR12 sheet steel or aluminium and shall be bolted to robust brackets welded to the framework of the board.

At positions where single core cables are employed the cable gland shall be fabricated from non-ferrous material of adequate thickness to support the cables i.e. 15mm thick TUFNOL, 5mm 316 stainless steel or 8mm aluminium.

8.1.14 Doors and Covers

A door shall enclose the front of each compartment, unless stated otherwise in the project specification.

Enclosures for outdoor or moist environments shall be provided with a weatherlip angled at 45o to the face of the enclosure framework, together with a door enclosing the cubicle and enveloping the weatherlip. The top of the outdoor enclosure shall be fitted with a full width canopy projecting at least 100 mm from the enclosure face.

All doors shall be arranged to stand off from the face/rear of the board, cubicle, compartment or enclosure. Each door shall be properly stiffened and shall be twice returned at the periphery. The second return shall be gusseted in the corners to further brace the door.

Large doors (e.g. those fitted to the rear of individual switchboard/MCC tiers) shall be further stiffened with “top hat” section channels welded to the inside of the door.

Each door shall be mounted on pin type hinges and shall be secured by means of a lever operated tapered tongue catch or catches (Hinges and catches shall be Barker Nelson or equal to approval). The lever shall be provided with an external stop to prevent rotation in excess of 360□ and to provide a padlocking facility. (A hole in the stop and a hole in the lever).

A minimum of two square hatch keys catches are required per door or rear panel, installed in conjunction with the tapered tongue catch at the top and bottom edges of the door on the opposite side of the hinges. For rear panels, one or both of these square hatch key catches shall be padlockable by having an extended section that encloses the latching mechanism and will allow a standard lock to prevent operation of the catch while in place.

For covers over busbar chambers, four square hatch key catches are required, with a minimum of one catch required to be lockable.

Where doors are mounted adjacent to one another the spacing shall be arranged to permit each door to open through at least 150□, without fouling the adjacent door. A stop shall be provided which shall prevent the door from opening further to obviate damage to paintwork.

Doors fitted with flush mounted equipment shall be properly braced and stiffened to support the equipment. The hinges shall be easily able to support the mass added to the door when the flush fitted equipment is installed.

The space between the back of the door and the face of the coverplate shall be nominally 80mm.

Where coverplates are provided behind the doors, the coverplates shall be adequately recessed into the cubicle to permit the spindle on the lever to drive the tapered tongue catch into a slot in the framework of the board without fouling the coverplate.

Coverplates shall be fabricated as for the doors and shall be further stiffened to compensate for the machine punches circuit breaker slots. The coverplates shall be secured at the top edge with at least two square key driven catches, whilst at the lower edge they shall be located with two 6mm diameter tapered dowel pins located in holes drilled in the architrave. Each pin shall be fitted with a 1.2mm thick spacer washer. Both the pins and the washers shall be welded to the cover.

The end, rear and top coverplates shall be removable to permit access to the equipment. The coverplates shall be lockable in the closed positions. √

8.1.15 Space Requirements

In arranging the chassis layouts a minimum clearance of 80mm between equipment and framework, side panels or internal divisions is required. This minimum space is required on the top, bottom and sides of equipment.

A minimum of 50 mm is required between equipment and wire trunkings. The spacing between equipment shall be sufficient to allow for the installation of conductors (taking in account the minimum permitted bending radii of conductors and cables).

A minimum of 80mm is required between power equipment (circuit breakers, contactors, etc.) and any auxiliary control devices.

8.1.16 General Mounting Requirements

No special tools shall be required to remove and re-install any equipment.

8.1.17 Switchboard Standard Colours

The following colours shall be utilised for electrical switchboards:

11kV to 400V Mains Supply	– EXTERNAL	:	Light Orange-B26 to SANS 1091:2012
400V Mains Supply	– INTERNAL	:	Cloud White-(XXX?) Arc-Free to SANS 1091:2012
Emergency Supply	– External	:	A11 (Signal Red) to SANS 1091:2012
Uninterruptable Power supply	– External	:	Blue- (XXX?) to SANS 1091:2012

8.1.18 Metering within Switchboards

A combined Maximum Demand and kWh meter shall be provided, with associated cabling, fuses, current transformer, calibration certificates etc. in the metering cubicle situated above the bus-section switch for the metering of the incomer supply from the Local Supply Authority and the incomer from the future Generator.

The meters shall be positions behind a glass panel cut into the metering cubicle and shall only be accessible once the cubicle door has been opened. A small diameter hole shall be drilled though this glass to allow the meter function selector switch to be depressed without having to open the metering cubicle door.

This metering shall be independent of the metering to be supplied by the Local Supply Authority for billing purposes.

The meters shall be of the “Enermax” type or equal approved.

8.1.19 Field Control Stations

These constitute local control stations mounted adjacent to equipment such as instrumentation, motors, etc., or emergency stop stations in proximity to rotating machinery.

Where required, these field control stations shall be installed in Glass Reinforced Polyester enclosures mounted on a hot dip galvanised stand. The stand shall be constructed of a minimum of 100 mm x 50 mm U-channel, 3 mm thick, welded to at least a 300 mm x 300 mm x 3 mm thick base, bolted to the floor at each of the four corners. A

3CR12 hood shall be fitted over the GRP enclosure.

A proposal for such a Field Control station is shown in Drawing EAM-EE-GS-008.

8.1.20 Switchboard Construction Drawings – Standard Requirements

All Construction Drawings for switchboards (MCCs, DBs, Field Control Stations and Instrumentation Panels etc.) shall contain the following information:

- □ Project Name and Contract Number
- □ Manufacturer/Supplier
- □ Consulting Engineer and contact person
- □ Client details
- □ Drawing Number and Revision
- □ Drawing to be Signed
- □ Source of Supply – MCC or transformer name etc.
- □ Switchboard General Description
- □ Fault level (kA and time rating)
- □ Form factor/Sectioning
- □ Busbar Details (cross-section, material type, tinned etc.)
- □ Busbar Support Details – type, manufacturer
- □ Earth bar details (cross-section, full-length, front or rear etc.)
- □ Switchboard Material type, grade, thickness etc.
- □ Gland Plate details – material type, thickness, mounting etc.
- □ Colour – internal and external
- □ Switchboard Dimensions
- □ Base Dimensions and bolting arrangements
- □ Front door details – hinge and padlock requirements
- □ Rear door details – hinge and padlock requirements
- □ End panel details – removable cover details
- □ Door details - Stiffeners and restrainers installed etc.
- □ Hinge Details
- □ Locking Details
- □ Handle Details
- □ Cable Entry Details
- □ All bolts, nuts, screws material type (i.e. 316 Stainless Steel)
- □ Equipment details – CB ratings, fault levels, type, manufacturer etc.
- □ Equipment Layout details – Cubicle name, function, equipment function etc.
- □ Indication Light colours
- □ Section to be provided through switchboard

8.1.21 Switchboard Schematic – Standard Requirements

All Schematic Drawings for switchboards (MCC"s, DB"s, Field Control Stations, Instrumentation Panels etc.) shall contain the following information:

- □ Project Name and Contract Number
- □ Manufacturer/Supplier
- □ Consulting Engineer and contact person
- □ Client details
- □ Drawing Number and Revision
- □ Revision details to be listed
- □ Drawing Page Number
- □ Drawing to be Signed
- □ Reference Grid required on each schematic page
- □ Source of Supply – MCC or transformer name etc.
- □ Fault level (kA and time rating)
- □ Voltages for all circuit to be clearly indicated
- □ All devices to have reference number i.e. relays
- □ Equipment ratings to be given i.e. motor ratings
- □ All indication lamps to be labeled including required lamp colour
- □ Legend to be provided
- □ Equipment Tag Numbers as per P&ID and Water Services Plant Numbering System to be provided

9 SWITCHGEAR AND CONTROL EQUIPMENT FOR SWITCHBOARDS

9.1 GENERAL

All equipment shall be of sizes, ratings and specification as detailed and as shown on the Single Line Diagrams. Where feeders or cables have to be revised because of equipment selection by the Principal Mechanical Contractor, these shall be done subsequent to the award of the Tender.

All equipment shall be approved by the Engineer in writing before acceptance for use on the project, and shall bear the SANS mark.

9.2 CIRCUIT BREAKERS

The circuit breakers shall comply with SANS 156 and VC 8036.

Cascading of circuit breakers is not permitted unless specified in the detailed Project Specification.

All equipment shall be of sizes, ratings, and specification as detailed in on the single line diagrams. All equipment shall be approved by the Employer in writing and shall bear the SANS mark.

Where cascading of circuit breakers is allowed, all equipment shall be coordinated and discrimination shall be taken into account.

Circuit breakers shall preferably be from the same supplier in one application.

Circuit breakers shall be equipped with an instantaneous magnetic release and a thermal release.

Circuit breakers for motor circuits shall be suitably rated.

Circuit breakers handles shall provide a clear indication of “ON”, “OFF” and “TRIP” status.

Circuit breakers shall be installed vertically with the upstream terminal on top. Minimum clearances shall be maintained.

All circuit breakers shall be pad lockable in the “off” position or be supplied with means that will enable pad locking.

Circuit breakers shall be supplied and fitted with all supplementary equipment e.g. shrouds, mounting bolts, clips, adaptor plates etc.

9.3 METAL CLAD AIR CIRCUIT BREAKERS (ACB'S)

Metal clad air circuit breakers shall be of the withdrawable type and shall be suitable for use in power distribution systems up to 1000V 50Hz.

The circuit breakers shall comply with latest SANS Standard and shall have a P2 performance rating.
The ACB's shall be self-contained units of the dead front type with the necessary mechanical interlocks to prevent:-

- Access to "Live" terminals when the circuit breaker is withdrawn.
- The withdrawal or insertion of the ACB when the circuit breaker is in the closed position.
- Closing of the circuit breaker without resetting after an automatic trip.

The circuit breaker shall be of the quick make and quick break type with a stored-energy spring assisted operating mechanism provided with:-
- A trip free, mechanical, hand operated closing mechanism.
- A manually operated, mechanical, trip mechanism suitably protected to prevent inadvertent tripping.
- A positively driven mechanical device to provide ON – OFF. - TRIP indication.

All non-current carrying metal parts of the ACB shall be connected to the earthing contact on the truck of the switch, which shall engage with a mating contact on the cradle. The cradle itself shall be connected to the earthing bar in the switchboard. The contacts for the earthing shall be made in the "Racked In" position as well as in the "Test" position. The cradle shall be of robust construction and shall incorporate safety shutters.

The "RACKED IN", "TEST" and "RACKED OUT" positions shall be clearly marked and easily visible.

The ACB's shall be designed in such a way that the direction of the energy flow does not affect the operation or performance of the breaker.

Adjustable thermal overload releases shall be provided to suit the required current range. In addition, a magnetic short circuit release shall be fitted. This release shall have an adjustable current release value as well as an adjustable time lag. A minimum of four, time lag settings shall be available.

Care shall be taken to ensure the magnetic release occurs at a sufficiently low value to afford full protection under the lowest fault current conditions.(Where generators are encountered).

Each ACB shall be equipped with the following accessories:-

- Two normally open auxiliary contacts.
- Two normally closed auxiliary contacts.
- One alarm contact.
- One shunt release.
- Padlocking facilities in the "OFF" and "TEST" positions.
- Key interlock.

Each ACB shall allow for the fitting of the following options:-

- Motor drive for spring charge mechanism.
- Closing release complete with "Anti Pumping Circuit"
- Adjustable time delayed undervoltage release.
- Carriage switches for "RACKED IN" and "TEST" positions.
- Mechanical interlock facility of the Bowden type.

Minimum clearances and distances between the enclosure and the arc chutes shall be strictly observed.

Full technical information of the ACB's offered, shall be supplied with the Tender.

9.4 MOULDED CASE CIRCUIT BREAKERS (MCB'S)

Moulded case circuit breakers shall be suitable for use in 1000V distribution systems at 50Hz. The circuit breakers shall comply with SANS 156:2007 and VC 8036.

MCCB's of the same frame size and the same fault level shall be from the same manufacturer.

Circuit breakers for feeders to lighting and small power sub-distribution boards and motors shall be equipped with an instantaneous magnetic release and a thermal release.

Discrimination shall be provided in the feeder circuit breaker arrangement. An adjustable release shall be provided where deemed necessary.

MCCB's employed for motor-starting circuits shall be rated in such a manner as to avoid 'nuisance tripping'.

Feeder breakers to motor control centres shall be equipped with a thermal release and a time and value adjustable release. These MCCB's shall be selective towards the upstream and downstream circuit breakers.

MCCB's of the same frame size, where in one application an instantaneous magnetic release is

employed and in another application a time lagged release is used, shall have plug–in type trip units.

The operating handles of the MCCB's shall provide a positive "ON" "TRIP" "OFF" indication of the breaker status.

MCCB's shall be installed vertically. Horizontal mounting will not be accepted.

Minimum clearances and distances between the enclosure and the arc chutes shall be strictly observed.

10 MOTOR STARTING AND DRIVE SYSTEMS

10.1 GENERAL

Motor starter and in general all starter panels shall be as per drawing No.EAM-EE-GS-030.

Direct-on-line motor starter contactors shall be equipped with three pole thermal overload relays according to the rating of the motor. This shall be a combination unit with the door-interlocked circuit breaker.

The thermal overload relay shall be provided for single-phase protection, it shall be equipped with an electrical/electronic reset facility.

Drives to high gear ratio motor (such as the screen drive, screw conveyor and compactor) shall be equipped with an electronic shear-pin device. This protection relay will disregard the motor starting current, but trip the drive, should the current rise above a set threshold during running.

Should a phase failure or imbalance relay be incorporated in the design, this trip mechanism shall be manually reset along with the thermal overload relay.

10.2 DOL MOTOR STARTER COMPARTMENTS

Motor starter compartment shall include for a minimum of:-

i. Circuit-breaker (back plate mounted and arranged vertically).
ii. Mechanical operating handle for circuit-breaker, including door interlock, self aligning spindle and padlocking facility (door mounted).
iii. Current transformer class 1,5 (backplate mounted).
iv. Ammeter.
v. Run Hour meter.
vi. Contactors for DOL starting or contactors for alternative methods of starting (backplate mounted).
vii. Thermal overload device operating on single phase / three phases (usually mounted on contactor).
viii. Electrical/electronic reset push button for thermal overload (via door mounted pushbutton
ix. Selector switches MAN, OFF, AUTO (door mounted).
x. Stop / emergency stop push buttons (door mounted).
xi. Start push button (door mounted).
xii. Relays for stop : start and other controls where required (back plate mounted).

xiii. Pilot lights for:
- □ motor stopped but power available (red)
- □ motor running (green)
- □ motor tripped (amber)

xiv. Din rail mounted terminals.
xv. Lamp Test (black push button)
xvi. Submersible motor application

10.3 VARIABLE FREQUENCY CONVERTORS

10.3.1 General

The "Varispeed or WEG" 400kW (or equal to approval) variable frequency converters (motor starter/controller) shall be capable of driving a motor to its full, rated, nameplate output, at frequencies as specified, for an indefinite period. Short time ratings may not be considered.

(a) Technical requirements for variable frequency converter

The variable frequency converter shall be designed to the following technical requirements:

Type:	The controller shall be of the dc link pulse width modulated type and shall be fully digital, to the approval of the Engineer.
Operation:	Speed control through frequency variation with minimal losses. The desired operating speed shall be a measure of the frequency set point. Constant flux shall be supplied over the entire speed range. The inverter shall be the final controlling element for the converter voltage and frequency, in accordance with pre-set selections. The modulated output voltage shall ensure smooth running of the motor with minimal losses and noise down to the minimum speed.
Line frequency:	50 Hz ± 2,5 %
Power switching:	Power switching elements shall be Insulated Gate Bi-polar transistors.
Efficiency:	Shall exceed 96 %.
Overload factor:	120 % for 50 s.
Load side voltage:	400 V
Indication:	The following indication shall be provided and mounted on the VSD door or behind a suitable window in the door. Ammeter (measuring motor current) Motor Speed (in r/min) Running Hour meter (motor running hours) Motor running indicator lamp (LED) (Green) Fault indicating lamp (LED) (Amber) Starter healthy indicating lamp (LED) (Red)

(b) Selection functions and facilities of variable frequency converter

The selection of functions and the setting of parameters shall be accomplished through the use of menu driven software and a control pad. The control pad shall be a membrane covered keypad with LED display unit and shall be mounted on the front door of the enclosure and cabled to the converter. The control pad shall be lockable and shall not be available to the operator for normal operations. The LED display shall, however, be visible.

The converter shall be capable of providing the following minimum control functions: Skip

Frequencies:-	A minimum of three programmable skip frequency ranges
Auto restarts:-	A programmable number of restarts with a programmable delay.
Ramp functions:	Individually programmable start up and slow down ramp functions.
Running hour meter:	The variable speed controller shall give the total running time for the connected motor.

Communication interface: RS 485 (capable of communicating over a 10 m length of cable)

Analog control inputs:	Remote speed reference (0-10 V).
Local speed:	Thermistor (motor) (0-10 V).
Digital control inputs	External trip, Local start/stop, Auto; Off; Manual switch, Fault, Reset
Control outputs:	Fault relay Run relay Low speed relay Motor current (0-20 mA and/or 0-10 V) Motor frequency (0-20 mA and/or 0-10 V)
Protection:	Thermal Current limit Instantaneous over current trip Individual drive protection Earth fault detection Phase imbalance detection or loss of output phase or phases.
Frequency:	Adjustable in the range 2 000 Hz to 5 000 Hz.
Range of Speed:	0 - 70 Hz

Adjustment:

Start/Emergency stop: Start/Emergency stop push buttons shall be mounted on the front door of the respective enclosure and wired accordingly.

Auto, Off, Manual: An auto, off, manual switch shall be provided on the front door of the cubicle and wired accordingly.

Manual Speed Control: A potentiometer shall be provided inside the enclosure.

The variable frequency converter shall incorporate simple controls for adjusting the ramp-up time and regulating the starting current.

The Contractor shall wire the following variable frequency converter status signals back to the Telemetering cubicle:

i. Motor running and / or motor tripped,
ii. Flow rate of pump,
iii. Power failure conditions.

10.3.2 Technical Requirements for variable frequency converter

The variable frequency converter shall be designed to the following technical requirements:

Type: The controller shall be of the dc link pulse width modulated type and shall be fully digital, to the approval of the Engineer.

Operation: Speed control through frequency variation with minimal losses. The desired operating speed shall be a measure of the frequency set point.

Constant flux shall be supplied over the entire speed range. The inverter shall be the final controlling element for the converter voltage and frequency, in accordance with pre-set selections. The modulated output voltage shall ensure smooth running of the motor with minimal losses and noise down to the minimum speed.

Line frequency: 50 Hz ± 2,5 %

Power switching: Power switching elements shall be Insulated Gate Bi-polar transistors.

Efficiency: Shall exceed 96 %.

Overload factor: 120 % for 50 s

Load side voltage: 400 V

Indication: The following indication shall be provided and mounted on the door or behind a suitable window in the door.
Ammeter (measuring motor current)
Motor Speed (in r/min)
Running Hour meter (motor running hours)
Motor running indicator lamp (LED) (Green)
Fault indicating lamp (LED) (Amber)
Starter healthy indicating lamp (LED) (Red)

10.3.3 Control Functions and Facilities

The converter shall be capable of providing the following minimum control functions:

Skip frequencies:- A minimum of three programmable skip frequency ranges.

Auto restarts:- A programmable number of restarts with a programmable delay.

Ramp functions:	Individually programmable start up and slow down ramp functions.
Running hour meter:	The variable speed controller shall give the total running time for the connected motor.
Communication interface:	RS 485 (capable of communicating over a 10 m length of cable)
Analog control inputs:	Local speed reference (0-10 V). Remote speed reference (0-10 V). Thermistor (motor) (0-10 V).
Digital control inputs: Local start/stop, remote start/stop, Auto;Off;Manual switch, Fault, Reset.	External trip,
Control outputs:	Fault relay Run relay Low speed relay Motor current (0-20 mA and/or 0-10 V) Motor frequency (0-20 mA and/or 0-10 V)
Protection:	Thermal Current limit Instantaneous over current trip Individual drive protection Earth fault detection Phase imbalance detection or loss of output phase or phases.
Switching Frequency:	Adjustable in the range 2 000 Hz to 5 000 Hz.
Range of Speed Adjustment:	0 - 70 Hz
Start/Stop:	Start/Stop push buttons shall be mounted on the front door of the respective enclosure and wired accordingly.
Auto, Off, Manual:	An auto, off, manual switch shall be provided on the front door of the cubicle and wired accordingly.
Manual Speed Control:	A potentiometer shall be provided inside the enclosure.

The variable frequency converter shall incorporate simple controls for adjusting the ramp-up time and regulating the starting current.

10.4 ACTUATED VALVE STARTER CUBICLES

The following equipment mounted behind the front door of the cubicle:-

i. Moulded case circuit-breaker [for motor applications] (cradle mounted and arranged vertically behind the door at the second architrave level).
ii. Mechanical operating handle for circuit-breaker, including door interlock, self aligning spindle and padlocking facility (door mounted).
iii. Hour meter
iv. Electronic reset push button for overload (door mounted).

v. Selector switch MAN, OFF, AUTO (door mounted).
vi. Door mounted pilot lights for:-
- motor stopped but power available (red)
- motor running (green)
- motor tripped (amber).

vii. Siemens Logo Controller (or equal to approval by the Engineer)
viii. Din rail mounted terminals.
ix. Lamp Test (black push button
x. Key Switch, back plane mounted, to enable/disable actuated valve controls (i.e. actuated valve controls must be in the "enable" position in order to control the actuated valve from the cubicle door)

11 WIRING, CABLE TERMINATIONS AND GLANDING

All wiring within panels may be enclosed in PVC slotted ducting. The exception is signal and instrumentation cabling passing through power compartments or cubicles, which shall be in galvanised screwed conduit. Wiring outside of panels and switchboards shall be run within galvanised ducting or conduit.

All wiring and terminations shall be labelled with identification tags corresponding to the wiring diagrams. Cable terminations shall be marked with an identification label externally to the switchboard indicating the source of supply as well as the equipment being fed for feeder cables or example: "FED FROM MCC 1" and "SUPPLY TO SUMP PUMP".

12 STANDARD COLOURS – INDICATION LAMPS AND BUTTONS

The suitability of colours employed is generally based on IEC 60073 (No SANS version/ To be updated with latest Standard).

Due to colour schemes on existing plant and user/operator familiarity, the application of certain colours differs from IEC 60073 (To be updated with latest standard). For clarification, the lamp colours are a reflection of the status of the particular control system (front of panel towards equipment to be controlled).

The following colours shall in general be employed on switchboards for indication lamps, push buttons and selector switches:

COLOUR	Condition / Meaning / Application
RED	System stopped/not running or CLOSED
AMBER/YELLOW/ORANGE	Any warning/trip/abnormal condition
GREEN	System running/healthy/normal/ SAFE Condition or OPEN
BLUE	Step/Process change condition
WHITE	Mode indication or other indication (where doubt exists about applicability of Red, Yellow or Green)

Specifically, the application of colours shall be as follows:

INDICATION LAMP COLOURS			Examples/Specifics
Local/Auto/SCADA Mode	Indication Lamp	WHITE	
Bus Bar Alive	Indication Lamp	WHITE	
Capacitor Bank Discharged	Indication Lamp	GREEN	Power Factor Equipment
Closed	Indication Lamp	RED	Valves, penstocks
Differential Pressure – HIGH	Indication Lamp	AMBER	
Differential Pressure – NORMAL	Indication Lamp	GREEN	
Earth Fault	Indication Lamp	AMBER	MV Equipment
Emergency Stop	Indication Lamp	AMBER	
Mechanical Seal Failure Warning	Indication Lamp	AMBER	Sub / Immersible Pumps
Moisture in Coolant	Indication Lamp	AMBER	Sub / Immersible Pumps

Moisture/Water Ingress	Indication Lamp	AMBER	
Motor Winding Over Temperature	Indication Lamp	AMBER	May be flashing AMBER
Open	Indication Lamp	GREEN	Valves
Overload	Indication Lamp	AMBER	
PFC Fault	Indication Lamp	AMBER	Power Factor Equipment
Running	Indication Lamp	GREEN	
Starter Alive (Circuit Healthy)	Indication Lamp	GREEN	
Stepped Function	Indication Lamp	BLUE	Power Factor Equipment
Stopped & Power Available	Indication Lamp	RED	
Tripped	Indication Lamp	AMBER	
PUSH BUTTON/SELECTOR SWITCH COLOURS			Examples/Specifics
Emergency Stop	Push Button	RED	With yellow backing
Lamp Test	Push Button	BLACK	
Reset	Push Button	BLUE	
Start	Push Button	GREEN	
Stop	Push Button	RED	
Up/Down/Left/Right/Forward/Reverse	Push Button	BLACK on WHITE	
Selector Switches/Knobs		BLACK	with Black back plates with white lettering

Note: AMBER=YELLOW=ORANGE
For All new equipment installed shall match the existing plant equipment (lamp/pushbutton etc.) All indication lamps to be accompanied with engraved backing plates.

The Engineer shall provide the final confirmation/approval of ALL colours to be employed on existing or new plant.

13 SWITCHBOARD ACCESSORIES

13.1 GENERAL

Refer to the switchboard equipment schedule in the Project Specification as well as the proposed Motor Control Centre layout drawing in the Project Specification for additional details. All manufacturers / suppliers of switchboard accessories shall ensure that the equipment is SANS certified. All systems providing starting and control shall provide full protection from the effects of internal and external faults.

13.2 INSTRUMENTATION IN GENERAL

Instruments shall generally be designed for an accuracy of 1% (Class 1) of the full-scale reading. (Assume the frequency remains constant at 50 Hz). Instrument faces shall be either
96mm x 96mm on large panels or 76mm x 76mm on smaller panels. The faceplates shall be painted white with black paint for the lettering and scale divisions. A thumbnail operated adjuster shall be provided to zero the pointer at any given time. A clear glass window that is positively located by the framework of the instrument shall enclose the pointer and faceplate. The glass shall be mounted on a gasket that will seal the space between the faceplate and the inside surface of the glass against the ingress of moisture and dust. Terminals shall comprise nuts on a moulded in stud at the rear of the instrument. The terminals shall be fitted with two washers and a colour coded rubber shroud. The shroud shall allow the wire, fitted with a lug, to approach the stud at 900 and shall be moulded accordingly.

Instruments shall be provided with a scale not less than 20% above the normal operating value of the function being measured, then rounded up to the nearest standard scale provided by the manufacturers.

13.3 VOLTMETERS

Volt meters shall be of two sizes 96mm x 96mm on the large panels and 72mm x 72mm on the smaller panels. The meters shall be of the moving iron type and the movements shall be mounted on shockproof suspensions. The accuracy shall meet class 1.5 i.e. 1,5% of full scale value at each reading.

The main incoming section of the Switchboards (Motor Control Centres in particular) shall have a Voltmeter of 96 mm x 96 mm size, equipped with coloured surrounds representing each phase, i.e. Red, White and Blue and equipped with a phase selector switch. The switch shall permit the indication of all phase to phase and phase to neutral voltages on the voltmeter. The phases shall be noted as "R", "W" and "B".

Where a voltmeter is connected to the main busbar and a selector switch is provided for the operator to monitor the voltage between any two phases or between any phase and neutral, then two sets of HRC fuses shall be provided. One set mounted on the respective phase bars and the second set mounted adjacent to the voltmeter on the back of the door. The fuses mounted on the cover plate shall each be provided with an element that affords protection for the conductors run between the two sets of fuses. The second set of fuses shall be fitted with elements that afford protection for the selector switch and instrument, besides being a convenient (and safer) point of disconnection for the maintenance staff. The minimum wire size for a voltmeter circuit shall be 2,5mm2.

13.4 AMMETERS

Digital Indicators:

Indicators shall conform to the following:

- Digital with relay outputs Microprocessor based
- LED display
- Measurements 96mm x 48m Unit must be pluggable Inputs:
  - ACV
  - DCV
  - Pt100
- Process signals at least 2 relays
- Isolated retransmit
- Current limiting for power and retransmit signals
- Programmable from front panel

Basic specifications:

Power Supply	115V 50/60Hz 230V 50/60Hz 24V 50/60Hz 24VDC Isolated
Power consumption	3~6VA
Display reading	User programmable from -999 to +999
Input	Thermocouple J,K,N,R,S,T, Pt100 0/4~20mA, 0/1~5V 0/2~10V, 0~1mA AC Volts true RMS AC Amps true RMS
Accuracy	±0,25% of span ± 1 digit
Repeatability	±0,2% of span ± 1 digit
Operating temperature	-5 to +65ºC
Operating Humidity	0 to 95% RH Non Condensing
Relays-SPDT	AC 5A 250V 1250VA DC 5A 30VDC

Ammeters shall be of two sizes 96mm x 96mm on the large panels and 72mm x 72mm on the smaller panels. The meters shall be of the moving iron type and the movements shall be mounted on shockproof suspensions. The accuracy shall meet class 1.5 i.e. 1,5% of full scale value at each reading.

The main incoming section of the Switchboards (Motor Control Centres in particular) shall be equipped with instantaneous and maximum demand ammeters of 96 mm x 96 mm size, equipped with coloured surrounds representing each phase, i.e. Red, White and Blue.

Each individual starter/drive cubicle shall be equipped with a 76 mm x 76 mm logarithmic scale instantaneous ammeter, with a label above the ammeter indicating the full load current for the respective drive.

Ammeters for ac applications shall be of the type suited to motor drives and shall provide a substantive over-range to allow for the motor starting current. The faceplate shall be marked, with a red line, at the point on the scale where the absorbed motor current occurs. Ammeters shall be arranged in circuit for direct reading or indirect reading (CT operated), as required. Direct reading devices shall be employed up to a maximum of 40 A. Where multiple CT's are installed to permit a single instrument to indicate the load on each phase, in sequence, a rotary selector switch shall be provided which will permit the operator to select the phase he wishes to monitor. The CT's shall be connected in a star configuration and the star point shall be directly connected to the main earthing bar in the MCC. The minimum wire size for a CT and Ammeter circuit shall be 2,5mm².

13.5 RUN-HOUR METER (RHM)

Run-hour meters in general shall be 72mm x 72mm in size and shall be installed for all motor starting and controlling applications. Run-hour meters shall be mounted on access doors with the face of the meter visible from the front of the board.

Run-hour meters shall be suitable for 230V 50Hz applications and arranged to operate directly from the control voltage but shall be controlled by the motor starter. The dial shall be cyclic and shall count to 99999,9 before returning to 0. A reset facility is not required.

Run-Hour meters shall however be the same physical size as the Ammeter on the same panel. Enlarged bezels that make the run-hour meter appear the same size as the Ammeter, will not be accepted.

13.6 TIME SWITCHES

The time switches shall be of the 24 hour type, operating on a 230 V 50 Hz supply with an electrically wound 9 hour spring reserve. The time switches shall be mounted behind the hinged access doors. Each time switch shall be fitted with fifteen "on" stops and fifteen "off" stops thereby providing 30 selective operations per 24 hours.

13.7 TIMERS

The timers shall be of the electronic plug-in type operating on a 230 V 50 Hz supply. The timers shall be adjustable by turning a knob. They shall be mounted facing the front of the board but behind the access door.

13.8 FUSES

The fuses shall comply with SANS 60269-1 and SANS60269-4 and shall be adequately rated for the circuit currents. All fuses shall be positioned so as to be accessible.

13.9 FUSE HOLDERS

All fuse holders shall comply with the latest SANS Standards and shall be adequately rated to cater for the load currents.

13.10 SELECTOR SWITCHES

Selector switches shall be of the rotary pattern and shall be mounted on the cubicle doors or on the door to the panel above the circuit breaker. All selector switches shall have a minimum rating of 15 A.

These shall preferably be of the same manufacturer as the push buttons and indicators lamps.

Selector switches shall allow contacts arranged in wafer housings that permit stacking along, and positioning about, the centrally mounted spindle driven by the operating knob. The escutcheon plate mounted on the door of the motor drive, or other, cubicle shall be secured with screws secreted from view by the 'snap on' plastic cover which shall be engraved in accordance with the circuit requirements (ie ON - OFF . REMOTE - OFF - LOCAL . MANUAL - OFF - AUTOMATIC) etc. The spindle shall be splined to allow the contacts within the wafer housings to be 'timed' for early or late, make and brake contacts, as required.

13.11 RELAYS

The relays shall be general purpose plug-in relays with octal or 11 pin bases. Soldered connections to bases will not be accepted. Each relay shall be tightly sealed with a clear plastic cover. All relays shall operate on a 230 V 50 Hz supply.

13.12 OVERLOAD RELAYS

The overload relays shall be of the thermal type with an element in each phase and shall conform to the characteristic curve held by the manufacturer with a tolerance of + 10% of the values as specified in the SANS/IEC 60947-4-1.

13.13 CONTACTORS

The contactors shall be operated electro-magnetically. The control voltage shall be 230 V, except for the dc emergency lighting contactor, which shall be 110 V dc. Contacts shall be capable of carrying 125% of the full load circuit current continuously. The contactors shall be suitable for “Intermittent Duty” 15 operations per hour.

13.14 CONTROL PUSHBUTTONS

In conjunction with the Clause entitled “STANDARD COLOURS – INDICATION LAMPS AND BUTTONS”, the Control Pushbuttons shall be of the round, flush, spring-loaded type, 22,5 mm in diameter, coloured in accordance with the duty as follows:-

START	=	Green
STOP	=	Red
LAMP TEST	=	Black
RESET	=	Blue

For field mounting of Control Pushbuttons, these shall be mounted and positioned as indicated on drawing No.EAM-EE-GS-008 depicting a general arrangement of a Field Control station.

13.15 INDICATING LAMPS

Indicating lamps shall comprise a cluster of four light emitting diodes arranged in a common housing. Each lens shall be coloured as required for stop, start, alarm, trip, etc. shall be at least 20 mm diameter and shall be clearly visible through an angle of 1800 in a brightly lit room (500 - 600 Lux) and the contrast between an energized condition and a de-energized conditions shall be clearly visible from all sides as well as in front.

The indicators shall be suitable for use on either 230V AC / 24V DC supply as per project specification. If the LED is not able to operate direct from the control voltage called for then a separate controller shall be provided with each LED to ensure that all LED's are fully interchangeable with those adjacent or on a separate panel some distance away.

The housing shall be fitted through a hole in the door of the cubicle and shall be secured with a separate screwed ring or a bayonet plate that is tightened into position with grub screws. The housing body shall be provided with a key to locate in a groove in the door cut-out to prevent the housing from rotating.

In conjunction with the Clause entitled “STANDARD COLOURS – INDICATION LAMPS AND BUTTONS”, the lens shall be coloured in accordance with the duty as follows:-

Red	=	System stopped and power available.
Green	=	System running.
Amber	=	System tripped.
Amber	=	Water ingress detected (Submersible / Immersible machines).
White	=	Busbar alive.

13.16 STOP PUSHBUTTONS

Stop push buttons shall comprise two main components namely a front mounted operator and a rear mounted contact block. The front mounted operator shall be fitted with a cylindrical housing, which is attached and keyed to the mounting panel. The cylindrical component shall house a spring returned, flush mounted button. The rear mounted contact block shall be arranged with a bayonet feature that attaches to the front mounted component and is secured with grub screws or a locking ring. The push button shall actuate a silver alloy bar contact rated at not less than 15A. Conductors shall be fitted with a crimping ferrule to be secured by a screw adjusted clamping terminal mounted in the contact block. The complete assembly when mounted and connected shall provide protection against the ingress of dust or vapours to IP66. Once access is gained to the rear of the device the Technician shall still be protected from accidental contact to IP4x. The unit shall be maintenance free and shall provide at least 1 million operations before failure. The front mounted operator shall be coloured RED and shall be engraved with the word STOP. The contact block shall be provided with locators and screw anchors or clips, to accommodate an additional contact block mounted "piggy back" on the first contact block.

13.17 START PUSHBUTTONS

Start push buttons shall be arranged as for stop push buttons with the exceptions that the contacts in the contact block shall be normally open and the front mounted operator shall be coloured GREEN and engraved with the word START.

13.18 RESET PUSHBUTTONS

Where required, reset push buttons shall be spring loaded mechanical devices, mounted immediately in front of the electrical overload. The outer appearance of the housing for the reset push button shall be similar to the start or stop push buttons on the same panel. The rod attached to the push button shall be adjustable to suit the depth of the drive cubicle, as required. The push button housing shall be of sufficient depth to provide proper support for the extension rod. The front mounted operator shall be coloured BLACK and engraved with the word RESET. To achieve a pleasing layout of equipment on the door to the motor drive cubicle it may be necessary to adjust the position of the overload device within the cubicle.

13.19 EMERGENCY STOP PUSHBUTTONS

Emergency stop push buttons shall be arranged in similar fashion to the stop buttons. The operating pushbutton however shall be at least 50mm in diameter and shall be knurled at the periphery. The mushroom head shall be mechanically latched when it is pressed, to prevent the contacts, within the contact block, from re-closing. To release the mechanical latch, and thus close the contacts, the operator shall be required to rotate the push button head through at least 600.

13.20 NAME PLATES AND LABELS

Each component of electrical apparatus installed under this Contract shall be properly and unambiguously labelled. Components on/in a distribution board shall be individually labelled, the compartments in which these components are mounted shall be labelled as an entity. The

labels on the outside of each compartment shall be operator orientated, whilst the labels inside the various compartments shall be technician orientated and shall be worded/numbered as per the wiring diagram for the respective cubicle/compartment.

All labels shall be secured to the outside and inside of distribution boards with machine screws. Self-threading screws or glue will not be permitted. The exception is equipment labels within the switchboard, which may be glued only. All screw fixed labels shall be jig drilled to provide interchange ability between compartments.

All notices and labels for warning purposes or indicating dangerous conditions shall be in English, Afrikaans and IsiXhosa. General operating and identification notices and labels shall be in English only. Labels shall have black letters on a white background for standard labels or white letters on a red background for caution, warning or danger labels.

Each label shall comprise a high quality plastic tri-laminate and the wording shall be engraved through the outer layer to expose the colour of the centre layer. All engraving shall have sharp, clearly defined edges.

Labels and character sizes shall be commensurate with the size of article being labelled, with the proviso that where a range of label sizes would thus occur on a panel, the labels/character sizes shall be of a uniform average size.

13.21 LABELING OF DISTRIBUTION BOARD

The source of supply need to be indicated for Circuitbreakers.

Circuit breakers shall be numbered with suitable engraved two layer “Trefolite”, black lettering on white. The labels shall slide into an aluminium bracket as per attached drawing. Each circuit breaker shall have a unique number and the number shall not be repeated on the same board. However the numbering on each board shall start at 1. Multi-phase breakers shall have a number for each pole.

Boards shall be numbered in “levels” e.g. the boards supplied by the transformer, mini substation or municipal kiosk shall be numbered MAIN DB1, MAIN DB2, etc. The sub boards supplied by these boards shall be numbered SUB DB1.1, SUB DB1.2, SUB DB2.1, etc.
The numbers shall be repeated on a legend card that is displayed on the inside of the board. The card shall indicate the following:

- □ Circuit breaker number
- □ Type of circuit e.g. power points, lights, etc.
- □ Rooms numbers supplied
- □ Number of lights, power points, etc. in brackets

The proposed numbering shall be submitted to the Employer for approval prior to manufacturing of the labels. Labels that are manufactured incorrectly shall be for the contractor account.

13.22 SUB-DISTRIBUTION BOARDS

A separate earth continuity conductor shall be supplied between the earth busbar in each sub-distribution board and the earth busbar in the Main Switchboard. The earth continuity conductor shall consist of insulated stranded copper conductor installed along the same routes as the supply cables or in the same conduit as the supply conductors.

14 EARTHING AND LIGHTNING PROTECTION

14.1 EARTHING

The earthing installation shall comply with the requirements of the latest revision of the Wiring Code of Practice (SANS 10142-1) as well as the requirements of the Local Supply Authority. Earthing shall be undertaken as detailed on in the Project Specification.

The Neutral shall not be bonded to the Earth in the Motor Control Centre, but at the source of supply, namely the transformer.

All metallic cable support systems, handrails, ladders and access platforms shall be connected to the earthing system.

The resistance measured between the consumers earth terminal and any exposed conductive part of the installation or any other conductive part that needs to be bonded to the earth continuity conductor shall not be more than 0,2 ohms.

14.2 LIGHTNING PROTECTION

Lightning protection for this installation shall be limited to surge arrestors on the main board and suitable voltage protection on the instrumentation cables and equipment.

The surge arrestors shall be of an approval manufacture and shall bear the SANS mark of approval.

15 CABLE TRAYS

15.1 GENERAL

All proposed cable tray installations shall be neatly sketched and submitted to the Engineer for approval before any cable tray work is commenced. The sketch shall include principal dimensions and show the proposed cable tray routes.

Cable trays shall be wide enough to accommodate the cables required in terms of this contract plus 15% spare capacity for future additions.

15.2 MATERIAL AND MANUFACTURE

Cable tray shall be of the heavy-duty type manufactured from 2,0mm thick sheet steel and hot dipped galvanised after manufacture, designed for internal and external use.

Cable trays shall be plumb and true to line and shall be arranged either vertically or horizontally. Trays fixed to brickwork or concrete shall be mounted on 90° Z section spacer brackets, manufactured from 3 mm thick material, to space the back of the tray 30 mm from the structure. The brackets shall be full tray width and shall be provided along the cable tray route at approximately 500mm centres. Brackets shall be provided where cable trays terminate.

Each bracket shall be fixed to the wall with two 8mm anchor bolts entered at least 70mm into the wall whilst the tray shall be secured to each bracket with two 6mm galvanised steel set screws with nuts and washers.

A sample of the spacer brackets shall be submitted to the Engineer for approval, before proceeding with the manufacture of the remaining brackets.

Joints in the tray shall be kept to a minimum and shall only occur coincident with a spacer bracket position or cross brace position.

Bends and tees in the cable tray shall be factory made by the same manufacturer as the cable tray. Joints in the cable tray shall be kept to a minimum and shall be arranged to occur coincident with a support bracket.

Nylon washers may be employed to prevent galvanic reaction between galvanised steel and 3CR12 or 316 steel (for specialised installation), but careful consideration shall be given to ensure earthing continuity of all metallic items employed.

Should the environment be considered corrosive (for example Wastewater Treatment Plants or near the coast) the Engineer may call for all brackets, straps, cable tray, bolts, nuts, washers, etc. employed for the cable tray system to be manufactured from AISI 316 stainless steel.

15.3 CABLE POSITIONING AND FASTENING

All cables shall be neatly fastened to the tray with PVC cable straps at 300mm centres.

Where cable trays are run Vertically, Power Cables shall be installed at the bottom of the cable tray and instrumentation and signal cables at the top.

Where cable trays are run horizontally, Power Cables shall be installed closest to the supporting surface i.e. wall, and instrumentation cable to the front.

All cables shall be run and cleated in accordance with the wiring regulations and shall be run in the ground or on cable trays secured to concrete, brick or steel structures.

16 BUILDING SERVICES INSTALLATION

16.1 GENERAL

All equipment supplied shall be suitably rated to the identified fault level in the Project Specification.

All electrical components supplied and installed, shall bare labels indicating its supply source. These labels will be secured to the outside and or inside of each electrical component with machine screws. Self-threading screws or glue will not be permitted. All screw fixed labels shall be jig drilled to provide interchangeability between compartments.

16.2 LIGHTING FITTINGS

The preferred lighting fittings for use in installations are as follows:

Type	Description
A	341mm x 195mm diameter surface mounted bulkhead lighting fitting with silver die-cast aluminum alloy body and diffuser, stainless steel securing screws, clear prismatic diffuser, ballast and holder to accommodate one 26 W lamp to BEKA Cat. No. 31126 or equivalent, complete with Osram lamp.
B	1 512 mm x 172 mm, 54 W two lamp totally enclosed, corrosion, dust and vapour-proof surface mounting fluorescent lighting fitting with one piece injection moulded, clear UV stabilised, polycarbonate diffuser with anti-tamper clips, To BEKA Cat. No. VLN – 254/ECG54 or equivalent, complete with Osram T5 lamps.
C	1 512 mm x 172 mm, 54 W one lamp totally enclosed, corrosion, dust and vapour-proof surface mounting fluorescent lighting fitting with one piece injection moulded, clear UV stabilised, polycarbonate diffuser with anti-tamper clips, complete with lamp. To “BEKA Cat to. VLN 254/ECG or equivalent, complete with Osram T5 lamps.
D	High Bay lighting fitting, complete with encapsulated ballast. To BEKA Cat. No. BEKAWAY – 150W HPS or equivalent, complete with Osram lamp
E	High Bay lighting fitting complete with hot dipped mounting bracket. To. Beka Cat. No. MAX-F or equivalent, complete with Osram HPS lamp

16.3 LIGHTING SWITCHES

The preferred switches for use in installation are as follows:

Type	Description
A	16 A – One lever one way rocker type flush mounted switch, with 100% polycarbonate construction, modular design, removable clip on surround which covers the fixing screws and plates complete with standard fixing screws. To Lumex Series 2000 Code S2031/1/2AWE, or equivalent. Colour Black.
B	16 A – One lever two way rocker type flush mounted switch, with 100% polycarbonate construction, modular design, removable clip on surround which covers the fixing screws and plates complete with standard fixing screws. To Lumex Series 2000 Code ST2031/2/3AWE-ST2031IWE, or equivalent. Colour Black.

16.3.1 Lighting Switches General

16.3.2 Non-Uniform Wall Finishes

Switches located on walls near change of wall finish, e.g. on tiled, face brick, or wood panelled dadoes, must be arranged so that the cover plates fall completely within one or other of the surfaces and not on the junction line of the different finishes. The Contractor must collaborate with the Principal Contractor and other trades to ensure that switches on such surfaces present a neat appearance.

16.3.3 Lighting Switches in Demountable Partitions or Mullions

Where these are specified they must be of the special narrow type, nominally 25mm wide and mounted flush in vertical hollow mullions or similar hollow metal clad partition members. The opening in the mullions and the holes for reception of the switch-cradle and its fixing screws must be provided by the Contractor. The Contractor must provide the fixing screws, which may be self-tapping and provide and fit an overlapping cover plate, finish as specified, to match the special narrow switch.

16.3.4 Lighting Wiring to Switches in Hollow Mullions and Demountable Partitions

The wiring to these switches may be run within the hollow mullion or other hollow metal structural members of the partitioning, but must be run in conduit from the lighting outlet, terminating with a bush at the point where wiring enters the hollow mullion. Where the wiring for lighting circuits is run in a ceiling channel which is situated directly over the hollow mullion or other wire carrying member, then the wiring to switches may be taken directly into the latter without the use of conduit or lead in tubes. Under no circumstances must the wire pass over sharp edges and suitable provision must be made to shield the wiring accordingly.

16.3.5 Lighting Wiring Of Lighting Circuits

Lighting circuits shall be wired with not less than 1.5mm² conductors. Lighting circuits shall be adequately rated to accommodate inrush currents.

16.3.6 Lighting Photo Cells

Photo Cells shall be mounted external to a building and at least at the same height of the luminaires it controls. Care shall be taken that the light spill from the controlled luminaires or any other luminaire does not affect the photo cell adversely. Fitting of light reflecting covers will not be permitted.

A rotary type switch mounted within the distribution board, shall be wired in the control circuit, to bypass the photo electric light sensing cell for testing purposes. A single pole circuit breaker

shall be provided for the control circuit and connected to the load side of the triple control circuit breaker protecting the contactor.

16.3.7 Lighting Dimmers

Dimmers shall be as rated and selected to suit the application.

16.3.8 Lighting Low Voltage Transformers

Low voltage transformers shall be WACO Code: V1P/TRAY-ET60, Voltage: 240V / 50Hz, Rated current (Primary): 0.26A, Secondary voltage (V): 11.65V Max 5.3A AC, Rated load (W): 20W - 50W, Short circuit protection -Auto reset on start, Thermal protection - Single shot, Surge protection: 1 KVP, Input terminal: 2.5mm, Output terminal: 2.5mm, Dimmable - To be used with a trailing edge dimmer only, Length: 125mm, Width: 35mm, Height: 30mm, Class: II, IP: 20 or similar and approved.

16.3.9 Lighting Isolators

Flush mounted isolators shall be installed for all domestic applications i.e. stoves, hot water cylinders, boiling water installations, etc.

Industrial pad lockable isolators shall be installed for air conditioning units, gate motors, extractor fans, etc. Isolators shall be IP65 rated.

16.4 SWITCHED SOCKET OUTLETS

The preferred power outlets for use in installation are as follows:

Type	Description
A	16 Ampere, double, switched socket outlet, on yoke, to fit 100 mm x 100 mm wall box, with cover plate. To Lumex Series 2000 Code ST2025WE, or equivalent and approved. Colour Black.
B	3 phase neutral and earth, switched socket outlet, 32 A. To Clipsal Code 76252-6 complete with plug, or equal to approval, or equivalent and approved. Colour Black.

16.4.1 Switched Socket Outlets General

All power socket outlets shall conform to the types set out in the Project Specification Annexures or Single Line Diagrams.

All power socket outlets shall be at a height of 500mm above finished floor level, or as otherwise specified in Project Specification or on Drawings.

Where the socket outlet position would interfere with dado lines or other finishes the final position shall be decided on site by the Engineer.

16.4.2 Surface Mounted Switched Socket Outlets

Where conduit or cable is surface run or where specified, switched sockets of the surface mounted metal clad type must be used.

16.4.3 Waterproof Switched Socket Outlets

Switched socket outlets installed in positions or situations exposed to the atmosphere or damp surroundings or where specified, supplied shall have an IP65 rating.

16.4.4 Industrial Switched Socket Outlets

Industrial switched socket outlets shall be five pin type as specified, with mechanical interlock and pad lock facility. Sockets shall be rated IP65.

16.4.5 Mounting Heights

Where no other mounting heights are indicated in the Scope of Works, switched socket outlets will mounted at the following heights from finished floor level to the bottom of box:

Flush switched sockets, Offices	- 500mm
Workshops, Garages, Kitchens	-1300mm

16.5 SWITCHED SOCKET OUTLETS CIRCUITS

16.5.1 Single phase socket outlet circuits

Circuits to single phase power socket outlets shall comprise two conductors not less than 4,05mm2 in cross sectional area drawn into 20mm or 25mm diameter conduit run between the switchboard and the socket outlet.

Circuits shall be arranged as detailed in the Project Specification.

16.5.2 Three Phase Socket Outlet Circuits

Three phase socket outlet circuits, rated up to 32 A, shall comprise 4 conductors not less than 6mm2 in cross sectional area drawn into a 32mm diameter conduit run between the distribution board and the respective socket outlet position.

Circuits shall be arranged as detailed in the Project Specification.

All three phase socket outlet circuits will be earth leakage protected.

16.6 GENERAL LABELLING

The Contractor shall label all power outlets, isolators and light switches.

The prefix capital letter(s) of any outlet refers to the distribution board from which it is fed. The next numeral after the letter(s) indicates the circuit, e.g. Circuit No. 2 fed from Distribution Board 1 = SUB DB 1.1/CB.

17 DUCTS, CONDUITS, CONDUIT RUNS AND DRAW WIRES

All conduits and conduit accessories shall be PVC, shall conform to SANS 950 and shall be concealed in walls, concrete floors or structures, and roof spaces, as far as possible. Conduit may be galvanised steel with screwed electric thread where specified.

Every effort shall be made to obviate chasing and the Contractor shall build conduits into walls and floors as the building work proceeds.

Where chasing is necessary the chases shall be as narrow as possible and shall be carried out by machine. Once the conduits have been installed they shall be secured to prevent springing whilst the brickwork is being made good. Chasing of concrete will not be permitted.

Where conduit is installed in concrete floor slabs the conduits shall not cross one another and shall be adequately spaced to permit the satisfactory consolidation of the concrete.

The conduits installed in the concrete slabs shall be kept well clear of the underside and top of the respective slabs. The conduits shall be installed so that any condensation that may form inside the conduit will gravitate to the nearest box.

An electrician shall be standing-by whilst the Contractor is casting concrete over any conduits.

Holes, slots and cable trenches will be formed in the structure as the building work proceeds. The Contractor shall ensure that his conduits are kept well clear (at least 300 mm) from these penetrations when placing conduits for casting or building into the structures.

are run in brickwork and are required to pass through a concrete column or beam, a conduit sleeve shall be cast into the column concrete. As the brickwork is raised the required conduit shall be installed through the sleeve.

Deep concrete boxes shall be employed in preference to shallow boxes fitted with extension rings.

All conduits shall be installed to permit the wiring to be "looped in". Surface

mounted conduit shall be subject to the approval of the Engineer.

All boxes shall be fitted with cover plates where they are not covered by lighting fittings or other devices. All conduit for surface mounted lighting fittings shall terminate with conduit boxes and shall be arranged to permit back entry to each lighting fitting. The conduit boxes shall be securely fixed, flush with the underside of the ceiling or wall.

All ducts, spare conduits and conduits for other services shall be clear, water and moisture free and fitted with 2,0 mm diameter galvanised steel draw wire.

All PVC pipes installed as cable sleeves shall be provided with bends, where necessary, with a minimum radius of 600 mm.

Galvanized steel conduit Bosal (similar and approved) shall be used in the following instances:
where conduit and accessories are exposed to ultra violet radiation for more than an hour a day;
where flame or explosion proof installations are required; and
Where the conduit will be load bearing e.g. for the suspension of lighting luminaires.
When specified in the Scope of Works.

Conduits shall not be installed closer than 150mm to pipes containing hot water, steam, gas or any other material which may damage the conduits or conductors.
PVC conduit shall be secured with saddles spaced not more than 900mm apart. Metal conduit shall be secured with saddles spaced not more than 1500mm apart.

18 CABLE SUPPORT SYSTEMS

18.1 GENERAL

Cable support system shall be wide enough to accommodate the cables specified in this contract plus 25% spare capacity for future expansion.
Pricing for cable support systems on the schedule of rates shall include all supplementary materials required to form a complete installation e.g. mounting bolts and nuts, brackets, threaded rods, chemical or mechanical anchors, “unistrut” (equal and approved), canter lever arms, T-pieces, risers, droppers, horizontal bends, 4 way cross overs, “Clip-On” support channels, joiner or splice sets and hold down saddles etc.

18.2 MATERIAL AND MANUFACTURE

Cable support system shall be of the heavy duty type manufactured from mild steel and hot dipped galvanized after manufacture, designed for internal and external use.

Should the environment be considered corrosive the Employer may call for 316L stainless steel. The contractor shall confirm the type of material before ordering.

18.3 INSTALLATION

Cable support system shall be plumb and shall length wise be arranged either vertically or horizontally. Joints in the cable support system shall be kept to a minimum and shall be properly braced. Bends and tees shall be from the same manufacturer.

Cable support system fixed to brick or concrete work shall be mounted on “unistrut” brackets manufactured from 2.5mm thick material. The brackets shall be the full width of the ladder and shall be spaced 500mm centres along the length of the tray. Brackets shall be provided where cable trays terminate. Each bracket shall be fixed to the brick or concrete work with two (2) 8mm bolts entered at least 70mm into the concrete. The tray shall be secured to each bracket with two (2) 6mm galvanized steel set screws with nuts and washers.

19 LOW VOLTAGE CONTROL AND SIGNAL CABLES

19.1 GENERAL

All cables indicated on the drawings and schematics shall be designed and selected according to the loadings, generally as detailed in the Project Specification.

A maximum total volt drop of 2,5% is allowed across the cable from the MCC to the motor terminals under running conditions.

All conductors used in the electrical installation shall be high conductivity, annealed copper with PVC insulation and shall comply with SANS 1507.

No joints will be permitted in any low voltage cable run, except where cable lengths exceed the drum length, without prior written acceptance by the Engineer. Any damaged cable shall be replaced by the Contractor at his own cost.

All cables shall be suitably rated.

19.2 CABLE ROUTES

Control and instrument cables for the project may be run on the same cable tray as the power cables but where electromagnetic interference may upset the control signals the necessary precautions regarding screening and physical separation shall be applied.

Cable routes indicated are merely indicative of the points to be connected. The Contractor shall ascertain whether that route is the most suitable and feasible. The contractor shall order the cable accordingly.

19.3 CABLE LENGTHS

Cable lengths indicated in the Project Specification are employed for voltage drop calculations only and shall not be used as a basis for re-measurement. The onus is on the Electrical (Sub) contractor to adequately survey the site and measure and price the power and control cabling installation as an all-inclusive complete item. Should a deviation be required due to unforeseen site conditions, the Schedule of Rates for the Electrical Installation shall be applicable to calculate the difference in cost for the installation of power and control cables, but only with the approval by the Engineer.

19.4 POWER AND INDICATION CABLES (1000/600 VOLT)

All power and indication cables shall be of the multi-core stranded soft drawn copper wire PVC insulated PVC bedded, steel wire armoured type with an overall PVC sheath (preferably black) and shall be manufactured and tested in accordance with SANS 1507:2014 for general purpose duty.
The colour of the cores shall be as follows:
Twin core: one red, and one black.
Three core: one red, one white and one blue.
Four core: one red, one white, one blue and one black.

19.5 INSTRUMENTATION CABLES (24V / 220V)

Instrumentation cable shall be constructed of multiple twisted pairs of insulated stranded copper wire, PVC insulated with an overall aluminium shield, extruded PVC inner jacket, served with steel wire armour with an extruded PVC outer jacket.

The nominal conductor resistance shall not exceed 3,5 ohms per 100 m at 20ºC.

The complete cable shall withstand a dielectric test conductor to conductor and conductor to shield of 1 000 V dc for one minute.

The insulation resistance of each conductor shall be not less than 8 800 meg ohms/km for 1 minute at 500 V and 20oC, measured with the remaining conductors in the cable connected to the armouring.

The minimum core size shall be 1,5 mm^2.

All instrumentation and signal cables (excluding optical fibre cables) shall be installed separate from power cables.

19.6 PANEL WIRING (24V / 220V)

Further to the abovementioned Clause, all panel wiring shall be of the silicone-insulated type with stranded tinned copper conductors, with a minimum conductor size of 1mm^2.

The colour of the conductors shall be as follows:

220V AC control Line => Brown
220V AC Neutral => Black
+24V DC => Orange
-24V DC => Violet or Purple

19.7 PLC WIRING

Further to the abovementioned Clause, all panel wiring shall be of the silicone-insulated type with stranded tinned copper conductors, with a minimum conductor size of 1mm^2.

The colour of the conductors shall be as follows for Digital Signals:

PLC DIGITAL Inputs => Grey
PLC DIGITAL Outputs => Pink

The color of the conductors shall be as follows for Analogue Signals:

PLC ANALOGUE Inputs => twisted pair Red/black
PLC ANALOGUE Outputs => twisted pair White/black

19.8 SPARE CORES IN ALL CABLES

All cables installed shall include for spare cores. The spare cores shall amount to 10% of the number of cores used, rounded up to the nearest whole core.

19.9 CABLE IDENTIFICATION

A suitable tag, onto which the appropriate cable identification number in accordance with the Contractor‟s detailed cable schedule shall be stamped, shall be adequately secured just below the gland at the ends of each cable.

Where cables deviate from one route to another (e.g. at tee‟s, on cable trays or in trenches) additional identification tags with numbers shall be fitted to each cable, within 500 mm of the point of deviation.

19.10 CABLE SCHEDULES

The Contractor shall submit to the Engineer a detailed schedule of all cables together with drawings showing cable routes (both underground and on cable trays) for approval prior to the commencement of laying such cables.

20 OPTICAL FIBRE CABLES

The optical fibres shall comply with SANS/IEC 60793 and the optical fibre cables shall comply with SANS/IEC 60794 and shall be installed in accordance with SANS/IEC 60794.

All cables or cable lengths shall be supplied along with Factory Test Certificates. Cable ends shall be suitably made off / protected to avoid water ingress, damage etc. while in storage.

The cables shall be of the multimode type, suitable for direct burial in the ground.

A cable shall contain 12 fibres packaged in two tubes and the fibres shall be to the following specification:

□	core diameter	:	50 microns
□	cladding diameter	:	125 microns
□	primary acrylic buffer	:	250 microns diameter
□	category	:	A2
□	wavelength	:	850nm
□	attenuation	:	3dB/km maximum
□	bandwidth	:	400-600 MHz/km

The cables shall be constructed to the following specification:

- □ tubes shall not be filled with water blocking compound
- □ the cable core shall be filled with water blocking compound
- □ the cable shall be designed with sufficient strength members to meet installation and service conditions so that the fibres are not subjected to strain of more than the limits specified by the manufacturer
- □ a moisture barrier shall be provided by a metallic tape applied over the cable core with a longitudinal overlap and bonded to the sheath
- □ the inner sheath shall be made of polyethylene
- □ the cable shall be armoured with Corrugated Steel Tape (CST)
- □ the outer sheath shall be a seamless sheath made of UV-stabilizer weather-resistant polyethylene in accordance with Clause 22 of SANS/IEC 60708-1(To be updated with latest Standard)
- □ the outer sheath shall be marked with the manufacturer‟s name and “Optical Fibre Cable” as a single line of marking at intervals not exceeding 1000mm.

□ optical elements and each fibre with a cable element shall be uniquely identified by colours.

Cables shall be subjected to the following tests in accordance with SANS/IEC 60794-1-2:

□ tensile performance
□ cable bend
□ crush
□ temperature cycling
□ water penetration

In addition, compatibility with the particular installation conditions shall be demonstrated though the following tests:

□ impact
□ kink
□ torsion
□ sheath abrasion resistance

21 MV CABLES

21.1 GENERAL

The contractor shall upon request by the Engineer present the qualifications of the cable jointer to be used, including copies of all relevant supporting documentation.

Note: The Tenderer shall have a complete toolbox with all the necessary equipment need to complete the work at hand as well as any other work that may arise due to site conditions.

Only artisans that can produce Certification to prove that the relevant Termination Manufacturer has accredited them will be accepted for the proposed work.

21.2 TERMINATIONS

Cable end terminations shall be dry type, suitable for the proposed equipment that is to be used.

The Engineer shall, before any work commencement, approve the type of cable ends proposed to be used by the contractor.

Heat shrink terminations shall be manufactured for non-tracking and U.V. stabilised for long life.

Termination or joint kits shall be packed as a complete kit, clearly marked in respect to the suitability for cable type, construction, and voltage. Each kit shall be have packed with the kit, a detailed set of manufacturer‟s instructions. All terminations, joints, and all associated work shall be executed with the correct tools as described by the manufacturer.

Soldered ferrules are to be used for cable joints and terminations.

Cable joints shall be of the moisture blocking type for the prevention of moisture ingress from one cable to the other through the joint box.

Paper-insulated cables that are to be made off into cable end boxes shall have the lead covering, armouring and a correctly sized earthing conductor, finished into and consolidated by a solder wipe.

The electrical continuity of all the conductors shall be ensured and shall not be degraded by any method of cable termination, by inferior workmanship or exposure to any form of corrosion.

The Contractor shall ensure that phase rotation of the cables installed, coincides with the supply phase rotation at all points in the installation.

Any cable ends that are to be left unattended shall have their ends capped to prevent any moisture ingress occurring.

In the event of inclement weather the Contractor shall ensure that all work on MV cables is undertaken under suitable cover.

21.3 CABLE GLANDS

All cable glands shall be of the adjustable pattern to secure to the wire armouring of the cable and shall be manufactured from nickel-plated brass. All cable glands shall be fitted with waterproofing neoprene shrouds.

21.4 POWER CABLE TERMINATIONS

Power cable terminations, connections and joints shall be facilitated by means of the use of a portable hydraulic compression tool with pre-set automatic tamperproof hydraulic unloading bypass valve, the entire equipment being either bought from, hired, or approved by the Cable Manufacturer.

Approved lugs or ferrules shall be crimped to the cable cores in all cases. No other method of termination or joint shall be allowed.

Where aluminium and copper or brass is in intimate contact and especially where the joint so formed is current carrying, "Densal" jointing paste or other approved paste or treatment shall be used.

22 CABLE TRENCHES

The cable trenches shall be as per project specification to suit environment, but shall generally be a minimum of 450 mm wide x 750 mm deep. The trenches shall contain no stone or sharp objects and shall be inspected by the Engineer prior to backfilling.

For the purpose of this Subcontract, only three classes of material are considered and all excavated material shall be classified according to the following:

Type (as measured) in this document	General Description	Formal Classification to SANS 1200:2014
Soft excavation	Excavation by pick and shovel in soft soil	Soft Excavation
Intermediate excavation	Possible by use of pneumatic tools and equipment	Intermediate excavation: Boulder excavation Class A Boulder excavation Class B
Hard rock excavation	Removal of material by blasting	Hard Rock excavation

The cable trenches shall conform to Drawing EAM-EE-GS-006 entitled ”Typical Multiple MV/LV Cable Trench Arrangement”.

The Contractor shall provide all cable trenches. The Contractor shall be responsible for any damage to any services which may exist on the site and shall cover all costs incurred for the repair of any services which are damaged during the trench excavations

Although a minimum cable trench width has been specified, the installation of two or more cables shall result in the Contractor engineering the actual cable trench width to ensure that all cables are not underrated.

Trenching that is to be undertaken within the existing MV substation shall be by hand and supervised by a competent person, approved by the Engineer. No trenching machines will be allowed within the Existing MV substation and MV equipment area.

Transnet may assist with the identification of existing cables depending on availability of equipment. The onus lies on the Contractor to ensure that services have been adequately surveyed and recorded prior to excavation.

All backfill material shall have enough moisture content so as to allow for good compaction. Backfill material shall be laid in layers to a depth of 150mm and then compacted by a compaction machine, suitable for the work at hand. The contractor shall ensure that the cable bedding sand and backfill is of a good quality to ensure that the thermal resistivity of the ground is at least improved.

All trenching shall conform to the standard as laid down in SANS 10198.

The contractor shall also ensure that the cable trenches are properly fenced off at all times until the cables have been installed and the trenches backfilled.

Danger tape shall be installed as specified.

The cable trench shall be shored with timber boards where required to ensure safety to workers and the public and facilitate ease of installation.

All trenching shall be inspected by the Engineer prior to backfilling.

23 CABLE ROUTE MARKER

Cable route markers shall be installed every 50m in straight runs and at every change of direction. These shall be of concrete pyramid type, with engraved aluminium label as detailed on Drawing EAM-EE-GS-004 entitled “Cable Route Marker”.

24 LOW VOLTAGE ELECTRICAL MOTORS

Reference shall be made to the General Mechanical Specification.

25 FIELD INSTRUMENTATION

25.1 GENERAL

The specifications for equipment to be supplied are as detailed below and within the Project Specification.

The Contractor shall include for all cabling required ensuring operation of the equipment as described in the Project Specification.

25.2 ULTRASONIC LEVEL DETECTORS

Ultrasonic Level Detectors shall be Mobary MSP 900GH or Enderss Hauser (or equivalent) and shall be of robust design.

(a) Generic

Ultrasonic level detection shall be by means of a transducer and separate transmitter, with the sensor powered via the transmitter. The sensors shall be mounted on suitably sized brackets of glass fibre reinforced construction, stainless steel or similar non-corrosive material directly over the medium being monitored.

The sensor shall have a stainless steel diaphragm and shall be equipped with an integral cable of 10m length, with the complete unit of at least IP65 rating. The sensors shall be capable of measuring range as set out below.
The transmitter shall be of minimum IP65 rating, or alternately, housing in a protective enclosure providing this rating. The transmitter shall have a local display, which shall be visible with the protective housing closed, if provided.

The transmitter shall be capable of bi-directional communication via a Modbus Plus network with the programmable logic controller.

The unit shall conform to the following:

Power supply	:	230 V AC
Output	:	Isolated 4-20 mA
	:	Relay (discreet outputs) as detailed
Calibration	:	Independent adjustments for zero and span
Accuracy	:	1% of span or better
Repeatability	:	0,2% of span
Resolution	:	0,1% of span or 2mm, whichever is greater
Dead band	:	- < 0,2% of span
Ambient temperature effect	:	< 0,5% of maximum span per 10°C change

(b) Differential Level measurement over inlet channel

Two ultrasonic sensors with common transmitter, shall be mounted over the inlet channel for control of the screen.

The sensors shall be mounted one upstream and one downstream of the screen on suitable brackets manufactured from either 304 Stainless Steel or glass reinforced polyester.

Medium	:	Water
Measuring Range	:	0 – 2,0 m
Outputs	:	4 – 20 mA 2 Relay

25.3 FLOW METERS

The flowmeter casing shall be aluminium, the flow transmitter remote from the primary element. The transmitter assembly shall be at least IP65 rating and suitable for operation with either a 24V DC or 230 V AC power.

The output of the flowmeters shall be 4-20mA and shall also include a pulsed signal.

26 UNINTERRUPTIBLE POWER SUPPLIES

26.1 GENERAL

A UPS shall be provided for each separate piece of equipment such as a SCADA computer or a PLC. Specific requirements are as detailed in the Project Specification.

The UPS shall include an alarm panel, serial connection to a SCADA server and adequate batteries for 30-min backup.

Critical alarms, warnings and readings shall be logged and displayed on all available user interfaces.

26.2 UPS SPECIFICATION

The UPS"s shall be to the "RIELLO" Catalogue model Sentinel XR (or equal), comply with the following specification for high availability, high stability under varying supply and varying loads, or equivalent.

(a) Rated input voltage:	230 V (+/-15%) at 50 Hz (+/-5%) single phase (Without having to supply a CVT line conditioner).
(b) Rated output:	230 V (+/-1,5%) at 50 Hz, single phase voltage
(c) Inverter rating:	- Dynamic regulation at 100% load application / removal: - Transient Recovery + 5% recovering to 1% within 10 m sec. LOSS of AC supply: - No change. Total harmonic distortion: - Better than 3% (Linear load). Overload capacity: - 120% (10 seconds).
(d) Power rating	Sufficient to power all equipment as specified including PLCs as well as the PLC Data Network equipment and fibre optic transceivers
(e) Rated stored	Standard with 30 minutes range energy time
(f) Interfaces	SCADA: Microprocessor serial interface (SNMP) Modbus TCP/IP open communication protocol card LCD Status display.
(g) Preferred Equipment	Riello XR Online, double conversion Batteries for UPS to be 10 year long life units

26.3 INSTALLATION

UPS output shall be cabled to equipment to which it shall be supply. If Plug Socket Outlets are required, these shall be 15A red top plugs (dedicated).

27 HUMAN MACHINE INTERFACE (HMI)

27.1 GENERAL

If any Human Machine Interface (HMI"s) are offered, the preferred (HMI"s) shall be Schneider "Magelis XBT GT or equivalent.

28 PROGRAMMABLE LOGIC CONTROLLERS (PLC's)

28.1 GENERAL

A standalone programmable logic controller (PLC) shall be provided for the control of the equipment as described in the "Control Philosophy" section of the Detailed Specification or the Project Specification. Allowance shall be made within the PLC equipment supplied for the future control of the entire existing and proposed plant as described in the specification and as detailed with the Proposed Single Line Diagram as referred to in the Project Specification.

Siemens Simatic S7 programmable logic controllers shall be supplied and installed with single or double rack configurations. A separate Ethernet (10/100 - RJ45 - Modbus TCP) module shall be installed on the configuration rack when Ethernet Communications is used.

Siemens Simatic S7 programmable logic controllers shall be supplied and installed with multiple rack configurations and/or larger numbers of Remote IO or Distributed IO.

28.2 EQUIPMENT SPECIFICATION

Hardware shall be field-proven under similar conditions and shall be suitably protected against excessive temperature, electrical interface, input and output overvoltage or short-circuit, and loss of program memory.

The equipment supplied shall incorporate a non-volatile form of program memory, which does not rely on an internal or external source of power to retain program memory in the event of a loss of normal power.

The CPU and I/O modules of the PLC shall be supplied with 20% excess program memory and I/O capacity for initial operation of all specified process components. However, the specifications of the PLC shall allow for future expansion of up to 50% additional memory and I/O capacity.

The PLC system shall be of a modular design with the mounting racks for the central controller, extension racks, power supply cards, central processing units interface cards, I/O cards, etc. interchangeable between the various nodes.

It shall be possible to code cards and slots to prevent the incorrect card being inserted into a given slot. Alternatively, the controller shall employ interrogation software, which shall detect the insertion of an incorrect module and prevent controller operation if an incorrect module is installed.

It shall be possible to change the modules without disturbing field writing. Connection blocks shall plug into the modules and shall be coded, to prevent connection blocks being plugged into the wrong modules. All modules shall have surge protection, which meets the IEEE-472 or similar standard.

All inputs shall have LED status indication on the modules. A maximum of 32 inputs with a single neutral shall be provided per module.

Output modules shall be of the opto-electric switched solid state relay (SSR) type. The module shall be able to withstand a peak load of 15A for one cycle and intermittent load of 9A for 3 cycles, per channel. For SSR type output modules, fuse terminals with blown fuse indicators shall be provided at the back of the PLC section of the board. Should the fuse fail to blow, then the fault shall only affect the switched output, and shall not affect the remaining outputs within the group. All outputs shall have LED indications.

For both the input and output modules, the LED"s shall give a true load – side indication to and from the field devices.

Analogue input modules shall be of the multiple input range type. This may be either by means of plug-in type measuring range cards or by dip-switch selection. The input resolution of the module shall be a minimum of 12 bits. All inputs shall be individually isolated. Input modules with LED indication for “Communication Active” and “Out of Range” are preferred. Where a large number of analogue inputs with relatively slow changing values is required to be monitored, use may be made of analogue multiplexer modules. The multiplexer shall be compatible with the analogue input module and shall therefore be supplied by the same manufacturer. The input resolution of the multiplexer shall be 12 bits.

Analogue output modules need not necessarily be of the full multiple output range type. The output resolution shall be 12 bits. The outputs shall be electrically isolated from each other. Output modules with “Communication Active” indicators are preferred. Galvanic isolation in the form of opto isolators shall be provided for all inputs and outputs and the driving logic of the modules.

The suppliers shall be permanently represented in Cape Town and shall guarantee the availability of local field service facilities and unit replacement ex-stock from the local depot, for one year after the completion of the defects liability period.

28.3 PROGRAMMING AND SOFTWARE

Transnet is currently in possession of an unlimited site licence for Siemens Simatic S7, PLC programming software and accordingly, all equipment supplied shall be 100% directly compatible with this software.

The Contractor shall provide his own computer hardware for programming, testing and commissioning of PLC"s. The Contractor may receive, free issue for the duration of the contract, copies of the abovementioned software that he may utilise to program the proposed PLC. This software is issued on the condition that it is only utilised for this contract, may not be copied in any form and shall be returned, complete, to this Administration upon practical completion of the contract, with all installed software removed from development and programming computers.

All PLC programs shall be stored on CD- ROMs, from which it shall be possible to download onto the PLC on site by means of a Notebook PC. "Master" and "Back-up" CD-ROMs of all programs shall be issued to the Employer after commissioning. In addition to the CD-ROMs, a hard copy (printout) of all software shall be provided with the manual.

No special passwords, dongles, or other protection shall be installed or copyrighted which may inhibit access to the software by Transnet's technical personnel.

28.4 DATA COMMUNICATION

The PLC"s shall be able to interface with a RTU device (provided at a future date where applicable by the Transnet Administration and general plant equipment. The PLC shall be able to interface with the general plant equipment as well as a future SCADA network via a Siemens Simatic S7 Premium communications network.

If communication is required between PLC's this shall be achieved using" Ethernet" concept.

28.5 PLC INPUTS / OUTPUTS

Although an Input / Output (I/O) schedule may be provided in the document, this indicates the minimum signals to be accommodated. The onus is on the Tenderer to study the proposed control of the philosophy and thus determine the precise I/O requirements and provide the necessary I/O"s with spare allowance as per the requirements set out in the tender document.

28.6 INSTALLATION

The PLC shall be installed in the PLC and Instrumentation panel in the MCC room (within a separate tier or within the marshalling section in the MCC is preferred). The I/O"s shall be wired to terminal blocks in the marshalling section of the PLC panel.

The PLC and Instrumentation panel manufacturer shall adhere strictly to the recommended mounting and earthing requirements of the PLC manufacturer. The panel manufacturer shall confirm to the Engineer that the PLC will not operate at any time outside the environmental limits published by the manufacturer. The average maximum and minimum temperatures, the humidity as well as the heat dissipation of the PLC shall be taken into consideration when designing the compartment housing and apparatus.

If forced ventilation and/or panel heaters are required to provide the climate necessary for the PLC apparatus, then this shall be included in the panel design, together with the climate monitors to inform the operator in the control room when the equipment is operating in undesirable conditions. Detectors shall be provided and wired to an input card of the local PLC to alert the operator via the alarm panel if the "climate" drifts outside the preset values.

29 SCADA

29.1 GENERAL

The SCADA system shall comprise the latest version of the Adroit SCADA package (ADROIT SMART UI) as this product is fully supported by this Transnet.

The Contractor shall derive the full and final Tag list from the free-issued software (if applicable) for existing PLCs and the software for new PLC‟s to be provided.

A complete and adequately commented Tag list shall be provided as part of the O & M Manuals at the start of the SCADA system commissioning

29.2 SCADA MODES OF OPERATION

The modes of operation to be provided in the SCADA system shall be the following:

Sequence Mode:

The SCADA system shall send a start or stop command to the Motor, Valve, Actuator or Controller in the PLC automatically, based on a general group or sequence start command from the SCADA operator. The group or sequence may be programmed in either the SCADA or preferably the PLC and shall always follow the actual process flow,

Automatic:

The SCADA system shall send a start or stop command to the Motor, Valve, Actuator or Controller in the PLC based on an individual start command by the SCADA operator. The start or stop shall be governed by process flow interlocks.

Manual (or Field):

The SCADA system shall not send a start or stop command to the Motor, Valve, Actuator or Controller in the PLC as it is controlled by Push Buttons on the MCC or Field Control Box. In this mode, all process flow interlocks are ignored but safety interlocks still apply.

Switching from "Sequence" to "Auto" shall not stop equipment that is already running, however switching any equipment from any state to "Manual" shall stop that equipment and all related equipment via process interlocks. Switching to Manual is provided at the MCC by means of a selector switch.

29.3 COMPUTER NAMING CONVENTION:

SCADA server 1
Computer name: scada1
IP address: 172.27.X.6
Subnet : 255.255.255.0
Gateway: 172.27.X.1
Administrator account User Name: Administrator
Password: adr01t (a.d.r.zero.one.t)
Auto-boot account user name: operator
Password: operator
Agent Server name: Adr1
Workgroup: WORKGROUP

SCADA server 2
Computer name: scada2
IP address: 172.27.X.7
Subnet : 255.255.255.0
Gateway: 172.27.X.1
Administrator account User Name: Administrator
Password: adr01t (a.d.r.zero.one.t)
Auto-boot account user name: operator

Password: operator
Agent Server name: Bdr2
Workgroup: WORKGROUP

DATABASE server
Computer name: plant mnemonic + DB
Supplied by Transnet e.g. FWTPDB (Faure Water Treatment Plant DB)
IP address: 172.27.X.8
Subnet: 255.255.255.0
Gateway: 172.27.X.1
Administrator account user name: Administrator
Password: adr01t (a.d.r.zero.one.t)
Auto-boot account user name: dbase1
Password: dbase1
Workgroup: WORKGROUP

View Node 1
Computer name: scada3
IP address: 172.27.X.9
Subnet : 255.255.255.0
Gateway: 172.27.X.1
Administrator account Username: Administrator
Password: adr01t (a.d.r.zero.one.t)
Auto-boot account Username: operator
Password: operator
Workgroup: WORKGROUP

View Node 2
Computer name: scada4
IP address: 172.27.X.10
Subnet: 255.255.255.0
Gateway: 172.27.X.1
Administrator account Username: Administrator
Password: adr01t (a.d.r.zero.one.t) Auto-
boot account Username: operator
Password: operator
Workgroup: WORKGROUP

The folders on the SCADA machines structure:
C:\Data
\Alarms (to contain Alarm windows)
\Events (to contain Event windows & logs)
\Archive (to contain archive Event log files)
\LogFiles (to contain SCADA log files)
\Archive (to contain archive SCADA log files)
\Mimics (to contain Mimics)
\Scripts (to contain Scripts if applicable)
\Trends (to contain Trend windows)
\WGP (to contain the current workgroup file only)
\Archive (to contain archive WGP files)

29.4 SCADA MIMICS

There should be an overview mimic, which depicts all functions or processes on the plant in block form.

Background colour must be pastel green, unless otherwise specified.
A mimic must depict a common segment of the process or operational area.

All mimics should have a “title” bar at the top which displays:

1. Left; the menu button
2. Left of Centre, an indication of unacknowledged alarms.
3. Centre; The name of the mimic, which describes the process area depicted by the mimic.

4. Right; Date and Time in the format YYYY/MM/DD HH:MM:SS
5. When an analogue signal is out of range the mimic should replace the value with "trans fail"
6. Tenderers shall allow for at least 4 re-iterations of the mimic designs as there will be amendments and comments during inspection and testing by the client and the Engineer as well as operational staff during commissioning
7. When an Analog signal is greater than the alarm limit set point the displayed value will alternate between the actual value and a Red "High "
8. When an Analog signal is smaller than the alarm limit set point the displayed value will alternate between the actual value and a Red "Low

29.5 COLOUR CODING

Graphic Symbols
The graphic symbols shall as possible reflect the IEC standards for Process and Instrumentation Diagrams;

Healthy (Auto/Man):	White
Healthy:	Flashing White
Tripped:	Flashing Amber
Tripped Acknowledged:	Amber
Faulty:	Flashing Red
Fault Acknowledged:	Red
Running (Auto/Man):	Green
Unknown (Comms Failure):	Grey

Process Flow Mimics

Mimics shall be configured to represent process flow as accurately as possible using IEC standards symbols

1. Mimics shall be displayed in 16 million colours and on maximum screen resolution of 1024x768 pixels

2. Mimics load time, from the selection on "Menu" or "Overview" mimic to completely loaded and dynamisized, shall not exceed 3 seconds

3. All mimics shall conform to the Standard screen layout and label font sizes shall be standardized throughout. Not font smaller than 10pica shall be used

Equipment Display Faceplates

1. All Operating equipment such as Motors, Actuators, Measured values and Controllers shall be represented by standard display faceplate

2. Faceplates may be customized for specialized equipment only as agreed the client (Plant)

3. Faceplates shall clearly identify the operated equipment by it‟s TAG Description and clearly display equipment status, Start/Stop, Auto/Man and reset commands in a common colour & common font

29.6 NAVIGATION

1. A system of progressive exposure and hot spots should be implemented.

2. On the overview mimic the menu button, once "pressed", should pop up a navigation mimic displaying buttons to navigate to all process mimics on the system, general alarms and events

3. On all other mimics, the menu button once "pressed" should pop up a navigation mimic displaying buttons to navigate to all related mimics and the overview mimic

4. From the navigation pop up mimic “pressing” the desired mimic button should display a further pop up mimic to select the mimic, related alarm window or one related trend windows.

5. On the pop up navigation mimic each mimic button should indication a current alarm condition for that mimic

6. Where applicable clicking on a device, such as a motor, should pop up a mimic displaying relevant data and any control functions associated with the device.

7. Hot spots should be available on process mimics to navigate to the upstream or downstream process mimic.

29.7 ALARMS

1. Alarms should be associated with process mimics.

2. Alarm description must be understandable.

3. The general alarms window, accessible from the overview mimic, should only contain alarms NOT displayed in other alarm windows.

4. Alarm window should display

   Date (YYYY/MM/DD),
   Time (HH:MM:SS) 24 hour format,
   Description (from the agent); Alarm
   type (from the agent), Reported
   Data (from the agent)

5. Must display a title bar with the function to close the window.

29.8 TRENDS

1. Trends should be associated with process mimics.

2. Up to 4 trend values should be displayed on one window and only in exceptional cases can this be expanded to a maximum of 6 values.

3. Trended values should be vertically separated within a trend window unless specifically indicated otherwise such as P.I.D values.

4. Trended values should be displayed on a trend window with a 24 hour time scale with a 10 second resolution. The period type should be current – interval. The Labels should be at 6 hour intervals on a 1 hour grid.

5. Trended values should also be displayed on a trend window with a 30 day time scale with a 300 second (5 minute) resolution. The period type should be current – interval. The Labels should be at 7 day intervals on a 1 day grid.

6. Must display a title bar with the function to close the window.

29.9 LOGGING

1. Data should be logged to the SCADAs proprietary database, SCADA logged values, and to a Squeal database.

2. SCADA logged values should be grouped together in the same manner as for trend windows and save in a separate log file per group

3. Each SCADA log value shall be logged for 60 days with a 5 second resolution.

4. The file should be overwritten on a First In First Out bases thus always holding the most recent 60 days of data.

5. A batch file initiated from a button a mimic should archive the SCADA log files to an archive folder on the SCADA machine.

6. A separate PC connected at the Ethernet layer should be used to warehouse the Squeal database.

7. Each Squeal log value shall be logged for 3 years with a 15 minutes resolution.

29.10 EVENTS

1. The events log should be able to contain 1000 records

2. The events log must automatically be backed up to the events archive folder at 23:55 with filename + date

3. The Event window should display
   Date (YYYY/MM/DD),
   Time (HH:MM:SS) 24 hour format,
   Description (from the agent);
   Action
   Alarm type (from the agent),
   Reported Data (from the agent)
   Category

29.11 SET POINT ENTRY

1. There will be 3 levels of set points

   Operational Set points
   Critical Set Points
   System Set Points

2. All set point entry shall be password protected such that the relevant person must re-enter his/her password even when logged on to change a set point.

3. A set point entry must be limited to the specified range.

4. The new value for the set point must be displayed and confirmation requested before the value is committed to the system

29.12 TRAINING REQUIREMENTS

Once the system has been commissioned, the Tenderer shall provide one day"s process controller training on the SCADA system.

29.13 IMPORTANT DATES (when tasks are to be completed)

The following milestones shall be emphasized in the proposed Project Plan;

1 Start of project.
2 Clarification of Owner Requirements.
3 Mimic Development.
4 Submission of mimics for approval.
5 Commissioning and Site Acceptance Testing.
6 Hand over and Training.
7 Documentation and a full set of as-built back up of system on CD or DVD.

29.14 SCADA HARDWARE AND SOFTWARE

Hardware

1 The Servers will use PC architecture with an Intel mother board i-5-3470(3.10 HGz) –Full v-Pro
2 The SCADA Servers will be fitted with minimum of 8GB Mbytes RAM
3 The SCADA Servers will be fitted with a redundant power supply
4 The SCADA Servers will be fitted with a 500 Gigabyte hard disk drive or greater and an equivalent mirrored hard disk drive.
5 The SCADA Servers will be fitted with Media-DVD +RW.
6 The SCADA Servers will be fitted with 4 X USB Memory Slots
7 The monitors shall be 23" Colour LCD.
8 The SCADA Servers cases will be 19" rack mount with forced air cooling and dust filters.
9 The SCADA Servers will have at least one USB port on the front of the case.
10 All the SCADA Servers and ancillary equipment will be mounted in an aluminium frame 19" rack fitted with a toughened smoked glass door.

Network

The Ethernet switch will be a (Latest) Model of Enterasys V2H123-24

Firewall

The security router will be (Latest) Model of Enterasys
- □ XSR-1805 Enterasys security router
- □ XSR-18XX-FW Firewall code upgrade for the XSR 1800 series.
- □ XSR-1805-KTM XSR rack mounting.
- □ XSR-64MB-EM 64mb Memory Upgrade for XSR 1805.

KVM Switches

- □ The unit will cater for 4 computers.
- □ The unit will have USB inputs.
- □ 4 * Sets of USB (keyboard and mouse) and monitor cables will be provided to link the switch to the computers.

Software

- □ Latest Microsoft Windows Server or Microsoft Windows Platform Operating System
- □ Latest Microsoft SQL Database Software Package
- □ Latest version of PLC Programming tool Unity

29.15 SQL DATABASE

- □ All Analog and Digitals must be mapped to the data base.
- □ The data must be represented on a web page format.
- □ Current Inflow/s and Outflow/s displayed.
- □ A Maximum of 4 values can be selected from a dropdown list.
- □ A Graph of the selected values must be drawn.
- □ The data must be downloadable in an Excel data sheet

29.16 SECURITY

29.16.1 General

The SCADA requires security to prevent unauthorised access to the system. Securing the system through usernames and passwords will prevent accidental reconfiguring by the process controllers and managers.

Four levels of security have been identified. Windows groups should be used or created as follows:

29.16.2 Operator User

The users must logon to be able to perform their functions as follows:

13.1 When the system boots up the Adroit Agent Server shall start as (a Windows Service)
13.2 The ADROIT CLASSIC/SMART UI user interface shall automatically start.
13.3 After start up, the Overview Mimic or Graphical Form without data shall be displayed. This will force the process controller or manager to logon so a trace of all users can be kept.
13.4 All Adroit menu items will be inaccessible
13.5 All Operating System"s operations shall be inaccessible. The Task Manager shall not be accessible from the keyboard. The Explorer shall not be accessible.
13.6 Windows Operating System shall not be able to be shutdown.
13.7 Operation of the USB and the CD ROM drive shall be disabled.

29.16.3 Process Controllers

The process controllers must logon to be able to perform their functions as follows:

14.1 Move from mimic to mimic.
14.2 Stop, start and reset all equipment.
14.3 Change value settings.
14.4 Acknowledge alarms.
14.5 Reconfigure TREND periods.
14.6 Print TRENDS

29.16.4 Managers:

In addition the process controllers the managers must be able to perform the following functions:

15.1 View the EVENTS list.
15.2 Reconfigure the EVENTS list.
15.3 Print the EVENTS

29.16.5 Administrator:

Process Control Systems (PCS) staff members with full access to Windows but has extra power in Adroit Classic & Smart UI interaction - due to the Adroit UI's capability to disable the overriding power of the standard Windows Administrators group.

Will have access to all “ADROIT” menu items and functionality
A Mimic or Graphical Form shall be available with buttons for easy access to the following:

Windows Task Manager.
Windows Explorer
Windows User Manager.
ADROIT Setup
ADROIT Protocol monitor

29.17 INSTALLATION

a) General

The PLC and SCADA system components shall be installed to satisfy the configuration diagrams.

b) PLC's:

PLC's for process control shall be installed in control panels to be designed, supplied and installed next to each new LV switchboard called for the Project Specification. The PLC

power supply, CPU unit, IO cards and signal marshalling terminals shall be arrange in the control panel.

Remote IO Modules shall be installed in wall mounted enclosures conforming to the standard specification. Inputs to the remote IO modules shall be connected to auxiliary terminals on the terminal boxes of the medium voltage switchgear.

All signals shall be connected using the specified signal cable and shall be installed according to the standard specification for wiring, cable terminations and glanding.

c) SCADA in Central Control Room:

The SCADA system shall consist of a "Client-Server" arrangement where "Client" shall refer to the Operator stations to be supplied and installed in the control room and "Server" shall refer to the SCADA servers to be supplied and installed in the computer cabinet.

d) Computer Cabinet:

The server computers shall be installed in a standard 19 rack mount computer cabinet. The/ cabinet shall be a minimum of 1.8m high, provide front and rear access via glass panel doors/with lever locks and allow adequate ventilation through louvers in the plinth and the cubicle top. |

The UPS shall be supplied in a floor standing enclosures as per tile standard specification and shall be installed as per the control room layout drawing.

The engineering workstation shall be installed on a conventional office type computer desk and shall include flexible cable computer locks to secure the casing, monitor and keyboard/mouse to the desk.

All power and network cabling shall be neatly installed in "power skirting" as shown in the drawing. The "power skirting" shall be provided and installed under this contract. Standard as well as red-top (flat earth pin) 15A socket and R J45 network sockets (or RS232 sockets) shall be installed in the "power skirting" near each computer or peripheral to be connected to the system.

e) Central Control Room General:

All SCADA operator computers and peripherals shall be installed in the 19" rack space provided or in a desk as detailed in the Project Specification.

Power and network cables shall be neatly installed in power skirting in the computer desk. Standard as well as UPS red-top (flat earth pin) 15A socket and R J45 network sockets (or DB9 sockets for UPS Serial) shall be installed in the "power skirting" near each computer or peripheral to be connected to the system.

Power and network cable shall be run in separate channels of the power skirting.

29.18 INSPECTION AND TESTING

Each PLC and its software as well as the link to the SCADA system shall preferably be individually inspected and tested.

The Contractor shall provide a staggered inspection and test plan which clearly indicates when the SCADA system and hardware shall be ready for inspection and testing and on what date the inspection and/or test shall take place.

The test report produced by the Contractor shall clearly show test results of all motor, valve, actuator, measured values and closed loop controllers programmed in the PLC.

The Engineer shall review the full test report and may call for the random re-testing of specific motors, valves, actuators, measured values or closed loop controllers, during the witnessing of tests.

The successful Tenderer shall make provision to configure, test and prove the functionality of the fibre optic ring "Process Level" data communications which test shall be demonstrated to and witnessed by the client and the Engineer.

30 CONTROL PHILOSOPHY

30.1 SCOPE OF WORK

The Control Philosophy to be employed for the operation of the plant is as described in the Project Specification. The proposed Control Philosophy shall be controlled by the proposed PLC as described in the Project Specification.

30.2 TYPICAL MODES OF CONTROL

Once a „Stop‟ button has been pressed and the respective motor drive is stopped, it shall only possible to start the motor by first releasing the stop facility and then pressing the ‟Start‟ button.

Each item of plant, as indicated in the Motor List and Control Schedules shall be provided with a “Manual/Off/Auto” selector switch on its MCC cubicle door.

In “Manual” control, panel-front pushbuttons shall be provided for starting, stopping and control.

In “Auto” control, starting and stopping shall be via the PLC, with appropriate input from control instrumentation where applicable.

The Emergency Stop button shall be hard-wired to the respective equipment starter.

31 POSITIONS

The Engineer shall approve final positions and arrangements of all equipment forming part of this contract.

32 REDUNDANT EQUIPMENT

All equipment made redundant during work on this Transnet‟s Plant contract shall be listed in writing and made available to the Engineer who shall provide final confirmation as to what equipment may be scrapped by the Contractor. This Transnet reserves the right to retain any equipment made redundant for use on this or other plants under its control.

33 FINISHING AND PAINTING OF MATERIALS AND EQUIPMENT

All equipment and materials supplied under this Contract, irrespective of whether it is for the electrical subcontract or not, shall comply with this Transnet‟s specifications.

The painting and finishing specifications are detailed in the General Mechanical Specification, and the onus is on the Electrical Contractor to familiarise with these specifications.

34 OPERATION AND MAINTENANCE MANUALS

Operation and Maintenance (O & M) manuals are required for all major items of equipment. Where literature is supplied by the manufacturer, the Contractor shall omit all duplicate sections in other languages. The manual shall be in English only.

These O & M manuals are required for the commissioning of the works. The installation shall not be commissioned or the Subcontract deemed complete without these manuals.

The Contractor shall provide all electrical drawings on "CD" in a format capable of being retrieved directly into AutoCAD version 14.

The Contractor shall supply an “as built” cable schedule included in the electrical portion of the maintenance manual.

Equipment lists shall be provided with each drawing.

Specific requirements for the manual, layout and format etc., are as detailed in the General Mechanical Specification.

35 SPARES AND TOOLS

At completion of the work, before commissioning, the Contractor shall submit for approval by the Engineer, a full list of the spares that he intends providing.

Where specific spares are recommended by the supplier or manufacturer, these shall be included in full in the list for approval.

Generally, spares shall include the following:

- □ LV fuses: 1 spare for every 2 installed.
- □ Indicator lamps: 1 spare for every 10 installed.
- □ Lamp lenses: 3 spare for each colour installed
- □ Push buttons: 1 spare for every 3 or less of each colour and type installed.
- □ Lamps of luminaires: 1 spare for every 10 or less of each type installed.

Any special tools required to perform routine maintenance on any specific item of equipment shall be provided under this contract. Contractor or tenderer must provide list of recommended spares- refer datasheet of spares

36 EQUIPMENT APPROVAL

The Contractor shall submit detailed working drawings of all boxes, boards, panels, brackets, trays, etc. to the Engineer for approval prior to manufacture. The drawings shall be not less than A2 and shall clearly indicate the principal dimensions and at least two cross sections shall be provided. Door and cover plate details shall be given, together with details of hinges and catches. The work may not proceed until the drawings have been properly scrutinised and approved.

37 SCHEDULE OF EQUIPMENT

A complete list of fittings and other equipment intended for use on this Contract is to be submitted with the tender. This list shall contain manufacturers' names, catalogue numbers, etc. Where any item offered is not to specification, prior approval in writing shall be obtained from the Engineer before this can be offered.

Should any item supplied not comply with the specification, an alternative which meets the specification is to be approved by the Engineer and provided at no additional cost to the Contract.

38 EQUIPMENT TO BE SUPPLIED AND INSTALLED

The Engineer reserves the right to call for samples of the equipment offered, to inspect the workmanship as the work proceeds and to either accept or reject the equipment, or workmanship. The Engineer's approval of the design, materials and workmanship shall in no way reduce the Contractor's liability to provide a complete and proper working plant which is abreast with modern technology.

All such samples may be retained until completion of the Contract. All such samples shall have securely attached thereto labels designating the Contract by name and number (if any), the name of the Contractor and any further relevant information.

Unless where specified and agreed to IN WRITING, all equipment supplied by all parties shall be new and unused.

39 EVERYTHING NECESSARY

The Contractor will be deemed to have visited the site and to have satisfied himself as to the nature of the work, to have acquainted himself with any limitations which may be imposed upon him and to have provided for any additional costs which he may consider necessary for the proper completion of the work. No claim will be recognised or considered after submission of price on the grounds of lack of knowledge of site conditions or limitations.

The installation shall include everything necessary whether specified in detail or not and shall be carried out in the best possible way to ensure a complete and first class installation to the approval of the Engineer.

40 UNIFORMITY

All items of the same type of equipment shall where at all possible - be of the same make and type for each item throughout the installation, to ensure interchange ability and ease of maintenance.

41 RADIO, TELEVISION, COMPUTER AND COMPUTER SYSTEM INTERFERENCE

The Contractor shall allow for interference suppression components where required, to ensure that the electrical installation shall not cause interference to radio, television, staff location, computer and computer systems.

42 DELIVERY

The Contractor must co-ordinate the delivery dates for all items of equipment supplied by him to allow adequate time for installation, commissioning and testing prior to contract completion.

To this end, the Contractor must ensure that shop drawings are presented to the Engineer for approval timeously, and a programme of submission of such drawings must be approved by the Engineer as specified in the Conditions of Tender.

Documentary proof is to be supplied of the placing of all orders for equipment having a protracted delivery period. No substitution of specified items will be allowed due to the late placing of orders, and no delay claims in this regard will be entertained.

43 CONTRACTOR'S STAFF

The work shall be done by, or at all times be under the personal supervision of an installation electrician appointed in writing by the Contractor as the Responsible Person, in terms of the requirements of the Machinery and Occupational Safety Act. This person shall be available during working hours, and shall be experienced in projects of the specified.

The Engineer may, if he deems fit, require that the Contractor removes or causes to be removed an employee of his from the specified premises by virtue of that person's incapability, appearance or any such reason which in the opinion of the Engineer, is valid.

At all times while on the specified premises, all artisan and labourer members of the Contractor's staff shall wear clothing adequately marked with the Contractor's name or acceptable identification.

44 VARIATIONS

For the purpose of determining the cost of individual variations the Tenderer shall quote scheduled rates which would be accepted as a basis for the evaluation of extras and omission.

45 INSPECTIONS, TESTS, MEETINGS AND COMMISSIONING

45.1 GENERAL

Should any tests or inspections be required outside of the Cape Metropole Area / Saldanha Bay Area, the Tenderer shall allow in his Tender price for all costs (travel, accommodation, subsistence, etc.) for minimum of two persons to attend such tests or inspections.

The fact that the plant and equipment has satisfactorily passed any test made at the Subcontractor's works shall in no way lessen the responsibility of the Subcontractor to obtain the same results after it has been delivered and erected permanently on site.

45.2 TESTS

The Contractor shall notify the Engineer at least 2 weeks in advance, should his presence be required for inspections or witnessing of tests.

45.3 INSPECTIONS

Works acceptance (function) tests shall be performed, which shall be witnessed by the Engineer and the Client or the Engineer‟s representative.

In the event that tests fail, the Contractor shall be required to perform such tests again. Should these test require the Engineer to be present again, the Engineer‟s cost for time and travel shall be recovered from the Contractor at rates as set out by the South African Association of Consulting Engineers.

All test certificates required in terms of the current SANS regulations shall be furnished before the project can be completed. These shall also be bound into the operating and maintenance manuals.

45.4 MEETINGS

It is expected that the Contractor will be represented at every Project meeting during the contract. Meetings will be held in two formats, Site meetings and Technical meetings. The Site meetings will be held monthly, and it is expected that the Subcontractor be represented by a senior person in the Subcontractor‟s firm, who can act on behalf of the Subcontractor.

At the Technical meetings, held between the Site meetings, the Subcontractor‟s representative may be a site or contracting foreman who is technically competent, having only to receive instructions on behalf of the Subcontractor.

The Subcontractor shall make provision in the pricing of his Preliminary and General costs for these meetings.

TRANSNET PORT TERMINALS

BULK TERMINAL, SALDANHA IRON ORE HARBOUR

THE IMPLEMENTATION OF A DUST PREVENTION AND SUPPRESSION SYSTEM

SPECIFICATIONS FOR MECHANICAL WORKS

JUNE 2020

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STANDARD SPECIFICATION FOR MECHANICAL WORKS

1. GENERAL

The Standard Specification for Mechanical Works shall apply wherever it is relevant to the Contract unless it is superseded in accordance with the precedence stated and, in particular, by the Detailed Mechanical Specification.

2. ENVIRONMENT

2.1 General

The site shall be considered as coastal with excessive iron ore dust and industrial pollution.

2.2 Dust Suppression System

For the purposes of this Specification the Dust Suppression Site shall be regarded as severe marine environments with considerable industrial and iron ore dust pollution.

Besides being coastal, site and plant has large open liquid areas which are aerated and/or agitated and the environment is damp. The high prevailing winds can also carry spray and foam not only from the plant but in some areas also from the sea.

This environment is very corrosive to ferrous metals and, where the use of such metals cannot be avoided, the metals must be adequately protected, such protection systems being designed for a life of at least 15 years.

Iron ore dust is present throughout the site and in addition to being corrosive to ferrous metal it is also corrosive to most non-ferrous metals. **The effect on copper alloys can be particularly severe, often with disastrous effects on the reliability and life of switchgear, control systems, slip-rings, etc. Such equipment must therefore be adequately sealed and protected.**

3. CLIMATIC CONDITIONS (CAPE PENINSULA)

Barometric Pressure	101,3kPa

Summer Conditions		
Max. dry bulb temperature		36°C
	Relative Humidity	20-30%
	Wet Bulb Temp.	0 C
Max. dry bulb temperature	24 Hour average	22 C
Max. wet bulb temperature		23°C

Wind	Predominantly South To South East
Max. hourly average	36 knots (67 km/h)
Gusts up to	74 knots (137 km/h)

Winter Conditions		
Minimum dry bulb temperature		0°C
	Relative Humidity	100%
	Wet Bulb Temp.	0 C

Wind	Predominantly North to North West
Max. hourly average	40 knots (74 km/h)
Gusts up to	68 knots (126 km/h)

4. DESIGN

4.1 General

This Specification lays down the performance, quality and overall system requirements of the Works. Deviation from the Specification will only be considered if the Engineer considers such deviation an improvement.

4.2 Safety

Safety shall be an all-important and overriding consideration and proper attention shall be paid to this aspect at the design stage. The regulations of the Occupational Health and Safety Act, Act 85 of 1993, as amended, shall be strictly observed.

Equipment which is potentially dangerous shall be designed in accordance with a relevant South African or international Standard.

The following must be noted:

(a) Hazards must be avoided or guarded. Nip points shall be guarded; sharp corners shall be rounded off; operating handles, supports and protrusions shall be kept clear of access ways; and so forth.

(b) The Contractor's Drawings and specifications shall clearly specify the structural requirements of the Works and the Contractor shall be responsible for covering all unsafe gaps and openings left in structures after installation.

(c) Moving parts shall be properly guarded to the satisfaction of the Engineer.

(d) An emergency stop button shall be installed in a convenient position next to each machine. The installation shall be designed to provide immediate access without the danger of accidental operation. In addition, trip wires which will stop the driving motor when pulled shall be provided along the accessible side/s of moving conveyor belts, chains and the like irrespective of operating speed and irrespective of guards provided.

Installations considered unsafe by the Engineer shall be corrected by the Contractor at no cost to the Transnet.

4.3 Design Aspects

A high quality standard is required and reliability, long life, trouble free operation, efficiency, ease of maintenance and operation, and neatness are essential.

All plant and equipment shall be of robust construction and the design shall, as applicable, be based on:

(a) the full range of duties which can be reasonably anticipated;
(b) the power and torque transmitted by the driver system under full load and stalled conditions; (c) the maximum pressure or vacuum which can be produced by pumps, blowers and compressors under all conditions including blocked or closed inlet and outlet circuits;
(d) conservative service and safety factors based on approved standards or laid down in the printed specifications of reputable and approved manufacturers;
(e) a safety margin of at least 20 % in addition to any service or safety factors which apply;
(f) twenty four hour per day operation;
(g) a minimum life of 100 000 hours before repair or major part replacement;
(h) prevention of serious damage from normal operational problems such as blockages, blinding, jamming, seizure, malfunction and, as far as is practical, maloperation; if these occurrences cannot be avoided by good design.

Machines with non-overloading characteristics shall be selected wherever possible; eg: motors shall be sized so that they cannot be overloaded by the driven machine.

4.4 Fail-Safe Operation and Protections

Where damage can occur from normal operational or other foreseeable problems, plant, equipment and systems must be designed to be fail safe; i.e. must have built-in redundant elements, or be fail-to-safe; i.e. must return to a safe condition where no further damage can be done in the event of a failure, malfunction, maloperation, overload and, as far as practical, misuse. All reasonable and economically justifiable protections to prevent or limit damage to plant and equipment, particularly in high risk situations, must be incorporated. Protections shall:

(a) be directed at the source of the problem, limit forces to safe levels and act quickly enough to prevent damage (electrical thermal type overloads are inadequate);
(b) stop or prevent from starting all equipment at risk;
(c) activate an alarm with a labelled indicator on the control panel whenever a protection operates;
(d) not permit unauthorised tampering;
(e) operate reliably after long inactive periods exposed to corrosive and dirty conditions.

Tenderers shall highlight equipment limitations which can be exceeded during operation and cannot be guarded against.

4.5 Moving Parts

The following general requirements apply not only to machines but to all equipment with moving parts such as headstocks, extension spindles, swivelling davits, heavy duty hinges, pivots and the like:

(a) All rotating or swivelling shafts, pins and the like, shall be adequately supported, guided and restrained by lubricated or self-lubricating bearings, collars and/or bushes.
(b) Swivelling joints on linkages and the like shall be of the "universal" or fork and rod type with bearings or bushes fitted to the eyes or forks.
(c) On abrasive applications abrasion resistant materials and slow speed operation shall be utilised. Sea water and sludge shall be regarded as very abrasive.
(d) All applications associated with wastewater shall be regarded as corrosive and materials of construction shall be selected to suit.
(e) Susceptibility to fatigue failure shall be minimised by proper design and manufacturing procedures. In particular, changes in section shall be radiused and care must be taken to avoid the use of welded components in areas of fluctuating stress.
(f) The locking of nuts and pins in position shall be done to the approval of the Engineer.
(g) Wearing parts shall be designed for interchangeability and ease of removal and replacement.

4.6 Arrangement and Mounting

The arrangement and general design shall take the following requirements into consideration:

(a) Lifting eyes, lugs, hooks, etc., shall be provided on heavy or large items to facilitate handling.
(b) Castings or fabrications shall have machined pads for seating and be mounted on either soleplates or baseplates as appropriate.
(c) Where accurate alignment is required, positioning pins and/or jacking screws shall be provided.
(d) The needs of operation and maintenance including neatness, access, working space, safety, cleaning, adjustment, handling, assembly, alignment, disassembly, removal, etc.
(e) With plant and equipment to be mounted on or against concrete or brick structures built by others, provision shall be made for adjustment in the mechanical design. Any special accuracy requirements must be specified on the Contractor's Drawings.

4.7 Prevention of Corrosion

The Contractor shall review all designs from a corrosion protection point of view prior to commencing work. Any details which might have a negative effect on the corrosion protection and the future application of coatings are to be brought to the Engineer's attention for a ruling prior to commencement of work.

All items shall be designed to minimise corrosion in the environment in which they shall be exposed. Particular emphasis shall be placed on accessibility for surface preparation and the application of coatings. The general requirements of SANS 10120 – 3 HC shall apply.

Mastics, sealants, insertion rubber or suitable gasket material shall be used to seal unavoidable crevices such as bolted connections; e.g. under guardrail feet.

The design of articles shall ensure that surfaces of corrodible materials, such as carbon steel, shall be accessible for initial coating and for maintenance. The use of back-to-back angles, partially open box sections or inaccessible stiffeners shall be avoided. Fabrication openings shall be of sufficient size to enable fettling, blast cleaning and painting.

5. INSTALLATION

5.1 General

The Works shall comply with the following:

(a) When erected and installed, the plant and equipment shall be of neat and workmanlike appearance, solidly and evenly supported, true to line, level, plumb and in proper working order.
(b) The requirements of Sub-clause "Arrangement and Mounting" (see Clause "Design") must be noted.
(c) The Contractor shall provide all foundation bolts, supports, hangers, brackets, etc. required for the support and fixing of equipment.
(d) The Contractor is not responsible for grouting puddle pipes which pass through liquid retaining walls or slabs but shall be responsible for all other grouting necessary for all plant and equipment.
(e) The use of more than three shims in the alignment of equipment will not be permitted. Machined spacers shall be prepared where necessary. Shims and spacers shall be of a corrosion resistant material such as stainless steel.
(f) Corrosion protection requirements shall be carefully attended to and the relevant paragraphs of Sub-clause "Paint Application" (see Clause "Corrosion Protection : Paint Coatings) must be noted. All mating faces must be coated before and sealed after assembly.
(g) A small amount of a nickel-based, anti-seize compound shall be applied along the full length of fastener threads before the nut is applied.
(h) Crevices which are formed between two metal surfaces shall, prior to final fastening, be filled with a suitable formable packing, Denso tape or equivalent, or with a suitable mastic or sealant.

5.2 Alignment of Shafts

Shafts for drives, such as motors, with an output above 150 kW shall be aligned to the driven shaft as follows:

(a) Final alignment shall be done after installation and before commissioning and shall be checked in the presence and to the approval of the Engineer. Alignment shall be sufficiently accurate to ensure that no initial pre-load is placed on the shaft coupling.

(b) Each motor shall be aligned to its pump by alignment specialists using laser aligning equipment with real time computer display.

(c) The use of pourable epoxy resin chocks (Epocast 36, Chockfast or equivalent) shall be acceptable. If pourable chocks are used, the baseplate feet do not have to be machined but each machine foot shall be provided with a screw for vertical alignment. The chock thickness shall not be less than 20 mm.

6. MATERIALS

6.1 Materials – Generally

All materials used in the manufacture and construction of plant and equipment shall be new, unused and shall be the best of their respective kinds. The Contractor shall ensure that the materials are selected in accordance with the best engineering practice to suit the working conditions and the extremely corrosive environment.

6.2 Steel

All structural steel shall comply with the requirements of SANS 1431 grade 300W and shall be legibly marked with the maker's name or trade mark and identification marks.

6.3 Stainless steel

The AISI grade of stainless steel to be used will normally be specified in the Detailed Mechanical Specification. Unless otherwise specified, rolled material shall be supplied with a matt, annealed and pickled or otherwise de-scaled surface finish. For wrought steels, the equivalent BS 970 grade may in each case be used.

The common applications are as follows:

APPLICATION	AISI	BS 970
Wastewater Treatment Works (all applications)		
Welded	316L	316S12
Not welded	316	316S16
Low Corrosion Interior		
Welded	304L	304S12
Not Welded	304	304S15
Exterior and Corrosive Interior		
Welded	316L	316S12
Not Welded	316	316S16

A manufacturer's test certificate shall be provided for each batch of stainless steel giving details of the material analysis and any mechanical tests carried out on the material. Each stainless steel item supplied shall be clearly and permanently marked with the grade of stainless steel and cross-referenced to the applicable test certificate.

Where grades 316 and 304 are mentioned in the Tender Documents:

(a) these shall be taken synonymously with grades 316L and grade 304L, respectively.

(b) Contractors may offer grade EN 1.4162 in place of grades 316 and 304.

6.4 3CR12

This is the titanium stabilised, 12 % chrome steel as produced by Columbus Stainless, South Africa.

3CR12 shall always be supplied with an annealed and pickled finish. 3CR12, in cases where it is to be coated, shall be suitably abrasive blasted to ensure adherence of the prime coat.

6.5 Plastics

Thermoplastics and fibre reinforced polymers shall be UV resistant, have adequate tensile strength and high impact strength and generally suit the application.

PVC is regarded as too brittle and shall not be used unless called for in this Specification or approved in writing by the Engineer before supply.

7. CASTINGS

Castings shall comply with the relevant South Africa or British Standard for the material used, including the following:

Grey Cast Iron	SANS 1034	BS 1452
S. G. Iron	SANS 936/7	BS 2789
Steel (General Purpose)	SANS 1465	BS 3100
Aluminium	SANS 989/992	BS 1490
Copper and Copper Alloy	SANS 200	BS 1400

Particular attention shall be paid to cleanliness, soundness and neat fettling and dressing of castings. Surfaces shall be smooth and irregularities caused by mould washaways, and the presence of porosity and sand and slag inclusions will not be tolerated. Areas under bolt heads, nuts and washers, shall be machined or spot faced to ensure a flat and smooth pressure bearing area, and sufficient space shall be provided for the use of ring or socket spanners.

All pressure retaining castings shall be hydrostatically tested to not less than 1,5 times the maximum working pressure after machining and shall be pressure tight.

No repairs shall be undertaken to castings without the written permission of the Engineer and welding will not be permitted on cast iron castings.

Castings shall be heat treated to provide optimum corrosion resistance and toughness combined with reasonable machinability. In particular stainless steel castings shall be heat treated so as to ensure that all carbides are in solution, to ensure optimum grain size, and to provide maximum corrosion resistance.

The Contractor shall provide a test certificate for each casting or batch of castings, except for those made of grey cast iron, giving details of the material analysis, the heat treatment and any mechanical tests carried out.

8. FABRICATION OF CARBON STEELS

8.1 Standards

Steelwork shall be constructed, fabricated and erected in accordance with SABS Standard Building Regulations, Chapter 6, "Structural Steelwork", and with SANS 1200 H where applicable.

8.2 Finish

Edges shall be rounded to a radius of at least 2 mm.

Weld spatter and other protrusions shall be removed.

8.3 Requirements for Corrosion Protection

In addition to finishing requirements, the requirements of corrosion protection application shall be taken into consideration. Surfaces must be accessible for surface preparation and coating. Inaccessible pockets and open hollow sections and similar hidden surfaces shall not be permitted unless the corrosion protection system specified for the fabrication is hot-dip galvanizing without painting.

Pits, undercuts, indentations, etc. which would prevent access to blast material are unacceptable.

8.4 Drawings

General and detailed fabrication drawings shall be submitted by the Contractor for approval by the Engineer. Full details of the welding procedures and standards which he proposes to use shall be shown on these drawings.

8.5 Inspections

The Contractor shall arrange for the Engineer to inspect fabrications, including fabricated pipework, in the fabrication workshop and prior to corrosion protection.

9. FABRICATION OF STAINLESS STEELS

The requirements regarding the fabrication of carbon steels applies to the fabrication of stainless steel as well. In addition, the following requirements apply to the fabrication of stainless steels:

(a) Fabrication of stainless steels and 3CR12 shall follow the recommendations in "The Stainless Steel User Manual" and "The 3CR12 Fabrication Guide" issued by Columbus Stainless. Only fabricators experienced with stainless steel will be considered acceptable. Such fabricators shall use permanently dedicated storage and fabrication areas and shall use machines, tools and handling equipment suited and permanently dedicated to this type of material.

(b) Surfaces which become contaminated with steel or otherwise stained or otherwise marked so as to be of uneven colour, shall be cleaned by pickling or electro-cleaning rather than by grinding.

(c) The Contractor shall arrange for the Engineer to inspect fabrications, including fabricated pipework, in the fabrication workshop.

10. WELDING

10.1 General Welding Requirements

10.1.1 Standards

Standards complying with good modern practice, and acceptable to the Engineer, shall be adopted. These include the following:

BS EN 1011	-	Arc welding carbon and carbon manganese steelwork.
BS 4677	-	Arc welding austenitic stainless steel pipework.
BS 2633	-	Class 1 Arc welding of steel pipework.
BS 2971	-	Class II Arc welding of steel pipework.
BS 806	-	Design and construction of ferrous piping in connection with land boilers (used for arc welding specification of all pipe flanges).

Welders shall be experienced competent artisans approved in accordance with BS 4872.

10.1.2 Continuous Welding and Elimination of Crevices

Welding shall be continuous on all sides of any joint. All crevices, including those arising from welding on one side only, shall be eliminated. This requirement applies to the welding of all metals and, in this respect, it should be noted that welding deformation results from incorrect welding procedure rather than from continuous welding.

In special cases only, non-continuous welding might be approved in writing by the Engineer. The resulting crevices shall be sealed with either a coal tar product which can be applied at thicknesses of up to 1 000 µm such as Carboline Bitumastic 50 or equivalent; or a two part solvent free epoxy which can be applied at thicknesses of up to 600 µm such as Sigmaline 523 or equivalent.

10.1.3 Weld Appearance

Welding shall be free of blowholes, projections, pinholes, splatter and undercuts and all welding flux shall be removed. All weld spatter and other sharp imperfections shall be removed prior to abrasive blasting. Prior to painting, weld beads with a surface irregularity exceeding 3 mm or with sharp crests having a radius under 2 mm shall be ground. Weld grinding must not be performed on 304L or 316L stainless steel, however, unless unavoidable and in approval by the Engineer.

10.1.4 Site Welding

Site welding shall be kept to a minimum and shall only be undertaken with the approval of the Engineer.

10.2 Welding of Stainless Steel and 3CR12

The following applies in addition to all of the above.

10.2.1 Stainless Steel Welding

Stainless steels shall be welded strictly as recommended in "The Stainless Steel User Manual" issued by Columbus Stainless.

10.2.2 3CR12 Welding

3CR12 shall be welded strictly as recommended in "The 3CR12 Fabrication Guide" issued by Columbus Stainless.

10.2.3 Stainless Steel Type

Austenitic stainless steels to be welded shall be of the low carbon grade (i.e.: 304L, 316L, etc.).

10.2.4 Welding Rods

The welding rods used shall be the most suitable for the metal and purpose. Type 309 stainless steel welding rods shall be used for welding 3CR12 unless otherwise approved in writing.

10.2.5 Welders

Only welders experienced with welding stainless materials shall be used.

10.2.6 General

All possible steps shall be taken to ensure maximum corrosion resistance and strength of the welds and welded material. Special care shall be taken to avoid prolonged heating. Welds shall be passivated. Discolouration and steel contamination must be removed by pickling or electro-cleaning as approved by the Engineer but should rather be avoided by taking the appropriate measures.

11. CORROSION PROTECTION: APPLICATION AND CONTROL

11.1 Painting Contractor

Surface preparation and coating application shall be carried out by suitably trained and experienced industrial painting contractors who are fully equipped and staffed to do such work in their own covered premises strictly in accordance with the paint manufacturer's recommendations. Before proceeding with the corrosion protection coatings, the Contractor shall submit the name of the painting sub-contractor and the proposed works supervisor for approval by the Engineer.

11.2 Site Work

Surface preparation and coating application shall not be done on Site except for minor repairs, for application of the final aesthetic coat, where specifically called for in the Detailed Mechanical Specification or where permitted by the Engineer in writing.

11.3 Systems to be used

11.3.1 Systems

The corrosion protection systems to be used on the plant and equipment will usually be specified in the Detailed Mechanical Specification, but if not, the Contractor shall recommend a suitable system for approval by the Engineer. If doubt exists as to the system or colour to be used, the Engineer's requirements must be ascertained.

11.3.2 Alternative Systems

Alternative systems superior to those specified may be used if approved in writing by the Engineer.

11.3.3 All Items to be Painted

Except where otherwise specified, all metal surfaces shall be painted. This includes hot-dip galvanized items and metal-sprayed coatings. In the latter case the paint shall be in the form of a sealer. Details of approved painting systems to be used are given below.

11.3.4 Grade 316 Stainless Steel

It is not usually necessary to paint 316 stainless steel. If corrosion of 316 stainless steel does occur, and depending on the appearance or extent of the problem, the Engineer may call for pickling, electro-cleaning, painting or replacement of the item at no additional cost. Painting may however be required if contaminated or stained surfaces cannot be properly cleaned or where stitch welding has been approved.

11.4 Quality Control of Coating Application

11.4.1 Quality Plan and Records

The Contractor shall provide a Quality Plan which shall include all steps in the surface preparation and corrosion protection process plus technical data sheets for all products proposed.

Records of compliance with the Quality Plan shall be maintained.

11.4.2 Responsibility and Rectification

The Contractor is responsible for the quality of the work and materials used, irrespective of any quality surveillance that may be carried out by the Engineer.

If unacceptable work is found on Site, the full area associated by the engineer with that unacceptable area shall be redone after the Contractor has submitted a method proposal.

11.4.3 Inspections

The Contractor shall arrange for the coating application on fabricated steelwork to be inspected throughout by the Engineer. The Engineer may approve inspections by an independent competent person (hereinafter called the Inspector) appointed by and at the cost of the Contractor. Inspections shall be adequate to ensure compliance with the Specification and shall be done at the following stages as a minimum:

Coating (Hot-Metal Spray, Paint, etc.)
After fabrication but before surface preparation.
After surface preparation but before application of the first coat.
After application of the final hot-metal sprayed coating or after application of the paint primer or first coat (as applicable).
After the final factory applied paint or sealing coat.

Hot-dip Galvanizing
After fabrication but before hot-dip galvanizing.
After hot-dip galvanizing.

Duplex Protection (Hot-dip Galvanizing and Coating)
After fabrication but before hot-dip galvanizing.
After hot-dip galvanizing but before application of the first coat.
After application of the primer.
After the final Site-applied paint coat.

11.4.4 Witnessing of Inspection

If the coating is to be done in the Cape Peninsula by in inspector other than the Engineer, the Contractor shall, nevertheless, arrange for the Engineer to witness the inspections at the latter's discretion.

11.4.5 Dry Film Thickness

The dry film thickness of any coat or coating system shall be determined in accordance with SANS 2808. The test method defines that the instrument is to be calibrated on a substrate that represents the surface to be coated.

11.4.6 Inspection Report

A written report of the inspections, prepared by the Inspector and signed by both the Inspector and the Contractor, shall be submitted for appraisal by the Engineer before delivery of the equipment to Site.

11.4.7 Inspector Qualifications

Inspectors appointed by the Contractor shall hold an appropriate qualification from one of the following:

(a) Corrosion Institute of Southern Africa.
(b) South African Institute of Welding.
(c) South African Institute for Non-Destructive Testing.
(d) South African Qualification and Certification Committee.

11.4.8 Identification of Items

Every item to be coated shall be identified by a welded or hard-stamped code. Records shall be maintained for each item.

12. CORROSION PROTECTION: SURFACE PREPARATION

12.1 Imperfections

Welding shall be free of blowholes and all welding flux removed. All weld spatter, sharp edges and other imperfections shall be removed prior to abrasive blasting. Prior to painting, weld beads with a surface irregularity exceeding 3 mm or with sharp crests having a radius under 2 mm shall be ground. (Weld grinding must not, however, be performed on stainless steel). Areas to be painted shall be free of crevices.

12.2 Edges

Edges shall be rounded to a radius of at least 2 mm.

12.3 Cleanliness

The provision of acceptable cleanliness entails not only the removal of existing mill scale, coatings and/or corrosion product, but also the removal of surface contaminants such as oil, grease and soluble salts.

Water soluble salts present on the steel before application of the primer shall not exceed 10 µg/cm^2.

12.4 Abrasive Blasting

Before coating, all new steel surfaces shall be abrasive blast cleaned in accordance with Section 4.3 of SANS 10064 to a preparation grade of ISO-Sa3 in accordance with ISO 8501. The blast profile, measured in accordance with SANS 5772 (dial gauge), shall be in the range of 50 to 75 µm. The abrasive shall comply with SANS 10064 and shall be free from all traces of oil, grease, foreign matter and corrosive contaminants such as chlorides, etc. The blasted surface shall be cleaned and degreased as required. The prepared surface shall be given the first coat of the painting system within 4 hours after blasting.

In instances where stainless steel and 3CR12 are to be painted, the surface shall be suitably abrasive blasted prior to primer application.

12.5 Between Coats

Between coats or with previously painted surfaces in good condition, all traces of oils, greases, soluble salts and corrosive air borne contaminants shall be thoroughly washed from the surface to be painted using a detergent type cleaning agent, rinsed and dried. The previous coat shall then immediately be lightly sanded or otherwise prepared as recommended by the paint manufacturer, wiped clean, dried and painted. Solvents are not acceptable as a surface cleaning agent.

12.6 Hot-Dip Galvanized Surfaces

Hot-dip galvanized surfaces to be painted shall not be passivated and shall be free from white rust and shall be cleaned with an approved water based galvanizing cleaner using non-metallic abrasive pads until a "water break free" surface is obtained. The surface shall then be thoroughly rinsed with clean potable water to remove all residues and dried immediately prior to painting. Where necessary to obtain adhesion a sweep blast of the surface shall be done after cleaning.

13. CORROSION PROTECTION: METAL COATINGS AND DUPLEX COATINGS

13.1 General

Fabrication of items to be protected by metal coatings shall be in accordance with SANS 14713.

13.2 Hot-Dip Galvanizing

13.2.1 General

Hot-dip galvanizing shall be done in accordance with SANS 121 and the following shall apply:

(a) Coatings shall be to the thicknesses detailed in the Standard.
(b) Hot-dip galvanized material which is to remain unpainted shall be passivated as specified in SANS 121. Items to be painted after hot-dip galvanizing shall be air dried and not passivated.
(c) Hot-dip galvanized material shall be substantially free from white rust when it is erected on site. Stacking and storing shall at all times be done in a manner to prevent white rust forming.
(d) Damage to hot-dip galvanizing caused by welding, grinding, etc. is not acceptable. Repair to hot-dip galvanizing damaged by handling or transport shall be done by cleaning the area and applying 3 coats of a zinc rich primer giving a dry film thickness of at least 100 µm and containing at least 94 % zinc in the dried film. If the Engineer considers that damage is excessive, such items shall be replaced by the Contractor without cost to the Transnet.
(e) Welding after hot-dip galvanizing is not acceptable.
(f) The Contractor shall supply a galvanizer's guarantee or test certificate prior to installation.

13.2.2 Duplex Systems

Preparation and application of organic coatings on hot-dip galvanizing shall be done in accordance with the Hot Dip Galvanizers Association Southern Africa's Code of Practice for Surface Preparation and Application of Organic Coatings.

The duplex system shall be as follows:

(a) Hot-dip galvanizing; without passivation of the zinc coating.
(b) Application of one coat of an epoxy primer (two part; for hot-dip galvanised surfaces) with a dft of 75 µm.
(c) Polyurethane enamel top coat (two part) with a dft of 50 µm; done on Site after suitable repair to the primer.

Acceptable coating products are specified elsewhere.

13.3 Hot-Metal Sprayed Coatings

13.3.1 General

Fabrication and surface preparation of items to be protected by hot-metal spray shall comply with the requirements specified in this Standard Specification for Mechanical Works (including General Works).

Hot-metal sprayed coatings shall be in accordance with SANS 2063 and shall comply with the following:

(a) The minimum coating thickness for both aluminium and zinc shall be 150 µm. Greater thicknesses may be specified in the Detailed Mechanical Specification.
(b) The thickness shall be checked on every surface plane at points not more than 300 mm apart for small articles and 500 mm for large articles. Angles shall be checked along all 4 surfaces, channels along all 6 surfaces, pipes in 4 planes. The minus tolerance on thickness in isolated areas shall also not exceed –10 % and such low areas shall not be larger than 50 mm in diameter.
(c) The time between surface preparation and coating shall be shortened from 4 hours to 2 hours at any application area closer than 10 km from the coast.

(d) Unless otherwise specified, all hot-metal coatings shall be sealed and coated immediately after hot-metal spraying. The system shall consist of a low viscosity sealant, which is applied until absorption is complete, followed by a suitable coating system.

The sealant systems outlined below are acceptable (where appropriate for the particular application).

13.3.2 System 1 (for immersion applications)

Application of an epoxy zinc sealer to a dft of 60 µm (Sigmacover 522, or equivalent). Application of two coats of epoxy pipe coating to a dft (per coat) of 125 µm; (Sigmaguard 720, or equivalent).

13.3.3 System 2 (for non-immersion applications)

Application of a two part epoxy primer to a dry film thickness of 40 µm; (Intergard 269, Carboline Rustbond Penetrating Sealer, or equivalent).
Application of one intermediate coat chemical resistant vinyl copolymer to a minimum dry film thickness of 70 µm (Carboline Polyclad 938 HB, or equivalent).
Application of one coat of vinyl copolymer chemical resistant enamel to a minimum dry film thickness of 40 µm (Carboline Polyclad 938-2, or equivalent).

13.3.4 System 3 (suitable for crane beams, gantries, etc.)

Application of one coat of a two-part epoxy primer to a dry film thickness of 40 µm; (Carboline Rustbond Penetrating Sealer, Intergard 269, or equivalent).
Application of two coats of a two-part polyurethane enamel (two part) to a minimum combined dry film thickness of 70 µm.

13.3.5 System 4

Application of micaceous oxide pigmented polyamide cured epoxy to achieve a dry film thickness of 60-80 µm; (Sigmacover 522, or equivalent).
One coat of solvent borne modified acrylic coating to achieve a dry film thickness of 70 µm; (Sigma Topacryl coating, or equivalent).
One coat of solvent borne modified acrylic finish to a dry film thickness of 30-45 µm; (Sigma Topacryl finish, or equivalent).

14. CORROSION PROTECTION: PAINT COATINGS

14.1 Paint

14.1.1 Paint Quality

Paint shall be of best quality, of approved manufacture and brand and comply with the requirements of the relevant SANS (South African National Standards) or BS specifications.

14.1.2 Compatibility

All materials in a paint system shall be purchased from one paint manufacturer.

14.1.3 Packaging

All coating materials shall be delivered in the manufacturer's original, sealed containers of maximum 25 litre capacity, clearly marked with the following:

(a) Manufacturer's name.
(b) Product Brand and Reference Number.
(c) Batch Number, which may incorporate the date of manufacture.
(d) Date of manufacture, unless already incorporated in the batch number.
(e) Abbreviated instructions for storage and use of the material, which shall include mixing ratios of components for multi-component materials, minimum temperature of application, method of application, and minimum and maximum overcoating times where applicable.

14.1.4 Confirmation of Suitability

Contractors shall obtain confirmation from their paint suppliers that, when using their paints, the systems specified are technically correct and suitable for the application and the material being coated.

14.2 Paint Application

14.2.1 Surface Preparation

All surfaces shall be properly prepared as specified in Clause "Corrosion Protection : Surface Preparation".

Coats shall be clean and free from dust, oil and moisture before overcoating. The primary method for determination of oil and grease contamination of surfaces shall be visual inspection. Any surface that exhibits obvious signs of oil and grease, as well as variations in surface rusting and flash rusting, shall be regarded as having oil or grease contamination. All surfaces which have been machined or have had holes drilled shall be regarded as having oil and grease contamination.

14.2.2 Environmental Conditions

Paint shall not be be applied if:

(a) the conditions are windy or dusty.
(b) the surface temperature is less than 10 ºC.
(c) the surface temperature is less than 3 ºC above dewpoint.
(d) the surface temperature is above 35 ºC.
(e) the conditions are contrary to the manufacturer's recommendations.
(f) the relative humidity is 85% or above (the determination of humidity may be made using moisture sensitive hair-type gauges, electronic gauges or sling psychrometers (whirling hygrometers) having a resolution of at least 1% humidity. Electronic gauges shall have calibration certification not more than 6 months old. Moisture sensitive hair-type and analogue gauges shall have a calibration certificate not more than 1 month old. The accuracy of thermometer used in sling psychrometers shall be tested by placing at least 4 thermometers displaying temperatures within half a degree Centigrade of a mean shall be used).

14.2.3 Mixing

Coating materials shall be mixed thoroughly by a power stirrer.

In the case of two-pack materials, each component shall be thoroughly stirred separately. The two components shall then be mixed together in the proportions supplied by the manufacturer until the mixture is completely homogeneous. The use of part of the contents is not acceptable.

In the case of solvent based epoxy materials, the mixed material shall be allowed to stand for the induction period recommended by the material manufacturer.

14.2.4 Painting

Paints shall be applied strictly in accordance with the manufacturer's instructions by tradesmen skilled in this class of work. Thinning of paint shall only be allowed for spray application and the manufacturer's recommended thinners shall be used.

14.2.5 Stripe Coats

All edges and welds shall be provided with at least one stripe coat. This coat shall, preferably, be the same as the primer but can be the same as the intermediate coat.

14.2.6 Coating of Hidden Areas

Areas which will be inaccessible after erection and surfaces resting on floors shall receive the full paint system prior to erection.

14.2.7 Surfaces in Contact

Mating or contact surfaces shall be treated with one of the following systems, the system being chosen to suit the application:

(a) Surfaces shall be prepared and primed and brought together while the paint is still wet; or,
(b) Each surface shall be provided with one coat of inorganic zinc silicate; or,

(c) Surfaces shall be provided with a mastic or sealant; or,
(d) Surfaces shall be provided with insertion rubber or other gasket material.

14.2.8 Crevices

Crevices will not be permitted. Where unavoidable crevices are accepted by the Engineer, such crevices shall be sealed with either a coal tar product which can be applied at thicknesses of up to 1 000 µm such as Carboline Bitumastic 50 or equivalent; or a two part solvent free epoxy which can be applied at thicknesses of up to 600 µm such as Sigmaline 523 or equivalent.

14.2.9 Items Encased in Concrete

Metal to be encased in concrete shall be painted externally up to 30 mm inside the concrete section, leaving the remainder bare so as to facilitate bonding with the concrete.

14.2.10 Protection of Machined Surfaces

Where painting of machined surfaces is not possible or advisable, these surfaces shall be coated with an approved proprietary anti-corrosion compound giving 12 months protection under operating conditions. Shaft ends and machined mating or mounting surfaces or pads shall be so coated and shall not be painted.

14.2.11 Coating Thickness

The dry film thickness shall be measured using a non-destructive thickness testing machine and shall comply with the Specification. 90 % of all thicknesses measured shall comply with the minimum requirements of the Specification. Up to 10 % of all readings may be below the specified minimum thickness, but may not be less than 80 % of the specified minimum thickness.

14.2.12 Repair

Painted areas damaged during transportation, erection or any means whatever shall be repaired as follows - Rusted spots shall be removed and cleaned by means of a wire brush or emery paper to a bright metal finish and the surrounding paint which is still intact shall be feathered for a distance of 50 mm beyond the damaged area. Spot priming and repair shall consist of all the coats previously applied and shall overlap the undamaged area.

14.2.13 Protection on Site

Proper and adequate use of cover sheets and other means shall be made to protect the existing paintwork from damage and from metal dust and sparks when welding, grinding, and wire brushing on site. Similarly effective steps shall be taken to prevent spillage or splashing or other damage to floors, walls and equipment when painting on site and any damage or mess caused shall be corrected at the Contractor's cost.

14.2.14 Final Coat

A continuous, smooth finish with a uniform colour is required. The final external coat/s shall, where applicable, be applied on Site after installation.

14.3 Final Colour Code – General

Colours shall comply with the National Colour Standard, SANS 1091. The final colour marking shall be in accordance with SANS 10140.

Where SANS 10140 does not specify a requirement, the colour marking shall comply with the following (please note that wastewater treatment works are dealt with separately below):

PIPEWORK				
CONTENTS OF PIPE	BASIC COLOUR	COLOUR OF INDICATOR		
		1 BAND	2 BANDS	3 BANDS
AIR				
Compressed, Power	Arctic Blue (F28)		-	-
Aeration	Arctic Blue (F28)	Canary Yellow (C61)	-	-
Instrument	Arctic Blue (F28)	Salmon Pink (A40)	-	-
Vacuum	Arctic Blue (F28)	Primrose (C67)	-	-
Lime Transfer	Arctic Blue (F28)	Crimson (A03)	-	-
Backwash	Arctic Blue (F28)	Verdigris Green (E22)	-	-
CHEMICALS				
Aluminium Sulphate	Jacaranda (F18)	Verdigris Green (E22)	-	-
Sodium Aluminate	Jacaranda (F18)	Crimson (A03)	-	-
Ferric Sulphate	Jacaranda (F18)	Canary Yellow (C61)	-	-
Lime (dry powder)	Jacaranda (F18)	Salmon Pink (A40)	-	-
Activated Carbon	Jacaranda (F18)	Light Stone (C37)	-	-
Polyelectrolyte	Jacaranda (F18)	Cloud White (G80)	-	-
GASSES (other than air); liquefied or gaseous				
Butane, Propane	Light Stone (C37)	-	-	-
Ammonia	Light Stone (C37)	Ultramarine (F09)	-	-
Blast furnace	Light Stone (C37)	Crimson (A03)	-	-
Carbon Dioxide	Light Stone (C37)	Light Brunswick Green (H07)	-	-
Coke Oven	Light Stone (C37)	Light Grey (G29)	-	-
Producer	Light Stone (C37)	Verdigris Green (E22)	-	-
Chlorine, Hypochlorite	Light Stone (C37)	Canary Yellow (C61)	-	-

WATER				
Cold Drinkable	Brilliant Green (H10)	Cornflower (F29)	-	-
Hot Drinkable	Brilliant Green (H10)	Crimson (A03)	Cornflower (F29)	-
Boiler Feed (Distilled)	Brilliant Green (H10)	Crimson (A03)	Cloud White (G80)	Crimson (A03)
Boiler Feed (De-mineralised)	Brilliant Green (H10)	Cloud White (G80)	-	-
Industrial, Raw	Brilliant Green (H10)	Golden Yellow (B49)	-	-
Reclaimed	Brilliant Green (H10)	Jacaranda (F18)	-	-
Backwash	Brilliant Green (H10)	Light Stone (C37)	-	-
De-sludge	Brilliant Green (H10)	Canary Yellow (C61)	-	-
Stove Circulating	Brilliant Green (H10)	Salmon Pink (A40)	-	-
Hydraulic Power	Brilliant Green (H10)	Terra Cotta (A10)	-	-
Final Treated Effluent	Aquamarine (E67)	-	-	-
Interchange, Stage	Drakensberg Green (H36)	-	-	-
Water	Olive Green (H05)	-	-	-
Sea Water	Light Brunswick Green (H07)	-	-	-
Primary Sludge	Dark Brown (B03)	-	-	-
Waste Activated Sludge	Light Brown (B15)	-	-	-
Digested Sludge	Light Brown (B15)	Light Olive Green (H21)	-	-
Pasteurised Sludge	Light Brown (B15)	Cloud White (G80)	-	-
OIL				
Diesel Fuel	Golden Brown (B13)	Cloud White (G80)	-	-
Hydraulic Power	Golden Brown (B13)	Salmon Pink (A40)	-	-
Lubricating	Golden Brown (B13)	Verdigris Green (E22)	-	-
Transformer	Golden Brown (B13)	Crimson (A03)	-	-
Paraffin	Golden Brown (B13)	Arctic Blue (F28)	-	-

PLANT AND EQUIPMENT	
EQUIPMENT	COLOUR CODE
FIRE FIGHTING	
Equipment and Pipework	Signal Red (A11)
ELECTRICAL	
Distribution Boards, Switch-Gear, Terminal Boxes and Conduits	Light Orange (B26)
Emergency Stop	Signal Red (A11)
MACHINE GUARDS	
Inside	Light Orange (B26)
Outside	Colour of Machine
Protruding Shafts, Exposed Gear Wheels and Rotating Parts	Light Orange (B26)
HANDRAILS	
Horizontal Rails and Chains	Golden Yellow (B49)
Stanchions	Black
Protrusion, Sides of Ramps	Black and Yellow Diagonal Stripes
GENERAL	
Scour Pipes	Deep Buff (B24)
Valves	Basic colour of pipeline
WORKSHOP FLOOR DEMARCATION	
Demarcation Lines	Golden Yellow (B49)
Working Areas	Pastel Grey (G54)
No Parking, No Storage	Golden Yellow (B49)
Aisles and Walkways	Brilliant Green (H10)
Storage Area	Terracotta (A10)
Urethane based paint is to be used for concrete surfaces *Traffic paint is to be used for tarred surfaces*	

14.4 Final Colour Code – Wastewater Treatment Works

Colours shall comply with the National Colour Standard, SANS

1091. The final colour marking shall be in accordance with SANS

10140.

Where SANS 10140 does not specify a requirement, the colour marking on wastewater treatment works shall comply with the following:

PIPEWORK

CONTENTS OF PIPE	BASIC COLOUR	COLOUR OF INDICATOR		
		1 BAND	2 BANDS	3 BANDS
WATER				
Fresh Water	Cornflower (F29)			
Sea Water	Light Brunswick Green (H07)			
Cooling Water	Aquamarine (E67)			
Final Treated	Aquamarine (E67)			
Fire Fighting	Signal Red (A11)			
SLUDGES				
Interchange	Drakensberg Green (H36)			
Water	Light Olive Green (H21)			
Primary Sludge	Dark Brown (B03)			
Waste Activated Sludge	Light Brown (B15)			
Digested Sludge	Light Brown (B15)	Light Olive Green (H21)		
Pasteurised Sludge	Light Brown (B15)	Cloud White (G80)		
OTHER LIQUIDS				
Drainage	Black			
Hydraulic Oil	Salmon Pink (A40)			
Lubricating Oil	Verdigris Green (E22)			
Polyelectrolyte	Aquamarine (E67)	Dark Violet (F06)		
Diesel Fuel	Golden Brown (B13)			
GASSES				
Chlorine, Hypochlorite	Canary Yellow (C61)			
Digester Gas	Smoke Grey (F20)			
Air	Arctic Blue (F28)			
Oxygen	Cloud White (G80)			
Ventilation Air	Pale Grey (G62)			
Steam	Silver (Aluminium)			
Hydrogen	Poppy Red (A14)			

Bands shall be 250 mm wide, 4 000 mm apart.

Hot liquid lines shall have a 50 mm wide band of Crimson (A03) every 4 000 mm.

PLANT AND EQUIPMENT

EQUIPMENT	COLOUR CODE
ELECTRICAL EQUIPMENT	
Motors : External	Light Grey (G29)
Motors : Fans, Cowl internal surfaces	Light Orange (B26)
Electrical switchgear, other than starting and stopping devices and emergency stop controls	Light Orange (B26)
Terminal boxes, Conduits	Light Orange (B26)
Emergency stop and control stop devices	Signal Red (A11)
MECHANICAL EQUIPMENT	
Pumps	To suit liquid being pumped.
Blowers, Compressors, incl. ancillary equipment	Strong Blue (F11)
Turning shafts, Couplings, Pulleys, Fans, etc.	Light Orange (B26)
Baseplates	Black

Direction arrows, Unit no., etc.	Black on white, White on other colours.
Valves	To suit liquid being handled.
Handwheels	Black
Bridges for settling tanks	Light Admiralty Grey (E46), or Arctic Blue (F28)
Bulk mechanical equipment, Gearboxes, General Fabrications, Brackets, Supports, etc.	Light Grey (G29)
Cranes and Crawl Beams	Golden Yellow (B49)
DANGER AREAS	
Guards : Internal surfaces	Light Orange (B26)
Guards : External surfaces	As per adjacent surfaces, but always contrasting with B26

Turning shafts, couplings, pulleys, fans, etc.	Light Orange (B26)
Fire fighting	Signal Red (A11)
Protrusions, Low beams, etc.	Black/Golden Yellow Stripes (- /B49)
Guardrails : Top horizontal and chains	Golden Yellow (B49)
Guardrails : Bottom horizontal	Black
Guardrails : Stanchions	Black

Items made of 316 or 316L stainless steel may be left unpainted provided the surface is of uniform self-colour without blemishes, rust, marks or stains. If blemished, the surfaces must either be painted or cleaned by pickling and/or electro-cleaning (not grinding or other mechanical means).

14.5 Painting Systems

14.5.1 Definition of Terms

The abbreviation "dft." used in this Specification shall mean dry film thickness given in microns and, except where otherwise specified, is the minimum (not average) thickness permissible.

14.5.2 System for Large Immersed Steel Fabrications

This system is suitable for steel items subject to immersion, semi-immersion and non-immersion such as tanks, pipes, etc.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Apply three coats of a low solvent, high solids,polyamine/amide cured, epoxy (two part).	350
		Total = 350 µm
The coating shall undergo EID detection over the full surface in accordance with SANS 1217. This test shall be done by an inspector holding an appropriate qualification from either the CISA, the SAIW or the SAQCC. When applied to hot-dip galvanized surfaces, a suitable epoxy primer shall be used after careful surface preparation before applying this system. This system shall be applied by a specialist applicator prior to delivery to site with particular attention to the required interval between coats. The first and third coats shall be a different colour to the second coat.		

14.5.3 System for Large Immersed Steel Fabrications (non-chalking surface)

This system has similar applications to the system above but which also require a non-chalking surface.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	System for Large Immersed Steel Fabrications	350
2	One coat of polyurethane enamel (two part)	40
		Total = 390 µm

14.5.4 System for Large Immersed Steel Fabrications (not requiring decorative finish)

This system is suitable for steel items subject to immersion, semi-immersion and non-immersion such as archimedes screw pumps, large tanks, etc.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Coat of polyamine/amide cured coal tar epoxy.	140
3	Coat of polyamine/amide cured coal tar epoxy.	140
4	Coat of polyamine/amide cured coal tar epoxy.	140
		Total = 420 µm
Each coat shall preferably be of a different colour. Two coats will be acceptable if recommended by the paint manufacturer.		

14.5.5 System for non-immersed Steel in Coastal Atmosphere

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Coat of two component zinc epoxy primer.	100
3	Coat of two component epoxy intermediate.	150
4	Coat of polyurethane enamel (two part).	50
		Total = 300 µm

14.5.6 System for non-Immersed Steel in Moderate Atmosphere

This system is suitable for heavy fabricated steel items requiring a hard, high gloss colour finish; eg. bridges, structural steel, mobile equipment, etc.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Coat of inorganic zinc silicate	75
3	Coat of epoxy intermediate coat	75
4	Coat of polyurethane enamel (two part)	40
		Total = 190 µm
The complete system must be factory applied and touch ups will be required on Site. The primer shall be tested for full cure before applying the subsequent coats. This system shall not be used for items subject to immersion.		

14.5.7 System for Hot-Dip Galvanized Steel (Duplex)

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	After hot-dip galvanizing, do not passivate.	
2	Coat epoxy primer (two part for HDG surfaces)	75
3	Coat polyurethane enamel (two part)	50
		Total = 125 µm

14.5.8 System for Repair to Coating on Steel and Cast Iron ("Maintenance Coating")

This system is suitable as a maintenance coat over weathered coatings and partially failed coatings.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Surface preparation shall include, as a minimum, removal of all loose mill scale, non-adherent rust and loose paint prior to wire brushing and de-greasing and shall comply with ISO-St3 (ISO 8501) or with SSPC-SP3 (Steel Structures Painting Transnet of the USA).	
2	Coat of aluminium filled epoxy (two part).	100
3	Coat of epoxy intermediate.	150
4	Coat of polyurethane enamel (two part).	40
		Total = 290 µm

14.5.9 System for Cast Iron Components

This system is suitable for motors, gearboxes and other cast iron components.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa 2 ½ in accordance with ISO 8501	
2	Coat high build epoxy primer	100
3	Coat polyurethane enamel (two part)	60
		Total = 160 µm

14.5.10 System for Steel in Dry Applications up to 200 ºC

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Coat of a two part micaceous iron oxide pigmented polyamine/amide cured epoxy sealer/coating (Sigmacover 522 or equivalent).	60
3	Coat of a two part micaceous iron oxide pigmented polyamine/amide cured epoxy sealer/coating (Sigmacover 522 or equivalent).	60
		Total = 120 µm

14.5.11 System for Steel in Dry Applications up to 200 ºC

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501.	
2	Coat of inorganic zinc silicate.	75
3	Coat of modified silicon heat resisting coating for 200 ºC.	75
		Total = 150 µm
Particular care shall be taken to obtain the recommended anchor pattern during abrasive blasting and to achieve the required primer thickness on all surfaces in one coat. The primer must be factory applied. The primer shall be tested for full cure before applying the subsequent coat. An intermediate coat suitable for 200 ºC shall be included between the primer and top coat if so recommended by the paint manufacturer. The top coat must cure at ambient temperatures.		

14.5.12 System for Steel in Potable Water up to 100 ºC

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Coat of a two part micaceous iron oxide pigmented polyamine/amide cured epoxy sealer/coating (Sigmacover 522 or equivalent).	80
3	Coat of a two part micaceous iron oxide pigmented polyamine/amide cured epoxy sealer/coating (Sigmacover 522 or equivalent).	80
4	Coat of a two part micaceous iron oxide pigmented polyamine/amide cured epoxy sealer/coating (Sigmacover 522 or equivalent).	80
		Total = 240 µm

14.5.13 System for Steel and Cast Iron in Dry Applications up to 540 ºC

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Coat modified silicon	40
3	Coat modified silicon	40
4	Coat modified silicon	40
		Total = 120 µm

14.5.14 System for Steel Grid Flooring (where HDG is not suitable)

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-$Sa_{2\ 1/2}$ in accordance with ISO 8501.	
2	Apply a glass flake resin by dipping in catalysed resin.	

14.5.15 System: Fusion Bonded Epoxy

This system is suitable for immersed objects, cast iron valve bodies, pipework, etc.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Apply fusion bonded epoxy in accordance with the manufacturer's instructions for the item to be coated.	300
		Total = 300 µm
This is a water resistant, non-toxic and non-tainting, fusion bonded epoxy pipe coating in accordance with SANS 1217. The material used shall be of Type 2; i.e. a thermosetting powder-coating material. Pre-heating is needed to achieve the required coating thickness. No reading shall be less than 200 µm. The Contractor shall execute EID detection over the full surface in accordance with SANS 1217. The items to be coated shall be prepared in accordance with the relevant clauses of this Specification and, in particular, shall have edges ground to a radius of curvature of at least 3 mm.		

14.5.16 System: Hot-Applied Thermoplastic

This system is suitable for immersed objects, cast iron valve bodies, pipework, etc.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Blast steel surface to ISO-Sa3 in accordance with ISO 8501	
2	Apply one coat of a synthetic thermoplastic polyamide.	300
		Total = 300 µm
No reading shall be less than 200 µm. The coating shall be applied by dipping into a fluidised bed of the polymer after the object has been suitably heated. The coating shall be executed strictly in accordance with the recommendations of the polymer supplier and the applicator shall be certified by the supplier for application of the coating. The Contractor shall execute EID detection over the full surface in accordance with SANS 1217. Objects to be coated shall be prepared in accordance with the relevant clauses of this Specification and, in particular, shall have edges ground to a radius of curvature of at least 3 mm.		

14.5.17 System for Repair of Coatings on Submerged Steelwork

This is a two part, solvent free epoxy which is suitable for application to wet steel.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Abrade corroded areas to St 2 in accordance with ISO 8501.	
2	Feather existing coating and lightly abrade existing coating.	
3	Clean and degrease surfaces to be coated and allow to dry.	
4	Apply coat(s) of a two part, solvent free epoxy which is suitable for application to wet steel.	800
		Total = 800 µm
Coating shall be done in accordance with the manufacturer's instructions.		

14.5.18 System to Provide Thick Coating for Complex Surfaces

These systems are thick coatings for covering complex surfaces normally including crevices which are formed by fasteners, seams, edges and corners and are generally applied either before or after the parent surfaces have already been suitably coated. Suitable for immersed and non- immersed applications.

STEP	PREPARATION/COATING METHOD	Minimum dft (µm)
1	Clean and degrease surfaces to be coated and allow to dry.	
2a	Two coats of a solvent free, two part epoxy which can be applied at thicknesses of up to 600 µm such as Sigmaline 523 or equivalent.	600
	OR	
2b	Single part, cold applied coal tar coating which can be applied up to a dry film thickness not less than 1 000 µm; Carboline Bitumastic 50 or equivalent.	1 000
		Total > 1 000

14.6 Acceptable Materials and Suppliers

The table below lists acceptable materials and suppliers. In all cases, other equivalent materials and suppliers are acceptable.

GENERIC	MATERIAL/SUPPLIER
Hot-Dip Galvanizing	Hot-dip galvanisers shall hold the certification mark for SANS 121.
Powder Coating	Plascon epoxy/polyester powder : CEP series, Sigmalining FBE 27.
Universal Undercoat	Sigmarine 40, Carboline GP-64 Undercoat, Plascon Plasconamel 189 Undercoat.
High-Gloss Alkyd Enamel	Carboline AD-51 Finish, Plasconamel 1000 Finish, Sigmarine 49.
HB Epoxy Primer : Two Part	Plascon Plascotuff HB Epoxy MLE series, Sigmazinc 109HS, Carboline 193 Primer.
Epoxy Primer : Two Part (for hot-dip galvanized surfaces)	International Interguard 269, Sigmacover 280.
Polyamine/Amide Cured Epoxy Sealer/Coating : Two Part	Carboline Rustbond Penetrating Sealer, Plascon Plascoguard Copon EA3 Primer, Sigmacover 522.
Epoxy Intermediate Coat	Sigmacover 456, Carboline 190 HB, Plascon Plascosafe 18 Primer, Sigmacover 435.
Low Solvent, High Solids, Polyamine/Amide Cured Epoxy : Two Part	Plascon Plascoguard Copon KSIR88, Sigmaguard 720 Ameron Amercoat 385, Carboline 891.
Polyamine/amide Cured Coal Tar Epoxy : Two Part	Sigmacover 300, Carbomastic 200, Ameron Amercoat 78HBB.
Solvent Free Epoxy repair coating	Plascon Plascoguard Copon Hycote 151, Sigmaguard 575.
Aluminium Filled Epoxy : Two Part	Ameron Amerlock 400 AL, Carbomastic 15, Sigmacover 630.
Two Part Solvent Free Epoxy For Submerged Applications	Sigmarite Submarine Coating, Carboline 1208, InterZone 954, Jotamastic 87.
Zinc Phosphate Primer	Carboline GP-18 Primer, Plascon Plascoprime 183 HB, Bildphos M10 Primer.
Inorganic Zinc Silicate	Plascon Plascozinc 233, Sigmazinc 160, Carboline Carbozinc 11, Ameron Dimetcote 11.
Modified Silicon	Carboline 4631, Plascon Plascotherm Silicone 540 – Aluminium, Sigmatherm 520.

Silicone Acrylic	Plascon Plascotherm Silicon – Acrylic 200 T, Carboline 1248.
Polyurethane Enamel : Two Part	Sigmadur 550, Carboline 134 over polyamine/mide coatings, Carboline 133 HB over zinc coatings, International Interthane 990, Plascon Plascothane Recoatable Enamel CPC Series, for two-coat systems, Plascon Plascothane Recoatable Enamel CPQ Series, for single coat systems.

Glass Flake Resin	Power Blast Vitaglass or equivalent.
Hot-applied Thermoplastic	Rilsan or equivalent.
Thick Coating for Complex Surfaces	Sigmaline 523 or Carboline Bitumastic 50.

15. FASTENERS

15.1 Standards

Bolts and nuts shall be hexagon head type complying with SANS 1700 with threads of the coarse pitch series. Allen head screws of any type shall not be used without the Engineer's written consent.

15.2 Fasteners M12 and Smaller

All fasteners M12 and smaller shall be of grade 316 SS, or better.

15.3 Fasteners Larger than M12 - in Corrosive Areas

All fasteners in corrosive areas shall be of 316 SS, or better. Corrosive areas shall be taken to include any moist or wet area such as in and above settling tanks, in or in the vicinity of open channels, where a continuous spray can be expected and all internal and external areas in the vicinity of the inlet works of a wastewater treatment works. All fasteners embedded in brick, concrete or soil shall also be of 316 SS, or better.

15.4 Fasteners Larger than M12 - Non-Corrosive Areas

Fasteners larger than M12 which are in non-corrosive areas shall, except when specified otherwise, be hot-dip galvanized.

15.5 High Tensile Bolts

Where high tensile bolts are required by the design, they shall be hot-dip galvanized and painted. The bolt holes and crevices shall be filled and sealed prior to painting.

15.6 Material Compatibility

Fastener material shall always be of equal or better corrosion resistance than the items being fastened, e.g. 316 SS bolts must be used to fasten together 316 stainless steel fabrications or flanges.

15.7 Washers

Washers of similar material to the bolts shall be provided under each nut and setscrew head. Multiple washers or shims shall not be used. Spring washers or other approved locking arrangement shall be used on all fasteners subject to vibration.

15.8 Anti-Seize Compound

Before assembly, threads shall be treated with a nickel based, anti-seize/corrosion protection compound; Chesterton 725: Nickel Anti-Seize Compound, or equivalent. The Contractor shall note:

(a) Copper-based compounds are not acceptable and, if used, shall be cleaned off before the correct compound is applied.

(b) If it is found during inspection that compound has not been applied, the Contractor shall

disassemble all fasteners and comply with this requirement.

(c) A small amount of compound shall be applied along the full length of the thread before the nut is applied. Excessive compound visible on the thread after the nut has been applied shall be cleaned off.

15.9 Thread Projection

Bolt threads shall project between 1 and 6 mm from the head of the nuts when fixed. Longer projections will only be allowed if the Contractor can show that bolts of a more suitable length are not manufactured.

15.10 Corrosion Protection

After installation the exposed surfaces of bolts not made of 316 SS or of EN 1.4162 shall be coated as for the items being fastened. If the use of Allen head or similar fasteners has been approved by the Engineer, the recessed heads shall be filled with a suitable non-hardening sealing compound.

16. ANCHOR FASTENERS

16.1 Type and Material

All anchor fasteners shall be of grade 316 SS, or better.

Anchor fasteners for water retaining structures and for brickwork shall be of the chemical anchor fastening type. Anchor fasteners for other applications may be of the expanding type or chemical anchor type.

16.2 Hook Bolts

Grade 316 SS, or better, hook bolts shall be supplied and grouted by the Contractor into pockets which will be provided in the concrete structure in accordance with the information to be supplied by the Contractor. The grouting products shall be used strictly in accordance with the manufacturer's instructions.

16.3 Alternative Anchor Bolts

The use of 316 stainless steel "Hilti Kwik Bolt" stud bolts or equivalent may be used as an alternative where approved by the Engineer. If steel reinforcing bars are encountered while the holes are being drilled, the Contractor shall knock a hole in the concrete around the steel and grout in a stainless steel hook bolt as described above.

16.4 Through-Bolt Anchors

Where machinery is anchored by studs or bolts which extend through the supporting structure and is therefore fastened down with the use of nuts from both sides, these, together with associated washers and brackets, shall also be of grade 316 SS, or better.

16.5 Anti-Seize Compound

A small amount of a nickel-based, anti-seize compound shall be applied along the full length of fastener threads before the nut is applied.

17. GRID FLOORING

All platforms and stairways shall be constructed with a non-slip profile or finish.

Consideration may be given to use glass fibre grating only in applications of non-elevated heights and where theft is a potential problem. The grating shall be of open grating type and not less than 38mm in depth. The mesh size shall not be less than 38mm x 38mm and the resin shall be Vinyl Ester.

All elevated walkways and stairways shall be Mild Steel Dipped Galvanised construction.

The depth of bearer bars in steel grid flooring shall not be less than 30 mm with a bearer bar pitch of not greater than 40 mm. The bearer bars shall be across the shorter span.

Panels shall be set level and fixed to angle frames to prevent rocking.

Cut-outs in grid flooring for pipes, valve spindles, etc. are to be made and banded before any corrosion protection is done. The edges of removable grid access covers must also be banded.

Grid flooring and frames shall be hot-dip galvanized after fabrication. Alternatively, a glass flake resin which is applied by dipping the flooring in catalysed resin, is acceptable; such as Power Blast's Vitaglass or equivalent. The grating shall be of open grating type and not less than 38mm in depth. The mesh size shall not be less than 38mm x 38mm and the resin shall be Vinyl Ester. All GRP type grating shall include an anti-slip coating. Painted coatings will not be acceptable.

Where grid flooring rests on painted surfaces, strips of rubber insertion material shall be secured under the grid to protect the paint.

The fixing clip set (saddle clamp and locking plate) shall be of hot-dip galvanised steel or stainless steel. All fasteners shall be of grade 316 SS, or better.

18. GUARD RAILING

18.1 General

Guard railing shall be provided in accordance with legislated requirements and shall be provided generally in positions where the vertical change in level is 1 000 mm or greater.

Guard railing shall comply with SANS 10104.

Fabrication and installation requirements are specified elsewhere in this Standard Specification for Mechanical Works (including General Works).

18.2 Guard Railing for Equipment Installations

Guard railing for equipment installations shall comply with the following specific requirements:

(a) Guard railing shall be of grade 316 stainless steel and shall comprise hand and knee rails not less than 32 mm diameter and stanchions spaced at not more than 1,8 m except where specifically directed otherwise in writing by the Engineer.

(b) On platforms, walkways, landings or around dangerous areas the vertical height, measured from the top of the hand rail to the floor or surface, shall be **at least 1 000 mm**.

(c) On stairways and fixed ladders the rails shall be parallel to the strings, and the vertical height, measured from the top of the hand rail to the nosing of the tread, shall be at least 900 mm.

(d) For applications covered by this Specification, the rails and stanchion shall withstand, without permanent deflection, a proof force of 890 N and 1780 N respectively, applied at any point and in any direction. This requirement is in addition any strength requirement specified in SANS 10104. Contractors shall provide proof that their guard railing has been tested and withstands these loads.

(e) No opening between rails shall allow the passage of a ball of diameter 600 mm.

(f) Stanchions and rails shall be smoothly finished and free from sharp corners, edges and projections which may injure persons or damage clothing. Stanchion bases shall have the corners rounded or sheared off.

(g) Welded guard rail installations are preferred. Installations which incorporate jointed sections shall be secure and without relative movement of the components under loading. “Pop” riveted installations will not be acceptable. Joints shall be smoothly finished, without corners.

(h) Railings shall be ended off with positively fixed closure bends. At corners, short radius bends with stanchions on both ends shall be employed or, alternatively, stanchions specifically designed for such a position shall be employed. No sharp endings will be permitted.

(i) Stanchions shall generally be base-mounted to suit the arrangement requirements and shall be of solid or welded construction. Welding shall be continuous and shall be smoothly finished and then passivated.

(j) Stanchions which are hollow shall be self-draining.

(k) Stanchion feet which are attached to metallic surfaces shall have minimum dimensions of 150 mm X 60 mm X 8 mm. Two fasteners, of minimum size M16, shall be used to secure each foot. Neatly fitting packing, Denso tape or equivalent, shall be fitted under stanchion feet to prevent the formation of crevices.

(l) Stanchion feet which are attached to non-metallic surfaces shall have minimum dimensions of 150 mm X 150 mm X 10 mm. In instances where the horizontal surface to which the foot is to be fastened is less than 150 mm wide, the foot shall be designed to be seated on at least two surfaces. Four fasteners, of minimum size M16, shall be used to anchor the foot. Non- shrink, cementitious grout shall be applied under the foot just prior to final tightening of nuts.

(m) A small amount of a nickel-based, anti-seize compound shall be applied along the full length of fastener threads before the nut is applied.

(n) All components shall be supplied in the pickled and passivated condition which may also be polished. All surfaces must be uncontaminated and unmarked to ensure maximum corrosion resistance. A manufacturer's test certificate shall be provided for each batch of stainless steel giving the chemical analysis of the material.

(o) Where kickplates are required by legislation, these shall extend to 150 mm above the walkway level.

18.3 Guard Railing in Public Places

The requirements for guard railing at equipment installations shall also apply for guard railing for public places. The following specific requirements must also be complied with:

(a) The structural design shall be done in accordance with the requirements of SANS 10104.
(b) No opening in guard railing installed in public places shall allow the passage of a ball of 100 mm diameter.

19. PERMANENT LADDERS AND STAIRS

19.1 General

Permanent ladders shall comply, primarily, with the requirements of the OSH Act and, secondarily, with BS 5395. Stairs shall comply with BS 5395, Part 3.

Unless other materials are specified, ladders and stairs shall be of carbon steel and hot-dip galvanized after all fabrication has been completed.

Unless other materials are specified, bolts shall be hot-dip galvanised but anchor bolts in concrete and brickwork shall be of grade 316 SS, or better, and shall be no smaller than M16.

19.2 Permanent Ladders

Ladders shall comply with the following detail design aspects:

(a) Access points to the head of ladders from platforms and walkways shall be protected by self-closing gates or by chains.
(b) No part of the ladders shall project into the passageway.
(c) The width between strings shall be between 380 mm and 450 mm.
(d) A minimum clear space of 230 mm must be allowed behind the rungs.
(e) The diameter of the rungs shall be approximately 25 mm and these shall be formed from HT steel reinforcing bar.
(f) Additional rungs shall be provided in the same horizontal plane as the top rung in order to close the gap between the platform and the ladder. Sufficient rungs shall be provided to ensure a maximum gap of 75 mm. These top rungs shall be at the same level as the floor or platform to which access is being provided.
(g) Strings shall be formed from flat bar.
(h) The vertical distance between the ladder support brackets shall not exceed 1 800 mm.
(i) The strings shall extend to 1 100 mm above the floor or platform and shall be matched with any guard rail protections at this level. Connections between hot-dip galvanized steel ladders and stainless steel guard railing shall be bolted. Unless laterally supported by the guard rails, these strings shall be supported by vertical structural sections (not flat bar) whose footings shall comply with this Specification for guard rail stanchion feet.
(j) All rises in a flight shall be uniform and the surface of the top rung shall be level with the top platform or landing. The height chosen for the rise shall be between 225 mm and 255 mm.
(k) Except on chimneys, the height of a ladder should not exceed 6 000 mm. Greater heights shall be provided with intermediate landings between each 6 000 mm ladder section.
(l) If the height between start and end levels is over 4 000 mm, the ladder shall be fitted with a safety cage. The safety cage shall extend at least 1 000 mm above the higher landing. The cage *"shall afford firm support along its whole length for the back of the person climbing the ladder, and for which purpose no part of the cage shall be more than 700 mm away from the level of the rungs." (as per OHS General Safety Regulations)*. The cage shall comprise no fewer than seven vertical elements.
(m) Strings, rungs and support members shall be of solid structural sections (e.g. flat bar, round bar, square bar, angles, etc.) and no hollow sections will be accepted for any part of the ladder.

19.3 Stairs

Stairs shall comply with BS 5395.

20. PIPEWORK

20.1 Pipes and Fittings

20.1.1 Steel Pipe – General Duties

Steel pipes for general non-corrosive, non-abrasive duties for liquid, air and gas shall be as follows:

Up to DN 150	-	SANS 62 medium class.
Over DN 150	-	SANS 719.

Unless otherwise specified, steel pipework and fittings shall be hot-dip galvanised and painted.

20.1.2 Steel Pipework – Design

Pipework up to DN 600 shall be in accordance with SANS 1476. Pipework for the conveyance of water shall, in addition, comply with CCT-WS 11 Standard Specification for Steel Pipe, Fittings and Specials.

20.1.3 Stainless Steel Pipework

Stainless steel pipework shall be to ASTM 312. Schedule 10 pipes and fittings shall be used except where otherwise specified.

20.1.4 Steam Pipework

Steam pipework smaller than DN 50 shall be of 316 stainless steel to ASTM A-312 Schedule 40 or approved equal. Steam pipework DN 50 and larger shall be manufactured to SANS 62 heavy class, ANSI B36.10 STD/Schedule 40 or to BS 1600 Schedule 40. Steel pipework shall be supplied with a suitable temporary corrosion protection both internally and externally in order to prevent corrosion during the storage, installation and pre-commissioning period. A primer similar to Plascon SNK 2, phenolic modified polyvinyl butyral self-etch primer, would be suitable.

20.1.5 Hydraulic and Oil Pipework

Hydraulic pipework shall be to BS 778 or equal. All hydraulic and oil pipes and fittings shall be thoroughly degreased, descaled and cleaned internally and externally after fabrication by abrasive blasting or pickling, thoroughly cleaned and rinsed, dipped in a hot iron phosphate solution and coated internally with a corrosion inhibiting, oil soluble preservative. After treatment and drying all openings shall be sealed until the pipes are installed.

20.1.6 Butt Weld Fittings

Steel butt welding pipe fittings shall be to ANSI B 16.9, BS 1965 or BS 1640 of the same schedule as the pipework or heavier. Butt weld fittings in stainless steel shall be to ASA B 36.19 for schedule 5S and 10S and ASA B 16.9 for schedule 40S and 80S. Alternatively, fittings may be to BS 1640.

20.1.7 Malleable Cast Iron

Malleable cast iron fittings shall be to SANS 14.

20.1.8 Cast Iron

Cast iron pipes and fittings shall comply with BS 2035 (Class D) and shall be pressure tested in accordance with Clause 12 of that Standard. The requirements of the Standard's Clause 6 regarding freedom from defects and casting appearance and Clauses 8, 9 and 10 regarding casting accuracy will be strictly applied. The requirements of the Standard with regard to protection and flanges shall be modified to comply with this Specification. Also refer to Clause "Castings" of this Specification.

20.1.9 Copper

Copper pipes shall be to BS 2871 or approved equal.

20.1.10 Plastic Pipework

Polyethylene or Polypropylene pipes shall comply with SANS 533 and SANS 1315 respectively and shall carry the SABS mark. The contractor manufacturing and installing the pipework shall satisfy the requirements of SANS 9001. PVC pipework is not acceptable except where specified.

An operating life of 50 years shall be designed for and appropriate derating factors shall be applied to suit the application. The rated maximum working pressure at operating conditions of the class of pipe selected shall be not less than 1,5 times the actual maximum operating pressure. If the material used has insufficient resistance to solar radiation (U.V. light) for the application, suitable protection must be provided to achieve the required life.

Note that nominal bores and pipe diameters specified must be regarded as the minimum inside diameter.

20.2 Pipework Design

20.2.1 Pipe Type and Material

The type and material of pipe to be used will be given in the Detailed Mechanical Specification.

20.2.2 Pipe Diameters

Unless otherwise specified in the Detailed Mechanical Specification, pipe diameters shall be based on the following velocities. The velocities shall be based on the compressed volume at the operating pressure in the case of steam, air and other gases. Valves and other ancillaries shall generally be of the same nominal diameter as the pipe. Non-standard sizes shall not be used.

FLUID	FLUID FLOW [ℓ/s]			
	0-2,5	2,5-15	15-100	100-500
	ALLOWABLE FLOW VELOCITY [m/s]			
LIQUID				
GRIT FREE:	0.75 max	1,25 max	1,5 max	2 max
HIGH SOLIDS OR GRIT:		0,8 min	1 min	1 min
		1,5 max	1,75 max	2 max
STEAM	10 max	15 max	20 max	25 max
AIR AND GAS				
above 10 kPa	5 max	8 max	10 max	12 max
below 10 kPa	2,5 max	3 max	4 max	5 max

Grit free liquids include potable water, centrate, supernatant, etc. Liquids considered to have high solids content will include water, sludge and grit slurry.

If anomalies occur within the same system using the above table, the larger pipe diameter shall generally be used.

20.2.3 Coupling Arrangement

Screwed fittings may be used on DN 50 and smaller provided that sufficient unions or flanges are provided for disassembly and removal of equipment. Reducing sockets and reducing bushes shall be used where required.

All steel pipes larger than DN 50 shall be flanged or fitted with mechanical pipe couplings as applicable.

Suitable pipe couplings shall be incorporated wherever necessary to facilitate maintenance or isolate vibration. A coupling shall be provided on each pump suction. Couplings shall be adequately restrained by harnesses as specified in the Clause "Pipe Couplings".

20.2.4 Draining, Venting and Purging

On liquid lines provision shall be made for draining and venting where necessary. Vents shall be provided at all vertical down bends on gravity lines. On gas lines provision shall be made for purging.

20.2.5 Condensate Drains for Air Lines

Automatic condensate traps with isolating valves and valved by-passes shall be provided at all necessary points including ahead of any globe type valve, orifice plate or concentric reducer in a horizontal line, at each change of level and immediately ahead of the user equipment.

A suitable well of a diameter equal to the pipe diameter with a bottom drain shall be provided at each condensate removal point. Condensate traps and valves shall be accessible and condensate shall be piped to the nearest drain. Pipework shall be sloped in the direction of flow towards a drain point with a slope of 1 in 150 and care shall be taken to avoid sagging at any point.

20.2.6 By-Passes

Isolating valves and valved by-passes shall be provided around condensate traps, pressure reducing valves and valves with solenoid or other actuation which do not have provision for manual operation.

20.2.7 Encased Pipes

Pipework to be permanently encased in concrete, cement or similar shall be of cast iron or 316 SS, or better, for steel and stainless steel pipework respectively. The encased portion shall be a short, straight length of pipe, flanged both ends with adequate clearance between the wall surface and the flanges for inserting flange bolts. Victaulic type couplings may in some instances be permitted instead of flanges.

Pipe sections through walls below ground or water level shall be provided with a puddle flange the same diameter as a standard flange. The encased area shall in such cases be uncoated up to 30 mm inside the wall surface and coated to Specification from there on.

20.2.8 Isolation

The layout design shall make provision for isolation and easy removal of mechanical equipment.

20.2.9 Nozzles for Fittings, Gauges, etc.

Nozzles on pipework (for installation of gauges, transmitters, drain pipes, cooling water take-offs, air release valves, etc.) shall be designed so that the pipework corrosion prevention system is not affected.

Nozzles shall consist of a flanged, welded tee-off of at least 100 mm diameter, painted or cement-lined internally and provided with a non-corrosive blank flange, e.g. grade 316 stainless steel. The blank flange shall be provided with tapped holes suitable for the equipment installation.

Internally painted, small diameter carbon steel nozzles and screwed carbon steel tee-offs are not acceptable. Carbon steel pipework may be provided with small diameter, grade 316 stainless steel nozzles which are welded into the pipework if the Engineer considers this acceptable in the application.

20.2.10 Flow Straighteners

If a flow straightener is specified in the Detailed Mechanical Specification, this shall be provided in accordance with drawing number ME-A4/1520 : Pump Suction Flow Straightener – Plain Ended Pipe. This design is for plain ended pipes on the suction side of pumps but the blade configuration shall apply where applicable to other applications.

20.3 Pipework Installation

20.3.1 Appearance

Pipes and fittings shall be conservatively selected to suit the application, neatly installed, straight to line and level, adequately supported and shall operate without vibration.

20.3.2 Valve Orientation

On sludge or water pipelines, check valves shall, wherever possible, be mounted horizontally and isolating valves with spindles vertical. Valve handwheels shall be arranged so that they are accessible to the operators.

20.3.3 Supports

Proposed designs of pipe supports shall be submitted to the Engineer for acceptance prior to manufacture. Specific requirements are:

(a) Steel supports shall be fabricated from heavy duty hot-rolled steel sections. The complete assembly shall be hot-dip galvanised after all fabrication is completed.
(b) Welds shall be "all-round".
(c) Each foot shall feature at least four anchor fasteners.
(d) For cantilevered pipe supports, the spacing between anchor fasteners shall be not less than one third of the cantilevered length

The spacing between pipe supports shall be as follows:

APPROXIMATE DISTANCE BETWEEN SUPPORTS FOR STEEL PIPE	
Pipe Diameter (DN)	**Distance Between Supports (mm)**
0 – 15	800
20 – 50	1 500
65 – 100	2 500
125 – 200	3 500
250 – 500	5 000
> 500	6 000
Distance between supports must be halved for pipe materials other than carbon steels and stainless steels.	

Pipe supports shall be so located that when an item of mechanical equipment is removed, the associated valves and pipework are still adequately supported. Supports shall be provided close to heavy items such as valves. No external loads shall be placed on items of mechanical equipment such as pumps, compressors, etc. Adequate provision shall be made for expansion and contraction due to variations in temperature or pressure.

3 mm thick neoprene strips shall be placed between pipes and supports or clamps to protect the paintwork and limit corrosion. Where roller or sliding supports are used to accommodate movement, suitable wear blocks shall be fixed to the pipe to prevent damage.

Floor pipe supports shall be aligned using a nut above and below the foot. A space of at least 20 mm shall be left between the foot and the floor and this space shall be filled using non-shrink grout in accordance with the manufacturer's recommendations once alignment has been completed. Alternative designs and installations may be submitted by the Contractor. Wall pipe supports shall be similar.

Where the Engineer approves the use of concrete pipe supports to be built by a civil contractor under a separate contract, these will be constructed after installation of the pipework and temporary supports shall be provided by the Contractor in positions which will not interfere with the construction of the concrete supports.

20.3.4 Pressure Testing

All pipelines shall be pressure tested to 1,5 times maximum working pressure. This shall be done before covering up the pipeline in any way where applicable and shall be witnessed by the Engineer.

21. PIPEWORK FOR PUMP SUCTION

21.1 General

Pump suction pipework shall be designed in accordance with good engineering practice. The following, in particular, shall be complied with:

(a) Suction pipework shall be sized, where practical, to ensure that the flow speed is no higher than 1,5 m/s.
(b) High points shall be avoided and it is preferred that the pipework slopes up toward the pump.
(c) Air leaks shall be avoided / prevented.
(d) Reducers shall be of the unequal type.
(e) Reducers shall have a diametral reduction of no more than 50 mm per 300 mm length and shall have a parallel-sided length between the tapered portion and each flange.
(f) “Lobster-back bends” shall have a minimum of five segments. The segments welded to the pipe flanges shall be perpendicular those flanges.
(g) Flow straighteners shall be provided where specified in the Detailed Mechanical Specification.
(h) Strainers shall be provided where specified in the Detailed Mechanical Specification.

21.2 Bell-Mouths

All pump suction piping which draws the pumped liquid from open sumps shall be provided with bell-mouth inlets. The bell-mouth shall have an integral flange and shall be bolted to a flange on the suction pipework.

The bell-mouth design shall be in accordance with drawing EAM_ME_2015_001.

The preferred material for the bell-mouth is glass-fibre or stainless steel 316 however cast iron suitably coated, may be acceptable.

22. FLUID STRAINERS FOR PIPEWORK

22.1 General

This clause deals with strainers required for removing substantial solid particles from fluid flow and does not deal with automatically-operated, fine screen strainers.

Fluid strainers shall be selected to be suitable for the application.

A strainer is required on the suction side of all centrifugal and positive displacement pumps which draw from fluid bodies such as tanks, channels, sumps, reservoirs, etc., which have open surfaces. The Detailed Mechanical Specification gives specific requirements for strainers.

22.2 Type, Design and Arrangement

Strainers shall preferably be of a proprietary type, A.R.I Semi Globe Filter, Krombach y-type, Bermad 70 F or equivalent. They shall be of the double-flanged configuration. Circular strainer elements are preferred.

The strainer element’s hole diameter shall be decided in conjunction with the Engineer.

Differential pressure reading across the strainer shall be provided. Gauges shall be provided with isolation valves as well as protection from solids contamination.

Strainers whose baskets exceed 20 litres in volume shall incorporate:
(a) top pull-out configuration;
(b) a lifting device, such as a crawl beam with hoist or a davit arrangement; and the strainer basket shall be provided with a suitable lifting eye.
(c) a hot-dip galvanized steel support or a concrete support plinth.

The ratio of open area in the strainer element to inlet pipe area for non-proprietary units shall exceed 7 and shall be designed to suit the application. Strainer elements shall be made of stainless steel perforated plate with an opening size to be decided in conjunction with the Engineer. If the Engineer approves the use of wire grid for strainer elements, the wire shall be of at least 2 mm diameter and shall be of stainless steel. Strainer elements shall be robustly constructed, shall be provided with adequate flow passages between the strainer element and body and shall withstand the differential pressure developed when a strainer element is partially blocked. Flat surfaces shall be adequately braced to prevent buckling collapse. Lids shall incorporate an O-ring type seal and shall be secured with grade 316 SS, or better. Handles shall be provided on baskets of 20 litres or smaller.

All sharp edges on the strainer's internal surfaces and on the basket shall be removed.

22.3 Corrosion Protection

Strainer housings and lids shall be either:
(a) coated cast iron;
(b) 316 SS, or better;
(c) glass reinforced plastic;
(d) plastic; or,
(e) hot-dip galvanized carbon steel.

Coated carbon steel will only be acceptable if the design is such that internal scraping of the surface is unlikely to occur. In such cases, the System for Large Immersed Steel Fabrications or System "Fusion Bonded Epoxy" or System "Hot-Applied Thermoplastic" or the System for Large Immersed Steel Fabrications (not requiring a decorative finish) will be acceptable.

22.4 Testing

Strainer bodies shall be pressure tested to a minimum of 500 kPa and vacuum tested to 70 kPa before delivery to Site.

23. FLANGES

23.1 Standards

All standard flanges shall comply with SANS 1123. For flange sizes not included in the SANS, BS 4504 shall be used. Cast iron flanges and their mating flanges shall have flat faces. The flange table shall be as specified or, if not specified, selected to suit the maximum possible operating pressure but not less than Table 1000. Drilling and installation of flanges shall be "off-centre".

23.2 Flange Fixing

Flanges DN 50 and smaller may be of the screwed on type. Metal flanges above DN 50 shall be welded on in accordance with BS 806 Type 6 unless otherwise agreed or specified.

23.3 Machining of Flanges

All flanges shall be machined on the sealing face. Flanges cut from plate shall also be machined on the bore and outside diameter. Cast iron flanges shall also be machined or spot faced on the

back of the flange to ensure a flat bearing surface for the fastener's head or nut and washer. All edges, including bolt-holes, shall be chamfered or rounded to a 2 mm radius.

23.4 Butt Flanges

If the use of a loose hot-dip galvanized butt flange arrangement with stainless steel pipework is specified or approved by the Engineer, such arrangement and design shall comply with BS 4504 Table 6/6 or 10/6 as appropriate. The butt welded shouldered end for the pipe may be rolled from hot rolled stainless steel angle section. The hot-dip galvanized butt flange must be electrically insulated from the stainless steel pipework.

23.5 Gaskets

The jointing material used on flange joints shall be of rubber or compressed asbestos fibre at least 3 mm thick complying respectively with BS 2494 or BS 1832, as applicable. Full face gaskets shall be used for full face flanges. Inner bolt circle gaskets shall be used on raised face flanges and when clamping items such as wafer type valves between flanges inside the bolt circle. Properly designed O-ring seals are also acceptable.

24. PIPE COUPLINGS

24.1 General

Where pipework movement, misalignment or dismantling must be allowed for, or if necessary for any other reason, pipe couplings may be used if approved by the Engineer. Pipe couplings shall be of the mechanical type, stainless steel bellows type or rubber bellows type.

24.2 Supports and Anchors

Pipework using couplings shall be supported and anchored strictly in accordance with the coupling manufacturer's recommendations.

If the pipework configuration does not provide axial restraint, harnesses against separating forces shall be provided. Systems incorporating additional flanges or lugs and connected by tie bars or positively fixed to anchors will be acceptable. Systems relying purely on friction will not be acceptable. Tie bar harnesses shall incorporate three tie bars or more.

24.3 Mechanical Pipe Couplings

Mechanical pipe couplings shall:

(a) be of rolled steel, forgings or of high grade castings;
(b) be coated;
(c) have rubber seals of a suitable grade;
(d) shall have stainless steel fasteners, and,
(e) be supplied without centre register unless otherwise specified.

Pipe ends shall be in accordance with the coupling manufacturer's recommendations. Where machining is required, as in the case of cast iron pipes, the length of machining on each pipe shall be approximately equal to the total length of the coupling to ensure that the coupling can be separated for pipe removal.

Couplings for air applications below 60 ºC shall be hot-dip galvanized for air applications above 60 ºC shall be of stainless steel. Couplings for liquid applications shall be coated in accordance with System – “Hot-Applied Thermoplastic” or System – “Fusion Bonded Epoxy”. Couplings for stainless steel pipework shall be stainless steel.

Fasteners, including coupling studs, **stub studs** (i.e. studs welded to the flanges of flange adaptors), washers and nuts shall be of grade 316 SS, or better.

When couplings are part of a buried pipeline, the metallic surfaces shall be coated as specified above and then covered and wrapped. Couplings shall be covered with mastic to a smooth finish, wrapped with tape and then wrapped with a polythene sheet which is strapped in place. "Denso mastic" and "Denso tape", or equivalent products, are suitable. If the operating temperature is likely to exceed 70 ºC, the mastic and tape shall be replaced with suitable grease or a suitable sealer.

24.4 Stainless Steel Bellows Pipe Couplings

Stainless steel bellows shall incorporate stainless steel flanges and fasteners.

24.5 Rubber Bellows Pipe Couplings

Rubber bellows couplings are acceptable for machinery which is flexibly mounted and also in applications which require isolation of driven machinery from the surrounding pipework and/or structures.

The flexible material used for rubber expansion joints shall be chosen specifically for maximum resistance to bursting.

Metal backing flanges for rubber expansion joints shall be of stainless steel or hot-dip galvanized steel.

25. CONDENSATE TRAPS FOR WATER GAS

Condensate traps shall be of the automatic float operated type which shall not permit the escape of gas. For pipeline condensate removal a valve with l" BSP pipe connections shall be used.

Water gas is generally at a very low pressure and often contains sticky solids. The valve of the condensate trap shall therefore be provided with an orifice and a seat of large area using a soft sealing element. The valve shall not be subject to sticking and shall preferably be of a ball type.

The body shall be of either cast iron suitably coated internally and externally or of aluminium. All other parts shall be of 316 stainless steel.

Condensate traps shall be provided with an isolating valve and valved bypass.

26. FLAME ARRESTERS

Flame arresters shall have 316 stainless steel or aluminium bodies and 316 stainless steel elements. For all normal duties flame arresters shall be of a type which incorporates a fusible plug controlling an automatic shut off valve. Alternatively a separate thermally operated valve may be incorporated. Flame arresters used to protect relief valves shall however not incorporate a shut off valve.

Provision shall be made in the arrangement for access to the flame barrier element for maintenance. Valves shall be incorporated to isolate the flame arrester.

The gas has a very high moisture content and the flame trap design shall minimise the entrapment of water and suitable drainage petcocks shall be provided.

Suitably valved pressure tappings shall be provided upstream and downstream of the flame arresters.

27. PRESSURE RELIEF AND VACUUM BREAKER VALVE WITH FLAME ARRESTER UNIT

The valve is generally used to protect anaerobic digesters and shall suit this duty.

The valve shall be of a type using removable lead weights on the pressure pallet. Each lead weight shall represent a pressure of 25 mm W.G. and the valve shall be supplied with sufficient weights for the pressure given in the Detailed Mechanical Specification. Below this pressure setting the valve shall not leak. The vacuum pallet shall be set to 50 mm W.G.

The valve shall be of aluminium construction with 316 stainless steel wire mesh screens over the intake and exhaust ports. Pallets shall be centre and side guided and provided with seat inserts of a suitable material which is not subject to distortion. Seat rings and pallets shall be removable.

A flame arrester (of a type not incorporating a shut off valve) shall be installed between the digester and the relief valve.

The complete relief valve/flame arrester unit shall be sized to permit a pressure relief gas capacity of 5 m^3/min with a pressure increase not exceeding 25 mm W.G. and a vacuum relief air flow of 10 m^3/min at a vacuum of approximately 150 mm W.G.

28. VALVES FOR LIQUIDS OR GASES

28.1 General

The valves to be used on the more common applications are specified below.

Where special valves are necessary for special applications, these will be specified in the Detailed Mechanical Specification but, if not, tenderers must select suitable valves and provide details in the tender.

The handwheel, lever, etc. on valves, valve actuators and valve gearboxes to be supplied and installed for the Bulk Water Department of the Transnet shall be configured to be anti-clockwise closing unless unobtainable. All valves supplied and installed for other Departments in the Transnet shall be clockwise closing.

Department	Valve Closing Direction
Bulk Water	Anti-Clockwise closing
Waste Water and all other	Clockwise closing

28.2 Requirements for All Valves

All valves shall comply with the following (unless inapplicable):

(a) Valves shall be designed and constructed to ensure reliable operation after long periods of non-operation.
(b) Valves shall be double-flanged unless unavailable or otherwise specified.
(c) Valves and their method of actuation shall be designed to operate under the full pressure rating of the valve.
(d) If not obvious from the configuration, all valves, including valves with gearboxes and valves with actuators, shall be provided with an indication of the current position as well as an indication of the closing and/or the opening direction.
(e) Spindle covers shall be provided for valves with rising spindles.
(f) The specific application shall be taken into account in the corrosion protection of valves.
(g) Cast iron valve components, including valve bodies, shall be protected with System – "Fusion Bonded Epoxy" or System – "Hot-Applied Thermoplastic".
(h) Metal plating of ferrous materials is not an adequate corrosion protection system.

(i) Lever handles on small bore valves and position indicator plates shall be of stainless steel.
(j) Fasteners shall be of grade 316 SS, or better. This applies to all fasteners on the body of the valve and its gearbox. Pipework flange bolts are specified elsewhere.

28.3 Cast Iron Gate Valves with Resilient Seals

Resilient seal gate valves may be used on raw water and general duties where some solids may be present but must not be used on high solid applications such as sludge and grit duties. The valves shall comply with the following:

(a) The valves shall comply with SANS 664 or SANS 665, Class 10 or higher as required.
(b) The valves shall be double flanged.
(c) Valves shall have rising spindles unless otherwise specified or necessary because of space restrictions. Non-rising spindle valves shall be fitted with indicators showing the valve opening position.
(d) Handwheels shall be of cast-iron.
(e) The spindle shall be of grade 316 SS, or better.
(f) Fixing lugs for end of travel limit switches shall be provided
(g) Handwheel size and construction shall permit easy opening of the gate when subjected to a differential pressure equal to the maximum operating pressure anticipated. Suitable gearboxes shall be fitted to provide easy opening when necessary. These gearboxes shall be grease filled.
(h) Valves larger than DN 150 shall be provided with bypass arrangements.

28.4 Cast Iron Gate Valves (Wedge Gate)

Wedge gate valves shall be used on raw water and treated water duties but shall not be used on raw water, sludge and general duties where some solids may be present. The valves shall comply with the following:

(a) The valves shall comply with SANS 664 or SANS 665, Class 10 or higher as required.
(b) The valves shall be double flanged.
(c) The material of the body seat and the material of the gate trim shall be of copper alloy or stainless steel.
(d) The body shall be provided with channel guides for gate travel. The gate shall be provided with shoes which slide within the channel guides. Guides and shoes shall be of a copper based alloy or of stainless steel and shall guide the gate along the complete travel distance.
(e) Fixing lugs for end of travel limit switches shall be provided.
(f) Valves shall have rising spindles unless otherwise specified or necessary because of space restrictions. Non-rising spindle valves shall be fitted with indicators showing the gate position.
(g) The spindle shall be of grade 316 SS, or better.
(h) Handwheels shall be of cast-iron. Handwheel size and construction shall permit easy opening of the gate when subjected to a differential pressure equal to the maximum operating pressure anticipated. Suitable gearboxes shall be fitted to provide easy opening when necessary. These gearboxes shall be grease filled.
(i) Valves larger than DN 150 shall be provided with bypass arrangements, normally isolated by brass ball valves.
(j) Valves larger than DN 250 shall be provided with doors for inspection and cleaning.
(k) The valves shall comply with the additional requirements of CMC-WS15:1993 where applicable.

28.5 Knife-Gate Valves

Knife-gate valves shall be used on water sludges as well as on primary, waste activated and digested sludge duties. They shall also be used on water and other liquid/solids application and may be used for duties specified under Clause "Cast Iron Gate Valves with Resilient Seals".

The valves shall comply with the following:

(a) Valves shall have cast iron bodies, stainless steel blades, cast handwheels, and shall have no carbon steel parts.
(b) Valves shall be clockwise closing (with the exception of valves for the Bulk Water Branch which shall be anti-clockwise closing).
(c) Valves shall have chamfered blade edges and resilient body seals.

(d) Blade faces shall be surface ground or otherwise provided with two flat, parallel surfaces.
(e) The blade seal shall be protected by a non-metallic scraper or similar device.
(f) Suitable sealing shall be provided to prevent leakage from the valve and it shall be possible to adjust these seals while the valve is in line under pressure.
(g) Valves shall be droptight but need not be designed for bi-directional flow unless called for in the Detailed Mechanical Specification.
(h) Internal and external surfaces of the valve body shall be protected with a water resistant, non-toxic and non-tainting, FBE pipe coating in accordance with System – "Fusion Bonded Epoxy".
(i) Valves shall be double-flanged and shall suit the standard flange rating but may incorporate drilled and tapped fastener holes (wafer type valves will be considered for acceptance only where it is unlikely that the pipe or flanged item on either side will have to be removed or if isolation will not be necessary if it is removed). Fasteners may be studs or setscrews manufactured to suit the tapping depth.

28.6 Waterworks Type Butterfly Valve

These are the type which utilise a replaceable rubber seal with retaining ring and shall be used on raw and potable water duties. Valves shall comply with CMC-WS1:1995.

28.7 Resilient Seal Butterfly Valves

These are the type which either utilise a resilient body liner with a stainless steel disc or utilise a resilient-lined disc for sealing. They may be used on air, gas and clean liquid duties where approved by the Engineer and shall comply with the following:
(a) Shafts and fittings shall be of stainless steel and bearing bushes shall be of Teflon or similar. Seals shall be selected to suit the application. No carbon steel components shall be permitted internally and externally such components shall be properly protected.
(b) Valves shall be air, gas and water tight when closed, as applicable.
(c) Hand lever valve actuation with a locking system for incremental valve setting from fully shut to fully open shall be provided for valves up to and including DN 200. Valves larger than DN 200 shall be equipped with robust, weatherproof grease-filled gearboxes with an indicator to show the degree of valve opening.
(d) For normal usage, the valves may be of the type which is clamped between two flanges. Where it is necessary to remove equipment on either side for maintenance purposes, suitable spacer pipes must be provided or the valves shall be flanged and provided with drilled and tapped holes.
(e) The valves shall be installed with their disc shafts in horizontal orientation.

28.8 Bronze Isolating Valves

These may be used for isolating duties on clean air and liquid duties up to DN 50.

Bronze gate valves shall be to SANS 776.

Ball or plug valves of appropriate construction may also be used where preferred.

28.9 Diaphragm Valves

Diaphragm valves may be used on air, water, sludge and other dirty or corrosive liquid duties as well as clean liquid duties. The diaphragm material shall be suitable for the fluid to be carried.

Valves shall be double-flanged and shall preferably be of the straight-through type. The weir type may be used for control valve duties. The design shall allow for replacement of the diaphragm without removal of the flanges from the line.

This type of valve shall not be used on the suction side of pumps or on any line subject to vacuum unless designed specifically to cope with design conditions.

28.10 Needle Valves (above DN 150)

Needle valves, VAG Plunger Valve or equivalent, shall be used for the regulation of flow and/or

pressure in pipelines containing water where the size is DN 150 or greater unless this is overridden by the requirements of the Detailed Mechanical Specification. The configuration shall be double-flanged with co-axial flanges unless otherwise specified.

The seal seat and associated downstream parts shall be selected to prevent any cavitation for the application. Such parts shall be of stainless steel or copper based alloy.

28.11 Telescopic Overflow Valves

Telescopic overflow valves, (Fulton, or equivalent), shall be vertically mounted and shall be specifically designed for the purpose intended.

Operation shall be by handwheel mounted on an independently mounted headstock. Rising spindles are preferred. The outer tube shall be flanged and bolted to a similarly flanged vertical pipe. The inner tube shall incorporate a conical bellmouth. The bridge connnecting the inner tube to the valve's spindle shall be attached to the outside of the bellmouth in order to limit the effect of fouling rags, etc.

The spindle shall be of grade 316 SS, or better. The outer tube and inner tube shall be of 3CR12. The headstock and handwheel shall be of painted cast iron or painted 3CR12.

28.12 Level Control Valves

Level control valves which do not incorporate pilot control are preferred, VOSA Series 7354 or equivalent.

Level control valves which incorporate pilot control shall be simple to check and to maintain. A suitably sized strainer shall be provided to prevent blockage of the pilot. The strainer shall be self-cleaning or shall be easily cleaned.

Level control valves which are not proprietary items and which incorporate linkages shall be designed with overall strength and rigidity in mind. The design shall incorporate an allowance for fatigue effects.

29. CHECK VALVES

29.1 General

Where special valves are necessary for special applications, these will be specified in the Detailed Mechanical Specification but, if not, tenderers must select suitable valves and provide details in the tender. Check valves to be used on the more common applications are specified below.

Single-door and double-door check valves shall comply with SANS 1551-1 unless overridden by the requirements of this Clause.

Bronze swing type check valves may be used for pipework up to DN 50.

29.2 Requirements for All Check Valves

Check valve installations shall comply with the following:

(a) Valves shall be designed and constructed to ensure reliable operation after long periods of non-operation.
(b) Valves shall be double-flanged unless unavailable or otherwise specified.
(c) Valves shall be designed to function correctly under the full pressure rating of the valve.
(d) The specific application shall be taken into account in the corrosion protection of valves. Steel and cast iron valve components, including valve bodies, shall be protected with System – “Fusion Bonded Epoxy” or System – “Hot-Applied Thermoplastic”.
(e) Fasteners shall be of grade 316 SS, or better. Flange fasteners are specified elsewhere.
(f) Check valves shall be sized to open fully at the system’s design flow rate.
(g) The check valve installation shall ensure that the valve is able to operate without interference from a physical obstruction such as a shut-off valve, bend, mortar lining, etc. Where a check

valve is located close to another valve, a straight pipe shall be provided and this shall have a flange-to-flange length of not less than 1,5 times the valve diameter.

(h) Indelible body markings, as per SANS 1551-1, shall include the manufacturer's name, pressure rating (PN), nominal size (DN) and the direction of flow.

(i) A shut-off valve shall be installed downstream of each check valve.

29.3 Axially-Sprung Check Valves for Water

Axially-sprung check valves (nozzle check valves) for treated water and raw water duty shall be double-flanged; RGR Concentric, Vent-O-Mat Maxiflo or equivalent.

The valve design shall prevent shock closing and shall incorporate a hydrodynamically efficient flow path to minimise head loss.

The spring shall be of stainless steel and the guide rod shall be supported within a non-corroding, non-galling bearing material.

29.4 Double-Flap Check Valves for Water

Double-flap check valves for treated water and raw water duty shall be of the positive-closing type; Crane Duo-Chek II or equivalent.

Bodies shall be of cast-iron or cast-steel. Flaps shall be of the light, leaf type, shall be of bronze or stainless steel with machined sealing faces, shall be specifically designed to be non-sticking, and shall have teflon bearing washers. Seals shall be of resilient material. The axis of rotation of the flaps shall be vertical, pins shall be of 316 SS, or better, and closure shall be initiated by stainless steel springs, suitably rated for the duty so that closing is initiated prior to the onset of reverse flow.

Positive, external indication of the position of both plates shall be provided.

29.5 Rubber Diaphragm Check Valves

Rubber diaphragm check valves shall be of the double-flanged configuration and shall incorporate a hydrodynamically efficient flow path to minimise head loss; VAG Top-Stop or equivalent. Valves featuring multiple small orifices will only be acceptable for nominal flow speeds below 0,5 metres/second.

The flexible rubber diaphragm shall be replaceable.

29.6 Ball Check Valves

Ball check valves, AVK Series 53 or equivalent, may be used on water, sludge or similar applications.

The ball shall be rubber coated and it shall be possible to inspect and/or replace it without removing the valve from the pipework.

29.7 Swing Check Valves

Suitably designed swing check valves may be used on water, sludge or similar applications. Orientation of the valve shall comply with the manufacturer's recommendation.

Swing check valves shall:

(a) be of double-flanged configuration.

(b) have ductile iron bodies.

(c) be suitable for a working pressure of at least 1 000 KPa.

(d) be fitted with a side lever and adjustable weight.

(e) be provided with a bolted cover which provides access, without dismantling or removing the valve, to the swing flap.

(f) have stainless steel hinge pins.

(g) have engineered plastic or non-ferrous bearings.

30. AIR RELEASE VALVES

30.1 General

Air release valves for water pipework shall be of the non-slamming type, A.R.I. or Vent-O-Mat or equivalent.

Valves for water and similar duties shall be specifically designed for the application.

30.2 Arrangement and Installation

Air valves shall be installed above pockets designed to collect the air entrained with the water flow. The pockets shall be designed in accordance with the requirements for nozzles in the Clause "Pipework". The diameter of the nozzle shall be at least half the diameter of the parent pipework.

Valves shall have flanged connections and shall be provided with upstream isolating cocks.

31. VALVE ACTUATORS

31.1 General

Manual operation, by lever, handwheel, etc., shall be provided on all actuators unless otherwise specified.

The direction of operation of handwheels shall comply with Clause "Valves for Liquids or Gases".

Metal plating of ferrous materials, (e.g. zinc or cadmium plating) is not an adequate corrosion protection system for items such as actuator shafts and such items shall be provided with an additional coating of a semi-setting, thick protective layer, such as a suitable Tectyl product, or equivalent.

31.2 Electric Actuators

Electric actuators shall be specifically matched to the design duty. Actuators providing modulating duties shall be specifically designed for continuous modulation.

The actuator motor and gearbox shall form one integrated unit. Motors shall be for three phase, 400 Volt, 50 Hz supply, shall be Class F insulated (or better) and shall have an embedded thermostat for overload protection. The complete unit, including installation work, glands and controls shall be ingress protected to IP 68 unless otherwise specified.

If the opening or closing period is specified in the Detailed Mechanical Specification (e.g. to avoid water hammer) this period shall be achieved, without pulsing, by incorporating a suitable gear ratio to allow the motor to operate from fully open to fully closed without stop/starts.

For open/shut duties, the continuous actuator torque rating shall be at least 200 % of the start-opening or shut-off torque, whichever is higher, specified by the valve manufacturer for this application (after the gearbox mechanical advantage has been taken into account). For modulation duties, the continuous actuator torque rating shall be at least 400 %.

All components of the drive shall be designed to prevent backlash.

Electric actuators shall incorporate the following features:

(a) hand operated gearwheel override operation incorporating open/close direction indication.
(b) visual valve position indication at the unit.
(c) the terminal compartment shall be separately sealed from the internal electronics and mechanisms.
(d) the actuator shall initiate a trip if:-
    - it does not succeed in moving the valve within a suitable period.
    - the motor windings overheat.

Where specified in the Detailed Mechanical Specification, the following shall be provided:

(e) the actuator shall provide an impact effect to overcome:-
    - tightly seated valves.
    - an unintended loss of movement.

(f) the following information shall be fed back to the control panel or, if applicable, the SCADA system:-
    - valve position.
    - torque on output shaft.

(g) it shall be possible to configure the control instructions and interrogate the actuator status without removing covers.

31.3 Pneumatic Actuators

Pneumatic actuators shall be selected to match their valves' operating requirements.

Actuators shall be fabricated of non-corrosive materials and shall be mounted using stainless steel mounts and couplings. Fasteners shall be of stainless steel.

Unless the system configuration clearly does not require it, automatic spring-closing shall be provided to ensure that the valve closes (if open) or remains closed (if closed) upon power failure or failure of the air supply. The spring shall be of stainless steel.

Linear actuators shall be provided with stainless steel cylinder piston, cylinder rod and attachments. For open/shut duties, continuous actuator force rating shall be at least 200 % of the start-opening or shut-off force, whichever is higher, specified by the valve manufacturer for this application (after any mechanical advantage has been taken into account). For modulation duties, continuous actuator force rating shall be at least 400 %.

For open/shut duties of rotational actuators, continuous torque rating shall be at least 200 % of the start-opening or shut-off torque, whichever is higher, specified by the valve manufacturer for this application (after any mechanical advantage has been taken into account). For modulation duties, continuous actuator torque rating shall be at least 400 %.

The air supply upstream of each actuator shall be fitted with a filter-regulator unit with an automatically operating water drain trap.

32. BASEPLATES

32.1 Baseplate Configuration

Both direct-coupled and belt-driven machines shall be mounted with their drivers on common cast iron or fabricated steel baseplates of rigid construction.

In applications where baseplates are not practical, machined soleplates, suitably fixed and grouted to the concrete plinths, shall be provided. No machine may be mounted directly onto a concrete base without the use of either a baseplate or soleplate.

32.2 Corrosion Protection

Steel baseplates shall be hot-dip galvanized unless specified otherwise in the Detailed Mechanical Specification.

32.3 Drainage

Baseplates shall be configured to prevent pooling of water. Baseplates shall be either fully grout filled or provided with drain holes in all side members.

32.4 Machined Mounting Pads

The baseplate shall incorporate machined mounting pads at the support and fixing positions of each item of plant and equipment to be mounted on the baseplate. On fabricated baseplates this machining shall be done after fabrication, stress relieving (if applicable) and hot-dip galvanizing are complete. The thickness of the mounting pads shall be not less than 1,25 times the diameter of the holding down bolts. The pads shall not be provided with threaded holes for machine screws but shall be drilled for inserting through-bolts and adequate provision shall made for reaching the nut with a suitable spanner. In the period between machining and installation of the equipment, the machined surface shall be protected against corrosion by a removable coating. After installation, a non-hardening compound, Tectyl or equivalent, shall be applied to exposed machined surfaces and to the crevice formed at the foot of the equipment.

The above design may be suitably modified if the Contractor uses a pourable resin based chocking system. Such chocks shall be at least 15 mm thick.

32.5 Shimming

Not more than three shims may be used at any point and these must be made of a corrosion resistant material.

32.6 Jacking Arrangement

At least two diagonally opposed jacking screws shall be provided for belt tensioning in the case of belt-driven units. Direct-coupled motors above 10 kW shall be provided with jacking screws for horizontal alignment and direct-coupled motors above 150 kW shall be provided with jacking screws for vertical alignment as well. Jacking screws shall be of grade 316 SS, or better.

Drilled and tapped flat plate is not acceptable for jacking points. A jacking point shall consist of a suitable hot-rolled steel section welded to the baseplate and with a captured machine nut to accept the jacking screw.

32.7 Grouting

Baseplates shall be designed and grouted to eliminate collection points for water or dirt. Except where otherwise approved in writing by the Engineer, all baseplates on concrete plinths shall be fully grouted in. Grouting holes must be provided on baseplates having a continuous top plate. Tapped holes and fixing setscrew protrusions shall be suitably protected.

The material used for grouting shall be a non-shrink, cementitious grout (ABE Duragrout 1000, or equivalent). ABE Epidermix 324, or equivalent, is acceptable if the Contractor’s design requires an epoxy grout to be used.

The initial grouting shall be overseen by the grout supplier's technical representative.

32.8 Fasteners

Anchor fasteners shall be of grade 316 SS, or better.

A small amount of a nickel-based, anti-seize compound shall be applied along the full length of fastener threads before the nut is applied.

32.9 Alignment

Preliminary alignment of equipment mounted on baseplates shall be done at the factory to ensure that the baseplate has been correctly manufactured, but final alignment shall always be done on Site after installation and grouting has been completed. Alignment shall be accurate and to the approval of the Engineer and a final alignment check witnessed by the Engineer must be carried out by the Contractor prior to start up.

33. GUARDS

Guards shall comply in all respects with the Occupational Health and Safety Act of 1993 as amended and the following points shall also be noted:-

(a) Guards are required to cover all moving or revolving components of machinery. **Guards which do not adequately cover moving protrusions such as keys, lock-nuts, lockwashers, setscrews, etc., or irregularities such as keyways, will under no circumstances be accepted.**

(b) Guards shall be neatly and rigidly constructed and fixed and shall not vibrate or cause noise during operation.

(c) Where expanded metal or similar mesh is used, the mesh opening shall not permit a circular object 10 mm or larger to penetrate.

(d) Mesh shall not be used for chain guards but on belt drives the side of the guard most conveniently sited for inspection shall be constructed of expanded metal or similar. Mesh should similarly be used in other situations where inspection or ventilation is required.

(e) Guards shall completely enclose drives and shall entirely prevent a person from touching any moving protrusion.

(f) Allowance must be made for adjustment on belt guards or where adjustment will be required.

(g) It shall be possible to remove the guard easily for maintenance purposes.

(h) Guards shall preferably be fabricated of 316 stainless steel (uncoated) but may also be hot-dip galvanized, hot-metal zinc-sprayed or hot-metal aluminium-sprayed carbon steel, coated to Specification in all these cases. Fasteners shall be M10 or larger and shall be of 316 stainless steel.

34. ELECTRIC MOTORS

34.1 Rating

All electric motors shall be rated for operation on a 3-phase, 4-wire, 400/230 volt, 50 Hz, AC supply at sea level, with an ambient temperature of up to 40 ºC.

The rated power of the motor shall be selected to be not less than 20 % in excess of the designed power requirement of the associated plant unless the motor forms part of a packaged unit and/or where the size of the motor is specified and/or as otherwise approved by the Engineer.

A motor shall be selected so that it shall reach full operating speed within 10 seconds for the method of starting and drive arrangement used.

34.2 Specifications

Except as otherwise specified, motors shall be standard squirrel cage or slip-ring motors complying with SANS 1804 as amended, with IP55 enclosure and IC 0141 cooling, and suitable for a damp environment. Motors shall be suitable for both "continuous running duty", Duty Class S1, and "intermittent periodic duty", Duty Class S3. Windings shall be copper conductors insulated with Class F material (100 ºC rise capability) with Class B temperature rise (80 ºC). The motors shall be suitable for 6 starts per hour, two of which shall be consecutive.

34.3 Type

The type of motor (and starter if applicable) to be supplied is determined by the requirements of the application specified in the Detailed Mechanical Specification and by the starting limitations specified in the Electrical Specification. In the absence of such specifications, a standard squirrel cage motor complying with this Clause shall be offered.

34.4 Construction

Motor frames shall be of the totally enclosed fan cooled type with cast iron yoke frames and cast iron end covers. Sheet steel is not acceptable for fan cowls and these shall be of cast iron, tough plastic or stainless steel. The end covers and yoke shall be properly machined and each cover shall locate on a spigoted register to ensure concentricity and parallelism. Bearings shall be of grease lubricated roller and/or ball type, provided with grease nipples (with extension tubes where access is restricted) and sealed to suit external use. Motors required for external use shall be fully weatherproofed.

34.5 Terminal Boxes

Terminal boxes shall be top mounted wherever possible and arranged for cable entry from either side. The two ends of each stator winding shall be "brought out" to the terminal box. Squirrel cage motors shall be wired to permit both direct-on-line and star-delta starting.

34.6 Thermistors

Motors of 55 kW and up to (but not including) 150 kW, as well as motors for variable speed drives shall be provided with thermistors embedded in the windings of each phase. The thermistor tails shall be "brought out" to separate terminals mounted near the motor winding terminal block.

34.7 RTDs

Motors rated at 150 kW and above, both fixed and variable speed, shall be provided with PT 100 type RTDs. Two RTDs shall be provided per phase winding. All six shall be incorporated into the control system; three to provide monitoring and three to provide high temperature trip functions.

34.8 Heaters

Motors of size 75 kW and above shall be fitted with "pocket" heaters. The heater shall be mounted at the bottom of the motor frame and shall be replaceable without dismantling the motor. These shall be arranged to switch on when the motor stops operating and switch off when it starts operating.

34.9 Slip-Ring Motors

Slip-ring (wound rotor) motors shall be of the totally enclosed fan cooled type with stainless steel slip-rings. The slip-rings shall be mounted inboard of the non-drive end bearing and shall be fitted and keyed to the shaft as a single unit. The terminal box shall be common to both stator and rotor connections.

The brush holders shall be manufactured from fibreglass and shall be removable from the terminal box as a complete unit. Where the current density in a single brush at the full operating load approaches or is above 80 % of the capability of the brush, then an additional brush shall be provided in a separate brush box.

34.10 Motor Speed

Motor speeds shall be selected as follows:

(a) motors with ratings below 30 kW can have nominal speeds up to 3 000 rpm.
(b) preference shall be given to motors with nominal speeds up to 1 500 rpm for ratings between 30 kW and 132 kW, both inclusive.
(c) motors with ratings above 132 kW shall have a nominal speed of 1 500 rpm or below.

34.11 Variable Speed Applications

In applications where the motor speed is controlled by variable frequency drive, the motors shall be cooled by a separate, 50 Hz motor driven "piggy-back" fan. This requirement will be waived if the Contractor can provide documentation to confirm that the drive and motor design can operate in the application, with shaft-mounted fan, without overheating. This requirement does not apply to submerged motor applications.

34.12 Hazardous Locations

When required to suit a hazardous location in terms of SANS 10108 or in terms of this Specification, suitable motors complying with SANS 60034-5 or SANS 61241, as appropriate, shall be supplied. The relevant SANS certificates, clearly indicating the location classification in which the machine may be operated, shall be submitted to the Engineer before delivery of the motors. Each motor shall be clearly and permanently marked with the applicable certificate number.

34.13 Special Motors

Should the Tenderer wish to offer a different type of motor to those specified so as to obtain special starting characteristics and/or variable speed, a full technical specification of the motor must be supplied and such specification shall be for equipment to a standard at least equal to that of the motors specified above. In particular, no item of electrical protection shall be omitted.

34.14 Warning

Motor manufacturers must be warned that the motors are to be installed in an extremely corrosive and often damp environment. All motors shall therefore be adequately protected against corrosion.

35. POWER TRANSMISSION

35.1 Shaft Couplings

Shaft couplings shall be selected to reduce transmission of misalignment forces and of torsional oscillations between the driving and driven machine. Couplings shall, wherever practical, be of the rubber-tyre or rubber compression type, keyed to the shafts.

Elastomeric elements shall be urethane based. Flexible metallic elements shall be of stainless steel. Couplings shall not require lubrication.

Spacer couplings shall be used in all cases where this will assist maintenance.

Coupling guards shall comply with the requirements of the OHS Act and shall be to the approval of the Engineer.

After installation, the alignment of all couplings shall be checked by the Contractor in the presence of the Engineer or a person delegated by him. Alignment shall be accurate and to the approval of the Engineer.

35.2 Vee Belt Drives

Vee drives shall be designed to suit the power rating of the motor using service factors appropriate to the driving and driven machinery. Drives shall be designed, manufactured and installed in accordance with BS 3790 and ISO 4184, utilizing taperlock pulleys with taperlocks keyed to the shaft.

Where alternative pulley diameters can be selected, preference must be given to the larger pulley diameters to minimize the belt loading on bearings.

Tenderers shall ensure that the bearing arrangements of driving and driven machinery are designed to cope with the loads imposed by vee-belt drives and shall incorporate lay shafts where necessary. Lay shafts shall be supported by bearings mounted in bearing housings which are adequately sealed and fitted with grease nipples. Bearing units incorporating open, shielded bearings are not acceptable. Tenderers shall submit their design calculations and drawings for lay shaft arrangements for acceptance by the Engineer. Bearings shall be designed for an L_{10} life exceeding 100 000 hours.

35.3 Motor Driven Gearboxes

Gearboxes shall, unless otherwise specified, be supplied with environmental protection to IP 55.

Gearboxes shall be selected using a service factor of 1,75 based on the drive rating and shall have an efficiency of not less than 96 % on two stage reduction and 95 % on three stage reduction. Gears shall be case hardened, profile ground and lapped, helical and spiral bevel gears.

Roller bearings shall be used throughout. Bearings shall be designed for an L_{10} life in excess of 100 000 hours.

The gearbox housing shall be of rigid cast iron construction preferably split in the horizontal plane. A

breather designed to prevent moisture from entering shall be fitted.

Oil-bath gearboxes shall have suitable oil level indicators or dipsticks. Unless otherwise decided by the Engineer, the drain from the gearbox shall be extended beyond the base so that the oil can be easily collected. The drain line shall be of grade 316 stainless steel and shall be fitted with a ball valve and square-head plug.

Each gearbox shall be mounted on machined sole plates fitted with jacking screws to assist with alignment.

36. MACHINE VIBRATION

The mechanical vibration of machines measured at all important points such as bearings shall be lower than that specified as "good" for that class of machine in BS 7854 (ISO 10816).

Reciprocating machines shall be designed and installed so that the machine vibrations are isolated from the floor structure. Vibration isolation mountings which will eliminate not less than 90 % of the vibrations transmitted by the equipment shall be provided between the baseplate and the concrete plinth. When mounted on the vibration isolators, distortion of the baseplate shall be negligible in comparison with the permissible and acceptable misalignment of the equipment mounted thereon.

Shafts shall be designed so that the critical speed is outside the operating speed range.

36.1. Condition Monitoring Portable Verification

Portable verification vibration analysis shall be performed as defined in the Detailed Mechanical Specification.

General

Condition Monitoring Portable Verification comprises actions of collecting regularly information about machinery condition to detect failures or deterioration of machinery. Measurements and observations shall be carried out during operation of the equipment at various sites within Transnet. A full technical report with corrective measures should be issued upon completion of the work and feedback should be given to the responsible person / people involved. The mechanical vibration of newly installed machines measured at strategic

predetermined points shall be lower than that specified as "good" for that class of machine in ISO 10816 and ISO 2372.

The purpose of machine condition monitoring is to monitor the state of a machine and detect any deterioration in condition, to determine the cause of this deterioration and predict when failure can be expected. The result is to maximize the availability and utilization of the machine elements (bearings, gears etc).

Scope of Work

This specification provides for the supply of computerised condition monitoring services within Transnet sites. The service shall be provided by suitably qualified and experienced individuals and shall include labour, material and travel cost.

Data shall be collected by the Contractor onsite with a hand held machinery analyser. The captured data shall then be downloaded into a database for trending and analysis.

It will remain the responsibility of the Contractor to co-ordinate his site visits with the relevant personnel prior to visiting the site. On arrival the Contractor must liaise with the relevant personnel and obtain the necessary approvals and permits before proceeding to monitor any equipment.

If parts of machinery components or even components as a whole, which influence the operation of the condition monitoring system, have to be changed / renewed, the Contractor shall ensure that the condition monitoring system is still functioning reliably.

The Contractor must submit a full report on all data collected. Colour coding shall allow for easy differentiation of trends and data points outside normal accepted parameters. The table below shows the classification of vibration severity zones along with the relevant colours.

Table D37: Classification of vibration severity zones

VIBRATION SEVERITY (ISO 2372)					
Machine		**Class I** **< 15 kW**	**Class II** **15 – 75**	**Class III** **> 75 kW**	**Class IV** **> 75 kW**
	mm/s				
Vibration Velocity V_{RMS}	0.28	A	A	A	A (Good)
	0.45				
	0.71	B			
	1.12		B		
	1.80	C		B	
	2.80		C		B (Allowable
	4.50	D		C	
	7.10		D		C (Tolerable
	11.2			D	
	18.0				D (Not perm ss ble)
	28.0				
	45.0				

These evaluation zones are defined to permit a qualitative assessment of the vibration of the given machine and provide guidelines on possible actions.

Classifications:

Class I: Small (up to 15kW) machines and subassemblies of larger machines.

Class II: Medium size (15kW to 75kW) machines without special foundations or machines up to 300kW rigidly mounted on special foundations.

Class III: Large rotating machines rigidly mounted on foundations which are stiff in the direction of vibration measurement.

Class IV: Large rotating machines mounted on foundations which are flexible in the direction of vibration measurement.

Detailed Reports shall include:

- Photographs of the monitored equipment depicting drive end (DE) and non-drive end (NDE)
- Photograph of the monitored equipment nametag
- Existing fault levels
- Existing alarm levels
- Vibration amplitude (mm/sec) – assessed against evaluation zones as described in the table
- Frequency (Hz) – refer to ISO 2954
- Plot trends and dynamic data points – Trend, spectrum and wave form
- Trend display and overall vibration levels
- Findings and recommendations
- Data capturing and analyses equipment calibration certificates

All material which the successful Contractor is required to prepare or develop in the performance and completion of this contract, including exception reports, trend plots, dynamic data plots, notes and reports shall become the sole and exclusive property of the Transnet without limitation when made or prepared, whether delivered or not. The Contractor shall however retain the right to use the same to perform the work under this contract.

It will remain the responsibility of the Contractor to ensure that all data are backed up onto a reliable storage medium.

Condition of Measurement Roots and Points

Before any data may be collected or processed the plant to be monitored must be configured in software to define the points to be monitored. All available machine data, parameters, alarm levels, and known fault frequencies must be noted.

The Contractor shall at all times utilize the most cost efficient and technically reliable technology to accurately diagnose and report on the machine health, identifying any possible defects.

The Contractor shall comment on visual inspections (oil leaks, cleanliness, loose items, blocked vent, open wires, safety issues etc) and general machine as well as factory condition.

Plant to be monitored

Analysis shall be performed on each individual rotating machine component rated larger and equal to 15kW within an operating speed of 120 rpm and 3000 rpm. Machines to be monitored shall include:

- Blowers and Fans
- Electric Motors
- Gearboxes
- Generators
- Pumps
- Turbines

For each point on the motors, gearbox and blower shaft bearings the FFT frequency range must be set correctly to monitor frequencies of interest i.e. bearings and gears. Vibration readings must be recorded on all machine-bearing points in the Radial, Vertical and Axial planes where permissible.

Experience and Qualifications

Inspection personnel engaged in the execution of this contract shall be adequately qualified and trained. Minimum training requirements for individuals shall be in accordance with ISO 18436-2:2014 Vibration and Condition Monitoring – Category 2 (or equivalent). The Contractor shall submit copies of CV's and training certificates upon request.

Contractors shall state their experience with this type of work by completing the appropriate schedules.

37. NOISE CONTROL

37.1 General

Noise emitted by equipment shall be kept to a minimum and shall not exceed the noise levels specified in these documents.

37.2 Noise Levels

The sound power of any equipment shall not exceed 89 dB(A) (referred to 10^{-12} Watts) unless specifically approved by the Engineer. This is approximately equivalent to a sound pressure level of 81 dB(A) at a radius of one metre from the acoustical centre assuming uniform hemispherical propagation in a free field on a hard floor. In certain instances, a lower noise level may be called for in the Detailed Mechanical Specification.

Where the Contractor is unable to restrict the noise level of the machines to the maximum specified by the appropriate selection of suitable equipment; e.g. by selecting slow speed or silent type machines, quiet type cooling fans, suitable silencers, etc.; this shall be clearly pointed out by the tenderer so that appropriate steps can be taken at the design stage to counteract the effects of noise.

37.3 Acoustic Treatment

Acoustic enclosures are not acceptable unless specifically called for. Acoustic treatment of high noise sources must, however, be included where applicable where this can be done without greatly interfering with operation or maintenance.

When acoustic lagging is called for in the Detailed Mechanical Specification this shall consist of a 100 mm thick layer of rockwool having a density of 60 kg/m^3, suitably fixed in place and reinforced to prevent collapse, and covered with 25 mm thick asbestos free plaster having a density of 1 000 kg/m^3 (I.P. Insultex AF720, or equivalent). The outer surface shall be finished off with scrim cloth before being painted.

It is not necessary to lag flow meters and cast iron valves on acoustically lagged pipelines. Components

which can move, such as those associated with expansion bellows or mechanical couplings, shall be enclosed by an effective acoustic enclosure designed to prevent sound transmission but able to cope with movement without damage.

37.4 Measurement

Noise levels will be verified by taking impulse weighted L_{eq} readings in dBA over ten minutes at the specified positions. Readings so achieved shall not exceed the specified level by more than 2 dBA. Should the noise exceed the specified level or should the level be in dispute, the Contractor will be responsible for obtaining certified sound pressure levels across the full octave band mid-frequency range in order to establish the precise A-weighted level.

38. THERMAL LAGGING

Thermal insulation shall only be carried out after successful pressure testing of the equipment.

The efficiency of the insulation system shall exceed 90 % and the insulation cold face temperature shall not exceed 40 ºC.

Pipe insulation shall consist of pre-formed insulation material having a thermal conductivity of approximately 0,040 W/mK at 60 ºC. The insulation material shall not have any corrosive effect on the pipework and, in particular, it must be noted that fibreglass may not be used on stainless steel.

Inside buildings, or in other protected areas, pipe insulation shall be supplied with a canvas covering having a 50 mm lap at one end and along the longitudinal seam. The laps shall be sealed using a suitable lagging adhesive. On bends the insulation material shall be neatly mitred and covered with canvas. At all flanges the insulation shall be closed off. Flanges, couplings, tees and valves shall be insulated using a removable canvas blanket or jacket fastened in place with brass hooks and eyes.

All insulation shall be coated with a suitable sealer and then painted in accordance with the colour code. The manufacturer shall advice regarding the paint types and system to be used.

Outside buildings or in other exposed areas pipe insulation shall be fixed in position using three bands per section or a suitable adhesive and then clad with aluminium. All longitudinal and circumferential joints shall incorporate a 50 mm lap with each edge grooved. The longitudinal joints shall be positioned in the "twenty past" position with the lap and groove downwards. All ends next to couplings or flanges shall be closed off and sealed before fitting muff type insulation and cladding over the couplings and flanges. All bends, tees and other fittings shall also be insulated and clad but valves need not be insulated. All joints shall be primed and sealed using a silicone or other appropriate sealer and the contractor shall generally ensure that the lagging is weatherproof with particular attention being paid to all joints and pipework support or anchor points.

With large exposed items such as vessels mounted outside, the Tenderer shall recommend a suitable system incorporating a 20 mm thick, smooth layer of weatherproof, reinforced plaster covered with a scrim cloth and overcoated with at least two coats of fibre reinforced resin sealer.

39. BEARINGS

39.1 General

Bearing systems shall be designed to provide safe start-up and shut-down, under normal stoppages as well as electrical supply failure, without damage.

Unless prevented from running in a particular direction, rotational bearings shall be designed to support shaft rotation in both directions.

39.2 Bearing Choice

Bearings shall be chosen primarily to suit the equipment manufacturer's requirements and the plant's design conditions but the following guidelines shall be considered:

(a) Greased lubricated bearings are generally acceptable for units with power ratings up to 100 kW.
(b) Units with power ratings between 100 kW and 1 000 kW shall preferably be provided with rolling element bearings.
(c) Units with power ratings above 1 000 kW and with high speed shafts shall preferably be provided with plain bearings (oil-film type). Plain bearings shall be provided with oil ring lubrication or positively fed lubrication.

39.3 Design Life for Rolling Element Bearings

Ball and roller bearings shall generally be selected for a design life of 100 000 – 200 000 hours;

i.e. the bearing manufacturer's category for machines required to work with a high degree of reliability 24 hours per day.

39.4 Thermal Alarms

Thermal alarms on bearing systems shall be set in accordance with the specific instructions of the equipment manufacturer or, if it necessary for these to be set on Site, such alarms shall be set after no less than 24 hours of operation have occurred.

40. LUBRICATION

40.1 Grease Lubrication

Where greasing points are not easily accessible, grease lines shall be piped to an easily accessible position for manual greasing. Each grease point shall be provided with completely separate pipework.

A distributor shall be provided where motorised lubrication is provided to more than one destination. The distributor shall be a positive displacement device which ensures equal, successive lubrication to all destinations.

Pipework for grease distribution shall be of stainless steel or non-ferrous metal.

40.2 Oil Lubrication

Where oil lubrication is provided, the Contractor is responsible for the initial oil fill and the first oil change, including flushing, draining and filling, after an initial run-in period not exceeding 3 months.

Oil level indicators shall be fitted for visual checking. Drain cocks, including 316 SS fittings where necessary to permit convenient draining, and plugged at the end, shall be provided for oil reservoirs exceeding 1,5 litre capacity. Drains shall be from the lowest point and syphon type drains are unacceptable.

Lubrication systems shall be designed to exclude dirt and moisture. Air vents on the oil reservoir shall incorporate filters. Drain facilities shall always be provided.

41. CENTRIFUGAL PUMPS

41.1 Pump Duty

Details of pump duties are given in the Detailed Mechanical Specification and the type of pump and materials of construction shall at all times be selected to suit the fluid to be pumped and the performance requirements.

Pumps handling water and sludges shall be capable of running without choking, clogging, any liquid which may contain long fibrous material; vortex or open impellers are therefore preferred.

41.2 Pump Type

Centrifugal pumps shall, wherever possible, be of the single-stage, end-suction, back pull-out type, direct-coupled to the motor using spacer type couplings and complete with common baseplate and guard. Close-coupled pumps may be used on clear water applications for motor sizes up to 2,2 kW.

41.3 Pump Speed

Preference shall be given to pumps which operate at 1 500 rpm or lower. Pump speed and casing test pressures must be given in the Tender.

41.4 Performance Parameters

Performance characteristics shall be suitable for parallel operation with pump head increasing continuously to shut off. The pump shall be selected to operate as close as possible to best efficiency at duty point and shall be adequately sized to safely permit an increase in capacity of at least 25 % should the head be lower than estimated.

41.5 Margin of Power

A non-overloading absorbed power characteristic, preferably with maximum power absorbed at best efficiency, is preferred.

The motor's continuously rated power shall exceed the greater of the following:

(a) 10 % above the maximum power demand under any condition of operation for the pump, including open discharge.

(b) 20 % above the pump's maximum power demand over the full range of flow and pressure conditions anticipated in the pump installation.

41.6 Life

Pumps and motors shall be designed for long life under continuous operation. Bearings shall be designed for an L_{10} life of not less than 100 000 hours.

41.7 Impeller

Preference shall be given to pumps whose impeller diameter does not exceed 95 % of the maximum impeller diameter for the volute/diffuser provided. The impeller surface finish shall be up to N7. The peripheral speed of impellers should be designed not exceeding 10.5 m/sec.

41.8 Lubrication

Unless otherwise specified in the Detailed Mechanical Specification, bearings shall be grease lubricated and adequately sealed against the ingress of moisture or dirt.

41.9 Vibration

Rotating elements shall be balanced.

The vibration severity of the unit during operation shall not exceed Vrms = 1 mm/s at the pump and motor bearings.

41.10 Pump Glands

Shaft sealing shall be arranged as follows:

(a) **For clear, non-aggressive liquids up to 200 kPa** discharge pressure - shaft sleeve with packed gland or mechanical seal.

(b) **For clear non-aggressive liquids at pressures above 200 kPa and for clear corrosive liquids at any pressure** - 316 stainless steel shaft sleeve with mechanical seal.

(c) **For liquids with solids in suspension at any pressure** – mechanical seal or packed gland with hardened and/or protected stainless steel shaft sleeve and grease seal. If a mechanical seal is specified, the pump gland shall be arranged to suit a clean water flush. A throttle bushing made of a suitable non-corrosive, self-lubricating material shall restrict the flushing water flow into the pump. Mechanical seals for such applications shall have silicon or tungsten carbide sealing faces.

41.11 Venting

A vent cock shall be fitted to the highest part of the casing.

41.12 Connections

Suction and discharge connections shall be flanged for pump connections larger than 40 mm.

Pump connections of 40 mm and smaller may be screwed. Unions shall be incorporated in the pipework close to the suction and discharge connections.

A flexible coupling shall be fitted close to the pump’s suction connection.

41.13 Isolating and Check Valves

Isolating valves shall be provided on the suction and discharge of all pumps. A check valve shall also be fitted between the discharge isolating valve and the pump except where reverse flow through the pump when stationary cannot occur. Any reducing necessary shall be done immediately next to pump connections.

41.14 Pressure Tapping Points and Gauges

Pressure tapping points shall be provided near the suction and discharge connections of each pump. These points shall be located, where feasible, on a straight length of pipework where readings will be steady and accurate. Pressure (or suction, as applicable) gauges shall be fitted at these tapping points. Gauges shall measure gauge pressure (i.e. not absolute pressure).

41.15 Strainers

A centrifugal pump which draws from a tank or sump shall be protected by a strainer, suitably designed for the installation. The strainer shall be installed between a shut-off valve and the pump.

42. DRAINAGE PUMPS

42.1 General

This Clause applies to drainage pumps to be provided for applications involving seepage, slow leakage, etc. Drainage pumps which are to prevent accidental flooding or other large inflows of water shall be specifically designed for the application by a pump engineer.

42.2 Pump

Pumps shall be of the free-standing, submersible water, heavy construction, cast-iron type. Drive motors shall be three-phase units with oil bath and shall have protection to IP 68. The shaft shall be of stainless steel. Switching shall be done in accordance with liquid level by a float switch on cable (pivoting arms will not be acceptable).

42.3 Installation

Drainage pump installations shall comply with the following:

(a) The discharge pipework shall be rigidly supported at a distance not exceeding 1 000 mm. The discharge point shall be indicated by the Engineer.
(b) The discharge pipework shall incorporate a check valve on the initial upward run of pipework.
(c) The pump's discharge shall be connected to the discharge pipework via a clear flexible hose. It shall be possible to remove the pump and check valve without damaging the pipework.
(d) Discharge pipework shall be of uPVC, Class 12 or higher.
(e) The area of the outlet pipework shall not exceed 200 % of the area of the pump outlet.
(f) Discharge pipework shall be sloped up away from the pump at all points apart from a single final straight run to the drain which may slope downwards at any angle.

43. PUMP PERFORMANCE TESTING

43.1 Performance Test

The pump units including the pump coupled to the motor, shall be tested at the manufacture's works in the presence of the engineer or his representative. The cost of carrying the work performance tests shall be deemed to be included in the overall cost of the plant. The test results should be supplied to the Client Branches within two weeks.
Works tests includes:

a) Balancing of the complete impeller and shaft at the manufacturers place
b) Flow head curves shall be genetated at the manufactures premises and checked against the manufacture's listed pump curves for any major discrepancies

43.2 Testing On Site

The testing of the pumping plant shall be carried out strictly in accordance with BS 599: 1939 or according to the conditions of contracts where specified in the detailed Mechanical Specification. During the testing of each unit careful examination will be important and the records are to be kept. The examination records should incorporate the following:

- Differential pressure rise across the pump
- Pressure (suction and discharge)
- Flow (instantaneous and totalized)
- Electrical power consumption
- Efficiency
- Bearing temperatures and vibration analysis

The pumping unit shall be calculated to determine whether these are in compliance with the guaranteed figures submitted by the contractor at the time of tendering.

After commissioning, checks should be carried out for proper functioning, direction and speed of rotation, and power consumption over the Trial Operation Period. Equipment performance will be considered acceptable when the requirements as specified have been met consistently during test period. The performance of the equipment shall be examined and tested at 1, 3, 6, 9 and 12 months intervals during Defects Notification Period. At each test intervals performance reports including items of examination should be submitted to the engineer.

44. LIFTING EQUIPMENT

44.1 General Requirements

Lifting equipment shall comply with the following general requirements:

(l) The design, fabrication and installation of lifting equipment shall be fully in accordance with the relevant aspects of the Occupational Health and Safety Act and Regulations.

(m) Lifting equipment shall be designed, constructed and installed in accordance with an internationally accepted technical design standard.

The guidelines given in the Southern African Steel Construction Handbook may be used where applicable and where these do not conflict with the internationally accepted technical design standard.

(n) Test certificates shall be provided for all items of lifting equipment.

(o) The safe working load (SWL) shall be permanently marked on all items of lifting equipment.

(p) Lifting equipment and installations shall be inspected and shall be tested over the complete lifting range using a test load.

Unless otherwise specified in the internationally accepted technical design standard, the test load shall be:

- at least 125 % of the SWL for equipment with a SWL of up to 10 tonne SWL;
- at least 110 % of the SWL for equipment with a SWL of 10 tonne and above.

(q) High-tensile and alloy steel chains shall have a factor of safety of at least four. Other chains shall have a factor of safety of at least five.

(r) Steel-wire ropes shall have a factor of safety of at least six. Man-made fibre ropes or woven webbing shall have a factor of safety of at least six. Natural fibre ropes shall have a factor of safety of at least ten.

(s) Anchor fasteners for securing steel structures to concrete shall have a diameter of not less than M16 and shall be of grade 316 SS, or better.

(t) Foot-plates for columns which form part of lifting gantries shall be secured with a minimum of four anchor bolts.

(u) Hollow steel sections such as pipes and tubing are not acceptable as structural members unless the section is fully closed by welding.

(v) Tenderers shall note that many aspects, such as fabrication, welding, corrosion protection and fasteners, shall be in accordance with the requirements of other clauses in this Standard Specification for Mechanical Works (including General Works).

44.2 Steel Gantries

In addition to the general requirements for lifting equipment, steel gantries shall comply with the following:

(w) The same internationally accepted technical design standard used for the design of the crawl beam or crane shall be used for designing the gantry which supports the crane or crawl beam.

(x) Columns shall be cross-braced and/or “triangulated” in more than one plane. In other words, columns shall not be cantilevered in any vertical plane.

(y) Gantry steelwork shall be hot-dip galvanised. If this is not feasible, steelwork shall be hot-metal zinc-sprayed, sealed and coated in accordance with the clause “Corrosion Protection : Metal Coatings”.

44.3 Overhead Travelling Cranes

In addition to the general requirements for lifting equipment, overhead travelling cranes shall comply with the requirements below.

44.3.1. General

Construction of the crane shall be in accordance with BS 466 and BS 2573 (or BS EN 13 001), as applicable. All welding of steelwork shall be carried out in accordance with BS EN 1011 by competent artisans meeting the requirements of BS 4872. (Suitable equivalent standards are acceptable).

Design requirements for the fixing and installation of the crane rails shall be provided by the Contractor to the Engineer for acceptance.

The Tenderer shall determine a suitable method of installation for the crane and the crane rails and shall manage all work accordingly.

The Contractor may use the crane during the installation of other parts of the Works on condition that all testing and certification for the complete lifting installation, including the supporting structure, has been successfully completed.

44.3.2. Certificate

The Contractor shall supply to the Engineer a certificate from the crane manufacturer which:
(a) certifies that the crane has been manufactured in accordance with the requirements of the Driven Machinery Regulations of the Occupational Health and Safety Act; (b)
specifies the internationally accepted technical design standard used, and; (c)
states the SWL and the test load.

This certificate shall be provided to the Engineer prior to delivery of the crane to Site. D

44.3.3. Configuration

The overall configuration shall be as follows:
(d) the crane hoist shall be supported on and travel along a steel crane beam structure.
(e) the crane beam shall be supported on end carriages which travel along crane rails.
(f) the crane rails shall be supported along their full length, either on a concrete beam or on a hot-dip galvanised steel beam structure.

The crane long travel, cross travel and hoist shall be electrically-powered or manually operated as stated in the Detailed Mechanical Specification.

Unless otherwise stated:
(g) the lowest hook level shall be floor level.
(h) electrical control pendants shall be arranged to move independently along the length of the crane beam and shall be situated at one metre above floor level.
(i) the operating chains of manually operated cranes shall fall to one metre above floor level.

44.3.4. Construction

All materials shall be new and unused and suited to the application. Structural steelwork shall comply with the requirements of SANS 1431 and the grade used for structural members shall be 300 WC.

Fabrication shall comply with the following:
(j) Site welding will not be acceptable. (k)
Welding shall be continuous.
(l) Crevices will not be permitted.
(m) Weld slag and spatter shall be removed and welds shall be ground smooth prior to coating.
(n) Welds shall be free of blowholes and undercut.
(o) Edges shall be rounded to a radius of at least 3 mm.
(p) Open pockets which are inaccessible for preparation and coating will not be permitted.

The crane rails shall be standard rail sections. Rails manufactured from square section steel bar will not be acceptable. Rail lengths shall be joined using fish-plates, with at least four fasteners, to provide a continuous path for the travel of the crane wheels.

The crane beam and end carriages shall be designed with suitable dimensions, wheel spacings and gusset plates or diagonal bracing to prevent cross-whipping.

End stops with rubber buffers shall be fitted to prevent the hoist from moving off the travelling beam. Stops and buffers are also required to limit the long travel on the rails.

Lubrication systems shall be designed to exclude dirt and moisture and all gear wheels shall be fully enclosed.

Bearings shall be mounted in sealed, cast iron bearing housings or in totally enclosed and sealed housings, grease-lubricated and provided with grease nipples in both cases. The open type bearing units with exposed "lubricated for life" bearings will not be acceptable.

44.3.5. Installation

The crane and rails, when erected and installed, shall be of neat and workmanlike appearance, solidly and evenly supported, true to line, level, plumb and in proper working order. The crane rails shall be straight to within the permissible deviations given in BS 466 over their entire length.

The distance between rail supports shall not exceed 1 000 mm. Every rail length shall be supported at both its ends.

Crane rail anchor fasteners shall be M16 or larger and shall be of grade 316 SS or better.

The full length of the rails shall be grouted in cases in which the rails rest on a concrete beam. A suitable gap between the rails and the beam shall be provided for application of the grout. The grout shall be applied strictly in accordance with the manufacturer's instructions. The grout shall be neatly finished with a 45º chamfer. The Engineer shall be notified prior to application of the grout.

In the alignment of equipment or structures, the use of multiple shims will not be permitted. Shimmed feet shall be fully grouted to provide corrosion protection of the shims.

Grouting shall be done using a non-shrink cementitious grout, ABE Duragrout 1000 or equivalent, to the approval of the Engineer and in accordance with the manufacturer's instructions.

44.3.6. Corrosion Protection

The Contractor shall arrange for the fabrication of the crane to be inspected by the Engineer at the fabricator's premises prior to preparation for corrosion protection.

The crane beam and end carriages shall be hot-metal zinc-sprayed, sealed and coated in accordance with the clause "Corrosion Protection: Metal Coatings". Smaller items, such as cable brackets and protective covers, shall be hot-dip galvanized.

The crane rails shall be hot-dip galvanized after all fabrication work is complete. D

44.3.7. Maintenance Platform and Ladder

Where specified in the Detailed Mechanical Specification, a maintenance platform for two people shall be provided along the length of the crane beam.

The crane beam structure shall incorporate welded lugs onto which the platform shall be bolted; i.e. the platform shall be removable and shall not be welded to the crane beam. The complete platform and all guard-railing shall be hot-dip galvanised after fabrication. The platform floor shall have a minimum width of 500 mm.

Guard rails shall be provided on the maintenance platform and shall comply with the clause "Guard Railing".

Where specified in the Detailed Mechanical Specification, a hot-dip galvanised fixed steel ladder shall be provided at a suitable position within the building for accessing the platform on the crane. This shall comply with Clause "Permanent Ladders and Stairs".

44.4 Hoists

In addition to the general requirements for lifting equipment, hoists shall comply with the following:

(a) Hoists shall be provided with an overload prevention device; e.g. a clutch which slips upon overloading. Powered hoists shall comply in all applicable respects with Driven Machinery Regulation 18 of the Occupational Health and Safety Act.

(b) Powered hoists shall hold the load stationary upon power failure.

(c) The bottom hook shall swivel on a ball or roller bearing through 360º and the bearing shall have a protective skirt. The hook shall be fitted with a safety latch.

(d) Lifting chain is preferred, but corrosion-protected steel wire rope is acceptable.

(e) Chain boxes shall be provided for holding unloaded lengths of lifting chain.

(f) Wire rope hoists shall comply with the following:

- Drum diameter shall be at least 25 times the wire rope diameter.
- Drums shall have no more than three layers of wire rope when fully wound up.
- Drums shall have no fewer than three full turns of wire rope remaining when the hook is at the lowest design level.

44.5 Hoist Trolleys

In addition to the general requirements for lifting equipment, hoist trolleys shall comply with the following:

(a) Hoist trolleys shall be designed so that the trolley will remain on the support beam if a wheel falls off or a wheel axle fails.

44.6 Crawl Beams

In addition to the general requirements for lifting equipment, crawl beams shall comply with the following:

(a) Crawl beams shall be fabricated from standard I-Sections or standard H-Sections.

(b) Crawl beams shall be hot-dip galvanised after all fabrication is complete. If the zinc coating is removed or damaged by drilling or welding or any other activity, the complete beam shall have the zinc removed by abrasive blasting and it shall be returned to the galvanisers for hot-dip galvanising.

(c) Crawl beams anchored to concrete shall be secured using grade 316 SS, or better, anchor bolts. The anchor bolts shall, preferably, be through-bolted. If through bolting is not feasible and chemical anchor is used, every anchor shall be tested to the design load for the anchor prior to installation of the beam.

(d) Mechanical expanding anchors are not acceptable for anchoring crawl beams.

(e) Crawl beams fastened to steel support structures shall be secured using hot-dip galvanised fasteners.

44.7 Davits

In addition to the general requirements for lifting equipment, davits shall comply with the following:

(a) Davits shall be column mounted with swivelling booms and shall be designed to suit the application. Where specified in the Detailed Mechanical Specification, each davit shall be provided with a winch rigidly fixed to the davit at a convenient height and position.

(b) The davit shall be designed for a SWL at least 50 % above the load requirements of the equipment installation.

(c) Guide pulleys shall be provided to suit the arrangement. These pulleys shall be machined with a groove having a radius 5 % to 7,5 % greater than the rope radius and with a flare angle of 52º. The pulley effective diameter shall be not less than 25 times the wire rope diameter. The groove depth shall be twice the rope diameter or greater.

(d) The davit shall either be manufactured of grade 316L SS, or better, or of carbon steel, hot-dip galvanized and painted. All fasteners, pins, shafts, shackles, hooks, etc., shall be of

316 SS, or better. Guide pulleys and shafts shall be made of 316 SS, or better, or other approved corrosion resistant material, and shall use suitable non-metallic bearings which do not require lubrication.

(e) The swivelling arrangement shall be properly designed for easy operation, shall be accurately fitted and shall not be subject to corrosion problems. Bushes made of nylon, "Vesconite" or other suitable non-metallic material shall be used and any metallic rubbing mating face shall be of 316 stainless steel.

(f) Operating cross bars, locking arrangements, fixing arrangements, etc., shall not represent a hazard to passers-by. If necessary, operating levers shall be hinged so that they can be swung out of the way when not in use.

44.8 Hand Cranked Winches

In addition to the general requirements for lifting equipment, hand cranked winches shall comply with the following:

(a) Hand cranked winches shall be rated for a SWL of at least 50 % in excess of the expected working load. All gears, clutches, etc., shall be enclosed in a robust cast iron, cast steel or fabricated stainless steel casing which shall be grease filled and sealed against ingress of dirt and moisture. The winch shall be designed to hold the load stationary when the hand crank is released during raising and lowering. In addition, a locking arrangement to lock the position of the load at any point shall be provided.

(b) The force required to operate the winch at its maximum rated load shall not exceed 130 Newtons.

(c) The wire rope shall be of stainless steel. The wire rope shall be long enough to reach the lowest required position and still have at least 3 turns remaining on the drum. The drum size shall easily store the full rope length. The drum shall have a diameter of at least 25 times the diameter of the wire rope.

(d) The support brackets, all exposed fasteners, shafts, handles, pins, etc., shall be of 316 SS, or better, and the casing shall be hot-dip galvanized or hot-metal zinc-sprayed (to a thickness of 150 µm) and then painted.

45. INSTRUMENTATION

Environmental protection of electronic instrumentation shall be as follows:

(a) Instrumentation and associated displays and transmitters which are either located inside or located outside and above ground level shall have IP 55, or higher, rating.

(b) Instrumentation and associated displays and transmitters which are located in underground chambers shall have IP 68 environmental protection. The instrument shall be mounted in an enclosure which shall provide physical protection and shall be self-draining.

(c) Instruments and associated displays and transmitters which are located outside buildings shall be mounted in enclosures. Enclosures shall be of polycarbonate construction with transparent front, Fibox EK or equivalent. The complete enclosure installation shall have an IP 55 rating or higher. The enclosure size shall be chosen to provide a clearance of at least 100 mm all-round the instrument.

Instruments and their cabling shall be protected so that electromagnetic interference does not affect their operation and signal transmission.

Calibration certificates shall be included in the Manual.

46. FLOW METERS

46.1. Electromagnetic Flow Meters

46.1.1. Meters

Electromagnetic flow meter sensors shall be full-bore, in-line, double-flanged units with remotely mounted transmitters. The transmitters shall provide local flow indication and 4-20 mA output.

Sensors shall, unless otherwise specified, have IP 68 protection and transmitters shall have IP 67 protection.

Electromagnetic flow meters shall have polyurethane lined stainless steel tubes with either Titanium or Hastelloy C electrodes. Accuracy shall be ± 1 % of flow or better. Rubber linings are acceptable for treated water applications.

Calibration shall be in litres per second unless otherwise specified.

For applications other than for treated water, flow meters shall be provided with an electronically operated electrode cleaning device. Automatic, timed cleaning shall be provided.

46.1.2. Installation

The equipment shall be correctly installed, connected, adjusted and calibrated by competent persons. Calibration shall be done in the presence of the Engineer. The operation and signal transmission of meters against electromagnetic interference shall be provided.
The meter shall be installed with a straight pipe length of at least 10 pipe diameters upstream of the sensor and a straight pipe length of at least 5 pipe diameters downstream of the meter. If this is not possible, specific measures shall be taken to provide flow straightening. The complete meter installation shall comply with the manufacturer's instructions.

Grounding rings shall be supplied and installed if the application requires these.

46.1.3. Testing

A factory test calibration certificate shall be provided for each flow meter.

The flow meter shall be provided with a simulation test unit for field verification of the measuring system without removal of the sensor. If more than one identical model flow meter is installed, two simulation test units shall be provided.

46.2. Visual Flow Meters and Indicators

46.2.1. General

Visual flow meters or flow indicators shall be provided if specified in the Detailed Mechanical Specification. These are normally used for auxiliary circuits such as cooling and lubrication circuits and for flushing of mechanical seals.

46.2.2. Design and Materials

The units shall be of the double window type with a graduated indicating flap. Flow indicators which utilize a moving spinner or ball will be acceptable in some applications.

The body shall be double flanged and shall incorporate easy dismantling to allow cleaning of the windows.

Bodies shall be of stainless steel.

47. GAUGES

47.1. Gauges – General

Gauges shall comply with the following:

(a) Gauges shall be of durable, industrial construction. Case and bezel shall be of stainless steel unless this material is unsuitable.

(b) Scale markings shall be radial, plain, straight, black lines on a white background and shall be spaced so that one scale division represents approximately 1 % - 1,5 % of the maximum scale value in values of 1, 2 or 5 multiplied by any power of 10 to suit the maximum operating rating.

(c) On circular gauges the scale shall be concentric and the maximum and minimum scale values shall be near the bottom of the gauge, with the scale symmetrically disposed about the vertical centre line of the gauge.

(d) The tip of the pointer shall be of the knife edge type extending across the scale divisions and shall be as close as practical to the dial.

(e) Wherever applicable, **gauges shall be clearly strip marked in green to indicate the normal operating range and in red to indicate the non-permissible range of values.** Such markings shall always be on the inner scale face and not on the glass face.

(f) The units of measurement shall be clearly marked on the dial. A printed label of approved non-corrosive material indicating the duty of the gauge shall be neatly fixed on or near the gauge.

47.2. Gauge Installation and Mounting

Gauges shall be installed and mounted in accordance with the following:

(a) Gauges shall be mounted vertically and in such a position that they can be easily read from floor level.

(b) Flanged nozzles for gauge tappings shall be provided on the parent pipework. Nozzles shall comply with the requirements of the Clause "Pipework".

(c) Gauges for permanent equipment installations, such as for centrifugal and reciprocating pumps, shall not be mounted directly on pipework but shall be mounted on a wall or on a pedestal stand so as to minimise vibration. Gauge cocks shall be provided at each end of the connecting pipework.

(d) Pressure gauges shall be fitted with an isolating and air bleed cock.

(e) Pressure gauges used on water, sludge, powder, chemical or other applications where blockage or corrosion of the gauge is possible shall be fitted with a diaphragm type chemical seal, both being liquid filled. The portion of the seal in contact with the process liquid shall be of a suitable non-corroding material and, when solids are handled, shall have a large threaded socket connection not smaller than 1" BSP.

(f) Gauges for liquids containing solids shall have the nozzle on the side of the parent pipe and the configuration shall allow easy cleaning of the passageways.

47.3. Pressure Gauges

Pressure gauges shall comply with the following:

(a) Pressure, vacuum or compound gauges shall comply with SANS 1062. Gauges shall be of Accuracy class 1.6 and Durability grade A unless otherwise specified. The gauges shall bear the Standards South Africa mark.

(b) Gauges shall have a scale diameter of not less than 100 mm.

(c) Calibration shall be in kiloPascals with the full scale reading between 1,5 and 2 times maximum actual operating pressure except where otherwise specified. The full scale reading for a gauge on the discharge leg of a centrifugal pump shall be higher than the pump shut-off head.

(d) All gauges shall be suitable for continuous operation and shall be liquid filled on all pump applications and where fluctuations in pressure may cause damage.

(e) Gauges shall not be mounted directly on equipment subject to vibration. Gauges in pump stations shall not be mounted directly on the pipework and shall be connected to the pressure tapping point by small diameter stainless steel pipework.

(f) For dry locations indoors, the casing may be reinforced plastic or epoxy coated aluminium and the elastic element and shank of stainless steel. For damp indoor locations, particularly in any location where water is flowing, and for all locations outdoors, the gauges shall be weatherproof and have the cases and other metal components of grade 316 stainless steel.

(g) When used on steam lines a siphon shall be fitted between the steam line and the gauge which shall be filled with water before putting the gauge into service

47.4. Temperature Gauges

Temperature gauges shall comply with the following:

(a) Temperature gauges shall have dials not less than 120 mm diameter. Accuracy shall be ± 1 % of reading or better.

(b) The gauges shall be fitted vertically into removable 316 stainless steel wells and the gauges shall be removable without leakage from the pipe or vessel. Protrusion into a pipeline shall be kept to a minimum. When handling sludge, water or other abrasive liquids the protrusion shall not exceed 15 mm and in this case the wells shall also be of a heavy duty abrasion resistant type.

48. THERMOMETERS

Thermometers shall be of the liquid column type and the complete tube shall be protected by a sturdy pocket of stainless steel or brass.

49. CONTROL SYSTEMS

49.1. General

Control systems shall comply with the following:

(a) Control shall function as an integrated, coherent system.

(b) Protection systems shall be designed to prevent damage to equipment. Failing to start, tripping or stopping of any item of equipment shall prevent the start-up or shall initiate the appropriate shut-down procedure of related equipment in cases where damage could occur.

(c) Emergency stop stations shall be provided near to each motor driven unit.

(d) Digital indicators shall provide no fewer than three significant places (and, preferably, no more than three).

49.2. Design

The design of the control system, including drawings, functional specification, control panel layout, circuit diagrams and protection systems, shall be submitted to the Engineer for acceptance.

49.3. Testing and Commissioning of Control Systems

Setpoints for equipment and process parameters which are required for the operation of control systems shall be obtained once the equipment is operational.

The Contractor shall submit a schedule of all control functions to be checked on Site during testing and commissioning. This shall be submitted for acceptance by the Engineer. The format shall be as follows, or similar:

COMMISSIONING - CONTROL SYSTEM TESTS				
Date	Test Function	Test Method	Result (e.g. SCADA message, etc.)	Proposed Corrective Action

49.4. Technical Details

49.4.1. Control Panels

Where the details of motor starter panels have not been specified in the electrical specifications, every 400 V starter panel shall include the following standard equipment:

(a) Circuit breaker (complete with auxiliary contacts for control circuits).
(b) Contactor.
(c) Overload relay with manual reset
(d) Ammeter (CT based, if above 40A).
(e) Starter alive indicating light (Red).
(f) Motor running indicating light (Green).
(g) Running hour meter.
(h) Selector switch.
(i) Stop push button.
(j) Start push button.

49.4.2. PLC/SCADA Systems

Control systems utilising PLC/SCADA systems shall incorporate the following:

(o) The PLC/SCADA system shall be configured for equipment to be PLC controlled such that the installation will be able to operate following a failure of the SCADA system.

(p) Mimic screens provided for SCADA systems shall include the following (unless inapplicable):
- Overview of scheme; including the process flow diagram and indicating all electronically monitored parameters which are not included in a sub-system.
- Overview of each plant grouping.
- Individual unit (Centrifuge, compressor, pumpset, etc.).
- Equipment sequence selection.
- Equipment start interlocks.
- For each motor larger than 55 kW, motor status and, where applicable, motor protection relay diagnostic.
- Electrical reticulation schematic.
- Hardware diagnostic.
- Alarms.
- Set-points for alarm, trip and control loop functions (including password protected alteration facility).
- Record of equipment and process parameters at instant of equipment trip and station trip (see also below).
- Event log.
- Trending of monitored system parameters (see also below).
- Communication status of control system hardware.
- SCADA security system current settings, including personnel names.
- Ancillary equipment status; e.g. security, fire detection, UPS.
- Printing.

(q) Trend screens shall be as follows:
- Screens may include logical operational groupings.
- Points of inflection of measured parameters shall be recorded.
- Trend screens shall be provided for 3 hours, for 7 days and for 3 months (unless the nature of the parameter demands different scales).

(r) At least one colour printer (for graphs, mimics, etc.) and one line printer (for alarms) shall be provided in accordance with the detailed specifications.

(s) The control system shall provide an alarm on the SCADA screen if an instruction to an item of equipment to start or stop does not cause that item to start or stop.

(t) Alarm conditions which lead to the control system executing an equipment trip shall be logged. Subsequent alarms which occur as a result of the tripping action shall be logged as subordinate alarms. The condition **which caused the trip** shall be described with respect to the:

- Item of equipment.
- Trip setpoint reached.
- Description of parameter; i.e. flow, temperature, etc.
- Time of event.

(u) A time delay following an alarm condition leading to a control system trip shall be incorporated in order to prevent tripping actions caused by electrical disturbances or similar occurrences. The time delay chosen shall match the functional needs and shall be decided in conjunction with the Engineer.

(v) Three significant places shall be used for representation of values on SCADA systems.

50. CONTRACTOR'S DRAWINGS

The Contractor's drawings shall comply with the following:

(a) Drawings shall be provided in electronic data of AutoCAD format or compactable version indicating the true reflection of as built design.

(b) Drawings shall be prepared in accordance with the latest issue of SANS 10111. The equivalent BS code of engineering drawing practice will also be acceptable.

(c) Drawings shall be to A1 or A0 size.

(d) Drawings shall be to scale, with both the scale and the drawing being large enough to clearly show all relevant components of the plant and equipment.

(e) In addition to the usual plan and two side elevations, sufficient additional sections shall be included to clearly show the arrangement of all plant and equipment.

(f) Item lists shall be provided on the drawing or on a separate parts list.

(g) Item descriptions shall include the material of construction, quantity and full identification information, including, as applicable, brand name, manufacturer's reference number, model number, size, rating, source, duty, quantity, etc.

51. CONTRACTOR'S RESPONSIBILITY WITH REGARD TO CIVIL WORKS

Buildings and concrete structures will form part of a separate civil contract which will include all plinths, foundation blocks, rebates, pockets, holes, thrust blocks and so forth to accommodate the installation of the plant as must be detailed on the drawings and other information to be submitted by the Contractor in terms of the Contract.

While the building and civil work will be done by others under a separate contract, the Contractor shall, prior to taking possession of the Site and before delivering any equipment to site, inspect and check the related building and civil works for accuracy and suitability of construction and for conformance with the Contractor's drawings. No payments shall be allowed for additional costs to the Contractor resulting from a failure to check such works timeously.

Ensuring that holes through walls and floors have been done correctly will be the responsibility of the Civil Contractor however the supply and installation of all foundation bolts and grouting of bases, supports or any other mechanical equipment shall be the responsibility of the Mechanical Contractor.

52. TRAINING

52.1. General

During the Trial Operation Period, the Transnet's site staff will assist the Contractor in operating the plant and the Contractor shall train these staff in the starting, operating and stopping of the plant and shall train the City of Cape Town's maintenance staff on the maintenance requirements and procedures. Unless otherwise called for in the Detailed Mechanical Specification, the Tenderer shall price for the on-Site personal tuition of
10 operational staff members and 5 engineering staff members depending on the nature of the project.

The Contractor shall also provide the trainees with printed copies of the Operating and Training Manual which forms part of the Operation and Maintenance Manual.

52.2. Operational Staff Tuition

The Contractor shall provide the following tuition as applicable to the Contract:

(a) Start-up, shut-down and operating instruction for all operational modes for the Works shall be provided. This shall be comprehensive and shall include actions to be taken in the case of all alarm conditions and basic fault finding.
(b) A layout drawing of the installation, a process flow diagram, and a P&ID shall be provided for each Operator. The instructions described in (a) above shall also be provided in printed form for each Operator.
(c) If the specified control system is SCADA based, the tuition shall include instruction on the SCADA system.

52.3. Electrical Engineering Staff Tuition

The Contractor shall provide the following tuition as applicable to the Contract:

(d) Control system software instruction.
(e) Detailed overview of 11 kV protection and settings.
(f) Tuition on setting of 11 kV protection.
(g) Motor protection relay and settings.
(h) Overview of PLC programming for the purposes of making changes and re-loading programs if PLCs are replaced.
(i) Overview of SCADA system.

53. SPARES

Spares which are specified in the Detailed Mechanical Specification shall be packed individually in wooden boxes with the lids unattached. Each box shall be labelled with the Contract number, manufacturer, contents, relevant part/model numbers and the supplier's address. The boxes shall be brought to Site and the lids shall be secured to the boxes immediately after the Engineer has approved the spares and the packaging.

54. OPERATING INSTRUCTIONS AND SIGNAGE

Operating instructions and signage, if specified in the Detailed Mechanical Specification, shall comply with the requirements below.

54.1. Operating Instructions

Wall mounted operating instructions shall comply with the following:

(j) Start-up, Shut-down and Operating instructions shall be provided. These shall be comprehensive and shall indicate actions to be taken in the case of all alarm conditions. These shall be written from the point of view of the plant operator.
(k) A layout drawing of the equipment installation, a process flow diagram, and a P&ID shall be provided.
(l) Instructions shall be framed (wooden frame. glass front, hardboard backing) and shall be attached to the wall in the control room using brass screws.

54.2. Signage

Signs, suitably framed or encapsulated, which shall be provided by the Contractor in appropriate places on the walls of the plant room shall include the following:

(m) All statutory and special safety warning instructions.
(n) Course of action during/after electrical shock.
(o) Any operating restrictions for equipment.
(p) Operating instructions in cases of plant trip and electrical supply failure.
(q) Spares list.

Symbolic signs shall comply with SANS 1186.

The wording of the signs shall be approved by the Engineer prior to final printing. All signs shall cross refer, where applicable, to the relevant portion of the Manual.

All signs shall be installed prior to commissioning.

55. OPERATION AND MAINTENANCE MANUALS

55.1. Submission of Manual

Three draft copies of the Manual shall be submitted to the Engineer prior to commissioning the Works. One copy will be returned to the Contractor with comments. The second copy will be used by the operational staff on Site.

Six copies of the final version of the Manual, as accepted by the Engineer, shall be provided prior to the start of the Defects Notification Period.

55.2. General Requirements

The Manual shall comply with the following:

(r) The Manual shall be for the complete Works and shall be of a standard acceptable to the Engineer. It shall be in English and shall be practically and neatly presented.
(s) One Manual shall contain original documents and this set shall be marked "Original". The other 5 Manuals shall contain all the information in the original and shall be marked "Copy 2" to "Copy 6".
(t) Binders shall have hard, plastic protected covers utilising four-ring, spring-clip holders. Binders shall not be overloaded. One spare, empty binder shall be provided for every three used. A title label shall be affixed to the spine of all binders. This shall indicate Contract number, title, Contractor's name, Site/Plant name, volume number and contents.
(u) Sections and sub-sections shall be titled, uniquely numbered and provided with separator sheets.
(v) Printed matter which is inserted in the Manual shall be arrowed (indelibly) to indicate the equipment installed.
(w) Drawings shall be to a scale which makes details clear. Large drawings shall be held in plastic envelopes in the Manual. A4 and A3 drawings may be bound as normal pages. Drawings shall also be provided on electronic data storage in Autocad, or equivalent, format.
(x) Cross-referencing within the Manual is acceptable where duplication occurs.

55.3. Format and Contents

The Manual shall be in accordance with the following (the Contractor shall modify, elaborate and repeat this format as required):

CD Format

Each final copy O&M Manual shall be accompanied by a softcopy version (CD).

The folder and file layout of the CD softcopy shall reflect the equipment breakdown as per the hardcopy manual.

All necessary software programs and passwords to be provided.

No.	HEADING	CONTENT
1	**GENERAL**	
1.1	Contents List	Contents List for complete Manual.
1.2	Description of the Works	The description of the Works shall include a description of; firstly, the process; secondly, the design parameters and; thirdly, a detailed description of the equipment installation supported by drawings and
1.3	Equipment List	Equipment list containing each item of mechanical, electrical, instrumentation and control equipment. The equipment list shall include the make, model, serial number, description, size, range, performance data, motor and drive details, supplier's name, address and phone numbers, all as applicable. The design duty, the position of each unit's installation and its purpose in the system shall be given. Additional information which shall be provided for instruments includes the normal operating reading, maximum or minimum permissible readings, set-points (activation, warning and trip), etc. A separate list of all spares provided in
1.4	Drawing List	Drawing list of all the Contractor's drawings and the Tender drawings.
1.5	Cable Schedule	Cable schedule for power, data, control and instrumentation cables. This shall include the cable construction, conductor material, insulation, protection, voltage rating, start and finish points, route length, duty, load, voltage drop, core area, no. of cores, no. of cores used and gland size. For cable voltages above 400 Volts, the schedule shall also include the purchase details,
1.6	Documents	As-built system, layout and GA drawings. Plant circuit, flow diagrams and/or P&IDs. Control panel layouts. I/O list, program listing, loop and logic diagrams for each PLC. Colour prints of SCADA mimic screens, control faceplates and sequences. System control diagram and logic sequence chart. Copy of
2	**OPERATION**	
2.1	Control System	Description of control system; including all manual and automatic controls. This shall include controls, instruments, protection list, settings, indications, alarms, trips, etc.
2.2	Commissioning	Commissioning Instructions. Commissioning report.
2.3	Operating and Training Manual	Operating and training manual. This shall include normal start-up, adjustment, operating and shut-down procedures and any emergency operating procedures. All specific safety aspects as well as settings, adjustments, observation, etc. shall be provided.
3	**MAINTENANCE SCHEDULES**	
	Maintenance and Lubrication	Schedule of routine maintenance, by time period, for all mechanical, electrical, instrumentation and control equipment. This shall be all-inclusive but reference to manufacturer's standard manuals in other parts of the Manual is acceptable. The schedule shall incorporate a lubrication schedule of
4	**MECHANICAL EQUIPMENT** *(This section shall be repeated for each item of equipment)*	
4.1	Identifying Information	Identifying information for the item, copied from the Equipment List.
4.2	Nameplate	A photograph of the nameplate and a table containing the unit's nameplate
4.3	Design and Operation	Details of operating principles, construction and operating instructions.
4.4	Maintenance Information	Technical and maintenance information including instructions for installation, assembly, disassembly, lubrication, adjustment, calibration, reconditioning,
4.5	Spares	A spares list giving the item number, part number, description, quantity and materials. A list of spares recommended to be held
4.6	Test Results	Factory and Site test results.
4.7	Corrosion Protection	Corrosion protection systems used, coating supplier's data sheets and
4.8	Documents	Performance curves. Large scale, dimensioned, cross sectional and arrangement drawings of the item for assembly and spares recognition purposes, cross-referenced to the spares list. Dimensioned

5	**ELECTRICAL EQUIPMENT** *(This section shall be repeated for each item of equipment)*	
5.1 to 5.6	As for 4.1 to 4.6 for Mechanical Equipment (see above).	
5.7	Control Details	Control and electrical details, including logic sequence, circuit diagrams and software, as applicable.
5.8	Documents	Electrical reticulation drawings. Equipment overall dimensions. Wiring diagrams. Switchboard layout drawings and SLDs. Electrical panel construction drawings.
6	**INSTRUMENTATION EQUIP.** *(This section shall be repeated for each item of equipment)*	
6.1 6.6	As for 4.1 to 4.6 for Mechanical Equipment (see above).	
6.7	Documents	Circuit diagrams of instrumentation systems and of individual instruments. Installation arrangement.
7	**CONTROL EQUIP.; ETC.**	
7.1	Identifying Information	Identifying information for PLCs, transmitters, HMIs, computers, etc.; copied from the Equipment List.
7.2	I/O List	Cross-referenced listing of all I/Os used.
7.3	SCADA	Colour prints of SCADA mimic screens, control faceplates, sequences and trend screens. Schedule of alarm messages and TAG lists. File structures,
7.4	Program	CDs containing all software. An annotated program listing.
7.5	Documents	Schedule of cable terminals. Copy of SCADA hardware diagnostic
8	**DRAWINGS**	
	Drawings	All drawings not filed elsewhere shall be filed in this section.

56. STARTING, SITE TESTING AND COMMISSIONING OF PLANT

56.1. General

The Contractor shall advise the Engineer when instructions may be given to the Building Contractor to execute any necessary screeding and finishings around the Works. Tenderers shall allow a reasonable period in their installation programme for this work to be done and no compensation for delay in the commencement of testing and commissioning shall accrue to the Contractor during such period.

56.2. Preparation

Installation work shall be complete and accepted by the Engineer prior to commissioning.

Before starting up any section of the Works, the Contractor shall make all necessary checks to ensure that the installation has been correctly carried out, that all ducts, pipework, tanks, etc., are clean, that all equipment is correctly aligned, lubricated and connected up, and is in all respects ready to start with safety. The Contractor shall provide initial fill requirements, such as lubricating oil.

56.3. Starting-Up and Testing

The Contractor shall arrange for the Engineer to be present at initial start-up and also for any electrical and control instrumentation sub-contractors to be present.

The Contractor shall start up and test each section of the Works. These tests shall be carried out to certify that the Works is operating in accordance with the requirements specified and must be witnessed by the Engineer. All necessary modifications and rectifications shall be carried out during this period.

Setpoints for equipment and process parameters which are required for the operation of control systems shall be confirmed and recorded.

56.4. SCADA System

During commissioning of a new installation which incorporates SCADA as part of the control system, each control system alarm and interlock shall be tested and the resulting alarm messages shall be modified by the Contractor to be acceptable to the Engineer.
A schedule of alarm messages and their full explanations shall be inserted in the Manual.

56.5. Commissioning

When all tests have been completed to the satisfaction of the Engineer, the Works shall be commissioned. Unless the Engineer states otherwise, the complete plant, including all control functions and control systems shall be commissioned as a unit and the process performance requirements shall be achieved during normal operation.

Once the Works has been commissioned to the satisfaction of the Engineer, the operational acceptance period shall start and shall consist of a continuous period of operation free from trouble. Unless otherwise stated, this period shall be four weeks. During the operational acceptance period, the Contractor shall carry out all necessary servicing and any adjustments required. The plant staff will assist the Contractor in operating the Works during this period. The Contractor shall train the operational staff in the starting, operating and stopping of the Works, and shall train the maintenance staff on the routine maintenance requirements.

56.6. Commissioning Report

A comprehensive commissioning test report, including the SCADA system commissioning procedure and schedule of alarm messages, shall be submitted by the Contractor prior to issue of the Certificate of Completion and shall be inserted in the Manual.

The contractor shall provide the following performance reports: for commissioning and tests as said above, a report after month of commissioning, report after three, six and 12 months of commissioning.

56.7. Inspection

At the end of the Trial Operation Period, an inspection shall be done by the Contractor and the Engineer for the purpose of taking over the Works in terms of Clause 10 of the General Conditions of Contract.

56.8. Defects Notification Period

Refer to Clause 11 of the General Conditions of Contract and the Detailed Mechanical Specification for requirements regarding maintenance during the 365 day Defects Notification Period.

Reactive and proactive maintenance performed shall be captured by the Contractor and confirmed by the Senior Engineer. This communication shall be done in the following format:

Date:
Plant name:
Location and GPS:
Equipment reference / what failed:
What is the damage:
Causes of the damage: