# TRANSNET SOC LTD

**TENDER NO.: iCLM EL 725/TPT**
**(e-Tender Reference No.: TPT/2024/10/0023/81242/RFP)**

**DESCRIPTION OF THE SERVICES: REFURBISHMENT OF THE GRAIN ELEVATOR SUBSTATIONS AT THE EAST LONDON MULTI PURPOSE TERMINAL FOR TRANSNET SOC LTD (REG NO. 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED AS "TPT") FOR THE DURATION OF 12 MONTHS**

**ADDENDUM NO. 02** **DATED 18 November 2024**

The following information is hereby furnished for your further attention in respect of the above-mentioned service/tender.

1. **T1.2: Tender Data**
   Refer to Functionality Criteria (page 18 of 23):
   T2.2-07: Health & Safety
   Roles & Responsibility:
   S16.2 Assistant CEO; Construction Health and Safety officer; Works Supervisor; Risk Assessor; First Aider (trained level 1) **to be amended and read as follows:**

   **S16.2 Assistant CEO; CR 8.1 Construction Manager (Competent) and CR 8.5 Safety officer (SACPCMP Registered); Risk Assessor; First Aider (trained level 1)**

2. **PART C3: Scope of Work**
   - Refer to page 39 of 73 - Clause 7.5 (c) The Consultant/Contractor shall be in possession of the requested software and hardware to perform the study.

     **Clause 7.5 (c) to be amended and read as follows:**

     **The Contractor shall procure the latest version of the ETAP software tool as per annexure P – ETAP SPECIFICATION. The software tool shall be handed-over to the Employer complete with the as-built model of the power system upon completion of the project.**

     ETAP SPECIFICATION attached and included as Annexure P.

   - Refer to page 42 of 73 - Clause 7.6.3 Cable Installation
     a. The Contractor shall disconnect the existing MV feeder and incomer cables from the existing MV switchgear. The mentioned cables to be disconnected shall be reused in the new installation with new termination kits.
     b. The Contractor shall disconnect the existing LV feeder and incomer cables from the existing LV switchgear. The mentioned cables to be disconnected reused in the new installation with new termination kits.

**Clause 7.6.3 Cable Installation to be amended and read as follows**

a. **The *Contractor* shall disconnect the existing MV feeder and Incomer cables from the existing MV switchgear. The incomer cables shall be cut and joined with new 150mm2 XLPE SWA Cu 11kV 3 core cables using transition joints. The MV transformer feeder cables shall be replaced with new cables 95mm2 XLPE SWA Cu 11kV cables using the existing cable route.**
b. **The *Contractor* shall disconnect the existing LV feeder and incomer cables from the existing LV switchgear. The mentioned cables to be disconnected shall be replaced with new 630mm2 XLPE SWA Cu 11kV 1 core cables with new termination kits.**

**<u>Note to Bidder:</u> See changes to item 3 of section H for the amendment of the pricing schedule with regards to the addendum.**

**3. C2.2 The Bill of Quantities**

The following changes were made on the Bill of Quantities:

- Quantities changed on both items 1 and 2 under section F:

| **F** | **MEDIUM VOLTAGE CABLE TERMINATION** | | |
|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** |
| 1 | Supply new 630A Feeder MV plug type terminations designed to EN 50181 and DIN 47637. | 14 | ea |
| 2 | Supply new 1250A Incomer MV plug type terminations designed to EN 50181 and DIN 47637. | 7 | ea |

- Additional items added for item 3 under section H:

| **H** | **Cables, Routes, and Building Modifications** | | |
|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** |
| 3 | Provisional sum for the testing, joining and replacement of cables. | | |
| 3.1 | Supply, install, and commission150mm2 XLPE SWA Cu 11kV 3 core cable | 300 | m |
| 3.2 | Supply, install, and commission 95mm2 XLPE SWA Cu 11kV cable | 300 | m |
| 3.2 | 630mm2 XLPE SWA Cu 11kV 1 core cable | 200 | m |
| 3.3 | Select, Supply, and install MV cables transition joints (150mm2, 11kV, 3 core Paper oil impregnated to 3 core XLPE cable.) | 4 | ea |
| 3.4 | Select, Supply, and install MV cables transition joints (95mm2, 11kV, 3 core XLPE cable to 1 core XLPE cables). | 5 | ea |
| 3.5 | Select, Supply, and install MV cables transition joints (150mm2, 11kV, 3 core XLPE cable to 1 core XLPE cables). | 3 | ea |

- Item Descriptions changed for both items under section J:

| J | Power Quality | | |
|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** |
| 1 | Provisional sum for Power Factor Correction | 1 | Sum |
| 2 | Provisional sum for Harmonic Filtration | 1 | Sum |

**Note:**
**A revised RFP/Tender document is attached for completion by the bidder/tenderer. Bidders must ensure that they download the revised RFP/Tender document for completion and submission. Failure to submit the revised RFP/Tender document will result in disqualification and will therefore not be considered for evaluation.**

**4. Additional Information and Revised Drawings**

The following additional information and revised drawings are provided:

1. Grain Elevator Substation LV Layout
2. Grain Elevator Substation MV Layout
3. High Level Commissioning Plan
4. TPD-001-EL&PSPEC
5. TPD-002-DBSPEC
6. TPD-003-CABLESPEC
7. TPD-004-EARTHINGSPEC
8. TPD-007-MVSWITCHSPEC

**WITNESSES:**

_____ _____

***TENDERER / BIDDER***

Date: _____

**APPROVED BY:**

**Lesley Pillay** _____

***TRANSNET SOC LTD***

Date: 18.11.2024

Dear Sirs/ Madam

**TENDER NO.: iCLM EL 725/TPT**
**(e-Tender Reference No.: TPT/2024/10/0023/81242/RFP)**

**DESCRIPTION OF THE SERVICES: REFURBISHMENT OF THE GRAIN ELEVATOR SUBSTATIONS AT THE EAST LONDON MULTI PURPOSE TERMINAL FOR TRANSNET SOC LTD (REG NO. 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED AS "TPT") FOR THE DURATION OF 12 MONTHS**

Receipt of **Addendum No. 02 dated 18 November 2024** is hereby acknowledged.

Kind regards

_____
**TENDERER NAME**
**DATE:**

**NOTE:** This acknowledgement must be signed and returned via email on or before closing date of tender via email to granville.vandermerwe@transnet.net

**TRANSNET SOC LTD**

**SPECIFICATION FOR THE SUPPLY OF ETAP SOFTWARE LICENSE FOR TRANSNE SOC LTD (REG. NO. 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT").**

# ANNEXURE P – ETAP SPECIFICATION

| Document Reference | Title | Number Of Pages |
|---|---|---|
| | **SPECIFICATION FOR SUPPLY OF ETAP SOFTWARE LICENSE FOR TRANSNET SOC LTD (REG. NO. 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")** | **6** |
| | **Total number of pages** | **6** |

| REVISIONS | | |
|---|---|---|
| REV | DATE | APPROVED |
| | 07/11/2024 | |
| | | |
| | | |
| | | |

# 1. INTRODUCTION

TPT requests delivery from the contractor to provide an ETAP software modelling and simulation tool with a single standalone license.

## 2. BACKGROUND

ETAP is a software for electrical power systems modelling and simulation, optimizing customer electricity power systems from design and engineering to operations and maintenance.

ETAP delivers best-in-class, seamless customer experience and ensuring universal and Morden accessibility for designers, engineers, and operators empowering users to increase productivity, collaboration, and efficiency, and enabling the energy transition journey.

## 3. PURPOSE

Request for the supply of ETAP software.

## 4. SCOPE OF THE SPECIFICATION.

4.1 The *Contractor* shall in collaboration with the employer's ICT department ensure that the software, with all modules, is functional.

4.2 The *Contractor* shall arrange for training on all modules for four employer's personnel. The training shall be a formal training for users.

4.3 Details of software licence:

- The *Contractor* shall provide a new standalone licence with a standard support for the duration of 1 to 3 years.
- The bus level shall be **5000 buses.**

## 5. SPECIFIC DELIVERABLES FOR THE SUPPLY of ETAP SOFTWARE LICENSES

The most recent version of ETAP software shall be supplied with the modules and specifications listed below:

| Item Description | Maintenance Term | Licence Metrics | Quantity |
|---|---|---|---|

<table>
<tr>
<td>ETAP New License – 1 Single Commercial SA, unlimited Bus:<br><table>
<tr><td>Base Module</td><td>Multi-Dimension Digital-Twin Platform, Revisions, Libraries, Wizards</td></tr>
<tr><td>IEEE, ICEA, NEC</td><td>Cable Ampacity & Sizing - IEEE, ICEA, NEC</td></tr>
<tr><td>IEC 60502 & 60364</td><td>Cable Capacity, Sizing & Shock Protection - IEC 60502 & IEC 60364</td></tr>
<tr><td>Load Flow, AC</td><td>Power Flow, 3-Phase & 1-Phase Systems, Voltage Drop, Result Analyzer</td></tr>
<tr><td>Panel Schedule</td><td>Schedules, Calculations, 3-Phase, 1-Phase, NEC, IEC</td></tr>
<tr><td>Renewables</td><td>Wind Turbine Generator, PV Array - PV Pro, Controls, Libraries, Profiles</td></tr>
<tr><td>HVDC</td><td>Control Schemes, Dynamic Modes,</td></tr>
</table></td>
<td>In line with the standard offer.</td>
<td>Fixed/Standal one.</td>
<td>1</td>
</tr>
</table>

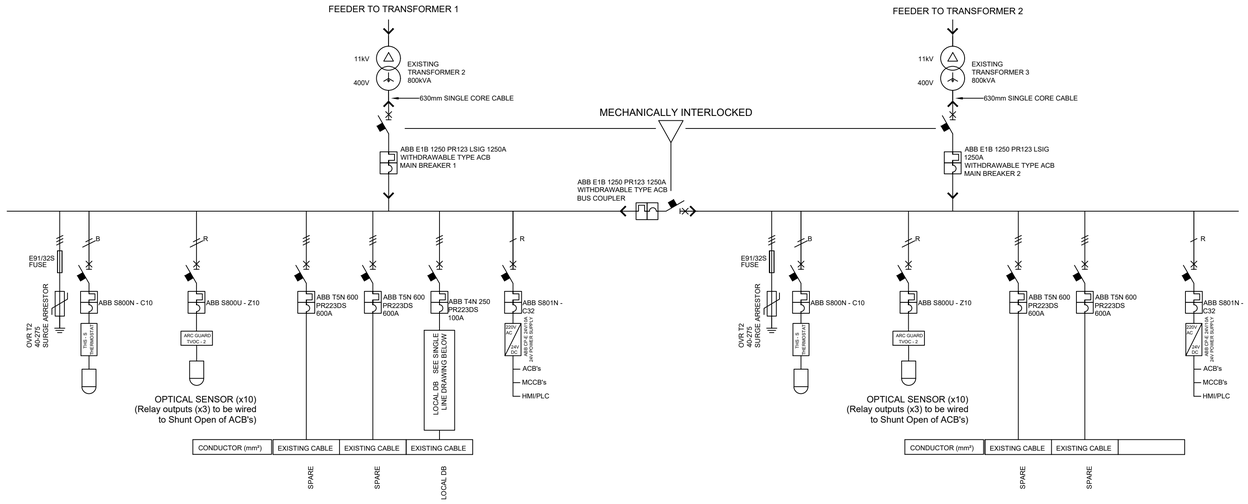
| | | | | | |
|---|---|---|---|---|---|
| | Rectification, Inversion | | | | |
| Short Circuit, AC | ANSI & IEC, Balanced 3-Phase & 1-Phase, Duty Evaluation, Analyzer | | | | |
| Arc Flash, AC | IEEE 1584 2018 & NFPA 70E 2021 - Analyzer, Work Permit, Safety Labels | | | | |
| Star | Protection, Selectivity, Sequence of Operation, Protective Devices | | | | |
| Star Auto-Eval | Auto-Evaluation of Protection, Selectivity, Zone, Arc Flash* | | | | |
| Harmonics | Harmonic Load Flow, Frequency Scan, Harmonic Filters & Sizing | | | | |
| Ground Grid | 3D Ground Grid Systems, IEEE 80 & 665, Finite Element (Irregular Grids) | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cable UG Thermal | UG Raceways, Direct Buried, Neher-McGrath, IEC 60287 | | | | |
| Load Flow, DC | Voltage Drop, Power Losses, Reports, IEEE 946 | | | | |
| Battery Sizing | Battery Discharge & Sizing, IEEE 308, 485, 946, Integrated with Control Simulator | | | | |
| Renewable energy | | | | | |

The Service Provider is required to provide the following as part of the deliverables:

1. Provide the ETAP licence software inclusive of all design modules.
2. Installation and testing of all modules.
3. Technical and backup support for the period of licencing or as a standard offer for the licence.
4. Accredited/ETAP approved formal training on all modules for four users.

# GRAIN ELEVATOR LV SINGLE LINE No2




| DISTRIBUTION BOARD SPECIFICATION | |
|---|---|
| SPARE WAYS | |
| DISTRIBUTION BOARD TYPE | FLOOR STANDING |
| MATERIAL | 3CR12 |
| THICKNESS OF MATERIAL | 2mm |
| PAINT TYPE | POWDER COATED (40 MICRONS) |
| FRAME COLOUR | BRUNSWICK GREEN |
| FORM TYPE | FORM 3B |

| MANUFACTURER | |
|---|---|
| ACB/MCCB / MCB MAKE | ABB |
| HMI/PLC MAKE | UNITRONIC/EAST COAST SOLUTIONS (V1040) |
| PFR MAKE | ABB (CM - PVE) |
| TERMINALS MAKE | ABB (ZS - RANGE) |
| | |

## NOTES

TERMINATION: CONTRACTOR TO ENSURE THAT ALL NEW CABLE TERMINATIONS BE MADE ON SABS APPROVED TERMINAL RAILS AND SHALL BE LOCATED IN THE SAME POSITIONS AS PER EXISTING INSTALLATIONS.

NO CABLE JOINTS WILL BE PERMITTED.

MCCB'S : SHALL BE FITTED WITH FRONT LEVER MECHANISM/LOCK (FLANGE).
SHALL BE FITTED WITH X3 AND X4 CONNECTORS.
VM210 SHALL BE ALLOWED FOR (ONE PER FIVE MCCB'S).
SHALL BE FITTED WITH AUX - E (AUXILLIARIES)

POWER SUPPLY : 24V DC POWER SUPPLY SUITABLE RATED FOR ACB'S;
MCCB'S AND HMI/PLC SHALL BE ALLOWED FOR TO SUPPLY WHARF PLUG SAFETY CIRCUIT

HMI/PLC : GSM MODEM FOR TRIP STATUS AND DATA ACQUISITION SHALL BE FITTED.
HMI/PLC SHALL DISPLAY VOLTAGE; CURRENT; POWER(S); TRIPS AND ETC FOR EACH AND EVERY MCCB

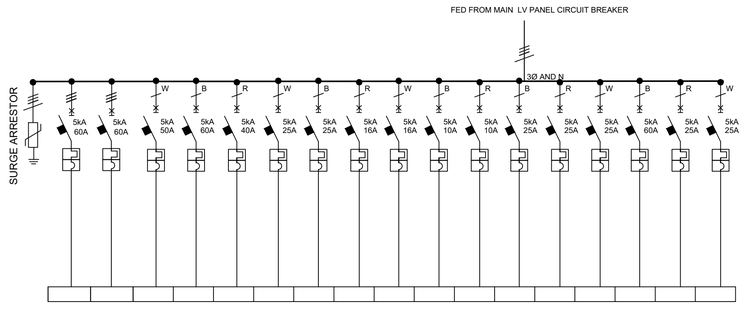
HEATERS: ANTI-CONDENSATION HEATERS 230V SHALL BE PROVIDED FOR ALL PANEL SECTIONS, AND BE CONTROLLED BY THS - S AS SPECIFIED.

ARC GUARD: RELAY (R1) TO OPEN MAIN BREAKER 1 DURING ARC/FLASH.
RELAY (R2) TO OPEN MAIN BREAKER 2 DURING ARC/FLASH.
IN ADDITION TO THE ABOVE RELAY (R1) OR RELAY (2) WILL OPEN BUS COUPLER DURING ARC/FLASH AS WELL.
RELAY (R3) SHALL BE WIRED TO HMI/PLC.

AUDIBLE AND VISUAL ALARM : CONTRACTOR SHALL ALLOW FOR INSTALLATION OF AUDIBLE AND VISUAL ALARM OUTSIDE SUB STATION CONTROLLED BY THE THS - S THERMOSTATS.

LIGHT BARRIERS : CONTRACTOR SHALL ALLOW FOR LIGHT BARRIERS IN BUSBAR CHAMBER

## LOCAL DB




| ESTIMATED LOAD | KW |
|---|---|
| CONDUCTOR SIZE | mm2 |

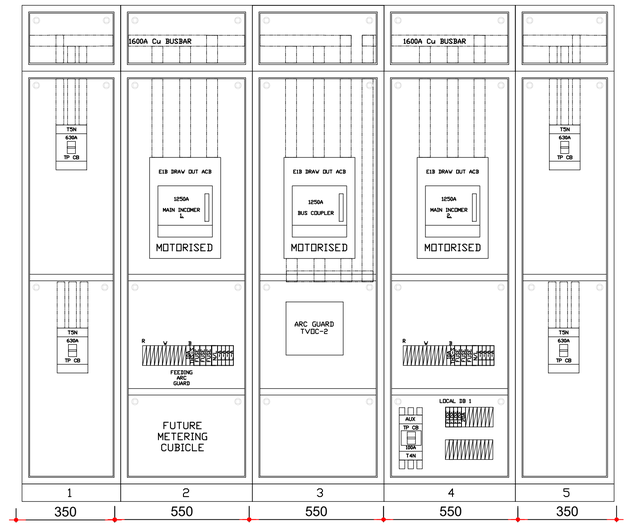
| DISTRIBUTION BOARD SPECIFICATION | |
|---|---|
| SPARE WAYS | 30% |
| DISTRIBUTION BOARD TYPE | . |
| MATERIAL | . |
| THICKNESS OF MATERIAL | . |
| PAINT TYPE | . |
| FRAME COLOUR | . |
| MCCB / MCB MAKE | ABB |

### DISTRIBUTION BOARD WARNING LABEL

WARNING

THIS IS A SERIES-CONNECTED (CASCADED) SYSTEM.
EXCEPT WHEN RECOMMENDED BY THE CIRCUIT-BREAKER MANUFACTURER, DO NOT REPLACE ANY CIRCUIT-BREAKER IN THE SYSTEM WITH A CIRCUIT-BREAKER THAT IS NOT OF IDENTICAL TYPE AND RATING

## GRAIN ELEVATOR LV PANEL LAYOUT No2




| | |
|---|---|
| TYPE | FLOORSTANDING |
| MATERIAL | 3CR12 STEEL |
| IP RATING | 40 |
| FORM | 3B |
| DOORS | NO |
| DEPTH | 900mm |
| PANEL CATCHES | SQUARE KEY |
| PANEL HINGES | BUTT HINGES |
| DOOR CATCHES | N/A |
| DOOR HINGES | N/A |
| ACCESS | FRONT & REAR |
| CABLE ENTRY | BOTTOM |
| CABLE EXIT | BOTTOM |
| COLOUR | BRUNSWICK GREEN |
| FAULT LEVEL | 20kA/25kA |

DRAWING NO. | REFERENCE

REFERENCE DRAWINGS

## NOTES :

1. THIS DRAWING FOR EL&P ONLY.
2. A CERTIFICATE OF COMPLIANCE TO BE COMPLETED BY CONTRACTOR ON COMPLETION OF WORK.
3. ALL D.B.'S AND ISOLATORS TO BE CLEARLY LABELLED.

| NO. | DESCRIPTION | BY | CHKD | APPD | DATE |
|---|---|---|---|---|---|
| 00 | ISSUED FOR CONSTRUCTION | ZWN | KZ | SM | 11-11-24 |
| 0A | ISSUED FOR TENDER | ZWN | KZ | SM | 27-03-24 |

REVISIONS



| CONTRACTOR / CONSULTANT | | | |
|---|---|---|---|
| TITLE | NAME | SIGN | DATE |
| . | . | | . . . |
| . | . | | . . . |
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| OPERATING DIVISIONS | | | |
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| TITLE | NAME | SIGN | DATE |
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| TRANSNET CAPITAL PROJECTS | | | |
|---|---|---|---|
| TITLE | NAME | SIGN | DATE |
| DRAWN | Z.W.N | | 11 11 24 |
| CHECKED | S.M | | 11 11 24 |
| DESIGNED | Z.W.N | | 11 11 24 |
| CHECKED | | | 11 11 24 |
| . | . | | . . . |
| . | . | | . . . |
| . | . | | . . . |

PrEng / PrTech Eng
NAME Samukelo Magcaba
SIGNATURE
DATE 11 11 24
REG. NUMBER 20190951
SCALE : A1

Transnet Port Terminals
TRANSNET LTD
202 SMITH STREET
DURBAN
P.O. BOX 36136, DURBAN

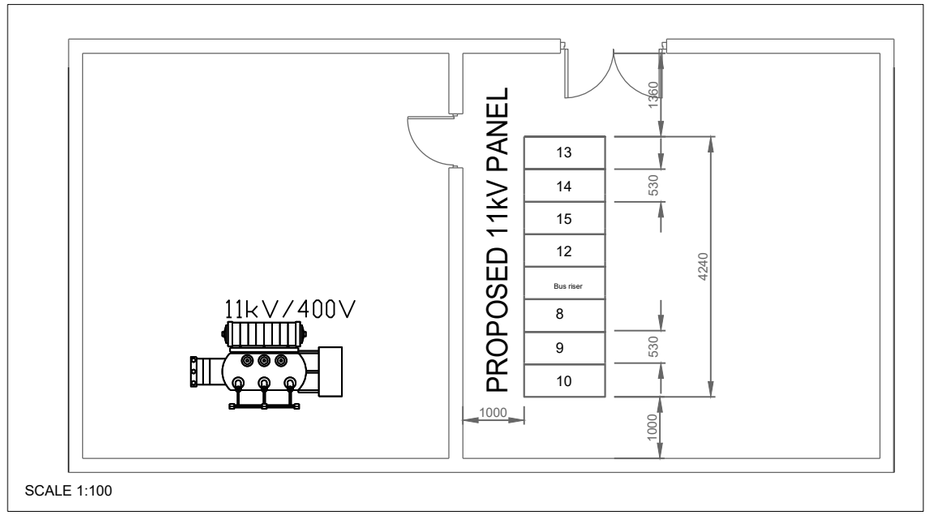
TRANSNET

**DURBAN**

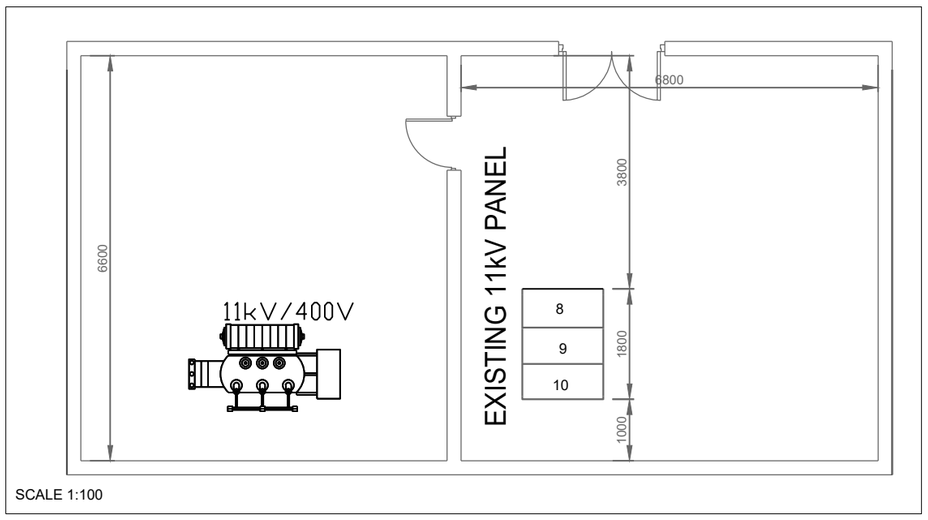
SUBSTATION UPGRADE

GRAIN ELEVATOR12th FLOOR SUBSTATION No2
SINGLE LINE AND LAYOUT DRAWING

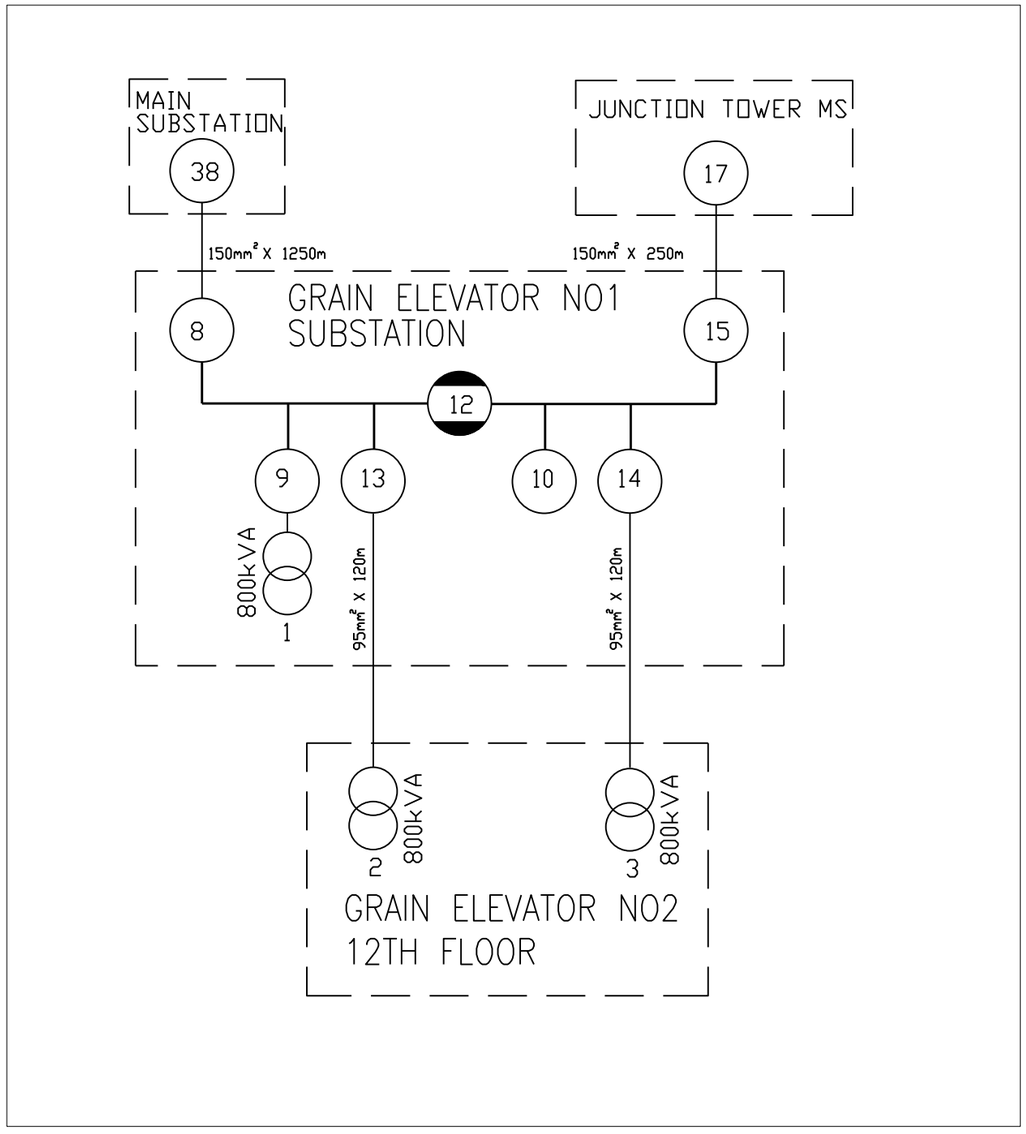
| PROJECT NUMBER | BU | FBS | DIS. | TYPE | DRG. NO. | SHT. | REV. | ID |
|---|---|---|---|---|---|---|---|---|
| | | 000 | E | LA | | 0 | 00 | TD |




GRAIN ELEVATOR SUBSTATION PROPOSED MV FLOOR PLAN




GRAIN ELEVATOR SUBSTATION EXISTING MV FLOOR PLAN




GRAIN ELEVATOR SUBSTATION
LINE DIAGRAM

NOTES

1. DO NOT SCALE DRAWING - ONLY DIMENSIONS SHOWN TO BE USED.

2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS, DIMENSIONS AND LEVELS ON THE SITE AND NOTIFY THE NEC SUPERVISOR OF ANY VARIATIONS BEFORE CONSTRUCTION.

| DRAWING NO. | REFERENCE |
|---|---|
| | |

REFERENCE DRAWINGS

| NO. | DESCRIPTION | BY | CHKD | APPD | DATE |
|---|---|---|---|---|---|
| 00 | ISSUED FOR CONSTRUCTION | ZWN | KZ | SM | 25-4-24 |
| A | ISSUED FOR REVIEW | ZWN | KZ | SM | 25-4-24 |

REVISIONS



| CONTRACTOR / CONSULTANT | | | |
|---|---|---|---|
| TITLE | NAME | SIGN | DATE |
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| OPERATING DIVISIONS | | | |
|---|---|---|---|
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| TRANSNET CAPITAL PROJECTS | | | |
|---|---|---|---|
| TITLE | NAME | SIGN | DATE |
| DRAWN | ZN | | 11 11 24 |
| CHECKED | AM | | 11 11 24 |
| DESIGNED | ZN | | 11 11 24 |
| CHECKED | KZ | | 11 11 24 |
| | | | |
| | | | |
| | | | |

| PR.ENG. / PR.TECH./PR. ENG | |
|---|---|
| NAME | SAMUKELO MAGCABA |
| SIGNATURE | |
| DATE | 11 11 24 |
| REG. NUMBER | 20190951 |
| SCALE : | 1 :100. A3 |

Transnet Port Terminals
TRANSNET LTD
202 SMITH STREET
DURBAN
P.O. BOX 36136, DURBAN

TRANSNET

**DURBAN**

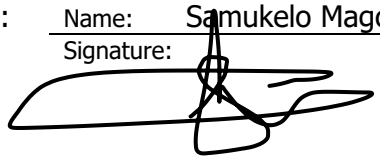
# TPT SUBSTATION UPGRADE GRAIN ELEVATOR MV SINGLE LINE DIAGRAM AND FLOOR PLANS

| PROJECT NUMBER | OD | FBS | DIS | TYPE | DRAWING NO. | SHEET | REV | ID |
|---|---|---|---|---|---|---|---|---|
| | | | E | LA | . . . . | 0. | 00 | TD |

# Transnet Port Terminals
# High Level Commissioning Plan
# Electrical Equipment

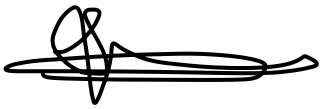
**Document No:**

**Prepared by**: Name: Samukelo Magcaba — May 2018
Signature: — Date



**Reviewed by:** Name: —
Signature: — Date

**Approved by:** Name: Samukelo Magcaba — September 2022
Signature: — Date



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|---|---|---|
| | | |
| | | |
| | | |
| | | |
| 00 | May 2018 | Issued for Review |
| **Rev** | **Date** | **Revision Details** |

# Contents

# 1. INTRODUCTION

The purpose of the High Level Commissioning Plan is to outline the procedures associated with commissioning various types of electrical and mechanical systems and equipment. A detailed commissioning plan as where deemed appropriate at the discretion of the responsible engineer, shall be prepared as required for the various systems. International best practice norms and standards shall be followed in terms of inspection, testing for safety, setting and configuring, and rendering the installed equipment fully functional to its intended purpose.

# 2. STATUTORY REQUIREMENTS

All aspects of the commissioning process shall adhere to any and all relevant requirements of the following legislation, as appropriate:

- Occupational Health and Safety Act 85 of 1993
- National Environmental Management Act 107 of 1998
- South African National Standards and Codes of Practice
- All local, provincial or S.A. Government laws in force at the time.

# 3. GOVERNING CODES, STANDARDS AND SPECIFICATIONS

The commissioning process for all electrical and mechanical equipment shall adhere to any specific and relevant requirements contained in the following national and international standards. Where different standards call for different testing and commissioning procedures for the same equipment, the most stringent alternative shall apply.

Note: Where reference is made to a code, standard or specification, the reference shall be taken to mean the latest edition of the code, standard or specification, including latest Addenda, supplements and revisions thereto.

The commission process in general, shall be in accordance with the recommendations of:

- The International Electrotechnical Commission (IEC), and
- The Institute of Electrical and Electronic Engineers (IEEE)
- International Standards and Codes – ISO, DIN, BS, ASME, ASCE, ANSI, ASTM, EU

# 4. SCOPE

This plan covers site electrical pre-operational tests and commissioning tests required for electrical apparatus, wire, cables and other miscellaneous equipment and material as called for in the specifications and must be read in conjunction with the other specifications.

# 5. GENERAL INFORMATION

5.1. Pre-operational tests and acceptance certificates as herein specified are defined as those tests and inspections required by the ENGINEER prior to equipment being energized to

determine that the apparatus involved may be safely energized.

5.2. Calibrating tests, checks on limit switch settings, interlocking, PLC functioning etc. are so called cold commissioning or dry tests.

5.3. Hot commissioning tests are the tests as specified by the Engineer such as burn in tests for electronic equipment and continuous cycle tests etc. when the equipment is handling the product it was designed for.

5.4. Final acceptance will not only depend on equipment dependability, as determined by the subject tests, but will depend on complete operational tests on all equipment to show that the equipment will perform the functions for which it was designed.

5.5. These specifications intend that the workmanship methods, inspections and materials used in erection and installation of the subject equipment shall conform with accepted engineering practices, the specifications as prepared by the Engineer, Manufacturer's instructions and the relevant Standards as referred to in all the attached specifications.

**5.6. Thermographic images shall be taken, as directed by the Engineer, of all equipment put into service, as part of the commissioning documentation. These images shall be time and date stamped.**

5.7. The Contractor shall bear the costs of all tests required.

# 6. RESPONSIBILITY

6.1. The testing shall be performed by and under the immediate supervision of the Contractor and witnessed by the Engineer and/or his duly authorised representative. This representative may be an Independent Commissioning Engineer appointed by the contractor with the Engineer's approval.

6.2. The Contractor shall adjust, set, co-ordinate, calibrate and test all systems and equipment furnished and/or installed by him.

6.3. The Contractor shall determine, and the Engineer shall approve the individuals in whom final responsibility and authority rests for carrying out these tests and inspection procedures on particular equipment. The method to be followed in obtaining clearances on electrical equipment shall also be established and such method rigidly adhered to.

6.4. All testing shall be scheduled by the Contractor and cleared through the Engineer. No testing of any kind shall be done or scheduled without this clearance.

6.5. The Contractor shall notify in person or by letter all the interested parties at least 24 hours prior to tests, establishing the time the test is to be performed.

6.6. The interested parties to be informed will be determined in conjunction with the Engineer.

6.7. The parties notified shall be responsible for having their representatives present at the designated time. Absence of any one representative will not prohibit the test from proceeding on schedule, unless such representative is essential in doing the tests.

6.8. Each of the notified interested parties and the testers employed shall be individually responsible for the safety of all members of their organization during such time as the tests

are performed.

6.9. The Contractor will coordinate all testing to ensure that all trades are prepared and that the conditions are safe.

6.10. Detailed testing method and equipment shall be approved by the Engineer.

6.11. On some tests, particularly the final inspections of important equipment, the manufacturer's Engineer or representative shall be present and perform same. The request for a manufacturer's representative shall be made sufficiently in advance to the date the test is scheduled so that satisfactory arrangements for the representative's services can be made. Frequently, the manufacturer's responsibility applies to both electrical and mechanical equipment. Where such joint responsibility exists, the request for a manufacturer's representative shall be arranged to satisfy both electrical and mechanical requirements simultaneously.

6.12. Manufacturer's instructions shall be carefully read for any special conditions that may be required for testing.

6.13. Following established procedures, equipment will be energized after certification on the relevant form by the personnel performing the tests, that equipment is ready for energizing and with the concurrence of the Engineer.

# 7. TESTING EQUIPMENT

7.1. All testing equipment for tests which are to be performed shall be furnished by the Contractor.

7.2. Testing equipment required to prove guarantee values shall be calibrated immediately prior to the relevant tests to be performed. The error curves shall be submitted with the report.

# 8. TESTING RECORDS

8.1. Test results shall be entered in test forms provided by the Contractor or, if such forms are not available, in test forms approved by the Engineer.

8.2. Authorized, qualified representatives of the parties interested (see paragraph 3.0 shall be present to approve a test when made. One (1) copy of the rough draft-test report shall be given to each authorized representative at the time the test is made.

8.3. Formal test reports approved by the Engineer shall be supplied and prepared by the party performing the test within 48 hours, signed by the authorized representatives, and furnished to the Engineer for distribution.

# 9. SAFETY PRECAUTIONS

9.1. The Contractor shall exercise extreme care in performing the tests specified so as not to jeopardize the safety of personnel and to prevent equipment damage during any tests. All exposed live parts subject to testing shall be guarded by personnel, barricades, or other practical means to ensure against personnel being injured by coming in contact or close proximity to exposed parts.

9.2. All equipment, exposed live parts, etc., shall be completely discharged by grounding or other accepted methods so as to eliminate the possibility of injury to personnel from electrical shock after the tests have been completed.

# 10. PROVISIONAL ACCEPTANCE

10.1. The Engineer's Provisional Acceptance of any electrical installation shall be based upon the completion of tests and checks prescribed in clauses 8 through 13, submission of test data (where required), satisfactory materials and workmanship, and demonstration of satisfactory start-up.

# 11. EARTH CONTINUITY AND RESISTANCE TESTS

11.1. General:

11.1.1. All earthing and bonding cables must be checked for continuity and earth resistance.

11.2. Test procedure:

11.2.1. Measuring the cable and connection resistance simultaneously with a resistance bridge or accurate multi-meter.

11.3. Acceptance:

11.3.1. The resistance of the earthing and bonding cables and connections must be less than stated in SABS 0142/latest.

11.3.2. Complete and accurate records of all resistance readings of all earthing conductors of motors, transformers, power cables etc. must be made.

The records shall include the following:

11.3.2.1. Complete identification of the cable and connection points including its approximate length;

11.3.2.2. Resistance reading;

11.3.2.3. The approximate average cable temperature.

11.3.3. No electrical systems will be energized until the master copy of its test record is approved by the Engineer.

# 12. MEDIUM VOLTAGE CABLES

12.1. General:

12.1.1. The Contractor shall give all medium voltage cables a Very Low Frequency (VLF) Hi Pot test in compliance with the cable manufacturers specifications, after all splices and potheads or cable terminations have been made.

12.1.2. The Contractor shall then perform a Dissipation Factor (Tan-Delta) test on the cable as per the cable manufacturer's specifications.

12.1.3. The medium voltage cables shall be given a complete dielectric absorption test before and after the VLF and Tan-Delta test. The cable test shall be performed prior to connections to the electrical equipment at either end.

12.1.4. DC Hi Pot Testing is strictly prohibited on any MV cables or systems owned and operated by Transnet.

12.1.5. The Contractor shall supply all instruments for testing.

12.2. Test Procedures:

12.2.1. Medium voltage stress cone type terminations or potheads shall remain intact but testing shall not include any bus work beyond the pothead or stress termination.

12.2.2. Cable continuity and phase identification shall be checked.

12.2.3. In setting up the test set special safety precautions should be taken regarding grounding of the test equipment. The test set, it's voltmeter and the cable shield should be grounded at the same ground.

12.2.4. All 4 core cables shall be tested between one conductor and ground with the other conductors and the metallic shield, metallic sheath or armour grounded to the same ground. Each conductor to be tested in this manner.

12.2.5. All single conductor cables shall also be tested between one conductor and ground with the other conductor in the same conduit grounded.

12.2.6. Each cable is to be given a full dielectric absorption test as herein specified with a suitable motor driven or electronic megger. The readings taken shall be recorded in the test record.

12.2.7. The dielectrical absorption megger test shall be applied for a long enough duration to fully charge the cable. Megger readings shall be taken every fifteen (15) seconds during the first three (3) minutes and at one (1) minute intervals thereafter. The test shall continue until three (3) equal readings one (1) minute apart are obtained. The cable may then be considered to be fully charged.

12.2.8. All cables should have approximately the same megohm reading. In the event that a cable shows an appreciably lower resistance value than the others in the same conduit or cable run, this condition shall be discussed with the Engineer prior to the application of the high potential test.

12.2.9. After an acceptable megger test, the Contractor shall give the cables a VLF high potential test in accordance with the requirements of IEEE 400.2-2013. After completion of the test, the contractor shall ensure that there is no residual charge contained in the cables. Any cable that does not perform as per manufacturer's specifications shall be rejected.

12.2.10. Cables shall then be subjected to the Tan-Delta testing.

12.2.11. The successful high potential test shall be immediately followed by another megger test as heretofore specified.

12.3. Acceptance:

12.3.1. The cable must withstand the specified high voltage without an appreciable increase in leakage current.

12.3.2. Final acceptance will also depend on satisfactory results of the two megger tests. The results of the final megger test should reasonably parallel those of the first megger test and should show no evidence of differing performance prior to the VLF Hi-Pot and Tan-Delta Testing.

12.3.3. Complete and accurate records of all megger and accompanying VLF and Tan-Delta tests shall be made. The records shall include the following:-

12.3.3.1. Complete identification of the cable including its approximate length;

12.3.3.2. Megger readings vs time data;

12.3.3.3. VLF and Tan-Delta test results with date and time of test.

12.3.3.4. The approximate average cable temperature taken by Thermographic Imager, with images recorded along the entire length of cable.

12.3.4. No cable shall be energized until the master copy of its test record is approved by the Engineer.

# 13. LOW VOLTAGE POWER CABLES

13.1. General:

13.1.1. All wires and cables shall be tested for continuity. Except for 60 volt services and below, all wires and cables shall be given a megger test.

13.1.2. All cable connections must pass visual inspections for workmanship and conformance with standard practice.

13.2. Test Procedure:

13.2.1. Continuity shall be checked by means of a DC test device using a beeper.

13.2.2. Bus tie cables shall be meggered before connections to buses are made.

13.2.3. Each 400 volt service cable from substations shall be meggered with the cable connected to the switch gear with the corresponding breaker racked in and open. Connections at the other end of each of these cables shall be as follows:-

13.2.3.1. Cables to individual motors shall be disconnected from the motor for initial tests, and followed by cables connected to motors as per specification for rotating equipment;

13.2.3.2. Cables to control centres shall be connected to the control centre main breaker with breaker in the open position.

13.2.4. Minimum megger readings shall be 1 Me 6 ohm.

13.2.5. The megger test must be held until the reading reaches a constant value. For 400 volt cables the cable megger test shall be held until three (3) equal readings, each one (1) minute apart, are obtained.

13.2.6. A 1000 volt motor-driven or electronic megger with a value of at least twice that of the RMS voltage shall be used on all service conductors.

13.3. Acceptance:

13.3.1. Minimum megger requirements must be met.

13.3.2. Any cable having a megger reading 50% lower than average, even though meeting minimum requirements, shall await further instructions from the Engineer as to drying or other treatment to be given the cable prior to acceptance.

13.3.3. Complete and accurate records of all tests and inspections shall be made.

# 14. MEDIUM VOLTAGE SWITCH GEAR AND CIRCUIT BREAKERS

14.1. General:

14.1.1. All switch gear shall be given operational tests. This shall include mechanical operation, as well as operation by control circuits, relays and tripping devices. All breakers and busbars shall be given a megger test.

14.2. Test Procedures:

14.2.1. Megger tests on the medium voltage bus shall be applied between each phase separately and ground with other phases tied to ground. All breakers shall be racked-out.

14.2.2. In addition each breaker shall be given a megger test in the racked-out and closed position. Megger tests shall be applied between each phase to ground and to each other phase.

14.2.3. A suitable motor driven or electronic megger shall be used. Each test shall be held until a constant reading is obtained. Minimum test values shall be as specified in specifications.

14.2.4. All test readings shall be recorded.

14.2.5. All circuit breakers shall be operated through at least three (3) open-close-open cycles in both the rack-in and test positions by manual operation and by control circuits from each control point. All indication lights, annunciators, alarms and targets shall be observed to determine correct operation and breaker mechanism shall be observed for correct alignment, freedom of binding and good contact. All breakers shall be checked for ease of rack-in and rack-out and checked to determine that the breaker cannot be moved out of operation position while the breaker is closed.

14.2.6. The interchangeability of the circuit breakers shall be demonstrated.

14.2.7. PT and CT data shall be recorded and PT and CT circuits shall be checked with a multi-tester.

14.2.8. Protective relays shall be adjusted and calibrated with an injection type test arrangement (multi-amp or equal). Results shall be recorded and the co-ordination of the protective relaying shall be proved.

14.2.9. After initial energization, switch gear shall be checked for correct phase sequence.

14.3. Acceptance:

14.3.1. Minimum megger requirements must be met;

14.3.2. Proper mechanical and electrical operation of switch gear must be assured;

14.3.3. Correct protective relaying operation must be proven;

14.3.4. Complete and accurate records of all tests and inspections shall be made.

# 15. POWER TRANSFORMERS

15.1. General:

15.1.1. Before testing, all transformers shall be inspected for cleanliness, damage, moisture (blue coloured silica gel), oil leaks and phase identification. Each transformer winding shall be given megger tests.

15.1.2. Oil filled transformers shall have the oil checked for dielectric strength.

15.1.3. Accessories and auxiliary circuits to switchgear and alarm panels shall be checked.

15.2. Test Procedures:

15.2.1. Transformer windings shall be meggered with cables disconnected. (The cables have to be disconnected anyhow for cable high potential tests). See clause 9.0.

15.2.2. The 400 volt connection to the switchgear does not have to be opened, but the secondary isolator shall be racked out.

15.2.3. The transformer neutral has to be disconnected from ground.

15.2.4. When meggering the primary side, the secondary winding has to be grounded and vice versa.

15.2.5. The minimum values of the specified megger tests shall be as specified in the standard specification.

15.2.6. All 2500 V megger tests shall be held at least five (5) minutes and until three (3) consecutive equal readings one (1) minute apart are obtained. Readings shall be taken every thirty (30) seconds during the first two (2) minutes and every minute thereafter. 1000 V Megger readings must be held until the reading reaches a constant value and until three (3) consecutive equal readings one (1) minute apart are obtained.

15.2.7. The oil samples for the dielectric strength test shall be taken from the bottom of the transformer tank and tested in accordance with SABS Specifications.

15.2.8. Oil temperature indicator, level gauge and pressure relief devices must be manually actuated to check operation of auxiliary circuits.

15.2.9. To check the Bucholz relay, air shall be injected at the test connection.

15.3. Acceptance:

15.3.1. Minimum megger requirements must be met.

15.3.2. Oil dielectric strength shall be above the minimum specified by the manufacturer.

15.3.3. Auxiliary circuits shall be fully operational.

# 16. LOW VOLTAGE SWITCH GEAR

16.1. General:

16.1.1. The 400 volt switch gear bus shall be given a phase-to phase and phase-to-ground megger test.

16.1.2. All switch gear, relays and control devices shall be given complete operational tests to show that the equipment performs all design functions and meets design and equipment procurement specifications.

16.2. Test Procedures:

16.2.1. With transformer secondary breaker and load breakers open, all current transformers shorted, all potential transformer fuses removed and all 400 volt feeder breaker load terminals grounded, the 400 volt bus shall be given a phase-to-phase and phase-to-ground megger test.

16.2.2. Megger tests on the 400 volt bus shall be applied between each phase and ground with phases not under test also grounded.

16.2.3. All circuit breakers shall be operated through at least three (3) open-close-open cycles in both the rack-in and test position by manual operation and by control circuits from each control point (draw out breakers only). All indicating lights, annunciators, and breaker mechanisms shall be observed for correct alignment, freedom of binding and good contact. Draw out breakers shall be checked for ease of rack-in and rack-out and checked to determine that the breaker cannot be moved out of operating position while the breaker is closed.

16.2.4. PT and CT data shall be recorded and PT and CT circuits shall be checked with a multi-tester.

16.2.5. Protective relays shall be adjusted and calibrated with an injection type test arrangement (multi-amp or equal). Results shall be recorded and the co-ordination of the protective relaying shall be proved.

16.2.6. After initial energization, switch gear shall be checked for correct phase sequence.

16.3. Acceptance:

16.3.1. Minimum megger requirements must be met.

16.3.2. Proper mechanical and electrical operation of switch gear must be assured.

16.3.3. Correct protective relaying operation must be proven.

16.3.4. Complete and accurate records of all tests and inspections shall be made.

# 17. COLD COMMISSIONING

17.1. The programmable logic control system shall only be tested once the LV switchboard and other control panels have been tested in the manual mode and been provisionally accepted by the Engineer.

17.2. The control system shall firstly be tested DRY, i.e. all motor fuses shall be removed or circuit breakers shall be in the OPEN positions.

17.3. All plant/external inputs to the PLC shall be individually checked in the field or motor control centre by operating the required field limit switch, relays etc. and checked on the programmer monitor if the status indication of the correct input reference alters.

17.4. All plant/external outputs shall be checked individually by forcing the PLC output coil by means of the programming unit and checking the field, motor control or mimic display panel if the correct relay, indication lamp or contactor has operated.

17.5. A signed test record showing all input/ output references and reference to which field, motor control centre or mimic panel device was initiated or was operated shall be made and handed to the Engineer before the second part of the DRY test commences.

17.6. The second part of the DRY test shall be by carrying out drive selections, route start ups and route stops for all possible drives as listed. All inputs which cannot be present because of the absence of any plant movement shall be simulated by a plant input simulator to be provided by the Contractor.

17.7. Upon completion of the tests, a signed test record showing all route selections, starts and stops simulated for every route and a list of all simulated inputs/outputs used shall be made and handed to the Engineer.

17.8. The Contractor shall then call upon the Engineer to witness a repetition of all previous DRY tests.

# 18. HOT COMMISSIONING

18.1. Commissioning of the whole installation shall not commence until all work which is essential for safe operation has been completed.

18.2. First, the electrical equipment and circuitry shall be checked and tested in each Motor Control Board and shall be rendered "healthy" and fully operational before any other part of the installation is commissioned.

18.3. The settings of all protective, instrument and timing devices are to be correctly based on the manufacturer's characteristic curves.

18.4. The operation of all equipment and motors shall be tested on the "manual" sequence first prior to attempting "automatic" sequence control.

18.5. Commissioning shall follow the electrical testing procedures necessary prior to start-up of the equipment.

18.6. The start-up of each system or plant shall be done in the presence of the authorized representatives of the machine suppliers, the mechanical contractors, the electrical suppliers of the boards, the Electrical Contractor and the Engineer, unless otherwise arranged by the Engineer.

18.7. During hot commissioning the temperature rise of all motors will be calculated using the resistance method.

18.8. For a period determined elsewhere in this document, after completion of the foregoing operations, the Electrical Contractor shall arrange for a competent representative to remain on site to test-run the installation to the satisfaction of the Engineer.

# SPECIFICATION FOR ELECTRICAL INSTALLATIONS TO BUILDINGS OTHER THAN DWELLINGS HOUSES

| REVISIONS | | |
|---|---|---|
| **REV** | **DATE** | **APPROVED** |
| **0** | **September 2022** | |
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**INDEX**

SECTION CONTENTS

## 1.0 SCOPE

1.1 This specification covers the requirements with respect to the electrical installation, including the supply of all material and labour necessary to complete the EL&P installation for buildings.

1.2 This specification also applies to electrical alterations and additions carried out to existing installations.

## 2.0 REFERENCES

2.1 The following publications (latest edition) are referred to herein:

CODES OF PRACTICE

| | | | |
|---|---|---|---|
| SANS | 10313 | | Code of Practice for Protection of Buildings against Lightning. |
| SABS | 086 | - | Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres. |
| SABS | 0108 | - | The Classification of Hazardous Locations and the Selection of Electrical Apparatus for use in such Locations. |
| SABS | 0114 | - | Artificial Lighting |
| SANS | 10142-1 | - | Code of Practice for the Wiring of Premises |
| SABS | 0199 | - | Bulkhead Lighting Fittings (surface mounted). |

SPECIFICATIONS

| | | | |
|---|---|---|---|
| SABS | 152 | - | Low Voltage Air Break Switches, Connectors, Switch Disconnecters, Fuse Combination Units. |
| SABS | 156 | - | Moulded Case Circuit Breakers. |
| SABS | 160 | - | Electric Air Heaters. |
| SABS | 162 | - | Screwed Metal Conduit and Fittings for Electrical Wiring. |
| SABS | 163 | - | Wall and Appliance Switches. |
| SABS | 164 | - | Two Pole and Earthing Pin Plugs and Switch Socket Outlets |
| SABS | 165 | - | Lampholders |
| SABS | 172 | - | Cartridge Type Fuse Links |
| SABS | 181 | - | Thermostats for Electric Storage Heaters |
| SABS | 314 | - | Flameproof Enclosures foe Electrical Apparatus |
| SABS | 743 | - | Low Voltage Isolating Transformers |
| SABS | 767 | - | Core Balance Earth Leakage Protection Units. |
| SABS | 763 | - | Hot Dip Zinc (galvanised) Coatings |
| SABS | 784 | - | Metal Enclosed Busbar Trunking Systems |
| SABS | 890 | - | Ballasts for Fluorescent Lamps |
| SABS | 908 | - | Meter Cabinets |
| SABS | 950 | - | Non-metallic Conduit and Fittings. |
| SABS | 1012 | - | Electric Light Dimmers |
| SABS | 1041 | - | Tubular Fluorescent Lamps |
| SABS | 1065 | - | Screwed Metal Conduit |
| SABS | 1085 | - | Wall Outlet Boxes. |

| | | | |
|---|---|---|---|
| SABS | 1092 | - | Contactors |
| SABS | 1119 | - | Interior Luminaries for Fluorescent Lamps. |
| SABS | 1180 | - | Electrical Distribution Boards. |
| SABS | 1197 | - | Metallic Wireways for installation in floors |
| SABS | 1247 | - | Coatings Applied by the Power-coating Process |
| SABS | 1278 | - | Interior Luminaires for Discharge Sodium Lamps |
| SABS | 1279 | - | Floodlight Luminaires |

| | | |
|---|---|---|
| SABS CKS 50199 | - | Bulkhead Luminaires (surface mounted) |
| SABS IEC 439 | - | Low Voltage Switchgear |
| SABS IEC 309 | - | Plugs, Socket Outlets and Couplers for Industrial Purposes |
| SABS IEC 742 | - | Isolating Transformers and Safety Isolating Transformers |

## 3.0 SERVICE CONDITIONS

3.1 The cable shall be designed and rated for continuous operation under the following conditions :-

### 3.1.1 Ambient/Environment Conditions :

| | | | |
|---|---|---|---|
| 3.1.1.1 | Altitude | : | Sea level. |
| 3.1.1.2 | Ambient temperature | : | -5° C to +45° C (daily average +35° C). |
| 3.1.1.3 | Relative humidity | : | As high as 96% |
| 3.1.1.4 | Lightning conditions | : | Severe, with a maximum lightning ground flash density 11 flashes per $km^2$ per annum. |
| 3.1.1.5 | Exposure conditions | : | Salt laden, industrial atmosphere as well as hazardous gases and dust atmosphere. |

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

## 4.0 ELECTRICAL INSTALLATION

4.1 The contractor shall carry out the installation in accordance with SANS 10142-1: Code of Practice for the Wiring of Premises and the requirements of this specification.

4.2 Where the local supply authority requirements differ from those specified herein Transnet Projects Electrical Engineer shall be approached for a decision.

4.3 All equipment and material shall comply with the relevant National or International standard specification. Where equipment does not comply it shall be submitted with the Transnet Projects Electrical Engineer for approval.

4.4 The system of supply will be three phase, 4 wire or single phase 2 wire 50 Hz. alternating current with earthed neutral at a nominal voltage of 400/230 volts. The voltage may vary within the range of ±5 % of the nominal voltage.

4.5 Wiring

4.5.1 All wiring shall be carried out in cable trunking and/or conduit. Only the loop in system of wiring shall be accepted.

4.5.2 Joints in wiring, nor the cutting away of strands to facilitate connections shall be permitted.

4.5.3 Single core cable smaller than 1,5 mm shall not be used. PVC cables shall not be connected directly to the lampholders for incandescent lamps. Conductors shall terminate in an approved connector in the conduit box directly behind the luminaire, and connection to the lampholder made by means of adequately rated silicone heat resistant wire.

4.5.4 Colour identification of conductors shall be used.

4.5.5 Flameproof equipment shall comply with SABS 314 or BS 229 for installation in hazardous areas, as defined in SABS 0108.

4.5.6 Equipment in hazardous areas shall be installed in accordance with SABS Code of Practice 086.

4.6 The provision and installation of the supply cable to the building, the termination and the connection thereof to the distribution board main incoming isolating shall be the responsibility of the Contractor, as directed by the Engineer.

4.7 The Contractor shall be responsible for the provision and connection of power supplies to electric urns, stoves, geysers, frytops, fans etc. provided by others; unless otherwise stated in the Schedule of Requirements.

6.7.1 The Contractor shall provide power supplies to air-conditioning equipment. The connection to air-conditioning equipment will be undertaken by others.

4.8 Cables shall be adequately supported to prevent strain on the terminals.

4.9 Drilling or welding of steelwork for the mounting of electrical equipment will not be permitted unless approved by Transnet's Civil Engineer on site. Equipment shall be fixed to the steelwork by means of approved, purpose made clamp/brackets.

4.10 Lightning protection shall be in accordance with the requirements of the local supply authority and SANS 10313 : Code of Practice for Protection of Buildings against Lightning.

## 5.0 DISTRIBUTION BOARDS

5.1 Architrave type for flush mounting, and surface type for mounting on indoor walls shall comply with SABS 1180 Parts 1 and 2 respectively.

5.1.1 These distribution boards shall be supplied with a cover plate or open window door and be suitably painted and finished to harmonise with wall finish.

5.1.2 All switches and associated equipment shall be fully enclosed within the distribution board with only the operating handles protruding through the cover plate or door.

5.2 Cubicle type shall comply with IEC publication 439.

5.3 Distribution boards for outdoor use shall be weatherproof and corrosion resistant.

5.4 A substantial earthing terminal shall be firmly attached to the steel work of the distribution board and connected to the earthing bar.

5.5 Entries suitable for all incoming and outgoing cables shall be provided. Glands for bottom entry cables shall not be less than 600mm above floor level.

5.6 Space for mounting of 20% additional control units shall be allowed on all distribution boards. In addition, 20% spare conduits (20mm diameter) shall be provided between flush distribution boards and the ceiling/roof space in pitched roof buildings (minimum 2 conduits).

5.7 All circuits shall be clearly labelled. Labels shall be of the fabricated type and permanently secured. Embossed tape is not acceptable.

5.8 When called for labelling of moulded case circuit breakers shall be labelled by means of numerals. A legend inserted behind a clear plastic window on the inside of the door shall be provided to detail the various circuits.

## 6.0 ISOLATING SWITCHES

6.1 Isolating switches for machines shall be lockable in the open position.

6.2 Isolating switches shall comply with SABS 152.

## 7.0 MOULDED CASE CIRCUIT BREAKERS

7.1 Moulded case circuit breakers shall: -

7.1.1 comply with SABS 156.

7.1.2 have a breaking capacity as specified.

7.1.3 be of the fixed pattern, non-adjustable type.

7.1.4 be suitable for clip-on tray mounting.

## 8.0 EARTH LEAKAGE PROTECTION UNITS

8.1 Earth leakage protection units shall: -

8.1.1 be the integral moulded case type and comply with SABS 767.

8.1.2 have a sensitivity of 30 mA.

8.1.3 be similar in design to moulded case circuit breakers and suitable for clip-on tray mounting.

8.1.4 have a breaking capacity and current rating as specified.

## 9.0 FUSE SWITCHES

9.1 Fuse switches shall :

9.1.1 comply with SABS 152

9.1.2 be of the double break, horizontal drawout, air insulated type, suitable for flush mounting.

11.1.3 be of the quick break, dustproof type.

## 12.0 HIGH RUPTURING CAPACITY FUSE LINKS

12.1 High rupturing capacity fuse links shall :

12.1.1 comply with SABS 172

12.1.2 be of the cartridge type with a breaking capacity not less than that shown in the Category of Duty AC 50 table 2 of SABS 172.

12.1.3 have a class Q1 fusing factor

12.1.4 A spare set of fuse links for each of the different ratings shall be provided and accommodated in the distribution board.

## 13.0 CONTACTORS

13.1 Contractors shall comply with SABS 1992.

## 14.0 LUMINAIRES FOR INCANDESCENT LAMPS

14.1 Luminaires shall be suitable for accommodating 100 watt B.C. lamps.

14.2 The insulation of internal wiring shall be heat resistant.

14.3 Bulkhead luminaires shall comply with CKS 199.

14.4 Bowl type luminaires shall have porcelain or acrylic galleries with white opal, high impact acrylic screw-in type bowls.

14.5 Well glass luminaires shall consist of a body of non-corrosive material with a top entry for a 20mm conduit, have a clear glass cover and be completely weatherproof.

## 15.0 LUMINAIRES FOR FLUORESCENT LAMPS

15.1 Luminaires for fluorescent lamps shall comply with SABS 1119.

15.2 Lampholders shall be of the telescopic type.

15.3 The luminaires shall be suitable for 1,2m or 1,5m "rapid start" lamps to SABS 1041, class B, group 2, with rated colour 3. (warm white).

15.4 Anti-corrosive luminaires shall have a body channel constructed of fibre-glass or non-corrosive material with a moulded acrylic enclosing diffuser.

15.5 A gasket shall be provided between the body channel and the diffuser to ensure a reliable seal.

15.6 The enclosing diffuser shall latch to the body channel with captive-type non-corrosive latches.

15.7 It is essential that full descriptions and photometric data of the luminaires and lamps offered, accompany tenders. This information shall include description and drawings of the various items of equipment as well as full photometric data issued by the South African Bureau of Standards.

## 16.0 INTERIOR LUMINAIRES FOR HIGH INTENSITY DISCHARGE LAMPS

16.1 Interior luminaires for high intensity discharge lamps shall comply with SABS 1278 and be suitable for use in an ambient temperature of 40$^{o}$C.

16.2 Suitable provision shall be made on the ballast housing for eyes or lugs, for the attachment of safety chains.

16.3 The electronic ignition device for high pressure of sodium and metal halide lamps shall be of the three wire type operating on the superposed pulse principle. The circuitry shall be such that at starting, or on failure of a lamp, high voltage pulses will be confined to the high voltage lead between the igniter and centre contact of the lampholder. Igniters incorporating a switching element are not acceptable.

16.4 A fully electronic ignition circuit shall be utilized to trigger the pulse transformer.

16.5 The natural frequency of the electronic ignition circuit shall be in the order of 100kHz.

16.6 The lamp ignition voltage shall remain constant within a mains voltage variation of between 200 and 250 volts.

16.7 Tenderers shall guarantee that pulsing of the igniter on a failed lamp will not have a detrimental effect on the life and efficient operation of the control gear, igniter, lampholders and circuit wiring.

16.8 It is essential that full descriptions and photometric data of the luminaires and lamps offered, accompany tenders. This information shall include description and drawings of the various items of equipment, as well as full photometric data issued by the South African Bureau of Standards.

## 17.0 ELECTRIC AIR HEATERS

17.1 Electric air heaters shall comply with SABS 160.

17.2 Tubular heaters shall be rated at 260 watt per metre length of tube and have an enclosed entry box containing terminals for incoming line, neutral and earth connections with a suitable entry for a flexible conduit connector.

17.2.1 Tubular heaters shall be mounted with the bottom 200mm above floor level

17.3 Convector Heaters shall:

17.3.1 be of the natural convection type, of good appearance and suitable for flush or surface mounting.

17.3.2 have incorporated a manually adjustable control switch, automatic controlling thermostat and indicating neon pilot lighting showing when the heater is on.

17.3.3 have a mounting box or housing suitable for a 20mm electrical conduit entry.

17.3.4 be installed with the bottom of the mounting box/housing 200mm above floor level.

17.4 Fan Heaters shall :

17.4.1 be of the wall mounted type with air flow directional adjustment and locking facilities.

17.4.2 have a totally enclosed type fan motor fully protected from damp and dust and fitted with self aligning noiseless bearings.

17.4.3 have a separate manually adjustable control unit incorporating an automatic controlling thermostat. The control unit shall be housed in a adequately ventilated sheet steelcase. Means of protecting and isolating the heater, shall be provided. The control unit circuit shall be arranged such that during summer months the heater can be switched off and the fan used alone for ventilation.

## 18.0 ROOM THERMOSTATS

18.1 Room thermostats shall comply with BS 3955 Part 2, section 2F, and be to category A.

18.2 An over-riding switch shall be mounted adjacent to the thermostat for manual control.

## 19.0 LIGHT SWITCHES

19.1 Light switches shall comply with SABS 163 and be of the rocker type.

19.2 They shall be mounted 1 500 mm above floor level and where possible 200 mm from door frames.

## 20.0 LIGHT SENSITIVE CONTROL UNITS

20.1 The complete unit shall be of the solid state type and housed in a sealed weatherproof enclosure suitable for mounting in any position.

20.2 The light sensitive cell shall operate in a manner to give an area of detection not less than a hemisphere.

20.3 The unit shall not operate due to light fluctuations of duration less than 5 minutes. They shall incorporate main contacts rated at least to 10 amps and be mounted at a height of not less than 2 400 mm.

20.4 An over-riding switch shall be provided.

## 21.0 SOCKET OUTLETS

21.1 All 220 volt, 16 amp socket outlets shall comply with SABS 164 and be of the 3 round pin shuttered type.

21.2 All 32V, 5A socket outlets for lead lights shall be of the industrial two pin, weatherproof type with a screw cover attached to the socket outlet by a short length of chain.

21.2.1 They shall be mounted on columns/walls 1 500mm above floor level or in recesses provided in inspection pits.

21.3 Welding socket outlets shall be in accordance with IEC publication 309 and be rated for 63A (unless other rating is indicated on the drawing) and be of the 5 pin, 6 h configuration type.

21.3.1 Welding plugs shall be supplied complete with matching male plugs and be mounted 1 500mm above floor level.

## 22.0 TRANSFORMERS 220V/32V

22.1 The transformers for 32V socket outlets shall be in accordance with SABS SV 118 and be designed for 220V to 250V primary power supply and have an output voltage of 32V.

## 23.0 ISOLATING AND SAFETY ISOLATING TRANSFORMERS

23.1 Isolating and safety isolating transformers shall comply with SABS IEC 742 and SABS 743.

## 24.0 POWER POINTS

24.1 Power points for hot water cylinders shall be equipped with a 2 or 3 pole isolating switch adjacent to the cylinder except for hot water cylinders mounted below sinks.

24.2 Where contactors are necessary for the operation of hot water cylinders these shall be installed adjacent to the appliance where practicable and in a suitable enclosure.

24.3 Power points for tubular heaters shall be equipped with a flush mounted 100mm x 100mm conduit box, blanked off with a cover plate accommodating a 15A flush mounted switch. Connection to the heater shall be by means of a PVC covered flexible conduit. The flexible conduit shall have sufficient slack to avoid strain but shall not touch the floor.

24.4 Power points for fan heaters shall be equipped with two recessed interconnected conduit boxes, one for connection to the heater and the other for connection to the control unit 1 500mm above floor level.

24.5 Power points for stoves, fry tops and boiling tables shall be equipped with a 2 or 3 pole isolating switch for the appliance shall be 1 500mm above floor level. The outlet for connection to the appliance shall be 500mm above floor level.

24.6 Power points for air-conditioning units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit and equipped with a 2 pole isolating switch.

24.7 Power points for extractor fan units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit.

24.8 Where a common thermostat is specified for controlling a number of fans, power points shall be so arranged to allow for circuit wiring between the fans and thermostat.

24.9 Power points for smoke detection and $CO_2$ equipment shall terminate in a 100mm x 100mm conduit box equipped with a 30A, 2 pole isolating switch, lockable in the "on" position, mounted 1500mm above floor level, with connecting facilities to the equipment.

24.10 Power points for air conditioning units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit and equipped with a 2 pole isolating switch, with connecting facilities for the unit.

24.11 Power points for machinery shall terminate in a connection box suitable for mounting a 2 or 3 pole isolating switch, with connecting facilities to the machine.

24.12 Power points for lighting shall terminate in a circular conduit box fitted with an unswithched 5 A 3 pin socket outlet.

## 25.0 CONDUIT AND ASSOCIATED FITTINGS

25.1 Screwed metal conduit shall comply with SABS 162.

25.2 Non-metallic conduit and fittings shall comply with SABS 950. Non- metallic conduit shall not be cast into concrete.

25.3 Wall outlet boxes shall comply with SABS 1085.

25.4 In areas within 50 km of the coast only galvanised or non- metallic conduit shall be used. Where conduit is exposed to the weather elements only galvanised conduit shall be used or UV T. Routed P.V.C. pipe.

25.5 Threads of metallic conduit and associated fittings shall be effectively protected against rust by non-corrosive paint where they are exposed to moisture or weather elements.

25.6 Wall outlet boxes shall be positioned with the major dimension vertical and not more than 15 mm below the finished wall surface. Cover plates shall fit plumb and flush with wall surfaces.

25.7 Conduits are to be concealed and chased into plastered brick walls or cast into concrete work as building work proceeds. Where conduit cannot be concealed these shall be installed neatly on the surface as approved by the Engineer.

25.8 Conduits are to be concealed and chased into plastered brickwalls or cast into concrete work as the building work proceeds.

25.9 Chasing of finished walls or concrete work will not be allowed. Under no circumstances will chases be permitted through structural members of the building.

25.10 Chasing of face brick walls will not be permitted. Conduits and outlet boxes shall be built into walls.

## 26.0 CABLES AND GLANDS

26.1 Polyvinyl-chloride cables shall comply with SABS 150. Armoured cables shall be of the earth continuity conductor type.

26.2 Cable glands shall be of the compression type, (brass or bronze) and be suitable for termination of earth continuity conductor type cables. Glands shall be supplied with neoprene shroud.

## 27.0 BUSBAR TRUNKING

27.1 Busbar trunking shall comply with SABS 784.

## 28.0 CABLE TRAYS

28.1 Cable trays shall be protected against corrosion and be adequately supported so that when fully loaded the deflection does not exceed 10mm. They shall be wide enough to accommodate the power cables in a single layer.

## 29.0 EARTHING AND BONDING

29.1 The complete electrical installation shall be earthed in accordance with SABS 10142-1: Code of Practice for the Wiring of Premises.

29.2 Earth electrodes shall consist of an exterior copper layer molecularly bonded to a high strength steel core. The copper shall have a minimum thickness of 0.25mm.

29.3 Only approved non-corrosive substances may be used to reduce earth resistivity. The earth resistance as measured with a earth resistance tester shall not exceed 5 ohm.

29.4 Copper tape used for bonding and earthing of waste pipes shall have a minimum cross sectional area of 12mm², and when run along walls shall be fixed by means of non-ferrous screws in plastic plugs at intervals of 300 maximum.

## 30.0 PAINTING

30.1 All surfaces of distribution boards shall be light orange to SABS 1091 colour No. B26 unless otherwise stated in the Schedule of Requirements attached to this specification.

30.2 All surfaces shall be cleaned according to the appropriate method described in SABS 064 for the particular surface to be cleaned, the contamination to be removed and the primer to be applied.

30.3 Components that will be powder coated shall be cleaned and prepared in accordance with the requirements of SABS 064. Powder coating shall comply with the requirements of SABS 1274 - 1979 Type 4; Corrosion resistant coatings for interior use and using thermosetting high gloss coating.

30.4 All specified coatings shall be applied according to the relevant specification and the manufacturers instructions shall be followed. Coatings shall not be applied in conditions which may be detrimental to the effectiveness of the coating, or the appearance of the painted surface.

30.5 When examined visually the finished product shall have a uniform appearance as far as gloss is concerned and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

## 31.0 TESTS

31.1 Insulation, continuity and earthing tests in accordance with SANS 10142-1 shall be carried out to the satisfaction and in the presence of the Engineer or authorised deputy on completion of the work.

31.2 An installation Certificate of Compliance for the electrical installation issued by an accredited person as required by the Occupational Health and Safety Act,1993 (Act 85 of 1993) shall be provided.

31.3 The Contractor shall provide the necessary approved instruments.

31.4 Transnet Projects reserves the right to use its own instruments should it be considered necessary.

**WITNESSES**

**1.** ……..  ……
**TENDERER**

**2.** …….  …….
**DATE**

**Transnet Projects**
**Design Services**

# SPECIFICATION FOR LOW VOLTAGE DISTRIBUTION BOARDS

This specification covers Transnet's requirements for low voltage distribution boards

| REVISIONS | | |
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| **REV** | **DATE** | **APPROVED** |
| **0** | **September 2022** | |
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# INDEX

## 1. SCOPE

1.1. This specification covers Transnet's requirements regarding the design, supply, manufacture, population, works testing, delivery to site, site erection, site testing and commissioning of low voltage Distribution Switchboards consisting of fuse switches incorporating high rupturing capacity cartridge fuse links, air circuit breakers, moulded case circuit breakers and auxiliary equipment. The tenderer is required to familiarise themselves with all applicable Standards and Codes of Practice listed herein, and to ensure compliance in the execution of any work in terms of this document.

## 2. REFERENCES

2.1. The following publications (latest edition) are referred to herein:-

### 2.1.1. SOUTH AFRICAN BUREAU OF STANDARDS

**Codes of Practice**

| | |
|---|---|
| SANS 064 | The preparation of steel surfaces for coating |
| SANS 10111 | Engineering Drawings. |
| SANS 10142 | Wiring of premises Part 1: Low voltage installations |
| SANS 10313 | Protection against lightning - Physical damage to structures and life hazard |

**Specifications**

| | |
|---|---|
| SANS 60947 | Low-voltage switchgear and control gear |
| SANS 156 | Moulded-case circuit breakers |
| SANS 60269 | Low-voltage fuses |
| SANS 1091 | National colour standards for paint |
| SANS 1195 | Busbars |
| SANS 1274 | Coating applied by the powder coating process |
| SANS 1973-1 | Low-voltage switchgear and control gear assemblies Part 1: Type-tested assemblies with stated deviations and a rated short-circuit withstand strength above 10 kA |
| SANS 1973-3 | Low-voltage switchgear and control gear assemblies Part 3: Safety of assemblies with a rated prospective short-circuit current of up to and including 10 kA |
| SANS 60529 | Degrees of protection provided by enclosures (IP Code) |
| SANS 1507 | Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) |
| SABS ISO 9000 | Quality management systems -- Fundamentals and vocabulary |
| SANS 1019 | Standard voltages, currents and insulation levels for electricity supply |
| SANS 170 | Fasteners |

**International Electrotechnical Commission**

| | | |
|---|---|---|
| BS | 3938 | Current Transformers |
| IEC | 61508 | Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems. |
| IEC | 60051 | Direct acting indicating analogue electrical measuring instruments and their accessories |

## 3. SERVICE CONDITIONS

3.1 The equipment shall be designed and rated for continuous operation under the following conditions:-

### 3.1.1 Ambient/Environment Conditions:

3.1.1.1 Ambient temperature- 5□C to +40□C (daily average +35 □C).

3.1.1.2 Relative humidity- As high as 95%

3.1.1.3 Lightning conditions- Severe, with a maximum lightning ground flash density of eleven (11) flashes per km² per annum.

3.1.1.4 Atmosphere- Salt laden and corrosive industrial atmosphere

### 3.1.2 Electrical Conditions:

3.1.2.1 The system of supply shall be three phase, 4 wire, 50 Hz alternating current with solidly earthed neutral at a nominal voltage of 400 / 231 Volts.

3.1.2.2 The voltage may vary within the range of 95% to 105% of the nominal and all equipment installed shall be suitably rated.

3.1.2.3 All equipment shall be adequately rated for prospective fault level ratings.

## 4 DRAWINGS AND INSTRUCTION MANUALS

4.1 All drawings shall be in accordance with SANS 10111 – Engineering Drawings.

4.2 The successful tenderer shall supply the following instruction manuals, all of which shall be included in the tender price and be to the satisfaction of Transnet.

4.2.1 THREE (3) sets of detailed drawings and instruction manuals, with illustrations where necessary and 2 sets of prints of the "As Built" General Arrangement drawings and the schematic and wiring diagrams to facilitate erection and adjustment of the switchgear.

4.2.2 A full set of electronic media including all information requested above.

4.2.3 These instruction manuals and drawings shall be supplied as soon as possible after placing of the order, but before delivery of the equipment.

## 5. STANDARD OF WORK, EQUIPMENT & MATERIALS

5.1. The distribution board shall conform to the requirements of the latest edition and amendments of SANS 10142-1 Code of Practice for the Wiring of Premises Part 1: Low voltage installations and any additional requirements thereto, described in this specification.

5.2. All equipment and material used shall be of high quality and the work shall be of a high standard of workmanship carried out by qualified staff under proper supervision by experienced and competent officers.

5.3. If any special tools are required for the maintenance of the switchboard, the tenderer shall supply three (3) sets at delivery of the switchboard to site.

## 6. DISTRIBUTION BOARDS

6.1. The distribution board shall comply with SANS 60439-1

6.1.1. The form of separation will be specified in the project specific documentation.

6.2. The degree of protection shall be to IEC Publication 144/EN60529 and shall conform to the following:

- Inside Substations and MCC Rooms: IP42
- Other Locations: IP65

6.3. The distribution board shall consist of either a framework of substantial steel sections covered with heavy gauge steel plates or of folded sheet steel sections, forming a robust construction.

6.4. Particular attention shall be given to the ventilation of panels, to eliminate build-up of excessive heat caused by the sun or internal heat generation. All necessary precautions shall be taken to ensure that the temperature of the air in any portion of the assembly does not rise more than 15°C above ambient air temperature

6.5. Every board shall be fitted with a suitable gasket incorporated into the frame to ensure that the arrangement is in accordance with the required degree of protection. Sealing strips and gaskets shall be made of durable, non-hardening rubber, neoprene or other synthetic material, suitably fixed to the door or frame to ensure that the seal does not become dislodged during normal operation.

6.6. Where possible the lock and door catch shall comprise of a combination unit. Door latching and delatching operations shall be smooth and quick, whilst ensuring proper compression of the sealing gaskets. Repeated opening and closing of the hinged doors and operations of the door locks and catches shall not cause chipping or scratching of the painted surfaces or any other blemishes to the finished boards

6.7. Lifting lugs shall be provided for floor standing enclosures and as needed for wall mounted enclosures.

6.8. The board shall have a separate latches hinged or removable front cover secured to the board by means of suitable captive type screws or bolts. When the cover is removed/ opened, easy access to that compartments components and wiring shall be possible.

6.8.1. The control units shall be mounted flush with the front cover so that only the operating handles protrude.

6.8.2. Large removable panels shall be supplied with handles for easy handling.

6.8.3. No possibility should exist for panels to come into contact with live parts.

6.9. Due care shall be taken to ensure that the live side of the MAIN SWITCH is suitably protected so that no live conductors are exposed when the panel door is opened or the panel cover is removed.

6.10. The board shall be equipped with a set of 3 phase and neutral copper busbars. The 3 phase busbars shall be continuously rated for the full load of the incoming supply switch. The neutral shall be 100% of the phase busbars. Earth bar shall be rated to fault current and touch voltage.

6.11. All busbars shall be designed, manufactured, marked and tested in accordance with SANS1195.

6.12. Busbar rating shall be 2A/mm$^2$ up to 630A and 1.6A/mm$^2$ thereafter.
6.13. Busbar temperature shall not exceed a 40$^0$C temperature rise.

6.14. The busbars shall be adequately braced and supported. The busbars shall be covered with a sufficient number of layers of high quality insulating tape or heat shrinkable sleeving and finished in standard colours.

6.15. Where busbar joints and terminations have not been covered, a kit shall be provided for covering during installation.

6.16. Alternatively, busbars shall be suitable enclosed in a busbar chamber or behind a protective barrier for protection against inadvertent contact with "live" busbars with access panels removed.

6.17. Inter-connectors between the busbars and control units shall be by means of fully insulated, adequately rated conductors firmly bolted to the busbar and secured to the appropriate terminals of the control units using crimped-on terminal lugs. Solid flat conductors shall be used if the rating exceeds 400 A or if the fault current exceeds 25kA rating. No conductor of less than 16mm$^2$ shall be used between busbars and control units. All conductors shall be suitably rated for the fault level.

6.18. The other terminals of the incoming and outgoing panel units shall be connected by means of conductors conforming to clause 6.17, i.e. they shall be robust, insulated, easily accessible terminals, of adequate size, conveniently located in the distribution board near the incoming and outgoing cable entries but with sufficient clearance and space to enable the incoming and outgoing cables to be connected to their corresponding terminals without difficulty or strain.

6.19. All the outgoing connections of MCCB'S greater than 400A 3 phase shall be done by means of copper bus bars, securely clamped using approved busbar clamping insulators, fixed to a robust metal section of adequate size, conveniently located in the rear of the distribution board to enable the incoming cables to be terminated in the back of the distribution board cubical behind each respective MCCB. This is to allow for the easy termination of the larger incoming cables, with sufficient clearance and space to enable the outgoing cables to be connected to their corresponding busbar terminals without difficulty or strain to the MCCB's. Each MCCB up to 250A shall be fitted with extended terminal complete with phase barriers as supplied by circuit breaker supplier.

6.20. Outgoing cable tails that connect to the busbars in clause 6.19 shall have securing places to enable the cable to be secured with nylon type cable fasteners in an approved manner.

6.21. The busbars that protrude into the back compartment of the distribution board shall be covered with a perspex type barrier and shall have danger signs on each section.

6.22. Removable gland plates shall be provided. These gland plates shall be of adequate thickness or construction for the cables to be terminated without distortion of the gland plate, and shall not be less than 2mm mild steel (zinc passivated). Gland Plates shall not be mounted less than 300mm above ground floor level, alternatively a base frame of suitable depth may be provided.

6.23. Distribution board cases shall be of such dimensions that adequate space is available for manoeuvring and connecting the incoming and outgoing cables.

6.24. All cable entries shall be from the bottom of the distribution board unless stated otherwise.

6.25. Glands shall not be less that 300mm above floor level. Unless otherwise stated.

6.26. The terminals of all incoming and outgoing cables shall be firmly connected to the terminals on the lugs or ferrules, unless they are of a type that will grip the cable without splaying the strands of the conductor.

6.27. A substantial earthing terminal shall be firmly attached to the metal work of the distribution board and connected to an earth bar of cross sectional area not less than 50% of the phase bars, running the full length of the distribution board to which all earthing conductors of the incoming and outgoing circuits shall be firmly connected.

6.28. A removable link shall be provided in the Neutral busbar to ensure that the neutral busbar can be split in two sections for testing purposes. The link shall be secured in position with a bolt and nut arrangement.

6.29. The distribution board manufacturer shall allow for at least 30% capacity for the installation of additional switchgear in the distribution boards.

6.30. Each distribution board shall be fitted with the following labels as needed in suitable positions:

- Live busbars
- Flash signs
- Main label (always required)
- Voltage rating
- Current rating
- Fault level and time
- IP rating
- Job number
- Reference number
- Date of manufacture
- Form of separation
- Fed from
- Each feeder/starter to be labelled

6.31. Each distribution board shall be supplied with a test certificate. This certificate shall include all items as indicated in annexure 1 of SANS 1973–1 and annexure E of SANS 1973–3.

## 7. ARC DETECTION SYSTEM

7.1. All switchgears shall be equipped with an efficient and reliable arc detection system designed according to IEC 61508 with a safety level meeting at least SIL 2.

7.2. The system shall consist of one or more arc monitoring units and light detectors.

**7.2.1. Arc detection system:**

Arc detection system shall not be activated by interfering influences such as portable lamps, electro-magnetic fields, vibration or touching. In case of an arc occurring in the switchgear it shall be possible to identify where and when the arc has occurred. This information should be accessible without opening the switchgear door and stored even if power is lost to the system. The HMI shall not affect the IP degree of the cabinet.

**7.2.2. Arc monitoring unit and light detector:**

The arc detection system shall use light as the main condition for tripping. Detectors shall cover each bus-bar section, respective circuit breaker and in any other areas where the designer of the switch gear considers or finds it as a potential risk for an arc. The detectors shall be made of optical fibre in order to avoid EMC disturbances. Without any extra calibration from the user the system shall not react for a light intensity lower than 3000 lux in order to avoid nuisance tripping. The light intensity shall also be constant regardless the length of the detector.

7.3. The trip signal shall be sent within less than 2 ms to the circuit breaker in an event of an arc

7.4. The arc monitoring unit shall provide at least three high speed solid state tripping outputs to the circuit breaker.

7.5. It shall be possible to configure the detectors to trip different breakers depending on which detector detects the arc.

7.6. The system shall have the possibility to mount up to 30 detectors in the space of the main unit in order to avoid space issues if the system would be extended.

## 8. FUSE SWITCHES

8.1. Fuse switches shall comply with SANS 152 and SANS 60947 – 3.

8.2. Fuse switches shall be enclosed, triple pole, quick break and dustproof.

8.3. Fuse switch handle shall have an IP rating of IP65 and the handle shall be defeatable to override the door interlock.

8.4. Fuse switches shall be of the double break type and the fuses shall be completely isolated when the switches are in the "OFF" position.

8.5. Fuse switch and handle shall have a test position. It will be possible to have an auxiliary for only indication test position.

8.6. The switches shall be interlocked to prevent the opening of the front covers unless the switches are in the "OFF" position and the closing of the switches with the covers open. The switches shall be lockable in the "OFF" position.

8.7. Fuse Switches shall have a lever or rotary action with a positive spring controlled opening and closing action for making or breaking the circuit under load conditions. Fuse carrier and base contacts shall be designed to give permanent high contact pressure and shall be designed to facilitate location of blown fuses without removal of the carrier. Fuse carriers and bases shall be of the highest grade phenolic mouldings to BS 771 and shall be non-flammable and nonhygroscopic, with a hard gloss black finish.

8.8. It shall be possible to install the fuse switch in any position without derating.

## 9. FUSE LINKS

9.1. HRC Fuse Links shall be of the high rupturing capacity type, compliant with SANS IEC 60269 –

1:2006. Fuse links shall incorporate a visual indication device to facilitate location of blown fuses and shall be designed to clip into the fuse carrier contacts without the use of fixing screws.

9.2. Breaking capacity of all fuse links shall be not less than Category of duty AC.50 at 415 Volts (SANS IEC 60269 - 1:2006). The Fusing factor of the fuses shall not exceed 1.5 (SANS IEC 60269 Class Q1).

9.3. Fuse current ratings shall be indicated on engraved 20 x 12mm white-black-white trifoliate labels in 4mm letters. The labels are to be fitted at the fuse bases and shall not be obscured by wiring.

9.4. Fifty- percent spare fuses of each size shall be provided in suitable cubicle on the switchboard. The door of this cubicle shall be suitably identified.

## 10. AIR CIRCUIT BREAKERS (ACB) SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.

### 10.1. Functional characteristics:

10.1.1. Air circuit breakers for use on the incoming supply side of the distribution board shall comply with SANS 60947.

10.1.2. The circuit breakers shall have a continuous enclosed current rating as indicated on the relevant drawings with a minimum Icu (ultimate breaking capacity) of 42kA at 415 volts. The circuit breakers shall be tested for category P.2, unless specified otherwise.

10.1.3. The circuit breakers shall have an Ics (service capacity) rating equal to the Icu (ultimate breaking capacity) rating.

10.1.4. The circuit breakers shall have an Icw (withstand current) of 1 sec and 3 sec. The 1 sec Icw rating shall be equal to the Icu rating.

10.1.5. The air circuit breakers shall be of the enclosed, ventilated, independent manual spring, draw-out type with a rated service voltage of 690 volts and a rated insulation voltage of 1000 volts and be equipped for shunt tripping from a 115 V DC battery supply. The shunt tripping facility shall be wired so that the ACB shall trip when it's associated high voltage transformer circuit breaker trips.

10.1.6. The circuit-breakers shall have a rated impulse withstand voltage of 12 kV.

10.1.7. The rated uninterrupted current shall be between 100 and 6300 A with the possibility of set trip threshold of L protection from 40A.

10.1.8. Different versions of circuit-breakers shall be available, divided into their category of use: A (current-limiting) and B (selective).

10.1.9. Different versions shall be available with rated ultimate breaking capacity from 42 to 150 kA at 440 V AC and from 42 to 100 kA at 690 V AC for circuit-breakers in category B and with 130 kA at 415 V AC, 85 kA at 690 V AC for circuit-breakers in category A.

10.1.10. The mechanical life shall be at least 12000 operations with a frequency of 60 operations/hour without the need for maintenance of the contacts and arcing chambers

10.1.11. The electrical life at a voltage of 440 V AC shall be (with a frequency of at least 10 operations/hour and without the need for maintenance of the contacts and arcing chambers):

- at least 9000 operations up to 2000 A
- at least 5000 operations up to 3200 A

These values are intended to be valid only for catagory B circuit-breakers.

**10.2. Environmental characteristics**

10.2.1. Operating temperature: -25 °C...+70 °C (-13 °F...158 °F) and storage temperature: -40

10.2.2. Altitude: operation without derating shall be up up to 2000 metres above sea level. (6600 ft), and with derating up to 5000 metres above sea level. (16500 ft).

10.2.3. Suitability for use in a hot-humid environment. With regard to this, the circuit-breakers shall undergo a tropicalisation process which makes them suitable for use in a hothumid environment, as established by the prescriptions of the main shipping registers and in accordance with the international IEC 60068-2-30 Standards.

**10.3. Construction characteristics**

10.3.1. All the models shall be available in the 3 and 4 pole versions both in the fixed (with rear horizontal, rear vertical and front terminals) and withdrawable (with rear horizontal, rear vertical, front and fl at terminals) versions.

10.3.2. There shall be total segregation between power and front shield, using double insulation where suitable so as to guarantee maximum operator safety.

10.3.3. Total segregation between the phases shall be guaranteed for safety reasons without need of phase barriers up to 1000V.

10.3.4. It shall be possible to inspect easily the arcing chambers easily and to check main contact wear with the circuit-breaker racked-out, by removing the arcing chambers.

10.3.5. All the circuit-breakers in the range shall have the same height and depth with the aim of standardising the supporting structures of the switchgear and the switchgear itself as far as possible.

10.3.6. IP30 degree of protection shall be guaranteed on the front part and IP20 on the rest of the circuit-breaker (excluding the terminals), with the possibility of having IP54 degree of protection (NEMA 3/3s/13) on the front, using the transparent cover which completely protects the front, but still leaves the panel underneath and the protection unit fully visible with the relative indications.

10.3.7. The whole range of air circuit-breakers shall be fitted with electronic protection releases. It shall be allowed the inter-changeability of protection releases from skilled personnel.

**10.4. Special points for withdrawable versions:**

10.4.1. The circuit-breakers in the withdrawable version shall be fitted with anti-racking-in locks to prevent racking a moving part into a fixed part with a different rated current.

10.4.2. In the case of the withdrawable version, the presence of a device shall prevent racking-out and racking-in with the apparatus closed.

## 10.5. Accessories

The following accessories shall be common to the whole range standard:

### 10.5.1. Electrical accessories:

10.5.1.1. Shunt opening/closing release.

10.5.1.2. Control and monitoring Test Unit - allows continuity of the different versions of the shunt opening releases to be checked;

10.5.1.3. Undervoltage release;

10.5.1.4. Time delay device for undervoltage release - allows release trip delay with established and adjustable times;

10.5.1.5. Geared motor for the automatic charging of the closing springs;

10.5.1.6. Mechanical and electrical signalling of overcurrent release trip;

10.5.1.7. Trip reset release;

10.5.1.8. Auxiliary contacts which allow signalling of the circuit-breaker state;

10.5.1.9. Current transformer for the neutral conductor outside the circuit-breaker;

10.5.1.10. Homopolar toroid for the main power supply earth conductor (star centre of the transformer).

### 10.5.2. Mechanical accessories:

10.5.2.1. Interlocks between 2 circuit-breakers or among three circuit-breakers can be used horizontally, vertically or in “L” position using different types of flexible cables:

10.5.2.2. Standard version (with maximum distance between two circuit breakers: up to 1200 mm if horizontally interlocked while up to 750mm if vertically interlocked).

10.5.2.3. Extended version (with distance between two circuit breakers: from 1200mm up to 1600 mm if horizontally interlocked while from 750 up to 1000 if vertically interlocked).

10.5.2.4. Mechanical locks to control enabling racking-in/out operations available also with interlocks. IP54 transparent front protection (NEMA 3/3S/13).

## 10.6. Protection Release

### 10.6.1. Basic Protection Functions

10.6.1.1. The release shall not require auxiliary power supplies since the power is taken from the current transformers.

10.6.1.2. The signals supplied by the release shall not operate with power supply supplied by internal batteries.

10.6.1.3. The protection against overload (L) with characteristic t=k/I2 shall always have setting ranges with timing adjustable up to 144s with I=3In.

10.6.1.4. The protection of neutral shall be set at 50%, 100%, 200% and OFF of the phase currents without changing any component.

10.6.1.5. All the protection functions except protection against overload shall be excludable.

**10.6.2. Measurement Functions**

10.6.2.1. The release shall always be able to provide measurement of the currents and voltages in the three phases, in the neutral and of earth fault (ammeter function), both in self-supply and with an auxiliary power supply. Measurement function shall be active, even without external supply, starting from 140 A of single-phase current, independently from the circuit-breaker size. Accuracy of the ammeter measurement chain (current sensor plus ammeter) shall equal or better than 1.5% in the 30% - 120% current interval of In.

10.6.2.2. The release shall not normally require auxiliary power supplies since the power is taken from the current transformers. For measurements and programming at very low currents, a power supply at 24 V DC shall be available. As alternative the release shall be able to receive power supply directly from busbars or terminals, up to line voltage equal to 690 V AC.

10.6.2.3. The release shall be able to acquire the waveforms of electrical values with a sampling frequency selectable from 600 to 4.800 Hz and sampling interval from 3 s to 27 s. Acquisition shall be frozen after a trip or a configurable event. Acquisition data shall be retrieved from an external device (personal computer or similar) for fault analysis purposes. The release shall show voltage measurements on display, with a precision equal or higher than 1%.

10.6.2.4. Measurement functions that shall be available:

- Current measurements
- Voltage measurements
- Power measurements
- Power factor measurements.
- Measurements of frequency and peak factor
- Energy measurements
- Historical measurements
- The last 10 trips information
- Complete trip information on display without batteries
- Data logger included as standard

**10.7. Advanced Protections Functions**

10.7.1. Thermal memory for functions L (overload protection) and S (short circuit protection).

10.7.2. Protection against over-temperature. It shall be possible to signal the presence of anomalous temperatures on the release by means of two LEDs (Warning and Alarm) and, if decided during the unit configuration phase, when the temperature is over 85 °C, to simultaneously control circuit-breaker opening.

10.7.3. Protection against missing and unbalanced phase (U) with characteristic t=k shall be possible.

10.7.4. Load control protection (K).

10.7.5. Undervoltage protection (UV)

10.7.6. Overvoltage protection (OV)

10.7.7. Residual voltage protection (RV)

10.7.8. Underfrequency protection (UF)

10.7.9. Overfrequency protection (OF)

10.7.10. Protection against reversal of active power (RP)

**10.8. User Interface and Signalling LEDs**

10.8.1. An alarm shall indicate by means of LEDs located on the release the disconnection of opening solenoid and current transformers. A trip shall also occur, after a short time delay, when the disconnection is detected.

10.8.2. The release shall allow parameterisation by means of keys and a LCD graphic display.

10.8.3. Access to control and configuration of the unit by means of a password (edit MODE).

10.8.4. The signals given by the permanent indicators shall guarantee maximum reliability.

10.8.5. Indication shall be available directly on display on request of the user for not less than 48 hours even without an auxiliary voltage and batteries and also be given in the case of re-losing on a fault. After 48 hours of inactivity the information shall be retrievable by external devices. Indication shall contain at least the protection tripped.

10.8.6. It shall be possible to read the current values and information on the last 10 measures (current values, protection tripped) at any time through external devices, some of which can transmit data via bluetooth;

10.8.7. In the event of CB tripped, shall be indicated the type of protective function that intervened.

10.8.8. Each alarm or warning alarm shall be clearly shown on the display, when it is active.

10.8.9. On the protection release two (2) led's shall be present.

10.8.10. Warning LED shall be in place indicating at least the following:

- Presence of one or more phases with current values in the 0.9*In< I <1.05*In range
- Presence, between two or three phases, of unbalance higher than the value programmed during configuration
- The first temperature threshold of T=70 °C has been exceeded
- Contact wear > 80%
- Harmonic distortion
- Out of range frequency
- Breaker status error
- Warning threshold override

10.8.11. Alarm LED shall be in place indicating at least following:

- Presence of one or more phases under overload with current values I >1,3*In (Overload Protection - L under timing)
- Timing in progress for protection function S (Selective short circuit protection)
- Timing in progress for protection function G (Earth fault protection)
- The second temperature threshold of T=85 °C has been exceeded
- Contact wear 100%.
- Timing in progress for protection function D;
- Timing in progress for protection function UV(Under Voltage), OV(Over Voltage), RV (Residual Voltage);
- Timing in progress for protection function RP(Reversal of Active Power);
- Timing in progress for protection function
- Timing in case of unbalance between the phases higher than the value set during configuration with trip set to ON;
- Current Sensors disconnected;
- Opening solenoid (Trip Coil) disconnected

10.8.12. The communication function shall be implemented on the release by means of:

- An internal bus, with interface RS485;
- An external bus, with Modbus RS485 protocol 2-Wire Twisted Pair, 19.2 kbit/s max.

10.8.13. There shall be the possibility of setting the release in remote and in local operating mode, and with the latter it shall not be possible to carry out data transmission from the system to the release. It shall be possible to automatically set the local mode by means of an external contact. An 24VDC auxiliary supply shall be used.

10.8.14. The protection release shall be able to send to the system these data:
Protection parameters set, phase and neutral currents, state of the circuit-breaker (open closed), position of the circuit-breaker (connected-isolated), state of the springs (charged discharged), number of circuit-breaker mechanical operations, total and for each protection number of trips, last interrupted current, contact wear, state of the protection functions (pre alarm function. L, timing function. L, S,G…), overtemperature protection function, state of internal communication bus.

10.8.15. The system shall transmit to the protection release the following data: protection parameters, circuit-breaker opening and closing commands, reset for tripping of some protection functions.

10.8.16. Adjustable inverse definite minimum time (IDMT) overcurrent release facilities are required in addition to the instantaneous fault trip for the air circuit breakers.

## 11. MOULDED CASE CIRCUIT BREAKERS (MCCB) SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.

### 11.1. Functional Characteristics

11.1.1. AC rated service voltage for currents over 160 A: 690 V AC (50-60 Hz).

11.1.2. DC rated service voltage: 500 V DC for currents of 160 A and 750 V DC for currents over 160A.

11.1.3. Rated uninterrupted current for 1000 V AC or DC applications: 800 A (three and four poles).

11.1.4. Minimum rated insulation voltage for currents equal or over 160 A: 8 kV.

11.1.5. Rated insulation voltage for currents equal or over 160 A: 800 V AC.

11.1.6. Rated uninterrupted current between 160 and 3200 A with trip units settings starting from 1A.

11.1.7. According to IEC 60947-2 (§ 4.4) starting from 400 A the circuit breakers shall be category B

11.1.8. MCCBs shall be available with different ultimate short breaking capacities between 16kA and 200kA @ 380/415 V AC.

11.1.9. Both line up and line down supplying shall be possible without decreasing MCCBs performances or functionality

11.1.10. For rated uninterrupted currents up to160 A, the MCCB limiting features shall be enough to assure its conformity to IEC 60439-1 (§ 8.2.3.1) once installed into a type AS or ANS switchboard as general breakers. This shall be valid up to the MCCB's rated uninterrupted current (limiting versions are excluded).

11.1.11. A test bottom for the correct functionality checking (moving contacts opening) shall be place in front of the breaker.

**11.2. Ambient Characteristics**

11.2.1. Operating temperature: -25 °C. +70 °C (ambient temperature)

11.2.2. Storage temperature: -40 °C .. +70 °C (ambient temperature)

11.2.3. Reference temperature for setting the thermal element of the thermomagnetic trip unit: +40 °C

11.2.4. Maximum relative humidity: 98%

11.2.5. Maximum altitude: 2000 m above sea level, 5000 m above sea level with derating suitability for being used in hot-humid places. With regard to this, the circuit-breakers shall undergo a tropicalization process to make them suitable for use in hot-humid places, as established in the prescriptions of the major naval registers and in compliance with the International IEC 60068-2-30 Standards.

11.2.6. Circuit-breakers fitted with electronic trip units shall comply with the prescriptions of the International Standards on electromagnetic compatibility.

**11.3. Construction Characteristics**

11.3.1. The range of moulded case circuit-breakers shall cover a range of rated uninterrupted currents from 160 to 3200 A

11.3.2. By means of the double insulation technique, moulded case circuit-breakers shall guarantee complete separation between the power circuits and the auxiliary circuits.

11.3.3. Moulded case circuit-breakers shall have an operating lever which always indicates the exact position of the circuit-breaker contacts (positive operation), by means of safe and reliable signals (I= closed, O= open, yellow-green line= open due to trip unit).

11.3.4. The operating mechanism shall be designed to operate all poles of the circuit breaker simultaneously for making, breaking and tripping.

11.3.5. Moulded case circuit-breakers shall be suitable for isolation in compliance with § 7.2.7 of the IEC 60947-2 Standard. This indication shall be clearly and indelibly marked on the circuit-breaker (in accordance with § 5.2 of IEC 60947-2) and in a position where it is visible with the circuit-breaker installed.

11.3.6. Moulded case circuit-breakers shall be available in the three-pole and four-pole version both in the fixed, and in any possible plug-in or withdrawable versions.

11.3.7. Circuit-breakers in the plug-in version starting from 250 A shall be available. In the case of a plug-in or withdrawable version, the presence of a device shall prevent racking-in or racking-out with the apparatus closed.

11.3.8. In the withdrawable version, racking-out with the door closed shall be possible.

11.3.9. The same depth and installation on a DIN EN 50022 rail shall be guaranteed up to the rated setting of 250 A inclusive. The same deph shall be guaranteed. This characteristic shall allow the switchboard and their support structures to be standardized.

11.3.10. Moulded case circuit-breakers with rated uninterrupted current up to 250 A shall have a 45 mm high face which makes them suitable for installation on modular panels.

11.3.11. All the installation positions shall be possible without jeopardizing the function of the apparatus. Starting from 630 A up to 1600 A the withdrawable version shall be mounted and operated horizontally.

11.3.12. For the front parts of the circuit-breakers the degree of protection of at least IP20 (excluding the terminals) shall be guaranteed, IP30 when they are installed in switchboards, and up to IP54 for circuit-breakers installed in a switchboard fitted with transmitted rotary handle and special accessory.

**11.4. Protection Trip Units**

11.4.1. Moulded case circuit-breakers shall be equipped with interchangeable trip units. From 160 A up to 800 A it shall be possible to choose between a thermomagnetic and an electronic protection. For the sizes higher than 800 A, the trip unit shall only be electronic. The trip unit shall be integrated in the volume of the apparatus.

11.4.2. From the 250 A size circuit-breakers, the trip unit shall be interchangeable. Trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings

**11.5. Thermomagnetic Overcurrent Trip Units**

11.5.1. Thermomagnetic trip units shall be fitted with protection threshold against overload (whose thermal element shall consist of a bimetal) and with protection threshold against short circuit.

11.5.2. The protection threshold against overload shall be continuously adjustable starting from 0.7 times the rated current of the trip unit and up to its rated value.

11.5.3. The reference temperature for setting the thermal element of the protection trip unit is 40°C.

11.5.4. The temperature performance of the trip unit shall be indicated as the temperature varies.

11.5.5. The protection threshold against short-circuit shall be either the fixed or adjustable type with continuity from 5 and up to 10 times the rated current of the trip unit. In the four-pole version, the neutral pole shall always be protected. For current values equal to or higher than 125 A, protection of the neutral pole shall, at choice, be at 100% or at 50% of the rated current of the trip unit. Vice versa, for current values of less than 125 A, protection of the neutral pole shall always be 100%.

11.5.6. For circuit-breakers with rated uninterrupted current of 160 A, 250 A, 400 A and 500A, a thermomagnetic trip unit shall be available for generator protection with adjustable thermal threshold, starting from 0.7 x In, and fixed magnetic threshold at 3 x In or adjustable magnetic threshold from 2.5 to 5 x In. Suitability for use in direct current.

**11.6. Magnetic only overcurrent trip units**

11.6.1. The overcurrent trip units with magnetic only threshold shall be suitable for protection against short-circuit.

11.6.2. The adjustable magnetic only trip units (suitable for motor protection) shall only be available in the three-pole version, whereas those with fixed threshold shall also be available in the four-pole version.

11.6.3. The adjustable magnetic only trip units shall be available for circuit-breakers up to 320 A. Suitability for use in direct current.

**11.7. Electronic Overcurrent Release Trip Units**

11.7.1. The electronic overcurrent trip units shall be self-supplied and shall be able to guarantee correct operation of the protection functions even in the presence of a single phase supplied with a current value equal to 20% of the phase current. They shall be unaffected by electromagnetic interference in compliance with the EMC directive on the matter.

11.7.2. The basic version shall be fitted with protection functions against overload (function L) and against short-circuit. The latter function can either be of the instantaneous type (function I) or, alternatively, with intentional delay selective short circuit protection (function S). The function of protection against short circuit shall be excludable.

11.7.3. A basic version shall also be provided with only the protection threshold against instantaneous short-circuit which cannot be excluded.

11.7.4. The complete version shall be fitted with protection threshold against overload (function L), against instantaneous short-circuit (function I) and with intentional delay (function S) and also with protection threshold against earth fault (function G). All the protection functions except for protection against overload shall be excludable.

11.7.5. The advanced version shall be suited for zone selectivity protection for the S and G protection functions. An integrated ammeter and many other additional features are provided over and above the protection functions. All the protection functions except for protection against overload shall be excludable.

11.7.6. The advanced version shall be suited for zone selectivity protection for the S and G protection

functions. An integrated ammeter and many other additional features are provided over and above the protection functions. All the protection functions except for protection against overload shall be excludable.

11.7.7. A version dedicated to ultra rapid short-circuit protection (with a detection time less than 5 ms) combined with zone selectivity shall be available.

11.7.8. An advanced version dedicated to motor protection shall be available with protection functions against overload (function L), against instantaneous short circuit (function I ), against unbalanced or missing phase (function U) and against rotor block (function R).

11.7.9. A version dedicated to generator protection shall be available (up to 160A), with protection functions against overload (function L), against instantaneous short circuit (function I ) and with intentional delay (function S). The S and I protection functions are not an alternative to each other. All these functions are imposed by the major naval registers.

11.7.10. All the advanced trip units shall be available with thermal memory.

11.7.11. All the protection functions shall be characterized by threshold and time tolerances according to the International Standards.

11.7.12. The trip unit shall allow parameterization of the trip thresholds and timing locally or remotely; in the case of any anomalies in remote parameterization, the protection shall automatically use the series of parameters set manually on the front of the circuit breaker.

11.7.13. On the advanced version, access to information and programming shall be allowed by a keyboard and graphic liquid crystal display.

11.7.14. Alarm signals for the protection functions will be available by means of LEDs located on the trip unit (complete version) and/or on the display (advanced version).

11.7.15. The size of the current sensors shall be a minimum of 10 A to a maximum of 3200 A so as to cover the widest possible current range.

11.7.16. Interchangeable rating-plugs shall be available starting from 400 A.

11.7.17. The four-pole circuit-breaker shall always be supplied with the neutral protected at 100% up to 125A excluded, and for higher values with protection selected between 50% and 100% of the rated current of the trip unit. Starting from 630A setting of the neutral at 150% and 200% shall be possible.

11.7.18. The current sensors for external neutral shall be optional.

11.7.19. Moulded Case Circuit breakers equipped with electronic releases shall be available a dedicated function to verify the correct connection between the trip unit, current sensor and trip coil. Eventual anomalies shall be signalled by a red led flashing.

11.8. Accessories for electronic trip units shall be available, such as the test unit for checking functioning of the tripping coil of the electronic trip unit, a trip signalling unit of the protections, a test and configuration unit which allows the electronic trip unit protections to be tested and configured, an actuation unit which allows circuit-breaker opening and closing by means of a motor operator

mounted on it, a battery unit which allows trip unit testing when the circuit-breaker and an external unit for wireless communication.

11.8.1. For both the complete and the advanced version a measurement module shall be available, in order to gauge the plant functioning parameters, such as phase and phase to phase voltages, powers and energies. On the advanced version all the available measurements can be displayed on the LCD. Furthermore, for the electronic trip units for motor protection, there shall also be a contactor control unit available.

11.8.2. The advanced version will be provided with a data logger function that automatically records and stores the instantaneous values of all the currents and voltages. Data shall be easily downloaded to any personal computer for elaboration. The data logger function freezes the recording whenever a trip occurs, so that a detailed analysis of faults can be easily performed. The sampling rate shall be adjustable up to 4800Hz, with total sampling time up to 27 s (@ 600Hz sampling rate). Tracking of up to 64 events shall be possible.

## 11.9. Protections

The minimum performances of the protection functions of the electronic protection trip unit for distribution, where present, shall be:

11.9.1. Function L:adjustable trip threshold I1= (0.4-1) x In, trip curves for the basic version with time settings from 3 to 12 seconds – 2 different trip curves - (at 6 times the set threshold), whereas for the advanced version with time settings from 3 to 18 seconds – 4 different trip curves - (at 6 times the set threshold). For the advanced version, L function according to IEC 60255-3 shall be available. *Cannot be excluded.*

11.9.2. Function S: adjustable trip threshold I2= (1-10) x In, trip curves for the basic version with time settings from 0.1 to 0.25 seconds – 2 different trip curves – (at 8 times the rated current of the trip unit), whereas for the advanced version with time settings from 0.05 to 0.5 seconds – 4 different trip curves with inverse short time with definite time characteristic or curves with definite time – (at 6 times the rated current of the trip unit). For circuit breakers from 250 A to 630 A, in the advanced version, I2= (0.6-10)x In. *Can be excluded.*

11.9.3. Function I: adjustable trip threshold I3= (1-10) x In for the basic version (instantaneous trip), whereas for the advanced version I3= (1.5-15) x In (instantaneous trip). *Can be excluded.*

11.9.4. Function G: adjustable trip threshold I4= (0.2-1) x In with trip time settings from 0.1 to 0.8 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.5. Function U: adjustable trip threshold I6= (2%…90%) x I1 with trip time settings from 0.5 to 60 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.6. Function OT: fixed at 85 °C (with instantaneous trip). *Can be excluded.*

11.9.7. Function UV: adjustable trip threshold U8= (0.5-0.95) x Un with trip time settings from 0.1 to 5 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.8. Function OV: adjustable trip threshold U9= (1.05-1.2) x Un with trip time settings from 0.1 to 5 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.9. Function RV: adjustable trip threshold U10= (0.1-0.4) x Un with trip time settings from 0.5 to 30 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.10. Function RP: adjustable trip threshold P11= (-0.3…-0.1) x Pn with trip time settings from 0.5 to 25 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.11. Function UF: adjustable trip threshold f12= (0.9-0,99) x fn with trip time settings from 0.5 to 3sec with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.12. Function OF: adjustable trip threshold f13= (1.01-1.10) x fn with trip time settings from 0.5 to 3 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.13. The minimum performances of the protection functions of the electronic protection trip unit for motor protection shall be:

- Function L: adjustable trip threshold I1= (0.4-1) x In, trip curves in class 10A, 10, 20 and 30 or 3E, 5E, 10E e 20E in compliance with the IEC 60947-4-1 Standard, with temperature compensation and sensitivity to missing/unbalanced phase. *Cannot be excluded.*

- Function R: adjustable trip threshold I5= (3-10) x I1 + OFF, with 4 different trip curves with definite time with time settings t5= 1...10 s. Automatic exclusion of the function during the motor starting phase, and automatically reactivated after this. *Can be excluded.*

- Function I: adjustable trip threshold I3= (6-13) x In (instantaneous trip) with recognition of the motor starting phase.

- Function U: adjustable trip threshold I6= (0.4-0,9) x I1 e t6= 4 s. *Can be excluded.*

- Possibility of contactor control for trip of functions L and R.

- Possibility of connection to a PTC (temperature probe) inserted in the motor.

**11.10. Dialogue**

For circuit-breakers from 250 A to 1600 A dialogue shall be available, making the following functions possible:

11.10.1. Remote setting of the protection function parameters, unit configuration and communication.

11.10.2. Transmission of measurements, states and alarms from circuit-breaker to system transmission of events to the system.

11.10.3. Dialogue units able to support different standard market protocols shall be available:

11.10.3.1. Modbus RTU protocol, EIA RS485 physical transmission means, speed 9.6...19,2 Kbit/s, bus architecture.

11.10.3.2. Profibus DP protocol, RS485 physical transmission, speed 9.6...19,2 Kbit/s, bus architecture.

11.10.3.3. Device Net protocol, RS485 physical transmission, speed 9.6...19,2 Kbit/s, bus architecture. Wireless bluetooth protocol.

11.10.3.4. The dialogue unit shall make all the parameterization and measurement information of the protection unit available on the field bus, as well as the state of the circuit-breaker (open/closed, racked-in/racked-out) and of the related trip units. Shall be providing a tool able to analyse all these data by PC.

## 11.11. Accessories

### 11.11.1. Electrical Accessories

11.11.1.1. Internal Accessories has to be the same up to 250A as well from 250A to 1000A.

11.11.1.2. Auxiliary contacts: these shall allow the state of the circuit-breaker (open or closed; contact on change-over) and trip unit to be known. Auxiliary contacts for use at 250 V AC/DC, 400V AC and 24 V DC (digital contacts) shall be available.

11.11.1.3. Releases: the shunt opening and under-voltage releases shall be available with different power supply voltages both in AC and DC.

11.11.1.4. With circuit-breakers up to 250 A the electrical accessories shall be available both in the pre- cabled version and with 1m long un-cabled cables.

11.11.1.5. The addition of the electrical accessories shall not increase the volume of the circuit breakers.

### 11.11.2. Mechanical Accessories

11.11.2.1. Terminals: different types of terminals (both front and rear) shall be available for all the sizes, suitable for connection with copper, copper-aluminium cable and bus bar connections.

11.11.2.2. Up to the 160 A size, the circuit-breakers can be fitted with different types of terminals combined in different ways (higher of one type, lower of a different type). Terminal covers and phase separators shall also be available.

11.11.2.3. Multi-cable terminals shall be available for circuit-breakers for the 250-320-400-630 A size. Support for fixing onto DIN rail: supports for fixing onto DIN EN 50022 rail shall be available up to the rated current of 250 A inclusive.

11.11.2.4. Mechanical interlocks: mechanical interlocks shall be available for the whole series of circuit-breakers; the interlock can be of the front type for circuit-breakers with rated

current up to 250 A. It shall be possible to interlock circuit-breakers of different sizes at least up to 250 A and between 250A and 630 A.

11.11.2.5. Rotary handle: a rotary handle operating mechanism both in the direct and transmitted version shall be available for the whole range of circuit-breakers, both padlockable in the open position and fitted, on request, with the following accessories: early contact for under-voltage release, compartment door lock and key lock in open position.

11.11.2.6. The whole range of moulded case circuit-breakers shall be fitted with motor operator (according to the rated current of the circuit-breaker, this can either be of the solenoid type, or with stored energy) for remote operation of the circuit-breaker.

## 11.12. Residual Current Release

### 11.12.1. General Aspects

11.12.1.1. The residual current releases used in low voltage installations shall be designed, constructed and tested in compliance with the International Standards and in particular with:

11.12.1.1.1. IEC 60947-2 appendix B and ANNEX M

11.12.1.1.2. IEC 60255-4 and IEC 61000: for protection against unwarranted trips

11.12.1.1.3. IEC 60755 for insensitivity to the continuous current components

11.12.1.2. It shall be possible to install the residual current releases in installations with line-to line voltage up to 690 V.

11.12.1.3. They shall be able to be used in close connection with circuit-breakers and/or switch disconnectors.

11.12.1.4. Shall be guaranteed the normal operating up to -25°C

## 11.13. Construction Characteristics

11.13.1. It shall be possible to combine the range of residual current releases with all the circuit breakers making up the range of moulded case circuit-breakers so as to cover the whole current range of MCCBs.

11.13.2. It shall be possible to combine the residual current releases with circuit-breakers in fixed, plug-in and withdrawable version.

11.13.3. Their installation on a DIN rail shall be possible.

11.13.4. Control of correct operation shall be possible according to the prescriptions of the reference Standards, by means of a test pushbutton on the front of the apparatus.

11.13.5. Residual current releases shall be available both in the three-pole up to 250A and in the four-pole version.

11.13.6. Dedicated residual current releases shall be available up to 1600 A

11.13.7. Type B residual current protection shall be available

11.13.8. It shall be possible to select the maximum threshold of sensitivity to the residual current fault frequency (3 steps: 400 700 1000 Hz).

**11.14. Electrical Characteristics and Performances**

11.14.1. Up to the rated current of 250 A, the service voltage shall be between 85 and 500 V AC line-to-line (operation up to 50 V phase-neutral). Trip thresholds Idn starting from 0.03A and up to 10 A shall also be available for the advanced version which shall also allow selection of the trip times (for the basic version, the trip shall be of the instantaneous type).

11.14.2. A contact signalling pre-alarm shall be available in the advanced version and the availability of an input for remote opening.

11.14.3. There shall be type A versions for alternating pulsed current, S selective and E for emergency stop of the residual current release.

11.14.4. The release shall be self-supplied and the power supply can come either from above or below.

11.14.5. Compliance with the International Standards on the matter of electromagnetic compatibility.

11.14.6. There shall be a switchboard residual current unit with voltage varying between 80 and 500 V AC and between 48 and 125 V DC. There shall be availability of several adjustment ranges from 0.03 to 30 A, with trip times from instantaneous to 5 s and pre-alarm threshold adjustment.

11.14.7. The toroidal transformers can either be closed (from 60 to 180 mm in diameter) or open (from 110 to 230 mm in diameter).

**12. MINIATURE CIRCUIT BREAKERS SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.**

**12.1. Functional Characteristics (1 to 63 Amps)**

12.1.1. Miniature Circuit Breaker for cable protection according to:
DIN VDE 0641 Teil 11,
EN 60898, IEC 60947-2, EN 60947-2,
UL1077/C22.2 No.235, UL489/C22.2 No.5

12.1.2. Rated short-circuit capacity Icn shall be: 6/10/25 kA unless otherwise indicated.

**12.2. Tripping Characteristics/curves shall be as follows**

B: In 6/10/13/16/20/25/32/40/50/63 A
C: In 0,5/1/1,6/2/3/4/6/8/10/13/16/20/25/32/40/50/63 A
K: In 0,2/0,5/1/1,6/2/3/4/6/8/10/13/16/20/25/32/40/50/63 A
Z: In 0,5/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63 A
*Number of poles*: 1/2/3/4/1+NA/3+NA
*Energy Limiting Class*: 3
*Rated Voltage Un:*
Single-pole: 230/400 VAC
Multi-pole: 400VAC
*Max. Operating Voltage UBmax DC:*
Single Pole: 72 VDC

Double Pole: 125 VDC
Suitable for isolation acc. IEC 60898-1

**12.3. Environmental Characteristics**

12.3.1. Operating temperature: -25 °C...+70 °C and storage temperature: -40 °C...+70 °C.

12.3.2. Altitude: operation without derating up to 2000 m (6600 ft), and with derating up to 4000 m.

12.3.3. Suitability for use in a hot-humid environment. With regard to this, the circuit-breakers shall undergo a tropicalisation process which makes them suitable for use in a hot humid environment, as established by the prescriptions of the main shipping registers and in accordance with the international IEC 60068-2-30 Standards.

**12.4. Construction Characteristics**

12.4.1. Guide edge for labels

12.4.2. Prepared for locking devices

12.4.3. Quick and easy removal of installed device

**12.5. Wiring**

12.5.1. *Busbars*: Terminals for in and out coming feeder on top of busbars. The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

**12.6. Accessories**

12.6.1. Retrofit accessories (extract):

- Universal signal contact/auxiliary contact (right): 1SO
- Auxiliary contact (right): 1SO
- Auxiliary contact (left): 1NO/1NC, 2NO or 2NC
- Bottom-fitting auxiliary contact: 1NO or 1NC
- (bottom fitted without increasing width of MCB)
- Undervoltage- or Shunt trip release
- Hand operated neutral
- Motor operating device (remote control)
- DDA-Block
- Labelling system (marked or blank)
- Locking devices

**12.7. Functional Characteristics (80 to 100 Amps)**

12.7.1. Miniature Circuit Breaker for cable protection according to:
DIN VDE 0641 Teil 11, DIN VDE 0660 Teil 101, IEC 60898, EN 60898, IEC 60947-2, EN 60947-2

12.7.2. Rated short-circuit capacity shall be minimum: 6 kA unless otherwise stated.

**12.8. Tripping Characteristics**

12.8.1. B mit In 80/100 A

C mit In 80/100 A
*Number of poles:* 1/2/3/4
*Energy Limiting Class:* 3
*Rated Voltage:*
Single-pole: 230 VAC and 60 VDC
Single-pole: 400 VAC and 125 VDC
Suitable for isolation acc.: IEC 60947-1/-3

**12.9. General Features**

12.9.1. Label holder

12.9.2. Prepared to get equipped with toggle-locking device

**12.10. Wiring**

12.10.1. *Busbars*: Terminals for in and out coming feeder on top of busbars.The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

**12.11. Accessories**

12.11.1. Auxiliary contact: 2 or 3 contacts (screw-able or push-in-able)

12.11.2. Auxiliary contact (low power): 1 or 3 contacts

12.11.3. Signal contact or signal contact/auxiliary contact: 3 contacts

12.11.4. Undervoltage release or shunt trip

12.11.5. Neutral conductor

12.11.6. Printed labels

12.11.7. Labels for individual printing

12.11.8. Locking devices

**12.12. Functional Characteristics (DC Protection)**

12.12.1. Miniature Circuit Breaker for cable protection according to: DIN VDE 0641 Teil 12, DIN VDE 0660 Teil 101, IEC 60898, EN 60898, IEC 60947-2, EN 60947-2, UL1077

12.12.2. Rated short-circuit capacity: 4,5/6 kA

**12.13. Tripping characteristics shall conform to the following**

B: In 6/10/16/20/25 A
K: In 0,2/0,3/0,5/0,75/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63 A
In 0,5/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63A
*Number of poles :* 1/2/3/4 (K,Z); 1/2 (B)

*Rated Voltage:*
Single-pole: 230/400 VAC and 220 VDC
Multi-pole: 400 VAC and 440 VDC
Suitable for isolation acc: IEC 60947-1/-3

**12.14. General Features**

12.14.1. Label holder

12.14.2. Prepared to get equipped with toggle-locking device

**12.15. Wiring**

12.15.1. *Busbars*: Terminals for in and out coming feeder on top of busbars. The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

**12.16. Accessories**

12.16.1. Auxiliary contact: 2 or 3 contacts shall be (screw-able or push-in-able)

12.16.2. Auxiliary contact (low power): 1 or 3 contacts

12.16.3. Signal contact or signal contact/auxiliary contact: 3 contacts

12.16.4. Undervoltage release or shunt trip

12.16.5. Neutral conductor

12.16.6. Printed labels

12.16.7. Labels for individual printing

12.16.8. Locking devices

## 13. CONTACTORS

13.1. Contactors shall comply with SANS 60947. Duty cycle shall be AC3. Contactor coil voltage may be either 230V or 400V unless otherwise stated.

13.2. Lighting contactors for 24 to 63 Amps (AC1) shall be DIN mounted on the same rail as the MCBs and feature a DC solenoid actuator and are thus hum-free. They shall have a switching position indicator, integrated coil protection circuits and overvoltage protection for the solenoid coil up to 5kV.

13.3. Contactors from 9 to 38 Amps shall be electronic coils.

13.4. For contactors from 50 to 300 Amps, standard coils will be accepted.

13.5. Contactors from 400 to 2050 Amps shall be electronic coils.

13.6. Mixture of contactors shall not be permitted.

**13.7. Ambient characteristics**

13.7.1. Climatic withstand according to IEC60068-2-0 AND 60068-2-11

**13.8. Construction characteristics**

**13.8.1. Contactors with electronic coils 9 to 38 Amps AC3 shall have:**

13.8.1.1. Maximum of two frame sizes from 9 to 16 amps AC3

13.8.1.2. Width not to exceed 45mm for contactors 9 to 38 amps AC3 rating

13.8.1.3. Contactor up to 16 amps to include built in auxiliary contact

13.8.1.4. Common auxiliaries for contactors 9 to 38 amps AC3

**13.8.2. Contactors 9 to 110 Amps with standard coil shall have:**

13.8.2.1. Mounting positions: only position 6 not permitted (see appendix 1)

13.8.2.2. Maximum of 4 frame sizes from 9 to 110 amps

13.8.2.3. Quick fixing on mounting rail according to IEC 60715 standards as:-

- 35 x 7.5 mm for 9 to 40 amps contactors
- 35 x 15 mm for 9 to 75 amps contactors
- 75 x 25 mm for 50 to 110 amps contactors
- Terminal with captive screws
- Terminal screws to be of Pozidriv type up to 75 amps AC3
- Terminal screws to be M8 Hexagon socket for main terminals and Pozidriv for coil terminals

**13.8.3. Contactors 145 to 750 Amps AC3 with Standard or Electronic Coil shall have:**

13.8.3.1. Maximum of 4 frame sizes from 145 amp to 750 amp

13.8.3.2. Mechanical design to incorporate power terminal at base of contactor, operating coil to be mounted on top of contactor. Coil removal to side of contactor shall not be permitted.

13.8.3.3. Shall have front access to coil , with no need to remove the power cables when changing coils

13.8.3.4. Shall have front access to main fixed and moving contacts , without the need to remove the power cables

13.8.3.5. Removal and replacement of the fixed and moving contacts shall be able to be accomplished without the need to remove the power cables

13.8.3.6. Contactor shall have quick release quarter turn screws for easy access to main contact inspection

13.8.3.7. Clear marking of contactor electrical information, marking to be clearly visible on front of contactor

**13.8.3.8. Electrical characteristics and performances**

13.8.3.8.1. All Contactors shall be electrically coordinated with upstream protection device, whether device or the fuse type, MCCB, or manual motor starter. All coordination to be backed up by Manufactures coordination tables, available on request.

**13.8.4. Contactors with electronic coils 9 to 38 Amps AC3**

13.8.4.1. Same coil to cover both the AC or DC control supplies

13.8.4.2. Coil to be of torroidal design

13.8.4.3. Coil to have extended voltage operating limits.

13.8.4.4. 4 coil types only covering: 24..500 V 50/60Hz and 20..500 V DC

13.8.4.5. Coil Consumption not to exceed the following limits

13.8.4.6. On pull in 50VA

13.8.4.7. On holding 2.2VA

13.8.4.8. Built-in surge protection to be incorporated

13.8.4.9. Flexible position of Coil terminals i.e. can be transferred from the top to the bottom of contactor

13.8.4.10. With additional coil terminal block, it shall be possible to connect the coil both at the top and at the bottom.

**13.8.5. Contactors with standard AC coil 50 to 30 Amps AC3 shall have:**

13.8.5.1. Rated operational voltage 690V for contactors up to 40 amp AC3

13.8.5.2. Rated operational voltage 1000V for contactors 50 to 750 amps AC3.

13.8.5.3. Rated making capacity to be equal to 10 x AC3 rated operational current, or greater.

13.8.5.4. Rated breaking capacity to be equal to 8 x AC3 rated operational current, or greater.

13.8.5.5. Coil operating limits (according to IEC60947-4-1 ) 0.85 ….1.1 x rated Control circuit voltage, at temperature less or equal to 55degrees Celsius

13.8.5.6. Drop out voltage in %age of rated Control Voltage approximately 40 to 65%

13.8.5.7. Contactors 400 amp AC3 upward to incorporate electronic coil technology

**13.8.6. Contactors with electronic coils 400 to 750 Amps AC3 shall have:**

13.8.6.1. As above but to include the following

13.8.6.2. Same coil to cover both the AC or DC control supplies

13.8.6.3. Coil to have extended voltage operating limits.

13.8.6.4. Can withstand voltage interruptions or voltage dips in control supply up to 20ms.

13.8.6.5. Distinct opening and closing voltages as follows

13.8.6.6. Opening 0.55 x min operating voltage

13.8.6.7. Closing 0.85 x min operating voltage

13.8.6.8. Coil types only covering: 24..500 V 50/60Hz and 20..500 V DC

**13.9. Accessories**

13.9.1. All auxiliary contacts shall employ the “wipe action” mechanism for the self cleaning of the contact tips.

13.9.2. Front mounted auxiliary contact blocks rated insulation voltage equal to 690V a.c or greater

13.9.3. Rated operation voltage 24…690VAC

13.9.4. Rated making capacity 10 x AC-15 rated operational current

13.9.5. Rated breaking capacity 10 x AC-15 rated operational current

13.9.6. Rated short time withstand current 100amps for 1sec:, 140 amps for 0.1 sec

13.9.7. Electrical durability, max electrical switching frequency 1200 cycles per hour or greater

**13.10. Side Mount Auxiliary Contact Blocks shall have:**

13.10.1. Rated insulation voltage equal to 690V a.c or greater

13.10.2. Rated operation voltage 24…690V a.c

13.10.3. Rated making capacity 10 x AC-15 rated operational current

13.10.4. Rated breaking capacity 10 x AC-15 rated operational current

13.10.5. Rated short time withstand current 100amps for 1sec:, 140 amps for 0.1 sec

13.10.6. Electrical durability, max electrical switching 1200 cycles per hour or greater.

## 14. LIGHTNING AND SURGE PROTECTION

**14.1. Main Distribution Board**

14.1.1. According to the IEC 62305 recommendations, electrical installations shall be protected against direct lightning and surge impulses with din rail Class 1/Type 1 (10/350µs) lightning current arresters.

14.1.2. SPD shall use a triggered spark gap technology to allow high lightning discharge current, unpluggable type to avoid ejection of the cartridge during the discharge of the current and non-blow out technology to avoid fire risks.

14.1.3. The SPD shall provide either common protection in TNC network or common and differential mode protection in TT and TNS network according to the IEC60364 recommendations.

14.1.4. Lightning arresters shall have the following technical specifications:

14.1.4.1. Class of test (IEC 61643-1) I

14.1.4.2. Lightning impulse current: Iimp/pole (10/350µs) ≥ 25kA

14.1.4.3. Nominal voltage Un 230 / 400V

14.1.4.4. Maximum continuous AC voltage Uc 255V

14.1.4.5. Follow current extinguishing capability Ifi ≥ 50kA

14.1.4.6. Protection level Up : 2.5kV

14.1.4.7. Max. back up fuse gG/gL: 125A

14.1.4.8. Visual state indicator: Yes

## 14.2. Sub-Main Distribution Board

14.2.1. According to the IEC 62305 recommendations to avoid oscillations and magnetic coupling phenomenon, sensible equipments shall be protected against indirect surges with din rail Class 2 / Type 2 (8/20µs) surge arresters.

14.2.2. The SPD shall have a safety reserve system and shall be pluggable for preventive and easy maintenance. The SPD shall provide either common protection in TNC network or common and differential mode protection in TNS and TT network according to the IEC 60 364 recommendations.

14.2.3. In case of common and differential mode protection the SPD shall use an association of MOV and GDT to provide isolation to the ground and low protection level in all protection modes. The associated switching element

14.2.4. (MCB/Fuse) (to insure a safe end of life) shall be the same brand as the SPD to insure a good coordination.

14.2.5. Surge arresters technical specifications:

14.2.5.1. Class of test (IEC 61643-1) II

14.2.5.2. Max. discharge current: Imax/pole (8/20µs) ≥ 40kA

14.2.5.3. Nominal current In / pole ≥ 20kA

14.2.5.4. Nominal voltage Un 230 / 400V

14.2.5.5. Maximum continuous AC voltage Uc 275 / 255V

14.2.5.6. Protection level Up at 20kA ≤ 1.5 kV

14.2.5.7. Protection level Up at 3kA (Class 3 test)

14.2.5.8. Pluggable :Yes

14.2.5.9. Visual status indicator: Yes

14.2.5.10. Safety reserve: Yes

14.2.5.11. Remote indicator :Yes

**14.3. Data line / Telecom line**

14.3.1. The selection of the surge protection device shall be according the IEC 62305 recommendations and therefore shall be a type C2 SPD.

14.3.2. The SPD shall be pluggable type for easy maintenance and shall provide the dialling tone returns when the cartridge is withdrawn in case of end of life.

14.3.3. The cartridges, whatever the nominal voltage, shall be adaptable onto different base. The base shall be chosen according to the connection of the wire: it can be RJ11, RJ45 or screw connection. The connections to the earth shall be either by a DIN rail contact or by a screw terminal.

14.3.4. The SPD dimension shall not exceed 12.5 mm wide to save space. The SPD shall use two level of protection: the first one by GDT, the second one by zener diode. These two levels shall be coordinated and shall provide common and differential mode protection.

14.3.5. Low current surge arresters technical specifications:

14.3.5.1. Class of test (IEC 61643-21): C2

14.3.5.2. Nominal voltage Un According to the Max.voltage of signal

14.3.5.3. Maximum continuous AC voltage Uc (L-N / N-G): According to the Max. voltage of signal

14.3.5.4. Loading current: 140mA

14.3.5.5. Max. discharge current: Imax / line (8/20µs) ≥ 10kA

14.3.5.6. C2 Nominal discharge current In / line (8/20µs) ≥ 5kA

14.3.5.7. Protection level Up (L-L / L-G): According to the Max. voltage of signal

14.3.5.8. Pluggable: Yes

## 15. ANTI-CONDENSATION HEATERS

15.1. Anti-condensation 220 Volt heaters shall be provided for all compartments. A switch with thermostat shall be provided to control the heaters.

15.2. The wiring from the heater elements to terminals shall be high temperature insulation covered, a suitable compression type gland shall be fitted for the incoming 231V supply.

## 16. INDICATING INSTRUMENTS

16.1. A flush mounted, industrial grade, 96 mm square voltmeters and ammeter conforming to SABS 1299 shall be mounted near the centre top of the front panel and connected to measure the busbar voltage and current.

16.2. The calibrated scale length shall be a minimum of 70 mm. Means shall be provided for zero adjustment from the front without any dismantling of the indicating instrument.

16.3. A voltmeters selector switch with phase to phase, phase to neutral, and "off" position shall be provided.

16.4. An ammeter selector switch shall be provided with an "OFF" position.

16.5. Meters shall indicate by means of colours the relevant phase that it is metering.

## 17. CURRENT TRANSFORMERS

17.1. Current transformers shall comply with BS 3938.

## 18. MECHANICAL CABLE GLANDS

18.1. Cable glands shall be of the compression type, manufactured in brass and/or bronze, and suitable for termination of earth-continuity conductor type cables where applicable.

18.2. The gland body shall incorporate a knurled cone for clamping the armouring and an integrally cast earth lug, complete with earthing screw.

18.3. All metal portions of the gland shall be electroplated for corrosion resistance.

18.4. The glands shall be supplied complete with weatherproof neoprene shrouds.

18.5. Entries for multi-core PVC, PVC, wire armoured, PVC sheathed cables shall comprise cone grip mechanical type glands mounted on robust gland plates.

18.6. The board shall be supplied complete with all glands for all outgoing and incoming circuits as indicated on the drawing.

## 19. LIGHT SENSITIVE CONTROL UNIT

19.1. Light sensitive control units shall be supplied by others.

19.2. A suitably rated single pole over-riding switch, for over-riding the unit in 19.1, and moulded case circuit breaker shall be provided, when called for in the drawings or appendices hereto.

19.3. The switch and circuit breaker shall be wired to a suitable terminal strip, mounted within the distribution board, to facilitate connection of the light sensitive control unit when installed.

## 20. EARTHING

20.1. The components shall be effectively bonded to the main frame of the distribution board, which shall also be bonded to the main earth bar. Earthing shall comply with SANS-10142 code of practice for the wiring of premises.

## 21. CABLING AND WIRING

21.1. All cables and wires used shall be stranded, 600/1000 V grade and comply with SABS 150, except where special cables have been otherwise specified.

## 22. LABELS

22.1. Labels shall be provided comprising conspicuous engraved black lettering on white background secured with rivets or screws on or adjacent to the items concerned, and worded in English.

22.2. Labels of embossed tape or labels secured with adhesive are not acceptable.

22.3. All fuse-switches, circuit breakers, isolators, contactors, relays, etc., shall be clearly designated.

22.4. The terminals of all outgoing circuits shall be provided with labels to correspond with the labelling of the units on the panel of the distribution board.

22.5. All terminal connections shall be provided with durable tags or clips, on which shall be clearly and indelibly marked, the identifying code letters of each wire. Such code letters shall correspond to those used on the wiring diagram.

## 23. PAINTING

23.1. All surfaces of the distribution board shall be light orange to SABS 1091 colour No. B26. (Transnet orange; Pantone 165C / 021U; Coats 50/50; Vermilion MW52; RAL 2004 rein orange; Trichromatic 70% magenta, 90% yellow), unless otherwise specified.

23.2. All surfaces shall be cleaned according to the appropriate method described in SABS 064 for the particular surface to be cleaned, the contamination to be removed and the primer to be applied.

23.3. Blast cleaning of components shall be in accordance with clause 4.3 of SABS 064 to a degree of cleanliness of at least Sa2 for inland exposure components and Sa 1/2 for coastal exposure components. See Table 1 of SABS 064 for the appropriate profile.

23.4. Sheet metal that cannot be blast cleaned shall be cleaned by pickling according to clause 4.6 of SABS 064.

23.5. Components that shall be powder coated shall be cleaned and prepared by the surface conversion process according to clause 5 of SABS 064 to a medium-weight classification of table 2 of that specification.

23.6. Oil and accumulated dirt on steel components where no rusting is present shall be removed according to clause 3 of SABS 064.

23.7. The powder-coating process shall be in accordance with SANS 1242 - type 4 : Corrosion-resistant coatings for interior use and using the thermosetting type high gloss coating.

23.8. All specified coatings shall be applied according to the relevant specification and the manufacturer's instructions shall be followed.

23.9. Coatings shall not be applied under conditions that may be detrimental to the effectiveness of the coating or the appearance of the painted surface.

23.10. When examined visually the finished products shall have a uniform appearance as far as gloss is concerned and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

## 24. ADDITIONS AND MODIFICATIONS TO EXISTING DISTRIBUTION BOARDS

24.1. Where the contractor needs to make modifications or additions to existing distribution boards, the following minimum criteria shall be adhered to :

24.1.1. Re-labelling and proving of existing circuits in accordance with security of existing terminations to be confirmed

24.1.2. Isolation barriers, cover blanks to be in place where required

24.1.3. Panel modification in terms of architraves, DB covers, and the closing of redundant openings to be undertaken by an accredited switchboard manufacturer.

24.1.4. Wiring to be examined for integrity correct sizing and tidied and/or replaced and neatened as required.

24.1.5. A certificate of compliance shall be issued for the full distribution board and not the additions only.

## 25. INSPECTION

25.1. Transnet reserves the right to carry out inspection of any items of equipment and work at any time during the manufacture at manufacturer's works and to be present at any tests.

25.2. A final inspection by Transnet before delivery to site is required.

## 26. TESTS

26.1. All prescribed tests as referred to in the standard specifications may be called for at the discretion of Transnet.

26.2. Transnet also reserves the right to carry out any check tests on the equipment.

26.3. Notwithstanding the successful completion of tests, the tenderer shall still be responsible for the efficient operation of the equipment.

26.4. The tenderer shall bear all costs for any tests, which shall be required.

## 27. GUARANTEE

27.1. The Contractor shall undertake to repair all faults due to bad workmanship and / or faulty materials and to replace all defective apparatus or materials during a period of twelve (12) calendar months, calculated from the date of delivery.

27.2. Any defects that may become apparent during the guarantee period shall be rectified to the

satisfaction of, and free of cost.

27.3. The Contractor shall undertake work on the rectification of any defects that may arise during the guarantee period within 7 days of his being notified by Transnet of such defects.

27.4. Should the Contractor fail to comply with the requirements stipulated above, Transnet will be entitled to undertake the necessary repair work or effect replacement of defective apparatus or materials, and the Contractor shall reimburse Transnet the total cost of such repair or replacements, including the labour costs incurred in replacing defective material.

## 28. SPARES

28.1. The tenderer shall state whether a complete range of spares is held in stock by their local representatives for subsequent purchase by Transnet as and when required.

**WITNESSES**

**1.** ……..  ……
**TENDERER**

**2.** ……  ……
**DATE**

**Transnet Port Terminals**
**Design Services**

# SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF MEDIUM VOLTAGE AND LOW VOLTAGE ELECTRICAL CABLES

| REVISIONS | | |
|---|---|---|
| REV | DATE | APPROVED |
| 0 | September 2022 | |
| | | |
| | | |
| | | |
| | | |

# INDEX

### 1.1 SCOPE OF WORK

The scope of this specification covers the minimum requirements for the supply installation, testing and commissioning of medium and low voltage cables, instrumentation cables, cable racking, trenching, sleeves and earthing reticulation on Transnet sites on behalf of Transnet.

Contractors are required to familiarise themselves with all applicable Standards and Codes of Practice listed herein, and to ensure compliance in the execution of any work in terms of this document. Failure to comply may render the contractor liable for corrections at his own cost.

These Standards and Codes of Practice should be read in conjunction with all other Specifications and drawings as issued for a particular contract. Where discrepancies occur, these must be brought to the attention of Transnet in writing before commencement of work. In the event of any conflict between the contents of any documents forming part of a contract (as listed in the Master Index) and this document, the former shall prevail.

### 1.2 APPLICATION TO WORK ACTIVITIES

The Standards and Codes of Practice contained herein apply to all installations requiring Medium and Low voltage Electrical and Instrument Cabling, Racking, Trenching Sleeves and Earthing Reticulation and include amongst others the following standards:

- Supply of electrical and instrument cable trenches
- Supply, installation of electrical and instrument ladder racking reticulation
- Supply, installation of electrical and instrument dropper reticulation
- Supply, installation and termination of electrical and instrument cabling
- Cable Tagging and Core Identing standards for electrical and instrument cabling
- Supply, installation of instrument and electrical earthing

## 2. STANDARDS AND REFERENCES

2.1 The requirements of the materials, design, layout, fabrication, assembly, erection, examination, inspection and testing of equipment and facilities on site shall be in accordance with the relevant sections of codes: -

| | | | |
|---|---|---|---|
| a) | SANS 10142-1 | - | Code of Practice for the Wiring of Premises |
| b) | SABS 763 | - | Hot dip (galvanising) Zinc Coating. |
| c) | SABS 1507 | - | Electric cables with extruded solid dielectric Insulation for fixed installation. |
| d) | SANS 1574 | | |
| e) | ASME/ANSI.B31.3 | - | Chemical Plant and Petroleum Refinery piping |
| f) | ASME/ANSI.B31.4 | - | Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohols. |
| g) | SABS 089:Part II-1965 | - | The Petroleum Industry Part II: Electrical Code |

| | | | |
|---|---|---|---|
| h) | SABS 089 - Part II | - | The Handling, Storage and Distribution of Petroleum Products (Electrical Code) |
| i) | SABS 0198 | - | "The Selection, Handling and Installation of Electric Power Cables of rating not exceeding 33KV" |
| j) | API 2003 | - | Protection against ignitions arising out of static, Lighting and stray currents. |
| k) | SABS 03 | - | The Protection of structures against lightning. |
| l) | SABS 086 | - | The Installation and Maintenance of Electrical Equipment used in explosive atmospheres. Refer to Section 2 for Hazardous area classification. |
| m) | IEC 79-14 | - | Electrical Installations in Hazardous Areas |

n) Government, local authorities or other statutory bodies' regulations, laws, requirements or customs which are more stringent than those specified in this project specification.

2.2 The following standard specifications are to be used for reference purposes and need to be noted by Contractors in order to signify familiarity and compliance with the requirements. It is expected of Contractors that they be familiar with the applicable clauses and that these will be adhered to in the execution of any work in terms of this specification. Contractors will be required to confirm that they are able to meet these requirements.

a) SABS 0108 : 1995 The Classification of hazardous locations and the selection of electrical apparatus for use in such locations

b) The Occupational Health & Safety (OHS) Act No. 85 of 1993.

c) SABS 0314 Flameproof Enclosures for Electrical Apparatus

d) SABS 0549 Intrinsically Safe Electrical Apparatus

e) API Manual of Petroleum Measurement Standards Chapters 4 to 12
IP Chapter 10 and Papers 2 and 3

f) SABS 969 Enclosures for electrical apparatus

g) BS 5490 Classification of degrees of protection provided by enclosures

h) Safety Regulations for Contractors

i) Technical Instruction No. 16 - Contractors Work Permit Procedures.

j) VDE Standards

2.3 Where no specific rules, regulations, codes or requirements are contained in this specification nor covered by the above mentioned codes, the contractor shall, in consultation with Transnet, adhere to internationally accepted modern design and engineering practices in the Electrical and Petrochemical Industry.

## 3.0 SERVICE CONDITIONS

3.1 The cable shall be designed and rated for continuous operation under the following conditions :-

### 3.1.1 Ambient/Environment Conditions :

| | | | |
|---|---|---|---|
| 3.1.1.1 | Altitude | : | Sea level. |
| 3.1.1.2 | Ambient temperature | : | -5° C to +45° C (daily average +35° C). |
| 3.1.1.3 | Relative humidity | : | As high as 96% |
| 3.1.1.4 | Lightning conditions | : | Severe, with a maximum lightning ground flash density 11 flashes per $km^2$ per annum. |
| 3.1.1.5 | Exposure conditions | : | Salt laden, industrial atmosphere as well as hazardous gases and dust atmosphere. |

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

### 3.1.2 Electrical Conditions:

3.1.2.1 The system of supply will be three phase, 3 wire, 50 Hertz, 11KV alternating current for medium voltage and three-phase, 4 wire, 50 Hz 400 Volts alternating current for low voltage.

3.1.2.2 The voltage may vary within the range of 95% to 105% of the nominal and all cable shall be suitably rated.

## 4.0 RESPONSIBILITY FOR WORK, SAFETY

4.1 The Contractor shall be responsible for all aspects associated with the provision of the cables. This includes items such as supply of testing cable to test the cables prior to commissioning, provision of site office and storage facilities.

4.2 Occupational Health and Safety Act (Act No 85 of 1993) must be complied with in all respects during the execution of this contract. The onus shall be on the contractor to ensure that staff under his control adheres to the provisions of the act at all times.

## 5.0 ELECTRICAL CABLE SPECIFICATION

This part of the specification covers the general specification of electrical cables to be used on Transnet sites on behalf of Transnet Port Terminals.

## 5.1 TYPES OF CABLE

### 5.1.1 CROSS-LINKED POLYETHYLENE (XLPE)

5.1.1.1 Cross-linked Polyethylene (XPLE)-insulated cables shall be individually screened, 3 core, stranded copper conductor, type A, cable manufactured in accordance with SABS.1339. The cable is to be supplied with an overall graphite coating to the outer PVC sheath.

5.1.1.2 The cable shall have embossed on the outer P.V.C. sheath next to the **S.A.B.S.** mark the following letters:

**T/G/B**

where T = TRANSNET STANDARD G = GRAPHITE COATED B = BEDDING TEST

Only the above mentioned cable shall be accepted.

5.1.1.3 The cable shall be capable of withstanding continuous operational temperatures up to $90^{O}$ C.

5.1.1.4 Completed cable runs are subjected to the following tests :-

a. As laid down in S.A.B.S. 1339 (Appendix "E" paragraph E-1.4)

b. Anti-electrolysis insulation, applied between armouring and earth, tested at 1OkV D.C. for one minute. Bedding shall be tested at 4kV D. C. for one minute.

All the above tests shall be carried out in the presence of the Engineer

### 5.1.2 PAPER INSULATED

5.8.2.1 Fully impregnated hygroscopic paper insulated, Helically lapped, insulated, Three core, Stranded copper conductors, Outer layer numbered for core identification, Seamless pure lead sheath, Covered with bitumen impregnated paper, Single steel wire armoured, extruded plastic sheathed, Operational voltage 6.35 to 11kV.

5.1.2.2 The cable shall have embossed on the outer P.V.C. sheath next to the **S.A.B.S.** mark the following letters:

**T/G/B**

Where: T = TRANSNET STANDARD
G = GRAPHITE COATED
B = BEDDING TEST

Only the above mentioned cable shall be accepted.

5.1.2.3 The cable is to be supplied with the P.V.C. outer sheath impregnated with a high quality graphite powder coating.

5.1.2.4 Type general purpose copper woven taped screened (Table 19) cable manufactured in accordance with S.A.B.S. 97 is required.

5.1.2.5 The cable shall be capable of withstanding continuous operational temperatures up to 70 / 80$^{O}$ C.

5.1.2.6 Completed cable runs are subjected to the following tests

a. As laid down in S.A.B.S. 97

b. Anti-electrolysis insulation, applied between armouring and earth, tested at 10Kv D. C. for one minute. Bedding shall be tested at 4Kv D.C. for one minute.
<u>All the above tests shall be carried out in the presence of the Engineer</u>

**5.1.3 LOW VOLTAGE PVC CABLE**

5.1.3.1 Low voltage cables shall be PVC insulated cables with ECC, and shall comply with SABS.1507.

5.1.3.2 Earth continuity conductors shall be single core PVC insulated copper cables, and shall comply with SABS. 1507.

5.1.3.3 The cable shall be capable of withstanding continuous operational temperatures up to 70$^{O}$ C.

5.1.3.4 Electrical LV Power cabling installed in hazardous locations (flammable environment) running between Equipment located in the field, LV Panels or Motor Control Centre Panels, Valve Panels and Distribution Boards shall comprise of steel wire armoured, earth continuity conductor (ECC), PVC Insulated, four core cable, as follows:

Conductors.

Core Size : 4 core - Rated as per application (SABS 10142-1)
Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min period.

Insulation Colours: Colored RD-BL-YE/WT-BK (not numbered)

Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Inner Jacket

Extruded fire retardant black PVC with rip cord for jacket removal.
Minimum thickness 1.2mm

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon black added).

Jacket thickness 1.5mm

Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

5.1.3.5 Electrical Control cabling running between the Equipment located in the field, Control System Marshalling Cabinets, LV Panels and Incomer Breaker panels will comprise of steel wire armoured, PVC Insulated, multi-core cable, as follows :

Conductors.

Core Size : 7 core – 1.5 mm2 (Valve Actuators)
12 core – 1.5 mm2, 19 core – 1.5 mm2 (Switchgear)

Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min
Insulation Colours: 7 core and less – colored BL-YE/WT-RD-GR-BK-BR-PR/OR (Not numbered)
12 core and more – black, conductors to be numbered
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Inner Jacket

Extruded fire retardant black PVC with ripcord for jacket removal.
Minimum thickness 1.2mm up to 7 core, 1.5mm for 12 and 19 core

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant.
Jacket thickness 1.5mm up to 7 core, 2.0mm for 12 and 19 core
Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

5.1.3.6 Completed cable runs are subjected to the following tests as laid down in SANS 10142-1. Insulation resistance test between Phases, Phases and Neutral, Phases and ECC, Neutral and ECC.

### 5.1.4 INSTRUMENTATION CABLING

5.1.4.1 Instrument Cabling as defined within this and other Transnet Specifications includes the following types of cabling:

1. PVC SWA Multicore instrument cables running between Instrument Junction Boxes in the field and PLC Cabinets (IS and non-IS rated)
2. PVC SWA Multicore instrument cables running between instruments in the field and PLC Cabinets (IS and non-IS rated)
3. Dekabon armoured instrument cables running between Junction Boxes in the field and the instruments themselves (IS and non-IS rated)

5.1.4.2 All Instrumentation Cabling will comply in all respects to the specifications as contained in the Scope of Work attached to an Order. In the absence of cable specifications being detailed in the Scope of Work attached to an Order, the following cable specifications will apply.

5.1.4.3 Instrument cabling will be marshalled on Instrument racking and trenching as defined elsewhere within this specification.

5.1.4.4 Instrument multi-core cabling running between the Field Junction Boxes and the Control System Marshalling Cabinets will comprise of steel wire armoured, PVC Insulated, individual and overall screened multi-core cable. Note that Petronet has standardised on 1 pair, 2 pair, 8 pair and 16 pair cable – prior approval from Petronet will be required to deviate from these specifications.

Conductors

Core Size : 1.0 mm2

Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min.

Insulation Colours : Black and White

Multipair cores to be numbered (numeric on both conductors of the pairs)
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Shield/Screen

Individual & overall screened – plasticised aluminium foil (100%) coverage
Stranded tinned copper drain wire 0.5 mm2

Inner Jacket

Extruded fire retardant black PVC with rip cord for jacket removal.
Minimum thickness 1.2mm up to 8 pair, 1.5 mm for 16 to 36 pair

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon Black added).
Jacket thickness 1.5mm up to 8 pair, 2.0 mm for 16 to 36 pair.
Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

IS Circuits: Jacket color light blue  Non IS Circuits: Jacket color black.

5.1.4.5 Individual Instrument cabling running between the Field Junction Boxes and the individual field mounted Instruments will comprise of Dekabon armoured, PVC Insulated, individual and overall screened multi-core cable. Note that Petronet has standardised on 1, 2, 4 and Triad cable – prior approval from Petronet will be required to deviate from these specifications.
(Note that this specification only applies to cabling running on racks above the ground, all Instrument cables running in trenches will need to comply with the Instrument Multi-core Cable Specifications detailed above).

Conductors.

Core Size : 1.5 mm2
Stranded untinned copper, 7 strands minimum
PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min
Insulation Colours : Black and White
Multipair cores to be numbered (alphanumeric on both conductors of the pairs)
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Shield/Screen

Individual & overall screened – plasticised aluminium foil (100%) coverage
Stranded tinned copper drain wire 0.5 mm2

Inner Jacket

Extruded fire retardant black PVC with ripcord for jacket removal.
Minimum thickness 1.2mm

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon black added).
Jacket thickness 1.5mm.
Jacket to be totally bonded to an inner waterproof aluminium sleeve, with a ripcord under the sleeve for jacket removal.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be

used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics are not required to be used.

IS Circuits: Jacket color light blue  Non IS Circuits: Jacket color black.

## 6.0 CABLE TERMINATIONS

6.1 Medium and Low Voltage cables shall be terminated to busbars and switchgear in the panels, distribution boards and kiosks using suitable cable lugs. Cable earth wires shall be brought into glands on gland plates. The insulation between cable armouring and cable earth wires shall be maintained at terminations. The separate earth conductor cable shall terminate to the main earth bar.

6.2 All materials necessary for installing all cable terminations shall be provided by the Contractor and the cost thereof shall be included in the tender price.

### 6.3 Glanding

6.3.1 All instrument and electrical cables will be glanded at both ends using the appropriate sized gland and will include associated adaptors, washers, ferrules, bands, etc. Provision for all glands, adaptors, washers, ferrules, bands etc. shall be included in the Tenderer's offers. All cable glands shall comply with the following specification, unless otherwise specified in the Scope of Work attached to an Order:

6.3.2 Dekabon Armoured Cabling (Instrumentation)
Increased Safety Ex"e" rated compression gland, IP68 rated, complete with UV resistant black shroud where required, in accordance with SABS 1031.

6.3.3 PVC SWA Cabling (Instrument & Electrical motors)
Increased Safety Ex"e" rated non-compression gland, IP68 rated, complete with SWA protection (CCG Corrosion Guard or similar), in accordance with SABS 1031.

6.3.4 PVC SWA Cabling (Ex"d" rated Valve Actuators)
Flameproof Ex"d" rated non-compression gland, IP68 rated, complete with SWA protection (CCG Corrosion Guard or similar), in accordance with SABS 808.

6.3.5 PVC SWA Cabling (Electrical and PLC Panels located within buildings rated as Safe Areas in terms of Hazardous Area Classifications SABS 0108)
Non-Flameproof rated, non-compression gland, IP68 rated, complete with UV resistant (black) shroud where required.

All glands will be waterproof and in the case of Hazardous Areas, correctly rated in terms of the Explosion Proof Classification of the equipment housings to which they are installed.

### 6.4 Termination

6.4.1 All cables will be terminated at field instrumentation, electrical equipment, field junction boxes, switchgear panels and control room marshalling cabinets according to

manufacturers specifications, instrument hook-up diagrams and control system specifications as provided/approved by Petronet.

6.4.1.1 **Instrument Dekabon Cabling**

- Outer Dekabon armouring shall be stripped back to the entry point into the associated termination/junction box. Protrusion of cable sheath/armouring into the termination/junction box (through the compression gland) shall be a minimum of 15mm and a maximum of 50mm.

- Cable pair inner aluminium foil shall be stripped back to the point at which the individual cores leave the PVC Trunking to be terminated onto the respective terminal rails. Ends of the inner foil shall be neatly taped/heat shrunk so as to prevent unravelling.

- Individual cable ends shall be sealed with the use of heat shrink tubing applied over the cable sheath/armouring at the point of entry into the termination/junction box/panel, in order to protect the cable and prevent the ingress of moisture.

- Both cable overall (drain wire) and individual screens shall be insulated with the use of appropriately sized green coloured sleeving, to prevent inadvertent contact with metallic surfaces.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided. All spare cores shall be terminated into terminals so provided.

- Termination of individual cable cores in the termination strips will be such that all Control System related cabling will be terminated to one side of termination strips, whilst all field instrumentation/equipment cabling will be connected to the other side of termination strips.

In the case of Field Junction Boxes with dual terminal strips, multi-core cabling will be glanded in the centre of the gland plate and terminated into terminal rails provided, running from the centre PVC Trunking outwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the outermost PVC Trunking inwards.

In the case of Field Junction Boxes with single terminal strips, multi-core cabling will be glanded on the right side of the gland plate and terminated into terminal rails provided, running from the right hand side of the panel inwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the left hand side of the panel inwards.

- All cables connected to individual instruments/equipment will be provided with a single loop of minimum diameter of 150mm. All loops will be neatly strapped.

- All cores (including spares) will be terminated into allocated termination strips/rails in the respective Instrumentation, Termination and Field Junction Boxes

6.4.1.2 **Instrument PVC SWA Multi-core Cabling**

- Cable SWA armouring shall be stripped back to the entry point into the associated marshalling cabinet/junction box and shall be glanded in such a manner so as to ensure electrical continuity with the gland. When terminated in hazardous areas, cable armouring shall be bonded to the panel equi-potential bonding system via means of earthing rings provided as an integral part of the gland. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

- Protrusion of cable inner PVC sheaths into the marshalling cabinet will be a minimum of 25mm and a maximum of 50mm.

- Cable inner aluminium foil shall be stripped back to the point at which the individual cores leave the PVC Trunking to be terminated onto the respective terminal rails. Ends of the inner foil shall be neatly taped/heat shrunk so as to prevent unravelling.

- Cable ends shall be sealed with the use of heat shrink tubing applied over the cable inner sheath at the point of entry into the termination/junction box/panel, in order to protect the cable and prevent the ingress of moisture.

- Both cable overall and individual screens shall be insulated with the use of appropriately sized green coloured sleeving, to prevent inadvertent contact.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided. All spare cores shall be terminated into terminals so provided.

- Termination of individual cable cores in the termination strips will be such that all Control System related cabling will be terminated to one side of termination strips, whilst all field instrumentation/equipment cabling will be connected to the other side of termination strips.

In the case of Field Junction Boxes with dual terminal strips, multi-core cabling will be glanded in the centre of the gland plate and terminated into terminal rails provided, running from the centre PVC Trunking outwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the outermost PVC Trunking inwards.

In the case of Field Junction Boxes with single terminal strips, multi-core cabling will be glanded on the right side of the gland plate and terminated into terminal rails provided, running from the right hand side of the panel inwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the left hand side of the panel inwards.

- All cores (including spares) will be terminated into allocated termination strips/rails in the respective Instrumentation, Termination and Field Junction Boxes

6.4.1.3 **Electrical Power and Control Cabling (Low Voltage)**

- Cable SWA armouring shall be stripped back to the entry point into the associated equipment housing/termination box/panel and shall be glanded in such a manner so as to ensure electrical continuity with the gland. When terminated in hazardous areas, cable armouring shall be bonded to the panel equi-potential bonding system via means of earthing rings provided as an integral part of the gland. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

- (Option 1) Cable inner PVC sheath shall be cut back at the point of entry into the equipment housing/termination box/panel, protrusion of the inner sheath into the associated switchgear cabinet/equipment housings shall be a minimum of 25mm and a maximum of 50mm. Heat shrink tubing shall be applied at the point of entry into the equipment housing/termination box/panel, in order to protect the cable and prevent the ingress of moisture.

  (Option 2) Where cables are glanded into panels, cable inner PVC sheaths may be taken directly into trunking/marshalling arrangements, with the inner PVC sheaths cut back at point of termination. Note that in this instance, heat shrink need not be applied at the point of entry into the cabinet.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided.

- Termination of individual cable cores in the termination strips will be such that all Starter related cabling will be terminated to one side of termination strips, whilst all field cabling will be connected to the other side of termination strips.

- All cables connected to individual instruments/equipment will be provided with a single loop of minimum diameter of 150mm. All loops will be neatly strapped.

6.5 **Cable Core Lugging**

All individual cable cores will be neatly terminated. Appropriately sized lugs will be attached to all core ends, using the appropriate crimping tool (not side cutters or ordinary pliers). The colouring of crimps will match the size of the associated cable core. All cable lugs utilised shall comply with the following specification, unless otherwise specified in the Scope of Work attached to an Order:

- Instrument Cables - bootlace ferrules

- Electrical Power Cables - spade lugs for compression terminals, ring lugs for screw terminals (pin lugs are not acceptable)
- Electrical Control Cables - spade lugs for compression terminals, ring lugs for screw terminals (pin lugs are not acceptable)

6.6 **Cable Screening – Instrument Cabling**

6.6.1 **Individual Screens**

6.6.1.1 All Individual Instrument Cable Pair Screens shall be terminated into terminals provided within the Instrument Termination Boxes as well as the Field Junction Boxes, and shall be grounded to a common insulated earth rail to be provided in each of the Control System Marshalling Cabinets, alongside the Termination Rails provided. Individual Screens shall be terminated in such a manner so as to be continuous from the Instrument/Instrument Termination Box to the Control System Marshalling Cabinets i.e. individual instrument cables as well as multi-pair cables.

6.6.1.2 Individual screen terminals shall be insulated in the Termination Boxes and Field Junction Boxes provided, thus ensuring that the individual cable pair screens are not grounded at instrument/equipment ends, i.e. to prevent common mode noise. Where Instrument Cables terminate directly into Instrument housings, individual screens shall be cut back and insulated within the Instrument housing using heat shrink sleeving, to prevent inadvertent contact with any conducting surfaces.

9.6.1.3 All individual screen earth rails in the Control System Marshalling Cabinets will be connected to the existing panel Instrument Earth bar via means of a 25mm insulated earth cable, which shall in turn be connected at two points via means of PVC Cu 70mm2 insulated earth cables (Yellow/Green in colour), to the Instrument Earth bar located within the control room.

6.6.2 **Overall Screens**

6.6.2.1 All Instrument Cable Overall Screens/Drain wires shall be terminated to insulated earth bars provided within the Field Junction Boxes, and shall be earthed to a common electrical earth bar to be provided in each of the Control System Marshalling Cabinets. Overall Screens /Drain Wires shall be cut back and insulated within the Instrument Termination Boxes and Instrument housings (where applicable) to prevent inadvertent contact with the Termination Box housing, utilising heat shrink sleeving. Overall Screens shall be terminated in such a manner so as to be continuous from the Instrument Junction Box to the Control System Marshalling Cabinets.

6.6.2.2 The electrical earth bar shall be earthed to the Cabinet Frame, and connected at two points via means of PVC Cu 70mm2 insulated earth cables (Yellow/Green in colour), to the Electrical Earth bar located within the control room.

6.7 **Cable Screening – Electrical Cabling (Power & Control)**

6.7.1 All electrical cable screens/drain wires (where applicable) will be grounded to a common electrical earth bar to be provided in each of the Control System Marshalling Cabinets/Switchgear Cubicles. The electrical earth bar shall be earthed to the Cabinet Frame,

and connected at two points via means of PVC Cu 70mm2 insulated earth cables (Yellow/Green in colour), to the Electrical Earth bar located within the control and switchgear rooms.

## 7 ADDITIONAL REQUIREMENTS FOR EX IA/IB INSTALLATIONS

7.1 All I.S. (Ex ia/ib Intrinsically Safe) Installations shall be in strict compliance with IEC 79-14 Electrical Installations in Hazardous Areas, and in particular Chp 12 "Additional Requirements for type protection Instrinsic Safety", inclusive of the under mentioned items.

7.2 **Clause 12.2.**

In installations with Zone 1 and 2 classifications, IS apparatus and the intrinsically safe parts of associated apparatus shall comply to at least category "ib". Note that Petronet has standardised on category "ia" protection, and permission will need to be sought in writing for relaxation to "ib".

7.3 **Cables – General**

Where multi stranded cables are used in a hazardous area, the ends of the conductor shall be protected against separation of individual strands, by means of cable lugs.

Where cable screens are required, these shall be connected to earth at one point only, normally in the non-hazardous area. (Refer to Section 9..6 and 9.7 of this specification).

Cable armouring shall normally be bonded to the equi-potential bonding system via the cable entry devices (glands), at the end of each cable run. Where interposing Junction Boxes exist or other apparatus, the armouring shall be similarly bonded to the equi-potential bonding system at these points. In this regard and where earthing rings are provided as an integral part of the gland, use of these is recommended in serving this function. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

Conductors of intrinsically safe circuits and non-intrinsically safe circuits shall not be carried in the same cable.

Conductors of intrinsically safe circuits and non-intrinsically safe circuits in the same bundle or duct shall be separated by an intermediate layer of insulated material or by an earthed metal partition. No segregation is required if metal sheaths or screens are used for intrinsically safe or non-intrinsically safe circuits. Note that Petronet has standardised on physical separation regardless of whether the cabling is screened or not, and permission will need to be sought in writing for relaxation.

7.4 **Cables – Marking**

Un-armoured Cables containing intrinsically safe circuits shall be marked. If outer sheaths are marked by color, the color used shall be light blue. Note that whilst armoured cabling

is not required to be marked in terms of IEC79-14, Petronet has standardised on the principle of marking all cable outer sheaths carrying intrinsically safe circuits by color (light blue), whether armoured or not, and that this will need to be complied with in all instances.

### 7.5 Cable Insulation Tests

All cables carrying intrinsically safe circuits shall be proven to be capable of withstanding an RMS AC test voltage of twice the normal voltage of the intrinsically safe circuit with a minimum of 500 V between the armouring and screens joined together and the individual conductors. Tests shall be conducted in accordance with manufacturers specifications. Where no such method is available, tests shall be carried out as follows:

- Voltage shall be an ac voltage of sinusoidal waveform at a frequency of between 48 and 62 Hertz
- Voltage shall be derived from a transformer of at least 500 VA output
- Voltage shall be increased steadily to the specified value in a period of not less than 10 seconds and maintained for a period of not less than 60 seconds.

### 7.6 Cable Termination

All terminals shall be reliably separated from non-intrinsically safe circuits (for example by a separating panel or gap of at least 50mm). Terminals of intrinsically safe circuits shall be marked as such. Petronet has standardised on marking by color - the specified color being light blue. All terminals, plugs and sockets shall satisfy the requirements of IEC79-11 Sections 6.3.1 and 6.3.2 respectively (6mm creepage and clearance rules 4mm to earth).

### 7.7 Zone 1 Installations - Surge Protection

All equipment installed in Zone 0 areas and exposed to hazardous potential differences (e.g. lightning surges), shall have a surge protection device installed between each non-earth bonded conductor/core and the local earthed structure as near as is practically possible. The surge protection device shall be capable of diverting a minimum peak discharge current of 10kA (8/20 microsecond impulse according to IEC60-1, 10 operations). The bonding connection between the protection device and the structure shall have a minimum cross sectional area equivalent to 4 mm2 copper.

Note that Petronet has extended these requirements to include all analogue transmitters installed in the field, whether in hazardous areas or not, and will need to be complied with in all instances.

## 8. CABLE JOINTS

### 8.1 MEDIUM VOLTAGE CABLE JOINTS

8.1.1 The contractor shall give the Engineer advance notice of his intention to do jointing of medium voltage cables to enable arrangements to be made for measuring and inspection.

8.1.2 The complete cable installation, including all joints shall be fully insulated from earth throughout.

## 8.2 LOW VOLTAGE CABLE JOINTS

8.2.1 The low voltage cable through joints shall be of the epoxy resin filled type. The low voltage joints shall be constructed according to manufacturer's instructions.

## 9. CABLE ROUTES

9.1 All low voltage cables and associated earth continuity conductors shall be installed as shown in drawings PPD: BDD059C-E-01, sheet 1 of 3.

## 10. SURVEY OF ROUTE

10.1 The drawings showing the proposed cable route listed in the "Schedule of Drawings" shall not be taken to show the precise final cable route. The Contractor shall within 30 days after being awarded the Contract carry out a final route survey, which shall include digging test holes, and using the routes shown on the drawings as a general guide, to determine a suitable route.

10.2 The Contractor shall submit details of the cable routes selected in final survey to the Engineer for approval. No excavation of any section of the cable route shall commence until the Engineer has authorised the commencement of work on the section concerned.

10.2.1 After completion of all cable laying and jointing and before commissioning of any cable the Contractor shall carry out a final "as laid" survey of the cable routes and hand to the Engineer cable route plans. The cable route plans shall include the following information:

(i) Overall length of each cable.

(ii) Centre to centre distances between all joints and between final joints and terminations of each cable including auxiliary cables.

(iii) Accurate indications of the position of each cable joint and cable marker preferably by triangulation, i.e. indicating two distances to each joint or marker from structures not likely to be moved such as permanent buildings, bridge piers, etc.

(iv) Tables showing all information regarding each high-voltage cable necessary for cable fault location by the reflected pulse method.

(v) Soil thermal resistivity and temperature values as determined on final survey shown on the plans at the positions where they were determined.

## 11. EXCAVATIONS

11.1 Excavations shall be carried out in strict compliance with the specification for works on, over, under or adjacent to a railway line No. E.7 (July 1998) (Part 1) that forms part of the tender documents.

11.2 The procedure and the order of doing the work shall be subject to the approval of the Engineer.

11.3 The Contractor shall, before trenching commences, familiarise himself with the route and conditions on site. The Contractor shall be advised of any known buried services such as cables, pipes, etc., in the vicinity of the cable route. However, the Contractor shall at all times exercise care to ensure that any uncharted services are not damaged.

11.4 Power driven mechanical excavators may be used for trenching operations provided that they are not used in close proximity to other cables, water mains, or any other plant liable to be damaged by the use of such plant. Their use along sections of the route shall in each case be subject to approval of the Engineer.

11.5 Trenches shall be as straight as possible and each trench shall be excavated to the dimensions indicated in this specification. The Contractor shall provide shuttering for use in places where danger exists should the sides of the trench collapse. The strength of such shuttering must be adequate especially where railway tracks in proximity are concerned and the shuttering must be braced across the trench. Provision of shuttering will be paid for per metre length of shuttered trench.

11.6 The bottom of each cable trench shall be as firm as conditions permit and be of smooth contour.

11.7 In sections where the soil or water level conditions indicate that the cable trench will endanger rail tracks or any nearby structures, the Contractor must restrict the length of continuous open trench to a distance to be indicated by the Engineer.

11.8 The Contractor shall take all reasonable steps to ascertain if the cables will be liable to be subjected to chemical or other damage or electrolysis action and shall submit his recommendations for approval, of any precautionary measures to be taken, in such instances.

11.9 The material excavated from each trench shall be placed adjacent to the trench in such a manner as to prevent nuisance or damage to adjacent ditches, railway lines, drains, gateways and other properties and shall be stacked so as to avoid undue interference with traffic. Where, owing to certain considerations, this is not permissible, the excavated materials shall be removed from the site and be returned for refilling the trench on completion of laying.

11.10 Surplus material shall be disposed of by the Contractor at his cost. Where the possibility exists that railway line ballast may be fouled by excavated material or material brought on site, the Contractor shall take precautions as directed by the Engineer.

11.11 The Contractor shall not trench beneath any railway line without departmental supervision. Should the contractor wish to carry out such work the Engineer must be

advised not less than 14 working days before hand to arrange for the necessary supervision. The cost of such supervision shall not be charged to the Contractor.

11.12 Prior to laying the cable, the trench shall be inspected thoroughly by the Engineer or his authorised representative to ensure that it is free from all objects likely to damage the cable either during or after cable laying operations. Cable laying shall not proceed unless the Engineer or his authorised representative is satisfied with the condition of the trench.

11.13 When trenching, the Contractor shall take all precautions necessary to prevent damage to any other cables, water mains, roads, pavements, drainage systems, building or any structure etc. Should any of the above be damaged by the Contractor's staff, it shall be reported immediately to the Engineer, who shall arrange for the necessary repairs. The Contractor is responsible for the cost of repairs.

11.14 Should it be necessary for any reason to remove accumulated water or other liquid from the trench, this shall be done by the Contractor at his expense and should be taken into account at the time of tendering. The Contractor is to provide all pumps and appliances required to carry out this operation. Water or any other liquid removed shall be disposed of without creating any nuisance or hazard.

14.15 Trenching procedure shall be programmed in advance with the Engineer and the programme approved by the Engineer shall not be departed from save with his consent.

11.16 Programming of trenching shall be on the basis of the Contractor giving the Engineer an assurance that any length of trench opened on a particular day will be back-filled and compacted to an adequately firm surface on the same day where possible. If it is anticipated that trenching will remain open for longer periods, the Contractor shall first obtain the approval of the Engineer. No new sections of trenching shall commence if previously uncompleted sections still exist. Under no circumstances may sections greater than 300 metres be opened.

Where such approval is given, the onus shall be on the Contractor to safeguard the works to the satisfaction of the Engineer during the extended period such trenches remain open. Where cables have already been laid, but not covered, steps shall be taken by the Contractor to protect cables and the personnel around.

11.17 The near side of any cable trench shall preferably not be less than 2500mm from any adjacent railway line. Approval from the Engineer will be required if the above clearances cannot be achieved. The conditions of clause 13.1 shall apply.

11.18 The removal of obstructions along the cable routes shall be subject to the approval of the Engineer and shall be paid for at pre-agreed rates.

11.19 The area traversed by the cable routes has been used for many years. It is inevitable that there will be uncharted services. On encountering any such service the Contractor shall promptly advise the Engineer who shall direct what action shall be taken.

11.20 Transnet reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at scheduled rates.

11.21 Any existing electrical cables obstructing the cable routes shall be removed or deviated as appropriate by the Contractor. The work shall be paid for at scheduled rates.

11.22 The bottom of the trench shall be filled with 200mm of suitable soil sifted through a 6mm mesh and levelled off. Only soil with a satisfactory thermal resistivity may be used for this purpose and ash which occurs on the route shall not be used. Where no suitable soil is available in proximity, imported fill shall be arranged. The manufacturer's assurance is required that the current rating of cables is not reduced by the ground conditions.

## 12.0 TRENCH/EXCAVATION SPECIFICATION

Separate Trenches shall be supplied to cater for the following cable types:

### 12.1 ELECTRICAL HV/MV TRENCHES

| | | |
|---|---|---|
| Trench Dimensions | : | 1200 mm deep by 500 mm wide (two cables), add 300mm width for additional cables |
| River Sand Bedding | : | PVC Piping – 75 mm above pipe, 50mm under pipe |
| | : | Direct Burial – 100 mm |
| Identification | : | PVC or Concrete Interlocking Tiles at a depth of 350mm |
| Cable Markers | : | Concrete with engraved anodised aluminium ID plates cable Marker Colour – Brilliant Green |
| Cabling | : | Medium and High Voltage Power Cabling > 400 VAC |
| Separation | : | 400 mm (LV cabling), 800mm (Instrument cabling) |

### 12.2 ELECTRICAL LV TRENCHES

| | | |
|---|---|---|
| Trench Dimensions | : | 800 mm deep by 300 mm wide |
| River Sand Bedding | : | PVC Piping – 75 mm above pipe, 50mm under pipe |
| | : | Direct Burial – 100 mm |
| Identification | : | Polythene Marker Tape (150mm wide, yellow and marked with the words “Electric Cable” at a depth of 350mm |
| Cable Markers | : | Concrete with engraved anodised aluminium ID plates. cable Marker Colour – Black |
| Cabling | : | Low Voltage Power Cabling 400 VAC/230 VAC (e.g. Actuators, Aux Motors, DB circuits) |
| | : | Control Cabling (e.g. MV Breaker Inter-tripping cables, Actuator control signals, Aux Motor local stop/start panels etc.) |

Separation : 400 mm (HV/MV cabling), 800mm (Instrument cabling)

12.3 **INSTRUMENT TRENCHES**

Trench Dimensions : 500 mm deep by 300 mm wide

River Sand Bedding : PVC Piping – 75 mm above pipe, 50mm under pipe

: Direct Burial – 100 mm

Identification : PVC Tiles / Polythene Marker Tape (150mm wide, yellow and marked with the words "Electric Cable/Elektriese Kabel") at a depth of 350mm

Cable Markers : Concrete with engraved anodised aluminium ID plates cable Marker Colour – Light Blue

Cabling : Instrument Multi-core & Single Pair Cabling (IS and non IS)

Separation : 800mm (HV/MV/LV Electrical cabling)

**13. CABLE LAYING**

**13.1 CABLES BURIED UNDERGROUND.**

13.1.1 HV, MV, LV AND Instrument cables shall be spaced as indicated in Table 1 below. Pilot cables shall be laid beside the associated power cable. Cables crossing beneath railway tracks, roads, etc., shall be enclosed in 15Omm diameter uPVC pipes. Where more than one length of pipe is required for a crossing, uPVC couplings with PVC glue, shall be used to prevent water from penetrating the joint. Cable pipes must maintain or exceed the specified cable spacing.

Table 1

| CABLE | MINIMUM SPACING BETWEEN CABLES |
|---|---|
| | |
| MV To MV | 300mm |
| MV To LV | 400mm |
| LV TO LV | 300mm |
| MV To instrumentation | 800mm |
| LV To instrumentation | 800mm |

13.1.2 All pipes laid beneath the railway lines, roads, pavements shall be laid with their tops not less than 900mm below the formation level, and shall where possible extend at least 2000mm on either side of the centre of the outer most line. Where there is more than one

line crossed and in the case of roads and pavements at least 900mm on either side of the road and 1 or pavement. All pipes shall be graded for water drainage ; the required grade is 75mm in 30m.

13.1.3 All Low voltage cables shall be laid at a depth of 750mm. All cable depth measurements shall be made to the top of the cable when laid direct in the ground, otherwise to the top of the duct concerned.

13.1.4 Except where ducts, tunnels or pipes are provided and unless instructed to the contrary by the Engineer, the Contractor shall lay the cables direct in the ground.

13.15 Rollers may be used during the laying of cables, but they shall have no sharp projecting parts liable to damage the cables. They shall be carefully placed in the trench or duct in such a manner that they will not readily capsize during cable laying operations.

13.1.6 The Contractor shall ensure that all cable is laid in the same direction. No crossing of conductors inside through joints or end boxes will be permitted.

13.1.7 Where cables have to be drawn around corners, skid plates shall be used for this purpose and these plates shall be well lubricated. The skid plates shall be securely fixed between rollers and shall be constantly examined during the cable laying operations.

13.1.8 Cable shall be visually inspected for damage during and after laying.

13.1.9 Cable pulling and laying shall preferably be done manually whenever possible. Mechanical means such as winches and the like may only be used subject to the. approval of the Engineer. No cable shall be subjected to a tension exceeding that stipulated by the cable manufacturer.

13.1.10 In the event of mechanical means of cable pulling being approved, the Contractor shall establish means of communication between the operator of the winch or other pulling device and the persons tending the drum from which the cable is being run off, to the satisfaction of the Engineer.

13.1.11 The contractor shall be wholly responsible for making his own arrangements for transporting all materials to and from and on the working sites.

13.1.12 At locations where cables run under concrete bridges, the cables shall be supported on suitable brackets secured on the side of concrete wall. These brackets shall be spaced a maximum of 500mm apart. Brackets and fixing material shall be of robust design and shall meet with Engineer's approval. Drawing of proposed ' bracket shall accompany tender. Brackets shall be galvanised in accordance with SABS 763, and thereafter painted to the satisfaction of the Engineer.

## 14.0 CABLES LAID IN DUCTS, CABLE TRAYS AND LADDERS

14.1.1 Cables in stalled in ducts shall be supported by cable ladder installed along the walls of the ducts or installed on the duct floor. If the cable ladder is installed on the duct floor, it shall be supported at +/- 50mm from the duct floor.

14.1.2 Cables installed in perforated cable trays and cable ladder shall be secured by means of heavy duty cable ties, cable clamps, etc.

14.1.3 Where medium and low voltage cables share the same wire-ways a reasonable space shall be left between the medium voltage and low voltage cables.

## 15.0 CABLE SLEEVING

15.1 All areas subject to vehicle traffic, rail crossings and paved areas shall be sleeved.

15.2 Sleeves shall be designed and installed so as to ensure 25 % spare capacity.

15.3 Sleeve Specifications

Material : PVC or PHD Polyethylene

Dimensions : 100 mm OD min

Standards : DIN EN50086-2, BS EN50086-2-4:1994

## 16.0 DRAW BOXES

16.1 Where cable sleeves are utilised and to facilitate the hauling of cables, brick draw boxes shall be provided at all trench junctions, complete with concrete slab, as detailed below:

Draw Box Dimensions (min) : Internal 450 mm square, 3 courses of stock brick deep.

Base & Top : Concrete 50mm thick

## 17. COVERING, BACKFILLING AND REINSTATEMENT

17.1 Filling in of trenches shall not be commenced until the Engineer or his authorised representative has inspected and approved the cables in situ in the section of trench concerned. Such inspection shall not be unreasonably delayed.

17.2 Where, in the opinion of the Engineer, the soil on site is unsuitable for riddling or backfilling, the Contractor shall arrange for the importation of approved material. A 75mm thick layer of soil sifted through a 6mm mesh shall be laid above the high-tension cables and consolidated by hand ramming only. The conditions of clause 13.20 apply in this case also.

17.3 All excavations made (whether for the purpose of cable laying, joint bays or trial holes) shall be back-filled in 150mm layers, the earth in each layer being well rammed and consolidated and sufficient allowance being made for settlement. The back-filling shall be completed to the satisfaction of the Engineer.

15.4 The refilled trench shall be maintained by the Contractor at his expense in a thoroughly safe condition for the duration of the contract. In the case of tarmac surfaces, until such time as this surface has been restored.

17.5 All backfilling of road crossings shall be mechanically rammed by means of approved type of mechanical power driven rammer.

17.6 The replacement of made up surfaces, such as roads, pavements, tarred aprons, verandas, floors, etc., necessitated by trenching or other works shall be arranged by the contractor at his cost. The price thereof shall be included in the tender price.

17.7 Concrete cable protection slabs to Drawing No. PPD-PA-10 shall be laid on top of the 75mm layer of soil referred to in clause 15.2 before the trenches are backfilled. Cable protection slabs shall be laid close butted, convex end to concave end, directly above each cable throughout the underground portion except where otherwise protected such as by. pipes, etc. Three coloured slabs to drawing PPD-PA-9 shall be provided to give the indication of the route in the case of a change of direction. Only unbroken cable protection slabs, and those actually laid will be paid for.

17.8 When back filling of cable trench has reached a level, after consolidation, approximately 150mm below the normal level of the surface of the surrounding area the Contractor shall lay a continuous plastic cable warning tape directly above each cable for the full length of the cable trench before completing the backfilling.

17.9 Concrete cable markers to Drawing No. PPD-PA-12 shall be provided and installed by the Contractor at his cost. The price thereof shall be included in the tender price. Initial cable markers shall be installed as close as possible to cable terminations, thereafter at approximately 60m intervals and at cable joints, also on either side of crossings of oil pipelines and at ends of underground cable pipes.

17.10 Changes of direction and joints in cable runs shall be indicated by installing two markers at such positions in the manner shown on Drawing No. PPD-PA-12. The markers shall be coloured orange with oxide mixed into the concrete. Cable markers shall project approximately 25mm above normal ground level except where projecting cable markers could be a hazard to pedestrians such as in shunting yards, walkways, pavements, etc. In such cases the cable markers shall be flush with the surface.

17.11 If more than one cable is laid in one trench, only one row of cable markers shall be placed on the centre line of the trench to define the general route of the cables.

## 18. CABLE TESTING AND TEST DATA

18.1 All tests on completed cables shall be carried out in the presence of a representative of Transnet Projects. Not less than 14 working days notice of the Contractor's intention to carry out such tests shall be given to the Engineer.

18.2 On completion of the jointing and termination of cables, the 11kV cables are to be subjected to the test laid down in paragraph E-1.4 of Appendix E of S.A.B.S.1339 and the low voltage type cables to be tested for insulation and loop resistance.

18.3 The anti-electrolysis insulation of each 11kV cable run complete, shall withstand for 1 minute, a test voltage of 1OkV D.C., applied from the cable armouring to earth. The bedding shall withstand a test voltage of 4kV D.C. between screen and armouring for 1 minute.

18.4 As a graphite coating is required to be applied to the PVC oversheath (in accordance with British Standard), a D.C. voltage test will be carried out on all cables after installation. The D.C. voltage test can only be carried out on the installed system if the joints are suitably insulated from earth, otherwise the D.C. voltage test should be carried out prior to jointing.

18.5 The contractor shall obtain written confirmation from the manufacture of all cables, joints and terminations -etc. that the test that Transnet Projects requires the contractor to carry out in terms of this specification meets with the manufacturers approval. Such confirmation must be obtained prior to any, tests commencing.

18.6 The electrical Contractor shall on completion of the tests submit three copies of all test results. The costs of all the tests mentioned above shall be borne by the Contractor.

18.7 In addition the cable manufacturer shall provide test sheets of each manufactured cable drum length together with the cable drum numbers which shows all the test results.

18.8 Transnet Projects reserves the right to carry out any further tests deemed necessary itself, using either the Contractor's instruments and cable, or its own, or both. The costs of such tests shall not be charged to the Contract.

18.9 **Cable Testing – Low Voltage Cables (< 1 kV)**

Each individual core of all cables (including spares) will be checked for continuity and insulation breakdown, in accordance with SABS 150 (PVC):

- Insulation Resistance shall be measured with a 1000V Megger and the readings tabulated and certified.
- Similarly, earth continuity resistance shall be measured and recorded.
- All cables will be checked for correct termination.

18.10 **Cable Testing – Medium Voltage Cables (< 22 kV)**

Each section of laid and jointed cable shall be tested, in accordance with SABS 97 (PILC/SWA):

- Insulation Resistance shall be measured with a 1000V Megger, followed by the relevant pressure test. Readings shall be tabulated and certified.
- AC test voltage must be applied to each phase in turn for one minute, or alternatively the DC test voltage for fifteen minutes. Leakage current shall be measured and recorded for each test.
- All cables will be checked for correct termination.

## 19. MEASUREMENTS OF CABLES

19.1 All measurements for payment purposes shall be made jointly by representatives of the Contractor and Transnet Projects and shall be agreed and approved by both parties.

19.2 Measurements of cable length shall be made from centre to centre of cable joints and to the cable ends and will exclude any wastage due to jointing and terminating.

19.3 Measurements of trench width and depth shall be made to the nearest 50mm and shall not take into account subsidence or unnecessarily large excavations. No allowance shall be made where trenches have to be widened at the bottom to accommodate cables, cable joints and protection slabs

# APPENDIX 1

## STATEMENT OF COMPLIANCE
## (TO BE COMPLETED BY TENDERER)

This tender complies with specification TPD: 003-CABLESPEC in all respects.

SIGNATURE : _____ DATE : _____

---

This tender complies generally with specification TPD: 003-CABLESPEC but differs from it on the following points.

_____

_____

_____

_____

SIGNATURE : _____ DATE : _____

**Transnet Port Terminals**

# SPECIFICATION FOR EARTHING AND THE PROTECTION OF BUILDINGS AND STRUCTURES AGAINST LIGHTNING.

| REVISIONS | | |
|---|---|---|
| **REV** | **DATE** | **APPROVED** |
| **0** | **September 2022** | |
| | | |
| | | |
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**INDEX**

## 1.0 SCOPE

1.1 This specification covers Transnet Projects requirements with respect to the protection of buildings and structures against lightning and the requirements for air terminal systems, down conductors and earthing of installation of this specification

1.2 This specification applies to assessing, testing and upgrading of existing lightning protection systems and earthing on existing buildings and structures.

## 2.0 STANDARDS, SPECIFICATIONS AND DRAWINGS

2.1 The following publications (latest editions and amendments) are referred to herein.

South Africa Bureau of Standards (South African National Standards)

| | | |
|---|---|---|
| SANS 10313 | - | The protection of structures against lightning. |
| SABS IEC 61643 | - | Surge protective devices connected to low voltage power distribution systems. |
| SANS IEC 60950 | - | Information technology equipment – safety. |
| SANS 10142 | - | Code of practice for the wiring of premises |
| BS 6651 | - | Code of practice for protection of structures against lightning. |
| BS 7430 | - | Code of Practice for Earthing. |
| SABS 064 | - | Code of Practice for the Preparation of Steel Surfaces for Coating. |
| SABS 086 | - | Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres. |
| SANS 10108 | - | The Classification of Hazardous Locations and the Selection of Electrical Apparatus for use in such Locations. |
| SABS 0199 | - | The design and Installation of Earth Electrodes SPECIFICATIONS |
| SABS 763 | - | Hot Dip Zinc (galvanised) Coatings |
| SABS 1091 | - | National Colour Standards for Paints. |
| SABS 1507 | - | Electric Cables with Extruded Solid Dielectric Installation for Fixed Installations |
| SABS IEC 742 | - | Isolating Transformers and Safety Isolating Transformers. |

OCCUPATIONAL HEALTH AND SAFETY ACT OF 1993 (ACT 85 OF 1993).

## 3.0 SERVICE CONDITIONS

3.1 The earthing shall be designed, rated and installed for continuous operation under the following conditions :-

### 3.1.1 Ambient/Environment Conditions :

| | | | |
|---|---|---|---|
| 3.1.1.1 | Altitude | : | Sea level. |
| 3.1.1.2 | Ambient temperature | : | -5° C to +45° C (daily average +35° C). |
| 3.1.1.3 | Relative humidity | : | As high as 96% |
| 3.1.1.4 | Lightning conditions | : | Severe, with a maximum lightning ground flash density 11 flashes per $km^2$ per annum. |
| 3.1.1.5 | Exposure conditions | : | Salt laden, industrial atmosphere as well as hazardous gases and dust atmosphere. |

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

## 4.0 EQUIPMENT AND MATERIALS

4.1 Equipment and materials to be used, shall be of high quality, and shall comply with all relevant specifications, codes as mentioned in this specification as well as the Occupational Health and Safety Act of 1993(Act 85 of 1993).

4.2 Where equipment and material does not comply with the relevant specifications it shall be submitted to Transnet Project's Engineer for approval.

4.3 All materials used for the lightning protection system shall withstand the electric and electromagnetic effects of lightning current and predictable stresses without being damaged.

4.4 Materials and sizes shall be chosen bearing in mind the possibility of corrosion of either the lightning protection system or the structure to be protected.

4.5 Components of the lightning protection system may be manufactured from the materials listed in Table 8 of SANS 10313, provided they have sufficient electrical conductivity and corrosion resistance.

## 5.0 LIGHTNING PROTECTION REQUIREMENTS

5.1 The contractor shall carry out the installation in accordance with SANS 10313: Code of Practice for the protection of structures against lightning and the requirements of this specification.

5.2 Where the local supply authority requirements differ from those specified herein Transnet Projects's Electrical Engineer shall be approached for a decision.

5.3 All equipment and material shall comply with the relevant National or International standard specification. Where equipment does not comply it shall be submitted to the Transnet Projects Electrical Engineer for approval.

5.4 The system of protection will be finials/air terminals, down conductors and earth spike or roof conductors, down conductors and earth spike.

5.5 The earth resistance for separate earth electrodes if down conductors are not connected to a ring earth shall be not exceed the following;

Rt = 10 Ohm for category A structures
Rt = 15 Ohm for category B and C structures.

## 6.0 DESIGN OF LIGHTNING PROTECTION

The designer of lightning protection shall take into consideration the following principles and requirements during the design of the system.

## 6.1 GENERAL PRINCIPLES

**6.1.1 Basic Principles of Lightning Protection:** the requirements of the basic principles of lightning protection as detailed in SABS 0313 shall be taken into consideration to ensure proper protection of structures against lightning.

**6.1.2 Evaluation of Risk:** The risk of lightning stroke shall be evaluated as described in SANS 10313.

**6.1.3 Effective height of a structure (He):** The effective height of the highest point shall be determined by considering the average height of building, trees and structures and land profile of the surrounding area.

**6.1.4 Ground flash density (Ng):** The ground flash density (Ng) for general buildings, structures and installations shall be estimated from the average ground flash density given in table 1 of SANS 10313 as a general guide. For important structures and installations the value of the ground flash density shall be determined on the basis of at least 5 lightning years, or from existing records

**6.1.5 Number of flashes to structure per 100 year (Nt):** The number of flashes to structures per 100 year shall be determined taking into consideration type and the height of the structure as described in SANS 10313.

## 6.2 HAZARD CATEGORY

6.2.1 Buildings and structures where lightning protection system will be installed shall be categorised prior to the installation. Hazard categories are based on the nature of the building, its content and occupancy.

6.2.2 The Hazard categories are classified as follows in SABS 03 -1985 Code of practice for the protection of buildings structures against lightning.

**Category A: High Hazard**

**Category A1:** Structures and areas containing explosives of Category Z.

**Category A2:** Structures and areas classified as
a) Division 0 areas in accordance with SABS089: Part II, or
b) Class I, Division 0 locations in accordance with SABS 0108.

**Category A3:** Strategic control and communications installations such as airport towers

**Category A4:** Thatched-roof structures of historic values or that contain irreplaceable works of art or like values.

**Category B: Medium Hazard**

**Category B1:** Structures and areas containing explosives of Category X or Y.

**Category B2:** Structures and areas classified as
a) Division 1 or 2 areas in accordance with SABS089, Part II, or
b) Class I, Division 1 or 2 locations, or Class II, Division 1 location in accordance with SABS 0108.

**Category B3:** All structures not included in Category A and to which the public normally has access or which are of historic value.

**Category B4:** Large temporary structures used for exhibitions and entertainment.

**Category B5:** Thatched roof dwelling houses.

**Category B6:** Communications towers, water towers and reservoirs.

**Category B7:** Caravans and Yachts.

**Category B8:** Buildings and areas used for livestock, fuel or flammable material.

**Category C: Low Hazard**

**Category C1:** Small buildings that are infrequently occupied.

**Category C2:** Dwelling houses other than thatched-roof houses.
**Category C3:** Farm buildings, other than those included in category B8.

## 6.3 ZONES PROTECTION AND SHIELDING ANGLES

6.3.1 The zone of protection shall be the area covered by either one of the following types of protection:

a) Single Vertical air terminal
b) Single horizontal air terminals
c) Area between two or more air terminals
d) Area between roof conductors.

6.3.2 The shielding angles Þ and ß are given in table 3 of SABS03-1985, Code of practice for the protection of buildings and structures against lightning.

6.3.3 The zone protection for Shielding Angles on Steep Slopes and High Ridges is not considered effective beyond a horizontal distance from the nearest air terminal of greater than 2He, where He is the effective height of the part of the air terminal above its immediate surroundings.

6.3.4 In roof areas away from the edges of tall structures (generally of He > 50m), shielding angles given in table 3, SABS 0313 can be used appropriate to hazard category of the roof area so protected and the effective height He of the air terminal above the roof area.

## 6.4 SELECTION OF AIR TERMINAL

**6.4.1** **Mast Protection:** An air terminal consisting of one or more masts that cover the structure or area to be protected with the appropriate shielding angle will, with the possible exception of a few weak lightning strokes, successfully intercept lightning strokes.

**6.4.2** **Air Terminals as Part of the Structure**: An air terminal as part of the structure may be one or more of the following:

a) A continuous metal roof.
b) A metal roof structure supporting a metal roof
c) The metal reinforcement in the roof of a reinforced concrete structure with peripheral conductors and finials where necessary.
d) Roof conductors and finials, where necessary, on a non-conducting roof.
e) Finials in chimney, gable ends, parapet walls, etc.

**6.4.3** **Air Terminal Systems For Category A Hazards:** The protection is based on the principle that a primary air terminal system must be provided for the interception of major lightning strokes with, if necessary a secondary air terminal system for the interception of those weak lightning strokes that might penetrate the protection of the primary air terminal system. The secondary air terminal system shall not be intended to carry currents of major lightning strokes.

One of the following lightning protection systems shall be used as detailed in SANS 10313.

- Mast protection used as a primary air terminal
- Metal roof used as primary air terminal system
- Reinforced concrete structure used as primary air terminal system.

## 6.5 MASTS AND CATENARY CONDUCTORS OVER THE STRUCTURE TO BE PROTECTED

### 6.5.1 GENERAL

6.5.1.1 A lighting protection system consisting of free standing masts separate from the structure provides the highest degree of protection, subject to the correct positioning of the mast and to the correct choice of shielding angle.

6.5.1.2 The number and height of masts (and, where necessary, the provision of the catenary conductors between the masts) shall be based on cost, aesthetics, shielding angles and mechanical consideration

### 6.5.2 CLEARENCE FROM STRUCTURES

6.5.2.1 A safe clearance distance shall be kept between the mast and the catenary conductor strung between the masts and the structure to be protected by the mast or the catenary conductor. The clearance distance depends to various factors detailed in SANS 10313.

6.5.2.2 Where a common earth electrode is provided for mast and structures in close proximity, the following clearance distance “d” shall be maintained with a minimum of 100 m.

a) Between the mast and any point of structure: $d \geq 0{,}06.h$ m.

b) Between the catenary conductor and any part of the upper surface of the structure: d ≥ 0,1. (L/2) m for Category A hazard, and d ≥ 0,06. (L/2) m for Category B and C hazards.
c) Between a network of conductors and any part of the upper surface of the structure: d ≥ 0,1.(D + (L – D)/N) m for Category A hazard, and d ≥ 0,06. (D + (L – D) / n) m for Category B and C hazards.

*Where L = length of path measured from the base of one mast along the catenary conductor to the base of the other mast between which the catenary conductor is suspended, m.*
*D = spacing between the mesh of the network measured along the catenary conductor, m*
*h = height of structure, m*
*n = number of cross bonds between two catenary conductors.*

6.5.2.3 Where the earth electrode of a mast is separate from the metal water main, other services or the earth electrode of a structure, the following clearance distance "d" shall be maintained with a minimum of 1.00 m:

a) Between the mast and any point of the structure: d ≥ 0,06.h + 0,1. Rs m.
b) Between a horizontal catenary conductor and any part of the roof of the structure: d ≥ 0,06. )L/2) + 0,1. Rs m.

*Where Rs = numerical value of the earth electrode resistance of the mast or, where masts are connected together by a catenary conductor, of the mast thus connected together, measured in ohms.*

6.5.2.4 The minimum clearance distance "d" where the structure has no earth electrode and has limited water or electricity supply, shall be maintained within the following minimum clearance distances:

a) d ≥ 1, 00 m between the mast or catenary conductor and any part of the structure.
b) D ≥ 0,1 Rs m between the mast and any water pipe or electric cable, whether buried or above ground unless the mast electrode is bonded to the metal pipe of the underground water main. If Rs is not known, the clearance distance D must be at least 3m.

### 6.5.3 MAST PROTECTION IN THATCHED ROOFS

6.5.3.1 Thatched roofs shall be protected by one or more free-standing masts only. The zone of protection of the masts must include gable ends, chimneys, antennas, vent pipes and any other metal objects.
6.5.3.2 Telephone wires, overhead services connections to the electricity supply, or other overhead metal wires or pipes, shall not enter the structure through or close to the thatch.

6.5.3.3 On remote chimneys or gable ends close to imaginary surface of the protection zone, install a finial and down conductor well away from the thatch.

6.5.3.4 Metal wires and metal-coated insulating sheets used in the construction of the thatched roof shall be bonded together and to the earthed metal water main or electrode of the structure.

6.5.3.4 Where metals used in the construction of the roof are not bonded and earthed, a minimum clearance distance c of 1m between metals of the roof and water pipes, vent pipes, tanks, gas pipes, antennas, telephone and bell wires, bugler alarms and electrical wiring and conduits shall be maintained.

## 7.0 INSTALLATION

### 7.1 AIR TERMINALS ON THE STRUCTURE TO BE PROTECTED.

7.1.1 The purpose of an air terminal on a structure to be protected shall be to intercept lightning strokes at preferential points of an air terminal, thereby:

a) Minimizing penetration of a lightning discharge current which could have followed a random path in the roof structure with possibility of a resultant fire.
b) Preventing the loosening of masonry or the cracking of precast panels or reinforced concrete.

7.1.2 The selection of the air terminal system and the the position of down conductors shall be so selected such that at any likely point of incidence of lightning stroke, there are at least two parallel paths for the current to floe to earth.

7.1.3 Parallel routes shall not be necessary in the following cases.

a) An air terminal on a small structure having only one prominent point of incident.
b) Dead-ended conductors, i.e those conductors of the air terminal for which it is not feasible to provide a connection to a down conductor.

7.1.4 Where a peripheral roof conductor is required for the protection of the outer side edge of a structure, the conductor shall be installed as close to the edge as is practicable (preferable not more than 100mm from the outer edge)

7.1.5 Where buttresses or parapet walls are not already equipped with an air terminal in the form of continuous metal cladding or similar metalwork and peripheral conductors are to be provided at an effective height He of 15 m or more, finials shall be added on all exposed outer corners and at intervals not exceeding 30 m between outer corners. The finials shall be placed as close as possible to the outer edge, and so position the down conductors such that their connection to the peripheral conductor is close to the finial.

7.1.6 Concrete masonry chimneys or gables ends that are not protected with the appropriate shielding angle of another structure shall be protected by means of a finial or metal cap. Where the chimney or gable end is of masonry, a peripheral conductor along the gable or around the chimney shall be used instead.

7.1.7 Where it is not feasible to provide a down conductor at one end of an air terminal or a connection to another part of the lightning protection system, a dead ended conductor shall be used provided it is not longer than 10 m an generally flows a horizontal or downward course from the free end to end connected to the remaining part of the lightning protection system.

7.1.8 Where a dead-ended conductor partly flows an upwards course, the dead-ended conductor shall be not longer than 7.5 m. If the top of the protected part is considerably lower than the ridge conductor to which the dead-ended conductor is connected, a finial shall not be used at the free end, unless it is required for the enhancement of the protection of the surrounding area, in which case an additional down conductor at the free end is recommended.

7.1.9 Metal gutters shall be bonded along the outside perimeter of the roof to the nearest down conductor, or to the metal of the roof, where applicable.

### 7.2 METAL ROOFS AND NON-METAL ROOFS SUPPORTED BY METAL ROOF STRUCTURES

7.2.1 Structures having roofs covered with electrically continuous metal sheets do not require air terminals, but shall be earthed by down conductors.

7.2.2 Sheet metal separated from each other by insulating strips or by epoxy or plastic coating s, may be regarded as providing continuous metal roof. However where sparking between such roofing is considered undesirable because of magnetic interference, all sheets adjacent to the ridge conductor or peripheral conductor shall be bonded.

7.2.3 A non-metal roof consisting of non-combustible roofing material held by metal fasteners to a roof supporting structure of metal construction may be considered to be a metal if the metal structure is earthed by down conductors, or supported by earthed metal columns, and spacing between roof beams does not exceed 15m for Category B and C hazards.

## 7.3 REINFORCED CONCRETE STRUCTURES

7.3.1 Reinforced steel shall not be used as parallel paths to enable lightning discharge current to flow safely to general mass of the earth.

7.3.2 Air terminals or finials and where necessary peripheral conductors shall be installed, taking into consideration the likely points of incidence of lightning and the path of the current through internal down conductors.

7.3.3 Where the outer support columns of the structure may be regarded as continuous from roof to basement, the peripheral and air terminal conductors shall be bonded to the internal or external down conductors.

7.3.4 Peripheral conductors and finials shall be used for medium height structures with reinforced concrete. Where the peripheral conductor is on a parapet wall that surrounds a metal roof or the air terminals of other structures, the other air terminal shall be connected to the peripheral conductor, preferably close to a down conductor. The peripheral conductor and other air terminal shall be connected to internal or external down conductor.

7.3.5 If the upper edge of the structure with chimneys and cooling towers and of medium height is not metal clad, horizontal conductors around the upper circumference of the structure, equipped with finials at intervals of not more than 15 m, with a minimum of two shall be installed.

7.3.6 On tall reinforced concrete structures, one of the following shall be installed in order to increase the protective efficiency, depending on the risk and the degree of protection required, height and slenderness of the structure:

a) At intervals of not more than 10 m, install oblique finials along the upper perimeter, pointing upwards and outwards such that the tip of each finial points outwards at an angle of 30° to the vertical through the outer edge of the structure, and is at least 400mm above the structure, each finial being connected to a peripheral conductor.
b) A horizontal conductor that follows the contour of the structure and that is so raised on oblique struts of length at least 500 mm that the conductor is displaced outwards at an angle of 30° to the vertical through the outer edge of the structure.
c) Oblique finials spaced as in (a) above, positioned on a horizontal conductor arranged as in (b) above and in line with the oblique struts, each finial pointing upwards and outwards at an angle of 30 to the vertical through the outer edge of the structure, and of length such that the tip of the finial is at least 800 mm above the outer edge of the structure.

Where the structure is slender, an air terminal as in (b) or (c) above is to be preferred to that in (a)

The air terminal shall be bonded to the internal down conductor at intervals not exceeding 10 m, or where the circumference exceeds 60 m, at appropriate intervals not exceeding 30m with a minimum of six bonds.

## 7.4 FINIALS AND ROOF CONDUCTORS

7.4.1 Roof conductors and finials shall be installed along the ridges of the roof and on other projections, in accordance to SANS10313 – code of practice for the protection of structures against lightning.

7.4.2 Protruding metal objects shall be bonded in a horizontal or in a downwards direction to the nearest roof or down conductor where the distance between the metal object and the conductor is less than 7.5m otherwise provide a separate down conductor. In all cases where the pitch of the roof is less than 30°, metal gutters and roof conductors shall be bonded or eaves conductors shall be provided.

7.4.3 In the case of large roofs of non-conducting material, additional conductors shall be installed across the surface of the roof, perpendicular to the long side of the roof and at extremely equal spaces not exceeding 15m. If the width of the roof exceeds 15m install conductors to form a grid at approximately equal spacing not exceeding 15m in either direction.

7.4.4 Roof conductors, finials and roof conductor grids shall be connected to the closest down conductor.

7.5.5 All roof conductors shall be manufactured from SABS approved single-core bare aluminium conductor with a minimum cross sectional area of 25mm$^2$.

## 7.5 DOWN CONDUCTORS

7.5.1 Down conductors shall be installed close to the point of the air terminal that are most likely to be struck by lightning and preferably run them vertically along the most direct route to the earth electrode.

7.5.2 At least two down conductors shall be provided in a building, such that in plan view no point of a structure is more than 15m from the nearest down conductor , except for masts and small structures having only one prominent point of incident, such as rondavels, these need only one down conductor.

7.5.3 Each down conductor shall be supplies with a separate earth electrode. This will reduce the current flow per down conductor, resulting in a lower voltage drop across the down conductor caused by the surge impedance of the conductor.

7.5.4 Down conductors shall not be placed close to doorways or entrances to buildings. Maintain a minimum clearance distance of the order of 1 m from the door and window frames, balustrades and other large metal objects.

7.5.5 Where down conductors deviate from a vertical route due to sharp bends and loops required to carry a conductor over eaves and parapet walls, shall be permitted, provided that all requirements stated in SANS 10313, clause 6.1.4 are met.

7.5.6 Steel columns and internal metal storm water drain-pipes shall be used as down conductors only if they are joined by screwing, bolting or welding.

7.5.7 External metal stair cases, fire escapes or other large frames shall be used as down conductors if they

are electrically continuous over their full height. If not electrically continuous they shall be bonded to the lightning protection system at the top or at the bottom of the framework.

7.5.8 In the case of structures of Hazard Category A, Test joints shall be installed in down conductors at convenient heights above finished ground level.

7.5.9 Internal reinforcing steel of vertical concrete column, particularly those on the outer corners can be used as down conductors, provided that the reinforcement is electrically continuous.

7.5.10 Vertically discontinuous reinforcement shall be bonded between the reinforcement of each section to provide a continuous path to ground or an external down conductor shall be installed.

7.5.11 Large external metal frames, balconies and metal cladding on the top floors of tail structures (typically 30 floors or more) that may be exposed to direct lightning strokes must be bonded to the reinforcement of the structure or to a down conductor that is connected to the reinforcement of the roof.

## 8.0 STATUTORY REQUIREMENTS

8.1 The Contractor shall ensure that the installation satisfies the requirements of all relevant South African Statutory Regulations

8.2 Where applicable, equipment items shall carry the SABS mark to demonstrate compliance with the regulations.

## 9.0 RESPONSIBILITY FOR WORK

9.1 The tenderer shall be responsible for the complete installation of the lightning protection system including testing, earthing conductors, surge protection devices, spikes etc. as required for various buildings and structures. These installations shall include the review and the upgrading of the existing lightning protection systems. Due considerations shall be taken of the effects of lightning covered herein below in clause 8, in providing the lightning protection system.

9.2 The tenderer shall undertake to repair all faults due to bad workmanship and/or the use of faulty materials and to replace all defective materials within six months after the installation date.

9.3 The tenderer shall rectify all the defects to the satisfaction of Transnet Projects, that may become apparent during the guarantee period.

9.4 The tenderer may be required to carry out builders work such as cutting of concrete columns and coring of holes for testing of the continuity of the existing steelwork or cabling. Good contact between reinforcing bars should be ensured.

## 9.0 APPLICABLE INFORMATION

10.1 **Electrical effect** – The current discharged through the earth electrode resistance produces a resistive volt drop which may raise the potential of the system to a high value relative to true earth.

10.2 **Side-flashing** – The point of strike may be raised to a high potential, and there is a risk of flashover from the protection system to any metal or in the structure.

10.3 **Thermal effect** – The thermal effect of a lightning discharge is confined to the temperature rise of the conductor through which the current passes.

10.4 **Mechanical effect** – When a high current is discharged along parallel conductors in close proximity or along a single conductor with sharp bends, a different mechanical effect is exerted by a lightning flash. This is due to a sudden rise of 30 000K in air temperature and the resulting explosive expansion of the adjacent air in the channel along which the charge is propagated.

## 11.0 PROTECTION AGAINST CORROSION

11.1 The tenderer shall ensure that atmospheric, chemical and or electrolytic corrosion of copper and other metals is prevented from occurring when used for the lightning protection system.

11.2 The contact surfaces of dissimilar metals shall be kept completely dry and protected against ingress of moisture to prevent the acceleration of electrolytic corrosion.

11.3 Although copper is highly resistant to many types of chemical attack, lead coating shall be recommended wherever subjected to severe corrosion due to presence of sulphur compounds.

11.4 Stainless steel material of similar grading shall not be used unless prior approval is obtained.

## 12.0 EARTHING CODES OF PRACTICE

This part of specification details standards and codes of practice to be adhered to in the supply, installation and termination of earthing systems on all Transnet Sites.

### 12.1 National Standards

12.1.1 The requirements of the materials, design, layout, fabrication, assembly, erection, examination, inspection and testing of an earthing system on site shall be in accordance with the relevant sections of codes: -

| | | |
|---|---|---|
| • SABS 089 Part 2 | 1965 | Electrical Code for Petroleum Industry |
| • SABS 0121 | 1977 | Cathodic Protection of Buried and Submerged Structures |
| • SABS 0123 | 1976 | The Control of Undesirable Static Electricity |
| • SABS 0198 Part 12 | 1988 | Installation of Earthing System |
| • SABS 0199 | 1985 | The Design and Installation of and Earth Electrode |
| • SABS 0200 | 1985 | Neutral Earthing in Medium Voltage Industrial Power Systems |
| • SABS 0292 | 1999 | Earthing of Low Voltage (LV) distribution systems |
| • SANS 10313 | Latest ammed | Protection of Structures against Lightning |
| • SABS 1063 | 1998 | Earth Rods and Couplers |
| • SABS IEC 61000-5-2 | 1997 | Electromagnetic Compatibility (EMC) Part 5: Installation and mitigation guidelines |

Section 2: Earthing and Cabling

- SABS IEC TS 61312-2 1999 Protection against Lightning Electromagnetic Impulse (LEMP) Part 2: Shielding of structures, bonding inside structures and earthing
- SABS IEC 61024-1 1990 Protection of Structures against Lightning Part 1: General principles
- SABS IEC 61024-1-1 1993 Protection of Structures against Lightning Part 1: General principles Section 1: Guide A – Selection of protection levels for lightning protection systems
- SABS IEC 61024-1-2 1998 Protection of Structures against Lightning Part 1-2: General Principles Guide B – Design, Installation, maintenance and inspection of lightning protection systems
- SABS IEC 61312-1 1995 Protection against Lightning Electromagnetic Impulse Part 1: General principles
- SABS IEC 61312-4 1998 Protection against Lightning Electromagnetic Impulse Part 4: Protection of Equipment in existing structures
- SABS IEC 61643-1 1998 Surge Protective Devices Connected to Low Voltage Power Distribution Systems Part 1: Performance requirements and testing methods
- SABS IEC TS 61312-2 1999 Protection against Lightning Electromagnetic Impulse (LEMP) Part 2: Shielding of structures, bonding inside structures and earthing

12.1.2 Statutory Requirements

a) The Contractor shall ensure that the installation satisfies the requirements of all relevant South African Statutory Regulations

b) Where applicable, equipment items shall carry the SABS mark to demonstrate compliance with the regulations.

## 12.2 Technical Requirements

### 12.2.1 General

a) A common integrated station earthing system shall be provided for electronic and electrical systems equipment, static and lightning protection in accordance with the requirements of this document.

b) A soil resistively survey shall be carried out by a specialist earthing consultant/contractor. The consultant/contractor shall prepare a detailed report on the conditions identified and provide the survey data recordings together with proposals, for a basis of the earthing system design.

c) Major electrical equipment such as switchgear, transformers, lighting boards, floodlight towers on poles, control panels etc. and associated metallic support frameworks, shall be connected to the station safety earth via Electrical Earth bars located nearby.

Use of embedded conductors within a power cable (spare core earth) may be utilised as the primary equipotential bonding system provided the following conditions are met: (SABS 086-1:2001)

- The embedded conductor has a cross-sectional area equal to those of the live and neutral conductors or equal to the values in Table 1 of SABS 0142)

In addition, a second visual earth connection shall be provided to each item of electrical equipment, to prevent the potential to earth of such equipment rising above spark potential. (SABS 089-2:2000)

d) The neutrals of generators and transformers shall be connected to the main earth grid either directly or via an earthing resistor, as required. Where neutrals of transformers are connected directly to earth, this shall be done via means of connections to both an individual earth rod located nearby as well as to the station earth mat by means of Electrical Earth bar located within the Switchgear Room.

e) Frames of motors shall be connected to the earthing system in accordance with the following table:

| Motors kW Rating | Minimum Earth Conductor Size |
|---|---|
| Up to 30 | 16 $mm^2$ |
| 37 – 132 | 50 $mm^2$ |
| 150 – 175 | 70$mm^2$ |

**Note:**
In order to minimize the number of different sizes of earth conductor, the above three sizes only shall be used throughout, unless specifically stated otherwise.

f) Cables supplying lighting fixtures shall be 3 core for single-phase supplies and 5 core for 3 phase supplies, of which one core shall be used as the earth conductor.

g) Plant Infrastructure such as manifold piping, tanks and metallic support frameworks, shall be connected to the station safety earth, either directly or by means of Electrical earth bars located nearby.

h) Flanged joints in metallic pipelines shall be considered inherently continuous provided the surfaces of one of the bolts are cleaned and identified for earthing. Flanges of metallic pipelines that have insulated linings for purposes other than cathodic protection shall be bonded to ensure electrical continuity.

Pipelines shall only be connected to the earthing system where they enter and leave the battery limits.

i) Storage tanks that are not cathodically protected shall be earthed through at least two separate connections to the tank. Tanks shall be earthed in accordance with the relevant SABS code.

Electrically continuous structural steel columns may be used as down conductors by means of which elevated tanks, vessels, etc. shall be deemed to be connected to the earthing system.

All tank covers, gauge floats and stirrers etc. as well as all pipes entering the tanks shall be earthed.

The steel roof shall be in a direct electrical contact with, or bonded to the tank shell.

Earthed grids, gauges, gratings and the like placed in or across the inlets of tanks are not to be used as a means of static discharge. Individual bonding shall be made to the earthing system.

j) Cable trays and cable racks shall have continuous earth continuity. This shall be ensured by installing 10mm$^2$ earth straps across the racking fishplates (joints). Cable Trays shall be connected to the earthing system in two places - where they enter and leave the battery limits.

k) Earthing connections to all equipment and process plant shall comprise of welded earth bosses in compliance with SABS 089 Part II:1965 regulation 5.1.4K with properly provided terminations i.e. 10mm diameter earth studs. Anchor bolts shall not be used.

Earth connections to all equipment shall be effectively bolted, using crimped lugs.
All cable connections shall be fitted with a “star” or serrated washer in addition to the backnut, to ensure good earth contact.

l) All earthing connections between the station earth system and respective earth bars/lightning protection systems shall where possible be made above ground, by means of bolts, crimped lugs and PVC taped.

All cable connections shall be fitted with a “star” or serrated washer in addition to the backnut, to ensure good earth contact.

Earth connection points shall be clearly labelled.

In cases where earth connection points are required to be made underground (e.g. to earth rods), inspection wells shall be provided comprising of pre-cast concrete/PVC surrounds complete with covers, to facilitate periodic inspection.

m) Earthing conductors rising through paving or other concrete work shall be run in suitable protective sleeves which shall project above finished level.

n) Earthing and bonding conductors shall be sized and installed in compliance with regulations detailed in the current SAIEE Standard Regulations for the Wiring of Premises and in SABS 03 as applicable.

o) Extendable earthing rods shall be manufactured from stainless / copper clad / galvanized steel (dependant on soil acidity and chlorides and existence of cathodic protection systems) 16mm diameter, 1200 mm long sections, and shall have molecular bond between the two metals to prevent moisture ingress. Where it is necessary to join earth rods together, a non-ferrous corrosion resistant coupling device shall be used which shall prevent the ingress of moisture into the joint.

p) Lightning and static earthing protection shall be provided for all tall steel, masonry and concrete structures, towers, vessels, tanks etc, as well as all buildings used to house sensitive electrical/electronic equipment. Lightning protection systems shall be connected both to individual earth rods as well as bonded to the station earth mat. Where possible, the mesh method (as defined in SANS 10313) should be utilised in the protection of buildings against lightning strikes i.e. the use of masts and catenary conductors are to be avoided.

Tall steel structures such as towers or structure columns, provided they are electrical continuous, shall be considered inherently protected against lightning by their connection to the earth.

q) **The resistance of the common earthing system to the general mass of earth shall not exceed 1 Ohm.**

r) Where a separate system is installed for other than electrical equipment in remote locations, e.g. storage tanks; its resistance to the general mass of earth shall not exceed 7 Ohms. (Note: This applies only for Lightning Protection and remote valve chambers that are not connected to the Station Earth).

### 12.2.2 Station Safety Earth

In cases where a new Station Safety Earth Mat is required to be provided, the following specifications shall apply:

The **Earth Mat** shall consist of a completely buried, lattice network of 40x3mm, bare copper tape. All the crossover points of the lattice shall be braised or cadwelded and protected with PVC insulation tape. Buried joints or splices shall not be clamped or bolted. The earth mat shall be buried, 1000mm minimum, below finished grade.

The interconnecting conductors shall be radially interconnected to form a common earthing system, for all electrical equipment, lightning protection and static earthing in accordance with relevant SABS requirements.

If required, additional earth electrodes may be installed to achieve the specified resistance, of the common earthing system to the general mass of earth. Where earth rods are paralleled in a group to reduce the earth resistance to the permissible value, they shall be spaced apart for a distance at least equal to their buried depth length.

## 12.3 Switchgear Room Building and Equipment

12.3.1 A Main Safety/Electrical Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Switchgear Room. Where possible, this Earth Bar shall be designated as the Primary Test Point for the station earthing system with the following equipment directly connected:

- **Station Earth Mat**. Where possible, a minimum of four separate connections shall be taken into the Switchgear Room via separate routes from the Earth Mat, by means of 40mm x 3mm Cu Earth tape. Connection to the Main Safety Earth bar shall be made in two places by means of 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductor, to facilitate testing of the Earth System.
- **Transformers**. By means of 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductor
- **MV/LV Panels**. By means of dual 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductors
- **Generator**. By means of 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductor
- **Instrument Earth**. By means of dual 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductors
- **Manifold Earth**. By means of dual 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductors

Note that on existing sites, the earth mat has been connected to the station earthing system in multiple places (namely; the Switchgear Room, Control Room and Manifold), and thus designation of a single Primary Test point is not possible. Multiple test points have thus been defined as follows: Switchgear Room, Control Room and Manifold Mainline Pumps 1 & 4 (where possible).

12.3.2 All secondary earthing within the substation shall be attached to this station earth bar at appropriate demarcated points.

## 12.4 Control Room Building and Equipment

12.4.1 A secondary Safety/Electrical Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Equipment/Control Room in an easily accessible position. Where possible, this Earth Bar shall be directly connected to the Main Safety/Electrical Earth bar located in the Switchgear Room, by means of dual 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductors.

Note that all marshalling and equipment panels shall have an electrical earth bar, separate from an insulated instrument earth bar, installed and to which all electrical equipment earths shall be connected.

12.4.2 An Instrument Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Equipment/Control Room in an easily accessible position. Where possible, this Earth Bar shall be directly connected to the Main Safety Earth bar located in the Switchgear Room, by means of dual 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductors.

Note that all marshalling and equipment panels shall have an insulated instrument earth bar, separate from the electrical earth bar, installed and to which all clean/instrument earths shall be connected.

12.4.3 Instrument and Electrical Earth systems shall be clearly labelled.

## 12.5 Manifold Area and Equipment

12.5.1 All manifolds shall have an insulated manifold earthing system installed, comprising of the following specifications:

- 40mm x 3mm min flat copper tape, to run the entire length of the main electrical racking reticulation and supported off of insulators at distances of no more than 2m apart. Use of existing electrical racking reticulation supports shall be permitted. All joints will require to be braised. Earthing reticulation shall be installed in such a manner so as to be unobtrusive and yet accessible and shall be positioned so as to avoid obstruction to walkways and access routes.
- The Manifold Earth bar shall be connected to the main safety/electrical earth located in the Switchgear Room, by means of dual 70mm$^2$, 600-volt class, green colored, PVC insulated, stranded copper conductors.

  Note that on existing sites, the earth mat has been connected to the earthing system in multiple places (namely; the Switchgear Room, Control Room and Manifold), and thus designation of a single Primary Test point is not possible. Secondary test points have thus been defined where possible as follows: Switchgear Room, Control Room and Manifold Mainline Pumps 1 & 4.

12.4.2 All process plant and equipment located within the manifold area shall be attached to this manifold earth bar at appropriate demarcated points, via appropriately sized insulated PVC copper cable (green/yellow colored insulation), as follows:

- All electrical equipment shall be earthed via two separate earths, namely via the power cable earth core back to the respective Starter Panel electrical earth bar, and secondly via a separate visual earth from the motor frame to the manifold earth bar. Use of cable armouring as an earth conductor is not acceptable.

- All instrument stands and field junction boxes shall be separately earthed via means of an insulated 16mm2 min PVC copper cabling.

- All process vessels (tanks, vessels and piping) and racking reticulation shall be earthed via insulated 70mm2 min PVC copper cabling in two separate places.

All earth conductors utilized shall comprise of stranded, PVC insulated copper conductors with crimped cable lugs. All connections shall be fitted with a “star” or serrated washer in addition to the backnut, to ensure good earth contact.

## 12.6 Earth System Identification Standards

### 12.6.1 Earth Bar Labels

Earth bars shall be clearly labelled according to their functionality (e.g. “EB xx” to denote an electrical earth bar, “IB xx” to denote an instrument earth bar, where xx denotes a unique consecutive number). The Functional Identifier “EB 00” shall always denote the Station Earth Mat.

In addition, earth bars designated as Test Points shall be labelled accordingly.

Labels shall comprise of the Traffolyte engraved type, and fixed by means of stainless steel screws. Finish shall comprise of black letters against a white background, with text 40mm height.

Labels shall be readable/visible after the wiring has been done.

### 12.6.2 Earth cable Identification

Earth cables may be divided into two types, namely primary earth cabling running from subsystem earth bars directly or indirectly to the main station earth (and used for testing purposes), and secondary earth cabling running between the subsystem earth bars and equipment or infrastructure.

Only Primary earth cabling (i.e. those used for testing purposes) is required to be identified, by means of a Functional Identifier denoting both source and destination earth bars.

Identification numbers will comprise of the following specification:

- Grafoplast Targa Metal TGT System (Carrier Rail 58mm in length) 316 Stainless Steel Markers, with punched text 6 mm height minimum, fastened onto the cable at both ends via means of Stainless Steel cable ties

Examples:

EB01 – EB00 Cable Identifier for Earth cable running between Electrical Earth bar EB01 and the Station Earth Mat

IB01 – EB00 Cable Identifier for Earth cable running between Instrument Earth bar IB01 and the Station Earth Mat

## 12.7 Testing

### 12.7.1 Earth Resistivity and Electrode Testing

It will be the Contractors responsibility to carry out all necessary earth resistivity tests on site, where applicable. Tests will be in accordance with the requirements of BS 1013 as amended.

After all earth electrodes/trench earth's have been installed, an earth megger shall be used to test the earth resistance at the earth bar or connection point to the main station earth and the results recorded. Note that all ECC connections, and any other bonding material shall be disconnected from the earth connection point whilst the earth is being tested.

**Earth Continuity Testing.**

Earth continuity readings shall be measured and recorded from the earth bar to each item of equipment and process plant, and shall include all piping, vessels, transformers, motors, actuators, switchgear cabinets, marshalling enclosures and instrumentation.

12.7.2 The following are the maximum acceptable earth electrode resistances:

Electrical Earth
a) Main substation - 1 ohm
b) Miniature substations and kiosks - 2 ohms
c) Highmasts - 5 ohms.

Instrument Earth
a) Instrument Earth - < 1 ohm

## 13.0 INSPECTION AND GUARANTEE

13.1 Transnet Projects reserves the right to inspect the installation and the equipment to be used.

13.2 All lightning protection systems shall be inspected and certified by an accredited person after completion of the installation, to verify conformance as required by Code of Practice, SANS 10313.

13.3 All components of the lightning protection system shall be inspected to ensure that they are in good condition and are capable of performing their designed functions.

13.4 The tenderer shall ensure that all elements of the electrical installation have been incorporated into the protected space by bonding or extensions to the lightning protection system.

13.5 The mechanical condition of all conductors, bonds, joints and earth electrodes shall be checked and the observations noted. .

13.6 The tenderer shall undertake to repair and replace all faults and faulty materials due to bad workmanship during a period of six months.

13.8 The tenderer shall be required to guarantee the installation for a period of twelve (12) months.

**END**

**SIGNATURE OF TENDERER**: ----------

**DATE**: ----------

**TRANSNET PROJECTS**
**DESIGN SERVICES**

# SPECIFICATION FOR INDOOR MEDIUM/ HIGH VOLTAGE (1KV TO 33 KV) ALTERNATING CURRENT SWITCHGEAR AND CONTROL GEAR

| REVISIONS | | |
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## INDEX

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## 1. SCOPE

**"Where the document states "Transnet Group Capital, the name should read as Transnet Port Terminals".**
This specification covers Transnet Group Capital requirements for the supply, delivery, and installation of indoor, high voltage, 3 phase, 50-hertz switchgear and control gear in the range 1 kV to 36 kV as detailed in **Appendix 1** "Schedule of Requirements".

## 2. REFERENCE LIST

The following publications and documents (latest edition) are referred to herein.

*Note: We suggest that IEC standards are used, which allows the greatest selection of reputable suppliers and does not favour any particular supplier. For voltages above 11kV most switchgear is in any case imported and standards other than IEC standards are generally excluded.*

### 2.1 International Electro Technical Commission

IEC PUBLICATION 62271-100 High-voltage alternating current circuit breakers.

IEC PUBLICATION 60060 High-voltage test techniques.
IEC PUBLICATION 62271 Specification for AC metal enclosed switchgear and control gear, for voltages above 1kV up to and including 52kV

| Part: | |
|---|---|
| -1 | Common specifications for HV switchgear and control gear standards (IEC 60694) |
| -100 | Alternating current Circuit breakers (IEC60056) |
| -102 | Alternating current disconnectors and earthing switches (IEC 60129) |
| -103 | Switches for rated voltages above 1kV and less than 52kV (IEC60265-1) |
| -106 | Alternating current contactors and contactor-based motor-starters (IEC60470) |
| -200 | AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV |

IEC PUBLICATION 60027-7 Electrical drawing symbols used.
IEC PUBLICATION 60243 Recommended methods of test for electric strength of solid insulating materials at power frequencies.
IEC PUBLICATION 60282 High-voltage fuses.
IEC PUBLICATION 62271-200 High-voltage metal enclosed switchgear and control gear.
IEC PUBLICATION 62271-103 High-voltage alternating current fuse-switch combinations and fuse-circuit-breaker combinations.
IEC PUBLICATION 60051 Direct acting indicating electrical measuring instruments and their accessories.
IEC PUBLICATION 62271 -106 High-voltage switchgear and control gear - Part 106: Alternating current contactors, contactor-based controllers and motor-starters
IEC PUBLICATION 60071 Insulation coordination

| | |
|---|---|
| IEC PUBLICATION 60282-1 | Protection fuses |
| IEC PUBLICATION 60529 | Degree of protection (IP rating) |
| IEC PUBLICATION 60044-1 | Current transformer |
| IEC PUBLICATION 60044-2 | Voltage transformer |

| | |
|---|---|
| IEC PUBLICATION 60044-8 | Current sensors |
| IEC PUBLICATION 60044-7 | Voltage sensors |
| IEC PUBLICATION 61343-5 | Voltage detection system VDS |
| IEC PUBLICATION 60071-1 | Insulation coordination |
| IEC PUBLICATION 60125 | Protection relays |
| IEC PUBLICATION 60376 | SF6 gas |

2.2 The equipment offered shall comply with the latest editions of the relevant International Electro-technical Commission.

2.3 Users of this specification must ensure that they are in possession of the latest issues of the above-mentioned standards.

## 3. INFORMATION AND METHOD OF TENDERING

3.1 Tenderers shall submit their main offers/details of plant in accordance with the requirements of this specification. Deviations from the requirements of this specification which are of a minor nature and do not depart materially, will be considered at the discretion of Transnet Projects. The acceptance of alternative tenders will be considered only if a main tender is submitted as per this specification. Note, this specification will form part used to assess the substantive responsiveness of the bid and the submission of offer will be used for the assessment.

3.2 The "Technical Data Sheet" forming Appendix 2 of this specification shall be completed in detail, for each offer. Alternative offers shall be clearly marked "Alternative Offer No. _____".

3.3 All documents forming part of the Tender shall be firmly bound. No loose documents will be considered.

3.4 Failure to comply with the above requirements may preclude a tender from consideration.

3.5 All tender documents shall be presented in a clear format with index, uniquely numbered pages and cross-referenced. The total number of pages shall be clearly stated in the index.

3.6 **Type test reports/certificates shall be issued or certified by the appropriate test authority, that is accredited according to ISO/IEC 17025.**

## 4. APPENDICES

The following appendices form an integral part of this specification and shall be read in conjunction with it.

4.1 **Appendix 1 - Schedule of Requirements.**
This appendix details special requirements.

4.2 **Appendix 2 - Technical Data Sheet.**
This appendix calls, for specific technical information to be furnished with tenders. All Technical Data Sheets shall be signed by the Tenderer and returned as part of the tender. Failure to comply may result in a tender being excluded. This submission shall include the details of the form of offer, this is to say, the tenderers shall submit the drawing, preferably a preliminary shop/plant structural drawing, showing the details of the offer. This will be used to assess the compliance to the scope.

4.2.1 Equipment offered in this appendix shall be supplied in terms of this specification and no changes or substitutes will be allowed without the written consent from Transnet Group Capital.

4.2.2 Acceptance by Transnet Group Capital of the equipment offered in this appendix, in no way relieves the tenderer of his obligation to fulfil his statement of compliance with the specification.

4.2.3 This appendix is used during adjudication of tenders to assess the equipment offered.

4.2.4 The tenderer is responsible for the accuracy of information submitted in this appendix.

4.4 **Appendix 3 - "Test Requirements".**
This appendix contains Transnet Group Capital requirements with respect to type and routine test certificates and test procedures.

4.5 **Appendix 4 - "Statement of Compliance"**
This appendix shall be completed by all tenderers and signed. Where tenderers do not fully comply, all deviations shall be clearly indicated in the space provided or by means of a covering letter. **Failure to complete the statement of compliance will result in tenders being excluded.**

## 5. AMBIENT/ENVIRONMENTAL CONDITIONS:

The equipment shall be designed and rated for continuous operation under the following conditions:-

| | |
|---|---|
| Altitude.... | Sea level. |
| Ambient temperature.... | -5 C to +40 C (daily average +35 C). |
| Relative humidity.... | As high as 95%. |
| Lightning conditions . | Severe, with a maximum lightning ground flash density of 11 flashes per km² per annum. |
| Atmospheric conditions.... | Salt laden as well as industrial atmosphere.<br>Electrolytic corrosion conditions prevail in all areas owing to the proximity of direct current traction systems and cathodic protection schemes. |

## 6. DRAWINGS AND INSTRUCTION MANUALS

6.1 All drawings shall be in accordance with SANS 10111 – Engineering Drawings.

6.2 The successful tenderer shall supply the following instruction manuals, all of which shall be included in the tender price and be to the satisfaction of Transnet Group Capital:

6.2.1 Structural Drawings

Structural drawings shall be completely dimensioned, showing:

- Arrangement.
- Plan, front view, and other elevation views if pertinent.

- Required clearances for opening doors and for removing breakers.
- Conduit or cable entrance locations for bottom entrance.
- Busbar locations and configurations.
- Incoming and outgoing cable termination positions.
- Anchor bolt locations.
- Earthing connections.
- Mass of equipment. Individual mass of stationary units and breakers, if shipped separately.
- Foundation holding down bolting details showing mounting rails and run-out rails for draw-out circuit-breakers.

6.2.2 One Line Diagrams

One-line diagrams shall show:

- Instrument transformers
- Relays with their ANSI device numbers.
- Meters and meter switches.
- Other pertinent devices.

6.2.3 Schematic Diagrams

Schematic wiring diagrams shall be furnished for each different electrically operated breaker control scheme and show the following:

- All control devices and device contacts, each of which shall be labelled with its correct ANSI device function number, or reference.
- Device terminal numbers, terminal block numbers and terminal numbers.
- All internal interconnections, bus wiring, inter panel wiring and connections to external equipment.
- Relay internal logic configuration
- Protection relay setting sheet

6.2.4 As-Built Drawings

6.2.4.1 On completion of installation and commissioning of the relevant equipment, the originals of the above drawings shall be updated by the equipment supplier to reflect the as-built status.

6.2.4.2 The supplier shall then also provide Group Capital with three copies of all relevant CAD data for drawing records and drawing reproduction. The drawings must be in a format that can be read by AutoCAD 2000, format (“dwg” or “dxf” format).

6.2.5 Maintenance Manuals

6.2.5.1 On completion of installation and commissioning of the relevant equipment, the contractor shall submit three copies of the equipment maintenance manuals in both hard copy and electronic format. (The electronic format must be in Microsoft “Word”, or .pdf format)

6.3 The maintenance manuals shall include all the necessary information on electrical and electronic equipment to enable the maintenance staff to fully comprehend the function of the equipment and to maintain service and repair the equipment. In order to comply with this condition, the following information (as applicable) shall be included in the manuals:

6.2.6 Complete circuit diagrams.

6.2.7 System Block or Logic Diagrams.

6.2.8 Test Procedures (Flow Chart form preferred) and information to enable testing such as voltage values and tolerances, waveforms, polarities etc.

6.2.9 Component lists, which shall contain complete electrical information and standard identification in respect of all components, unless this is indicated directly on diagrams.

6.2.10 A complete description of the electronic equipment, including the function of all input and output points, maintenance and calibration procedures, reference to special test instruments required, etc.

6.3 All symbols used on diagrams shall be in accordance with IEC Publication 60027-7 wherever possible. A legend shall be supplied for all symbols that do not appear in the IEC Publications.

6.4. All information submitted in manuals should be clearly cross-referenced, indexed and accurately descriptive of the equipment provided. All filed changes to equipment shall be incorporated in the updated diagrams/sheets before expiry of the guarantee period.

6.5 Photocopies of original material shall only be acceptable if these are clearly legible and preferably colour copies.

6.6 A preliminary copy of the maintenance manual shall be forwarded to Transnet Group Capital for approval prior to issue and in advance of the delivery of equipment.

6.7 **Late submission of drawings, manuals and instructions shall incur delivery penalties on the full contract price. The contract will only be deemed to be complete on reception of all drawings, manuals and instructions.**

## 7. SWITCHGEAR AND CONTROLGEAR

### 7.1 General

7.1.1 All switchgear and control gear shall be designed, manufactured and tested in accordance with the recommendations of IEC PUBLICATION 298, IEC 62271-100, IEC 62271-200 and IEC 62271-102. The switchgear panels shall be of arc proof, AFLR rated, stainless steel, air insulated, free standing, extensible type, containing power busses, earthing bus, withdrawable (to be used as a standard for the bid process) or fixed type (with three suggested and clear visible indicators for breaker position, fixed type to be considered as an option during contract only and not for bidding purposes), completely screened busbars and terminations, sealed and protected from water and dust, auxiliary control devices, instrument transformers, modern SCADA compatible protection relays fitted in the panel LV compartment and control switches. They shall be supplied complete with all necessary terminal plates, cable glands for cable entry, wiring trunking for LV wiring and multi core cables.

7.1.3 The switchgear and control gear shall be of the air-insulated, indoor, modular, free standing, cubicle type housing with a minimum 316 stainless steel with a thickness of 2mm, powder coated with a minimum thickness of 50µm to the colour as specified in the detail specification.

7.1.3 The switchgear and control gear panels shall be bolted together to form a continuous, self-supporting, and self-contained switchgear and control gear board of uniform appearance capable for extension at both ends with similar panels.

7.1.4 Access to the current transformer and cable terminations shall be from the rear of the panels.

7.1.5 All cubicles shall be so constructed by means of modular design to ensure inter-changeability of all components of the same type between different panels.

7.1.6 All removable plates shall be secured by means of bolts and nuts. All bolts, nuts, washers fixing equipment etc. shall be stainless steel. Nuts shall be either welded in position or secured by means of a mechanical fixing device. Self-tapping screws will not be considered.

7.1.7 High-voltage and low-voltage equipment shall be housed in separate compartments.

7.1.8 The busbars shall be completely screened and contained in a separate compartment.

7.1.8.1 There shall be no barriers down the busbar runs except on either side of the busbar section switch. Barriers shall not be used to provide mechanical support for busbars or connections.

7.1.8.2 Entry through barriers between cubicles shall be via purpose designed bushings.

7.1.9 Each switchgear panel shall be a self-contained unit with a minimum degree of protection of IP54 for indoor installations.

7.1.10 The pollution level (IEC 186) shall be taken as "Medium" (creepage distance of 20mm/kV) for all equipment installed indoors or inside enclosures.

7.1.11 The panels shall be built to withstand internal faults and shall be based on IEC 62271-200. In the event of an internal arc fault, a person standing at the front, rear or alongside the panel shall not be burnt or electrocuted.

7.1.11.1 A means of pressure relief shall be provided and the tenderer shall describe in full the method used.

7.1.11.2 Vent outlets, if used, shall be suitably designed to prevent accidental inward opening.

7.1.12 The rated insulation levels shall be in accordance with, the recommendation of IEC PUBLICATION 298 Appendix EE test 2.

7.1.13 Fault-make integral earthing shall be provided to earth the circuit on the cable side of all switching devices.

7.1.14 Where separate earthing switches are used, they shall be so interlocked as to prevent operation when the main circuit is closed.

7.1.15 Fault-make integral earthing on the busbar side shall be provided for each busbar section. The busbar-earthing device shall be interlocked to prevent the earthing of an energized busbar. The earth switch can be located in the bus section / bus riser, or dedicated busbar earthing cubicle. If required the busbar earth switch can be located in the same cubicle as the busbar VT.

7.1.16 Where separate earthing switches are provided the switching devices shall be capable of earthing either the cable or busbar side.

7.1.16.1 The earthing switching device will be tested at the routine testing of the switchgear as specified in this specification.

7.1.17 Integral earthing shall be capable of being padlocked in the earthed position.

7.1.18 An earthing bus shall be provided for the entire length of the board and shall provide connection points at each panel section. The cross-sectional area of the earthing conductor shall be such that the current density shall not exceed 200A/mm$^2$ under the specified earth fault conditions. Provision will be made for solder-less connectors for 70mm$^2$ copper cables.

7.1.19 All compartment doors giving direct access to high voltage equipment shall be mechanically and electrically interlocked so that the door cannot be opened whilst the equipment is alive.

7.1.20 Each switching device panel shall be fitted with "close" and "open" controls. Where "close" and "open" pushbuttons protrude to the outside of panel they shall be of the shrouded type.

7.1.21 Means shall be provided for easy inspection and maintenance of the switchgear and control gear.

7.1.22 Applied insulation shall be in intimate contact with conductors and conductor joints to obviate voids.

7.1.23 Anti-condensation 230 Volt heaters shall be provided for each individual compartment and the bus bar chamber of each switch-gear. A switch shall be provided to control the heaters.

7.1.23.1 A thermostatically controlled switch, adjustable between 10°deg.C and 40°deg. C, shall be provided in the supply circuit to the heaters. An over-riding switch shall be provided for the thermostat.

7.1.23.2 The wiring from the heater elements to terminals shall be high temperature insulation covered. A suitable compression type gland shall be fitted for an incoming 230V supply.

7.2 The successful tenderer shall supply all material required to assemble the switchgear on site.

7.3 Two copies of all type and routine test certificates shall be supplied in accordance with NRS 003 for all equipment in the panels as applicable.

## 8. WITHDRAWABLE SWITCHGEAR AND CONTROLGEAR

8.1 Suitable indication shall be provided to mechanically indicate the position of the switching device, i.e. racked-in, racked-out (isolated), earthed, on/off. The indication shall be readily visible from the front of each panel.

8.2 Each switching device shall be mounted on a transporting truck device, and fitted with wheels.

8.3 Connection and disconnection of the switching device shall be by means of suitable contacts mounted on robust insulators.

8.4 In addition to interlocks recommended in IEC PUBLICATION 62271-200 the following shall be provided.

8.4.1 Separate shutters shall be provided to cover the "Busbar" and "Circuit" high-voltage sockets. These shutters shall automatically cover the sockets with a positive action when the switching device is withdrawn. The shutters shall be equipped with a fail-safe device to prevent their manual opening when the circuit breaker is removed from the compartment and the door is open.

In addition to the above.

8.4.1.1 Facilities shall be provided for independently padlocking each shutter in the closed position.

8.4.1.2 Busbar shutters shall be red (colour D29 in CKS 279) and shall be clearly marked "Busbars". The "Circuit" shutters shall be yellow (colour D26 in CKS 279) and shall be marked “cable”.

8.4.1.3 Provision shall be made for testing the operation of the switching device when fully withdrawn from the panels.

8.5 non-withdrawable switchgear shall only be offered if called for in Appendix 1 A of this specification or will only be considered in an event where a stringent requirement of this specification is only possible in a fixed pattern.

8.6 LSC type in accordance with IEC62271-200 shall apply. LSC2B shall apply for withdrawable switchgear and LSC2A shall apply for non-withdrawable switchgear, as called for in Appendix 1.

8.7 Partitioning shall be in accordance with IEC 62271-200. For withdrawable switchgear PM shall apply, for non withdrawable switchgear PI shall apply.

8.8 All operations shall be from the front of the switchgear from behind closed doors. No part of any operation / racking / shutter actuation shall be allowed with the door open or partially open.

8.9 The internal arc capability of the switchgear shall be in accordance with IEC62271-200 Appendix 1, and rated at AFLR, for the short circuit current for a duration of 1 second.

8.10 The switchgear shall be fitted with an arc vent duct that will contain the internal arc and safely vent the arc within the switch room or vent to the exterior of the switch room. The manufacturer should access each installation and make recommendations based as to the most suitable option for the switchgear installation. The manufacturers recommendations should be supported by a calculation that will calculate the pressure rise in the room, consider the room volume, and design fault level.

## 9. SWITCHING DEVICES

### 9.1 General requirements

9.1.1 All switching devices shall be ganged triple pole.

9.1.2 The method of securing the moving contact to the armature shall feature a safety device in addition to the normal securing mechanism.

9.1.3 A thermal overload device in addition to the low voltage circuit protection shall protect all motors used for spring charging or other applications.

9.1.4 Tripping shall be by means of trip coils.

9.1.5 Electrically held tripping mechanisms shall not trip due to transients or voltage dips to zero for 10 cycles or 70% of the rated voltage. This is not applicable when tripping occurs due to protective system operation.

9.1.6 Tripping mechanisms operating on power failures shall restore the switching device to the condition prior to the power failure.

9.1.7 If a direct means of indicating contact wear and the necessity for replacement is not provided, a concise description of how this can be determined shall be provided on a label permanently fixed to the switching device or switch panel.

9.1.8 Two spares normally open and two spare normally closed auxiliary contacts shall be provided on each switching device. The spare contacts shall be wired to a terminal strip in the panel. For withdrawable switchgear and control gear auxiliary plugs and sockets shall be used.

## 9.2 Circuit -Breakers

9.2.1 The insulation and arc-quenching medium will be vacuum or SF6.

9.2.2 Circuit breakers shall be designed manufactured and tested in accordance with IEC PUBLICATION 62271-100. The 50Hz electrical ratings of the circuit breaker shall be in accordance (or better) than the data listed in the manufacturer's data sheet.

9.2.3 The circuit breaker shall be of the vertical or horizontal isolating, draw out type. Where trolleys are required to remove circuit breakers, VT's or Contactors from the panel, at least two trolleys of each size / type per substation will be provided as standard operating equipment to facilitate swopping of similar equipment.

9.2.4 The control mechanism of the circuit breaker shall of the spring assisted trip free type with anti-pumping circuitry. The circuit breaker shall be equipped with mechanical tripping and closing in addition to electrical trip and close.

9.2.5 The first pole to clear factor shall be 1,5.

9.2.6 The making time shall not be greater than one second.

9.2.7 Rated insulation level for circuit breakers shall be in accordance with IEC 62271-100 and will be listed in the data sheet.

9.2.8 Interlocking shall be provided to prevent connecting the circuit breaker to, or disconnecting it from the bus stabs unless the circuit breaker is open.

9.2.9 Barrier shutters shall be provided which effectively close the bus stab disconnect openings when the circuit breaker is withdrawn. These shutters will be pad lockable and clearly marked to indicate the primary circuit, i.e. Busbar, Cable, Left Busbar or Right Busbar. Facilities shall be provided for independently padlocking each shutter in the closed position.

9.2.10 All compartment doors giving direct access to high voltage equipment shall be mechanically interlocked so that the door cannot be opened whilst the equipment is live.

9.2.11 Suitable indication shall be provided to mechanically indicate the position of the switching device, i.e. racked-in, racked-out (isolated), earthed, on/off.
The indication shall be readily visible from the front of each panel.

9.2.12 Circuit breakers shall have the following class rating, in accordance with IEC 62271-200
Extended Electrical life rating of E2
Extended mechanical life of rating M2
Very low re-strike probability or rating C2

9.2.13 Circuit breakers shall have stored energy mechanisms. Where spring assisted stored energy mechanisms are provided these shall be charged by means of a motor. For magnetic actuated circuit breakers the stored energy device shall be charged via an electronic controller. In both cases the circuit breaker may not be able to be closed until there is sufficient energy in the stored energy mechanism to enable the breaker from being opened immediately. The circuit breaker closing and opening mechanisms must not consume more than 750 W of power peak during opening or closing operations.

9.2.14 It shall be possible to mechanically trip the circuit breaker with the CB door closed.

**9.3 Switch Disconnectors (Isolators) and Earthing Switches**

9.3.1 All disconnectors and earthing switches shall be designed, manufactured and tested in accordance with the recommendation of IEC PUBLICATION 62271-102.

9.3.2 Integral type circuit test facilities shall be provided on all switch-disconnectors.

9.3.3 Earth switches shall be rated for the same fault ratings as the circuit breaker and busbars.

9.3.4 The busbar earthing shall be interlocked to prevent earthing of an energised busbar.

9.3.5 The integral earthing shall be capable of being padlocked in the earthed position.

9.3.6 Both the cable circuits as well as busbars shall be provided with fault-make rated earthing switch, unless otherwise approved. Each busbar section shall be provided with its own earthing switch.

9.3.7 The type of operation shall be independent manual.

9.3.8 The operating mechanism shall be positioned on the front of the panel and be lockable in all switching states. Reliable mechanical indication of these states shall be visible from the front of the panel.

9.3.9 Earth switches shall be equipped with mechanical and electrical interlocking to prevent:
- Closing a cable earth switch unless the circuit breaker is open and disconnected from the bus stubs.
- Reconnection of the circuit breaker to the bus stubs if the earth switch is closed
- Closing the circuit breaker

9.3.10 A notice bearing the following inscription shall be provided adjacent to the operating mechanism:
"DO NOT OPERATE UNDER LOAD"

## 10. BUSBARS

10.1 All busbars shall be designed, manufactured, marked and tested in accordance with BS 159.

10.2 The busbars shall be the bolted, modular screened, air Insulated and contained in an isolated compartment.

10.3 Busbars shall be made from electrical grade high conductivity hard drawn copper, capable of carrying the continuous rated current as specified in the detail specification, without exceeding the maximum temperature rise specified in the relevant Standard.

10.4 The busbars shall be mechanical braced for the asymmetrical ampere rating and duration of the circuit breaker having the highest interrupting rating. There shall be no barriers down the busbar runs except on either side of the busbar section switch. Barriers shall not be used to provide mechanical support for busbars or connections. Entry through barriers between cubicles shall be via purpose-designed bushings.

10.5 All joints and tees in busbars shall be made with high tensile stainless-steel bolts, nuts and washers, securely tightened with a torque wrench to the manufacturers specified torque settings. These settings shall aim to minimise contact resistance and avoid distortion and / or hardening of the copper due to overstressing.

10.6 Insulated bushings shall comply with SABS 1035.

## 11. BUSHINGS

11.1 All bushings shall be designed, manufactured, and tested in accordance with SABS 1035.

## 12. CABLE BOXES, GLANDS, AND TERMINATIONS

12.1 All cable end boxes shall be suitable to terminate (sizes up to a maximum of 185mm$^2$ wire armoured cable). Cable termination compartment shall be suitable for an equal or similar approved to EN50181, inner-cone, pluggable cable termination arrangement.

12.2 Cable armouring shall be insulated from the board with insulating material which shall withstand 4 kV or greater for one minute when tested in accordance with IEC PUBLICATION 60071.

12.2.1 Insulated gland plates with substantial links or straps connected to the earth terminal shall be provided for bonding the cable sheath and armouring to the earth conductor of the boards.

12.3 Cables shall terminate using a plugged type and the switchgear shall be air-insulated compartments and manufactured ready for the arrangement.

12.4 Adequate space shall be allowed from the cable terminations to facilitate connecting onto the boards.

12.4 The termination box switchgear shall be manufactured with the female plugs to accommodate the screened plugged type termination manufactured to EN50181.

## 13. INSULATING MEDIUM

13.1 The insulation medium will be vacuum or SF6, refer to Annexure 1

## 14. HIGH-VOLTAGE FUSES

14.1 All fuses shall be designed, manufactured and tested in accordance with the recommendation of IEC PUBLICATION 60282.

14.2 Integral three pole earthing facilities to earth both sides of the switching device shall be provided unless otherwise approved.

14.3 All fuses shall be of the air insulated, cartridge, striker pin type.

14.4 Parallel connection fuse cartridges shall not be used unless no single fuse cartridge of the same characteristic is available.

14.5 Integral type circuit test facilities must be provided.

## 15. CURRENT TRANSFORMERS

15.1 Current transformers shall comply with the requirements of SABS IEC 60044/1 shall be tested in accordance with the following procedure:

- Each unit must be pre-stressed at 1,04x line voltage and the peak discharge measured at 1,1x the phase voltage.
- The discharge level shall not exceed 50 pC for a wound primary and 10 pC for a bar primary.
- A representative from Transnet Group Capital shall witness this test, unless routine test certificates, issued by a recognised independent testing authority, are submitted.

15.2 Short circuit ratings and voltage classes shall match the ratings of the associated circuit breaker and the current transformers shall also be rated to ensure the correct operation of the equipment constituting the burden.

15.3 Current transformers shall be of accuracy class 3 for measuring purposes be of accuracy class 0,2 for metering purposes and be connected to the cable side and be fitted with a 10 amp test winding. Testing windings shall be fitted on the higher current ratio of multi-ratio transformers.

15.4 All current transformers will have a permanent thermal current carrying rating of a minimum of 120% of the maximum specified ratio.

15.5 The limits of temperature rise of the windings of the current transformers at the full load continuous primary current rating of the switchgear panel shall comply with SABS IEC 60044.

15.6 Ring type current transformers shall have separate insulation between live conductors of the main circuit and inner surface of the current transformers. This insulation shall be capable of withstanding the high voltage test as specified. A rigid system of mounting shall be used to ensure that concentricity is

maintained.

15.7 All current transformers shall be naturally air-cooled. Their secondary terminal connections shall be safely and readily accessible with the circuit isolated. The current transformers in a switchgear panel shall be readily accessible with only the circuit-side isolated for removal/replacement without extensive dismantling of primary circuits.

15.8 The secondary rating of the transformer shall be either 1 or 5 amp as required by the protection or metering equipment.

15.9 All terminals of the current transformers shall be terminated individually into terminals in the LV compartment to facilitate changing of ratio's or the star point. The current transformer neutral earthing point will be taken through an earthing link located in the LV compartment.

15.10 Each current transformer shall be connected to test block with shorting strips located on the LV compartment door.

15.11 Unless specified, each current transformer shall be equipped with a test winding, terminated in the LV compartment, on terminals equipped with test plugs to allow for easy testing. Test winding terminals shall be clearly marked

15.12 Each current transformer rating (VA, ALF, Vkp etc) shall be decided and calculated by the manufacturer to meet the protection requirements. Manufacturers shall provide proof of the calculations. The values given on appendix 1 schedule of requirements shall be taken as typical values.

## 16. VOLTAGE TRANSFORMERS

16.1 All voltage transformers shall be designed, manufactured and tested in accordance with SABS IEC 60044/2.

16.2 Dry type cast epoxy resin insulated voltage transformers of the withdrawable type shall be provided for protection and metering purposes. When isolated the plug connections on the switchboard shall be fully shrouded by means of automatic shutters with padlocking facilities.

16.3 Where directional protection elements are required, voltage transformers shall be of a single phase or five limb construction, star/ star/ residual open delta connected, with primary neutral earthed and secondary neutral earthed via an earthing link in the LV compartment. Ratios shall be:

$$\frac{V_L}{\sqrt{3}} : \frac{110}{\sqrt{3}} : \frac{110}{3}$$

A suitable anti Ferro-resonance device shall be fitted to the open delta winding to prevent any Ferro resonance voltages that may occur.

16.4 The voltage transformers shall be successfully tested in accordance with the following procedure:

- Each unit shall be pre-stressed at 1,04 x line voltage and then the peak discharge measured at 1,1 x the phase voltage. This discharge level shall be less than or equal to 100 pC. A representative from Transnet Group Capital shall witness this test, unless routine test certificates, issued by a recognised independent testing authority are submitted.

16.5 Voltage transformers secondary shall have the following minimum accuracy classes :

16.5.1 Indicating instruments - 3
16.5.2 Protective systems - 6P
16.5.3 Metering - 0,2

16.6 The primary of the voltage transformer shall be connected to the busbar side through high-voltage fuse-links.

16.7 Voltage transformers shall be fitted with three pole moulded case circuit breakers for protection of the secondary winding. The MCB's shall be mounted in the LV compartment of the panel

16.8 Phase or neutral earthing of the secondary winding through a removable link shall be provided. No fuses or miniature circuit breakers shall be fitted in this connection to earth.

16.9 The burden shall be suitable for the connected load but shall be not less than 25 VA per phase.

16.10 Where voltage transformers are fitted these shall be inside the arc proof enclosure. If voltage transformers are fitted outside the arc proof enclosure these shall be fully screened type. The arc capability of the switchgear must not be de-rated due to fitting of voltage transformers. Suitable documentary proof shall be provided for the design to prove compliance to the internal arc capability of the switchgear.

16.11 Busbar VT's shall be rackable type from behind a closed door. Busbar VT's can be situated in the bus riser cubicle, and if necessary a dedicated VT cubicle shall be supplied. Cable VT's shall only be accessible once the cable circuit is de-energised and a cable earth applied.

## 17. INDICATING LIGHTS AND INSTRUMENTS

17.1 All indicating instruments shall be designed, manufactured and tested in accordance with IEC 60051.

17.2 All indicating instruments shall have the following features:

17.2.1 be flush-mounted and dustproof.
17.2.2 be of minimum accuracy class 2,5.
17.2.3 have a scale length of not less than 85 mm.
17.2.4 be provided with zero adjustment from the front without requiring dismantling of the indicating instrument.
17.2.5 be marked with the ratios of the associated current and/ or voltage transformers.

17.3 Ammeter full-scale shall be the first standard value above the normal primary current rating of the associated current transformers.

17.4 Voltmeter full-scale deflection shall indicate nominal voltage at approximately 75% of the scale length and shall be marked with a red line.

17.5 Maximum demand ammeters shall be of the 15 minute thermal type and shall be integrated with the indicating ammeters.

17.6 All panels will be equipped with cluster LED type lights on the panel door indicating:

- Circuit Breaker Open

- Circuit Breaker Closed

17.7 All earth switch position statuses will be clearly indicated with LED type semaphores or on the protection relay LCD graphical display.

17.8 All alarms and trip conditions will be clearly indicated via either programmed LED's on the protection relay or an alarm annunciator.

17.9 A capacitive integrated voltage indicator for permanent monitoring of all three line voltages for "cable live", and "busbar live" indication shall be provided on each panel.

17.10 The voltage indicators shall comply with IEC 61243-5, consisting of flashing LED diodes deriving its power directly from the primary system via capacitive coupling electrodes. Test points shall provide for phasing and phase rotation checks.

## 18. ENERGY METERS

18.1 Energy meters shall be designed, manufactured, installed and tested in accordance with BS 37.

## 19. PROTECTIVE SYSTEMS AND RELAYS

19.1 Protective relays shall be designed, manufactured, and tested in accordance with IEC Publication 60125.

19.2 Protective relays shall have been type tested to verify performance and safety. Proof of these tests in the form of type test certificates shall be included in tender documents.

19.3 Standing load calculations for the all the protection schemes as supplied shall be calculated and submitted with the tender to allow for Battery charger sizing.

19.4 Unless otherwise stated in Appendix 1, each relay shall:

19.4.1 Have an error class index of 5.
19.4.2 Have an operating time class index of 60.
19.4.3 Have a rated number of contact operations with electrical duty class index N3.
19.4.4 Have a mechanical stability class index S2.

19.5 Each Relay shall:

- have at least t over current elements
- be rated in conjunction with its associated current transformer(s), to withstand the over current in the secondary winding of the current transformer/s under fault conditions
- be continuously rated for any current setting
- be clearly marked with the current ratio of the current transformer associated there-with
- Have contacts rated to make and carry the current of their associated circuits. The trip coil current shall be interrupted by auxiliary contacts on the circuit breaker.
- have manual reset and flag indications for the protection function that operated

- have an additional set of normally open and normally closed contacts, or auxiliary relays, for remote indication of the relay operation. The contacts shall be capable of handling 50 W in the range of 24 to 110 V DC, and shall be wired to a terminal strip at the back of the panel.

19.6 Microprocessor based digital protection relays with the following features

- A graphical display depicting the status of the devices connected to the protection relay
- A delay closing function as part of the CB control
- Clearly labelled LED indication
- Web server functionality
- Local Remote selection
- Disturbance and event recordings
- Time synchronization
- Communication protocol and SCADA requirements shall be in accordance with the TNPA Automation Control Standard.

19.6.2 Digital relays shall incorporate PT100 RTD inputs where required.

19.6.3 Where microprocessor based relays are supplied, communication cables and software will be supplied to configure the protection relays.

**19.7 Over-current and Earth Fault Relays**

19.7.1 The relays shall have the time/current characteristics as specified below

- IEC Normal inverse.
- IEC Very inverse.
- IEC Extremely inverse.
- IEC Definite Time

19.7.2 The relays shall have current settings adjustable either infinitely or in not less than equal steps in the following ranges:

| | |
|---|---|
| Overcurrent Low Set | 10% to 500% |
| Overcurrent High Set | 10% to 4000% |
| Overcurrent Instantaneous | 100% to 4000% |
| Earth Fault Low Set | 10% to 500% |
| Earth Fault High Set | 10% to 4000% |
| Earth Fault Instantaneous | 100% to 4000% |

***Where 100% corresponds to the secondary rating of the current transformer specified.***

19.7.5 Sensitive earth fault relays shall have at least a current setting of 2% - 3% and an operating time adjustable from 2 - 10 seconds.

## 19.8 Differential Pilot Wire Feeder Protection

19.8.1 Only to be used where a communication medium (pilot wires or fibre optic) exists or can be installed between the ends of the cable.

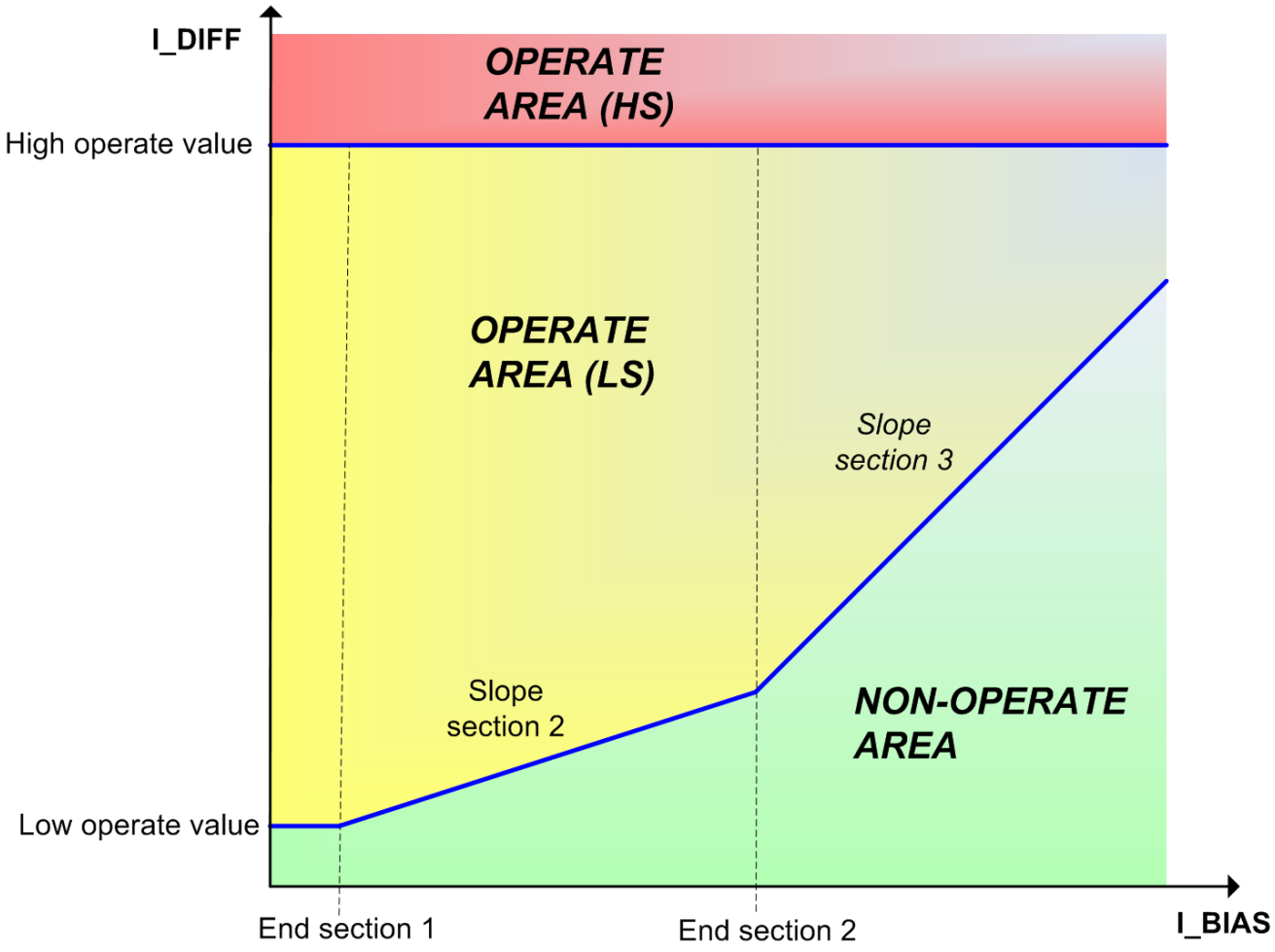



Figure 1

19.8.2 Relays incorporated in this system shall have a setting range of between

- I diff restrained 10% to 500%
- I diff un restrained 10% to 500%
- CT compensation 20% to 500%

They shall be compensated for any inherent out-of-balance in the current transformers supplied and shall be automatically biased against tripping on through-faults.

19.8.3 It shall be the responsibility of the tenderer to ensure that the current transformers and relays supplied will match exactly the equipment installed at the other end of the cable to be protected and that the whole protective system will be stable on through-faults but will operate satisfactorily on feeder faults.

**19.9 Arc Protection and Busbar Blocking Scheme.**

19.9.1 A combination of Arc Protection and a Busbar blocking scheme shall be used to detect busbar fault under the following 3 conditions:

- Earth faults
- Phase to Phase faults.
- Three Phase faults.

19.9.2 The switchgear protection “Zones” must be split over two sections

**19.10 *Arc protection***

19.10.1 The individual zone relays shall trip all the switching devices in their respective zones to isolate the fault from all sources of supply.

19.10.3 The reaction time of the busbar protection system shall be such as to limit the duration of an internal arc fault to the withstand capability of the board.

19.10.4 Each relay shall:

19.10.4.1 Have its current setting adjustable in not less than seven equal steps

Overcurrent 50% to 600%

Earth Fault 5% to 50%

where 100% corresponds to the secondary rating of the current transformer specified.

19.10.4.2 Tripping the Incomers and sections directly and loading Input on the feeder breakers to clear to zone

**19.11 Transformer Protection - (3 phase, 2 winding power transformers)**

19.11.1 Over-current and Earth Fault Protection relays shall consist of the following elements:

The relays shall have the time/current characteristics as specified below

- IEC Normal inverse.
- IEC Very inverse.
- IEC Extremely inverse.
- IEC Definite Time

19.7.2 The relays shall have current settings adjustable either infinitely or in not less than equal steps in the following ranges:

| | |
|---|---|
| Overcurrent Low Set | 10% to 500% |
| Overcurrent High Set | 10% to 4000% |
| Overcurrent Instantaneous | 100% to 4000% |
| Earth Fault Low Set | 10% to 500% |
| Earth Fault High Set | 10% to 4000% |
| Earth Fault Instantaneous | 100% to 4000% |

***Where 100% corresponds to the secondary rating of the current transformer specified.***

19.11.2 Relays provided for Restricted Earth Fault Protection of Star Windings shall be of the Low impedance instantaneous type and shall be tuned to 50 Hz.

19.11.2.1 Stability on through faults shall be maintained up to the fault rating of the switchgear.

19.11.2.2 Sensitivity shall be equal to the rated current of the current transformer.

19.11.2.3 The current transformer, to be installed in the neutral connection of the power transformer, shall be supplied and installed.

19.11.2.4 The insulation of the neutral current transformer shall be equal to the rated voltage of the switchgear.

19.11.2.5 The tenderer shall advise the maximum load burden.

19.11.2.6 The current transformer for the neutral connection of the power transformer shall be installed by the Tenderer, who shall be responsible for the correct operation of the complete protective system.

19.11.3 Biased Differential Protection relays shall have a high speed characteristic and be biased to provide stability during through faults. They shall not be operated by normal magnetising inrush currents.

19.8.2 Relays incorporated in this system shall have a setting range of between

- I diff restrained 10% to 500%
- I diff un restrained 10% to 500%
- CT compensation 20% to 500%
- Vector group Compensation
- Harmonic restraint

19.11.3.1 Current transformers for the higher voltage winding of the power transformer will be installed by others but the tenderer shall advise the maximum load burden.

19.11.4 Over temperature, Gas Detection and Overpressure Protection shall be provided unless otherwise stated in Appendix 1. All circuit breakers controlling transformers shall be provided with the following instantaneous trip auxiliary relays:

- One relay for over-temperature protection.
- One relay for Bucholz or over-pressure protection.

19.11.5 The circuit-breaker panel shall be provided with an instantaneous type relay for protection against Tank-earth faults.

### 19.12 Electrical Inter-Trip

19.12.1 When electrical inter-tripping between two circuit-breakers is specified in Appendix 1 and/or on the relevant drawings, tripping of the driving unit shall close a set of contacts, to instantaneously energise the trip circuit of the follower unit.

19.12.2 All circuit breakers, controlling transformers shall be provided with the equipment specified above for driving units.

## 20. CLOSING AND TRIPPING SUPPLIES

20.1 A battery and battery-charging unit when specified in Appendix 1 shall be supplied, with the switchboard. The battery shall be capable of providing 8 hours standby time in the event of loss of supply. The battery shall be charged via a constant voltage charger that is supplied from a 220VAC supply. The charger shall be sufficiently rated to deliver the average 24hr standing load as well as the battery charging current for a discharged battery. The charger and battery shall have a 20% overcapacity to cater for aging and unforeseen loads. The manufacturer shall provide a preliminary calculation with the tender that shall be finalised on design approval.

## 21. TEST TERMINAL BLOCKS

21.1 Readily accessible, suitably enclosed test terminal blocks (equal or similar approved to MMLG/MMLB type) shall be provided on the front panel of each switch unit for the purpose of testing all protective systems.

21.2 Test terminal blocks need not be provided for frame protection system if the associated current transformers are mounted externally.

21.3 The test blocks shall be wired to the protective relays and associated current transformers.

## 22. CONTROL SWITCHES

22.1 All control switches shall be designed manufactured and tested in accordance with the recommendation of IEC PUBLICATION 337.

22.2 Rotary pistol grip type switches shall be used on electrically operated switching devices.

22.3 The electrical and mechanical endurance of the control switches shall not be less than 100 000 operations.

## 23. MINIATURE CIRCUIT-BREAKERS

23.1 Miniature circuit breakers shall be designed, manufactured and tested in accordance with SANS 156 and shall be mounted in the relay compartment and be readily accessible.

## 24. LOW VOLTAGE WIRING

24.1 Internal LV wiring shall be multi-strand copper conductor with PVC insulation having a minimum insulation rating of 600V/1000V to SANS 1411. When subjected to movement, the wiring shall be fully flexible with a minimum of 40 strands (2.5mm$^2$).

24.2 Wiring shall be enclosed in a metal conduit when in the high voltage compartments.

24.3 Insulated crimp terminal lugs shall be used to terminate all wires. Lugs shall be correctly crimped to the lug manufacturers' specification.

24.4 All wiring from heaters to terminals shall be heat resistant.

24.5 Wiring shall be suitably strapped and enclosed in flexible conduit when looping from panels to doors and shall be continuous without joints.

24.6 Current transformer star points on secondary windings shall be earthed in the immediate vicinity of the transformer as well as onto the main circuit earth.

24.7 Terminal blocks or strips shall have a minimum of 10% spare terminals for future additions and be of the box type incorporating a pressure pad between the conductor and clamping screws.

27.8 LV wiring shall be colour coded and the ends of every wire shall be numbered as per NWS 1958 and in accordance with the approved schematic diagrams. Wiring shall also be neatly done and suitably strapped or housed in wire channels. Ferrule numbers shall be oil and moisture resistant.

24.9 Unless otherwise specified, the following guideline will be followed:

- DC Circuits (Indication and control) 1.5mm$^2$ Grey
- DC Circuit (Spring rewind motor) 2.5mm$^2$ Grey
- AC Circuits (VT) 1.5mm$^2$ Colour coded
- AC Circuits (1A CT) 4mm$^2$ Colour coded
- AC Circuits (5A CT) 4mm$^2$ Colour coded
- AC Circuits (Panel Heaters) 2.5mm$^2$ Black
- AC Circuit (Cable Live Indicators) 1.5mm$^2$ Colour coded
- DC Buswiring (Supply) 4mm$^2$ Grey
- AC Buswiring (Supply) 4mm$^2$ Black
- DC Buswiring (Signalling) 1mm$^2$ Screened

## 25. REMOTE CONTROL

25.1 All electrically operated switching devices shall be equipped with circuits for remote operation and indication.

25.2 The circuits shall include the following :

- TWO set of N/O and N/C auxiliary contacts to indicate the "open" or "closed" states of the switching device.
- Relays for remote closing and opening shall require a maximum of 50 watts at 110 Volts DC.

25.3 All remote circuits shall be wired to a terminal strip at the back of the panel.

Selectors switch on the front of the panel to select between "local" and "remote" operation.

25.4 An additional socket shall be allowed for at the front of the panel for remote operation via a handheld pendant type remote control unit (chicken switch).

## 26. ARC DUCTING

26.1 The switchgear should be fitted with arc ducting to safely vent the gases away from the operator, to the outside of the building.

26.2 The arc ducting can be vented into the sides of the switchgear or two the rear of the switchgear. The manufacturer must determine the most suitable venting arrangement for his switchgear from the substation drawings.

26.3 If arc ducting cannot be vented to the exterior of the building then the arc ducting can vent into the switch-room through an absorber.

26.4 The design of the switchgear arc ducting system must be supported by type test certificates.

26.5 If the arc ducting is fitted with an absorber then the pressure rise within the switch-room must be determined by means of a calculation.

26.6 The maximum height of the arc ducting should be 2600 mm from the floor to the top of the switchgear including the arc ducting.

## 27. NAMEPLATES AND LABELS

27.1 Labelling shall be done according to NRS 003. Graphic symbols for wiring diagrams shall comply with NRS 002.

27.2 Each switchgear and control gear panel shall be fitted with a nameplate in a conspicuous position indicating:

| | |
|---|---|
| Maker's name: | Maker's type number |
| Maker's serial number: | Client contract number |
| Service voltage: | Number of phases |
| Continuous rating: | Rating kA seconds |

27.3 Identical nameplates as that on all current and voltage transformers shall be mounted in a conspicuous position inside the relay compartment. The phase colour with which each current/voltage transformer is associated shall appear beneath each nameplate.

27.4 Interchangeable, engraved labels, showing panel designation (circuit breaker number and circuit name), shall be fitted to the front and the rear of the fixed part of each cubicle and associated withdrawable equipment for easy identification.

27.5 Only screws with nuts or rivets shall be utilized to fix label. Self-tapping screws or similar will not be used.

27.6 All equipment shall be clearly designated in position in accordance with the wiring and schematic drawings.

27.7 Voltmeter labels shall state whether busbar or cable voltage is indicated.

27.8 All labels shall be made of composite sandwich type plastic material with black lettering on white background. Letters must be of sufficient size to be clearly legible. All nameplates and labels shall be in English.

27.9 Danger Notices: White lettering on red background. Letters must be of sufficient size to be clearly legible.

## 28. PAINTING

28.1 All surfaces of the distribution board shall be light orange to SANS 1091 colour No. B26.

28.2 All surfaces shall be cleaned according to the appropriate method described in SANS 064 for the particular surface to be cleaned, the contamination to be removed and the primer to be applied.

28.3 Blast cleaning of components shall be in accordance with clause 4.3 of SANS 064 to a degree of cleanliness of at least Sa2 for inland exposure components and Sa 1/2 for coastal exposure components. See Table 1 of SANS 064 for the appropriate profile.

28.4 Sheet metal that cannot be blast cleaned shall be cleaned by pickling according to clause 4.6 of SANS 064.

28.5 Components that will be powder coated shall be cleaned and prepared by the surface conversion process according to clause 5 of SANS 064 to a medium-weight classification of table 2 of that specification.

28.6 Oil and accumulated dirt on steel components where no rusting is present shall be removed according to clause 3 of SANS 064.

28.7 The powder-coating process shall be in accordance with SANS 1274 type 4: Corrosion-resistant coatings for interior use and using the thermosetting type high gloss coating.

28.8 All specified coatings shall be applied according to the relevant specification and the manufacturer's instructions shall be followed.

28.9 Coatings shall not be applied under conditions that may be detrimental to the effectiveness of the coating or the appearance of the painted surface.

28.10 When examined visually the finished products shall have a uniform appearance as far as gloss is concerned and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

## 29. TESTS

29.1 All prescribed tests as referred to in the standard specifications may be called for at the discretion of Transnet Group Capital.

29.2 Transnet Group Capital also reserves the right to carry out any check tests on the equipment.

29.3 Notwithstanding the successful completion of tests, the tenderer will still be responsible for the efficient operation of the equipment.

29.4 The tenderer shall bear all costs for any tests that will be required.

## 30. INSPECTION

30.1 The successful tenderer shall advise Transnet Group Capital at least four (4) weeks in advance of panel testing to enable Transnet Group Capital to witness the testing at the manufacturer's premises once Switchboards are 100% ready before shipment.

30.2 All transport cost to enable Transnet Group Capital personnel to attend such test must be included in the tenderers price (Max. 2 persons)

30.3 In the event of major faults ie; wiring discrepancies, VCB"S failed to trip; busbar earthing device not demonstrated on the day, the successful tenderer shall again arrange for a retest at the tenderer cost.

## 31. TOOLS AND APPLIANCES

31.1 One set of any special tools and appliances required for normal operation and maintenance shall be supplied with each board.

## 32. SPARES

32.1 The tenderer shall state whether their local representatives hold a complete range of spares in stock as and when required.

32.2 The tenderer shall submit a separate quote for recommended spares for maintenance purposes of supply a detailed description of each item including manufacturer's catalogue number.

32.3 A complete spare parts list, including parts location diagrams or drawing and prices, which the manufacturer recommends for the first two years' operation, shall be submitted with the tender.

32.4 A separate list detailing items likely to be used in a 10-year period shall also be submitted with the tender.

## 33. PACKING

33.1 The equipment shall be packed in such a manner that it will be protected during handling and transport by road, rail or sea as applicable. The movements of instruments, meters and relays shall be protected against vibration damage during transit.

33.2 When sea transport is involved, a dehydrating agent shall be provided where necessary.

## 34. GUARANTEE

34.1 The tenderer shall guarantee the equipment supplied by him in terms of this specification for a period of one year after successful completion of hot commissioning of the plant. The tenderer shall state his compliance herewith.

34.2 This guarantee shall cover all materials, parts, workmanship, performance and efficiency (normal wear and tear excluded). The guarantee shall include all equipment supplied.

34.3 If any part/equipment fails during the 12-month guarantee period, the supplied shall immediately replace such part/equipment free of charge.

**WITNESSES**

**1.** ……..  ……
**TENDERER**

**2.** ……  ……
**DATE**

**Transnet Projects**
**Design Services**

**ANNEXURE 1**

**SCHEDULE OF REQUIREMENTS**

| GRAIN ELEVATOR SUBSTATION NO:1 (11KV) | | | | | | |
|---|---|---|---|---|---|---|
| Item | Description | | | | | |
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | **Panel Designation** | 8 Incomer 1<br>15 Incomer 2 | 9 – Transformer 01,<br>13 – Transformer 02<br>14 – Transformer 03 | 12 – Bussection<br>12a – Busbar ES & VT 1<br>16 – Bus riser & VT 2 | 10 – Feeder. | |
| | | | | | | |
| 1.1 | **General** | | | | | |
| | | | | | | |
| | Type of panel | New | Yes | New | New | |
| | | | | | | |
| | Number of switching devices | Two | Three | Two | One | |
| | | | | | | |
| | Neutral Earthing:<br>Unearthed:_____<br>Solidly Earthed:_____<br>Reactance Earthed:____<br>Resonant Earthed:_____ | Solidly Earthed | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Arrangement drawing reference of the switchboard with details of each panel and its components and accessories | To be submitted by tender | | | | |
| | Cable trench layout to be agreed with the supplier Yes/No | No Existing Building | | | | |
| | | | | | | |
| 1.2 | **Ratings of switchgear panels** | | | | | |
| | Rated voltage Kv | 11 kV | | | | |
| | Rated frequency 50 Hz | 50 Hz | | | | |
| | Busbars<br>Rated normal current (amps)<br>Type of Material:<br>Copper……..<br>Insulation | 1250A<br><br>Copper<br>Air Insulated | 1250A<br><br>Copper<br>Air Insulated | 1250A<br><br>Copper<br>Air Insulated | 1250A<br><br>Copper<br>Air Insulated | |
| | Rated insulation level KV | 95kV | | | | |
| | Max. Three phase and earth fault current kA / 3 seconds | 31.5 | | | | |
| | IAC Rating | AFLR | | | | |
| | Max Internal arc Fault rating kA / 1 second | 31.5 | | | | |
| | Rated normal current for Circuits A | 1250A | 630A | 1250A | 630A | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Anticondensation Heaters: Yes/No | Yes. In cable and CB compartment. | | | | |
| | Switchboard Colour | Grey, RAL7035 | | | | |
| | | | | | | |
| 1.3 | **Environnemental conditions** | | | | | |
| | a) altitude m | 0 to 1800m | | | | |
| | b) max. daily temperature °C | +45 | | | | |
| | c) min. daily temperature °C | -5 | | | | |
| | d) average daily temperature °C | +35 | | | | |
| | e) humidity % | 96 | | | | |
| | f) exposure conditions | Salt laden and industrial atmosphere | | | | |
| | g) Lightning Conditions | Severe: 11flashes/ $km^2$ /annum | | | | |
| | | | | | | |
| 1.4 | **Circuit-breakers** | | | | | |
| | Circuit-breaker type required (Withdrawable) | Vacuum | | | | |
| | Closing mechanism if other than a stored energy type | Stored Energy, spring or Capacitor | | | | |
| | Rating according to IEC 62271-100 | E2, M2, C2 | | | | |
| | Closing Supply:<br>Rated Voltage:_____<br>Peak Power:_____ | 110 Volts, Battery<br>Peak Power 750W | | | | |
| | | | | | | |
| | Tripping Supply:<br>Rated Voltage:_____<br>Peak Power:_____ | 110 Volts, Battery<br>Peak Power 750W | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Stored Energy Mechanism<br>Type: Motor/Capacitor<br>Voltage :_____<br>Peak Power:_____ | 110 Volts, Battery<br>Peak Power 750W | | | | |
| | | | | | | |
| | Number of spare auxiliary contacts required on circuit-breakers | | | | | |
| | - "Normally open " contacts | 5 | 5 | 5 | 5 | |
| | - "Normally Closed" contacts | 5 | 5 | 5 | 5 | |
| | | | | | | |
| 1.5 | **Safety earthing** | | | | | |
| | | | | | | |
| | Are earthing facilities required on main circuits?<br>Yes/No | Yes | Yes | | Yes | |
| | Are earthing facilities on busbars required?<br>Yes/No | | | Yes one per busbar section<br>1 x ES in Bus Section or Bus Riser (RHS)<br>1 x ES in BB VT / ES Cubicle (LHS) | | |
| | Are these facilities to be rated for fault making?<br>Yes/No | Yes | Yes | Yes | Yes | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Interlock BB E/S with all incoming and Feeders CB, racking. | | | Yes via Fortress Type Key Interlock | | |
| 1.6 | **Cable terminations** | | | | | |
| | | | | | | |
| | Type and size of cable | TBA | TBA | | 35mm2, 3-core XLPE | |
| | Cable termination compartments | | | | | |
| | Type of cable boxes required | Contractor's design for transitioning from existing cable to XLPE plugged type to EN50181 | Contractor's design for transitioning from existing cable to XLPE plugged type to EN50181 | | Contractor's design for transitioning from existing cable to XLPE plugged type to EN50181 | |
| | Type of filling required:<br>XLPE Air insulated Cables. | EN50181, pluggable Termination kits to be provided. | EN50181, pluggable Termination kits to be provided. | | EN50181, pluggable Termination kits to be provided. | |
| | Type of cable boxes required. | Air Insulated, EN50181, inner-cone, pluggable | Air Insulated, EN50181, inner-cone, pluggable | | Air Insulated, EN50181, inner-cone, pluggable | |
| | Are gland plates required?<br>Yes/No | as per design for the pluggable termination. | as per design for the pluggable termination. | | as per design for the pluggable termination. | |
| | | | | | | |
| 1.7 | **Current transformers (CTs)** | | | | | |
| | | | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Current transformer specification applicable | Yes | Yes | Yes | Yes | |
| | | | | | | |
| | a) Class type: Protection: | 1 | 1 | 1 | 1 | |
| | - quantity | 3 | 3 | 3 | 3 | |
| | Class X | 400-10/1<br>0.03 A<br>RCT < 2.8Ohm | Nil | Nil | Nil | |
| | - ratios | 800/1 | 100/1 | 800/1 | 100/1 | |
| | | 5P20 7.5VA<br>RCT <6.8 Ohm | 5P20 2,5VA<br>RCT < 0.9Ohm | 5P20 7.5VA<br>RCT <6.8 Ohm | 5P20 2,5VA<br>RCT < 0.9Ohm | |
| | | | | | | |
| | c) Metering CTs | | | | | |
| | Where required? | Incomer | Transformer Feeder | | Feeder | |
| | Class type: | 1 | 1 | | 1 | |
| | - quantity | 3 | 3 | | 3 | |
| | - ratio | 800/1 | 100/1 | | 100/1 | |
| | - accuracy % | Cl 0.5 - 7.5VA | Cl 0.5 - 7.5VA | | Cl 0.5 - 7.5VA | |
| | | | | | | |
| | Test Blocks<br>Yes/No | Yes<br>RXTP type<br>On LV Door | | | | |
| 1.8 | **Voltage transformers (VTs)** | | | | | |
| | | | | | | |
| | Panel to which VTs are to be fitted | | | Busbar riser / BB VT Panel. | | |
| | | | | | | |
| | VT requirements | | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Connected to | | | Busbar | | |
| | Quantity | | | 3 x Single Phase | | |
| | a) Class type / VA: Indicating Instruments / Meters | | | Class 0.5 / 50VA | | |
| | b) Class type / VA: Protection | | | 6P / 150VA | | |
| | - quantity | | | 1 per busbar section | | |
| | - ratios | | | 11000v3/110v3/110/3 Volts | | |
| | VT Protection device | | | Loading resistor or VT guard. | | |
| | | | | | | |
| | Connection of VT primary to: Busbar side/circuit side | | | Busbar Side, Withdrawable | | |
| | | | | | | |
| | Are HV fuse-links required? Yes/No | | | Yes | | |
| | | | | | | |
| 1.9 | **Live circuit indication** | | | | | |
| | According to IEC 61243-5 | Yes | Yes | | Yes | |
| | Is live circuit indication required Yes/No | Yes | Yes | | Yes | |
| | If Yes, on which panels? | Incomer | Transformer | | Feeders | |
| | | | | | | |
| 1.10 | **Control, protection and alarm circuitry** | | | | | |
| | | | | | | |
| | Drawing number, if applicable, for all panels | To be submitted by Manufacturer | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | | | | | | |
| | Are control wires to be terminated with crimped lugs?<br>Yes/No | Yes | | | | |
| | | | | | | |
| | Colour of auxiliary wires, if not grey | As per specification. | | | | |
| | | | | | | |
| | Requirements for alarm circuits | | | | | |
| | | | | | | |
| | Protection of d.c. circuits Fuses/MCCBs | MCB's | | | | |
| | | | | | | |
| | Are Ammeter required?<br><br>Yes/No | Yes via IED | | | | |
| | | | | | | |
| | Are Voltmeters required?<br><br>Yes/No | Yes via IED | | | | |
| | | | | | | |
| C.11 | **Battery, battery charger and d.c. supplies** | | | | | |
| | | | | | | |
| | Are a battery and battery charger to be supplied?<br>Yes/No | Yes | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | If Yes, details of the battery<br>V<br><br>A.h capacity suitable for 8hour standby | 110 Volt (gel type, maintenance free batteries)<br>Manufacturer to calculate the Ah capacity required | | | | |
| | Auxiliary supply | Yes 380/220V Local AC DB existing | | | | |
| | | | | | | |
| 1.12 | **Protection Relays**<br>**Overcurrent and Earth Fault Relays**: | | | | | |
| | Overcurrent: | Yes | Yes | Yes | Yes | |
| | Number of elements | Three | Three | Three | Three | |
| | IDMT Inverse | Yes | Yes | Yes | Yes | |
| | IDMT Extremely Inverse | Yes | Yes | Yes | Yes | |
| | High Set Instantaneous | Yes | Yes | Yes | Yes | |
| | Instantaneous<br>Definite Time | Yes | Yes | Yes | Yes | |
| | Earth Fault: | | | | | |
| | Number of elements | Three | Three | Three | Three | |
| | IDMT Inverse | Yes | Yes | Yes | Yes | |
| | IDMT Extremely Inverse | One | One | One | One | |
| | High Set Instantaneous | | | | | |
| | Instantaneous<br>Definite Time | Yes | Yes | Yes | Yes | |
| | Autoreclosing | No | No | No | No | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Cable Differential Protection | Yes (Bidder to price for a duplicate for substations feeding the proposed sub) The price to be included as part of diff protection for the proposed panel | No | No | No | |
| | Power Factor Protection | No | No | No | No | |
| | Busbar Blocking | Yes | Yes | Yes | Yes | |
| | Details of indication functions required | | | | | |
| | Current Indication | Yes in IED | Yes in IED | Yes in IED | Yes in IED | |
| | Voltage Indication | Yes in IED | Yes in IED | Yes in IED | Yes in IED | |
| | Energy Metering | Yes in IED | Yes in IED | NA | Yes in IED | |
| | Specify | P, Q, Pf | P, Q, Pf | NA | P, Q, Pf | |
| | Binary Inputs | 12 Inputs | 16 Inputs | 16 Inputs | 12 Inputs | |
| | Binary Outputs | 6 Normal + 4 Power Outputs | 6 Normal + 4 Power Outputs | 6 Normal + 4 Power Outputs | 6 Normal + 4 Power Outputs | |
| | Communications | Ethernet RJ45 | | | | |
| | Communications Protocol | IEC 61850 | | | | |
| | Type of IED | Similar to ABB REF615 HBFEAEAGNBA1BNA1XD | Similar to ABB REF615 HBFEAEAGNBA1BNA1XD | Similar to ABB REF615 HBFEAEAGNBA1BNA1XD | Similar to ABB REF615 HBFEAEAGNBA1BNA1XD | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Differential Protection | Solkor x 2 | No | No | No | |
| | Pilot wire Modem required Yes/No | No | No | No | No | |
| | Arc Protection | REA 101 | REA107 | REA107 | REA107 | |
| | Arc Protection system | Non Selective Tripping | | | | |
| | | | | | | |
| 1.13 | **Electrical Intertrip** | Remote Cable Differential Signal | No | No | No | |
| | | | | | | |
| | Driving unit: Breaker No.<br>Follower unit: Breaker No | Cable Differential Trip Signal | NA | NA | NA | |
| | | | | | | |
| | Where are VT fuses or links located? | | | On VT | | |
| | | | | | | |
| 1.14 | **Remote Switching** | Yes, via socket on panel face local and control LV panel | Yes, via socket on panel face local and control LV panel | Yes, via socket on panel face and local control LV panel | Yes, via socket on panel face and local control LV panel | |
| | | | | | | |
| 1.15 | **Tests** | | | | | |
| | | | | | | |
| | Routine test and type test of metering CTs required | Yes according to IEC 60044-1 | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Routine test and type test of protection CTs required | Yes according to IEC 60044-1 | | | | |
| | Routine Test and Type test of VTs required | | | Yes according to IEC 60044-2 | | |
| | Number of copies of routine test certificates required | Three | | | | |
| | | | | | | |
| 1.16 | **Marking/labeling/documentation** | | | | | |
| | | | | | | |
| | Are main circuit labels to be engraved? Yes/No | Yes | | | | |
| | | | | | | |
| | Documentation to be provided with the offer. | General Arrangement and details of equipment offered | | | | |
| | | | | | | |
| | Quantity of Operational and Maintenance manuals required: | Three copies | | | | |
| | | | | | | |
| 1.17 | **Accessories** | | | | | |
| | | | | | | |
| | Supply of cabinet required<br>Switchgear Operating Tools<br>Wall Mounted tool cabinet<br>CB service trolley | Yes<br>Yes<br>If Required | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No** | **8 & 15** | **9, 13 & 14** | **12 & 16** | **10** | |
| | Number of as-built drawings and O and M manuals required. | Three | | | | |
| | **Spares** | | | | | |
| | Period required for routine maintenance spares | 1 year | | | | |
| | Minimum availability of spares from date of supply | 10 years | | | | |
| | **Delivery** | | | | | |
| | Delivery period EXW in Weeks | | | | | |
| | Delivery period installation in weeks | | | | | |
| | Delivery period for commissioning in weeks | | | | | |

**Tenderer:** ……..
**Date:** ……..

**Witness 1:** …….
**Witness 2:** …….

**ANNEXURE 2**

**TECHNICAL DATA SHEET**
**To be completed by the Tenderer**

| GRAIN ELEVATOR SUBSTATION N0:1 (11KV) | | | | | | |
|---|---|---|---|---|---|---|
| Item | Description | | | | | |
| | **Panel No.** | | | | | |
| 1.1 | **General** | | | | | |
| | | | | | | |
| | Details of provisions for lifting/slinging | | | | | |
| | | | | | | |
| | Type of transporting device if not an integral device | | | | | |
| | | | | | | |
| 1.2 | **Circuit-breakers** | | | | | |
| | | | | | | |
| | Circuit-breaker type offered | | | | | |
| | | | | | | |
| | Rating of the closing device | | | | | |
| | a) rated control voltage V | | | | | |
| | b) rated current A | | | | | |
| | c) rated power kW | | | | | |
| | d) time lag fuses or MCCBs? | | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No.** | | | | | |
| | e) alternative methods of tripping if any | | | | | |
| | | | | | | |
| | Number of spare auxiliary contacts offered on circuit-breakers | | | | | |
| | | | | | | |
| 1.3 | **Safety Earthing** | | | | | |
| | | | | | | |
| | Details of earthing facilities offered | | | | | |
| | | | | | | |
| | Details of earthing busbars in bus-section and/or bus-coupler panels | | | | | |
| | | | | | | |
| 1.4 | **Cable termination compartments** | | | | | |
| | | | | | | |
| | Type of compartment offered | | | | | |
| | | | | | | |
| 1.5 | **Current transformers (CTs)** | | | | | |
| | | | | | | |
| | Current transformer specification offered | | | | | |
| | | | | | | |
| | Type of CT offered | | | | | |
| | | | | | | |
| | Are separate CTs used for indications? | | | | | |
| | | | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No.** | | | | | |
| | Is approval for connection of protection or indicating instruments to metering CTs required? Yes/No | | | | | |
| | | | | | | |
| 1.6 | **Voltage transformers (VTs)** | | | | | |
| | | | | | | |
| | Type of VTs offered | | | | | |
| | | | | | | |
| 1.7 | **Live circuit indication** | | | | | |
| | | | | | | |
| | Type of indication offered | | | | | |
| | | | | | | |
| | Voltage divider bushing details | | | | | |
| | - manufacturer | | | | | |
| | - type | | | | | |
| | - dielectric | | | | | |
| | - rating | | | | | |
| | | | | | | |
| 1.8 | **Battery, Battery Charger and dc supplies** | | | | | |
| | | | | | | |
| | Type of battery offered | | | | | |
| | Type of battery charger offered | | | | | |
| | | | | | | |
| | Battery load | | | | | |
| | Peak current from all switchgear A | | | | | |
| | Standby current A | | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No.** | | | | | |
| | | | | | | |
| 1.9 | **Protection relays and instruments** | | | | | |
| | | | | | | |
| | Details of protection equipment offered | | | | | |
| | | | | | | |
| 1.10 | **Terminals for auxiliary circuits** | | | | | |
| | | | | | | |
| | Type of test block offered | | | | | |
| | | | | | | |
| 1.11 | **Painting/Coating** | | | | | |
| | | | | | | |
| | Paint/coating system offered | | | | | |
| | | | | | | |
| 1.12 | **Tests** | | | | | |
| | | | | | | |
| | Summary of type test certificates available | | | | | |
| | | | | | | |
| | Test authority for type certificates | | | | | |
| | | | | | | |
| | Are any test certificates overseas products? | | | | | |
| | | | | | | |
| | If Yes, is the South African product identical? | | | | | |
| | | | | | | |

| Item | Description | | | | | |
|---|---|---|---|---|---|---|
| | **Panel No.** | | | | | |
| | How many units installed in South Africa? | | | | | |
| | | | | | | |
| 1.13 | **Accessories** | | | | | |
| | | | | | | |
| | Details of the accessories supplied | | | | | |
| | | | | | | |
| 1.14 | **Spares** | | | | | |
| | | | | | | |
| | Is a complete range of spares held in stock by the local representative? Yes/No | | | | | |
| | | | | | | |

**Tenderer:**……

**Date:** ……..

**Witness 1**: …….

**Witness 2**: ……

# ANNEXURE 3

## TEST REQUIREMENTS

### 1. TYPE TESTS

1.1 Type testing shall be carried out in accordance with the Recommendations, Standards, or Specifications referred to in this specification.

1.1.1 Type test certificates shall be submitted with tender documents.

### 2. ROUTINE TESTS

2.1 The following additional routine tests shall be carried out on the completed switchgear or control gear at the Manufacturers works prior to delivery.

2.2 The ratio, polarity and magnetism curve of each current transformer after their installation in the board.

2.3 The characteristic curves of each protection relay where applicable.

2.4 The ratio of each voltage transformer.

2.5 The errors of all indicating instruments.

### 3. FUNCTIONAL TESTS

3.1 A functional test of the complete board including all protective relays by primary injection shall be carried out by the manufacturer.

3.2 The breaker opening times shall be indicated in these tests.

### 4. GENERAL

4.1 Four copies of all approved routine test certificates shall be supplied, at a date not later than the delivery date of the switchgear or control gear.

4.2 All routine testing shall be witnesses and inspection carried out by the Engineer (Electrical) or his duly appointed representative.

## ANNEXURE 4

## STATEMENT OF COMPLIANCE
## (TO BE COMPLETED BY TENDERER)

This tender complies with specification TPD: 007-MVSWITCHSPEC in all respects.

SIGNATURE: _____ DATE: _____

This tender complies generally with specification TPD: 007-MVSWITCHSPEC but differs from it on the following points:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

SIGNATURE: _____ DATE: _____

**Transnet Port Terminals**

an Operating Division **TRANSNET SOC LTD**

[Registration Number 1990/000900/30]

# REQUEST FOR PROPOSAL (RFP)

## FOR THE: REFURBISHMENT OF THE GRAIN ELEVATOR SUBSTATIONS AT THE EAST LONDON MULTI PURPOSE TERMINAL FOR TRANSNET SOC LTD (REG NO. 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED AS "TPT") FOR THE DURATION OF 12 MONTHS

| | |
|---|---|
| **RFP NUMBER** | **: iCLM EL 725/TPT** |
| **ISSUE DATE** | **: 25 OCTOBER 2024** |
| **COMPULSORY BRIEFING** | **: 07 NOVEMBER 2024** |
| **CLOSING DATE** | **: 06 DECEMBER 2024** |
| **CLOSING TIME** | **: 12h00pm** |
| **TENDER VALIDITY PERIOD** | **: 12 weeks from closing date** |

# Contents

**Number Heading**

# 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]. It is estimated that tenderers must have a CIDB contractor grading designation of 7EP or higher class of construction work.

| | |
|---|---|
| **DESCRIPTION** | **The refurbishment of the grain elevator substations at the East London Multi Purpose Terminal for Transnet SOC Ltd (Reg no. 1990/000900/30) operating as Transnet Port Terminals (hereinafter referred as "TPT") for the duration of 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 East London, Combi Boardroom, 1 Hely Hutchison Road, Quigney on the 7th of November 2024.,** at **12:30pm** for a period of ± 3 (three) hours. [Tenderers to provide own transportation and accommodation].<br>The Compulsory Tender Clarification Meeting will start punctually and information will not be repeated for the benefit of Tenderers arriving late.<br>Contact person for directions: **Nowhi Hloma (Cell: 066 290 0474)**<br>**A Site visit to the Grain Elevator Substations will take place after the clarification meeting, tenderers are to note**:<br>• Tenderers are required to wear safety shoes, high visibility vests and hard hats.<br>• Tenderers without the recommended PPE will not be allowed on the site walk.<br>• Tenderers and their employees, visitors, clients and customers entering Transnet Offices, Depots, Workshops and Stores will have to undergo breathalyser testing.<br>• All forms of firearms are prohibited on Transnet properties and premises.<br>• 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 T2.2-01a** hereto must be completed and submitted with your Tender as proof of attendance is required for a **compulsory** site meeting and/or tender briefing.<br>**Tenderers are required to bring this Returnable Schedule T2.2-01a to the Compulsory Tender Clarification Meeting to be signed by the *Employer's* Representative.**<br>**Tenderers failing to attend the compulsory tender briefing will be disqualified.** |
| **CLOSING DATE** | **12:00pm on (06 December 2024)**<br>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 T2.2-18, [**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.

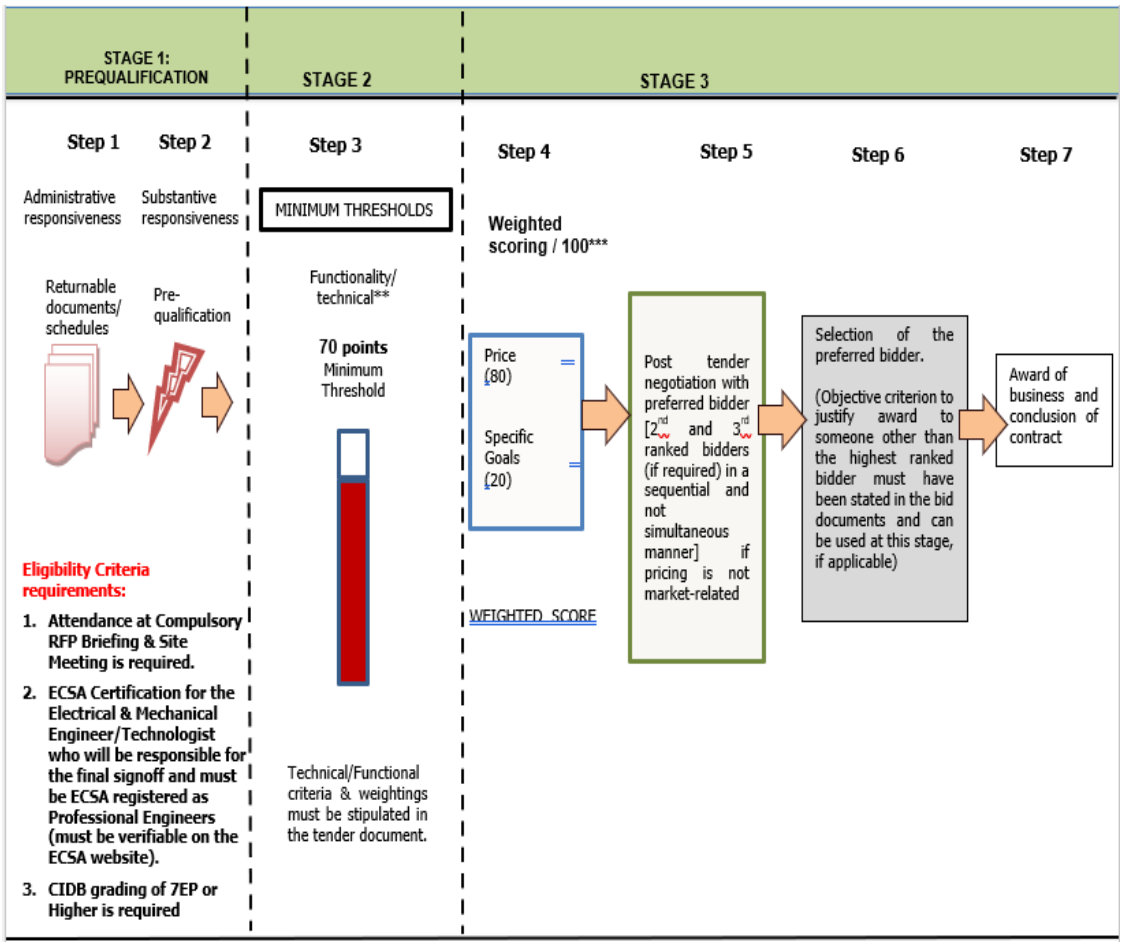
Each item of data given below is cross-referenced in the left-hand column to the clause in the Standard Conditions of Tender to which it mainly applies.

| Clause | | Data |
|---|---|---|
| C.1.1 | The *Employer* is | **Transnet SOC Ltd**<br>**(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<br>T1.2 Tender data |
| | Part T2 : Returnable documents | T2.1 List of returnable documents<br>T2.2 Returnable schedules |
| | **Part C: The contract** | |
| | Part C1: Agreements and contract data | C1.1 Form of offer and acceptance<br>C1.2 Contract data (Part 1 & 2)<br>C1.3 Form of Securities |
| | Part C2: Pricing data | C2.1 Pricing instructions<br>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: | Commodity Specialist |
| | Name: | Granville van der Merwe |
| | Address: | TPT Admin Building, Neptune Road, Port of Ngqura |
| | Tel No. | 041 – 507 8501 |
| | E – mail | granville.vandermerwe@transnet.net |

**Evaluation Methodology**

Transnet will utilise the following methodology and criteria in selecting a preferred Supplier, if so required:



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

**1. Stage One**

- **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 with regards to ECSA Certification:**

  ECSA Certification is required for the Electrical & Mechanical Engineer/Technologist who will be responsible for the final signoff and must be ECSA registered as Professional Engineers (must be verifiable on the ECSA website).

- **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 **7EP 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 7EP 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.***

**2. Stage Two - 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 70 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.***

**3. Stage Three – Weighted Scoring (Price & Specific Goals):**

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.

**Preferential Procurement points will be allocated as per the table below:**

**Preference Point System 80/20**

| **Specific Goals** | **Number of Points** | **Price** |
|---|---|---|
| B-BBEE Level 1&2 | 10 | |
| BO EMEs & QSE (51% BO) | 10 | |
| **Total** | **20** | **80** |

**Note:** Stage three also includes post tender negotiations, objective criteria and award of business

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 T2.2-01a 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:<br>▪ Name of Tenderer: (insert company name)<br>▪ Contact person and details: (insert details)<br>▪ The Tender Number: iCLM EL 725/TPT<br>▪ The Tender Description: The refurbishment of the grain elevator substations at the East London Multi-Purpose Terminal for Transnet SOC Ltd (Reg no. 1990/000900/30) operating as Transnet Port Terminals (hereinafter referred as "TPT") for the duration of 12 months<br><br>Documents must be marked for the attention of:<br>***Employer*'s Agent: Granville van der Merwe** |
| 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:<br>Time: **12:00pm** on the **06 December 2024**<br>Location: The Transnet e-Tender Submission Portal:<br>(https://transnetetenders.azurewebsites.net);<br>**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:<br>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**.<br>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;<br>3. Proof of CIDB in the correct designated grading;<br>4. Proof of registration on the Central Supplier Database;<br>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.<br><br>**Note:** Refer to Section T2.1 for List of Returnable Documents | |

C3.11 The minimum number of evaluation points for functionality is: **70**

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 |
|---|---|---|---|
| **T2.2-02 Project Schedule** | The Tenderer details the programme for evaluation and attaches it to this schedule. In addition, the Tenderer is to provide an electronic copy of the programme in Primavera or MS project format. The Tenderer's attention is drawn to core clause 31 of the NEC3 Engineering and Construction Contract regarding the items to be shown on a programme. | | **10** |
| | **Meet the required timeframes:**<br>Ability to provide the services in terms of the Employer's requirements within the required timeframe as stated in the Works Information and Tender Data by indicating, in a logical sequence, the order, the timing, and the duration of the works that will take place in order to Provide the Works.<br><br>**Score 0:** The tenderer has submitted no information or inadequate information to determine a score.<br>**Score 20:** The programme does not meet any of the required timeframes, key dates and sectional completion dates<br>**Score 40:** The programme does not meet all (less than 40%) of the required timeframes, key dates and sectional completion dates<br>**Score 60:** The programme does not meet all (more than 40%, but less than or equal | **8** | |

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| | to 60%) of the required timeframes, key dates and sectional completion dates<br>**Score 80:** The programme does meet all (more than 60%, but less than or equal to 99%) of the required timeframes, key dates and sectional completion dates<br>**Score 100:** The programme does meet All of the required timeframes, key dates and sectional completion dates | | |
| | **Programme Information:**<br><br>The Contractor clearly indicates in the schedule all milestones, activities & information related to the following: Float, Time Risk Allowances, Health and safety requirements, Procedures set out in this contract, Work by the Employer and Others, Access to a part of the site if later than its access date, Acceptances, Plant & Materials and other things to be provided by the employer, Information by Others, Starting date, access dates, Key Dates and Completion Date, Planned Completion for each Key Date for each option and the complete works, how each activity on the Activity Schedule relates to the operations on each programme.<br>**Score 0:** The tenderer has submitted no information or inadequate information to determine a score.<br>**Score 20:** The tenderer has addressed some but not all data requirements as listed in this returnable **(4 or less of 12 addressed)**<br>**Score 40:** The tenderer has addressed some but not all data requirements as listed in this returnable **(5 to 6 of 12 addressed)**<br>**Score 60:** The tenderer has addressed most but not all data requirements as listed in this returnable **(7 to 8 of 12addressed)**<br>**Score 80:** The tenderer has addressed most but not all data requirements as listed in this returnable **(9 to 10 of 12 addressed)**<br>**Score 100:** The tenderer has addressed all data requirements as listed in this returnable **(11 to 12 of 12 addressed)** | **2** | |

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| **T2.2-03 Quality Management** | The tenderers must sufficiently demonstrate the approach/methodology that will be employed to cover the scope of the project | | **10** |
| | Project Specific Quality Management Plan for the contract specifically produced for this scope of works as per STD-QAL-0001 project specification.<br>**Score 0%:** No PQP submitted.<br>**Score 20%:** PQP does not meet ISO 10005:2018 requirements nor covers the project scope<br>**Score 40%:** PQP covers the project scope and partially meets ISO 10005:2018 Project Quality Plan requirements<br>**Score 60%:** PQP meets ISO 10005:2018 requirements and covers the project scope<br>**Score 80%:** PQP is fully meets ISO 10005:2018 Project Quality Plan requirements.<br>**Score 100%:** PQP fully meets ISO 10005:2018 Project Quality Plan requirements and makes references all relevant QMS specifications and standards. | **2** | |
| | Project Specific Quality Data Book Index.<br>**Score 0%:** No Quality Data book index submitted<br>**Score 20%:** Quality Data book index is does not cover project scope<br>**Score 40%:** Quality Data book index is project specific but inadequate to cover project scope. Only one (1) discipline covered<br>**Score 60%:** Data book index shows adequate understanding of project quality requirements. Only two (2) disciplines covered<br>**Score 80%:** Data book index shows above average understanding of the project quality requirements. All disciplines covered.<br>**Score 100%:** The Data book index covers all disciplines including all relevant tests and certifications to be provided. | **2** | |
| | Procedures and Method statements to be used.<br>**Score 0%:** No list of QMS procedures and method statement (MS) submitted | **2** | |

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| | **Score 20%:** Index / list of QMS procedures and method statement is not project specific as per ISO 9001:2015/O.E.M. certification or equivalent<br>**Score 40%:** Index / list of QMS procedures and method statements is inadequate to cover project scope as per ISO 9001:2015/O.E.M. certification or equivalent. MS list covers Only one (1) discipline.<br>**Score 60%:** Index / list of QMS procedures and method statements partially covers project scope requirements as per ISO 9001:2015/O.E.M. certification or equivalent. MS list covers Only two (2) disciplines<br>**Score 80%:** Index / list of QMS procedures and method statements fully covers all project scope requirements as per ISO 9001:2015/O.E.M. certification or equivalent. MS list covers all disciplines<br>**Score 100%:** Index / list of procedures and method statements covers all project scope requirements as per ISO 9001:2015/O.E.M. certification or equivalent. MS list covers all disciplines as well as list relevant check sheets / forms. | | |
| | Order and timing of the audits, inspection and design milestones that will take place in order to provide the works.<br>**Score 0%:** No audit schedule submitted<br>**Score 20%:** Audit Schedule does not cover quality audit requirements of the project scope.<br>**Score 40%:** The Audit Schedule is inadequate to cover most of the quality audit (Not all disciplines and covered).<br>**Score 60%:** The Audit Schedule has adequate audits to cover most audit quality requirements for the project scope.<br>**Score 80%:** The Audit Schedule covers all the required audit requirements for the project scope. All clauses of ISO 9001 are covered. All disciplines covered<br>**Score 100%:** The Audit Schedule exceeds the required quality audit requirements of the scope. All clauses of ISO 9001 are covered. All disciplines covered | **2** | |

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| | Project specific Quality Control Plan (QCP).<br>**Score 0%:** No QCPs submitted<br>**Score 20%:** QCPs do not cover project scope.<br>**Score 40%:** QPCs are project specific but inadequate to cover project scope. Only one (1) discipline covered<br>**Score 60%:** QCP's shows adequate understanding of project quality requirements. Only two (2) disciplines covered<br>**Score 80%:** QPC's shows above average understanding of the project quality requirements, All disciplines covered.<br>**Score 100%:** QCP's covers all disciplines and intervention points with reference to standards, specifications, drawings, etc. | **2** | |
| **T2.2-04 Previous Experience** | Tenderers are required to demonstrate their past experience in the delivery of similar projects "of a minimum value of R8m per project" areas, conditions and circumstances in relation to the scope of work in the last 10 years, and to this end shall supply a sufficiently detailed reference list with contact details for tracing and verification of customers, indicate previous experience, and provide completion certificates. 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. | | **25** |
| | Electrical MV 70% and LV 30% infrastructure works.<br>**Score 0%:** The tenderer has submitted no information or inadequate information to determine a score.<br>**Score 20%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 1 similar projects.<br>**Score 40%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 2 similar projects.<br>**Score 60%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions | **12** | |

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| | and circumstances and has successfully completed more than 3 similar projects.<br>**Score 80%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 4 similar projects.<br>**Score 100%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 5 similar projects. | | |
| | Earthing and lightning protection 30%, and power systems modelling and simulation 70%<br>**Score 0%:** The tenderer has submitted no information or inadequate information to determine a score.<br>**Score 20%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 1 similar projects.<br>**Score 40%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 2 similar projects.<br>**Score 60%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 3 similar projects.<br>**Score 80%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 4 similar projects.<br>**Score 100%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 5 similar projects. | **8** | |
| | Automatic fire smoke detection and suppression system 50%, HVAC 50%<br>**Score 0%:** The tenderer has submitted no information or inadequate information to determine a score. | **5** | |

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| | **Score 20%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 1 similar projects.<br><br>**Score 40%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 2 similar projects.<br>**Score 60%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 3 similar projects.<br>**Score 80%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 4 similar projects.<br>**Score 100%:** The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances and has successfully completed more than 5 similar projects. | | |
| **T.2.2.05 Method Statement** | The Tenderer must submit a method statement which responds to the scope of work and outlines construction methodology including the relating but not limited to the programme, quality, health, safety, risk, environment, and an understanding of the project objectives.<br><br>**Electrical MV and LV infrastructure Installation Works (60%)**<br>**Power system modelling and simulation (20%)**<br>**Installation of automatic fire/smoke detection and suppression system, and HVAC (20%)** | | **20** |
| | Clearly articulated and based on the Works Information which includes the design, general arrangements of switchgear, power system study investigations and criteria. Approach to ensuring less disruption to operations.<br>**Score 0%:** The tenderer has submitted no information or inadequate information to determine a score | **8** | |

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| | **Score 20%:** The approach paper is not acceptable as it will not satisfy project objectives or requirements. The tenderer has misunderstood the scope of work and does not deal with the critical aspects of the project.<br>**Score 40%:** The technical approach and / or methodology is poor, not realistic, and practical and is therefore unlikely to satisfy project objectives or requirements. The tenderer has misunderstood certain aspects of the scope of work and does not deal with the critical aspects of the project.<br>**Score 60%:** The approach is generic and not tailored to address the specific project objectives and requirements. The approach does not adequately deal with the critical characteristics of the project. The approach to managing risk is too generic.<br>**Score 80%:** The approach is specifically tailored to address the specific project objectives and methodology and is sufficiently flexible to accommodate changes that may occur during execution. The approach to managing risk etc. is specifically tailored to the critical characteristics of the project.<br>**Score 100%:** Besides meeting the "80" rating, the important issues are approached in an innovative and efficient way, indicating that the tenderer has outstanding knowledge of state-of-the- art approaches.<br>The approach paper details ways to improve the project outcomes and the quality of the outputs. | | |
| | Demonstrates a clear understanding of the project objectives and the employer's specifications. Clear construction, and commissioning methodology. Outline the project specific requirements of the SHEQ requirements.<br>**Score 0%:** The tenderer has submitted no information or inadequate information to determine a score<br>**Score 20%:** The method statement is not acceptable as it will not satisfy project objectives or requirements. The tenderer has | **12** | |

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| | misunderstood the scope of work and does not deal with any aspects of the project.<br>**Score 40%:** The approach is generic and not tailored to address the specific project objectives and requirements. The approach does not adequately deal with the critical characteristics of the project. The approach to managing risk is too generic.<br>**Score 60%:** Satisfactory response/solution to the particular aspect of the requirement and evidence given that the stated employer's requirements will be met. Just complies with the employer's scope.<br>**Score 80%:** The approach is specifically tailored to address the specific project objectives and methodology and is sufficiently flexible to accommodate changes that may occur during execution. The approach to managing risk etc is specifically tailored to the critical characteristics of the project. Complies with the employer's scope.<br>**Score 100%:** Besides meeting the "80" rating, the important issues are approached in an innovative and efficient way, indicating that the tenderer has outstanding knowledge of state-of-the- art approaches. The method statement details ways to improve the project outcomes and the quality of the outputs. Above the employer's scope requirements. | | |
| **T.2.2-06 Management and CV's of Key Personnel** | The Tenderer must be able to demonstrate that the project personnel have sufficient knowledge, experience and qualifications to provide the required services | | **25** |
| | **Relevant Technical experience:**<br>**Management and Engineering= 100%**<br>10% Project Manager<br>30% Contract Manager<br>20% Protection Specialist<br>20% Mechanical Engineer<br>20% Installation Electrician<br>**Score 0%:** Failed to provide information or inadequate information provided to determine a score<br>**Score 20%:** Key staff do not have relevant levels of relevant experience.<br>Project Manager: ≥1< 3 years<br>Construction Manager: ≥1< 3 years | **7** | |

| | | | |
|---|---|---|---|
| | Protection Specialist: ≥1< 3 years<br>Mechanical Engineer: ≥1< 3 years<br>Installation Electrician: ≥1< 3 years<br>**Score 40%:** Key staff have limited levels of general experience<br>Project Manager: ≥ 3 < 5 years<br>Construction Manager: ≥ 3 < 5 years<br>Protection Specialist: ≥ 3 < 5 years<br>Mechanical Engineer: ≥ 3 < 5 years<br>Installation Electrician: ≥ 5 < 10 years<br>**Score 60%:** Key staff have reasonable levels of general experience<br>Project Manager: ≥ 5 < 8 years<br>Construction Manager: ≥ 5 < 8 years<br>Protection Specialist: ≥ 5 < 8 years<br>Mechanical Engineer: ≥ 5 < 8 years<br>Installation Electrician: ≥ 10 < 12 years<br>**Score 80%:** Key staff have extensive levels of general experience<br>Project Manager: ≥ 8 < 12 years<br>Construction Manager: ≥ 8 < 12 years<br>Protection Specialist: ≥ 8 < 12 years<br>Mechanical Engineer: ≥ 8 < 12 years<br>Installation Electrician: ≥ 12 < 15 years<br>**Score 100%:** Key staff have outstanding levels of general experience<br>Project Manager: ≥ 12 years<br>Construction Manager: ≥ 12 years<br>Protection Specialist: ≥ 12 years<br>Mechanical Engineer: ≥ 12 years<br>Installation Electrician: ≥ 15 years | | |
| | **Education, training and skills for the following:**<br>**Management and Engineering =100%**<br>10% Project Manager<br>30% Contract Manager<br>20% Protection Specialist<br>20% Mechanical Engineer<br>20% Installation Electrician<br>**Score 0%:** Failed to provide information or inadequate information provided to determine a score<br>**Score 20%:** Key staff does not have project specific education, skills, training and experience as indicated above.<br>Project Manager: ≥1< 3 years<br>Construction Manager: ≥1< 3 years | **8** | |

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|---|---|---|---|
| | Protection Specialist: ≥1< 3 years<br>Mechanical Engineer: ≥1< 3 years<br>Installation Electrician: ≥1< 3 years<br>**Score 40%:** Key staff have limited levels of project specific education, skills, training and experience.<br>Project Manager: ≥ 3 < 5 years<br>Construction Manager: ≥ 3 < 5 years<br>Protection Specialist: ≥ 3 < 5 years<br>Mechanical Engineer: ≥ 3 < 5 years<br>Installation Electrician: ≥ 5 < 10 years<br>**Score 60%:** Key staff have reasonable levels of project specific education, skills, training and experience<br>Project Manager: ≥ 5 < 8 years<br>Construction Manager: ≥ 5 < 8 years<br>Protection Specialist: ≥ 5 < 8 years<br>Mechanical Engineer: ≥ 5 < 8 years<br>Installation Electrician: ≥ 10 < 12 years<br>**Score 80%:** Key staff have extensive levels of project specific education, skills, training and experience<br>Project Manager: ≥ 8 < 12 years<br>Construction Manager: ≥ 8 < 12 years<br>Protection Specialist: ≥ 8 < 12 years<br>Mechanical Engineer: ≥ 8 < 12 years<br>Installation Electrician: ≥ 12 < 15 years<br>**Score 100%:** Key staff have outstanding levels of project specific education, skills, training and experience<br>Project Manager: ≥ 12 years<br>Construction Manager: ≥ 12 years<br>Protection Specialist: ≥ 12 years<br>Mechanical Engineer: ≥ 12 years<br>Installation Electrician: ≥ 15 years | | |
| | **Knowledge of issues pertinent to the project for the following:**<br>**Management and Engineering = 100%**<br>10% Project Manager<br>30% Contract Manager<br>20% Protection Specialist<br>20% Mechanical Engineer<br>20% Installation Electrician<br>**Score 0%:** Failed to provide information or inadequate information provided to determine a score | **10** | |

| | | | |
|---|---|---|---|
| | **Score 20%:** Key staff has no experience of issues pertinent to the project.<br>Project Manager: ≥1< 3 years<br>Construction Manager: ≥1< 3 years<br>Protection Specialist: ≥1< 3 years<br>Mechanical Engineer: ≥1< 3 years<br>Installation Electrician: ≥1< 3 years<br>**Score 40%:** Key staff have limited experience of issues pertinent to the project<br>Project Manager: ≥ 3 < 5 years<br>Construction Manager: ≥ 3 < 5 years<br>Protection Specialist: ≥ 3 < 5 years<br>Mechanical Engineer: ≥ 3 < 5 years<br>Installation Electrician: ≥ 5 < 10 years<br>**Score 60%:** Key staff have reasonable experience of issues pertinent to the project<br>Project Manager: ≥ 5 < 8 years<br>Construction Manager: ≥ 5 < 8 years<br>Protection Specialist: ≥ 5 < 8 years<br>Mechanical Engineer: ≥ 5 < 8 years<br>Installation Electrician: ≥ 10 < 12 years<br>**Score 80%:** Key staff have extensive experience of issues pertinent to the project<br>Project Manager: ≥ 8 < 12 years<br>Construction Manager: ≥ 8 < 12 years<br>Protection Specialist: ≥ 8 < 12 years<br>Mechanical Engineer: ≥ 8 < 12 years<br>Installation Electrician: ≥ 12 < 15 years<br>**Score 100%:** Key staff have outstanding experience of issues pertinent to the project<br>Project Manager: ≥ 12 years<br>Construction Manager: ≥ 12 years<br>Protection Specialist: ≥ 12 years<br>Mechanical Engineer: ≥ 12 years<br>Installation Electrician: ≥ 15 years | | |
| **T2.2-07 Health & Safety** | Contract specific health and safety plan addressing the requirements of TPT health and safety specification | | **10** |
| | **Health and Safety Company Policy:** signed by the accounting officer and dated (OHS Act, 16.2 appointee)<br>**Score 0%:** No information submitted for evaluation<br>**score 20%:** 1 of the 5 key policy components are recognized and meet the Employer's requirement. | **1** | |

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| | **Score 40%:** 2 of the 5 key policy components are recognized and meet the Employer's requirement.<br>**Score 60%:** 3 of the 5 key policy components are recognized and meet the Employer's requirements<br>**Score 80%:** 4 of the five key policy components are recognized and meets the Employer's requirements.<br>**Score 100%:** All 5 key policy components are recognized and meets the Employer's requirements | | |
| | **Roles & Responsibility:**<br>S16.2 Assistant CEO; CR 8.1 Construction Manager (Competent) and CR 8.5 Safety officer (SACPCMP Registered); Risk Assessor; First Aider (trained level 1)<br>**Score 0%:** No information submitted for evaluation<br>**Score 20%:** Roles and responsibilities do not meet the Occupational health and safety Act as per construction regulations and TPT health and safety specification.<br>**Score 40%:** Roles and responsibilities are unlikely to ensure compliance as per the Works information and not in line with OHS Act and TPT health and safety specification.<br>**Score 60%:** Satisfactory response on roles and responsibilities as per Employer's requirements.<br>**Score 80%:** Roles and responsibilities are likely to ensure compliance as per Works Information, OHS Act and TPT health and safety specification.<br>**Score 100%:** Roles and Responsibilities most likely to ensure compliance as per requirements of OHS Act and TPT Health and Safety Management Specification and CV and proof of professional registration with SACPCMP submitted. | **2** | |
| | **Training matrix:**<br>List of key responsible persons (job categories) for the project and health and safety competencies required per category<br>**Score 0%:** No information submitted for evaluation | **1** | |

| | | | |
|---|---|---|---|
| | **Score 20%:** Key responsible persons are not included on training matrix as per proposed organogram structure.<br>**Score 40%:** Not all key responsible persons are included in the training matrix. Trainings matrix submitted does not cover all SHE training listed on Health and Safety specification. Training matrix not signed by responsible personnel<br>**Score 60%:** Satisfactory response on the list of job categories and trainings as per proposed project organogram structure. Training matrix covers most of the trainings listed on TPT Health and safety specification.<br>**Score 80%:** Most of key persons listed on the training matrix as per proposed project organogram structure. Trainings specified on the matrix are in line with TPT health and safety specification.<br>**Score 100%:** Training matrix include Management and all employees /personnel in the project. Responsible personnel had signed training matrix. | | |
| | **Overview of the baseline:**<br>Overview of the tenderer's Risk Assessment methodology, and submission of project specific risk assessments indicating major activities of the project to be undertaken.<br>**Score 0%:** No information submitted for evaluation<br>**Score 20%:** Information supplied is very insignificant/inadequate to achieve the required standard of service.<br>**Score 40%:** Poor response/answer/solution lacks convincing evidence, medium risk that stated Employer's requirements will not be met.<br>**Score 60%:** Satisfactory response/answer/solution to the particular aspect of the requirement, evidence given that the stated Employer's requirements will be met.<br>**Score 80%:** Good response/answer/solution which demonstrates real understanding and evidence of ability to meet stated Employer's requirements. | **2** | |

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| | **Score 100%:** Very good response/answer/solution gives real confidence that the tenderer is most likely to ensure compliance with stated Employer's requirements | | |
| | **Two years synopsis:**<br>SHE incidents, description, type and action taken to prevent re-occurrence<br>**Score 0%:** No information submitted for evaluation<br>**Score 20%:** Information supplied is very insignificant/inadequate to achieve the required standard of service.<br>**Score 40%:** Poor response/answer/solution lacks convincing evidence, medium risk that stated Employer's requirements will not be met.<br>**Score 60%:** Satisfactory response/answer/solution to the particular aspect of the requirement, evidence given that the stated Employer's requirements will be met.<br>**Score 80%:** Good response/answer/solution which demonstrates real understanding and evidence of ability to meet stated Employer's requirements.<br>**Score 100%:** Very good response/answer/solution gives real confidence that the tenderer is most likely to ensure compliance with stated Employer's requirements | **1** | |
| | **Cost Breakdown Sheet:**<br>Submission of completed cost breakdown sheet<br>**Score 0%:** No information submitted for evaluation<br>**Score 20%:** Health and safety Budget submitted is very insignificant/inadequate to achieve the required standard of service, 0 to 1% allocated.<br>**Score 40%:** Health and safety Budget submitted is insignificant/inadequate /answer/solution to the returnable, Employer's health and safety requirements will not be met, 1.1 – 2% allocated. | **1** | |

| | | | |
|---|---|---|---|
| | **Score 60%:** Health and safety Budget submitted is Satisfactory response/answer/solution to the returnable, Employer's health and safety requirements will be met, 2.1 – 3% allocated<br>**Score 80%:** Health and safety Budget submitted is good response/answer/solution to the returnable, Employer's health and safety requirements will be met, 3% - above allocated.<br>**Score 100%:** Health and safety Budget submitted is Very good response/answer/solution to the returnable, Employer's health and safety requirements will be met, 4% - above allocated. | | |
| | **Safety Questionnaire:**<br>Complete and return with tender documentation the required supporting documentation included as an Annexure.<br>**Score 0%:** No information submitted for evaluation<br>**Score 20%:** Information supplied is very insignificant/inadequate to achieve the required standard of service.<br>**Score 40%:** Poor response/answer/solution lacks convincing evidence, medium risk that stated Employer's requirements will not be met.<br>**Score 60%:** Satisfactory response/answer/solution to the particular aspect of the requirement, evidence given that the stated Employer's requirements will be met.<br>**Score 80%:** Good response/answer/solution which demonstrates real understanding and evidence of ability to meet stated Employer's requirements.<br>**Score 100%:** Very good response/answer/solution gives real confidence that the tenderer is most likely to ensure compliance with stated Employer's requirements | **2** | |
| | | **Total Weighting** | **100** |
| **Minimum qualifying score required = 70%** | | | |

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

- T2.2-02 Project Schedule
- T2.2-03 Quality Management
- T2.2-04 Previous Experience
- T2.2-05 Method Statement
- T2.2-06 Management and CV's of Key Personnel
- T2.2-07 Health & Safety

Each evaluation criteria will be assessed in terms of scores of 0, 20, 40, 60, 80 or 100

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).

**STAATSKOERANT, 8 AUGUSTUS 2019**

**DEPARTMENT OF PUBLIC WORKS**

**NOTICE 423 OF 2019**

**STANDARD FOR UNIFORMITY IN ENGINEERING AND CONSTRUCTION WORKS CONTRACTS**

**AUGUST 2019**

# Annex C

# Standard Conditions of Tender

## C.1 General

### C.1.1 Actions

C.1.1.1 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 C.2 and C.3, timeously and with integrity, and behave equitably, honestly and transparently, comply with all legal obligations and not engage in anticompetitive practices.

C.1.1.2 The employer and the tenderer and all their agents and employees involved in the tender Process shall avoid conflicts of interest and where a conflict of interest is perceived or known, declare any such conflict of interest, indicating the nature of such conflict. Tenderers shall declare any potential conflict of interest in their tender submissions. Employees, agents and advisors of the employer shall declare any conflict of interest to whoever is responsible for overseeing the procurement process at the start of any deliberations relating to the procurement process or as soon as they become aware of such conflict and abstain from any decisions where such conflict exists or recuse themselves from the procurement process, as appropriate.

*Note: 1) A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of that person to act properly in his*

*or her position even if no improper acts result.*

*2) Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation, allegiance or loyalty which would in any way affect any decisions taken.*

C.1.1.3 The employer shall not seek and a tenderer shall not submit a tender without having a firm intention and the capacity to proceed with the contract.

**C.1.2 Tender Documents**

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

**C.1.3 Interpretation**

C.1.3.1 The tender data and additional requirements contained in the tender schedules that are Included in the returnable documents are deemed to be part of these conditions of tender.

C.1.3.2 These conditions of tender, the tender data and tender schedules which are required for Tender evaluation purposes, shall form part of any contract arising from the invitation to tender.

C.1.3.3 For the purposes of these conditions of tender, the following definitions apply:

a) **conflict of interest** means any situation in which:

i) someone in a position of trust has competing professional or personal interests which make it difficult to fulfill his or her duties impartially;

ii) an individual or tenderer is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit; or

iii) incompatibility or contradictory interests exist between an employee and the tenderer who employs that employee.

b) **comparative offer** means the price after the factors of a non-firm price and all unconditional discounts it can be utilised to have been taken into consideration;

c) **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;

d) **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;

**C.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 readily read, copied and recorded. Communications 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.

**C.1.5 Cancellation and Re-Invitation of Tenders**

C.1.5.1 An employer may, prior to the award of the tender, cancel a tender if

a) due to changed circumstances, there is no longer a need for the engineering and construction works specified in the invitation;

b) funds are no longer available to cover the total envisaged expenditure; or

c) no acceptable tenders are received.

d) there is a material irregularity in the tender process.

C.1.5.2 The decision to cancel a tender invitation must be published in the same manner in which the original tender invitation was advertised

C.1.5.3 An employer may only with the prior approval of the relevant treasury cancel a tender Invitation for the second time.

**C.1.6 Procurement procedures**

**C.1.6.1 General**

Unless otherwise stated in the tender data, a contract will, subject to C.3.13, be concluded with the tenderer who in terms of C.3.11 is the highest ranked or the tenderer scoring the highest number of tender evaluation points, as relevant, based on the tender submissions that are received at the closing time for tenders.

**C.1.6.2 Competitive negotiation procedure**

C.1.6.2.1 Where the tender data require that the competitive negotiation procedure is to be followed, tenderers shall submit tender offers in response to the proposed contract in the first round of submissions. Notwithstanding the requirements of C.3.4, the employer shall announce only the names of the tenderers who make a submission. The requirements of C.8 relating to the material deviations or qualifications which affect the competitive position of tenderers shall not apply.

C.1.6.2.2 All responsive tenderers or at least a minimum of not less than three responsive tenderers that are highest ranked in terms of the evaluation criteria stated in the tender data shall be invited to enter into competitive negotiations based on the principle of equal treatment, keeping confidential the proposed solutions and associated information.

Notwithstanding the provisions of C.2.17, the employer may request that tenders be clarified, Specified and fine-tuned in order to improve a tenderer's competitive position provided that such clarification, specification, fine-tuning or additional information does not alter any

fundamental aspects of the offers or impose substantial new requirements which restrict or distort competition or have a discriminatory effect.

C.1.6.2.3 At the conclusion of each round of negotiations, tenderers shall be invited by the employer to revise their tender offer based on the same evaluation criteria, with or without adjusted weightings. Tenderers shall be advised when they are to submit their best and final offer.

C.1.6.2.4 The contract shall be awarded in accordance with the provisions of C.3.11 and C.3.13 after tenderers have been requested to submit their best and final offer.

### C.1.6.3 Proposal procedure using the two stage-system

#### C.1.6.3.1 Option 1

Tenderers shall in the first stage submit technical proposals and, if required, cost parameters around which a contract may be negotiated. The employer shall evaluate each responsive submission in terms of the method of evaluation stated in the tender data, and in the second stage negotiate a contract with the tenderer scoring the highest number of evaluation points and award the contract in terms of these conditions of tender.

#### C.1.6.3.2 Option 2

C.1.6.3.2.1 Tenderers shall submit in the first stage only technical proposals. The employer shall invite all responsive tenderers to submit tender offers in the second stage, following the issuing of procurement documents.

C.1.6.3.2.2 The employer shall evaluate tenders received during the second stage in terms of the method of evaluation stated in the tender data, and award the contract in terms of these conditions of tender.

## C.2 Tenderer's obligations

### C.2.1 Eligibility

C.2.1.1 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.

C.2.1.2 Notify the employer of any proposed material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used by the employer as the basis in a prior process to invite the tenderer to submit a tender offer and obtain the employer's written approval to do so prior to the closing time for tenders.

### C.2.2 Cost of tendering

C.2.2.1 Accept that, unless otherwise stated in the tender data, 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 complies with requirements.

C.2.2.2 The cost of the tender documents charged by the employer shall be limited to the actual cost incurred by the employer for printing the documents. Employers must attempt to make available the tender documents on its website so as not to incur any costs pertaining to the printing of the tender documents.

### C.2.3 Check documents

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

### C.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.

### C.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.

### C.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.

### C.2.7 Clarification meeting

Attend, where required, a clarification meeting 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.

### C.2.8 Seek clarification

Request clarification of the tender documents, if necessary, by notifying the employer at least five (5) working days before the closing time stated in the tender data.

### C.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.

### C.2.10 Pricing the tender offer

C.2.10.1 Include in the rates, prices, and the tendered total of the prices (if any) all duties, taxes Except Value Added Tax (VAT), and other levies payable by the successful tenderer, such duties, taxes and levies being those applicable fourteen (14) days before the closing time stated in the tender data.

C.2.10.2 Show VAT payable by the employer separately as an addition to the tendered total of the prices.

C.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.

C.2.10.4 State the rates and prices in Rand unless instructed otherwise in the tender data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

### C.2.11 Alterations to documents

Do 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.

### C.2.12 Alternative tender offers

C.2.12.1 Unless otherwise stated in the tender data, submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted as well as a schedule that compares the requirements of the tender documents with the alternative requirements that are proposed.

C.2.12.2 Accept that an alternative tender offer must be based only on the criteria stated in the tender data or criteria otherwise acceptable to the employer.

C.2.12.3 An alternative tender offer must only be considered if the main tender offer is the winning tender.

### C.2.13 Submitting a tender offer

C.2.13.1 Submit one tender offer only, either as a single tendering entity or as a member in a joint venture to provide the whole of the works identified in the contract data and described in the scope of works, unless stated otherwise in the tender data.

C.2.13.2 Return all returnable documents to the employer after completing them in their entirety, either electronically (if they were issued in electronic format) or by writing legibly in non-erasable ink.

C.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.

C.2.13.4 Sign the original and all copies of the tender offer where required in terms of the tender data. The employer will hold all authorized signatories liable on behalf of the tenderer. Signatories for tenderers proposing to contract as joint ventures shall state which of the signatories is the lead partner whom the employer shall hold liable for the purpose of the tender offer.

C.2.13.5 Seal the original and each copy of the tender offer as separate packages marking the Packages as "ORIGINAL" and "COPY". Each package shall state on the outside the employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

C.2.13.6 Where a two-envelope system is required in terms of the tender data, place and seal the returnable documents listed in the tender data in an envelope marked "financial proposal" and place the remaining returnable documents in an envelope marked "technical proposal". Each envelope shall state on the outside the employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

C.2.13.7 Seal the original tender offer and copy packages together in an outer package that states on the outside only the employer's address and identification details as stated in the tender data.

C.2.13.8 Accept that the employer will not assume any responsibility for the misplacement or premature opening of the tender offer if the outer package is not sealed and marked as stated.

C.2.13.9 Accept that tender offers submitted by facsimile or e-mail will be rejected by the employer, unless stated otherwise in the tender data.

**C.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 form required, may be regarded by the employer as non-responsive.

**C.2.15 Closing time**

C.2.15.1 Ensure that the employer receives the tender offer at the address specified in the tender data not later than the closing time stated in the tender data. Accept that proof of posting shall not be accepted as proof of delivery.

C.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.

**C.2.16 Tender offer validity**

C.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.

C.2.16.2 If requested by the employer, consider extending the validity period stated in the tender data for an agreed additional period with or without any conditions attached to such extension.

C.2.16.3 Accept that a tender submission that has been submitted to the employer may only be withdrawn or substituted by giving the employer's agent written notice before the closing time for tenders that a tender is to be withdrawn or substituted. If the validity period stated in C.2.16 lapses before the employer evaluating tender, the contractor reserves the right to review the price based on Consumer Price Index (CPI).

C.2.16.4 Where a tender submission is to be substituted, a tenderer must submit a substitute tender in accordance with the requirements of C.2.13 with the packages clearly marked as "SUBSTITUTE".

**C.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 of tenderers or substance of the tender offer is sought, offered, or permitted.

***Note:*** *Sub-clause C.2.17 does not preclude the negotiation of the final terms of the contract with a preferred tenderer following a competitive selection process, should the Employer elect to do so.*

**C.2.18 Provide other material**

C.2.18.1 Provide, on request by the employer, any other material that has a bearing on the tender offer, the tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment. Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the tender offer as non-responsive.

C.2.18.2 Dispose of samples of materials provided for evaluation by the employer, where required.

**C.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.

**C.2.20 Submit securities, bonds and policies**

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.

**C.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.

**C.2.22 Return of other tender documents**

If so instructed by the employer, return all retained tender documents within twenty-eight (28) days after the expiry of the validity period stated in the tender data.

**C.2.23 Certificates**

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

**C.3 The employer's undertakings**

**C.3.1 Respond to requests from the tenderer**

C.3.1.1 Unless otherwise stated in the tender Data, respond to a request for clarification received up To five (5) working days before the tender closing time stated in the Tender Data and notify all tenderers who collected tender documents.

C.3.1.2 Consider any request to make a material change in the capabilities or formation of the Tendering entity (or both) or any other criteria which formed part of the qualifying requirements used to prequalify a tenderer to submit a tender offer in terms of a previous procurement process and deny any such request if as a consequence:

a) an individual firm, or a joint venture as a whole, or any individual member of the joint venture fails to meet any of the collective or individual qualifying requirements;
b) the new partners to a joint venture were not prequalified in the first instance, either as

individual firms or as another joint venture; or

c) in the opinion of the Employer, acceptance of the material change would compromise the outcome of the prequalification process.

**C.3.2 Issue Addenda**

If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until three (3) working 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 collected tender documents.

**C.3.3 Return late tender offers**

Return tender offers received after the closing time stated in the Tender Data, unopened, (unless it is necessary to open a tender submission to obtain a forwarding address), to the tenderer concerned.

**C.3.4 Opening of tender submissions**

C.3.4.1 Unless the two-envelope system is to be followed, open valid tender submissions in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data. Tender submissions for which acceptable reasons for withdrawal have been submitted will not be opened.

C.3.4.2 Announce at the meeting held immediately after the opening of tender submissions, at a venue indicated in the tender data, the name of each tenderer whose tender offer is opened and, where applicable, the total of his prices, number of points claimed for its BBBEE status level and time for completion for the main tender offer only.

C.3.4.3 Make available the record outlined in C.3.4.2 to all interested persons upon request.

**C.3.5 Two-envelope system**

C.3.5.1 Where stated in the tender data that a two-envelope system is to be followed, open only the technical proposal of valid tenders in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data and announce the name of each tenderer whose technical proposal is opened.

C.3.5.2 Evaluate functionality of the technical proposals offered by tenderers, then advise tenderers who remain in contention for the award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of tenderers, who score in the functionality evaluation more than the minimum number of points for functionality stated in the tender data, and announce the score obtained for the technical proposals and

the total price and any points claimed on BBBEE status level. Return unopened financial proposals to tenderers whose technical proposals failed to achieve the minimum number of points for functionality.

**C.3.6 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.

**C.3.7 Grounds for rejection and disqualification**

Determine whether there has been any effort by a tenderer to influence the processing of tender offers and instantly disqualify a tenderer (and his tender offer) if it is established that he engaged in corrupt or fraudulent practices.

**C.3.8 Test for responsiveness**

C.3.8.1 Determine, after opening and before detailed evaluation, whether each tender offer properly received:

a) complies with the requirements of these Conditions of Tender,

b) has been properly and fully completed and signed, and

c) is responsive to the other requirements of the tender documents.

C.3.8.2 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) significantly 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. 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.

**C.3.9 Arithmetical errors, omissions and discrepancies**

C.3.9.1 Check responsive tenders for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern.

C.3.9.2 Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers in accordance with C.3.11 for:

a) the gross misplacement of the decimal point in any unit rate;

b) omissions made in completing the pricing schedule or bills of quantities; or

c) arithmetic errors in:

(i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or

(ii) the summation of the prices.

C.3.9.3 Notify the tenderer of all errors or omissions that are identified in the tender offer and either confirm the tender offer as tendered or accept the corrected total of prices.

C.3.9.4 Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:

a) If bills of quantities or pricing schedules 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.

b) 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.

**C.3.10 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.

**C.3.11 Evaluation of tender offers**

The Standard Conditions of Tender standardize the procurement processes, methods and procedures from the time that tenders are invited to the time that a contract is awarded. They are generic in nature and are made project specific through choices that are made in developing the Tender Data associated with a specific project. Conditions of tender are by definition the document that establishes a tenderer's obligations in submitting a tender and the employer's undertakings in soliciting and evaluating tender offers. Such conditions establish the rules from the time a tender is advertised to the time that a contract is awarded and require employers to conduct the process of offer and acceptance in terms of a set of standard procedures.

**The CIDB Standard Conditions of Tender are based on a procurement system that satisfies the following system requirements:**

**Requirement Qualitative interpretation of goal**

Fair The process of offer and acceptance is conducted impartially without bias, providing simultaneous and timely access to participating parties to the same information.

Equitable Terms and conditions for performing the work do not unfairly prejudice the interests of the parties.

Transparent The only grounds for not awarding a contract to a tenderer who satisfies all requirements are restrictions from doing business with the employer, lack of capability or capacity, legal impediments and conflicts of interest.

Competitive The system provides for appropriate levels of competition to ensure cost effective and best value outcomes.

Cost effective The processes, procedures and methods are standardized with sufficient flexibility to attain best value outcomes in respect of quality, timing and price, and least resources to effectively manage and control procurement processes.

**The activities associated with evaluating tender offers are as follows:**

a) Open and record tender offers received
b) Determine whether or not tender offers are complete
c) Determine whether or not tender offers are responsive
d) Evaluate tender offers
e) Determine if there are any grounds for disqualification
f) Determine acceptability of preferred tenderer
g) Prepare a tender evaluation report
h) Confirm the recommendation contained in the tender evaluation report

**C.3.11.1 General**

The employer must appoint an evaluation panel of not less than three persons conversant with the proposed scope of works to evaluate each responsive tender offer using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data.

### C.3.12 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.

### C.3.13 Acceptance of tender offer

Accept the tender offer; if in the opinion of the employer, it does not present any risk and only if 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 No. 2008, bankrupt or being wound up, has his/her affairs administered by a court or a judicial officer, has suspended his/her 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 opinion of the employer, to perform the contract free of conflicts of interest.

### C.3.14 Prepare contract documents

C.3.14.1 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:

a) addenda issued during the tender period,

b) inclusion of some of the returnable documents and

c) other revisions agreed between the employer and the successful tenderer.

C.3.14.2 Complete the schedule of deviations attached to the form of offer and acceptance, if any.

### C.3.15 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.

### C.3.16 Registration of the award

An employer must, within twenty-one (21) working days from the date on which a contractor's offer to perform a construction works contract is accepted in writing by the employer, register and publish the award on the cidb Register of Projects.

### C.3.17 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.

### C.3.18 Provide written reasons for actions taken

Provide upon request written reasons to tenderers for any action that is taken in applying these conditions of tender but withhold information which is not in the public interest to be divulged, which is considered to prejudice the legitimate commercial interests of tenderers or might prejudice fair competition between tenderers.

# T2.1 List of Returnable Documents

## 2.1.1 These schedules are required for pre-qualification and eligibility purposes:

T2.2-01a **Stage One as per CIDB: Eligibility Criteria Schedule -** Certificate of attendance at Compulsory Tender Clarification Meeting

T2.2-01b **Stage One as per CIDB: Eligibility Criteria Schedule -** ECSA Certification

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

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

T2.2-02 **Evaluation Schedule:** Project Schedule/Programme

T2.2-03 **Evaluation Schedule:** Quality Management

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

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

T2.2-06 **Evaluation Schedule:** Management and CV's of Key Personnel

T2.2-07 **Evaluation Schedule:** Health & Safety

**Stage Three (Step 4): these schedules will be utilised for Specific Goals:**

Valid proof of Respondent's compliance to Specific Goals evidence (Preference Claim Form) requirements stipulated in SBD6.1. (Refer to T2.2-15)

## 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 Details of Plant Offered

T2.2-13 Schedule of proposed Subcontractors

T2.2-14 Site Establishment requirements

**Agreement and Commitment by Tenderer:**

T2.2-15 CIDB SFU ANNEX G Compulsory Enterprise Questionnaire

T2.2-16 Non-Disclosure Agreement

T2.2-17 RFP Declaration Form

T2.2-18 RFP – Breach of Law

T2.2-19 Certificate of Acquaintance with Tender Document

T2.2-20 Service Provider Integrity Pact

T2.2-21 Supplier Code of Conduct

**Bonds/Guarantees/Financial/Insurance:**

T2.2-22 Insurance provided by the Contractor

T2.2-23 Form of Intent to provide a Performance Guarantee

T2.2-24 Three (3) years audited financial statements

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

## 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

# T2.2-01a: 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: | Port of East London, Combi Boardroom, 1 Hely Hutchison Road, Quigney, East London | |
| On (date) | 07 November 2024 | Starting time: 12h30 |

**Particulars of person(s) attending the meeting:**

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

Capacity .....

**Attendance of the above company at the meeting was confirmed:**

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

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

Date .....

# T2.2-01b: Eligibility Criteria Schedule - ECSA Certification

Tenderers are to indicate their compliance in terms of **ECSA Certification** by filling in the table below.

**Attach a copy of the ECSA Certificate as a ECSA registered Professional Engineer.**

| Failure to comply with eligibility criteria i.e., a **"No" answer** or **"No" response** will lead to disqualification. | | | |
|---|---|---|---|
| **Eligibility Criteria:** | | **Comply (Yes/No)** | **Evidence Provided (Yes/No)** |
| 1. | The Tenderer to provide **ECSA Certification** for the **Electrical Engineer/Technologist** who will be responsible for the final signoff and must be ECSA registered as a Professional Engineer (must be verifiable on the ECSA website). | | |
| 2. | The Tenderer to provide **ECSA Certification** for the **Mechanical Engineer/Technologist** who will be responsible for the final signoff and must be ECSA registered as a Professional Engineers (must be verifiable on the ECSA website). | | |

Signed _____ Date _____

Name _____ Position _____

Tenderer _____

# T2.2-01c: Eligibility Criteria Schedule - CIDB Grading Designation

**Note to tenderers:**

Tenderers are to indicate their CIDB Grading by filling in the table below. **Attach a copy of the CIDB Grading Designation or evidence of being capable of being so registered.**

| CRS Number | Status | Grading | Expiry Date |
|---|---|---|---|
| | | | |

**1.** 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, for a **7EP or Higher** class of construction work, are eligible to have their tenders evaluated.

**2. 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 one level below the required grading designation in the 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 **7EP 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
4. the Contractor shall provide the employer with a certified copy of its signed joint venture agreement;
5. and in the event that the joint venture is an 'Incorporated Joint Venture' the Memorandum of Incorporation to be provided within 4 (four) weeks of the Contract Date.

# T2.2-02: Evaluation Schedule: Project Schedule/Programme

**Note to tenderers:**

**Programme**

**The Tenderer details the programme for evaluation and attaches it to this schedule. In addition, the Tenderer is to provide a hard copy of the programme in Primavera or MS project format.**

The Tenderer's attention is drawn to core clause 31 of the NEC3 Engineering and Construction Contract regarding the items to be shown on a programme.

The Programme should indicate the following columns as a bare minimum:

| Task ID | Task description | Start date | Finish date | Successor | Resources & Equipment | Time risk allowances (TRA) |
|---|---|---|---|---|---|---|
| | | | | | | |

The tenderer shall provide the proposed programme, at a minimum **Level 3** showing but not limited to the following:

- **Meet the required timeframes:**
  Ability to provide the services in terms of the *Employer*'s requirements within the required timeframe as stated in the Works Information and Tender Data by indicating, in a logical sequence, the order, the timing, and the duration of the works that will take place in order to Provide the Works. The Programme must clearly support and demonstrate alignment to the approach paper/Method statement as contained under T.2.2-05.

- **Programme Information:**
  The Tenderer clearly indicates in the schedule all milestones, activities & information related to the following –
  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 if 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

The scoring of the Programme will be as follows:

| | **Meet the required timeframes (8)** | **Programme Information (2)** |
|---|---|---|
| **Score 0%** | The tenderer has submitted no information or inadequate information to determine a score. | The tenderer has submitted no information or inadequate information to determine a score. |
| **Score 20%** | The programme does not meet any of the required timeframes, key dates and completion dates | The tenderer has addressed some but not all data requirements as listed in this returnable **(4 or less of 12 addressed)** |
| **Score 40%** | The programme does not meet all **(less than 40%)** of the required timeframes, key dates and completion dates | The tenderer has addressed some but not all data requirements as listed in this returnable **(5 to 6 of 12 addressed)** |
| **Score 60%** | The programme does not meet all **(more than 40%, but less than or equal to 60%)** of the required timeframes, key dates and completion dates | The tenderer has addressed most but not all data requirements as listed in this returnable **(7 to 8 of 12 addressed)** |
| **Score 80%** | The programme does meet all **(more than 60%, but less than or equal to 99%)** of the required timeframes, key dates and completion dates | The tenderer has addressed most but not all data requirements as listed in this returnable **(9 to 10 of 12 addressed)** |
| **Score 100%** | The programme does meet **All** of the required timeframes, key dates and completion dates. | The tenderer has addressed all data requirements as listed in this returnable **(11 to 12 of 12 addressed)** |

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

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

Tenderer .....

# T2.2-03: Evaluation Schedule – Quality Management

The tenderer is to note that if successful, and awarded the contract, shall execute, and complete the contract as per the **STD-QAL-0001** Quality Management Specification for Supplier/Construction.

The tenderer shall as a minimum submit the following:

- Project Quality Plan which satisfies the technical and quality requirements of the *works*, identifying all procedures, reviews, audits, controls, and records used to control and verify compliance with the Works Information.
- Project specific Quality data book index (index/list of procedures and method statements to be used during the contract).
- Qualifications and experience of quality personnel. Attach minimum qualifications as listed below:
- Index/List of procedures and method statements to be used during the contract.
- Quality Control Plans Specific to the Works Information not limited to the following.
    - These Q.C.P's shall identify all inspections, tests and verification requirements to meet Contractual obligations, specifications and related details including destructive and non-destructive testing, witnessing and hold points.
- A Guarantee period on the Switchgear of not less than five years on corrosion protection is required.
- Guarantee period on the Substation of not less than one year on workmanship is required.

| Item | Guarantee and Warrantee period | Description of Guarantee |
|---|---|---|
| | | |
| | | |

- A signed Quality Policy based on International Organisation for Standardisation (ISO 9001:2015) that displays the five key policy requirements. These requirements include:
    1. Is appropriate to the purpose of the organisation,
    2. Includes a commitment to comply with requirements and continually improve the effectiveness of the quality management system,
    3. Provides a framework for establishing and reviewing quality objectives,
    4. Is communicated and understood within the organisation, and
    5. Is reviewed for continuing suitability.

**Attached submissions to this schedule:**

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The scoring of the Quality Management will be as follows:

| | **Project Specific Quality Management Plan for the contract** | **Project Specific Quality Data Book Index** | **Procedures and Method statements to be used** | **Order and timing of the audits, inspection and design milestones that will take place to provide the works.** | **Project specific Quality Control Plan** |
|---|---|---|---|---|---|
| **Points** | **2** | **2** | **2** | **2** | **2** |
| **0** | No PQP submitted. | No Quality Data Book Index submitted | No list of QMS procedures and method statement (MS) submitted | No audit schedule submitted | No QCPs submitted. |
| **20** | PQP does not meet ISO 10005:2018 requirements nor covers the project scope | Quality Data book index is does not cover project scope | Index / list of QMS procedures and method statement is not project specific as per ISO 9001:2015/O.E.M. certification or equivalent | Audit Schedule does not cover quality audit requirements of the project scope. | QCPs do not cover project scope. |
| **40** | PQP covers the project scope and partially meets ISO 10005:2018 Project Quality Plan requirements | Quality Data book index is project specific but inadequate to cover project scope. Only one (1) discipline covered | Index / list of QMS procedures and method statements is inadequate to cover project scope as per ISO 9001:2015/O.E.M. certification or equivalent. MS list covers Only one (1) discipline. | The Audit Schedule is inadequate to cover most of the quality audit (Not all disciplines and covered). | QPCs are project specific but inadequate to cover project scope. Only one (1) discipline covered |
| **60** | PQP meets ISO 10005:2018 requirements and covers the project scope | Data book index shows adequate understanding of project quality requirements. Only two (2) disciplines covered | Index / list of QMS procedures and method statements partially covers project scope requirements as per ISO 9001:2015/O.E.M. certification or equivalent. MS list | The Audit Schedule has adequate audits to cover most audit quality requirements for the project scope | QCP's shows adequate understanding of project quality requirements. Only two (2) disciplines covered |

| | **Project Specific Quality Management Plan for the contract** | **Project Specific Quality Data Book Index** | **Procedures and Method statements to be used** | **Order and timing of the audits, inspection and design milestones that will take place to provide the works.** | **Project specific Quality Control Plan** |
|---|---|---|---|---|---|
| **Points** | **2** | **2** | **2** | **2** | **2** |
| | | | covers Only two (2) disciplines | | |
| **80** | PQP is fully meets ISO 10005:2018 Project Quality Plan requirements. | Data book index shows above average understanding of the project quality requirements. All disciplines covered. | Index / list of QMS procedures and method statements fully covers all project scope requirements as per ISO 9001:2015/O.E.M. certification or equivalent. MS list covers all disciplines | The Audit Schedule covers all the required audit requirements for the project scope. All clauses of ISO 9001 are covered. All disciplines covered | QPC's shows above average understanding of the project quality requirements, All disciplines covered. |
| **100** | PQP fully meets ISO 10005:2018 Project Quality Plan requirements and makes references all relevant QMS specifications and standards. | The Data book index covers all disciplines including all relevant tests and certifications to be provided. | Index / list of procedures and method statements covers all project scope requirements as per ISO 9001:2015/O.E.M. certification or equivalent. MS list covers all disciplines as well as list relevant check sheets / forms. | The Audit Schedule exceeds the required quality audit requirements of the scope. All clauses of ISO 9001 are covered. All disciplines covered | QCP's covers all disciplines and intervention points with reference to standards, specifications, drawings, etc. |

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

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

Tenderer .....

# T2.2-04: Evaluation Schedule - Previous Experience

**Note to Tenderers:**

Tenderers are required to demonstrate their past experience in the delivery of similar projects "of a minimum value of R8m per project" areas, conditions and circumstances in relation to the scope of work in the last 10 years, and to this end shall supply a sufficiently detailed reference list with contact details for tracing and verification of customers, indicate previous experience, and provide completion certificates. 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.

**Please provide your previous experience showing but not limited to the following:**

- Electrical MV and LV infrastructure Installation Works: LV/MV Power system studies, Design, installations, commissioning of MV/LV reticulation and distribution systems, LV/MV cable laying, splicing, transformer refurbishments, power quality installations, termination and installation inside substation buildings.
- Earthing and lightning protection, power system modelling and simulation: Design, supply and installation of Lightning protection and Earthing of buildings and structures. Proof of design reports, accreditation of specialist person and company shall be submitted for evaluation. Previously conducted power system modelling and simulation studies related to the SoW.
- Automatic fire smoke detection and suppression system, HVAC: Type of fire protection designs, installation, testing, commissioning, gas plant and equipment. Provide evidence for previously undertaking the design, supply, and installation of the HVAC or climate control system.

Fill in as many line items as needed for the similar previous projects undertaken, starting from the most recent projects completed:

| Client | Client contact details | Project Description | Year of project completion | Contract Value | Subcontractors |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
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**Index of documentation attached to this schedule:**

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The scoring of the Previous Experience will be as follows and in particular, the tenderers shall demonstrate their experience in the following areas:

| | **Electrical MV 70% and LV 30% infrastructure works** | **Earthing and lightning protection 30%, and power systems modelling and simulation 70%** | **Automatic fire smoke detection and suppression system 50%, HVAC 50%** |
|---|---|---|---|
| **25 Points** | **12** | **8** | **5** |
| **(score 0%)** | The tenderer has submitted no information or inadequate information to determine a score. | | |
| **(score 20%)** | The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances, and has successfully completed more than 1 similar projects. | | |
| **(score 40%)** | The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances, and has successfully completed more than 2 similar projects. | | |
| **(score 60%)** | The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances, and has successfully completed more than 3 similar projects. | | |
| **(score 80%)** | The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances, and has successfully completed more than 4 similar projects. | | |
| **(score 100%)** | The tenderer has sufficient experience in relation to the project and has worked previously under similar conditions and circumstances, and has successfully completed more than 5 similar projects. | | |

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

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

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

Tenderer .....

# T2.2-05: Evaluation Schedule – Method Statement

Method statement which responds to the scope of work and outlines proposed approach / methodology including that relating but not limited to programme, method statement, technical approach, and an understanding of the project objective.

The method statement should articulate what the Tenderer will provide in achieving the stated objectives for the project which should include a high-level project schedule which is aligned to the programme. Tenderers to also exhibit a clear understanding of the scope of works and has shown a concise method statement for all activities incorporating best practice.

The Tenderer must as such explain his / her understanding of the objectives of the works and the Employer's stated and implied requirements, highlight the issues of importance, and explain the technical approach and methodology they would adopt to address them. The method statement should explain the methodologies which are to be adopted and demonstrate its compatibility. The approach should also include and outline processes, procedures, and associated resources, to meet the requirements and indicate how risks will be managed. Consideration should be made to design objectives with respect to the legislations and compliance standards.

The method statement should also include a cash flow based on the tenderer's programme. The tenderer must attach his / her method statement to this page. The method statement should not be longer than 10 pages.

Tenderer shall attach the form of offer or general arrangements for plant and/or technology to demonstrate compliance to scope and an understanding of the employer's requirements.

The method statement should cover:

- Outline of proposed approach
- Narrative related to the programme
- Detailed method statement, technical approach, and construction sequencing in terms of the Works Information (design philosophy)
- Demonstrate an understanding of the project objectives.
- Detailed list of equipment, plant and people and number thereof to execute the works, and areas it will be utilised.
- Detailed list of other resources utilised including a resource matrix.

The Tenderer must attach his / her method statement to this page.

The method statement shall include as a minimum but not limited to the following (the contractor must refer to the Works Information for a full description of the scope of the works):

a. Power system Survey
b. MV and LV installations in Substations by Certified Personnel.
c. Provide details of the form of offer for switchgear in relation to the employer's specifications. General arrangements and data sheets.
d. MV and LV cable laying, tracing, jointing and termination.
e. Power systems load flow studies and protection grading.
f. Installations of earthing, bonding, and lightning protection systems.
g. Installation of MV and LV cable ways, cable trays and cable management systems.
h. Installation of electrical infrastructure in buildings and structures.
i. Installation of conduit and conduit systems.
j. Rigging of heavy electrical equipment.
k. Changing of transformer oil.
l. Design, supply, and installation of the HVAC.
m. Design, supply and installation of the fire detection and suppression system.

**Index of documentation attached to this schedule:**

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The scoring of the approach paper will be as follows:

| **Elements:** **Weight** | | **Clearly articulated and based on the Works Information which includes the design, general arrangements of switchgear, power system study investigations and criteria. Approach to ensuring less disruption to operations.** | **Demonstrates a clear understanding of the project objectives and the employer's specifications. Clear construction, and commissioning methodology. Outline the project specific requirements of the SHEQ requirements.** |
|---|---|---|---|
| | **20 Points** | **8** | **12** |
| | **Score** | | |
| **Electrical MV and LV infrastructure Installation Works (60%)**<br>**Power system modelling and simulation (20%)**<br>**Installation of automatic fire/smoke detection and suppression system, and HVAC (20%)** | **0%** | The Tenderer has submitted no information or inadequate information to determine a score. | |
| | **20%** | The approach paper is not acceptable as it will not satisfy project objectives or requirements. The tenderer has misunderstood the scope of work and does not deal with the critical aspects of the project. | |
| | **40%** | The technical approach and / or methodology is poor, not realistic, and practical and is therefore unlikely to satisfy project objectives or requirements. The tenderer has misunderstood certain aspects of the scope of work and does not deal with the critical aspects of the project. | |
| | **60%** | The approach is generic and not tailored to address the specific project objectives and requirements. The approach does not adequately deal with the critical characteristics of the project. The approach to managing risk is too generic. | |
| | **80%** | The approach is specifically tailored to address the specific project objectives and methodology and is sufficiently flexible to accommodate changes that may occur during execution. The approach to managing risk etc. is specifically tailored to the critical characteristics of the project. | |
| | **100%** | Besides meeting the "80" rating, the important issues are approached in an innovative and efficient way, indicating that the tenderer has outstanding knowledge of state-of-the- art approaches.<br>The approach paper details ways to improve the project outcomes and the quality of the outputs. | |

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

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

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

Tenderer .....

# T2.2-06: Evaluation Schedule: Management & CV's of Key Persons

Please describe the management arrangements for the *works* and the tenderer is to take note that evaluation of this schedule must contain the following information:

Comprehensive CV's should be attached to this schedule:

As a minimum each CV should address the following, but not limited to;

1. Personal particulars;
2. Qualifications (degrees, grades of membership of professional societies and

   Professional registrations, all these certificates are to be attached);
3. Skills (attach certificates of short courses and training obtained);
4. Name of current employer and position;
5. Overview of post graduate experience (year, organisation, position and responsibilities); and
6. Outline of recent assignments / detailed experience that has a bearing on the scope of work.
7. CV's for people proposed for all identified posts including:

i) **Project Manager**

The Project Manager should at least have a minimum qualification of a BSc. Eng./ B.Tech./ National Diploma in Engineering and a SACPMP registration/Pr. CPM/PMP with at least 5 years post registration experience in Electrical MV/LV and building construction projects. The Project Manager must have experience working in at least 3 separate projects, with at least 1 project in excess of R10m in electrical works (MV and LV switchgear, and power transformer installation) component value.

ii) **Contract Manager**

The Contract Manager or Site Agent must at least have a minimum qualification of a National Diploma in Electrical Engineering with a PR registration with ECSA as a Pr Tech Eng, with at least 5 years' post registration experience in electrical MV/LV substation design and construction. The Contract Manager or Site Agent must have experience working in at least one substation project with MV and LV switchgear scope in excess of R10 million.

iii) **Mechanical Engineer**

The Mechanical Engineer must at least have a minimum qualification of a National Diploma in Electrical Engineering with a PR registration with ECSA as a Pr Tech Eng, with at least 5 years' post registration experience in HVAC and Fire Protection design and installation.

iv) **Protection Engineer/Specialist**

The Protection Engineer must at least have a minimum qualification of a National Diploma in Electrical/Electronic Engineering with a PR registration with ECSA as a Pr Tech Eng, with at least 5 years' post registration experience in electrical MV/LV substation protection and SCADA. The protection specialist must have done a protection grading study, and load flow analysis for a power system network similar to the requirement of the scope of this project with experience in ETAP or a similar software.

v) **Installation Electrician**

The Installation Electrician must have a minimum N6 qualification, an Electrical trade, registration with the department of Labour and have at least 5 years' in MV/LV Switchgear installations. The Installation Electrician must have experience working in at least one substation project with MV and LV switchgear scope in excess of R10 million.

**8.** Details of experience for proposed staff working in similar projects in terms of nature, competency and value.

**9.** An explanation of how you propose to allocate adequate resources to enable you to comply with the requirements and prohibitions imposed on you by or under the statutory provisions relating to health and safety.

**10.** Details of experience for proposed staff in respect of NEC3 Engineering & Construction Contract option chosen for this Contract. If staff experience is limited, an indication of relevant training that they have attended would be helpful.

**Attached submissions to this schedule:**

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The scoring of the Management & CV's of Key Persons will be as follows:

| **Weight** | **Relevant Technical experience:**<br><br>**Management and Engineering= 100%** | **Education, training and skills for the following:**<br><br>**Management and Engineering =100%** | **Knowledge of issues pertinent to the project for the following: Management and Engineering = 100%** |
|---|---|---|---|
| 10%<br>30%<br>20%<br>20%<br>20% | 10% Project Manager<br>30% Contract Manager<br>20% Protection Specialist<br>20% Mechanical Engineer<br>20% Installation Electrician | 10% Project Manager<br>30% Contract Manager<br>20% Protection Specialist<br>20% Mechanical Engineer<br>20% Installation Electrician | 10% Project Manager<br>30% Contract Manager<br>20% Protection Specialist<br>20% Mechanical Engineer<br>20% Installation Electrician |
| **Points** | **7** | **8** | **10** |

| | | | |
|---|---|---|---|
| **(score 0%)** | Failed to provide information or inadequate information provided to determine a score | Failed to provide information or inadequate information provided to determine a score | Failed to provide information or inadequate information provided to determine a score |
| **(score 20%)** | Key staff do not have relevant levels of relevant experience. | Key staff does not have project specific education, skills, training and experience as indicated above. | Key staff has no experience of issues pertinent to the project. |
| | ▪ Project Manager: **≥1< 3 years**<br>▪ Construction Manager: **≥1< 3 years**<br>▪ Protection Specialist: **≥1< 3 years**<br>▪ Mechanical Engineer: **≥1< 3 years**<br>▪ Installation Electrician: **≥1< 3 years** | | |
| **(score 40%)** | Key staff have limited levels of general experience | Key staff have limited levels of project specific education, skills, training and experience | Key staff have limited experience of issues pertinent to the project |
| | ▪ Project Manager: **≥ 3 < 5 years**<br>▪ Construction Manager: **≥ 3 < 5 years**<br>▪ Protection Specialist: **≥ 3 < 5 years**<br>▪ Mechanical Engineer: **≥ 3 < 5 years**<br>▪ Installation Electrician: **≥ 5 < 10 years** | | |
| **(score 60%)** | Key staff have reasonable levels of general experience | Key staff have reasonable levels of project specific education, skills, training and experience | Key staff have reasonable experience of issues pertinent to the project |
| | ▪ Project Manager: **≥ 5 < 8 years**<br>▪ Construction Manager: **≥ 5 < 8 years**<br>▪ Protection Specialist: **≥ 5 < 8 years**<br>▪ Mechanical Engineer: **≥ 5 < 8 years**<br>▪ Installation Electrician: **≥ 10 < 12 years** | | |
| **(score 80%)** | ▪ Key staff have extensive levels of general experience | Key staff have extensive levels of project specific education, skills, training and experience | Key staff have extensive experience of issues pertinent to the project |
| | ▪ Project Manager: **≥ 8 < 12 years**<br>▪ Construction Manager: **≥ 8 < 12 years**<br>▪ Protection Specialist: **≥ 8 < 12 years**<br>▪ Mechanical Engineer: **≥ 8 < 12 years**<br>▪ Installation Electrician: **≥ 12 < 15 years** | | |
| **(score 100%)** | Key staff have outstanding levels of general experience | Key staff have outstanding levels of project specific education, skills, training and experience | Key staff have outstanding experience of issues pertinent to the project |

| | |
|---|---|
| | ▪ Project Manager: **≥ 12 years**<br>▪ Construction Manager: **≥ 12 years**<br>▪ Protection Specialist: **≥ 12 years**<br>▪ Mechanical Engineer: **≥ 12 years**<br>▪ Installation Electrician: **≥ 15 years** |

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

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

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

Tenderer .....

# T2.2-07: Evaluation Schedule: Health and Safety Management

Submit the following documents as a minimum with your tender:

1. The Tenderer must provide their Contract specific health and safety plan addressing the requirements of TPT health and safety specification and include the following documents:

    - Health and Safety Company Policy signed by the accounting officer and dated (OHS Act, 16.2 appointee) List the five elements -
        - Commitment to Safety, prevention of pollution,
        - Continual improvement,
        - Compliance to legal requirements, appropriate to the nature of contractor's activities,
        - Hold management accountable for development of the safety systems.
        - Include objectives and targets.

2. Roles and responsibilities of legal appointees in terms of OHSA 85 of 1993 and its Regulations.

    i. S16.1 CEO,
    ii. S16.2 Assistant to CEO,
    iii. CR8.1 Construction manager, registered with a registered body,
    iv. CR8.2 Assistant Construction manager,
    v. CR8.5 Construction Health & Safety officer, With CV and Proof of registration with SACPCMP
    vi. CR8.7 Construction Supervisor,
    vii. CR8.8 Construction assistant supervisor,
    viii. CR9.1 Risk Assessor

3. List of job categories for project and competencies required per category and develop a training Matrix for all employees who will be working on the project. This matrix must include Management and highlight training planned dates.

4. Overview of the tenderer's Risk Assessment methodology, and submission of **project specific risk assessments** indicating major activities of the project to be undertaken.
5. Two years synopsis of SHE incidents, description, type, and action taken to prevent re-occurrence.
6. Submission of completed cost breakdown sheet.
7. Complete and return with tender documentation the Contractor Safety Questionnaire with supporting documentation included as an Annexure.

**Attached submissions to this schedule:**

.....

.....

.....

## The scoring of the Tenderer's Health and safety requirements will be as follows:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Health and Safety Company Policy signed by the accounting officer and dated (OHS Act, 16.2 appointee) List the five elements:**<br>**1. Commitment to Safety, prevention of pollution,**<br>**2. Continual improvement,**<br>**3. Compliance to legal requirements, appropriate to the nature of contractor's activities,**<br>**4. Hold management accountable for development of the safety systems.** | **Roles & Responsibility : S16.1 CEO,**<br>**S16.2 Assistant to CEO,**<br>**CR8.1 Construction manager, Registered with a registered body,**<br>**CR8.2 Assistant Construction manager,**<br>**CR8.5 Construction Health & Safety officer, With CV and Proof of registration with SACPCMP** | **List of key responsible persons (job categories) for the project and health and safety competencies required per category (Training matrix)** | **Overview of the tenderer's Risk Assessment methodology, and submission of project specific risk assessments indicating major activities of the project to be undertaken.** | **Two years synopsis of SHE incidents, description, type, and action taken to prevent re-occurrence.** | **Submission of completed cost breakdown sheet.** | **Complete and return with tender documentation the Contractor Safety Questionnaire with required supporting documentation included as an Annexure.** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **5. Include objectives and targets.** | **CR8.7 Construction Supervisor,**<br>**CR8.8 Construction assistant supervisor,**<br>**CR9.1 Risk Assessor** | | | | | |
| **Points** | **1** | **2** | **1** | **2** | **1** | **1** | **2** |
| **(score 0)** | | The Tenderer has submitted no information or inadequate information to determine a score. | | | | | |
| **(score 20)** | 1 of the 5 key policy components are recognized and meet the *Employer's* requirement. | Roles and responsibilities do not meet the Occupational health and safety Act as per construction regulations and TPT health and safety specification. | Key responsible persons are not included on training matrix as per proposed organogram structure. | Information supplied is very insignificant/inadequate to achieve the required standard of service. | Information supplied is very insignificant/inadequate to achieve the required standard of service. | Health and safety Budget submitted is very insignificant/inadequate to achieve the required standard of service, 0 to 1% allocated. | Information supplied is very insignificant/inadequate to achieve the required standard of service. |
| **(score 40)** | 2 of the 5 key policy components are recognized and meet the *Employer's* requirement. | Roles and responsibilities are unlikely to ensure compliance as per the Works information and | Not all key responsible persons are included in the training matrix. Trainings matrix submitted does not cover all SHE is | Poor response/answer/solution lacks convincing evidence, medium risk that stated *employer's* | Poor response/answer/solution lacks convincing evidence, medium risk that stated | Health and safety Budget submitted is insignificant/inadequate /answer/solution to the returnable, *Employer's* health and safety requirements | Poor response/answer/solution lacks convincing evidence, medium risk that stated *Employer's* |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | not in line with OHS Act and TPT health and safety specification. | training listed on Health and Safety specification. Training matrix not signed by responsible personnel. | requirements would not be met. | *Employer's* requirements would not be met. | will not be met, 1.1 – 2% allocated. | requirements would not be met. |
| **(score 60)** | 3 of the 5 key policy components are recognized and meet the *Employer's* requirements. | Satisfactory response on roles and responsibilities as per Employer's requirements. | Satisfactory response on the list of job categories and trainings as per proposed project organogram structure. Training matrix covers most of the trainings listed on TPT Health and safety specification. | Satisfactory response/answer/solution to the aspect of the requirement, evidence given that the stated *Employer's* requirements will be met. | Satisfactory response/answer/solution to the aspect of the requirement, evidence given that the stated *Employer's* requirements will be met. | Health and safety Budget submitted is Satisfactory response/answer/solution to the returnable, Employer's health and safety requirements will be met, 2.1 – 3% allocated. | Satisfactory response/answer/solution to the aspect of the<br>Requirement, evidence given that the stated *Employer's* requirements will be met. |
| **(score 80)** | 4 of the five key policy components are recognized and meets the *Employer's* requirements. | Roles and responsibilities are likely to ensure compliance as per Works Information, OHS Act and TPT health and safety specification. | Most of key persons listed on the training matrix as per proposed project organogram structure. Trainings specified on the matrix are in line with TPT health and safety specification. | Good response/answer/solution, which demonstrates real understanding and evidence of ability to meet, stated *Employer's* requirements. | Good response/answer/solution, which demonstrates real understanding and evidence of ability to meet, stated *Employer's* requirements. | Health and safety Budget submitted is good response/answer/solution to the returnable, Employer's health and safety requirements will be met, 3% - above allocated. | Good response/answer/solution, which demonstrates real understanding and evidence of ability to meet, stated *Employer's* requirements. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **(score 100)** | All 5 key policy components are recognized and meets the *Employer's* requirements | Roles and Responsibilities most likely to ensure compliance as per requirements of OHS Act and TPT Health and Safety Management Specification and CV and proof of professional registration with SACPCMP submitted. | Training matrixes include Management and all employees /personnel in the project. Responsible personnel had signed training matrix. | Very good response/answer/solution gives real confidence that the tenderer is most likely to ensure compliance with stated *Employer's* requirements. | Very good response/answer/solution gives real confidence that the tenderer is most likely to ensure compliance with stated *Employer's* requirements. | Health and safety Budget submitted is Very good response/answer/solution to the returnable, Employer's health and safety requirements will be met, 4% - above allocated. | Very good response/answer/solution gives real confidence that the tenderer is most likely to ensure compliance with stated *Employer's* requirements. |

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

| | | | |
|---|---|---|---|
| Signed | ..... | Date | ..... |
| Name | ..... | Position | ..... |
| Tenderer | ..... | | |

# 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 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |

Attach additional pages if more space is required.

# 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:

| |
|---|
| ..... |
| ..... |
| ..... |
| ..... |
| ..... |
| ..... |
| ..... |
| ..... |
| ..... |
| ..... |

# 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.

| |
|---|
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| |
| |
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| |
| |
| |
| |

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.

# T2.2-12: Details of Plant Offered

**Note to Tenderer:**

Tenderers are required to submit the form of offer for critical plant. This will be used to evaluate the compliance to the employers works information. Where there is/are material deviation/s from the employers WI requirements, the Bid will be considered unacceptable.

- Tenderers to submit the details of offer for MV Switchgear.
- Tenderers to submit the details of offer for terminations.
- Tenderers to submit the details of offer for fire suppression technology.

| # | Description. | Compliance requirement. | Complies fully with the WI. Yes/No | Comments |
|---|---|---|---|---|
| 1 | MV Switchgear | As per the WI | | |
| 2 | Terminations | As per the WI | | |
| 3 | Fire suppression | As per the WI | | |

Signed _____ Date _____

Name _____ Position _____

Tenderer _____

# T2.2-13: Schedule of Proposed Subcontractors

The tenderer is required to provide details of all the sub-contractors that will be utilised in the execution of the *works.*

**Note to tenderers**:

- In terms of PPPFA Regulation 6 (5), A tenderer may not be awarded points for B-BBEE status level of contributor if the tender documents indicate that the tenderer intends subcontracting more than 25% of the value of the contract to any other person not qualifying for at least the points that the tenderer qualifies for, unless the intended subcontractor is an EME that has the capability to execute the subcontract.

- In terms of PPPFA Regulation 12 (3), A person awarded a contract may not subcontract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBBEE status level of contributor that the person concerned, unless the contract is subcontracted to an EME that has the capability and ability to execute the contract.

**Tenderer to note that after award, any deviations from this list of proposed sub-contractors will be subject to acceptance by the *Project Manager* in terms of the Conditions of Contract.**

Provide information of the Sub-contractors below:

| Name of Proposed Subcontractor | | | Address | | Nature of work | | Amount of Worked | Percentage of work |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **% Black Owned** | **EME** | **QSE** | **Youth** | **Women** | **Disabilities** | **Rural/ Underdeveloped areas/ Townships** | | **Military Veterans** |
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | ☐ |

| Name of Proposed Subcontractor | | | Address | | Nature of work | | Amount of Worked | Percentage of work |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **% Black Owned** | **EME** | **QSE** | **Youth** | **Women** | **Disabilities** | **Rural/ Underdeveloped areas/ Townships** | | **Military Veterans** |
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | ☐ |

| Name of Proposed Subcontractor | | | Address | | Nature of work | Amount of Worked | Percentage of work |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| **% Black Owned** | **EME** | **QSE** | **Youth** | **Women** | **Disabilities** | **Rural/ Underdeveloped areas/ Townships** | **Military Veterans** |
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| Name of Proposed Subcontractor | | | Address | | Nature of work | Amount of Worked | Percentage of work |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| **% Black Owned** | **EME** | **QSE** | **Youth** | **Women** | **Disabilities** | **Rural/ Underdeveloped areas/ Townships** | **Military Veterans** |
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

# T2.2-14: Site Establishment Requirements

Tenderers to indicate their Site establishment area requirements:

## T2.2-15: 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 Specific Goals contribution. Transnet will award preference points to companies who provide valid proof of evidence as per the table of evidence in paragraph 4.1 below.

## 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
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

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;

(b) B-BBEE Status Level of Contribution; and

(c) Any other specific goal determined in the Transnet preferential procurement policy

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

| | POINTS |
|---|---|
| **PRICE** | **80** |
| **SPECIFIC GOALS**<br>**B-BBEE STATUS LEVEL OF CONTRIBUTION Level 1 or 2**<br>**EXEMPTED MICRO ENTERPRISES (EME'S) AND QUALIFYING SMALL BUSINESS ENTERPRISES (QSE'S) OWNED BY BLACK PEOPLE (AT LEAST 51% BLACK OWNED)** | **10**<br>**10** |
| **Total points for Price and B-BBEE must not exceed** | **100** |

1.5 Failure on the part of a bidder to submit proof of evidence required for any of the specific goals together with the bid will be interpreted to mean that preference points for that specific goal 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.

(l) **Specific goals"** means targeted advancement areas or categories of persons or groups either previously disadvantaged or falling within the scope of the

Reconstruction and Development Programme identified by Transnet to be given preference in allocation of procurement contracts in line with section 2(1) of the PPPFA.

## 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. EVEDINCE REQUIRED FOR CLAIMING SPECIFIC GOALS

4.1 In terms of Transnet Preferential Procurement Policy (TPPP) and Procurement Manuals, preference points must be awarded to a bidder for providing evidence in accordance with the table below:

| Specific Goals | Acceptable Evidence |
|---|---|
| B-BBEE Status contributor | B-BBEE Certificate / Sworn- Affidavit / B-BBEE CIPC Certificate (in case of JV, a consolidated scorecard will be accepted) as per DTIC guideline |
| EME or QSE 51% Black Owned | B-BBEE Certificate / Sworn-Affidavit / CIPC Certificate |

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<br>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)<br>[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<br>Certificate issued by CIPC (formerly CIPRO) confirming annual turnover and black ownership<br>Certificate issued by SANAS accredited verification agency only if the EME is being measured on the QSE scorecard |

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 10 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.

[1] In terms of Transnet Preferential Procurement Policy (TPPP) and Procurement Manuals, preference points must be awarded to a bidder for providing evidence in accordance with clause 4.1

## 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 | |
|---|---|---|---|

v) Specify, by ticking the appropriate box, if subcontracting with any of the following enterprises:

| | Designated Group: An EME or QSE which is at last 51% owned by: | EME √ | QSE √ |
|---|---|---|---|
| | Black people | | |
| | Black people who are youth | | |
| | Black people who are women | | |
| | Black people with disabilities | | |
| | Black people living in rural or underdeveloped areas or townships | | |
| | Cooperative owned by black people | | |
| | Black people who are military veterans | | |
| | OR | | |
| | Any EME | | |
| | Any QSE | | |

## 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 Supplier/Service provider
- ☐ Other Suppliers/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<br>1. ……..<br>2. …… | ……<br>SIGNATURE(S) OF BIDDERS(S)<br>DATE: …….. |

**SBD4**

# 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] 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.

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 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] 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.

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.

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

# T2.2-16 NON-DISCLOSURE AGREEMENT

**Note to tenderers: This Non-Disclosure Agreement is to be completed and signed by an authorised signatory:**

**THIS AGREEMENT** is made effective as of ..... day of ..... 20..... by and between:

**TRANSNET SOC LTD**

(Registration No. 1990/000900/30), a company incorporated and existing under the laws of South Africa, having its principal place of business at Transnet Corporate Centre 138 Eloff Street , Braamfontein , Johannesburg 2000

**and**

.....

(Registration No. .....),a private company incorporated and existing under the laws of South Africa having its principal place of business at

.....

.....

**WHEREAS**

Transnet and the Company wish to exchange Information [as defined below] and it is envisaged that each party may from time to time receive Information relating to the other in respect thereof. In consideration of each party making available to the other such Information, the parties jointly agree that any dealings between them shall be subject to the terms and conditions of this Agreement which themselves will be subject to the parameters of the Tender Document.

**IT IS HEREBY AGREED**

**1. INTERPRETATION**

In this Agreement:

1.1 **Agents** mean directors, officers, employees, agents, professional advisers, contractors or sub-contractors, or any Group member;

1.2 **Bid** or **Bid Document** (hereinafter Tender) means Transnet's Request for Information [**RFI**] Request for Proposal [**RFP**] or Request for Quotation [**RFQ**], as the case may be;

1.3 **Confidential Information** means any information or other data relating to one party [the **Disclosing Party**] and/or the business carried on or proposed or intended to be carried on by that party and which is made available for the purposes of the Bid to the other party [the **Receiving Party**] or its Agents by the Disclosing Party or its Agents or recorded in agreed minutes following oral disclosure and any other information otherwise made available by the Disclosing Party or its Agents to the Receiving Party or its Agents, whether before, on or after the date of this Agreement, and whether in writing or otherwise, including any information, analysis or specifications derived from, containing or reflecting such information but excluding information which:

1.3.1 is publicly available at the time of its disclosure or becomes publicly available [other than as a result of disclosure by the Receiving Party or any of its Agents contrary to the terms of this Agreement]; or

1.3.2 was lawfully in the possession of the Receiving Party or its Agents [as can be demonstrated by its written records or other reasonable evidence] free of any restriction as to its use or disclosure prior to its being so disclosed; or

1.3.3 following such disclosure, becomes available to the Receiving Party or its Agents [as can be demonstrated by its written records or other reasonable evidence] from a source other than the Disclosing Party or its Agents, which source is not bound by any duty of confidentiality owed, directly or indirectly, to the Disclosing Party in relation to such information;

1.4 **Group** means any subsidiary, any holding company and any subsidiary of any holding company of either party; and

1.5 **Information** means all information in whatever form including, without limitation, any information relating to systems, operations, plans, intentions, market opportunities, know-how, trade secrets and business affairs whether in writing, conveyed orally or by machine-readable medium.

## 2. CONFIDENTIAL INFORMATION

2.1 All Confidential Information given by one party to this Agreement [the **Disclosing Party**] to the other party [the **Receiving Party**] will be treated by the Receiving Party as secret and confidential and will not, without the Disclosing Party's written consent, directly or indirectly communicate or disclose [whether in writing or orally or in any other manner] Confidential Information to any other person other than in accordance with the terms of this Agreement.

2.2 The Receiving Party will only use the Confidential Information for the sole purpose of technical and commercial discussions between the parties in relation to the Tender or for the subsequent performance of any contract between the parties in relation to the Tender.

2.3 Notwithstanding clause 2.1 above, the Receiving Party may disclose Confidential Information:

2.3.1 to those of its Agents who strictly need to know the Confidential Information for the sole purpose set out in clause 2.2 above, provided that the Receiving Party shall ensure that such Agents are made aware prior to the disclosure of any part of the Confidential Information that the same is confidential and that they owe a duty of confidence to the Disclosing Party. The Receiving Party shall at all times remain liable for any actions of such Agents that would constitute a breach of this Agreement; or

2.3.2 to the extent required by law or the rules of any applicable regulatory authority, subject to clause 2.4 below.

2.4 In the event that the Receiving Party is required to disclose any Confidential Information in accordance with clause 2.3.2 above, it shall promptly notify the Disclosing Party and cooperate with the Disclosing Party regarding the form, nature, content and purpose of such disclosure or any action which the Disclosing Party may reasonably take to challenge the validity of such requirement.

2.5 In the event that any Confidential Information shall be copied, disclosed or used otherwise than as permitted under this Agreement then, upon becoming aware of the same, without prejudice to any rights or remedies of the Disclosing Party, the Receiving Party shall as soon as practicable notify the Disclosing Party of such event and if requested take such steps [including the institution of legal proceedings] as shall be necessary to remedy [if capable of remedy] the default and/or to prevent further unauthorised copying, disclosure or use.

2.6 All Confidential Information shall remain the property of the Disclosing Party and its disclosure shall not confer on the Receiving Party any rights, including intellectual property rights over the Confidential Information whatsoever, beyond those contained in this Agreement.

## 3. RECORDS AND RETURN OF INFORMATION

3.1 The Receiving Party agrees to ensure proper and secure storage of all Information and any copies thereof.

3.2 The Receiving Party shall keep a written record, to be supplied to the Disclosing Party upon request, of the Confidential Information provided and any copies made thereof and, so far as is reasonably practicable, of the location of such Confidential Information and any copies thereof.

3.3 The Company shall, within 7 [seven] days of receipt of a written demand from Transnet:

3.3.1 return all written Confidential Information [including all copies]; and

3.3.2 expunge or destroy any Confidential Information from any computer, word processor or other device whatsoever into which it was copied, read or programmed by the Company or on its behalf.

3.4 The Company shall on request supply a certificate signed by a director as to its full compliance with the requirements of clause 3.3.2 above.

## 4. ANNOUNCEMENTS

4.1 Neither party will make or permit to be made any announcement or disclosure of its prospective interest in the Tender without the prior written consent of the other party.

4.2 Neither party shall make use of the other party's name or any information acquired through its dealings with the other party for publicity or marketing purposes without the prior written consent of the other party.

## 5. DURATION

The obligations of each party and its Agents under this Agreement shall survive the termination of any discussions or negotiations between the parties regarding the Tender and continue thereafter for a period of 5 [five] years.

## 6. PRINCIPAL

Each party confirms that it is acting as principal and not as nominee, agent or broker for any other person and that it will be responsible for any costs incurred by it or its advisers in considering or pursuing the Tender and in complying with the terms of this Agreement.

## 7. ADEQUACY OF DAMAGES

Nothing contained in this Agreement shall be construed as prohibiting the Disclosing Party from pursuing any other remedies available to it, either at law or in equity, for any such threatened or actual breach of this Agreement, including specific performance, recovery of damages or otherwise.

## 8. PRIVACY AND DATA PROTECTION

8.1 The Receiving Party undertakes to comply with South Africa's general privacy protection in terms Section 14 of the Bill of Rights in connection with this Tender and shall procure that its personnel shall observe the provisions of such Act [as applicable] or any amendments and re-enactments thereof and any regulations made pursuant thereto.

8.2 The Receiving Party warrants that it and its Agents have the appropriate technical and organisational measures in place against unauthorised or unlawful processing of data relating to the Tender and against accidental loss or destruction of, or damage to such data held or processed by them.

## 9. GENERAL

9.1 Neither party may assign the benefit of this Agreement, or any interest hereunder, except with the prior written consent of the other, save that Transnet may assign this Agreement at any time to any member of the Transnet Group.

9.2 No failure or delay in exercising any right, power or privilege under this Agreement will operate as a waiver of it, nor will any single or partial exercise of it preclude any further exercise or the exercise of any right, power or privilege under this Agreement or otherwise.

9.3 The provisions of this Agreement shall be severable in the event that any of its provisions are held by a court of competent jurisdiction or other applicable authority to be invalid, void or otherwise unenforceable, and the remaining provisions shall remain enforceable to the fullest extent permitted by law.

9.4 This Agreement may only be modified by a written agreement duly signed by persons authorised on behalf of each party.

9.5 Nothing in this Agreement shall constitute the creation of a partnership, joint venture or agency between the parties.

9.6 This Agreement will be governed by and construed in accordance with South African law and the parties irrevocably submit to the exclusive jurisdiction of the South African courts.

| | | | |
|---|---|---|---|
| Signed | ..... | Date | ..... |
| Name | ..... | Position | ..... |
| Tenderer | ..... | | |

## T2.2-17: 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<br>.....<br>duly authorised thereto |
| Name: |
| Signature: |
| Date: |

**IMPORTANT NOTICE TO TENDERERS**

- Transnet has appointed a Procurement Ombudsman to investigate any material complaint in respect of tenders exceeding R5,000,000.00 (five million S.A. Rand) in value. Should a Tenderer have any material concern regarding an tender process which meets this value threshold, a complaint may be lodged with Transnet's Procurement Ombudsman for further investigation.
- It is incumbent on the Tenderer to familiarise himself/herself with the Terms of Reference for the Transnet Procurement Ombudsman, details of which are available for review at Transnet's website www.transnet.net.

- An official complaint form may be downloaded from this website and submitted, together with any supporting documentation, within the prescribed period, to procurement.ombud@transnet.net
- For transactions below the R5,000,000.00 (five million S.A. Rand) threshold, a complaint may be lodged with the Chief Procurement Officer of the relevant Transnet Operating Division.
- All Tenderers should note that a complaint must be made in good faith. If a complaint is made in bad faith, Transnet reserves the right to place such a tenderer on its List of Excluded Bidders.

# T2.2-18: 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

# T2.2-19 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

# T2.2-20 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 ……..

# T2.2-21 : 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

# T2.2-22: 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 R5 000 000. | | | |
| Insurance in respect of loss of or damage to own property and equipment. | | | |
| (Other) | | | |

# T2.2-23: Form of Intent to Provide a Performance Guarantee

It is hereby agreed by the Tenderer that a Performance Guarantee drafted **exactly** as provided in the tender documents will be provided by the Guarantor named below, which is a **bank or insurer registered in South Africa**:

Name of Guarantor (Bank/Insurer) .....

Address .....

The Performance Guarantee shall be provided within **2** (**Two**) weeks after the Contract Date defined in the contract unless otherwise agreed to by the parties.

Signed .....

Name .....

Capacity .....

On behalf of (name of tenderer) .....

.....

Date .....

**Confirmed by Guarantor's Authorised Representative**

Signature(s) .....

Name (print) .....

Capacity .....

On behalf of Guarantor (Bank/insurer) .....

Date .....

# T2.2-24: 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:

.....

.....

.....

.....

.....

.....

.....

# 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:
**THE REFURBISHMENT OF THE GRAIN ELEVATOR SUBSTATIONS AT THE EAST LONDON MULTI PURPOSE TERMINAL FOR TRANSNET SOC LTD (REG NO. 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED AS "TPT") FOR THE DURATION OF 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 | ..... | ..... |

# C1.2 Contract Data

## Part one - Data provided by the *Employer*

| Clause | Statement | Data |
|---|---|---|
| 1 | **General** | |
| | The *conditions of contract* are the core clauses and the clauses for main Option | **B: Priced contract with bill of quantities** |
| | dispute resolution Option | **W1: Dispute resolution procedure** |
| | and secondary Options | **X5: Sectional Completion**<br>**X7: Delay damages**<br>**X13: Performance Bond**<br>**X16: Retention**<br>**X18: Limitation of liability**<br>**Z: *Additional conditions of contract*** |
| | of the NEC3 Engineering and Construction Contract June 2005 (amended June 2006 and April 2013) | |
| 10.1 | The *Employer* is: | **Transnet SOC Ltd**<br>**(Registration No. 1990/000900/30)** |
| | Address | Registered address:<br>**Carlton Centre**<br>**150 Commissioner Street**<br>**Johannesburg**<br>**2001** |
| | Having elected its Contractual Address for the purposes of this contract as: | **Transnet Port Terminals**<br>**202 Anton Lembede Street**<br>**Durban**<br>**4001** |

| | | |
|---|---|---|
| 10.1 | The *Project Manager* is: (Name) | **Nowhi Hloma** |
| | Address | **Transnet Port Terminals**<br>**Port of East London** |
| | Tel | |
| | e-mail | **nowhi.hloma@transnet.net** |
| 10.1 | The *Supervisor* is: (Name) | **Lonwabo Mkalipi** |
| | Address | **Transnet Port Terminals**<br>**Port of East London** |
| | Tel No. | |
| | e-mail | **lonwabo.mkalipi@transnet.net** |
| 11.2(13) | The *works* are | **The refurbishment of the grain elevator substations at the East London Multi-Purpose Terminal for Transnet SOC Ltd (Reg no. 1990/000900/30) operating as Transnet Port Terminals (hereinafter referred as "TPT") for the duration of 12 months** |
| 11.2(14) | The following matters will be included in the Risk Register | **Failure to meet project timelines**<br>**Commissioning delays**<br>**Quality Risk**<br>**Environmental risk**<br>**Inclement adverse weather challenges**<br>**Labour unrest**<br>**Safety**<br>**Waste Management** |
| 11.2(15) | The *boundaries of the site* are | **As stated in Part C4.1. "Description of the Site and its surroundings"** |
| 11.2(16) | The Site Information is in | **Part C4** |
| 11.2(19) | The Works Information is in | **Part C3** |
| 12.2 | The *law of the contract* is the law of | **the Republic of South Africa subject to the jurisdiction of the Courts of South Africa.** |
| 13.1 | The *language of this contract* is | **English** |
| 13.3 | The *period for reply* is | **2 weeks** |

| | | |
|---|---|---|
| **2** | **The *Contractor*'s main responsibilities** | **No additional data is required for this section of the *conditions of contract*.** |
| **3** | **Time** | |
| 11.2(3) | The *completion date* for the whole of the *works* is | **12 Months** |

| | | | |
|---|---|---|---|
| 11.2(9) | The *key date*s and the *condition*s to be met are: | ***Condition* to be met** | ***key date*** |
| | | **1 Site Establishment** | **TBC** |
| | | **2 Transportation of new Switchgear** | **TBC** |
| | | **3 Dismantling of existing MV and LV switchgear and transportation.** | **TBC** |
| | | **4 Supply, install and commissioning of new MV switchgear.** | **TBC** |
| | | **5 Supply, install and commissioning of new LV switchgear.** | **TBC** |
| | | **6 Supply, install and commissioning of new fire detection and suppression system.** | **TBC** |
| | | **7 Supply, install and commissioning of the room climate control.** | **TBC** |
| | | **8 Supply of the MV switchgear spares.** | **TBC** |
| | | **9 Cable testing and repairs.** | **TBC** |
| | | **10 Earthing and bonding system testing** | **TBC** |
| | | **11 Building repairs** | **TBC** |
| | | **12 Supply of data pack** | **TBC** |
| | | **13 Other (Building Separation Of MV & LV)** | **TBC** |

| | | | |
|---|---|---|---|
| 30.1 | The *access dates* are | **Part of the Site** | **Date** |
| | | **1 Access to entire site** | **TBC** |
| 31.1 | The *Contractor* is to submit a first programme for acceptance within | **2 weeks of the Contract Date.** | |
| 31.2 | The *starting date* is | **TBA** | |
| 32.2 | The *Contractor* submits revised programmes at intervals no longer than | **2 weeks.** | |
| 35.1 | The *Employer* is not willing to take over the *works* before the Completion Date. | | |
| **4** | **Testing and Defects** | | |
| 42.2 | The *defects date* is | **52 (fifty-two) weeks after Completion of the whole of the *works*.** | |
| 43.2 | The *defect correction period* is | **2 weeks** | |
| **5** | **Payment** | | |
| 50.1 | The *assessment interval* is monthly on the | **25th (twenty fifth) day of each successive month.** | |
| 51.1 | The *currency of this contract* is the | **South African Rand.** | |
| 51.2 | The period within which payments are made is | **Payment will be effected on or before the last day of the month following the month during which a valid Tax Invoice and Statement were received.** | |
| 51.4 | The *interest rate* is | **the prime lending rate of Standard Bank of South Africa.** | |
| **6** | **Compensation events** | | |
| 60.1(13) | The *weather measurements* to be recorded for each calendar month are, | **the cumulative rainfall (mm)**<br>**the number of days with rainfall more than 10 mm**<br>**the number of days with wind speed exceeding 40 km/hr** | |

| | | |
|---|---|---|
| | The place where weather is to be recorded (on the Site ) is: | **The *Contractor*'s Site establishment area** |
| | The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at: | **East London Weather Station** |
| | and which are available from: | **South African Weather Service 012 367 6023 or info3@weathersa.co.za.** |
| **7** | **Title** | **No additional data is required for this section of the *conditions of contract*.** |
| **8** | **Risks and insurance** | |
| 80.1 | These are additional *Employer*'s risks | **No additional risks are accepted by the Employer other than those which are provided for in this contract** |
| 84.1 | The *Employer* provides these insurances from the Insurance Table | |
| | 1 Insurance against: | **Loss of or damage to the *works*, Plant and Materials is as stated in the Insurance policy for Contract Works/ Public Liability.** |
| | Cover / indemnity: | **to the extent as stated in the insurance policy for Contract Works / Public Liability** |
| | The deductibles are: | **as stated in the insurance policy for Contract Works / Public Liability** |
| | 2 Insurance against: | **Loss of or damage to property (except the *works*, Plant and Materials & Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor)* arising out of or in connection with the performance of the Contract as stated in the insurance policy for Contract Works / Public Liability** |

| | | |
|---|---|---|
| | Cover / indemnity | **Is to the extent as stated in the insurance policy for Contract Works / Public Liability** |
| | The deductibles are | **as stated in the insurance policy for Contract Works / Public Liability** |
| 3 | Insurance against: | **Loss of or damage to Equipment (Temporary Works only) as stated in the insurance policy for contract Works and Public Liability** |
| | Cover / indemnity | **Is to the extent as stated in the insurance policy for Contract Works / Public Liability** |
| | The deductibles are: | **As stated in the insurance policy for Contract Works / Public Liability** |
| 4 | Insurance against: | **Contract Works SASRIA insurance subject to the terms, exceptions and conditions of the SASRIA coupon** |
| | Cover / indemnity | **Cover / indemnity is to the extent provided by the SASRIA coupon** |
| | The deductibles are | **The deductibles are, in respect of each and every theft claim, 0,1% of the contract value subject to a minimum of R2,500 and a maximum of R25,000.** |
| | Note: | **The deductibles for the insurance as stated above are listed in the document titled "Certificate of Insurance: Transnet (SOC) Limited Principal Controlled Insurance." Refer to Annexure AA** |

| | | |
|---|---|---|
| 84.1 | The minimum limit of indemnity for insurance in respect of 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 for any one event is | **The *Contractor* must comply at a minimum with the provisions of the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 as amended.** |

| | | |
|---|---|---|
| The *Contractor* provides these additional Insurances | **1** | **Where the contract requires that the design of any part of the *works* shall be provided by the *Contractor* the *Contractor* shall satisfy the *Employer* that professional indemnity insurance cover in connection therewith has been affected** |
| | **2** | **Where the contract involves manufacture, and/or fabrication of Plant & Materials, components or other goods to be incorporated into the *works* at premises other than the site, the *Contractor* shall satisfy the *Employer* that such plant & materials, components or other goods for incorporation in the *works* are adequately insured during manufacture and/or fabrication and transportation to the site.** |
| | **3** | **Should the *Employer* have an insurable interest in such items during manufacture, and/or fabrication, such interest shall be noted by endorsement to the *Contractor's* policies of insurance as well as those of any sub-contractor** |
| | **4** | **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 R 5 000 000.** |

| | | |
|---|---|---|
| | | **5 The insurance coverage referred to in 1, 2, 3, and 4 above shall be obtained from an insurer(s) in terms of an insurance policy approved by the *Employer*. The *Contractor* shall arrange with the insurer to submit to the *Project Manager* the original and the duplicate original of the policy or policies of insurance and the receipts for payment of current premiums, together with a certificate from the insurer or insurance broker concerned, confirming that the policy or policies provide the full coverage as required. The original policy will be returned to the *Contractor.*** |
| 84.2 | The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the works, Plant, Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor*) caused by activity in connection with this contract for any one event is | **Whatever the *Contractor* requires in addition to the amount of insurance taken out by the *Employer* for the same risk.** |
| 84.2 | The insurance against loss of or damage to the works, Plant and Materials as stated in the insurance policy for contract works and public liability selected from: | **Principal Controlled Insurance policy for Contract OR Project Specific Insurance for the contract** |
| **9** | **Termination** | **There is no additional Contract Data required for this section of the *conditions of contract*.** |
| **10** | **Data for main Option clause** | |
| **B** | **Priced contract with Bill of Quantities** | **No additional data is required for this Option.** |

| | | |
|---|---|---|
| **11** | **Data for Option W1** | |
| W1.1 | The *Adjudicator* is | **Both parties will agree as and when a dispute arises. If the parties cannot reach an agreement on the *Adjudicator*, the Chairman of the Association of Arbitrators will appoint an *Adjudicator.*** |
| W1.2(3) | The *Adjudicator nominating body* is: | **The Chairman of the Association of Arbitrators (Southern Africa)** |
| | If no *Adjudicator nominating body* is entered, it is: | **the Association of Arbitrators (Southern Africa)** |
| W1.4(2) | The *tribunal* is: | **Arbitration** |
| W1.4(5) | The *arbitration procedure* is | **The Rules for the Conduct of Arbitrations of the Association of Arbitrators (Southern Africa)** |
| | The place where arbitration is to be held is | **Durban, South Africa** |
| | The person or organisation who will choose an arbitrator<br>- if the Parties cannot agree a choice or<br>- if the arbitration procedure does not state who selects an arbitrator, is | **The Chairman of the Association of Arbitrators (Southern Africa)** |
| **12** | **Data for secondary Option clauses** | |

| | | | | |
|---|---|---|---|---|
| **X5** | **Sectional Completion** | | | |
| X5.1 | The *completion date* for each *section* of the *works* is: | ***Section*** | **Description** | ***Completion date*** |
| | | **1** | **Substation 1** | **TBC** |
| | | **2** | **Substation 2** | **TBC** |

| | | |
|---|---|---|
| **X7** | **Delay damages** | |
| X7.1 | Delay damages for Completion of the whole of the *works* are | **0.1% of the total contract value per day limited to 10% of the total contract value** |

| | | |
|---|---|---|
| **X13** | **Performance bond** | |
| X13.1 | The amount of the performance bond is | **5% of the total of the Prices** |
| **X16** | **Retention** | |
| X16.1 | The retention free amount is | **Nil** |
| | The retention percentage is | **10% on all payments certified.** |
| **X18** | **Limitation of liability** | |
| X18.1 | The *Contractor*'s liability to the *Employer* for indirect or consequential loss is limited to: | **An amount being equal to the loss or total contract value inclusive of VAT** |
| X18.2 | For any one event, the *Contractor's* liability to the *Employer* for loss of or damage to the *Employer's* property is limited to: | **The deductible of the relevant insurance policy** |
| X18.3 | The *Contractor's* liability for Defects due to his design which are not listed on the Defects Certificate is limited to: | **The cost of correcting the Defect** |
| X18.4 | The *Contractor's* total liability to the *Employer* for all matters arising under or in connection with this contract, other than excluded matters, is limited to: | **The Total of the Prices** |
| X18.5 | The *end of liability date* is | **A period being 12 (twelve) consecutive months after the completion by the Contractor of the whole of the works to the Employer in terms of the Contract** |

| | | |
|---|---|---|
| **Z** | ***Additional conditions of contract* are*:*** | |
| **Z2** | **Additional clause relating to Performance Bonds and/or Guarantees** | |
| **Z2.1** | | **The Performance Guarantee under X13 above shall be an irrevocable, on-demand performance guarantee, to be issued exactly in the form of the Pro Forma documents provided for this purpose under C1.3 (Forms of Securities), in favour of the *Employer* by a financial institution reasonably acceptable to the *Employer.*** |

## Z3 Additional clauses relating to Joint Venture

**Z3.1** **Insert the additional core clause 27.5**

**27.5. In the instance that the *Contractor* is a joint venture, the *Contractor* shall provide the *Employer* with a certified copy of its signed joint venture agreement, and in the instance that the joint venture is an 'Incorporated Joint Venture,' the Memorandum of Incorporation, within 4 (four) weeks of the Contract Date.**
**The Joint Venture agreement shall contain but not be limited to the following:**

- **A brief description of the Contract and the Deliverables;**
- **The name, physical address, communications addresses and domicilium citandi et executandi of each of the constituents and of the Joint Venture;**
- **The constituent's interests;**
- **A schedule of the insurance policies, sureties, indemnities and guarantees which must be taken out by the Joint Venture and by the individual constituents;**
- **Details of an internal dispute resolution procedure;**
- **Written confirmation by all of the constituents:**
  - **i. of their joint and several liabilities to the *Employer* to Provide the Works;**
  - **ii. identification of the lead partner in the joint venture confirming the authority of the lead partner to bind the joint venture through the *Contractor's* representative;**

| | | |
|---|---|---|
| | | **iii. Identification of the roles and responsibilities of the constituents to provide the Works.**<br>• **Financial requirements for the Joint Venture:**<br>**iv. the working capital requirements for the Joint Venture and the extent to which and manner whereby this will be provided and/or guaranteed by the constituents from time to time;**<br>**v. the names of the auditors and others, if any, who will provide auditing and accounting services to the Joint Venture.** |
| **Z3.2** | | **Insert additional core clause 27.6**<br><br>**27.6. The *Contractor* shall not alter its composition or legal status of the Joint Venture without the prior approval of the *Employer.*** |
| **Z4** | **Additional obligations in respect of Termination** | |
| **Z4.1** | | **The following will be included under core clause 91.1:**<br>**In the second main bullet, after the word 'partnership' add 'joint venture whether incorporate or otherwise (including any constituent of the joint venture)' and**<br><br>**Under the second main bullet, insert the following additional bullets after the last sub-bullet:**<br><br>• **commenced business rescue proceedings (R22)**<br>• **repudiated this Contract (R23)** |

| | | |
|---|---|---|
| **Z4.2** | **Termination Table** | **The following will be included under core clause 90.2 Termination Table as follows:**<br><br>**Amend "A reason other than R1 – R21" to "A reason other than R1 – R23"** |
| **Z4.3** | | **Amend "R1 – R15 or R18" to "R1 – R15, R18, R22 or R23."** |
| **Z5** | **Right Reserved by the *Employer* to Conduct Vetting through SSA** | |
| **Z5.1** | | **The *Employer* reserves the right to conduct vetting through State Security Agency (SSA) for security clearances of any *Contractor* who has access to National Key Points for the following without limitations:**<br><br>**1. Confidential – this clearance is based on any information which may be used by malicious, opposing or hostile elements to harm the objectives and functions of an organ of state.**<br><br>**2. Secret – clearance is based on any information which may be used by malicious, opposing or hostile elements to disrupt the objectives and functions of an organ of state.**<br>**3. Top Secret – this clearance is based on information which may be used by malicious, opposing or hostile elements to neutralise the objectives and functions of an organ of state.** |
| **Z6** | **Additional Clause Relating to Collusion in the Construction Industry** | |
| **Z6.1** | | **The contract award is made without prejudice to any rights the *Employer* may have to take appropriate action later with regard to any declared tender rigging including blacklisting.** |

| | | |
|---|---|---|
| **Z7** | **Protection of Personal Information Act** | |
| **Z7.1** | | **The *Employer* and the *Contractor* are required to process information obtained for the duration of the Agreement in a manner that is aligned to the Protection of Personal Information Act.** |
| **Z8** | **Assignment and Waiver** | |
| **Z8.1** | | **Neither the Employer nor the Contractor may, without the written consent of the other, assign the Contract or any part thereof or any obligation under the Contract or cede any right or benefit thereunder.** |
| **Z8.2** | | **No grant by the Contractor or the Employer to the other of any concession, waiver, condonation or allowance is, in respect of any specific event or circumstance other than that in respect of which the grant was made to constitute a waiver of the rights of the grantor in terms of the Contract or an estoppel of the grantor's right to enforce the provisions of the Contract.** |

**Z9 Anti-corruption, TPT Indemnity**

**Z9.1 Anti - Corruption**

**In the event that the Contractor is alleged to be, or found by any competent court or Tribunal to be involved in any corrupt, unlawful or illegal activities, or is being investigated for any alleged corrupt, unlawful or illegal activity in relation to Transnet or any other party with whom Contractor does business, or if Transnet learns that:**

**a. Improper payments are being or have been made or offered to Transnet officials or any other person by Contractor or those acting on behalf of Contractor with respect to the Services; or**

**b. *Contractor* or those acting on behalf of *Contractor* has accepted any payment or benefit, regardless of value, as an improper inducement to award, obtain or retain business or otherwise gain or grant an improper business advantage from or to any other person or entity.**

**Transnet reserves the right to terminate the aforementioned awarded contract, by giving immediate written notice to the effect that, all or any Agreements it may have with *Contractor* or any and all Awards made *Contractor* for breach of this clause.**

| | | |
|---|---|---|
| | | **Further in the event of such termination, Contractor shall not be entitled to any further payment, regardless of any activities undertaken or agreements with additional third parties entered into by Contractor prior to such termination; and further.**<br><br>**Contractor shall be liable to Transnet for any actual damages or remedies as provided either in the Agreements that are to be signed or in law.** |
| **Z9.2** | **Indemnity** | **1) Contractor irrevocably and unconditionally undertakes to indemnify and does hereby keep TPT indemnified and hold TPT harmless against, and, in respect of, all and any loss or damage incurred by itself or any other third- Party as a result of, arising out of or connected with any failure, act or omission or breach of this Agreement by Contractor or any of its employees, security officers, servants, agents , assigns, contractors or sub-contractors, or occurring during or as a result of the provision by the Contractor of the Security Service. Such absolute obligation of Contractor to indemnify TPT on a full indemnity basis against all claims shall including, but not be limited to:**<br><br>**a) liability in respect of any loss or damage to property, whether movable or immovable, belonging to third parties; or other**<br>**b) liability in respect of lost property belonging to third parties;**<br>**c) liability arising out of any unlawful act committed by or *Contractor* or its employees, security officers, servants, agents, contractors and sub-contractors during the process of rendering a Security Services; or at any other time when a claim** |

**has been and could be made against the TPT arising out of the acts of or omissions of one or more of such persons;**

**d) liability in respect of the death, unlawful arrest, injury, illness or disease of any person, or entity should the damage, loss, unlawful arrest, death, injury, illness or disease referred to above be attributable to or arise out of the Security Services that are being or have been rendered by the Contractor, its agents, contractors, sub-contractors in terms of this Agreement.**

**2) *Contractor* shall at its own expense and with effect from the date of signature hereof, take reasonable precautions for the protection of life and or property that is in any way connected with in whole or any part of this agreement and shall hold TPT harmless against all claims for any loss, demands, proceedings, damages, costs, charges, expenses whatsoever, arising out of this agreement.**

**3) *Contractor* agrees that it shall intervene in any claim arising and to indemnify and hold TPT harmless from any claim, damage, loss, cost, expense, legal expenses, arising from or attributable to *Contractor* provision of services, its acts, or omissions or those of its agents, employees, sub-contractors, representative/s or other for whom TPT may be / may not be deemed responsible for in terms of the agreement.**

# C1.2 Contract Data

**Part two - Data provided by the *Contractor***

The tendering *Contractor* is advised to read both the NEC3 Engineering and Construction Contract - June 2005 (with amendments June 2006 and April 2013) and the relevant parts of its Guidance Notes (ECC3-GN) in order to understand the implications of this Data which the tenderer is required to complete. An example of the completed Data is provided on pages 156 to 158 of the ECC3 Guidance Notes.

Completion of the data in full, according to Options chosen, is essential to create a complete contract.

| **Clause** | **Statement** | **Data** |
|---|---|---|
| 10.1 | The *Contractor* is (Name): | |
| | Address | |
| | Tel No. | |
| | Fax No. | |
| 11.2(8) | The *direct fee percentage* is | **%** |
| | The *subcontracted fee percentage* is | **%** |
| 11.2(18) | The *working areas* are the Site and | |
| 24.1 | The *Contractor's* key persons are: | |
| | 1 Name: | |
| | Job: | |
| | Responsibilities: | |
| | Qualifications: | |
| | Experience: | |
| | 2 Name: | |
| | Job | |
| | Responsibilities: | |
| | Qualifications: | |
| | Experience: | |

| | | |
|---|---|---|
| | | **CV's (and further key persons data including CVs) are appended to Tender Schedule entitled.** |
| 11.2(14) | The following matters will be included in the Risk Register | |
| 31.1 | The programme identified in the Contract Data is | |
| **B** | **Priced contract with bill of quantities** | |
| 11.2(21) | The *bill of quantities* is in | **C2 Part 2 Pricing Data Option B** |
| 11.2(31) | The tendered total of the Prices is | (in figures)<br><br>(in words), excluding VAT |
| | | |
| | **Data for Schedules of Cost Components** | *Note "SCC" means Schedule of Cost Components starting on page 60 of ECC, and "SSCC" means Shorter Schedule of Cost Components starting on page 63 of ECC.* |

| | | | | |
|---|---|---|---|---|
| **B** | **Priced contract with bill of quantities** | **Data for the Shorter Schedule of Cost Components** | | |
| 41 in SSCC | The percentage for people overheads is: | **%** | | |
| 21 in SSCC | The published list of Equipment is the last edition of the list published by | | | |
| | The percentage for adjustment for Equipment in the published list is | **%** (state plus or minus) | | |
| 22 in SSCC | The rates of other Equipment are: | **Equipment** | **Size or capacity** | **Rate** |
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| 61 in SSCC | The hourly rates for Defined Cost of design outside the Working Areas are | **Category of employee** | **Hourly rate** | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 62 in SSCC | The percentage for design overheads is | **%** | | |
| 63 in SSCC | The categories of design employees whose travelling expenses to and from the Working Areas are included in Defined Cost are: | | | |

# C1.3 Forms of Securities

## Pro forma Performance Guarantee

For use with the NEC3 Engineering & Construction Contract - June 2005 (with amendments June 2006 and April 2013)

The *conditions of contract* stated in the Contract Data Part 1 include the following Secondary Option:

Option X13: Performance bond

The pro forma document for this Guarantee is provided here for convenience but is to be treated as part of the *Works Information*.

The organisation providing the Guarantee does so by copying the pro forma document onto its letterhead without any change to the text or format and completing the required details. The completed document is then given to the *Employer* within the time stated in the contract.

The Performance Bond needs to be issued by an institution that are reasonably acceptable to the *Employer*.

Transnet may choose to not to accept an Issuer. Should the issuer not being accepted, the performance bond needs to be replaced by an issuer that are acceptable to Transnet. Issuers need to be verified for acceptance by Transnet before a performance bond is issued.

# Pro-forma Performance Bond (for use with Option X13)

*(to be reproduced exactly as shown below on the letterhead of the Surety)*

Transnet SOC Ltd
C/o Transnet Port Terminals
Transnet Corporate Centre
138 Eloff Street
Braamfontein
Johannesburg
2000

Date:

Dear Sirs,

## Performance Bond for Contract No. iCLM EL 725/TPT

With reference to the above numbered contract made or to be made between

**Transnet SOC Limited, Registration No. 1990/000900/30** (the *Employer*) and

**{Insert registered name and address of the *Contractor*}** (the *Contractor*), for

**{Insert details of the *works* from the Contract Data}** (**The refurbishment of the grain elevator substations at the East London Multi Purpose Terminal for Transnet SOC Ltd (Reg no. 1990/000900/30) operating as Transnet Port Terminals (hereinafter referred as "TPT") for the duration of 12 months**).

I/We the undersigned .....

on behalf of the Guarantor .....

of physical address .....

.....

and duly authorised thereto do hereby bind ourselves as Guarantor and co-principal debtors in solidum for the due and faithful performance of all the terms and conditions of the Contract by the *Contractor* and for all losses, damages and expenses that may be suffered or incurred by the *Employer* as a result of non-performance of the Contract by the *Contractor*, subject to the following conditions:

1. The terms *Employer*, *Contractor*, *Project Manager*, *works* and Completion Certificate have the meaning as assigned to them by the *conditions of contract* stated in the Contract Data for the aforesaid Contract.

2. We renounce all benefits from the legal exceptions "Benefit of Excussion and Division", "No value received" and all other exceptions which might or could be pleaded against the validity of this bond, with the meaning and effect of which exceptions we declare ourselves to be fully acquainted.

3. The *Employer* has the absolute right to arrange his affairs with the *Contractor* in any manner which the *Employer* deems fit and without being advised thereof the Guarantor shall not have the right to claim his release on account of any conduct alleged to be prejudicial to the Guarantor. Without derogating from the foregoing compromise, extension of the construction period, indulgence, release or variation of the *Contractor's* obligation shall not affect the validity of this performance bond.

4. This bond will lapse on the earlier of

   - the date that the Guarantor receives a notice from the *Project Manager* stating that the Completion Certificate for the whole of the *works* has been issued, that all amounts due from the *Contractor* as certified in terms of the contract have been received by the *Employer* and that the *Contractor* has fulfilled all his obligations under the Contract, or

   - the date that the Surety issues a replacement Performance Bond for such lesser or higher amount as may be required by the *Project Manager*.

5. Always provided that this bond will not lapse in the event the Guarantor is notified by the *Project Manager*, (before the dates above), of the *Employer's* intention to institute claims and the particulars thereof, in which event this bond shall remain in force until all such claims are paid and settled.

6. The amount of the bond shall be payable to the *Employer* upon the *Employer's* demand and no later than 7 days following the submission to the Guarantor of a certificate signed by the *Project Manager* stating the amount of the *Employer's* losses, damages and expenses incurred as a result of the non-performance aforesaid. The signed certificate shall be deemed to be conclusive proof of the extent of the *Employer's* loss, damage and expense.

7. Our total liability hereunder shall not exceed the sum of:

   (say) _____

   R _____

8. This Performance Bond is neither negotiable nor transferable and is governed by the laws of the Republic of South Africa, subject to the jurisdiction of the courts of the Republic of South Africa

Signed at _____ on this _____ day of _____ 2024

| | | |
|---|---|---|
| Signature(s) | | |
| Name(s) (printed) | | |
| Position in Guarantor company | | |
| Signature of Witness(s) | | |
| Name(s) (printed) | | |

# PART 2: PRICING DATA

| Document reference | Title | No of pages |
|---|---|---|
| C2.1 | Pricing instructions: Option B | 5 |
| C2.2 | The *bill of quantities* | 17 |

# 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 and 2013 (ECC) 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.<br><br>(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.<br><br>(28) The Price for Work Done to Date is the total of<br><br>• the quantity of the work which the *Contractor* has completed for each item in the Bill of Quantities multiplied by the rate and<br><br>• a proportion of each lump sum which is the proportion of the work covered by the item which the *Contractor* has completed.<br><br>Completed work is work without Defects which would either delay or be covered by immediately following work.<br><br>(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 ECC 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.

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

## 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.

[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 scopes of work

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*

## 2.4. Amplification of or assumptions about measurement items

For the avoidance of doubt the following is provided to assist in the interpretation of descriptions given in the *method of measurement*. In the event of any ambiguity or inconsistency between the statements in the *method of measurement* and this section, the interpretation given in this section shall be used.

# C2.2 The *bill of quantities*

| East London Grain Elevator Substation Refurbishment | | | | | | |
|---|---|---|---|---|---|---|
| **ITEM** | **PAY REF** | **DESCRIPTION** | **UNIT** | **QTY** | **RATE** | **AMOUNT** |
| | | **SECTION 1** | | | | |
| 1 | | **PRELIMINARY & GENERAL** | | | | |
| | | | | | | |
| | | **NOTE:**<br>Tenderers are to price this Schedule strictly in accordance with the Specifications and SANS 1200, where a conflict arises between these two documents the Specifications shall take precedence. Where a conflict arises between this Schedule and the Specifications, the Specifications shall take precedence. Tenderers shall study all relevant information before pricing this Schedule and the Schedule shall be priced to provide the complete Works | | | | |
| | | | | | | |
| | | To be read in conjunction with but not limited to the following Project Technical Specification(s):<br>Part C3: Works Information | | | | |
| | | | | | | |
| | **SANS 1200 A** | **GENERAL** | | | | |
| | | | | | | |
| **1.1** | **PSA 8.3** | **SCHEDULED FIXED-CHARGE ITEMS** | | | | |
| | | | | | | |

| ITEM | PAY REF | DESCRIPTION | UNIT | QTY | RATE | AMOUNT |
|---|---|---|---|---|---|---|
| 1.1.1 | 8.3.1 | **Contractual requirements** | | | | |
| | | | | | | |
| | | a) Sureties | Sum | 1 | | |
| | | | | | | |
| | | b) Insurance of the works and plant | Sum | 1 | | |
| | | | | | | |
| | | c) Third party or public liability insurance | Sum | 1 | | |
| | | | | | | |
| | | d) Unemployment insurance | Sum | 1 | | |
| | | | | | | |
| | | e) Performance security as per *Employer's* requirements | Sum | 1 | | |
| | | | | | | |
| | **PSA 8.3.2** | **ESTABLISHMENT OF FACILITIES ON THE SITE** | | | | |
| | | | | | | |
| 1.1.2 | PSA 8.3.2.1 | **FACILITIES FOR CONTRACTOR** | | | | |
| | | | | | | |
| | | a) Offices and storage sheds (1 No. Offices 1 No. Sheds) | Sum | 1 | | |
| | | | | | | |
| | | e) Ablution and latrine facilities | Sum | 1 | | |
| | | | | | | |
| | | f) Tools and equipment | Sum | 1 | | |

| ITEM | PAY REF | DESCRIPTION | UNIT | QTY | RATE | AMOUNT |
|---|---|---|---|---|---|---|
| | | g) Water supplies, electric power and communications | Sum | 1 | | |
| | | | | | | |
| | | h) Access | Sum | 1 | | |
| | | | | | | |
| | | | | | | |
| **1.1.4** | **PSA-8.3.3** | **OTHER FIXED-CHARGE OBLIGATIONS** | | | | |
| | | | | | | |
| | | a) Management meetings | Sum | 1 | | |
| | | | | | | |
| | | b) Documentation control including provision and/ or submission for approval of all *Contractor's* documents as part of the execution of the works | Sum | 1 | | |
| | | | | | | |
| | | c) Safety risk management including but not limited to the Safety Plan as required by the Occupational Health and Safety Act, Act 85 of 1993 | Sum | 1 | | |
| | | | | | | |
| | | d) Environmental management including but not limited to Environmental Method Statements in accordance with the Construction Environmental Management Plan | Sum | 1 | | |
| | | | | | | |
| | | e) Quality assurance requirements | Sum | 1 | | |
| | | | | | | |

| ITEM | PAY REF | DESCRIPTION | UNIT | QTY | RATE | AMOUNT |
|---|---|---|---|---|---|---|
| | | f) Site security requirements | Sum | 1 | | |
| | | | | | | |
| | | g) Programming | Sum | 1 | | |
| | | | | | | |
| | | h) Industrial relations management | Sum | 1 | | |
| | | | | | | |
| | | i) Operation and maintenance manuals of the installation, operation and maintenance manuals and drawings for the equipment under this contract | | | | |
| | | | | | | |
| | | i) Draft copies, three [3] in number | Sum | 1 | | |
| | | | | | | |
| | | ii) Final copies, number to be confirmed by *Employer* | Sum | 1 | | |
| | | | | | | |
| 1.1.5 | PSA-8.3.5 | ***Contractor's* design** | | | | |
| | | | | | | |
| 1.1.5.1 | PSA-8.3.5.1 | Design including but not limited to: | | | | |
| | | | | | | |
| | | a) Engineering package including detailed manufacturer design of MV and LV distribution panels, medium voltage switch gear and associated protection & control systems panels,HVAC, Power Factor Correction and Fire Systems | Sum | 1 | | |
| | | | | | | |

| ITEM | PAY REF | DESCRIPTION | UNIT | QTY | RATE | AMOUNT |
|---|---|---|---|---|---|---|
| | | b) Drawing submissions (all submissions for approval and/ or review by the *Employer*) | Sum | 1 | | |
| | | | | | | |
| | | c) Compilation and provision of as-built documentation in both electronic and hard copy format, including but not limited to test and commissioning certificates, check lists, drawings etc. **Note: All as-built drawings shall be provided in 4xCD roms with Adobe Acrobat (PDF & Native format)** | Sum | 1 | | |
| | | | | | | |
| | | | | | | |
| 1.1.6 | 8.3.4 | **REMOVAL OF SITE ESTABLISHMENT** | | | | |
| | | | | | | |
| | | a) Removal of site establishment | Sum | 1 | | |
| | | | | | | |
| 1.2 | PSA 8.4 | **TIME-RELATED ITEMS** | | | | |
| | | | | | | |
| | PSA 8.4 | **SCHEDULED TIME-RELATED ITEMS** | | | | |
| | | | | | | |
| 1.2.1 | 8.4.1 | **Contractual requirements** | | | | |
| | | | | | | |
| | | a) Sureties | Sum | 1 | | |

| ITEM | PAY REF | DESCRIPTION | UNIT | QTY | RATE | AMOUNT |
|---|---|---|---|---|---|---|
| | | b) Insurance of the works and plant | Sum | 1 | | |
| | | | | | | |
| | | c) Third party or public liability insurance | Sum | 1 | | |
| | | | | | | |
| | | d) Unemployment insurance | Sum | 1 | | |
| | | | | | | |
| | | e) Performance security as per *Employer's* requirements | Sum | 1 | | |
| | | | | | | |
| | | f) Other | Sum | 1 | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | PSA 8.4.2 | **OPERATION AND MAINTENANCE OF FACILITIES ON SITE, FOR DURATION OF CONSTRUCTION, EXCEPT WHERE OTHERWISE STATED** | | | | |
| | | | | | | |
| 1.2.3 | 8.4.2.2 | **FACILITIES FOR *CONTRACTOR*** | | | | |
| | | | | | | |
| | | a) Offices and storage sheds ( 1 No. Offices 1 No. Sheds) | Sum | 1 | | |
| | | | | | | |
| | | b) Ablution and latrine facilities | Sum | 1 | | |
| | | | | | | |

| ITEM | PAY REF | DESCRIPTION | UNIT | QTY | RATE | AMOUNT |
|---|---|---|---|---|---|---|
| | | c) Tools and equipment | Sum | 1 | | |
| | | | | | | |
| | | d) Access | Sum | 1 | | |
| | | | | | | |
| 1.2.4 | 8.4.3 | **SUPERVISION FOR DURATION OF CONSTRUCTION** | | | | |
| | | | | | | |
| | | a) Supervision for the duration of construction | Sum | 1 | | |
| | | | | | | |
| 1.2.5 | 8.4.4 | **COMPANY AND HEAD OFFICE OVERHEAD COSTS FOR THE DURATION OF THE CONTRACT** | | | | |
| | | | | | | |
| | | a) Company and head office overhead costs for the duration of the contract | Sum | 1 | | |
| | | | | | | |
| | | | | | | |
| 1.2.6 | PSA-8.4.5 | **OTHER TIME-RELATED OBLIGATIONS** | | | | |
| | | | | | | |
| | | a) Management meetings | Sum | 1 | | |
| | | | | | | |
| | | b) Documentation control including provision and/ or submission for approval of all *Contractor's* documents as part of the execution of the works | Sum | 1 | | |
| | | | | | | |

| ITEM | PAY REF | DESCRIPTION | UNIT | QTY | RATE | AMOUNT |
|---|---|---|---|---|---|---|
| | | c) Occupational Health and Safety Specification compliance | Sum | 1 | | |
| | | | | | | |
| | | d) Construction Environmental Management Plan compliance | Sum | 1 | | |
| | | | | | | |
| | | e) Quality assurance requirements | Sum | 1 | | |
| | | | | | | |
| | | f) Site security requirements (PSIRA Registered) | Sum | 1 | | |
| | | | | | | |
| | | g) Programming and progress reporting | Sum | 1 | | |
| | | | | | | |
| | | j) Transportation | Sum | 1 | | |
| | | | | | | |
| | | | | | | |
| | | **TOTAL CARRIED TO SUMMARY** | | | | |
| | | | | | | |

| ITEM NO. | ITEM DESCRIPTION | QUANTITY | UNIT | SUPPLY RATE | INSTALLATION RATE | TOTAL |
|---|---|---|---|---|---|---|
| | **SECTION 2**<br><br>**NOTE**<br><br>This Bill of Quantities shall be read in conjunction with the drawings, works information and the specifications and shall be priced to provide a complete installation, i.e. the supply where required, installation, testing and commissioning plus handing over of the fully functional equipment / installation. **The *Contractor* to furnish all design and shop drawings if applicable and any associated equipment specifications for approval prior to manufacturing and delivery to site** | | | | | |
| | To be read in conjunction with but not limited to the following Project Technical Specification(s): Part C3: Works Information | | | | | |
| **A** | **PREPARATION WORKS FOR THE PROPOSED SUBSTATION** | | | | | |
| | | | | | | |
| 1 | Disconnect and removal of the existing MV switchgear, LV switchgear and battery bank to be replaced. | 2 | sum | | | |
| | **TOTAL** | | | | | |

| B | MEDIUM VOLTAGE SWITCHGEAR | | | | | |
|---|---|---|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Design, supply, and install a new 1250A 11kV incomer VCB panel. | 2 | ea | | | |
| 2 | Design, supply, and install a new 1250A 11kV bus section VCB panel. | 1 | ea | | | |
| 3 | Design, supply, and install a new 630 11kV feeder VCB panel. | 3 | ea | | | |
| 4 | Design, supply a new spare 630 11kV feeder VCB panel. | 1 | ea | | | |
| 5 | Design supply and install a 11kV bus-riser panels/bus-bar Earth /VT panels. | 1 | ea | | | |
| 6 | Design, supply, install and commission a complete arc ducting and protection system for the 11kV switchgear | 1 | Sum | | | |
| 7 | Design, supply, install a battery bank (enclosed in a cabinet) and battery terminal unit for the 11kV switchgear complete with protection and wiring. | 1 | Sum | | | |
| 8 | Provision of racking tools | 1 | Sum | | | |
| | **TOTAL** | | | | | |

| C | LOW VOLTAGE SWITCHGEAR | | | | | |
|---|---|---|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Design, supply, and install a new LV switchgear including new standard terminations for the existing incomer and feeder. | 1 | Sum | | | |
| 2 | design, supply, and install a control panel for the proposed MV switchgear complete with cabling. | 1 | Sum | | | |
| | **TOTAL** | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **D** | **ELECTRICAL, LIGHTING AND POWER** | | | | | |
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| **1** | Design, supply, and install a new lighting and small power | 1 | Sum | | | |
| | **TOTAL** | | | | | |
| **E** | **TRANSFORMERS** | | | | | |
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Design supply and install a stainless-steel containment tray around the existing transformers | 3 | ea | | | |
| | **TOTAL** | | | | | |
| **F** | **MEDIUM VOLTAGE CABLE TERMINATION** | | | | | |
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Supply new 630A Feeder MV plug type terminations designed to EN 50181 and DIN 47637. | 14 | ea | | | |
| 2 | Supply new 1250A Incomer MV plug type terminations designed to EN 50181 and DIN 47637. | 7 | ea | | | |
| | **TOTAL** | | | | | |

| G | Earthing and Lightning Protection | | | | | |
|---|---|---|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Design, supply, and install earthing and lightning surge protection for the proposed substation upgrades. | 1 | Sum | | | |
| | **TOTAL** | | | | | |

| H | Cables, Routes, and Building Modifications | | | | | |
|---|---|---|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Provisional sum for the replacement of old chequered plates and sealing of cable entry/exit opening | 1 | Sum | | | |
| 2 | Provisional sum for the building refurbishments. | 1 | Sum | | | |
| 3 | Provisional sum for the testing, joining and replacement of cables. | | | | | |
| 3.1 | Supply, install, and commission150mm2 XLPE SWA Cu 11kV 3 core cable | 300 | m | | | |
| 3.2 | Supply, install, and commission 95mm2 XLPE SWA Cu 11kV cable | 300 | m | | | |
| 3.3 | 630mm2 XLPE SWA Cu 11kV 1 core cable | 200 | m | | | |
| 3.4 | Select, Supply, and install MV cables transition joints (150mm2, 11kV, 3 core Paper oil impregnated to 3 core XLPE cable.) | 4 | ea | | | |

| ITEM NO. | ITEM DESCRIPTION | QUANTITY | UNIT | SUPPLY RATE | INSTALLATION RATE | TOTAL |
|---|---|---|---|---|---|---|
| 3.5 | Select, Supply, and install MV cables transition joints (95mm2, 11kV, 3 core XLPE cable to 1 core XLPE cables). | 5 | ea | | | |
| 3.6 | Select, Supply, and install MV cables transition joints (150mm2, 11kV, 3 core XLPE cable to 1 core XLPE cables). | 3 | ea | | | |
| 4 | Replacement of substation doors and provision of signages. | 1 | Sum | | | |
| 5 | Refurbishment of Transformers | 3 | ea | | | |
| | **TOTAL** | | | | | |
| | | | | | | |
| **I** | **Power System Protection** | | | | | |
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Load flow, short circuit and protection grading study and configuration. | 1 | Sum | | | |
| 2 | Provision of a standalone ETAP licenced software. | 1 | ea | | | |
| | **TOTAL** | | | | | |
| | | | | | | |

| J | Power Quality | | | | | |
|---|---|---|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Provisional sum for Power Factor Correction | 1 | Sum | | | |
| 2 | Provisional sum for Harmonic Filtration | 1 | Sum | | | |
| | **TOTAL** | | | | | |

| K | HVAC and Fire | | | | | |
|---|---|---|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Design, supply and installation of the fire detection and suppression system. | 1 | Sum | | | |
| 2 | Design, supply and installation of the HVAC/climate control plant (Pressurising). | 1 | Sum | | | |
| | **TOTAL** | | | | | |

| L | Testing and Commissioning | | | | | |
|---|---|---|---|---|---|---|
| **ITEM NO.** | **ITEM DESCRIPTION** | **QUANTITY** | **UNIT** | **SUPPLY RATE** | **INSTALLATION RATE** | **TOTAL** |
| 1 | Test and commission the entire installation. The contractor shall issue test, certificates, user manuals and as-built drawings. **(Refer to works information)** | 1 | Sum | | | |
| | **TOTAL** | | | | | |
| | **TOTAL TENDER AMOUNT** | | | | | |

| ITEM | DESCRIPTION | UNIT | QTY | AMOUNT |
|---|---|---|---|---|
| | **SUMMARY** | | | |
| | **SECTION 1** | | | |
| 1 | Preliminary and General | sum | 1 | |
| | **SECTION 2** | | | |
| A | Preparation works for the proposed substation upgrades | sum | 1 | |
| B | Medium voltage switchgear | sum | 1 | |
| C | Low voltage switchgear | sum | 1 | |
| D | Electrical, Lighting and Power | sum | 1 | |
| E | Transformers | sum | 1 | |
| F | Medium Voltage Cable Termination | sum | 1 | |
| G | Earthing and Lightning Protection | sum | 1 | |
| H | Cables, Routes, and Building Modifications | sum | 1 | |
| I | Power System Protection | sum | 1 | |

| | | | | |
|---|---|---|---|---|
| J | Power Quality | sum | 1 | |
| K | HVAC and Fire | sum | 1 | |
| L | Testing and Commissioning | sum | 1 | |
| | **TOTAL DIRECT COST** | | | |

**Note:** Total of the Prices must be transferred to the Form of Offer

SANKOFA
Insurance Brokers

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Post : Postnet Suite 221, Private Bag X51, Rivonia, 2128
1st Floor, Block E, Edenburg Terraces, 348 Rivonia Boulevard, Rivonia, 2128

**To Whom It May Concern**,

**CERTIFICATE OF INSURANCE: TRANSNET (SOC) LIMITED – PRINCIPAL CONTROLLED INSURANCE**

In our capacity as Insurance Brokers to the Transnet Group of Companies, we hereby certify that the undermentioned insurances are currently in place:

| | |
|---|---|
| INSURED: | Transnet (SOC) Limited |
| PERIOD: | 1 April 2024 to 31 March 2025 (Both days inclusive) |
| DIVISION: | Transnet Freight Rail, Transnet Engineering, Transnet Properties, Transnet Pipelines, Transnet National Ports Authority and Transnet Port Terminals |
| THE INSURED'S VAT NO: | 4720103177 |
| THE INSURED'S COMPANY REGISTRATION NO: | 1990/000900/30 |
| POSTAL ADDRESS (Head Office) | Carlton Centre, 150 Commissioner Street, Johannesburg, 2001 |

**CONTRACT WORKS INSURANCE**

| | |
|---|---|
| Cover Provided : | Contract Works - Physical loss or damage to the Property Insured which being materials, plant and other things for incorporation into the permanent works. |
| Insurer : | Mirabilis (Santam Limited) |
| Policy Number : | MZAR35023-CAR |
| The Contract Site : | Any location within the Territorial Limits upon which The Insured Contract is to be executed or carried out as more fully defined in The Insured Contract documents together with so much of the surrounding area as may be required or designated for the performance of The Insured Contract. |
| Territorial Limits : | The Republic of South Africa. |
| Additional Co-Insureds: | |
| The Contractor: | All Contractors undertaking work in connection with The Insured Contract including the Employer to the extent that the Employer undertakes work in connection with The Insured Contract; |
| Sub-Contractors: | All Sub-Contractors employed by the Contractor and all other Sub- Contractors (whether nominated or otherwise) engaged in fulfilment of The Insured Contract; and to the extent required by any contract or agreement; transporters, suppliers, manufacturers, vendors, other persons, persons providing storage facilities, plant |

owners and/or operators in respect of liability loss or damage arising out of The Insured Contract; project managers, architects, land surveyors, quantity surveyors, engineers and other advisors or consultants or sub-consultants appointed in the performance of the Insured Contract activities arising at the Contract Site provided always that any such person shall not be insured hereunder in respect of liability loss or damage arising out of such person's error or omission in the performance of the professional services for which he was appointed;

Provincial & Government: any Local Provincial or Government Department with which the Insured enters into any contract or agreement for the performance of The Insured Contract;
all for their respective rights and interests.

Insured Contracts : All Contracts (including any undertaking awarded or commenced prior to Inception of the Period of Insurance) involving design, construction, Performance Testing and Commissioning in respect of the Works and shall Include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **excluding;**

a) contracts which at award stage have a value in excess of R 1,000,000,000;

b) contracts with an estimated construction period exceeding 48 months but increasing to 60 months in respect of rail maintenance contracts and Transnet Freight and Rail contracts for logistical support for inline inspections and identification of defects over a 5 year period in respect of Transnet's pipeline assets (excluding Defects Liability/Maintenance period);

c) contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured;

d) contracts in or on any aircraft;

e) Off-shore contracts;

f) Wet Risk Contracts which at award exceeds R500,000,000;

g) Dam Contracts

h) Tunnel contracts which at award exceeds R50,000,000;

i) Tunnel contracts using tunnel boring machines;

j) Underground Mining Contracts;

k) Horizontal Directional Drilling Contracts which at award exceeds R50,000,000;

l) Horizontal Directional Drilling Contracts where total drilling exceeds 1 km;

m) Horizontal Directional Drilling Contracts for pipe diameters greater than 76 cm.

*Definitions*

1. *"Off-shore contracts" means all works and installations in the sea or on the seabed including dredging which are accessible only by ship boat barge or helicopter and do not constitute normal wet works like harbours moles bridges wharves or sewage or cooling water intake or outlet facilities. "OffShore Contracts" shall include oilrigs and oil platforms (but not including oil platforms when connected to the land on completion). The term shall not apply to pre-fabrication works on land associated with an Off-Shore Contract.*

2 *"Wet Risk Contracts" shall mean any Contract and/or Works where more than thirty-five (35) percentile of its value is in a permanent body of water or is below the high water mark of any tidal body of water. The term shall include contracts for the construction of wharves, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to on-shore facilities and canal developments. Wet Risks shall exclude Off- Shore Contracts;*

3 *"Dam Contracts", which term shall include weirs and hydroelectric projects involving the construction of dams or weirs;*

4 *"Horizontal Directional Drilling Contracts", means micro-tunnelling work for the construction of tunnels utilising surface based horizontal directional drilling equipment.*

5 *Tunnels" means Tunnels (Including declines) involving all of the following;*
- *(a)* Works below ground level; and
- *(b)* Tunnelling machinery below ground level; and
- *(c)* A tunnelling crew operating the machinery below ground level;
- *(d)* But shall not include Horizontal Directional Drilling Contracts

6 *"Horizontal Directional Drilling Contracts", means micro-tunnelling work for the construction of tunnels utilising surface based horizontal directional drilling equipment.*

7 *"Underground Mining Contracts", which shall mean any contract involving underground mining.*

Testing Period: 120 Days not consecutive.

Maintenance Period : 12 Months

Main Policy Extensions :

- Costs & Expenses - Limited to a maximum of R50,000,000.
- Expediting Measures – Limited to a maximum of R50,000,000.
- Professional Fees In Reinstatement Of Property Insured - Limited to a maximum of R50,000,000.
- Costs & Expenses For Removal Of Debris No Damage - Limited to a maximum of R50,000,000.
- Surrounding Property in care custody or control of the contractor – Limited to a maximum of R55,000,000.
- Fire Brigade & Public Authorities - Limited to a maximum of R10,000,000.
- Public Authority Reinstatement Costs - Limited to a maximum of R20,000,000
- Public Relationship Costs - Limited to a maximum of R1,000,000.
- Records - Limited to a maximum of R2,000,000.
- Removal to Gain Access - Limited to a maximum of R20,000,000

- Road Reserve and Servitude Extensions - Limited to a maximum of R10,000,000
- Search & Locate Costs - Limited to a maximum of R20,000,000.
- Borrowing Of Plant For Commissioning Purposes - Limited to a maximum of R10,000,000
- Escalation during Construction – 30%
- Marine Contribution Clause
- Claim Preparation Costs – Limited to a maximum of R10,000,000

Main Policy Exclusions :

- War
- Nuclear Energy Risks
- Terrorism
- Computer Loss General Exception
- DE4 (All types of Works) for defective material workmanship design plan or specification.
- LEG 3 (Mechanical or Electrical Engineering Works only) for defective material workmanship design plan or specification. Limited to maximum of 10% of the total estimated contract value in the aggregate.
- Loss or damage arising during air transit or any ocean voyage or whilst in storage thereafter.
- Occurring during any defects/maintenance period unless cause occurred prior to such defects/maintenance period
- Disappearance or by shortage revealed during routine inventory or periodic stocktaking.
- Consequential loss of whatsoever nature.
- Normal wear and tear, normal atmospheric conditions, rust, erosion, corrosion or oxidisation.
- Due to its own explosion breakdown or derangement occurring after the Testing Period which has operated under load conditions.
- Second hand property due to its own electrical or mechanical breakdown or explosion.
- Cyber and Data
- Beneficial Occupation – 12 months
- Risk Mitigation – Safety Measures with Respect to Precipitation, Flood and Inundation – 10 years return period

Deductibles: In respect of loss or damage:

Major Perils shall mean damage caused by storm, rain, tempest, wind, flood, theft, malicious damage, subsidence, collapse, earthquake, testing or commissioning and the consequences of defective design, specification, materials or workmanship (DE4).

Minor Perils shall mean damage caused by a peril not defined as Major Perils defined above.

| Contracts with a contract value : | Major perils | Minor perils |
|---|---|---|

| | | |
|---|---|---|
| 0 to R100,000,000 | R25,000 | R15,000 |
| R100,000,001 to R250,000,000 | R50,000 | R15,000 |
| R250,000,001 to R500,000,000 | R100,000 | R25,000 |
| R500,000,001 to R1,000,000,000 | R150,000 | R25,000 |

Minimum wet risk deductible of R100,000 per occurrence to apply.

Electrical Cables, Wiring and Accessories 10% of claim minimum R100,000

LEG 3 Deductible (Only in respect of Mechanical and Electrical contracts);

| Contracts with a contract value | Deductible |
|---|---|
| 0 to R500,000,000 | R1,000,000 per occurrence |
| R500,000,001 to R1,000,000,000 | R1,500,000 per occurrence |

**PUBLIC LIABILITY**

Cover Provided : Contract Works Public Liability – cover the Insured's legal liability in respect of loss or damage or injury to third parties arising out of work performed in respect of the Insured Contracts.

Insurer : Stalker Hutchinson (Santam Limited)

Policy Number: 6000/132335

Territorial Limits : The Republic of South Africa.

Insured Contracts: All contracts (including any undertaking awarded or commenced prior to inception of the period of Insurance) involving design, construction, performance testing and commissioning in respect of the works and shall include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **Excluding**:

a) Contracts which at award stage have a value in excess of R 1,000,000,000.
b) Contracts with an estimated construction period at award exceeding 48 months but 60 months in respect of contracts awarded prior to 1 April 2020 for rail maintenance contracts For Transnet Freight & Rail and for Transnet Pipeline's logistical support for inline inspections and identification of defects in respect of Transnet's pipeline assets (all excluding Defects Liability/Maintenance period).
c) Contracts with a Contractual Defects Liability Maintenance Period exceeding 24 months.
d) Contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured.
e) Contracts in or on any aircraft.
f) Off-shore contracts - "Off-shore contracts" means all works and installations in the sea or on the seabed and do not constitute normal Wet Risk Contracts like

harbours, moles, bridges, wharves or sewage or cooling water intake or outlet facilities, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to onshore facilities and canal developments. "Off-Shore contracts" shall include oilrigs and oil platforms.

Policy Limits:

| | |
|---|---|
| Contractors Public Liability | R100,000,000 any one occurrence / unlimited during the Period of Insurance |
| Contractors Negligent Removal or weakening of Support | R100 000 000 any one occurrence and R100,000,000 per site in the aggregate during the Period of Insurance. |
| Statutory Legal Defence Costs | *R5 000 000 in the aggregate during the Period of Insurance. |
| Arrest / Assault / Defamation | *R5 000 000 in the aggregate during the Period of Insurance. |
| Prevention of Access | *R5 000 000 in the aggregate during the Period of Insurance. |
| Trespass / Nuisance | *R5 000 000 in the aggregate during the Period of Insurance. |
| Claims Preparation Costs | R5 000 000 any one occurrence |

*Where the limits are noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

Deductible(s) : R50,000 per occurrence but increased to R5,000,000 in respect of Spread of Fire and/or Hot Works and R250,000 in respect of Sudden and Accidental Pollution and/or Goods on the Hook and/or R150,000 in respect of Developers Removal of Support.

General Policy Exclusions :

The policy does not cover:-

- deliberate, conscious and intentional disregard to take reasonable precautions.
- fines, penalties, punitive and exemplary damages.
- Pollution unless caused by a sudden, unintended and unexpected occurrence.
- cost of removing, nullifying or cleaning up the effects of pollution unless caused by a sudden, unintended and unexpected occurrence.
- the hazardous nature of asbestos.
- War And Terrorism Risks.
- Nuclear Risks.

- Actual or alleged unlawful competition, unfair practices, abuse of monopoly power, cartel activities
- Compulsory Insurance
- Loss or damage and any consequence therefrom to any Data. •
- Sanctions Exclusion
- Grid Failure

**PROFESSIONAL INDEMNITY**

| | |
|---|---|
| Cover Provided : | Professional Indemnity<br>a) In respect of damages which the Insured shall become legally liable to pay in consequence of neglect, error or omission by or on behalf of the Insured in the conduct or execution of their Professional Activities and Duties as defined.<br>b) Prior To Handover/Rectification - against loss arising out of any defect in the works discovered prior to the issue of any practical completion or take-over certificate provided that any such defects are caused by a negligent breach of a Professional Activity or Duty by the Insured in consequence of neglect, error or omission by or on behalf of the Insured. |
| Insurer : | Stalker Hutchinson (Santam Limited) |
| Policy Number: | 6000/132337 |
| Jurisdiction : | Worldwide excluding North America |
| Insured Contracts: | All contracts (including any undertaking awarded or commenced prior to inception of the period of Insurance) involving design, construction, performance testing and commissioning in respect of the works and shall include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **Excluding**:<br>a) Contracts which at award stage have a value in excess of R 1,000,000,000.<br>b) Contracts with an estimated construction period at award exceeding 48 months (excluding Defects Liability/Maintenance period).<br>c) Contracts with a Contractual Defects Liability Maintenance Period exceeding 24 months.<br>d) Contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured.<br>e) Contracts in or on any aircraft.<br>f) Off-shore contracts - “Off-shore contracts” means all works and installations in the sea or on the seabed and do not constitute normal Wet Risk Contracts like harbours, moles, bridges, wharves or sewage or cooling water intake or outlet facilities, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to onshore facilities and canal developments. "Off-Shore contracts" shall include oilrigs and oil platforms. |

| | | |
|---|---|---|
| Limit Of Indemnity: | Professional Indemnity - | *R100,000,000 in the aggregate during the policy period of insurance. |

*Where the limit is noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

| | | |
|---|---|---|
| Policy Extension Limits Of Indemnity: | Claims Preparation Costs - | *R7,500,000 in the aggregate during the policy period of insurance. |
| | Loss of Documents - | *R2,000,000 in the aggregate during the policy period of insurance. |
| | Statutory Defence Costs - | *R5,000,000 in the aggregate during the policy period of insurance. |
| | Defamation - | *R5,000,000 in the aggregate during the policy period of insurance. |
| | Infringement of Copyright - | *R5,000,000 in the aggregate during the policy period of insurance. |

*Where the limits are noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

| | |
|---|---|
| Deductibles: | R5,000,000 each and every but R10,000 in respect of Claims Preparation Costs, Loss of Documents, Statutory Defence Costs, Defamation and Infringement Of Copyright. |
| Policy Special Conditions : | Condition precedent to liability that the Insured is fully qualified and registered with the relevant Industry Body/Association in terms of legislation as applicable. |

Prior to hand over/rectification – the insured must give prior written notice to the Insurers of the intention to take remedial action to rectify such defect and obtain the Insurers' written agreement to such action being taken and the costs and expenses expected to be expended.

Policy Main Exclusions:

- Excludes all consequential loss other than cost of re-design, rectification and replacement as a consequence of the defect.
- Excludes Supervision.
- Excludes liability arising out of environmental impairment / pollution
- Excludes the cost of removing, nullifying or cleaning-up the effects of environmental impairment/ pollution.
- Excludes war, invasion, acts of foreign enemies, hostilities or warlike operations (whether war be declared or not), civil war, rebellion, revolution, insurrection, civil commotion assuming the proportions of or amounting to an uprising, military or usurped power, any act of terrorism and nuclear risks.
- Excludes fines, penalties, punitive and exemplary damages, multiplication of compensatory damages and/or any other noncompensating damages of any kind.

- Excludes liability from the hazardous nature of asbestos.
- Excludes medical malpractice.
- Excludes failure to meet contractual requirements relating to efficiency, output or durability.
- Excludes failure to meet completion dates
- Excludes the estimation of probable costs other than cost advice and cost planning services normally provided by a Quantity Surveyor or Project manager.
- Excludes incorrect authorisation of payment.
- Excludes breach of any statutory regulation.
- Excludes liability from the insolvency, liquidation or judicial management of the Insured.
- Excludes the certification of value of work executed by any contractor where the Insured has an equity interest in such contractor;
- Excludes liability due to unlawful competition, unfair practices, abuse of monopoly power, cartel activities or breach of a competitions ac
- Sanctions Exclusion
- Grid Failure

**This certificate of the insurance cover arranged is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policies issued by Insurers.**

Dennis Govender

Chief Broking Officer

**PART C3: SCOPE OF WORK**

| Document reference | Title | No of page |
|---|---|---|
| | This cover page | 1 |
| C3.1 | *Employer's Works* Information | 71 |
| | *Annexures* | 1 |
| | | |
| | **Total number of pages** | **73** |

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|---|---|---|---|---|---|
| 00 | July 2024 | 00 | Nowhi Hloma | McDonald Tsubella | Adriaan Stadler |
| | | | | | |

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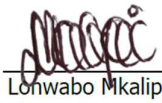
Reviewed by:  09.07.2024
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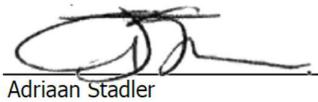
Approved by:  12.07.2024
Adriaan Stadler
Senior Engineering Manager
Date

# Contents

# SECTION *1*

## 1 Description of the *Works*

### 1.1 Background

The East London Multi-Purpose Terminal (EL MPT) consists of a Car Terminal, Grain Terminal, Breakbulk and Container handling facilities. The EL Grain Elevator is the largest grain silo in the South African coastline. Grain is received from a vessel and stacked to the silos through the grain elevator and/or grain is offloaded from the silo to the vessel through the grain elevator. The grain elevator consists of 8 bucket elevators and 12 conveyor belts. It is supplied by the Basement substation that is connected on a ring feed with 12th floor substation. Both these substations are connected to the national Grid through TNPA main substation.

The purpose of the substations are to supply power to the end user by varying the voltage levels, frequency and other aspects. Substations are key to the infrastructure of Transnet Port Terminals by supplying various equipment and machinery with the required power in order to ensure continues operations.

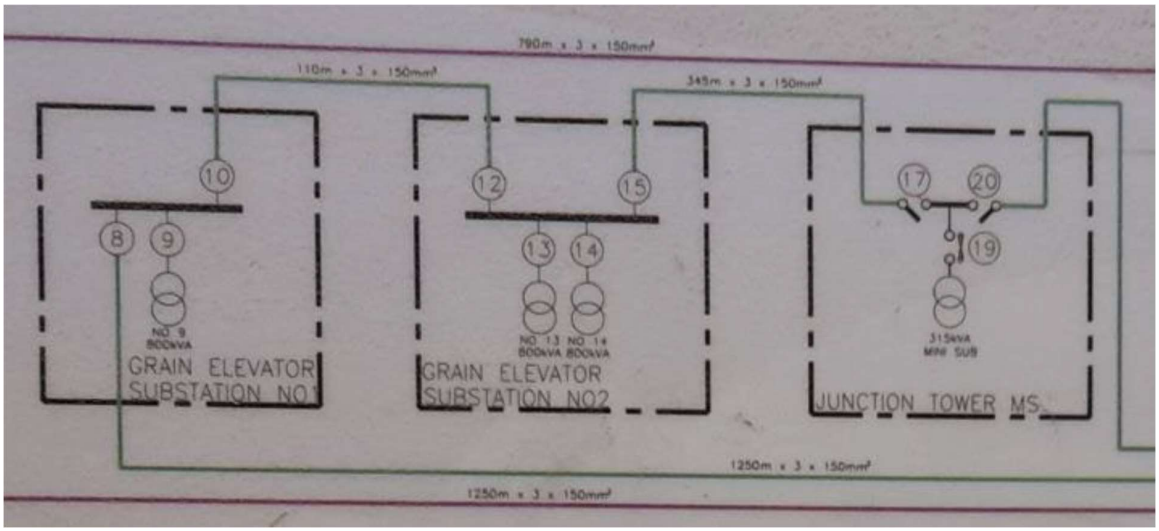



*Fig 1: EL MPT MV Schematic*

The line diagram above shows the two-grain elevator substations fed from TNPA Main substation.

## 1.2 Problem Statement

East London Grain Elevator substations were commissioned in 1963 and have been operating with equipment that have reached its life span and over. The substations still have old equipment such as oil circuit breakers, mechanical operated relays, CT's, VT`s, old analogue voltmeters, and ammeters as well as deteriorating Paper Insulated Lead Covered (PILC) cables. The Grain Elevator substations supplies power to the grain elevator Facility.

TPT is responsible for the maintenance and safety their own substations. As part of maintenance activities, switching is necessary. The existing equipment and technology in the substations are old and poses a safety risk to the Maintenance personnel and the facility itself. The existing equipment is obsolete and result in maintenance challenges due to lack of replacement spares on the market. It is important to ensure the required spares are readily available in case of a breakdown to ensure substation equipment operate safely and reliable.

## 1.3 Project High Level Scope:

The works that the *Contractor* is to perform include but is not limited to the following:

- Upgrade of Grain Elevator Substation 1
- Upgrade of Grain Elevator Substation 2
- The *employer's* scope of works is based on the conditional assessment reports that will be made available to the contractor. This shall include a network single line diagram which will be provided to assist with pricing of the works.
- High level designs and specifications shall be provided by the *employer*.
- Supply and install medium voltage switchgear.
- Supply and install low voltage switchgear.
- Size, supply and install Battery Tripping Unit.
- Supply and install anti condensation heaters.
- Supply and install power factor correction.
- Supply and install LV cables.
- Earthing and lightning protection system for the substation.
- Design, Supply, Installation, Testing, Commissioning, Certification and Handover of HVAC positive pressurised system and HVAC cooling system for substation 1 and substation 2.
- Perform MV switchgear protection setting calculations, relay coordination and grading, and relay programming.
- Test, commission, and handover the MV and LV switchgear.

- Make good of the substation walls and floors.
- Design, Supply, Installation, Testing, Commissioning, Handover and Certification of Gaseous Fire Detection and Suppression System as well as relevant fire extinguishers and fire signage associated with substation 1 and substation 2.
- The contractor shall provide all the required designs in addition to the *employer's* high-level designs for the completion of the works.
- All designs shall be submitted to the employer's engineer for acceptance. All design developments which the employer deems to be critical shall be progressively communicated with the employer for alignment.
- During construction, Transnet's Port electrical appointed personnel shall perform all the required switching and control work permits.
- The Contractor shall submit a notification of switching to the Project Manager 7 working days prior to the required work being performed.
- Commission and testing of the entire installation and handover to the *Employer*.

## 1.4 *Employer's* objectives

The Employer is Transnet Port Terminals (TPT) and the eventual owners of the works. TPT requires the refurbishment of a substations in the Port of East London.

The Employer's objectives are to achieve Completion of the Works by meeting the Completion Date whilst still maintaining the highest environmental, quality and safety standards and whilst minimising disruptions to on-going port and terminal operations and the operations and activities of other stakeholders.

## 1.5 Interpretation and terminology

For the purposes of this contract for all matters regarding technical decisions, Acceptance of Engineering related technical documents, Testing, Commissioning and any matters pertaining to the context of the Occupational Health and Safety Act, the Contractor is required to cooperate with the *Employer's* Engineers/Professional Engineers as per Core Clause 25.1 and Core Clause 14.2 as delegated by the *Project Manager*, for the former and as applicable in the context. The instructions received by the *Contractor* shall be interpreted as lawful in matters pertaining to the former if the Instruction has been endorsed by both the *Project Manager* and the Employer's Engineers/Professional Engineers as applicable in the context. The Employer's Owners Team shall be named post award of the contract and prior to commencement of the Works.

The Contractor is further advised that, in compliance to NEC3 ECC Core Clause 25.1, that co-operation with the *Employer's* Engineers and other representatives of the Employer (Others) is a requirement of this contract and the Contractor is to allow, grant and facilitate all reasonable access that may be required by the *Employer's* Engineers and Others as applicable, for the provision of the Works.

The following abbreviations are used in this Works Information:

Table 1: Abbreviations

| **Abbreviation** | **Meaning given to the abbreviation** |
|---|---|
| A | Ampere |
| ACB | Air Circuit Breaker |
| AIA | Authorised Inspection Authority |
| AIS | Air Insulated Switchgear |
| ASHRAE | The American Society of Heating, Refrigerating and Air-Conditioning Engineers |
| BBBEE | Broad Based Black Economic Empowerment |
| CEMP | Construction Environmental Management Plan |
| CEMPr | Construction Environmental Management Programme |
| CD | Compact Disc |
| CDR | *Contractor* Documentation Register |
| CDS | Contractor Documentation Schedule |
| CHSO | Construction Health and Safety Officer |
| CIRP | Contractor's Industrial Relations Practitioner |
| CM | Construction Manager |
| COC | Certificate of Compliance |
| COLTO | Committee of Land and Transport Officers |
| CRL | *Contractor* Review Label |
| CSHEO | *Contractor*'s Safety, Health and Environmental Officer |
| D | Diameter |
| DSTI | Daily Safety Task Instruction |
| DTI | Department of Trade and Industry |
| DWG | Drawings |
| EA | Environmental Authorization |
| ECC | Engineering and Construction Contract |
| EL | East London |
| ECSA | Engineering Council of South Africa |
| EO | Environmental Officer |
| FAT | Factory Acceptance Test |
| FEL | Front End Loading |
| FIC | Field Inspection Checklist |

| | |
|---|---|
| GIS | Gas Insulated Switchgear |
| HAW | Hazard Assessment *Work*shop |
| HAZOP | Hazard and Operability Study |
| HS | Health and Safety |
| HSSP | Health and Safety Surveillance Plan |
| HVAC | Heating, Ventilation and Air Conditioning |
| INC | Independent Nominated Consultant |
| IP | Industrial Participation |
| IR | Industrial Relations |
| IPP | Industrial Participation Policy |
| IPO | Industrial Participation Obligation |
| IPS | Industrial Participation Secretariat |
| IRCC | Industrial Relations Co-ordinating Committee |
| ISPS | International Ship and Port Facility Security |
| JSA | Job Safety Analysis |
| km | Kilo meter |
| kVA | Kilo-Volt Ampere |
| LV | Low Voltage |
| LT | Low Tension |
| m | metre |
| MV | Medium Voltage |
| mm | millimetre |
| MCB | Miniature Circuit Breaker |
| MCC | Motor Control Centre |
| MCCB | Moulded Case Circuit Breaker |
| Native | Original electronic file format of documentation |
| ONAN | Oil Natural Air Natural |
| PES | Project Environmental Specifications |
| PHA | Preliminary Hazard Assessment |
| PIRM | Project Industrial Relations Manager |
| PIRPMP | Project Industrial Relations Policy and Management Plan |
| PLA | Project Labour Agreements |
| PSIRA | Private Security Industry Regulatory Authority |
| PSIRM | Project Site Industrial Relations Manager |
| PSPM | Project Safety Program Manager |
| PSSM | Project Site Safety Manager |
| ProgEM | Programme Environmental Manager |
| ProjEM | Project Environmental Manager |
| PVC | Polyvinyl Chloride |
| QA | Quality Assurance |

| | |
|---|---|
| QC | Quality Control |
| R&D | Research and Development |
| SACPCMP | The South African Council for the Project and Construction Management Professions |
| SANS | South African National Standards |
| SAT | Site Acceptance Test |
| SASRIA | South African Special Risks Insurance Association |
| SCADA | Supervisory Control and Data Acquisition |
| SES | Standard Environmental Specification |
| SHE | Safety, Health and Environment |
| SHEC | Safety, Health and Environment Co-ordinator |
| SHEQ | Safety, Health, Environment and Quality |
| SIP | Site Induction Programme |
| SMP | Safety Management Plan |
| SOC | Safety Observation Conversations |
| SOC | State Owned Company |
| SSRC | Site Safety Review Committee |
| SF6 | Sulphur Hexafluoride |
| TEU | Twenty-foot Equivalent Unit |
| TNPA | Transnet National Ports Authority |
| TPT | Transnet Port Terminals |
| VT | Voltage Transformer |

Table 2: Description of Terminology

| Terminology | Description |
|---|---|
| Employer | For the purpose of this document, the Employer shall be regarded as Transnet Port Terminals |
| *Contractor* | For the purposes of this document the *Contractor* refers to the person(company) whom has been awarded the contract to perform the works stipulated by the employer |
| Specialist | Is a person or company appointed by the *Contractor* or employer who has significant expertise in execution of a particular work |
| Employer's Engineer | For the purpose of this document, the Employer's Engineer is a technical representative appointed by the Employer who holds a Bsc/Beng/Btech/Ndip and registered with ECSA as Pr Eng/Pr Tech in a relevant field of engineering. The purpose for the Employer's Engineer is to review, support and accept the designs, documents and drawings for this project. |
| Accepted | For the purpose of this document, the term "Accepted" shall be used to describe that an activity/task/document/drawing/design/calculation is received and believed to be true. However, by Accepting any of the above items does not |

| | |
|---|---|
| | alleviate legal and ethical responsibilities that is carried by the ECSA responsible signatory for the item |
| Supported | For the purpose of this document, the term "Supported" shall be used to describe that an activity/task/document/drawing/design/calculation is received and the contents herein with are agreed upon with encouragement to proceed. |

## 2 Employer and Contractor design

### 2.1 *Employer's* design and provisions

The *Employer's* design for the *Works* is:

#### 2.1.1 Electrical:

a. The high-level designs for the MV reticulation, for the Substation.
b. The selection of electrical Plant and switchgear associated with the MV systems.
c. The substation building and plant layout.
d. The *Employer* grants the *Contractor* a licence to use the copyright in design data presented to the *Contractor* for the purpose of the *Works* of this contract ONLY.

#### 2.1.2 Mechanical:

None

### 2.2 *Contractor's design*

All designs undertaken by the Contractor as per the below clauses are required to be endorsed by an ECSA Registered Professional Engineer/Professional Technologist suitably experienced in the relevant discipline.

2.2.1.1 **The *Contractor* is to design the following parts of the *Works*:**

a. All supporting infrastructure required. These may include, but is not necessarily limited to, cableways, cable support systems, conduit systems and arrangement, piped systems and pipe support systems, and the selection of fasteners and fastening systems for these items, where required and not specified, referenced or detailed by the *Employer*.
b. All designs of all MV and LV distribution panels.
c. The Earthing and Lightning Protection design.
d. Detail design of HVAC positive pressurised ventilation system and air conditioning cooling system for substation 1 and substation 2.

e. Detail design of Gaseous fire detection and suppression system for substation 1 and substation 2.
f. Detail design of fire protection in terms of fire extinguishers, fire and escape signage for substation 1 and substation 2.
g. The Contractor shall submit detailed drawings and Workshop details for all designs to the Project Manager for acceptance by the Employer's Consultant or the Employer's Engineers.
h. All and any equipment, formwork, and temporary work associated with the provision of the Works.
i. The Contractor is responsible in his design for the overall integration of the design of the Works with the existing infrastructure.
j. The Contractor is wholly responsible for all design coordination, integration and liaison activities involved in the Works, and shall take all measures necessary and make all arrangements for activities such as meetings, inspections, endorsements, and any other activities required for the timeous completion of the Works and to the appropriate quality. When these activities require the involvement of the Employer's Professional Engineering team or any other stakeholders, the Contractor is required to make these arrangements with due consideration of the Employer's Professional Engineering team's availability and the availability of other stakeholders.
k. The *Contractor* shall submit drawings and Workshop details for all designs to the Project Manager for acceptance by the Employer's Consultant or the Employer's Engineers.
l. All residual design responsibility and overall responsibility for the total design solution for the Works rests with the Contractor.
m. The *Contractor* shall engage the services of ECSA registered Engineers and/or Technologists for all aspects of the Works for which the Contractor is to design.
n. The Contractor shall thus be wholly accountable and responsible for all aspects of the employer's high-level designs.
o. The *Contractor* shall thus be wholly accountable and responsible for all aspects of his designs, including the implementation of all Statutory Safety, Health and Environmental Regulations of South Africa and the requirements, specifications, and regulations of the Employer pertaining to Health and Safety, Environment, Quality and Engineering.
p. The *Contractor* shall be wholly accountable and responsible for the implementation of the aspects of his designs including commissioning, putting into service, and handover of his constructed designs to the Employer, and his duly appointed ECSA registered Engineers shall be held accountable and responsible for these aspects of the Works for the lifetime duration of the Works.

2.2.1.2 **Use of *Contractor's* design**

a. The *Contractor* grants the *Employer* a licence to use the copyright in all design data presented to the *Employer* in relation to the Works for any purpose in connection with refurbishment, repair, and maintenance of the Works with such licence being capable of transfer to any third party without the consent of the *Contractor.*

b. The *Contractor* vests in the *Employer* full title guarantee in the intellectual property and copyright in the design data created in relation to the Works of this contract.

2.2.1.3 **Design of Equipment**

a. The *Contractor* submits his design details for the following categories of his proposed principal Equipment to the *Project Manager* for his information only:

- Any formwork required to Provide the Works temporary electrically powered compressed air systems and pneumatic equipment that may be required to Provide the Works.
- Small electrically powered equipment
- Equipment designed for the lifting of personnel to access any areas necessary to Provide the Works, which are not at ground level.
- Equipment designed for the lowering of personnel to access any areas necessary to Provide the Works, which are below ground level.

b. The following principal Equipment categories deployed for the *Contractor* to Provide the Works require its design to be accepted by the *Project Manager*.

- Temporary petrol- or diesel-powered compressed air systems and pneumatic equipment that may be required to Provide the Works
- Small petrol- or diesel-powered equipment
- Specialist Equipment required to Provide the Works
- Rigging platforms and specialised rigging Equipment that may be required by the *Contractor* to Provide the Works.
- Launching platforms and incremental launching equipment that may be required by the *Contractor* to Provide the Works
- Temporary access platforms, ladders, walkways, scaffolds, and any other temporary structures required to Provide the Works.
- The design of Equipment is considered in terms of this contract as *Contractor*'s design.

2.2.1.4 **Equipment required to be included in the Works**

a. Any shuttering/formwork that is left in-situ as required by the design of the *Works* and necessary for the provision of the *Works*.

## 3 Procedure for submission and acceptance of *Contractor's* design

### 3.1 The *Contractor* shall address the following procedures:

a. The *Contractor*'s documentation shall be issued to the *Project Manager* under cover of the *Contractor*'s Transmittal Note indicating all Contract references (i.e. Project No, Contract No, etc.) as well as the *Contractor*'s Project Document Number, Revision Number, Title and chronological listing of transmitted documentation. Formats of *Contractor* data submitted is dependent on the project procedure and shall be specified by the *Project Manager*, upon the notified request of the *Contractor*.

b. The *Contractor* shall deliver both hard copies and electronic media copies (CD Rom) to the *Project Manager* either at the address stated within the Contract Data or at the Project site office.

c. All electronic documentation shall be submitted by the *Contractor* in Adobe Acrobat (.PDF) and native file format.

d. Acceptance of documentation by the *Project Manager* will in no way relieve the *Contractor* of the responsibility for the correctness of information, or conformance with his obligation to Provide the Works. This obligation rests solely with the *Contractor*.

e. After review, a copy of the original reviewed/marked-up drawing/document, with the *Project Manager's* consolidated comments and document status marked on the *Contractor* Review Label, is scanned and the copy shall be returned to the *Contractor* under cover of the project's Transmittal Note for revision or re-submittal as instructed.

f. The *Contractor* shall allow the *Project Manager* 14 working days (unless otherwise stated and agreed) to review and respond to the *Contractor*'s submission of their documentation, i.e. from time of receipt by the project to the time of despatch. However, work shall proceed without delay in the event of late return of the documentation by the *Project Manager* with prior notification in writing by the *Contractor*.

g. On receipt of the reviewed documentation the *Contractor* shall make any modifications requested/marked-up and resubmit the revised documentation to the *Project Manager* within 14 working days. Queries regarding comments/changes should be addressed with the *Project Manager* prior to re-submittal.

h. Any re-submittals, which have not included the changes/comments identified, will be returned to the *Contractor* to be corrected. The *Contractor* shall re-issue the revised documentation incorporating all comments and other specified details not included in the previous issue within 2 working days of receipt of the marked-up document.

i. The *Contractor* is required to undertake design safety reviews with the *Project Manager*, the NEC *Supervisor*, the *Employer's* Engineer's and Professional team, the *Employer's* Health and Safety

Officers, the *Employer's* Environmental Officers, the *Employer's* Quality Assurance and Quality Control Officers and any other Specialists and/or Subject Matter Experts (SME) as deemed by the *Employer* necessary for the provision of the *Works*.

j. In undertaking the *Works* (including all incidental services required), the *Contractor* shall conform and adhere to the requirements of the *Contractor* Document Submittal Requirements Standard. The *Contractor* shall submit his designs to the *Project Manager* for acceptance before commencing with any manufacturing or construction.

### 3.2 Review and Acceptance of *Contractor* Documentation

a. The *Contractor* submits documentation as the '*Works* Information' requires to the *Project Manager* for review and acceptance.
b. In undertaking the '*Works*' (including all incidental services required), the *Contractor* shall conform and adhere to the requirements of the '*Contractor* Document Submittal Requirements' Standard.
c. The *Project Manager* may withhold acceptance of a submission if the document submission requirements stated in the Works Information are not adhered to.
d. The *Contractor* grants the *Employer* a licence to use the copyright in all design data presented to the *Employer* in relation to the *Works* for any purpose in connection with the construction, re-construction, refurbishment, repair, maintenance and extension of the *Works* with such licence being capable of transfer to any third party without the consent of the *Contractor*.
e. All documents submitted by the *Contractor* to the *Project Manager* for review and acceptance must display the date on which the document was submitted, be adequately signed off by the relevant ECSA professional designer which must also include the designer's professional registration number on the document/drawing. Failing in providing this information on the documents/drawings will render the drawing/document incomplete and will result in it not being reviewed by the *Employer* and will subsequently be send back for correction and resubmission.

### 3.3 As-built drawings, Operating manuals and Maintenance schedules

The *Contractor* provides the following:

a. As-Built/Final Documentation
    - In undertaking the *Works* (including all incidental services required), the *Contractor* shall conform and adhere to the requirements of the *Contractor* Document Submittal Requirements Standard.
b. Installation, Maintenance and Operating Manuals and Data Books

- The *Contractor* prepares two (2) marked up hard copies of the latest revision of the Employer documents/drawings to represent the As-Built/Final status.
- The mark-ups shall be in RED pencil or pen and be complete and accurate. The Contractor submits same to the Project Manager under cover of a *Contractor's* Transmittal Note.
- The *Contractor* provides manuals in an A4 hard covered, red, grease and waterproof binder, using 2 ring type binders. The manuals are well indexed and user friendly and include a summarized Table of Contents.
- Drawings and charts larger than A4 are folded and those greater than A3 are enclosed in an A4 plastic pocket of adequate strength.
- The *Contractor* submits the draft Table of Contents to the Project Manager for acceptance prior to the compilation and official submittal of the manuals.
- The originals of all brochures shall be issued to the Project Manager. When a general brochure is applicable to a range of equipment, then the specific item, catalogue number or model number shall be stated, which is best achieved by introducing a separate index page, which cross-references the specific item to a tag number.
- The address, phone numbers, fax numbers and reference numbers of all Sub-Contractors is provided.
- Where manuals include drawings that still need to be revised to "As-Built" status, and such manuals are required prior to 'As-Built' status, the manual will not be considered to be in its final form until the "As-Built" version of each such drawing has been incorporated. The required number of copies of the manual (s) shall be as specified by the Project Manager and submitted per type or model number of equipment included in the contract, or as specified by the Project Manager. A typical example of what the binder/file (s) shall be marked with on the spine and the front cover is as follows: -

    - Project No./Name
    - Manual Title, e.g. Installation, Maintenance and Operating Manual
    - FBS No. and Title
    - Manual Numbering (e.g. Volume 1 of 2, etc.)
    - Contract Number
    - *Contractor* Name

a. Unless otherwise stated in the CDS, the required number of copies of all As-Built/Final/Data Packs shall be:

3 x hard copies (Full size)

4 x CD Roms with Adobe Acrobat (.pdf) and "Native" formats

# 4 Construction

## 4.1 Temporary *Works*, Site services & construction constraints

a. The *Contractor* shall comply with the requirements of the *Employer* regarding site entry and security control, permits, and Site regulations.

b. The *Contractor* complies with the following requirements of the *Employer:*

- The *Contractor* shall attend all necessary Safety Inductions and ensure that all personnel engaged in the provision of the *Works* are inducted as directed by the *Project Manager*, NEC *Supervisor*.
- The *Contractor* and all personnel engaged in the provision of the Works shall attend all Safety Inductions as required by the TPT Control Officer as directed through the Project Manager.
- The *Contractor* and all personnel engaged in the provision of the Works shall attend all Safety Inductions as required by the Employer's Safety Officer, Employer's Electrical Engineer and/or as directed by the Project Manager.
- All work subsequent to the energizing of the proposed substation shall be supervised by a Transnet Category C "Green" for work that does not involves MV switching operations; and a Transnet Category A "Brown" certified officer for work that involves MV switching operations.

c. The *Contractor* shall make arrangements for the Transnet Category A "Brown" officer to arrange access to the substations during the execution of the *Works*.

- All personnel working or accessing the substation are required to sign the Substation Register and indicate the time of entry, time of exit and the details of the work carried out.

d. The *Contractor* shall obtain access permits from the TPT Permit Office, and the *Employer's* Safety Officer before accessing the site.

e. The *Contractor* shall obtain the relevant work permits from the TPT control officer, and the *Employer's* Safety Officer before performing any work.

f. The *Contractor* shall at all times comply with the Transnet MV Safety Instructions "Blue Book" whilst providing the *Works*.

g. The Safety Inductions, Access Permits and Work Permits are part of this contract and the *Contractor* shall make allowance for it in his *Price* and *Schedule*.

h. The *Contractor* shall ensure that all relevant safety inductions and access permits are obtained well before the Site Access Date as reflected in the Contract Data.

i. The Port of EL is a designated Security Areas under the ISPS requirement, and in terms of this, all access into the Port area will be strictly controlled. Compliance to these security requirements, including labour transport and access requirements, obtaining and maintaining access cards for the *Contractor*'s personnel on Site is part of this contract, and the *Contractor* shall make allowance for it in his *Price* and *Schedule*.

j. The *Contractor* shall obtain the TPT entry permits for all the *Contractor*'s personnel within the Port of EL in accordance with the access control requirements of the Port and the *Contractor* shall make allowance for it in his *Price* and *Schedule*.

k. The *Contractor* is also required to obtain the relevant permits for his Sub-*Contractor*s and all suppliers. The *Contractor* is required to make applications for these permits on behalf of his workers, suppliers and Sub *Contractor*s, and is to nominate a single person to liaise with the relevant port and terminal authorities and the *Contractor* shall make allowance for it in his *Price* and *Schedule.*

l. The *Contractor* provides all staff working within the Project with *Contractor* identification cards which detail the person's name, identity number and the foreman / engineer responsible. The provision of construction personnel with ID cards is considered part of this contract and shall be made by the *Contractor* to a standard acceptable to the *Project Manager* and the *Contractor* shall make allowance for it in his *Price* and *Schedule*.

m. The *Contractor* is to be in constant consultation and cooperation with the Port's security operations to ensure compliance with all the required security procedures and the *Contractor* shall make allowance for it in his *Price* and *Schedule*.

### 4.1.1 Restrictions to access on Site, roads, walkways and barricades

Access route to Site:

a. All vehicles are subject to security checks and all Plant and Equipment brought into the facility and leaving the facility are required to be security cleared by the relevant authorities (Project Manager and TPT Security Manager) before access or exit is granted, as the situation may require.

b. The Contractor is required to arrange for the clearing of the items with the Project Manager and the TPT Security Manager well in advance of the access or exit requirement to avoid delays in the provision of the Works.

c. The Contractor ensures that any of his staff, labour and Equipment moving outside of his allocated Site and Working Areas does not obstruct the Employer's operations if any. To this end access routes are allocated and co-ordinated by the Contractor in liaison with the Project Manager.

d. The Contractor ensures the safe passage of Contractor's traffic to and around the Site and Working Areas at all times. This includes providing flagmen, protective barriers, signage, etc for protection, direction and control of traffic.
e. The Contractor shall provide designated, signed and demarcated walkways for all personnel who are required to traverse between the different working areas on site. Personnel outside of the designated walkways are required to be conducting work activities, and when traversing, are required to use the designated walkways.
f. The Contractor plans and organises his work in such a manner so as to cause the least possible disruption to the Employer's operations or other possible contractors on site.

### 4.1.2 Barricades and fencing around site

a. The Contractor shall be responsible for providing a temporary barricade fence between the port operations and the construction site and maintaining, providing, and/or relocating, if required for construction purposes; the ISPS standard palisade fence to ensure the boundary fence is continuous, and the Contractor shall make allowance for it in his Price and Schedule.
b. The Contractor shall ensure that his site access gate is manned 24hrs a day for the duration of the Works and over any builder's breaks, by a Security Provider acceptable to the Project Manager and registered with the PSIRA and the Contractor shall make allowance for it in his Price and Schedule. Refer to Annexure O.
c. The Contractor shall obtain permission from the Project Manager prior to erecting and/or dismantling including temporarily relocating any section of the ISPS standard boundary fencing.

### 4.1.3 Restrictions to access on Site

a. The Contractor is prohibited from entering the Employer's Operational Areas.
b. The Contractor plans and organises his work in such a manner so as to cause the least possible disruption to the Employer's operations.
c. The Contractor ensures that all his construction staff, labour, and Equipment remains within his allocated and fenced off construction areas.

### 4.1.4 People restrictions on Site; hours of work, conduct and records:

a. The working hours shall be in accordance with the requirements of the Department of Labour or with the agreement of the relevant trade unions. This information relating to working hours shall be supplied to the Project Manager prior to commencement of the proposed working hours.
b. All Contractor's staff and labour engaged in the provision of the Works shall comply with Employer's safety requirements and are equipped with all necessary PPE, high visibility apparel and, when working within two meters of the quay wall, floating apparel.
c. In the event that the Contractor requests to work overtime, the Contractor will be liable for the supervision cost required from the Employers team during the Works.
d. The Contractor keeps daily records of his people, Plant and equipment engaged on the Site and Working Areas (including Sub-Contractors) with access to such daily records available for inspection by the Project Manager and/or the PIRM at all reasonable times. (summarised activity and progress for the day must be mentioned).

e. Minimum requirements of people employed on the Site are as follows:
    - South African identity document or passport/ visa and work permit for foreign nationals;
    - Employment of local labour only for unskilled and semi-skilled job categories as per PIRPMP;
    - Secondment of skilled core/ permanent employees if skills are not locally available;
    - Pre-employment medical examinations; and
    - Induction in IR matters and conditions of employment on the Project.
f. The *Contractor* complies with the requirements of the IRCC involving the engineering construction *Contractor*s engaged (including all future *Contractor*s) by the *Employer*.

### 4.1.5 Health and safety facilities on Site

a. The *Contractor* is referred to the Health and Safety specifications: Annexure C.

### 4.1.6 Title to Materials from dismantling, demolition and excavation

a. The *Contractor* has no title to any materials arising from dismantling, excavation and demolition in the performance of the *Works* with title to such materials remaining with the *Employer*. The *Project Manager* shall instruct the *Contractor* how to label, mark, set aside and/or dispose of such materials for the benefit of the *Employer* in accordance with ECC3 Clause 73.1

### 4.1.7 Cooperating with and obtaining acceptance of others

The *Contractor* performs the *Works* and co-operates with:

a. The Contractor performs the Works and co-operates with the Employer (including the agents of the Employer) who operate on Site during the entire duration of the Contract period.
b. The Contractor performs the Works and co-operates with the Employer's Engineers, (including the agents of the Employer's Engineers) who operate on Site during the entire duration of the Contract period.
c. The Contractor performs the Works and co-operates with The Employer's Management Consultants (including the agents of the Management Consultants) who operate on Site during the entire duration of the Contract period.
d. The Contractor performs the Works and co-operates with The TPT Control Office and agents of the TPT Control Office who operate on Site during the entire duration of the Contract period.
e. The Contractor performs the Works and co-operates with others, of whom the Contractor is to be notified once appointed by the Employer, who operate on Site during the entire duration of the Contract period.

### 4.1.8 Publicity and progress photographs

a. The Contractor shall obtain the permission and approval of the *Employer* before erecting any notice boards, using the details of the contract in any advertising media or revealing any details of the contract to the public.
b. The *Contractor* does not advertise the contract or the project to any third party, nor communicate directly with the media (in any jurisdiction) whatsoever without the express written notification and consent of the *Project Manager*.
c. The *Contractor* provides a notice board showing the *Employer*s Details, The *Employer*s Agent's Details and the *Contractor*'s Details at the site.
d. The *Contractor* shall submit the graphic design and the structural support designs of the notice board to the *Project Manager* for acceptance before fabricating or erecting it.
e. The *Contractor* provides progress photographs at monthly intervals in digital format as part of the *Contractor*'s monthly programme narrative report. The photos shall include detailed, close photos of construction activities as well as aerial photographs showing general progress.

### 4.1.9 Contractor's Equipment

a. The *Contractor* keeps daily records of his Equipment used on Site and the Working Areas (distinguishing between owned and hired Equipment) with access to such daily records available for inspection by the *Project Manager* at all reasonable times.
b. The *Contractor* complies with the following permissions and restrictions in the use of Equipment as required by the *Employer*:
    - Equipment used by the Contractor to Provide the Works shall be assembled and disassembled within the Contractors work area and site boundaries or lay-down areas as authorised by the Project Manager.
    - The Contractor is required to remove all equipment that is not part of the Works from site after completion of the Works and before de-establishment of the site.
    - All and any equipment used by the Contractor for the provision of the Works shall comply to the Employer's SHEQ regulations and restrictions, or any other statutory Health and Safety requirements as directed by the Project Manager in liaison with the Employer's Engineers or the Employers Consultants.

### 4.1.10 Equipment provided by the Employer

The Employer shall not provide any Equipment to the Contractor for the purposes of this contract.

### 4.1.11 Site services and facilities:

The *Employer* provides the following facilities for the *Contractor*:

a. For the duration of the Contract, the *Project Manager* will provide an area, free of charge, for the *Contractor* to establish his offices, lay down areas, stores, *Works*hops, and other *Contractor*'s Equipment.
b. The locations of the potential lay down areas will be identified at the site clarification meeting. The *Contractor* may establish a site camp anywhere within the boundary of this area that does not impede the provision of the *Works*.
c. The *Contractor* shall ensure that the area used has a suitable continuous security fence and the necessary access gates.
d. The area may be used for offices, stores, casting yards, repair shops, concrete batch Plants and any other engineering work that may be required.
e. All preparation and fencing, etc. shall be done by the *Contractor* and shall be allowed for in his Price, this includes clearing away and leaving clean and clear at completion.
f. The *Contractor* shall provide everything else necessary for Providing the *Works.*

### 4.1.12 Connections to services for Contractor's use:

a. A supply point for Potable Water on Site.
b. The connection points for the Potable water shall be identified at the site clarification meeting.
c. The *Supervisor* will arrange for the closing of the water valves during the installation of the metered take-off points.
d. The *Contractor* shall be responsible for providing water for all other Working Areas where not provided by *Employer*.
e. The *Contractor* shall provide everything else necessary for Providing the *Works* in accordance with this contract and attached Annexures.
f. The *Contractor* shall be provided with the power point for reticulation to a designated laydown area. The contractor shall provide a CoC for the power installation to the site establishment.
g. Wherever the *Employer* provides facilities (including, *inter alia*, temporary power, water, waste disposal, telecommunications etc) for the *Contractor's* use within the Working Areas and the *Contractor* adapts such facilities for use, then the *Contractor* makes good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the land) and surrounding areas to its original standard upon dismantling of such facilities and hand-back to the *Employer*.

### 4.1.13 Facilities provided by the Contractor:

a. The *Contractor* ensures that the site establishment area is compliant with the relevant safety regulations and restrictions, is clearly sign posted, and has a suitable security fence, lighting and the necessary access control gates.
b. All costs for preparation of the site establishment area are to be allowed for in the *Contractor*'s Price.
c. The *Contractor* submits details of the layout of his site establishment to the *Project Manager* for his acceptance.
d. The *Contractor* is responsible for his own connection to the *Employer's* services and for the reticulation of his services from the connection point. The cost of reticulation and all other usage costs associated with the provision of services are included in Price.
e. The *Contractor* provides the *Project Manager* with a "Certificate of Compliance" (COC), by an "Accredited" Person as defined by the OHS Act, in respect of his Construction Power electrical

installation. The *Project Manager* only makes construction power available upon receipt of the COC.

f. The *Supervisor* (or his nominated representative) conducts routine inspections of the *Contractor*'s construction power reticulation and power tools. If found to be un-safe and / or non-compliant with statutory requirements, the electrical power supply is disconnected until the *Contractor* rectifies all defaults.

g. The *Contractor* provides, at his cost, a sufficient number of toilets and maintains them in a clean and sanitary working condition.

h. The *Contractor* provides temporary lighting and fencing around every section occupied by him during the phased construction of the *Works*.

i. Such fencing demarcates and secures the construction area. The fencing is erected before any work starts and is removed only upon completion of the work in that area.

j. The *Contractor* includes for all costs for such lighting and fencing, including access control into and out of these restricted areas.

k. Wherever the *Contractor* provides facilities (either his own or for the *Project Manager* and/or *Supervisor*) and all items of equipment, involving, inter alia, offices, accommodation, laboratories, materials storage, etc, within the Working Areas, then the *Contractor* makes good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the land) and surrounding areas to its original standard, upon dismantling of such facilities and items of Equipment.

l. Upon completion, and within one month of the date of acceptance of the *Works*, the *Contractor* completely removes from the Site and Working Areas all his Equipment, including the foundations of any structures, stores, office accommodation or any other asset belonging to him, and leaves the Site and Working Areas in a tidy condition to the satisfaction of the *Project Manager*.

m. No excess or discarded materials or equipment may be buried or dumped within the port boundary.

n. Demolition of all temporary structures surfaces etc. shall be first approved by the *Project Manager* prior to the work being carried out.

o. The *Employer* does not provide any security for the Site and Working Areas. The *Contractor* provides same and indemnifies and holds indemnified the *Project Manager* and *Employer* against any claims and actions that may arise out of Site and Working Area security.

p. No housing is available for the *Contractor*'s employees. The *Contractor* makes his own arrangements to house his employees and transports them to site in a closed vehicle specifically designed for passenger transport (bus or similar) accepted by the *Project Manager*.

q. Wherever the *Employer* provides facilities for the *Contractor*'s use and the *Contractor* adapts such facilities for use, then the *Contractor* makes good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the land) and surrounding areas to its original standard upon dismantling of such facilities and hand-back to the *Employer*.
r. The *Contractor* shall provide, maintain and remove lockable portable chemical type toilets.
s. The *Contractor* shall provide a suitably sized construction power supply by means of either municipal supply, or Generation Plant equipment, as required.
t. The *Contractor* shall be wholly responsible for the provision of this power supply and shall make all the necessary arrangements for the supply, and the maintenance of the supply for the duration of the W*orks*.
u. The *Contractor* shall submit his invoices and\or municipal billing statements for the power supply as part of his Preliminary and General claims for the duration of the Works.

### 4.1.14 The Contractor provides the following facilities for the Project Manager and Supervisor:

a) Furnished air-conditioned offices. (1 No in accordance to SANS 12200A 8.3.2.1a)
b) Wherever the *Contractor* provides facilities (either his own or for the *Project Manager* and/or *Supervisor*) and all items of Equipment, involving, *inter alia*, offices, accommodation, laboratories, Materials storage, compound areas etc, within the Working Areas, then the *Contractor* makes good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the land) and surrounding areas to its original standard, upon dismantling of such facilities and items of Equipment.

c) Unless explicitly stated as a responsibility of the *Employer*, Connections to Services for *Contractor*s' use, all residual requirements for the provision of facilities and all items of Equipment necessary for the *Contractor* to Provide the Works remains the responsibility of the *Contractor*.
d) Existing premises, inspection of adjoining properties and checking work of Others, the *Contractor* will be held responsible for any damage to the existing structures and surfacing caused by the *Contractor* during the execution of this contract; fair wear and tear excluded, and shall repair it to the satisfaction of the *Project Manager* on conclusion of the *Works*.
e) For this purpose, a joint inspection with the *Project Manager* will be carried out prior to occupation of the site(s) and any existing damage noted.
f) The *Contractor* is required to forward a photographic report following the inspection to the *Project Manager* for record purposes.

### 4.1.15 Control of noise, dust, water and waste

The *Contractor* complies with the following:

a. Before moving Equipment onto the Site and Working Areas and commencing the Works, the Contractor submits his/her proposed methods of construction which demonstrate the measures taken to avoid and or reduce any environmental and health issues arising from dust, noise and vibration for acceptance by the Project Manager.
b. The Contractor is to provide dust suppression as per the CEMP, PES and SES documents to ensure that dust levels resulting from the *Contractor*'s construction traffic are kept to the required safety and environmental standards as specified in the relevant project environmental specifications.

### 4.1.16 Sequences of construction or installation

The *Contractor* complies with the following:

a. The Contractor is hereby informed of the requirements of maintaining the continuity of supply to the Port of EL, and is required to arrange and sequence his/her Works so as to ensure that there is no disruption to the Port Operations.
b. Should it be impossible to avoid a disruption as described in (a) above, the *Contractor* shall notify the Project Manager, Supervisor and the Employers Engineers 21 working days before the anticipated disruption and request authorization to commence with the aspect of the Works that will cause the disruption. The *Contractor* shall not proceed without said authorization to proceed.

### 4.1.17 Giving notice of work to be covered up

a. The *Contractor* notifies the *Project Manager* in writing of any elements of the *Works* which are to be covered up. This notification is given not less than 48 (forty-eight) hours prior to the proposed covering up.
b. The *Contractor* shall not cover the *Works* without the authorization of the *Project Manager*.
c. The *Contractor* shall notify the *Project Manager* of any tests and inspections required by the *Employer*s Quality Management Procedures and/or the *Employer*s Engineers within 14 working days prior to the advent of inspection or tests that require witnessing.

### 4.1.18 The Contractor complies with the following constraints in the execution of the Works:

a. The *Contractor* is required not to disrupt the continuity of electrical supply to the Port of East London during the provision of the *Works*.

b. Should it be impossible to avoid a disruption as described in (a) above, the *Contractor* shall notify the *Project Manager* 21 working days before the anticipated disruption and request authorization to commence with the aspect of the *Works* that will cause the disruption. The *Contractor* shall not proceed without said authorization to proceed.

## 5 Completion, testing, commissioning, and correction of Defects

### 5.1 The *work* to be done by the Completion Date

a. On or before the Completion Date or Sectional Completion Date, the *Contractor* shall have done everything required to Provide the Works including removal of his/her establishment and equipment from the respective sites but excluding the work listed below which may be done after the Completion Date but in any case before the dates stated in this contract.
b. The *Project Manager* cannot certify Completion until all the work except that listed below has been done and is also free of Defects, which would have, in his/her opinion, prevented the *Employer* from using the *Works* and others from doing their work.

Table 3: Data Packs

| **Item of work** | **To be completed by** |
|---|---|
| Submission of all data packs, quality assurance records and as-built drawings | 30 days after Completion |

### 5.2 Use of the *Works* before Completion has been certified.

The *Employer* uses the following part / parts of the *Works* before Completion is certified by the *Project Manager* which do not constitute take over by the *Employer* for the reason(s) stated:

a) All Cable, Switchgear, Protection relays, Control Systems Plant and Software or any other Electrical or Mechanical Plant installed by the Contractor so that the Employer may maintain the functionality of systems and existing Plant that is required by the Employer to conduct the Employers operational activities, and the operational activities of TPT.
b) All Cable, Switchgear, Protection relays, Control Systems Plant and Software or any other Electrical or Mechanical Plant installed by the Contractor so that the Employer may maintain the continuity of the Electrical Supply to the Port of EL.

c) Any temporary or permanent Lighting installation installed by the Contractor that may be required by the Employer to be used for the night-time operational activities of TPT or others, as required by the Project Manager.

## 5.3 Materials facilities and samples for tests and inspections

The *Contractor* provides the *Employer* with the following materials, facilities and samples during the provision of the *Works*, as per ECC Clause 40.2:

a. The Contractor is required to provide all materials, facilities and samples for any tests required.
b. The Contractor shall furnish samples of any Plant that is other than, or different to, that specified by the Employer's Engineers, to the Project Manager for Acceptance by the Employer's Engineers. The Contractor is prohibited from installing said Plant without the required prior authorization from the Project Manager.
c. The Contractor shall furnish samples of any Plant that is other than, or different to, that required by the Employer's Engineering Specifications, that shall be utilised in the Contractor's Designs, to the Project Manager for Acceptance by the Employer's Engineers. The Contractor is prohibited from installing said Plant without the required prior authorization from the Project Manager.
d. The Contractor shall furnish samples of any Plant that is proposed to be used in the Contractor's Designs, to the Project Manager for Acceptance by the Employer's Engineers. The Contractor is prohibited from designing with, and subsequently installing said Plant without the required prior authorization from the Project Manager.
e. The *Contractor* shall give notice to the *Project Manager* of the required inspection not less than 2 weeks before the inspection is required.
f. The *Employer* will not provide any materials or facilities for the use of the *Contractor*, to perform tests and inspections.

## 5.4 Pre-Commissioning Tests and Commissioning

a. The *Contractor* is referred to Annexure N - High Level Commissioning Plan for details of the inspections tests and activities required for commissioning of Plant. Where the word or expression in the former document reads "Equipment" the meaning is "Plant" and vice versa. The contractor shall develop a detailed Commissioning plan, taking into cognisance the employer's High-Level commissioning plan, as part of the provisions of this contract and submit the commissioning plan to the Employer's Agent for acceptance.

b. The *Contractor* shall arrange for Factory Acceptance Testing of selected Electrical and Mechanical Plant as required by the *Employer* at the Supplier's Premises before any Plant is despatched to site.
c. The Factory Acceptance Testing shall be witnessed by the *Employer*, but in doing so; the *Employer* assume no responsibility or accountability for the proper functionality of the Plant in any way whatsoever.
d. The *Contractor* shall arrange for Factory Acceptance testing for Electrical and Mechanical Plant at the factory of manufacture before the Plant leaves the factory.
e. The *Contractor* shall arrange Site Acceptance Testing for the selected Plant when it arrives on Site.
f. The Site Acceptance Testing shall be witnessed by the *Employer*, but in doing so; the *Employer* assumes no responsibility or accountability for the proper functionality of the Plant in any way whatsoever.
g. The cost of the FATs and SATs, including travel, accommodation and daily stipend for the *Employer*, is part of this contract, and shall be included in the *Contractor*'s Price. The anticipated number of persons to be catered for in this regard is 3 (Three) per FAT.
h. The *Contractor* shall appoint an independent ECSA registered commissioning engineer to conduct and coordinate the commissioning activities. The Curriculum Vitae of the commissioning engineer shall be submitted to the *Employer* for acceptance before his/her appointment.
i. The *Employer* reserves the right to reject the proposed commissioning engineer if he/her is deemed unsuitable to carry out the commissioning activities as required by the *Employer*.
j. The installation shall be comprehensively tested and commissioned as individual and integrated systems as may be required by the configuration, after the *Works* are substantially complete.
k. The *Contractor* shall provide adequate and competent personnel for testing and commissioning of every particular installation and for the full duration of the commissioning process.
l. The commissioning shall include interaction between other systems and others where interdependence of installations is encountered.
m. The commissioning process shall, after all testing has been completed be the final proving ground of the systems and during this procedure the installations shall be subjected to all possible inputs and actions which may be encountered under operational conditions.
n. The *Contractor* shall prove the full operation, working and compliance of the installation in accordance with the specifications.
o. A detailed programme of the planned commissioning procedures shall be submitted to the *Project Manager* at least 10 working days before commissioning commences.
p. The commissioning programme shall include but is not limited to:

- A schedule of equipment to be commissioned, the proposed tests to be conducted and the testing methods and the range of acceptable results,
- Commissioning check sheets,
- Commissioning programme dates and duration

q. The *Contractor* shall supply all relevant test equipment, monitoring devices, network analysers, protocol testers/analysers etc. required to test and commission the complete *Works*.

r. An accurate record of all commissioning and testing is to be taken and included in the handover documentation as a permanent record.

s. The *Contractor* shall perform all tests as required by any Sections or Clauses of the *Works* Information and all tests required by the *Employer*s Specifications annexed thereto, and all tests required by any applicable SANS Standard, or other Standard, and/or as directed by the *Project Manager*.

t. Testing and commissioning is considered part of the *Works* and is to be done before completion.

## 5.5 Take over procedures

The *Contractor* provides the following assistance to the *Employer*:

a. The *Contractor* ensures that the documentation required as per this *Works* Information is presented to the *Project Manager* before Completion.

b. The Contractor ensures that the *Project Manager* has a full and accurate dossier of As-built documents that represent the buildings, Plant, Switchgear, other systems that reflect the status of the completed Works for Mechanical, Electrical, Control and Instrumentation, General Layouts and Detail Drawings, (and including Plant within the Works) to present to the *Employer*.

c. The *Contractor* must submit the following documents for the HVAC and Fire Protection systems as part of the Handover file:

i. Final As-built drawings-signed off by ECSA professional designer
ii. Design Criteria
iii. Engineering design report
iv. Design Criteria
v. Operational manuals
vi. Maintenance manuals
vii. Training register of staff trained on the systems.
viii. COC-Certificates of Compliance

### 5.5.1 Access given by the Employer for correction of Defects

The *Contractor* complies with the following constraints and procedures of the *Employer* where the *Project Manager* arranges access for the *Contractor* after Completion:

a. Access into areas already handed over by the *Contractor* for correction of any defect shall be subject to the approval of Port's Operations, and these times shall be communicated to the *Contractor* by the *Project Manager*.
b. The areas required by the *Contractor* will need to be temporarily barricaded by the *Contractor* before the *Contractor* commences with any corrective work.

### 5.5.2 The Contractor complies with the following constraints and procedures of the Employer where the Project Manager arranges access for the Contractor after Completion:

a. Where the *Contractor* has to return to Site after Completion to rectify notified Defects, the *Employer* may either impose the same Site access / egress restrictions as communicated elsewhere in the *Employer's Works* Information at the starting date / access date stated under Contract Data - Part One, or as the *Works* are now in use or the *Employer's* occupation of the Site may be incrementally or substantially changed post Completion, there may be further access / egress restrictions as required by the *Employer* and/The Port of EL.

### 5.6 Operational maintenance after Completion

The *Contractor* performs the following operational maintenance in relation to the *Works* after Completion:

a. The *Contractor* shall provide technical support and operational maintenance (by means of an OEM service and maintenance contract) to the Port for the Substation Switchgear for a period of 24 months after completion.
b. After the expiry of the 24-month period, the OEM shall be required to offer a renewal of these contracts to TPT, at the same contract Price for the period, plus reasonable escalation, however, TPT reserves the right to decline the offer.
c. The *Contractor* shall provide maintenance contracts for Plant as contained and required anywhere else in this Works Information.
d. The *Contractor* shall include a maintenance contract for 24 months for the maintenance of complete HVAC system.
e. The *Contractor* shall include a maintenance contract for 24 months for the maintenance of complete fire detection and suppression system.

### 5.7 Performance tests after Completion

The *Contractor* performs the following performance tests after Completion of the *Works*:

a. The *Contractor* is required to demonstrate the functionality and performance of the Protection Relay settings for the Port of EL Substation installation, in its ability to function as a standalone system for the Substation, to the satisfaction of the Employer's Engineers.
b. The *Contractor* is required to demonstrate the functionality and performance of the proposed Substation Protection Relay settings and the grading thereof, as a part of the overall integrated Protection Relay settings and the grading thereof, that service all the substations/works linked to the construction and operations of the proposed Substation.
c. The *Contractor* shall perform all relevant testing and demonstrate the full functionality of the complete fire protection systems in both substation to the full satisfaction of the *Employer's Engineer.*
d. The *Contractor* shall perform all relevant testing and demonstrate the full functionality of the complete HVAC systems in both substations to the full satisfaction of the *Employer's Engineer.*

### 5.8 Training and technology transfer

The *Contractor* facilitates the following requirements for training *Works*hops after Completion for the *Works* in use:

a) The *Contractor* shall provide training for the Employer's selected staff in the maintenance and operations of all specialised Plant and Systems and Software, HVAC systems and FIRE systems, Switchgear and Protection Relays. Training cost is to be allowed for in the Contractor's Price.
b) The *Contractor* is to train the *Employer's* staff on the power systems modelling and simulation software required as part of the scope of works.
c) The Training shall be comprehensive with printed training manuals and electronic copies of such manuals made available to each delegate.
d) The *Employer* envisages that the number of staff required to be trained will be 10, the exact number to be confirmed by the *Project Manager* during the provision of the Works.

## 6 Plant and Materials Standards and Workmanship

### 6.1 Plant and Materials

a. The *Contractor* provides Plant and Materials for inclusion in the *Works* in accordance with the Standard Specifications and/or Project Specifications, unless otherwise stated elsewhere in the *Works* Information provided by the *Employer*. All Plant and Materials are new, unless the use of

old or refurbished goods and/or Materials are expressly permitted as stated by the *Project Manager*.

b. The *Contractor* replaces any Plant and Materials subject to breakages (whether in the Working Areas or not) or any Plant and Materials not conforming to standards or specifications stated and notifies the *Project Manager* and the *Supervisor* on each occasion where replacement is required.
c. No Plant or Materials will be provided "free issue" by the *Employer.*
d. The *Contractor* provides all Plant and Materials necessary for the *Works*.
e. The *Contractor* supplies all certification including test certificates, user manuals, maintenance manuals and data books with respect to Plant and Materials procured for the *Works*:

# 7 Detailed Engineering Scope of Works

## 7.1 Legal Requirements Regarding Designs

In addition to the specifications, TPT substations upgrade shall comply with the following relevant South African Acts and Regulations, and they shall apply in the order of precedence as listed below:

### 7.1.1 Reference Documents

### 7.1.2 Legislations

Table 4: List of South African and International Codes used in the development of this document.

| Item | Document Number | Description |
|---|---|---|
| [1] | OSH ACT 85 of 1993 | South African National Occupational Health and Safety Act 85 of 1993 |

### 7.1.3 Standards

Table 5: List of all South African and International Standards used in the development of this document.

| Item | Document Number | Description |
|---|---|---|
| [1] | SANS 10142-1&2 | Code of Practice for the Wiring of Premises. |
| [2] | SANS 62305-1 | Protection against lightning Part 1: General principles |
| [3] | SANS 62305-2 | Protection against lightning Part 2: Risk management |
| [4] | SANS 62305-3 | Protection against lightning Part 3: Physical damage to structures and life hazard |
| [5] | SANS 62305-4 | Protection against lightning Part 4: Electrical and electronic systems within structures |
| [6] | SANS 10313 | Protection against lightning - Physical damage to structures and life hazard |
| [7] | SANS 10199 | The design and installation of earth electrodes |
| [8] | SANS 1063 | Earth rods, couplers and connections |
| [9] | SANS 10198-8 | The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 8: Cable laying and installation |
| [10] | SANS 1091 | National Colour Codes |
| [11] | SANS 1973-1 | Low Voltage switchgear assemblies>10kA |
| [12] | SANS 1973-2 | Low Voltage switchgear assemblies <10kA |
| [13] | SANS 10292 | Earthing of Low Voltage (LV) distribution systems |
| [14] | SANS 60529 | Degrees of protection by enclosure (IP codes) |
| [15] | SANS 61689 | Instrument Transformer |
| [16] | SANS 62268 | Electricity Metering Equipment |
| [17] | SANS 725 | IEEE Guide for Safety in AC Substation Grounding |

### 7.1.4 Specifications

Table 6: List of all Transnet Specifications used in the development of this document

| Item | Document Number | Description |
|---|---|---|
| [1] | TPD-001-EL&PSPEC | Specification for electrical installations to buildings other than dwellings houses |
| [2] | TPD-002-DBSPEC | Specification for low voltage distribution boards |
| [3] | TPD-003-CABLESPEC | Specification for the supply and installation of medium voltage and low voltage electrical cables |
| [4] | TPD-004-EARTHINGSPEC | Specification for earthing and the protection of buildings and structures against lightning. |
| [5] | TPD-007-MVSWITCHSPEC | Specification for indoor medium/ high voltage (1kv to 33 kV) alternating current switchgear and control gear |
| [6] | TPD-008-MINISUBSPEC | Specification for Mini substations |

## 7.2 Service Conditions

The plant/equipment shall be designed and rated for continuous operation under the following conditions: -

| | |
|---|---|
| Altitude | 0 to 1800m above sea level |
| Ambient air temperature | Max 45 deg. C; Min. -5 deg. C |
| Humidity | as high as 96 % |
| Lightning conditions | Severe with 11 flashes/km$^2$/annum |
| In addition, the atmosphere will be Salt laden and corrosive industrial chemical and dust laden nature. Frequent heavy rains driven by wind reaching speeds of 100 Km/h and above. | |

## 7.3 Low Voltage Power System

All Low Voltage equipment and or plants to be provided as part of the engineering solution shall normally operate in the following conditions:

| | |
|---|---|
| Nominal system voltage: | 400V |
| Minimum - Maximum system voltage: | 380V - 420V |
| Nominal frequency: | 50 Hz ± 2 Hz |
| No. of phases: | 3 Phase and Neutral |
| Short Circuit | 31.5kA |
| Neutral Point | Solidly Earthed |

## 7.4 Medium Voltage Power System

All Medium Voltage equipment and or plants to be provided as part of the engineering solution shall normally operate in the following conditions:

| | |
|---|---|
| Nominal system voltage: | 11kV |
| Minimum - Maximum system voltage: | 10.45kV – 11.55kV |
| Nominal frequency: | 50 Hz ± 2 Hz |
| No. of phases: | 3 Phase |
| Neutral Point | Solidly Earthed |
| Short Circuit | 25kA |

## 7.5 Design *Works* to be executed by the *Contractor*

a. The *Contractor* shall appoint a protection *specialist/consultant* to perform medium voltage protection study for the entire Medium Voltage network.
b. The *Consultant* shall perform a modelling and simulation study of the entire network using the latest version of ETAP$^{PS}$ (latest version) and produce a load flow, short circuit and protection study report for acceptance by the *Employer*.
c. The Contractor shall procure the latest version of the ETAP software tool as per annexure P – ETAP SPECIFICATION. The software tool shall be handed-over to the Employer complete with the as-built model of the power system upon completion of the project.
d. The *Consultant* shall implement the protection settings of the entire network based on the simulated model and protection study report.
e. The *Contractor* shall test the integrity of the existing earthing system at the substation. The *Contractor* shall submit all test results to the *Project Manager* for acceptance by the *Employers Engineer*.
f. For the proposed new installation and in the case where the existing earthing and bonding system does not comply with the requirement of SANS 10313 and the *Employer's* specification, the *Contractor* shall perform full/parts of the design of the earthing system for substation. All designs performed by the *Contractor* shall be undertaken by an accredited specialist and the credentials/CV of the specialist shall be submitted to the *Employers Engineer* for acceptance.
g. All detailed designs of the plant in accordance with the specifications incorporated in this contract.
h. The *Contractor* shall be responsible for the full detail design of the of a HVAC positive pressurised ventilation system which must ensure that a positive pressure is maintained in substation 1 and substation 2 relative to the surrounding plant environment which will have the purpose of preventing ingress of fine dust particles from the plant area into the substation rooms. The *Contractor* shall also be responsible for the full detail design of a HVAC air conditioning system for each substation rooms which will have sufficient cooling capacity to service all heat loads which exists in the substations 1 and 2. All designs must be carried out in compliance with the relevant SANS codes and ASHRAE design codes. All HVAC designs must be signed off by and ECSA registered professional Pr.Eng or Pr.Tech Eng which has adequate experience in the specific discipline and applicable system design.
i. The *Contractor* shall be responsible for the full detail design of a Gaseous fire detection and suppression system. The fire suppression system detection and discharging of the

gas shall cover both the substation rooms as well as the cable trenches. Fire detection shall be designed to detect fire in trenches as well. The fire protection systems must be based on a total flooding gaseous agent which has a low ODP (ozone depletion potential). The gaseous suppression agent/gas must be FK-5-1-12 or any of the other of the Inert gasses which are most suitable for the substation, and which will fit into the space allowed for it inside each of the substations. It is the responsibility of the Contractor to ensure that most suitable type of system is designed. All designs must be carried out in accordance with the relevant SANS codes and other applicable codes of design.

j. All fire detection and suppression designs must be signed off by and ECSA registered professional Pr.Eng or Pr.Tech Eng which has adequate experience in the specific discipline and applicable system design.

k. The *Contractor* shall be responsible for taking the necessary on-site measurements and drafting of the relevant drawings needed/required as input to the HVAC system and Fire detection and suppression system designs.

l. The *Contractor* shall as part of the design process of the HVAC and Fire Protection Systems compile and submit the following documents to the *Employer* during the design process at the various stages of the design process:

    i. Concept drawings
    ii. Detail design drawings, plan layouts, sections, elevations and relevant detail drawings.
    iii. Design Criteria document which specifies the design premise, site conditions, codes of design, type of systems which will be designed, design approach etc.
    iv. Engineering design report which must report on all the systems designed regarding the design process followed, the codes of design followed, the design considerations, explain how the specific system were arrived at in the design process as the best possible solution including all design calculations.

## 7.6 Construction *Works* to be executed by the *Contractor*

### 7.6.1 MV Switchgear Installation

The *Contractor* shall apply for a working permit two weeks before any commencement of the MV works and ensure minimal disruption to operations.

7.6.1.1 Existing Switchgear (and the associated installation) Disconnection in the Substation.

a. The *Contractor* shall disconnect, remove and dismantle the existing 11kV MV switchgear. The removed 11kV switchgear shall be transported by the *Contractor* to the Transnet Port Terminals Depot within a radius of 5km and handed over to the depot electrical supervisor.
b. The *Contractor* shall disconnect and remove the existing battery charger with battery banks and associated accessories including loading, transportation within a 5km radius; offloading and safe disposal storage as instructed by the Transnet Port Terminals electrical supervisor.
c. The *Contractor* shall disconnect and remove the existing power factor correction equipment and associated accessories including loading, transportation within a 5km radius; offloading and safe disposal storage as instructed by the Transnet Port Terminals electrical supervisor.

7.6.1.2 Grain Elevator Substation NO:1 (Basement) MV Plant SoW

a. The *Contractor* shall supply, install and commission two 11kV incomer panels complete with protection relays, anti condensation heaters, Current and voltage transformers as per specification TPD-007-MVSWITCHSPEC and drawing: Grain Elevator MV Single Line Diagram and Floor Plans. The panels shall be bottom cable entry to allow installation of incoming cables from the Trench. The panels cable termination compartments shall be designed suitable for EN 50181 and DIN 47637 plug type terminations.
b. The *Contractor* shall supply, install and commission three 11kV transformer feeder panel complete with protection relays, anti condensation heaters and instrument transformers as per specification TPD-007-MVSWITCHSPEC, and drawing: Grain Elevator MV Single Line Diagram and Floor Plans. The panels shall be bottom cable entry to allow feeding cables to the Trench. The switchgear cable termination compartments shall be designed suitable for EN 50181 and DIN 47637 plug type terminations.
c. The *Contractor* shall supply, install and commission one spare 11kV transformer feeder panel complete with protection relays, anti condensation heaters and instrument transformers as per specification TPD-007-MVSWITCHSPEC, and drawing: Grain Elevator MV Single Line Diagram and Floor Plans. The panels shall be bottom cable entry to allow feeding cables to the Trench.
d. The *Contractor* shall supply, install and commission one 11kV bus-section panel equal to the incomer panel, complete with protection relays, anti condensation heaters and instrument transformers as per specification TPD-007-MVSWITCHSPEC, and drawing: Grain Elevator MV Single Line Diagram and Floor Plans.

e. The *Contractor* shall supply, install and commission one 11kV bus-riser panels/bus-bar Earth and VT panels.
f. The *Contractor* shall design, supply, install and commission a power quality technology for the installation. The power quality requirement shall be informed by the power systems simulation study that is part of the contractor's scope. As part of the power quality and compliance requirement, the *Contractor* shall refurbish three transformers and change the oil to equal or similar approved to Ester oil that is PCB free and an alternative for mineral oil.
g. The *Contractor* shall design, supply, install and commission the battery bank (enclosed in a cabinet) and battery terminal unit for the 11kV switchgear complete with protection and wiring.
h. The *Contractor* shall design, supply, install and commission a complete arc ducting system for the 11kV switchgear as per specification TPD-007-MVSWITCHSPEC. (Ducting to extract to exterior of substation with suitable weatherproof stainless-steel cowl).

7.6.2 LV Switchgear Installation

a. The *Contractor* shall apply for a working permit 7 working days before any commencement of the LV works and ensure minimal disruption to operations.
b. The *Contractor* shall disconnect, remove, and dismantle the existing 400V LV switchgear. The removed 400V switchgear shall be transported by the *Contractor* to the Transnet Port Terminals Depot within a radius of 5km and handed over to the electrical supervisor.
c. The *Contractor* shall design, supply, and install a Low Voltage Substation Distribution Board for the substation as per Specification no TPD-002-DBSPEC, TPD-001-EL&PSPEC, LV single line drawing and TPD-003-CABLESPEC.
d. The *Contractor* shall design, supply, and install a control panel for the proposed MV switchgear complete with cabling works as per Specification no TPD-002-DBSPEC, TPD-001-EL&PSPEC, and TPD-003-CABLESPEC.

7.6.3 Cable Installation

a. The Contractor shall disconnect the existing MV feeder and Incomer cables from the existing MV switchgear. The incomer cables shall be cut and joined with new 150mm2 XLPE SWA Cu 11kV 3 core cables using transition joints. The MV transformer feeder cables shall be replaced with new cables 95mm2 XLPE SWA Cu 11kV cables using the existing cable route.

b. The Contractor shall disconnect the existing LV feeder and incomer cables from the existing LV switchgear. The mentioned cables to be disconnected shall be replaced with new 630mm2 XLPE SWA Cu 11kV 1 core cables with new termination kits.
c. The existing cable terminations shall be handed over to the Transnet Port Terminals Depot electrical supervisor.
d. The *Contractor* shall supply new MV plug type terminations designed to EN 50181 and DIN 47637. The Contractor shall install and terminate all existing MV cables with new termination kits as per SANS 101980-4, Transnet specification TPD-003-CABLESPEC and drawing no: Grain Elevator MV Single Line Diagram and Floor Plans-04/02. The contractor to note that the switchgear cable compartment shall be manufactured (with the female end) to suit the plug type termination.
e. The Contractor shall supply new LV standard type terminations. The Contractor shall install and terminate all existing LV cables with new termination kits as per SANS 101980-4, and Transnet specification TPD-003-CABLESPEC.
f. The *Contractor* shall select, supply, and install transition joints from paper oil impregnated MV three core cables to single core XLPE SWA cables. The termination to switchgear shall be from XLPE cables.
g. The Contractor shall seal and make good all cable entries and exits of the substation to block water from entering the substation trenches.

7.6.4 Transformers in the substation/s.

a. The Contractor shall design supply and install a stainless-steel containment tray around the existing transformers to contain the oil leaks from the transformers as required by SANS 10142.
b. The *Contractor* shall change the 3xtransformer oil to biodegradable Ester oil, test, install and commission the existing transformers. The works shall be undertaken onsite with minimal disruption to operations.

7.6.5 Design, Supply, and Installation, Testing, Commissioning and Handover of new HVAC systems

a. The Contractor shall design, supply, install, test, commission, and handover a complete positive pressurised HVAC system for all the rooms in substation 1 and 2. This shall also include the testing and commissioning of newly installed HVAC systems.
b. The HVAC system shall be designed in such a way that it will be able to provide adequate cooling for all the heat loads present in each of the substations 1 and 2.
c. The HVAC system shall be a positively pressurised air conditioning system, to prevent ingress of dust and other fine particulate matter from the adjacent plant areas. This

design shall be carried out in accordance with the relevant SANS and ASHRAE design codes for this application to ensure efficiency and compliance.

d. The ventilation of the building must be in accordance with the requirements of the Occupational Health and Safety Act 85, 1993 and the relevant SANS codes or as amended.
e. The HVAC system shall be designed to conform to the SANS 10400 O and all other applicable standards.
f. All refrigerants used in HVAC systems must have an Ozone Depletion Potential (ODP) of zero and a very low Global Warming Potential.
g. The HVAC system must be interlocked with the fire detection and suppression system to allow for successful suppression in the event of a fire.
h. HVAC Distribution Efficiency:
    - All supply and return air branch ducts shall include the appropriate style of volume damper. Air terminal devices such as grilles, registers, and diffusers shall be balanced at duct branch dampers, not at terminal face.
    - All ductworks shall comply with SANS 1238 and all the codes referred to herein.
    - All medium- and high-pressure ductwork systems shall be pressure-tested in accordance with the relevant SANS code.
    - All ductworks shall be insulated. No interior duct liner shall be permitted.
    - All HVAC equipment shall be isolated from the ductwork system with flexible duct connectors to minimize the transmittance of vibration.
    - All mechanical system components shall be new.
i. The *Contractor* shall be responsible for the dismantling, and removal of all existing HVAC plant, materials and components in the substations and safely disposing thereof at a suitable off-site facility.
j. The *Contractor* shall also be responsible for making good all openings used by existing HVAC plant and components which will no longer be used in the newly designed HVAC system.
k. The *Contractor* must provide a 24-month warranty on the complete HVAC system.

7.6.6 Design, Supply, Installation, Testing, Commissioning and Handover of Fire Protection systems.

a. The Contractor shall design, supply, install, test, commission, and handover a complete fire suppression and detection system in all the rooms of the substation 1 and substation 2. This system must include fire detection for the substation rooms including the fire detection and suppression in cable trenches in the substation rooms.

b. The *Contractor* shall also be responsible for the design, supply, installation, testing, commissioning and handover of all fire extinguishers, fire and escape signage in accordance with the relevant SANS codes.
c. A fire stopping solution shall be installed between rooms and within the trenches. This will slow down the spread of a fire for a calculated length of time and would also allow for the designed suppression system to extinguish the fire.
d. The *Contractor* shall supply and install fire and explosion proof barriers between the transformers to prevent fire spread and equipment damage due to explosions.
e. The *Contractor* shall perform room integrity testing on each of the rooms of the substation, to ensure that all openings are tightly sealed to provide efficient containment of the fire suppression gas during a fire event. This would require any holes in walls, ceilings, etc. to be sealed using the correct method for the application.
f. Any roller shutter doors, windows, louvers, etc. may require sealing along the edges, or alternatively, the installation of fire curtains to prevent the release of gasses to the outside during a suppression event may be required.
g. The fire detection and suppression system must be suitably interlocked with the HVAC system in each of the rooms to ensure that the fire suppression system effectiveness is not hampered by the HVAC system operation. The necessary automated louvers and all other mechanisms to ensure an efficient suppression system must be included as part of the system.
h. The *Contractor* shall be responsible for the dismantling, and removal of all existing fire protection systems, materials and components and safely disposing thereof at a suitable off-site facility.
i. All inter-leading doors shall be fire rated to prevent a fire spreading between building compartments. The current doors need to be checked and replaced if required.
j. Fire control, safety and risk management shall be conducted in full compliance with the National Building Regulations, SANS 10400-T, as amended and with all other applicable codes, Legislation and Regulations. It will be required that a complete Fire systems report be submitted, along with all other information regarding Fire Compliance for all rooms in the substations.
k. The control panel for the monitoring of the fire detection system will be fitted to a Security Control Room to facilitate 24-hour monitoring.
l. All fire detection and suppression system plant, components and fixtures shall be new.
m. The *Contractor* must provide a 24-month warranty on the complete Fire Protection system.

7.6.7 Substation building refurbishments.

a. The *Contractor* shall supply and install new fire rated doors for the substation building.
b. The *Contractor* shall supply and install new signages in accordance with the OHS Act.
c. The *Contractor* shall undertake minor building refurbishments which includes but will not be limited to making good the substation floor, roof, and walls. A provisional sum will be allowed to undertake this work and the extent of the work shall be assessed and agreed in execution.
d. All works shall be in accordance with SANS 10400 and the OHS Act.

7.6.8 Testing and Commissioning of the installation

a. The *Contractor* shall conduct a Factory Acceptance Test (FAT) for all Plant's to be installed as part of the Works to be executed in this Contract prior to delivery to site. The FAT shall be conducted in the presence of the *Employer's Engineers*. The legal transfer of ownership from the Plant's supplier to the *Contractor* shall be held by the *Contractor* until the Plant is fully installed, tested commissioned on the *Employer's* designated site.
b. The *Contractor* shall conduct a Site Acceptance Test (SAT) for all Plant's supplied, offloaded, and delivered to the designated *Employer's* site. The SAT shall be conducted in the presence of the *Employer's* Engineer. The legal transfer of ownership from the Plant's supplier to the *Contractor* shall be held by the *Contractor* until the Plant is fully installed, tested commissioned on the *Employer's* designated site.
c. The *Contractor* shall test the MV installation and LV installation and hand over all relevant test certificates to the *Employer's* engineer for acceptance. The *Contractor* shall hand over both MV and LV certificate of compliance respectively as per the OHS Act 85 and SANS 10142-1 and SANS1042-2 for the installation.
d. The *Contractor* shall test and commission the entire Earthing system as per Transnet Specification TPD-004-EARTHINGSPEC and SANS 10142-1 in the presence of the *Employer's* Engineer. The *Contractor* shall handover all test certificates to the *Employer's Project Manager* for acceptance by the *Employer's* Engineers.
e. The *Contractor* shall test and commission the protection system.
f. The *Contractor* shall test and commission all HVAC systems and Fire detection and suppression systems in accordance with the relevant SANS and other applicable codes of standards.
g. All COC (certificates of compliance) and other relevant certifications must be issued for all HVAC and fire detection and suppression systems.

## 8 List of Drawings

### 8.1 Drawings issued by the *Employer*

This is the list of drawings issued by the *Employer* at or before the Contract Date and which apply to this contract.

Note: Some drawings may contain both Works Information and Site Information.

**Table 7: Drawings**

| Drawing number | Revision | Title |
|---|---|---|
| | 0A | Port Switching Layout |
| | 0A TD | Grain Elevator 12th Floor Substation No2 Single Line and Layout Drawing |
| | 0A TD | Grain Elevator MV Single Line diagram and Floor plan |

## SECTION *2*

## 9 Management and start up

### 9.1 Management meetings

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. Depending on the size and complexities of the Works, it is probably beneficial for the *Employer* to hold a weekly risk register meeting. This could be used to discuss safety, environmental, compensation events, subcontracting, overall co-ordination and other matters of a general nature. Separate meetings for specialist activities such as programming, engineering and design management, may also be warranted.

Regular meetings of a general nature may be convened and chaired by the Project Manager as follows:

Table 8: Communication Plan

| Title and purpose | Approximate time & interval | Location | Attendance by: |
|---|---|---|---|
| Kick-Off Meeting | Prior to Commencement of Construction | Port of EL | *Employer, Contractor (key persons) and Project Manager (appropriate delegates)* |

| | | | |
|---|---|---|---|
| Contract Progress Meeting | Fortnightly | Port of EL | *Employer, Contractor (key persons) and Project Manager (appropriate delegates)* |
| Risk Register and Compensation Events | Weekly | Port of EL | *Project Manager (and appropriate delegates), Supervisor (and appropriate delegates) and Contractor (appropriate key persons)* |
| Monthly SHE meeting | Monthly | Port of EL | *Employer, Project Manager (and appropriate delegates), Contractor (line management, site Supervisors, safety officer, environmental officer and safety reps)* |
| Safety Visible Felt Leadership Walkabout | Weekly | On Site | *Project Manager (and appropriate delegates) and Contractor (appropriate key persons)* |
| Safety Workshop | Bi-weekly | On Site | *Contractor's site Supervisors* |
| Safety Committee Meeting | Every second month | Port of EL | *Employer, Contractor (key persons) and Project Manager (appropriate delegates)* |

c. Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the Works. Records of these meetings are to be submitted to the *Project Manager* by the person convening the meeting within 5 working days of the meeting.

d. All meetings are to be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register are not to be used for the purpose of confirming actions or instructions under the contract as these are to be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

e. The *Contractor* attends management meetings at the *Project Manager's* request as set out in the table above. At these meetings the *Contractor* presents all relevant data including safety, health

and environmental issues, progress reports, quality plans, Sub-contractor management reports, as may be required.

## 9.2 Documentation Control

a. In undertaking the *Works* all documentation requirements for the *Works* shall be dealt with in accordance with document DOC-STD-0001 – Rev03 (*Contractor* Documentation Submittal Requirements). The control, maintenance and handling of these documents and drawings, using a suitable document control system, remain the sole responsibility of the *Contractor*.
b. The *Contractor* Documentation Submittal Requirements (CDSR) is as contemplated in DOC-STD-0001 – Rev 03, as contained in the Annexure B.
c. The *Contractor* documentation "Starter kit", as contemplated in DOC-STD-0001 – Rev 03, will be issued at the kick-off meeting following award.
d. All contract correspondence is issued through document control. All hardcopy communication will be delivered to the *Employer* via the Lead Document Controller at the project site office document control department.
e. Each supplier of documentation and data to the Project is responsible for ensuring that all documentation and data submitted conforms to the Project Standards and data Quality requirements in terms of numbering, uniqueness, quality, accuracy, format, completeness and currency of information. Data not meeting the Project Standards and data Quality requirements will be cause for rejection and returned to the *Contractor* for corrective action and re-submission.
f. Should any change be made to documentation or data, which has already been submitted to the Project, then new or revised documentation or data shall be issued to replace the out-dated information.
g. It is the responsibility of all Project participants undertaking work on the Project to ensure they obtain and comply with the relevant requirements to suit their deliverables and Scope of Work.
h. The *Contractor* is to ensure that the latest version of the required application software and a suitable 'IT' Infrastructure is in place to support the electronic transmission of documentation.
i. Electronic files submitted to the Project shall be clear of known viruses and extraneous "macros". The supplier of documentation is required to have, at all times, the latest generation of virus protection software and up-to-date virus definitions.
j. The *Contractor* shall be responsible for the supply of all Sub-Supplier/*Contractor*/ Manufacturer, etc. documentation and data related to their package of work and shall ensure that these Sub-Suppliers have the capability to supply the necessary documentation and data in the required time-frame and quality as outlined in the specified standards prior to awarding sub-orders.

k. The required number of copies shall as a minimum be three (3) (1x original + 2 x hard copies), with the corresponding PDF and 'Native' file formats upon final submission.
l. The *Contractor* shall apply "wet signatures" to the original Documentation before scanning the signed original and prior to formal submission to the Project.
m. Final issues of all documentation shall be supplied to the Project in "wet signature" format along with the associated corresponding electronic 'native files' and PDF renditions.
n. The *Contractor* shall ensure adequate resources are available to manage and execute the Document Control function as per the requirements of the Project. (*The Contractor* shall ensure that a dedicated Document Controller is available for the Project)

## 9.3 Safety risk management

a. The Contractor complies with the following HAS specifications and standards:
    i. Annexure C: Health and Safety Project Specification TRN-IMS-GRP-GDL-014.3;
    ii. Occupational Health and Safety Act (Act 85 of 1993) and Regulations;
    iii. Transnet health and safety policies and procedures;
    iv. National Road Traffic Act.
b. The Contractor ensures that its Subcontractors comply with the above-mentioned requirements.
c. The Employer will acknowledge the achievement of specific safety milestones set for the project with regards to incident statistics, incident recording, safety observation and conversations (SOC's) participation, safety initiatives, etc.
d. The Contractor makes the HAS specification available to its employees and subcontractors in the language of this contract and other local languages as required.
e. The Contractor conducts a risk assessment and method statement pack prior to carrying out any activity on the Site to the approval of the *Project Manager*.
f. The lines of communication of the various personnel acting on behalf of the *Project Manager*, who communicates directly with the *Contractor*, and his key persons with respect to the HAS specification, are contained within Annexure C (Health and Safety Project Specification TRN-IMS-GRP-GDL-014.3. One such person is the Clients appointed PrCHSA who will be responsible for obtaining the project construction work permit.
g. The roles and responsibilities of the various personnel acting on behalf of the *Project Manager* with respect to the HAS Project specification and health and safety issues as per Annexure C (Health and Safety Specification TRN-IMS-GRP-GDL-014.3)

h. The *Contractor* shall appoint a full time CHSO per shift, registered with SACPCMP for the duration of the works, the number of which depending on the scope, complexity, and high-risk activities involved, as required by the Construction regulations of 2014, regulation 8(5). The Health and Safety Officer(s) must be on site when work commences at the start of the day and must remain on site until all activities for that day (including the activities of sub-Contractors) have been completed.

i. The CM is responsible, within the context of the HAS project Specification, for health and safety on the Site and reports to the *Project Manager*. The CM specific tasks are detailed in:

   i. Annexure C (Health and Safety project Specification TRN-IMS-GRP-GDL-014.3).

j. All items of plant, Equipment and vehicles travelling within the Site shall be equipped with fully operational amber rotating flashing lights. All vehicles shall be roadworthy and shall at all times adhere to all traffic signage and speed limits.

k. All employees of the *Contractors* will undergo entry medicals at the *Contractor's* cost before the commencement of the project and thereafter on an annual basis inclusive of exit medicals. Medicals to include drug testing.

l. Trainings as stipulated in the HS project specification will be conducted by relevant *Contractors* employees at the *Contractor's* cost before the commencement of the project

m. All will comply with PPE requirements as mentioned in this document as well as HS project specification taking note that only long sleeve pants and shirts are allowed to be worn on site.

n. Transportation of employees will not be allowed at the back of bakkies.

o. All permit costs required for any activities relating to the project shall be for the *Contractors* account.

p. The *Contractor* shall further comply with all applicable legislative requirements and standards with respect to his own activities and others on the Site. A health and safety file to be submitted by the *Contractor* 14 working days post award of tender for approval by the *Employer* or *Employers Representative* before site access can be granted. In addition, 14 working days should be allowed for health and safety file to be approved by the *Employer's* HS Staff as well as TPT SHEQ Department. The *Contractor* must allow for this in their scheduling.

## 9.4 Environmental constraints and management

### 9.4.1 General

a. All work is to be conducted in accordance with the principles of the National Environmental Management Act, 1998 (Act no 107 of 1998) as well as all other applicable legislation, regulations,

the accepted environmental good practice inclusive of *Contractor* Environment and Sustainability Specification Guideline Annexure D (TRN-IMS-GRP-GDL 014.4).

b. The *Contractor* Environment and Sustainability Specification Guideline provides an integrated approach to environmental management. This approach is designed to guide the appropriate allocation of human resources, assign responsibilities, develop procedures and ensure project compliance with regulatory and best practice requirements. The *Contractor* Environment and Sustainability Specification Guideline requirements shall be applicable to the main *Contractor* and all its service providers.

c. The *Contractor* must sign the declaration of understanding as a commitment to abide with the *Contractor* Environment and Sustainability Specification Guideline. Sufficient environmental budget must be allocated to meet all the project environmental requirements for the duration of the contract.

d. The *Contractor* shall perform the Works and all construction activities within the Site and Working Areas having due regard for the environment and environmental management practices as more particularly described within the Contractor Environment and Sustainability Specification Guideline.

e. The *Contractor* must appoint a suitably qualified Environmental Officer with a relevant environmental qualification and environmental management experience.

## 9.5 Environmental Obligation

a. The overarching obligations of the *Contractor* in terms of the Contractor Environment and Sustainability Specification Guideline before construction activities commence on the Site and/or Working Areas is to provide environmental method statements for all construction operations at the Site and/or Working Area and where requested by the Construction Manager. The *Contractor* shall comply with the following:

   i. The *Contractor* shall identify the kinds of environmental impacts that will occur as a result of their activities and accordingly prepare separate method statements describing how each of these impacts will be prevented or managed so that the standards set out in the *Contractor* Environment and Sustainability Specification Guideline are achieved.

b. The *Contractor* shall take note of the environmental sensitivity of the Project area and surrounding areas and shall erect and maintain a highly visible temporary fence/barrier along the boundaries of the Site and around any no-go areas that may be pointed out. Site demarcation must be done and be in place prior to commencement of any construction related activity, to the satisfaction of the Construction Manager and Project Environmental Manager.

c. The *Contractor* must take note of various environmental monitoring requirements during construction, as specified by the *Contractor* Environment and Sustainability Specification Guideline, and must make adequate allowance for undertaking specified monitoring.
d. The *Contractor* must appoint a waste removal Service Providers as per the TPT list of waste removal Service Providers (to be provided after contract award).
e. The *Contractor* shall be responsible for rehabilitation/reinstatement and cleaning all areas to the satisfaction of the *Employer's* Environmental Officer or Construction Manager as detailed in the *Contractor* Environment and Sustainability Specification Guideline.

## 9.6 Quality assurance requirements

### 9.6.1 General Requirements

a. The *Contractor* shall execute the works in accordance with the project specification General Quality Requirements for *Contractor*s and Suppliers included in Annexure E (General Quality Requirements for *Contractor*s and Suppliers) of the Works Information.
b. The *Contractor*'s Quality Management System shall conform to the International ISO 9001 Standard or an equivalent standard acceptable to the *Project Manager*.

c. Prior to the commencement of the works on Site, the *Contractor* shall submit his quality assurance and control proposal(s) to the *Employer* for review and approval 14 working days post award of tender. Works on Site may only commence once these proposals have been approved by the *Employer*.
d. This proposal shall detail the *Contractor*'s quality management system as it applies to all aspects of supply or service provision, including design, procurement, manufacturing, construction, installation, erection, and commissioning.
The *Contractor* shall make allowance 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.

## 9.7 Quality Policy

a. The Quality Policy is a concise document, approved by the *Contractor*'s executive management that *defines* organisational goals and objectives with regard to 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 establishing, communicating and monitoring performance against agreed quality objectives.

## 9.8 Project Quality Plan

a. The *Contractor* shall submit a Project Quality Plan (PQP) within the period stated and, in any event, no later than 28 working days after the Contract start date, which shall also contain specific proposals and details with regard to quality control (QC) for the scope of the works.
b. The PQP includes the *Contractor*'s statement that outlines strategy, methodology, resources allocation, QA and quality control co-ordination activities to ensure that the works meet the standards stated in the Works Information.
c. The PQP is generally in narrative form detailing the Project Specific QA and QC systems and controls required by the *Contractor* for the specific works.
d. The requirements for a PQP are detailed in the project standard and shall include, but not be limited to, the following:
    i. 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.
    ii. 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;
    iii. Include a list of all proposed method statements for Site-based work activities;
    iv. Include a description of the *Contractor*'s project organization, with key positions and responsibilities identified and individuals named.

        The organization structure shall also indicate the resources committed to the management / coordination of QA / QC activities, both within the *Contractor*'s organization and that of his *subcontractors* and suppliers;
    v. Include a listing of all Quality Control Plans (QCP's), and associated Field Inspection Checklists (FIC's), as applicable;
    vi. Identify in the PQP any supplier/*subcontractor* work. Supplier/*subcontractor* quality plans shall be approved by the *Contractor*, and a copy forwarded to the *Project Manager* for approval;
    vii. Include the proposed Authorized Inspection Authority (where applicable - for pressurized equipment and systems);
    viii. Include a Data Book Index, scheduling the proposed quality records that will form the permanent record of conformance to requirements.

## 9.9 Submissions and Records

a. The *Contractor* submits his Quality Management System documents to the *Project Manager* as part of his programme under ECC3 Clause 31.2 to include details of:
   i. PQP for the contract;
   ii. Quality Policy;
   iii. Index of procedures to be used;
   iv. A schedule of internal and external audits during the contract.
b. The *Contractor* develops and maintains a comprehensive register of documents that will be generated throughout the works, including all quality related documents as part of its Quality Plan.
c. The *Project Manager* indicates those documents required to be submitted 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 and the dates upon which the *Project Manager* responded to documents submitted by the *Contractor*.
d. The index of procedures shall contain a list of the *Contractor*'s quality management system procedures to be applied during the course of the works, including any relevant 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 *subcontractors*.
e. A schedule of internal and external audits shall be included in the *Contractor*'s PQP, detailing the location, frequency and extent of internal and external quality system audits to be carried out during the contract period. The schedule shall include all locations at which such audits are carried, i.e., the *Contractor*'s offices and construction Sites, as well as the premises of suppliers and service providers.

## 9.10 Programme

### 9.10.1 General

The Contract programme, progress reports, subsequent updates, revisions and supplementary programmes as detailed in this section are an essential part of the project control system used by the *Employer* for managing the works and in monitoring the progress of the work under the Contract. The information and data provided by the *Contractor* pursuant to this procedure must therefore be reliable, accurate and timely in presentation.

### 9.10.2 Programme submission

A copy of the *Contractor*'s First Programme shall be submitted with the Tender Document Returnable Schedules that shall comply with the requirements as indicated in the Works Information. The *Contractor*'s Detailed Programme shall be submitted in both hard and soft copy forms within two weeks of award using a computer software package approved by the *Project Manager*. The preferred software package is Microsoft Projects or Primavera/similar approved.

### 9.10.3 Contract Programme (Baseline)

The *Contractor's* First Programme, agreeing with the tender submission, shall become the "Contract Programme" or "baseline" against which actual time performance will be compared. Once the baseline has been established, all subsequent programmes will have baseline (target) bars shown against each activity. This programme will be used as the basis on which all variations, extensions of time and changes to methods of delivery/execution shall be assessed.

Identified deviations from the baseline shall be addressed by the Contractor by either demonstrating that the deviation does not constitute a problem to the overall Contractor's Programme or providing a course of action to remedy the deviation.

### 9.10.4 Programme Information:

The Tenderer clearly indicates in the schedule all milestones, activities & information related to the following:

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 if 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.

**9.10.5 Meet the required timeframes:**

Ability to provide the services in terms of the *Employer*'s requirements within the required timeframe as stated in the Works Information and Tender Data by indicating, in a logical sequence, the order, the timing, and the duration of the works that will take place in order to Provide the Works. The Programme must clearly support and demonstrate alignment to the approach paper/Method statement as contained under **T.2.2-05.**

**9.10.6 Resourcing & Equipment:**

The Tenderer indicates for each operation, how the Tenderer plans to do the work identifying the principal Equipment and other resources which he plans to use. Resources & equipment are loaded against activities with their associated rates to the programme for evaluation.

**9.10.7 Revision to contract Schedule**

The *Project Manager*'s written approval of any revised contract programme shall be given prior to the revised contract programme becoming the new contract programme. Additional detail may be inserted into the Contract Programme at the request of either the *Contractor* or the *Project Manager*. In such cases, the overall start and finish dates of the detail activities shall not vary from the original summary activity(s) that were replaced. All revisions to the contract programme shall be prepared by, and at the cost of the *Contractor*.

**9.10.8 Supplementary Programmes**

The *Project Manager* may at any time, and at the cost and expense of the *Contractor*, direct the *Contractor* to produce supplementary programmes to highlight a particular aspect of the work under the Contract. The *Project Manager* shall not unreasonably request supplementary programmes.

**9.10.9 Cash Flow**

The *Contractor* shall submit to the *Project Manager* a detailed cash flow chart based on the contract programme showing the anticipated cash flow as represented by expected payment claim submissions, not only payments received.

### 9.10.10 Progress Reporting

To demonstrate the actual progress of the work under the Contract the *Contractor* shall, on a biweekly basis, update and submit the contract programme and the progress to the *Project Manager*. The contract programme shall be in the form of a two week look ahead schedule, and shall show the following two separate bars for each activity so as to enable comparison of the actual progress to the contract programme:
The contract programme "baseline" activity bar The current schedule activity bar identifying the currently forecast start and finish dates of the activity, and the status (% completion of each activity).

### 9.10.11 Progress Monitoring and Review

Monitoring and review of the progress of work under the Contract shall consist of an assessment of all activities currently in progress. The following shall be determined:

- percentage complete;
- forecast completion date;
- deviations from the baseline programme, and
- actions required to remedy any deviations.

### 9.10.12 Monthly Status Report

The *Contractor* shall provide a written status report by the 20th of each month or such other reporting period as may be required by the *Project Manager* from time-to-time. The report shall summarise progress and problems encountered during that month in respect of all parts of the work under the Contract.

- As a minimum the report shall include:
- progress against the current approved contract programme;
- summary of progress achieved during the period;
- list of milestones achieved during the period;
- status of design, procurement, and off-site works;
- status of on-site works;
- deviations from the contract programme "baseline", and in particular, the forecast completion

- dates of activities which have or should have commenced;
- status of approvals;
- actual or anticipated problems with corresponding action plans to minimise the impact;
- summary of works planned for the following period, and
- cash flow status versus the original forecast.

The progress report shall form the basis of a monthly progress meeting between the Project Manager and the *Contractor*

### 9.11 Staffing

a. The *Contractor* shall nominate a suitably experienced quality representative for all aspects of the works, including general Site activities, with a staff complement that is adequate to perform the requirements of the PQP.
b. The *Contractor* shall submit the CV of his nominated quality representative for the *Project Manager*'s review and approval.

### 9.12 *Contractor*'s management, supervision, and key people

a. The *Contractor* shall make an adequate, experienced, and stable project team available for the duration of the contract. The Contractor must exercise every effort to minimise the replacement of project team members to ensure optimum contract management continuity and efficiency.
b. The *Contractor* employs full time, fully qualified and experienced key persons who have been delegated sufficient authority to manage the contract efficiently on-Site during completion of the Works including and not limited to:

- **Project Manager x 1**

  The Project Manager should at least have a minimum qualification of a National Diploma in Engineering and a SACPMP registration/Pr. CPM/PMP with at least 5 years post registration experience in Electrical MV/LV and building construction projects. The Project Manager must have experience working in at least 3 separate projects, with at least 1 project in excess of R10m in electrical works (MV and LV switchgear, and power transformer installation) component value.

- **Construction Manager X 1**

  The Contract Manager or Site Agent must at least have a minimum qualification of a National Diploma in Electrical Engineering with a PR registration with ECSA as a Pr Tech Eng, with at least 5 years' post registration experience in electrical MV/LV substation design and construction. The Contract Manager or Site Agent

must have experience working in at least one substation project with MV and LV switchgear scope in excess of R10 million. SACPMP will be awarded as an education.

- **Contractor's Mechanical Engineer X 1**

  The Mechanical Engineer must at least have a minimum qualification of a National Diploma in Mechanical Engineering with a PR registration with ECSA as a Pr Tech Eng, with at least 5 years' post registration experience in HVAC and Fire Protection design and installation.

- **Protection Engineer/Specialist x 1**

  The Protection Engineer must at least have a minimum qualification of a National Diploma in Electrical/Electronic Engineering with a PR registration with ECSA as a Pr Tech Eng, with at least 5 years' post registration experience in electrical MV/LV power systems modelling and simulation of load flow, fault level, and protection. The protection specialist must have done a protection grading study, application and commissioning, and load flow analysis for a power system network similar to the requirement of the scope of this project with experience in ETAP or a similar software.

- **Installation Electrician X 1**

  The Installation Electrician must have a minimum N6 qualification, an Electrical trade, registration with the department of Labour and have at least 5 years' in MV/LV Switchgear installations. The Installation Electrician must have experience working in at least one substation project with MV and LV switchgear scope. Cable termination and joining experience demonstration is expected.

- **Foreman (Electrical MV/LV) x 1**

  The Electrical Foreman must have a minimum of NTC 4 Trade Certificate in Electrical Engineering with at least 5 years post certification experience in Electrical MV and LV Projects. The Electrical Foreman must have experience and/or preferably accreditation of plugged type termination from the manufacturer. The Foreman must have experience and/or preferably accreditation for trifurcation and transition MV joints.

- **Planner x1**

  Planner should have at least a minimum qualification of a Diploma in one of the built environment disciplines and 5 years of experience working in Electrical MV/LV Projects as planner.

- **Quality Officer X 1**

  Quality officer should have at least a minimum qualification of a Diploma in one of the built environment disciplines and a Certified qualification in quality systems with relevant quality experience in construction. At least 5 years of experience in a quality systems environment and relevant experience in electrical and mechanical construction projects is required.

- **Environmental Officer X 1**

  Environmental Officer must be registered with SACNASP and must have a bachelor's degree in environmental management/science with a minimum of 5 years work experience in electrical and mechanical construction projects. Proof of professional registration and qualifications must be attached and certified by a Commissioner of Oaths.

- **Health & Safety Officer X 1**

  Health and Safety Officers: Registered as Health and Safety Officer with SACPCMP with more than 5 years of experience on MV/LV electrical and mechanical construction projects and have a SAMTRAC or NEBOSH or modern SHEQ risk management training course as a minimum qualification.

- **Quantity Surveyor X 1**

  The Quantity Surveyor should have a qualification of a Diploma in Quantity surveying, experience in cost installation of substation plant. The Quantity Surveyor must also have experience in Conveyor construction and also exhibit Mechanical design and installation experience associated with the any infrastructure, equipment related to the Substation.

- **Document Controller X 1**

  Document controller should have at least a Higher Certificate in Office Administration and at least 5 years of experience working as a document controller in a construction environment.

The *Contractor* employs personnel listed above but not limited to those mentioned to perform the functions of key persons under NEC3 ECC Clause 24.1. These appointments shall have the necessary experience and be suitably qualified.

The *Contractor* provides an Organogram of all his key people (both as required by the *Employer* and as independently to be stated by the *Contractor* and how such key people communicate with the Project Manager and the Supervisor and their delegates.

a. The *Contractor* appoints an EO as a key person under ECC Clause 24.1. The EO ensures that the works, including all parts thereof, are undertaken subject to prior environmental method statement(s), approved by the *Project Manager*, and ensures that all the project's EA, permits and licences and CEMPR are implemented by the Contractor in a timely and proper manner.
b. The EO provides the *Project Manager* with all environmental method statements for approval prior to commencing with the required works. The EO tasks are:
   i. Daily, weekly, and monthly inspections of the Site and working areas. Monitor compliance with
   ii. the project's EA, permits and licences and CEMPr
   iii. Reporting of environmental incidents to the *Project Manager*;
   iv. Attendance at all SHE meetings, toolbox talks and induction programmes;
   v. Litter control and ensuring the *Contractor* clears litter from the Site;
   vi. Ensuring that environmental signage and barriers are correctly placed;
   vii. The EO submits daily, weekly and monthly checklists to the *Employer*'s EO/ECO.
c. The Contractor nominates a CIRP as a key person under ECC Clause 24.1. The CIRP is based on Site and ensures that all reports and IR requests are submitted accurately and in a timely manner to the Project Manager. The CIRP tasks are:
   i. Dedicated to human resources, industrial relations and any other *Contractor* employee related functions;
   ii. Resolve all human resources and industrial relations matters arising from the *Contractor*'s employees;

iii. Represent the *Contractor* at all industrial relations meetings.

### 9.13 Training *Works*hops

a. The *Contractor* facilitates the following requirements for training *Works*hops:
   i. Pre-mobilization workshop, scheduled for one week prior to Site establishment. Workshop will be attended by the Site management team including Site agents, all *Contractor*'s *Supervisor*s and safety personnel. Additional training will include, but is not limited to, SOC training as well as DSTI training,
   ii. Formal training as stipulated in the Health and Safety Project Specification 1124367-02-HS-SP-0001 to be attended by *Contractor*s identified personnel before commencement of any works

b. The Contractor provides the following documentation to the Employer:
   i. Health and Safety file, including Health and Safety Management Plan but not limited to:
   ii. Valid Company Letter of Good Standing
   iii. Medical certificates of fitness
   iv. Incident Management procedures;
   v. Performance Reporting;
   vi. Site Training Packages;
   vii. Safe Work Method Statements;
   viii. Safety Procedures;
   ix. Risk Assessment Process and as well as risk assessments for all activities;
   x. Insurance provided by the *Employer*;
   xi. Insurance provided by the *Employer* is contained in the Contract Data – Part 1

### 9.14 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.

### 9.15 Provision of bonds and guarantees

a. The form in which a bond or guarantee required by the conditions of contract is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data.
b. The *Contractor* provides a bond or guarantee as required by the conditions of contract concurrently with the execution by the Parties of the form of agreement for the ECC contract.

### 9.16 Records of Defined Cost, payments & assessments of compensation events kept by *Contractor*

a. The *Contractor* keeps the following records available for the *Project Manager* to inspect:
    - Records of design employees location of work or professional engineers engaged by the *Contractor*
    - Records of people and Equipment within the working areas
    - Records of Equipment used and people employed outside the Working Areas
    - Records of quotations, invoices and pay slips.

## 10 Plant and Materials

a. The *Contractor* provides plant and materials for inclusion in the works in accordance with COLTO 1208 Item (e), unless stated otherwise in the Works Information provided by the *Employer*. All Plant and Materials are new, unless the use of old or refurbished goods and/or materials are expressly permitted as stated elsewhere in this Works Information, or as may be subsequently instructed by the *Project Manager*.
b. The *Contractor* replaces any Plant and Materials subject to breakages (whether in the working areas or not) or any plant and materials not conforming to standards or specifications stated and notifies the *Project Manager* on each occasion where replacement is required.

## 11 Subcontracting

Where the *Contractor* employs a *subContractor* who constructs or installs part of the works or who supplies plant and materials for incorporation into the works which involves a *subContractor* operating on the Site, then the *Contractor* ensures that any such *subContractor* complies with the Contractor Environmental and Sustainability Specification Guidelines as well as Contractor Health and Safety Specification Guidelines as described in the Works Information, as appropriate. The subcontract documentation shall place back-to-back obligations on the *subContractor*, which reflect the *Contractor*'s obligations under the Contractor Environmental and Sustainability Specification Guidelines, all within the *Contractor*'s quality management system, as per the Works Information.

Where the *Contractor* employs a *subContractor* who constructs or installs part of the works, or who supplies plant and materials for incorporation into the works which involves a *subContractor*

operating on the Site and/or working areas, then the *Contractor* ensures that any such *subContractor* complies with the PIRPMP as appropriate and that the subcontract documentation places back-to-back obligations on the *subContractor* which reflect the *Contractor*'s obligations under the PIRPMP, all within the *Contractor*'s quality management system as per the Works Information.

## 12 Procurement

### 12.1 Code of Conduct

12.1.1 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.

12.1.2 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.

### 12.2 Prohibition of bribes, Kickbacks, Unlawful Payments, and Other Corrupt Practices

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

12.2.1.1 The Employer will not participate in corrupt practices and therefore expects its suppliers to act in a similar manner.

a) The *Employer* 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.

b) Employees must not accept or request money or anything of value, directly or indirectly, to:

i. Illegally influence their judgement or conduct or to ensure the desired outcome of a sourcing activity;

ii. Win or retain business or to influence any act or decision of any decision stakeholders involved in sourcing decisions; or

iii. Gain an improper advantage.

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

12.2.1.2 The Employer is firmly committed to the ideas of free and competitive enterprise.

a) The *Contractor* is expected to comply with all applicable laws and regulations regarding fair competition and antitrust.

b) The *Employer* does not engage with non-value adding agents or representatives solely for the purpose of increasing fronting.

12.2.1.3 The Employer's relationship with suppliers requires us to clearly define requirements, exchange information and share mutual benefits.

a) Generally, *Contractor*s 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:

i. Misrepresentation of their product (origin of manufacture, specifications, intellectual property rights, etc.);

ii. Collusion;

iii. Failure to disclose accurate information required during the sourcing activity (ownership, financial situation, B-BBEE, etc.);

iv. Corrupt activities listed above; and

v. Harassment, intimidation, or other aggressive actions towards Transnet employees.

b) The *Contractor* 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.

The *Contractor* must record and report facts accurately, honestly and objectively. Financial records must be accurate in all material respects.

### 12.3 Conflicts of Interest

12.3.1 A conflict of interest arises when personal interests or activities influence (or appear to influence) the ability to act in the best interests of the *Employer*. These include but are not limited to:

i. Doing business with family members

ii. Having a financial interest in another company in our industry

### 12.4 The Contractor's Invoices

All invoices submitted by the Contractor shall be VAT invoices, which shall be accompanied by a daily activity sheet, covering the services together with, where relevant, a brief explanation of the time covered, and full breakdown of expenses to which receipts relate.

**The invoice states the following:**

- Invoice addressed to Transnet Limited.
- Transnet Limited's VAT No: 4720103177.
- Invoice number.
- The Contractor's VAT Number.
- Referencing of the Purchase Order

**Invoices are to be delivered to:**

Transnet Port Terminals – Finance Department

1 Hely Hutchinson Rd

Quigney

East London

5201

Email address: tptcreditors-ELMPT@transnet.net

Email address: Nowhi.Hloma@transnet.net

The invoice is presented as an original.

**12.5 People**

Minimum requirements of people employed on the Site include the following:

i. Employee's medical certificate
ii. Health and Safety induction training

**12.6 Contractor Liability**

12.6.1 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.

12.6.2 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*.

12.6.3 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 *Employer*s premises, whether owned or rented, and shall notify the *Employer* of all matters associated with such action that may potentially affect the *Employer*.

12.6.4 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.

12.6.5 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.

**12.7 Industrial Action by Contractors Employees**

12.7.1 In the event of any industrial action by the *Contractor*'s employees, the *Contractor* is required to provide competent contingency resources permitted in law to carry out any of the duties that are, or could potentially be, interrupted by industrial action in delivering the service.

12.7.2 The *Contractor* warrants that it will compensate the *Employer* for any costs the *Employer* incurs in providing additional security to deal with any industrial action by the *Contractor*'s employees.

12.7.3 In the event of any industrial action by the *Contractor*'s employees, the *Contractor* is obliged to prepare and deliver to the *Employer*, within two (2) hours of the commencement of industrial action, an industrial action report. If the industrial action persists, the *Contractor* is required to deliver the report at 8h30 each day.

12.7.4 The industrial action report must provide at least the following information:

i. Industrial incident report;

ii. Attendance registers;

iii. Productivity / progress to schedule reports;

iv. Operational contingency plan;

v. Site security report;

vi. Industrial action intelligence gathered.

12.7.5 The final industrial action report is to be delivered 24 hours after finalization of the industrial action.

12.7.6 The management of the *Contractor* is required to hold a daily industrial action teleconference with personnel identified by the *Employer* to discuss the industrial action, settlement of the industrial action, security issues and the impact on delivery under the contract.

12.7.7 The resolution of any disputes or industrial action by the *Contractor*'s employees is the sole responsibility of the *Contractor*.

12.7.8 Access to the *Employer*'s premises by the *Contractor* and its employees is only provided for purposes of the *Contractor* delivering its services to the *Employer*.

Should the *Contractor* and its employees not, for any reason, be capable of delivering its services, the *Employer* is entitled to restrict or deny access onto its premises and, unless otherwise authorized, such person will be deemed to be trespassing.

12.7.9 The *Contractor* performs the works having due regard to the PIRPMP, statutory requirements and industry agreements.

12.7.10 The *Contractor* complies with the requirements of the IRCC involving the engineering construction *Contractor*s engaged (including all future *Contractor*s) by the *Employer*.

12.7.11 The roles and responsibilities of the various personnel acting on behalf of the *Project Manager* with respect to IR issues are stated in the following paragraphs.

12.7.12 The PIRM is responsible for ensuring that the *Contractor* complies with the PIRPMP. 12.7.13 The PIRM acts on behalf of the *Project Manager*.

12.7.14 The PIRM specific tasks are:

i. To liaise with the *Contractor* prior to the commencement of construction activities, as per the *Contractor*'s programme accepted by the *Project Manager*, with respect to IR issues;

ii. Responsible, inter alia, for day-to-day IR on the Site through the implementation of the PIRPMP;

iii. The PIRM reports directly to the *Project Manager*.

## 13 SPECIFIC GOALS

### 13.1 General Conditions

13.1.1 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.

13.1.2 Preference points for this bid shall be awarded for:

(a) Price;

(b) B-BBEE Status Level of Contribution.

(c) Any other specific goal determined in Transnet preferential procurement policy.

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

**Table 9: Preference Points**

| | POINTS |
|---|---|
| **PRICE** | **80** |
| **SPECIFIC GOALS** | **20** |
| **Total points for Price and Specific Goals must not exceed** | **100** |

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

13.1.5 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.

## 14 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 BroadBased 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"** means:

1) B-BBBEE status level certificate issued by an unauthorised body or person;
2) A sworn affidavit as prescribed by the B-BBEE Codes of Good Practice;
3) Any other requirement prescribed in terms of the B-BBEE Act.

(j) **"QSE"** means a Qualifying Small Enterprise in terms of a 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.

(l) **"Specific goals"** means targeted advancement areas or categories of persons or groups either previously disadvantaged or falling within the scope of the Reconstruction and Development Programme identified by Transnet to be given preference in allocation of procurement contracts in line with section 2(1) of the PPPFA.

## 15 Annexures

**List of Annexures:**

| | | |
|---|---|---|
| Annexure A | : | List of Drawings (Section 8) |
| Annexure B | : | Contractor Documentation Submittal Requirements: DOC-STD-0001 |
| Annexure C | : | Health and Safety Specification: TRN-IMS-GRP-GDL-014.3 |
| Annexure D | : | Contractor Environment and Sustainability Specification Guideline: TRN-IMS-GRP-GDL 014.4 |
| Annexure E | : | General Quality Requirements for Contractors and Suppliers |
| Annexure G | : | TPD-001-EL&PSPEC - Technical Specification for the Supply and Installation of Electrical Lighting and Power in Buildings other than Dwelling Houses |
| Annexure H | : | TPD-002-DBSPEC - Technical Specification for the Design and Manufacturing of Low Voltage Distribution Boards |
| Annexure I | : | TPD-003-CABLESPEC - Technical Specification for the Installation of Medium and Low Voltage Cables |
| Annexure J | : | TPD-004-EARTHINGSPEC - Technical Specification for the Design Supply and Installation of Lightning Protection and Earthing for Buildings and Structures |
| Annexure K | : | TPD-007-MVSWITCHSPEC - Technical specification for indoor medium/high voltage (1kV to 33kV) alternating current switchgear and control gear |
| Annexure L | : | TPD-011-UPSSPEC - Specification for the design, supply, delivery and installation of the back up three phase uninterruptible power supply system |
| Annexure M | : | Substation Assessment Report (Substation Conditional Assessment Report) |
| Annexure N | : | High Level Commissioning Management Plan |
| Annexure O | : | Baseline Security Risk Assessment |
| Annexure P | : | ETAP SPECIFICATION |

**Also refer to Addendum 02 for Additional Information and Revised Drawings**

# PART 4: SITE INFORMATION

Core clause 11.2(16) states

"Site Information is information which

- describes the Site and its surroundings and
- is in the documents which the Contract Data states it is in."

In Contract Data, reference has been made to this Part 4 of the contract for the location of Site Information

## 1. Description of the Site and its surroundings

### 1.1. General description – East London Grain Elevator

The site is within the Buffalo City Metropolitan Municipality region in East London, situated in the Eastern Cape province. The Grain Elevator Terminal imports and exports agricultural products such as wheat, maize, soya beans.

**Figure 1: Locality Map**

Access is available through the main TNPA and TPT Security check points. At all times the Contractor will familiarise and adhere to ALL Employers (TPT) rules and regulations regarding security / access control. The Contractor shall however be responsible for his / her own security and the Employer (TPT) will not be held liable / responsible for any stolen / lost property, tools, and equipment by the Contractor.

### 1.2. Existing buildings, structures, and plant & machinery on the Site

Grain Elevator is surrounded by workshops and moving machinery for operations. It might be dusty due to the cargo that is stored in the terminal. The vicinity of work area and site offices has a traffic flow of the cargo handling equipment, trucks as well as the employees'. During the construction/ installation, the contractor must always maintain a safe access to port users.

The work will be performed inside grain facility where substations are situated.

### 1.3. Contractor Establishment

Upon receipt of the site access certificate, the contractor will be required to establish site offices and laydown areas. The facilities established on site will remain for the duration of the works, and connection points will be available for the contractor, however, the contractor will be required to pay for services utilized during the duration of the contract. The proposed contractor site establishment and laydown area is shown below.

**Figure 2: Site Establishment**

They must adhere to the basic screening (Alcohol and drug) requirements at all entry and exit points of the Port. If the contractor or its employees tested positive during the screening, employee will not be permitted inside the premises.

### 1.4. Operations on the site

The works will be performed in an operational environment; the road will remain operational with on-going traffic for the entire duration of the contract. The contractor is to take cognisance of the Transnet employees and its stakeholders in and around the road.

### 1.5. Subsoil information

Not applicable

### 1.6. Hidden services

Working inside Grain Elevator facility

### 1.7. Other reports and publicly available information

This report is to be read in conjunction with the C3 Works Information Report provided. It is envisaged that the contraction site will be available to the contractor through the duration of the works.