
Part C1: Agreement and Contract Data

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Contract Data

The Employer is

Name Transnet SOC Limited, Trading as Transnet Freight Rail
Address C/o Paul Kruger & Minnaar streets, Nzasm Building, Pretoria
Telephone (012) 315 2137/2 Fax No. (012) 315 2138
E-mail Nico.swart3@transnet.net

The works is: The refurbishment of main transformers, auxiliary transformers and Bucholz relays at various 3kV DC traction substations under the control of the Depot Engineer, Nelspruit

The site is Hoedspruit, Westaffin, Mkhulu and Waterval Onder 3kV DC traction substations

The starting date is to be advised.....

The completion date is to be advised.....

The reply period is two weeks

The defects date is fifty two weeks after completion

The defect correction period is within 1 (one) week after defects date

The delay damages are R2,000.00 per day

The assessment day is the 13th (thirteenth) of each month

The retention is 10% on the total value of the contract

Does the United Kingdom Housing Grants, Construction and Regeneration Act (1996) applies? **No**

The Adjudicator is

Name: To be advised if disputes arise.....

Address:.....

Telephone:.....**Fax No.**

E-mail:.....

Contract Data

The interest rate on late payment is 2% per complete week of delay.

The *Contractor* is not liable to the *Employer* for loss of or damage to the *Employer's* property in excess of R2m (two million) for any one event.

The *Employer* provides this Insurance: **Transnet Principal Control Insurance**

The minimum amount of cover for the third insurance stated in the Insurance Table is

> R25,000.00 (Limited to R10, 000, 000.00. for any one event)

The minimum amount of cover for the fourth insurance stated in the Insurance Table is:

Not applicable

The adjudicator nominating body is: **The Chairman of the Association of Arbitrators (Southern Africa)**

The tribunal is: **Arbitration**

If the tribunal is arbitration, the arbitration procedure is: **The rules for the Conduct of**

Arbitrators of the Association of Arbitrators (Southern Africa)

The *conditions of contract* are the NEC3 Engineering and Construction Short Contract (June 2005) and the following additional conditions:

As mentioned in paragraph 1.0 (Contractual obligations)

1.0 CONTRACTUAL OBLIGATIONS

- 1.1 This project specification covers Transnet freight rail's requirements for the refurbishment of main transformers, auxiliary transformers and Bucholz relays at various 3kV DC traction substations under the control of the Depot Engineer, Nelspruit, under the control of the Depot Engineer, Nelspruit.
- 1.2 The Contractor shall not make use of any sub-Contractor to perform the works or parts thereof without prior permission from the Employer.
- 1.3 The Contractor shall ensure that a safety representative is at site at all times. All safety measures prescribed by Transnet Freight Rail – Electrical Safety Instructions and the "Occupational Health and Safety Act 1993 (Act 85 of 1993)" associated with working on a project of this nature shall be adhered to.
- 1.4 The Contractor shall comply with all applicable legislation and Transnet safety requirements adopted from time to time and instructed by the Employer / Employer's Deputy. Such compliance shall be entirely at his own cost, and shall be deemed to have been allowed for in the rates and prices in the contract.

- 1.5 The Contractor shall, in particular, comply with the following Acts and Transnet Specifications:-
 - 1.5.1 The Compensation for Occupational Injuries and Diseases Act, No. 130 of 1993. The Contractor shall produce proof of his registration and good standing with the Compensation Commissioner in terms of the Act.
 - 1.5.2 The Occupational Health and Safety Act (Act 85 of 1993).
 - 1.5.3 The explosive Act No. 26 of 1956 (as amended). The Contractor shall, when applicable, furnish the Employer / Employer's Deputy with copies of the permits authorising him or his employees, to establish an explosives magazine on or near the site and to undertake blasting operations in compliance with the Act.
 - 1.5.4 The Contractor shall comply with the current Transnet Specification E.4E, Safety Arrangements and Procedural Compliance with the Occupational Health and Safety Act, Act 85 of 1993 and Regulations and shall before commencement with the execution of the contract, which shall include site establishment and delivery of plant, equipment or materials, submit to the Employer / Employer's Deputy.
 - 1.5.5 The Contractor shall comply with the current Specification for Works On, Over, Under or Adjacent to Railway Lines and near High Voltage Equipment – BBD 8210, if applicable, and shall take particular care of the safety of his employees on or in close proximity to a railway line during track occupations as well as under normal operational conditions.
- 1.6 The Contractor's Health and Safety Programme shall be subject to agreement by the Employer / Employer's Deputy, who may, in consultation with the Contractor, order supplementary and/or additional safety arrangements and/or different safe working methods to ensure full compliance by the Contractor with his obligations as an employer in terms of the Act.
- 1.7 In addition to compliance with clause 1.4 hereof, the Contractor shall report all incidents in writing to the Employer / Employer's Deputy. Any incident resulting in the death of or injury to any person on the works shall be reported within 24 hours of its occurrence and any other incident shall be reported within 48 hours of its occurrence.
- 1.8 The Contractor shall make necessary arrangements for sanitation, water and electricity at these relevant sites during the installation of the equipments.
- 1.9 A penalty charge of **R2,000** per day will be levied for late completion of the project.
- 1.10 No retention money will be retained.
- 1.11 The Contractor shall supply a **site diary** (with triplicate pages). This book shall be used to record any unusual events during the period of the work. Any delays to the work shall also be recorded such as delays caused by poor weather conditions, delays caused by permits being cancelled etc. The appointed Employer or Employer's Deputy must countersign such delays. Other delays such as non-availability of equipment from 3rd party suppliers must be communicated to the Employer or Employer's Deputy in writing.
- 1.12 The Contractor shall supply a **site instruction book** (with triplicate pages). This book shall be used to record any instructions to the Contractor regarding problems encountered on site – for example the quality of work or the placement of equipment. This book shall be filled in by the Employer or Employer's Deputy and must be countersigned by the Contractor.
- 1.13 Both books mentioned in 1.10 and 1.11 shall be the property of Transnet Freight Rail and shall be handed over to the Employer or Employer's Deputy on the day of energising or handing over.

- 1.14 All processes or the manufacture and assembly of the product components must be subjected to a quality assurance system.
- 1.15 The Contractor will remain liable for contractual delivery dates irrespective of deficiencies discovered during workshop inspections.
- 1.16 The Contractor will only receive payment after he has been called by a Transnet technician to commission certain equipment or the complete substation.
- 1.17 The Contractor must submit a site diary and test sheets with the invoice as proof that the work has been done.
- 1.18 The Contractor must wear correct PPE at all times while doing tests in the substations

2.0 SITE ESTABLISHMENT

- 2.1 The Contractor shall be responsible to transport material to site, off-loading, handling, storage and security of all material required for the construction/execution of the works.
- 2.2 Transportation insurance must be arranged by successful Contractor to ensure their handling responsibility while material are in transit to site and during off loading as agreed upon.
- 2.3 The Contractor shall be responsible for all necessary (as decided by the Transnet Freight Rail Employer's deputy or Technical Officer) connections between the equipment as found before site establishment and other components in the substation including connections to the earth-mat.

3.0 TRANSFORMER REFURBISHMENT

- 3.1 The Contractor shall be responsible for the transportation to site, off-loading, handling and storage of all material required for the construction/execution of the works.
- 3.2 It is required of the Contractor to clean spilled oil on the transformers before work commencement.
- 3.3 Contractor has to supply Transnet Freight Rail with preliminary oil test results before working on the transformer.
- 3.4 The Contractor has to do complete re-gasketing of the main and auxiliary transformers Bucholz relay where necessary.
- 3.5 The Contractor shall replace all damaged LV insulators if found broken and re-gasket.
- 3.6 It is required for the Contractor to supply PCB, calibration Oil plant certificate to Transnet Freight Rail before work commencement.
- 3.7 Contractor shall top up oil and purify in accordance to Transnet Freight Rail recommended oil specification.
- 3.8 Contractor shall clean and treat spilled oil on the Transformer plinth.
- 3.9 Contractor shall supply Transnet Freight Rail with final oil test result before transformer commissioning.

4.0 SOIL REHABILITATION

- 4.1 Contractor shall remove contaminated soil due to oil spillage and compact with clean soil.
- 4.2 It is required for the Contractor to follow and arrange proper bioenvironmental aspects to ensure cleanliness of after soil treatment.

5.0 SITE TESTS

- 5.1 The Contractor shall be responsible for carrying out of on-site tests and commissioning of all equipment supplied and installed in terms of this specification and the contractual agreement.
- 5.2 Functional on-site tests shall be conducted on all items of equipment and circuitry to prove the proper functioning and installation thereof.
- 5.3 The Contractor shall submit a detailed list of on-site tests for the approval of the Employer's deputy or Technical Officer.
- 5.4 The Contractor shall arrange for the Technical Officer to be present to witness the on-site tests.
- 5.5 The on-site tests and subsequent commissioning **will not commence until ALL** work has been completed.
- 5.6 At the completion of the on-site tests, the Technical Officer shall either sign the tests sheets (supplied by the Contractor) as having witnessed the satisfactory completion thereof, or hand to the Contractor a list of defects requiring rectification.
- 5.7 Upon rectification of defects, the Contractor shall arrange for the Technical Officer to certify satisfactory completion of on-site tests.
- 5.8 Acceptance by the Technical Officer of satisfactory completion of on-site tests in no way relieves the Contractor of his obligation to rectify defects which may have been overlooked or become evident at a later stage.

6.0 COMMISSIONING OF EQUIPMENT

- 6.1 Commissioning will only take place after all defects have been rectified to the satisfaction of the Employer or Employer's Deputy.
- 6.2 Commissioning will include energising of equipment from the primary isolator to the track feeder circuits. The Contractor must prove the satisfactory operation of all equipment under live conditions.
- 6.3 On completion of commissioning, the Contractor will hand the equipment over to the Employer or Employer's Deputy in terms of the relevant instruction.
- 6.4 The commissioning of protection equipment by Transnet Freight Rail will in no way absolve the Contractor from any of his responsibilities during the guarantee period. It is the Contractor's responsibility to satisfy him or herself that the commissioning of the protection equipment has been carried out in a satisfactory manner, and in no way compromises the proper operation of the equipment supplied in terms of the contract.
- 6.5 The Contractor shall be present during the testing and setting of the protection to rectify any faults found.

7.0 GUARANTEE AND DEFECTS

- 7.1 The Contractor shall guarantee the satisfactory operation of the complete electrical installation supplied and erected by him and accept liability for maker's defects that may appear in design, materials and workmanship.

- 7.2 The Contractor shall be issued with a completion certificate with the list of all defects to be repaired within 14 working days after commissioning.
- 7.3 The guarantee period for these substations shall expire after:
A period of 12 months commencing on the date of completion of the contract / sub-order or the date the substation is handed over to Transnet Freight Rail whichever is the earliest.
- 7.4 Any defects that may become apparent during the guarantee period shall be rectified to the satisfaction of Transnet Freight Rail, and to the account of the Contractor.
- 7.5 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 Freight Rail of such defects.
- 7.6 Should the Contractor fail to comply with the requirements stipulated above, Transnet Freight Rail shall be entitled to undertake the necessary repair work or effect replacement of defective apparatus or materials, and the Contractor shall reimburse Transnet Freight Rail the total cost of such repair or replacements, including the labour costs incurred in replacing defective material.
- 7.7 Any specific type of fault occurring three times within the guarantee period and which cannot be proven to be due to other faulty equipment not forming part of this contract e.g., faulty locomotive or overhead track equipment, etc., shall automatically be deemed an inherent defect. Such inherent defect shall be fully rectified to the satisfaction of the Employer or Employer's Deputy and at the cost of the Contractor.
- 7.8 If urgent repairs have to be carried out by Transnet Freight Rail staff to maintain supply during the guarantee period, the Contractor shall inspect such repairs to ensure that the guarantee period is not affected and should they be covered by the guarantee, reimburse Transnet Freight Rail the cost of material and labour.

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Contract Data

The Contractor's Offer

The Contractor is:

Name

Address

Telephone **Fax No.**

E-mail

The percentage for overheads and profit added to the Defined Cost for people is.....%.

The percentage for overheads and profit added to other Defined Cost is.....%.

The Contractor offers to Provide the Works in accordance with the *conditions of contract* for an amount to be determined in accordance with the *conditions of contract*.

The offered total of the Prices is (VAT @14% inclusive) (In words)

Amount in figures: R.....(VAT @14% inclusive)

Signed on behalf of the Contractor

Name

Position

Signature..... Date

The Employer's Acceptance

The Employer accepts the Contractor's Offer to Provide the Works

Signed on behalf of the Employer

Name

Position

Signature..... Date

Part C2: Pricing Data

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Part C2.1: Pricing Data

Price Instructions

2.0 PRICING INSTRUCTIONS

1. The agreement is based on the NEC Engineering and Construction Short Contract 3. The contract specific variables are as stated in the contract data. Only the headings and clause numbers for which allowance must be made in the Price list are recited.
2. Preliminary and General Requirements are based on part 1 of SANS 1921, 'Construction and Management Requirements for Works Contracts'. The additions, deletions and alterations to SANS 1921 as well as the contract specific variables are as stated in the contract data. Only the headings and clause numbers for which allowance must be made in the Price list are recited.
3. It will be assumed that prices included in the Price list are based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for tenders.
4. Reference to any particular trademark, name, patent, design, type, specific origin or producer is purely to establish a standard for requirements. Products or articles of an equivalent standard may be substituted.
5. The Price list is not intended for the ordering of materials. Any ordering of materials, based only on the Price list, is at the Contractor's risk.
6. The amount of the Preliminaries to be included in each monthly payment certificate shall be assessed as an amount prorated to the value of the work duly executed in the same ratio as the preliminaries bears to the total of prices excluding any contingency sum, the amount of the Preliminaries and any amount in respect of contract price adjustment provided for in the contract.
7. The amount or items of the Preliminaries shall be adjusted to take account of the theoretical financial effect which changes in time or value (or both) have on this section. Such adjustments shall be based on adjustments in the following categories as recorded in the Price list:
 - a) An amount which is not to be varied, namely Fixed (F).
 - b) An amount which is to be varied in proportion to the contract value, namely Value Related (V).
 - c) An amount which is to be varied in proportion to the contract period as compared to the initial construction period, excluding revisions to the construction period for which no adjustment the Contractor is entitled to in terms of the contract, namely Time Related (T).
8. The following abbreviations are used in the Price list:

Hr	=	Hour
Ea	=	Each
Quant	=	Quantity
9. The prices and rates in these Price list are fully inclusive prices for the work described under the items. Such prices and rates cover all costs and expenses that may be required in and for the execution of the work described in accordance with the provisions of the scope of work and shall cover liabilities and obligations set forth or implied in the Contract data, as well as profit.

- 10 Where the scope of work requires detailed drawings and designs or other information to be provided, all costs associated therewith are deemed to have been provided for and included in the unit rates and sum amount tendered for such items.
- 11 Where no quantity has been provided against an item in the Price list, the Contractor shall use their discretion and provide the quantity.
- 12 The quantities set out in these Price list are approximate and do not necessarily represent the actual amount of work to be done. The quantities of work accepted and certified for payment will be used for determining payments due and not the quantities given in these Price list.
- 13 The short descriptions of the items of payment given in these Price list are only for purposes of identifying the items. More details regarding the extent of the work entailed under each item appear in the Scope of Work.
- 14 Contractor shall ensure that provision (financial as well as time) for excavations in a range of soil types is made for in their tenders.
- 15 For each item in the Price list, including Preliminaries, the Contractor shall provide in the appropriate column the portion of the tendered sum (inclusive of labour and material) which has been sourced locally (Republic of South Africa).
- 16 The Contractor shall also arrange forward cover within two weeks after contract award on all imported items.
- 17 The Contractor shall provide information related to imported content, i.e. equipment to be imported, value and applicable exchange rates. This information shall be provided as an Annexure to the Price list.
- 18 The total in the Price list shall be exclusive of VAT.
- 19 Transnet Freight Rail payment terms: 30 days from month end statement.

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Contract Data
Price List

Item	Description	Un	Qty	Rate	Price
	Waterval Onder 3KV Substation				
A1	Main Transformer				
1	Oil sampling prior work commencement	sum	1		
2	Flush and clean transformer Assembly	sum	1		
3	Re-gasket main transformer top cover, Buccholz relay, breather pipe, conservator tank joint and CT terminal boxes.	sum	1		
4	Supply & install new temperature gauges	ea	2		
5	Supply & install breather complete with silica gel crystals	sum	1		
6	Re-gasket radiator fins / O-rings	sum	1		
7	Replace conservator sight glass	ea	1		
8	Top up oil to level (Virgin Oil)	sum	1		
9	Oil purification and oil sampling	sum	1		
10	Clean, treat , paint main transformer tank and radiators grey and conservator tank white	sum	1		
A2	Auxiliary Transformer				
11	Oil sampling prior work commencement	sum	1		
12	Re-gasket top cover	sum	1		
13	Paint ,treat tank & conservator	sum	1		
14	Top up oil to level (Virgin Oil)				
	Oil purification and oil sampling	sum	1		
A3	Plinth , surface area & commission				
15	Bioenvironmental soil treatment	sum	1		
16	Soil & Stones oil treatment and level surface area	sum	1		
17	Ps & G's	sum	1		
18	Commissioning	sum	1		
A	Total Price for Waterval Onder =		R		
B	VAT (14 % of A) =		R		
D	Gross Total (A + B) =		R		

Contract Data Price List

Item	Description	Un	Qty	Rate	Price
	Westaffin 3KV Substation				
A1	Main Transformer				
1	Oil sampling prior work commencement	sum	1		
2	Flush and clean transformer Assembly	sum	1		
3	Re-gasket radiator fins / O-rings and Buccholz relay	sum	1		
4	Replace conservator sight glass	ea	1		
5	Re-gasket conservator tank joint	sum	1		
6	Top up oil to level (Virgin Oil)	sum	1		
7	Oil purification and oil sampling	sum	1		
8	Clean main transformer tank and radiators and conservator tank.	sum	1		
A2	Plinth , surface area & commission				
9	Bioenvironmental soil treatment	sum	1		
10	Soil & Stones oil treatment and level surface area	sum	1		
11	Ps & G's	sum	1		
12	Commissioning	sum	1		
A	Total Price for Westaffin =		R		
B	VAT (14 % of A) =		R		
c	Gross Total (A + B) =		R		

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**Contract Data
Price List**

Item	Description	Uni	Qty	Rate	Price
	Mkhuhlu 3kV substation				
A1	Main Transformer				
1	Oil sampling prior work commencement	sum	1		
2	Flush and clean transformer Assembly	sum	1		
3	Re-gasket top cover, CT terminal boxes and Bucholz relay	sum	1		
4	Supply & install new temperature gauges	ea	2		
5	Supply & install breather complete with silica gel crystals	sum	1		
6	Replace conservator sight glass	ea	1		
7	Re-gasket conservator tank joint	sum	1		
8	Top up oil to level (Virgin Oil)	sum	1		
9	Re-gasket breather pipe	sum	1		
10	Oil purification and oil sampling	sum	1		
11	Clean, treat , paint main transformer tank and radiators grey and conservator tank white	sum	1		
A3	Plinth , surface area & commission				
12	Bioenvironmental soil treatment	sum	1		
13	Soil & Stones oil treatment and level surface area	sum	1		
14	Ps & G's	sum	1		
15	Commissioning	sum	1		
A	Total Price for Mkhuhlu =			R	
B	VAT (14 % of A) =			R	
C	Gross Total (A + B) =			R	

Contract Data
Price List

Item	Description	Uni	Qty	Rate	Price
Hoedspruit 3KV Substation					
A1	Main Transformer				
1	Oil sampling prior work commencement	sum	1		
2	Flush and clean transformer Assembly	sum	1		
3	Re-gasket top cover, CT terminal boxes and bucholdz relay	sum	1		
4	Supply & install new temperature gauges	ea	2		
5	Supply & install breather complete with silica gel crystals	sum	1		
6	Replace conservator sight glass	ea	1		
7	Re-gasket conservator tank joint	sum	1		
8	Top up oil to level (Virgin Oil)	sum	1		
9	Re-gasket breather pipe	sum	1		
10	Oil purification and oil sampling	sum	1		
11	Clean, treat , paint main transformer tank and radiators grey and conservator tank white	sum	1		
A3	Plinth , surface area & commission				
12	Bioenvironmental soil treatment	sum	1		
13	Soil & Stones oil treatment and level surface area	sum	1		
14	Ps & G's	sum	1		
15	Commissioning	sum	1		
A	Total Price for Hoedspruit =			R	
B	VAT (14 % of A) =			R	
D	Gross Total (A + B) =			R	

Part C3: Scope of Work

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Scope of Work

Particular Specification

8.0 Description of work

The Contractor shall perform the following:

8.1 Waterval Onder 3kV DC traction substation

Main Transformer

- 8.1.1 Re-gasket main and auxiliary transformer top cover and both Red and Blue CT terminal boxes. Remove, store, purify, vacuum and test the oil as specified in Transnet Freight Rail's specification CEE. 0229.95.
- 8.1.2 Top up transformer with virgin oil which complies with the requirements specified in SABS 555. 1995;
- 8.1.3 **Clean and treat oil polluted ballast and plinth.**

8.2 Westaffin 3kV DC traction substation

Main Transformer

- 8.2.1 Re-gasket all the cooling fins of main transformer as well as Buchholz relay.
- 8.2.2 Remove, store, purify, vacuum and test the oil as specified in Transnet Freight Rail's specification CEE. 0229.95.
- 8.2.3 Top up transformer with virgin oil which complies with the requirements specified in SABS 555. 1995;
- 8.2.4 **Clean and treat oil polluted ballast and plinth.**

8.3 Mkhuhlu 3kV DC traction substation

Main Transformer

- 8.3.1 Re-gasket main transformer top cover and both Red and Blue CT terminal boxes.
- 8.3.2 Re-gasket conservator tank joint and Buchholz relay.
- 8.3.3 Remove, store, purify, vacuum and test the oil as specified in Transnet Freight Rail's specification CEE. 0229.95.
- 8.3.4 Top up transformer with virgin oil which complies with the requirements specified in SABS 555. 1995;
- 8.3.5 Clean and treat oil polluted ballast and plinth.

8.4 Hoedspruit 3kV DC traction substation

Main Transformer

- 8.4.1 Re-gasket main transformer top cover and both Red and Blue CT terminal boxes
- 8.4.2 Re-gasket main transformer Bucholz relay and conservator tank joint
- 8.4.3 Remove, store, purify, vacuum and test the oil as specified in Transnet Freight Rail's specification CEE. 0229.95.
- 8.4.4 Top up transformer with virgin oil which complies with the requirements specified in SABS 555. 1995;
- 8.4.5 Clean and treat oil polluted ballast and plinth.

8.5 QUALITY AND INSPECTION

- 8.5.1 **The Contractor shall apply 14 days in advance for the date of energizing.**
- 8.5.2 The Contractor shall be responsible to issue a compliance certificate in terms of SANS 0142 for each site before energizing of the equipment shall take place.

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Scope of work

Secondary Specifications

8.6 Specifications

8.6.1 South African National Standards:

8.6.1.1	SANS 1091	National colour standard.
8.6.1.2	SANS 763	Hot dip galvanised zinc coating.
8.6.1.3	SANS 121	Hot Dip Galvanised Coating for Fabricated Iron or Steel Article.
8.6.1.4	SANS 0555. 2007	Unused and reclaimed mineral insulating oil for transformer and switchgear.
8.6.1.5	SANS 8528	Reciprocating internal combustion engine driven alternating current generating set.
8.6.1.6	SANS 10064. 2005	Code of Practice for the preparation of steel surfaces for coating.
8.6.1.7	BSS 171. 1987	Power Transformers.

8.6.2 Transnet Freight Rail:

8.6.2.1	S.420 (1999)	Specification for concrete work.
8.6.2.2	CEE. 0229.95	Dry-out and Regeneration of insulating oil and reclaiming and de-sludging of transformers.
8.6.2.3	CEE.0045.2002/1	Painting of steel Components of Electrical equipment.
8.6.2.4	CEE.0183.2002	Hot dip galvanising and painting of electrical equipment.

NOTE: Any other specifications referenced in the above mentioned specification, will be for information purposes and may be provided on request after tender award.

8.7 Occupational Health and Safety Act No. 85 of 1993 (Available at depot for referral)

8.8 Constraints on how the Contractor Provides the Works

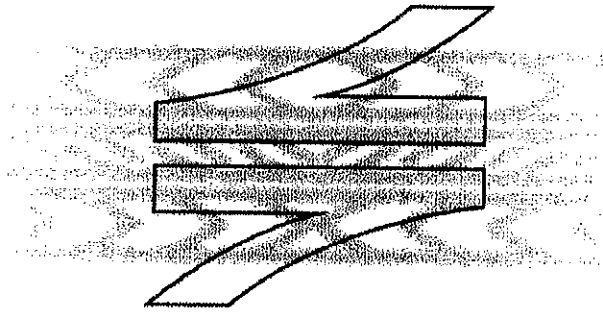
8.8.1 The constrains shall be as specified in the specifications of the particular equipment.

8.9 Requirements for the programme

- 8.9.1 Programme of work : To be submitted by successful Contractor
- 8.9.2 Format : Gantt chart
- 8.9.3 Information : How work is going to be executed and commissioned
- 8.9.4 Submission : 24 hours after the award of contract
- 8.9.5 Site diary : Successful Contractor to supply in triplicate carbon copies
- 8.9.6 Site instruction book : Successful Contractor to supply in triplicate carbon copies

8.10 Services and other things provided by the Employer

- 8.10.1 Transnet Freight Rail reserve the right to inspect the compatibility of machinery utilised before site establishment.
- 8.10.2 Transnet Freight Rail shall inspect all equipment before dispatching the equipment to site.
- 8.10.3 Transnet Freight Rail shall have an electrician available for isolation and the erection of barriers to live electrical equipment and issuing of work permits.
- 8.10.4 Upon successful completion of the works to the satisfaction of Transnet Freight Rail, Transnet Freight Rail shall perform necessary protection tests and commission the equipment.
- 8.10.5 **The Contractor shall make necessary arrangements for sanitation, water and electricity at these relevant sites during the installation of the equipments.**



SPOORNET

A division of Transnet limited

**TECHNICAL
RAILWAY ENGINEERING
SPECIFICATION**

**PAINTING OF STEEL COMPONENTS OF
ELECTRICAL EQUIPMENT**

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Circulation restricted to:

Technical: Maintenance (Infrastructure)

Technical: Maintenance

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1.0 SCOPE

This specification covers the surface preparation, paint systems and painting of steel components of electrical equipment.

2.0 REFERENCES AND GLOSSARY

The following standards and specifications are referred to herein:

2.1 South African Bureau of Standards: -

SABS 064 : Code of Practice for the Preparation of Steel Surfaces for Coating.

SABS 1091 : National Colour Standards for Paint.

2.2 Trade names :

OptiDegreaser

OptiPrime^{Aqua}

Noxyde

2.3 Classification of level of surface degradation:

RE1 – 0.05% of surface rusted

RE2 – 0.5% of surface rusted

RE3 – 1.0% of surface rusted

RE4 – 3.0% of surface rusted

RE5 – 8.0% of surface rusted

3.0 METHOD OF TENDERING

3.1 Tenderers shall indicate clause by clause compliance or non-compliance with the specification. This shall take the form of a separate document listing all the specification clause numbers indicating the individual statement of compliance or non-compliance. Tenderers to elaborate on their response to a clause can use this document.

4.0 SURFACE PREPARATION

4.1 NON-GALVANISED STEELWORK

4.1.1 New Steelwork

SURFACE PREPARATION (Read: NOTES and SPECIAL INSTRUCTIONS)	PRODUCT REQUIREMENTS & APPLICATION (See Variations for Specific Environmental Conditions)
<ul style="list-style-type: none"> > Sandblast to a standard of Sa2 to remove mill scale and/or flash rust > Remove dust with <u>clean</u> compressed air (Check air for oil contamination) 	<ul style="list-style-type: none"> > Apply a stripe coat to edges, bolts, crevices, nuts and rivets. > Apply one thick coat of Noxyde to the entire structure with contrasting color. > Apply a final thick coat of Noxyde at a consumption rate of minimum 400g/m²

4.1.2 Previously Coated Steelwork

4.1.2.1 COATING START FAILING TO A LEVEL OF RE 2

<ul style="list-style-type: none"> ➤ Test for adhesion (refer to supplier) ➤ Degrease thoroughly with OptiDegreaser ➤ Hydro Blast complete substrate using a rotating nozzle and minimum 250 bar at the nozzle 	<ul style="list-style-type: none"> ➤ Apply a stripe coat to edges, bolts, nuts and rivets and fill crevices. ➤ Apply one coat of Noxyde to entire substrate in a contrasting color
---	--

4.1.2.2 COATING FAILURE AND RUSTING TO A LEVEL OF RE 4

<ul style="list-style-type: none"> ➤ Remove all visible traces of rust by mechanical means ST2 (chip/grind/sand) OR shotblasting /spotblasting) ➤ Degrease thoroughly with OptiDegreaser ➤ Hydro Blast complete substrate using a rotating nozzle and minimum 250 bar at the nozzle. 	<ul style="list-style-type: none"> ➤ Apply a thick coat of Noxyde to the de-rusted areas, edges, bolts, nuts and rivets and fill crevices ➤ Apply one coat of Noxyde at a consumption rate of minimum 400g/m² to the entire substrate using a contrasting color.
---	---

4.1.2.3 BITUMEN COATED

<ul style="list-style-type: none"> ➤ Remove all visible rust and loosely adhering bitumen coating by means of chipping and scraping (ST2) ➤ Degrease thoroughly with OptiDegreaser ➤ Hydro Blast complete substrate using a rotating nozzle and minimum 250 bar at the nozzle. 	<ul style="list-style-type: none"> ➤ Apply a thick coat of Noxyde to the de-rusted areas, edges, bolts, nuts and rivets and fill crevices ➤ Apply two coats of Noxyde at a consumption rate of minimum 400g/m² per coat to the complete substrate using contrasting colors
---	---

4.1.2.4 BADLY RUSTED STEEL WITH PITTING & CRUST FORMATION TO RE 5

<ul style="list-style-type: none"> ➤ 1. Degrease thoroughly with OptiDegreaser ➤ 2. Hydro Blast complete substrate using a spinner tip and minimum 250 bar at the nozzle ➤ Shotblast/sandblast complete substrate giving particular attention to bolts nuts rivets and crevices. Sa2 ➤ 4. Dedust 	<ul style="list-style-type: none"> ➤ Apply a first thick coat of Noxyde to the entire substrate ➤ Apply a stripe coat to edges, bolts, nuts and rivets and fill crevices using a contrasting color ➤ Apply a final coat of Noxyde at a consumption rate of minimum 400g/m²
--	--

4.2 GALVANISED STEELWORK

4.2.1 NEW AND WEATHERED GALVANISING WITH A SMOOTH GLOSSY FINISH

<ul style="list-style-type: none"> ➤ Degrease thoroughly with OptiDegreaser ➤ Rinse down with copious quantities of potable water 	<ul style="list-style-type: none"> ➤ Apply one thin coat of OptiPrime^{Aqua} (100 micron wet/35 micron dry) ➤ Apply a stripe coat of Noxyde to edges, bolts, nuts and rivets and fill crevices ➤ Apply two coats of Noxyde at a consumption rate of minimum 400g/m² per coat to the complete substrate using contrasting colors
---	---

4.2.2 WEATHERED GALVANISING

4.2.2.1 White rust (zinc oxide)

<ul style="list-style-type: none"> ➤ Degrease thoroughly using OptiDegreaser - ensure that all traces of "white rust" are removed ➤ Rinse down with copious quantities of potable water 	<ul style="list-style-type: none"> ➤ Apply one thin coat Noxyde ➤ Apply a stripe coat of Noxyde to edges, bolts, nuts and rivets and fill crevices ➤ Apply a final coat of Noxyde at a consumption rate of minimum 400g/m² per coat to the complete substrate using a contrasting color
---	---

4.2.2.2 Combination of red rust (iron oxide) and white rust (zinc oxide)

<ul style="list-style-type: none"> ➤ Remove all traces of red rust ➤ Degrease thoroughly using OptiDegreaser - ensure that all traces of "white rust" are removed ➤ Rinse down with copious quantities of potable water 	<ul style="list-style-type: none"> ➤ Apply a thick coat of Noxyde to the de-rusted areas, edges, bolts, nuts and rivets and fill crevices ➤ Apply a final coat of Noxyde at a consumption rate of minimum 400g/m² per coat to the complete substrate using a contrasting color
--	---

NOTES and SPECIAL INSTRUCTIONS:		
<p>1 Sand or Grit-blasting</p> <ul style="list-style-type: none"> a) Always use clean, non-recycled grit b) Always use fine or extra fine grit c) Always use oil free air d) Always use a moisture trap e) Dedust 	<p>2 Degreasing:</p> <ul style="list-style-type: none"> a) Use only OptiDegreaser b) Dilute according to instructions - see data sheet c) Always follow up with hydro-blasting to remove all chemical residues 	<p>3 Hydro-blasting:</p> <ul style="list-style-type: none"> a) Always use clean potable water b) Use a rotating nozzle and ensure a pressure of minimum 250 bar at the nozzle c) Remove ALL traces of dirt and any form of salt contamination and residues of the degreasing agent d) Concentrate in crevices and other similar "collection" areas

5. PRODUCT APPLICATION

5.1 METHOD OF APPLICATION

OptiPrime ^{Agis}	Noxyde
<p>Temperature-Min 5 °C Relative humidity-Max 80% R.H.</p> <ul style="list-style-type: none"> ➤ Apply by brush, lacquer roller or airless spray using a no. 11 nozzle ➤ Apply one thin coat only - 100 micron wet = 35 micron dry (DFT) ➤ Small parts can be dipped - dilute with 10% water for dipping 	<p>Temperature-Min. 8 °C, Max. 55 °C Relative Humidity-Max 80% R.H.</p> <ul style="list-style-type: none"> ➤ Apply by brush, roller or airless spray ➤ For airless spray applications refer to "Tips for airless spraying of Noxyde"

5.2 DRYING TIME AND OVERCOAT PERIODS

<ul style="list-style-type: none"> ➤ Do not overcoat within 12 hours ➤ Wash down with clean potable water (100 bar) before over coating to remove dust or any other form of intermediate contamination 	<ul style="list-style-type: none"> ➤ Drying time is dependant on ambient conditions and can vary from a few minutes (in dry windy conditions) to a few hours (in humid shaded conditions) ➤ Overcoat as soon as possible to avoid contamination of previous coat ➤ Wash down with clean potable water (100 - 150 bar) before over coating if danger of contamination exists or if left more than 4 hours before over coating
--	---

5.3 CURING TIME

n/a	> 7 - 14 days to "full cure". During this period the product is prone to mechanical damage - the longer time it is allowed to cure, the tougher it becomes
-----	--

5.4 DRY FILM THICKNESS (DFT) READINGS

35 micron	<ul style="list-style-type: none"> > Severe coastal & marine environments (in the spray zone) - TWO stripe coats & overall minimum DFT of 400 micron > Normal coastal environment (1.5 km from the coast line) - a single stripe coat & overall minimum DFT of 400 micron > Non coastal high rainfall areas, in the immediate vicinities of rivers, dams, lakes, etc., and in industrial areas with high levels of chemical pollution - a single stripe coat & overall minimum DFT of 400 micron > Dry non aggressive environments - a single stripe coat & overall minimum DFT of 250 micron <p>NOTE: DFT readings can only be taken after 72 hours</p>
-----------	--

5.5 Notwithstanding the above requirements, 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.

5.6 Blast cleaning of components shall be in accordance with clause 4.3 of SABS 064 to a degree of cleanliness of at least Sa 2 for inland exposure components and Sa 2 ½ for coastal exposure components. See Table 1 of SABS 064 for the appropriate profile.

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

5.8 Components that will 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.

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

6.0 PAINT SYSTEM

A choice of two systems is available to suit the contractors equipment.

6.1 Noxyde paint system

1st coat: OptiPrime^{Aqua}

Wet film thickness: 100 micrometers. Dry film thickness: 35 micrometers.

2nd coat: Noxyde Topcoat

Dry film thickness: 165 micrometers @ 400g/m².

6.1.1 Paint application:

6.1.1.1 The primer and paint is normally applied by brush at supply viscosity (no reducer required).

6.1.1.2 The practical spreading rate of the primer and paint is a function of the ambient temperature, wind velocity and the application technique, but will generally fall in the range of 400g/m² in low to mild corrosive areas, and 500g/m² in severely corrosive areas.

6.1.1.3 Once the applied coat of primer/paint is touch dry, the next coat of paint may be applied.

6.1.1.4 If painted steelwork is to be bolted onto structures, it is imperative that the paint has been allowed to hard dry before the steelwork is bolted onto structures. This is to prevent the soft paint being damaged when tightening the bolts securing the steelwork to the structures.

6.2 Powder Coating System.

The powder-coating process shall be in accordance with SABS 1274 type 4: Corrosion-resistant coatings for interior use and using the thermosetting type high gloss coatings.

7.0 COATINGS AND WORKMANSHIP

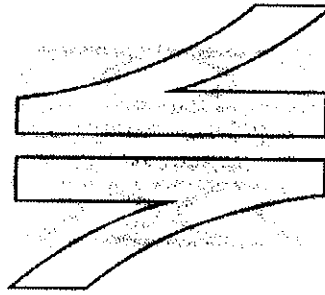
7.1 All specified coatings shall be applied according to the relevant specification and the manufacturer's instructions shall be followed.

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

7.3 When examined visually, the finished products shall have a uniform appearance and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

TENDERER'S SIGNATURE.....

DATE.....



SPOORNET

A division of Transnet limited

**TECHNICAL
RAILWAY ENGINEERING
SPECIFICATION**

**HOT DIP GALVANISING AND PAINTING OF
ELECTRIFICATION STEELWORK**

Circulation restricted to:

Technical

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1.0 SCOPE

- 1.1 This specification covers the hot dipped galvanising and painting of electrification steelwork.
- 1.2 The extent of work includes galvanising and painting of steelwork consisting of universal column masts with welded on bases up to 14 m in length and small part steelwork consisting of channel, angle and flat iron fittings, welded assemblies and tubular cantilevers.

2.0 REFERENCES

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

SABS 763: Hot Dipped Galvanising.

SABS 1091: National Colour Standards for Paint.

3.0 METHOD OF TENDERING

- 3.1 Tenderers shall indicate clause by clause compliance or non-compliance with the specification. This shall take the form of a separate document listing all the specification clause numbers indicating the individual statement of compliance or non-compliance.
- 3.2 The Schedule of Requirements, Quantities and Prices, Appendix 1 to this specification shall be fully completed by Tenderers. Failure to submit a fully completed sheet may preclude a tender from further consideration.

4.0 APPENDICES

The following appendices form an integral part of this specification:

Appendix 1: Schedule of Requirements, Quantities and Prices.

5.0 GALVANISING OF STEELWORK

- 5.1 The steelwork must be cleaned and hot dip galvanised to SABS 763 except for the following:
- 5.1.1 No ammonium chloride salts shall be used on withdrawal from the molten zinc.
- 5.2 After galvanising no passivation must take place. Quenching may be done with clean water. No sodium dicromate must be used.
- 5.3 All surface contamination of zinc oxide (zinc ash) must be removed by means of brushing.

6.0 PRIMER COATING

- 6.1 The hot dip galvanising shall be followed as soon, as is practical by the painting procedures as specified hereunder:
- 6.1.1 Prior to painting, all steelwork shall be cleaned with a solvent cleaner and washed down with clean water to remove all traces of solvent. The solvent cleaner used must be compatible with zinc (similar to Galv Clean).
- 6.1.2 The primer coating, a two-component polyamide cured epoxy primer e.g.: PLASCOGUARD GEHOPPENS PRIMER or equivalent shall be applied to a dry film thickness of 75 microns. Application shall be in accordance with the manufacturers

- instructions.
- 6.1.3 The primer coating shall be allowed to cure for a minimum period of 48 hours before handling to facilitate coating of the rest of the surfaces as well as the application of the intermediate coat.
- 6.1.4 A coat of a two-component high-build micaceous iron oxide pigmented polyamide cured re-coatable epoxy e.g.: SIGMACOVER CM MIOCOAT or equivalent shall be applied to a wet film thickness of 75-85 microns. Application shall be in accordance with manufacturers instructions.
- 6.1.5 A further 48 hours period must be allowed for curing of the primer coatings before handling the steelwork for transportation purposes.
- 6.2 All care must be exercised during handling to prevent damage of the painted surfaces.
- 6.3 Loading of steelwork must be done in such a way to limit damage of surfaces to a minimum during transit.
- 6.4 Only non-metallic slings should be used, preferably nylon or cotton material.
- 6.5 Spornet reserves the right to inspect the premises where this work is carried out at any time during the duration of galvanising and primer painting.
- 6.6 Spornet shall inspect all steelwork at the Tenderers premises before dispatch of any such steelwork.
- 7.0 TOP COATING**
- 7.1 The topcoat shall be applied directly after erection of the steelwork in accordance with procedures hereunder:
- 7.1.1 Damage of the primed surfaces shall be repaired, after erection, by the application of one or more coats of a two component high build micaceous iron oxide pigmented polyamide cured re-coatable epoxy coating e.g.: SIGMACOVER CM MIOCOAT or equivalent until the original film thickness is obtained.
- 7.1.2 A topcoat of a two-component aliphatic isocyanate cured acrylic finish e.g.: SIGMADUR GLOSS or equivalent shall be applied according to the paint manufacturers instructions to a minimum dry film thickness of 50 microns. The topcoat shall be determined by whether steelwork is for Spornet or the South African Rail Commuter Corporation.
- 7.1.2.1 For Spornet the colour shall be French Grey (SABS 1091: Code H30).
- 7.1.2.2 For the South African Rail Commuter Corporation the colour shall be Medium Sea Grey (SABS 1091: Code G24).
- 8.0 QUALITY**
- 8.1 The tenderer shall submit a copy of a Quality Plan to be implemented during the process. The Quality Plan shall include stages for preparation of metalwork prior to galvanising, for the galvanising and for the painting process.
- 8.2 The Quality Plan shall furthermore make provision for the customer's requirements for inspection and acceptance points and witnessing of tests to establish whether requirements of SABS 763 in so far as preparation of steelwork prior to galvanising, galvanising and painting requirements as per this specification are complied with.

9.0 SUBSTITUTION

- 7.1 This instruction replaces Specification CEE.0183.95.
- 7.2 All clauses have been revised to suit latest requirements e.g.: removal of the Complies/Does not complies reference.

END

TENDERER'S SIGNATURE: _____

DATE: _____

FOR SPOORNET: _____

GRADE: _____

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Appendix 1

SCHEDULE OF REQUIREMENTS, QUANTITIES AND PRICES

1.0

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END

FOR SPOORNET: _____

GRADE: _____

**SPOORNET
(INFRASTRUCTURE) (ELECTRICAL)**

SPECIFICATION No. CEE.0229.95

**DRY-OUT AND REGENERATION OF INSULATING OIL AND RECLAIMING AND
DE-SLUDGING OF TRANSFORMERS**

This specification covers Spoornet's requirements for in situ dry-out and de-sludging of power transformers and reclaiming insulating oil by means of regeneration

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SPECIFICATION No. CEE.0229.95

1.0 SCOPE

This specification covers Spoornet's requirements for the dry-out and de-sludging of power transformers and reclaiming of insulating oil by means of regeneration.

2.0 REFERENCE AND STANDARDS

The following publication is referred to herein.

South African Bureau of Standards

SABS 555 : Mineral Insulating Oil for Transformers and Switch gear.

3.0 METHOD OF TENDERING

3.1 Tendering shall be in accordance with Spoornet (Infrastructure) (Electrical) specification CEE.0012.

Complies/Does not comply

3.2 Tendering prices shall be based on cost of the process that will achieve the results required as per clause 9.0 for each individual transformer described in Appendix 1,2 & 3.

Complies/Does not comply

3.3 Tenderer's shall quote separately for the replacement of lost oil if required, (per litre).

Complies/Does not comply

3.4 Spoornet reserves the right to inspect the Tenderer's facilities prior to awarding the contract in order to ensure that suitable equipment is available for the type of operation.

Complies/Does not comply

4.0 APPENDICES

The following appendices form an integral part of this specification:

Appendix 1: Schedule of transformers to be regenerated.

Appendix 2: Schedule of transformers to be de-sludged.

Appendix 3: Schedule of transformers to be dried-out.

Appendix 4: Moisture content of oil leaving transformer at which dry-out process must be terminated for various transformers temperatures.

SPECIFICATION No. CEE.0229.95

5.0 TRANSFORMER DRY-OUT (DE-ENERGISED)

5.1 Note: Any moisture present in the transformer will be partly in the oil and partly in the layers of solid insulation. Normally more than 95 percent of moisture in the transformer is trapped in the insulation and less than 5 percent in the oil. Removal of moisture from the solid insulation in situ is a slow process due to the slow rate of diffusion of moisture between insulation and oil. No quick dry-out processes (eg 48 hours) will thus be accepted, as this will dry-out the oil only and not the solid insulation.

5.2 The dry-out plant shall include a vacuum type drier, or alternative dry-out method with suitable filter (see clause 6.2.1) to remove the solid particles and a suitable pump (see clause 6.2.2).

Complies/Does not comply

5.2.1 The hoses between the dry-out plant and the transformer shall have a built-in earth conductor to avoid static electricity to be charged to a high potential. The filter and tanks in the plant shall also be connected to earth.

Complies/Does not comply

5.2.2 The transformer tank shall not be subjected to a vacuum in excess of the maximum possible indication on the transformer name plate.

Complies/Does not comply

5.2.3 The oil temperature inside the transformer tank shall not exceed 90 degrees Celsius while the dry-out process is in progress.

Complies/Does not comply

5.3 The silica gel crystals in the transformer breather shall be replaced at the start of the dry-out process and the colour change shall be monitored during the process. New crystals shall be provided when more than 50 percent of the crystals are coloured pink.

Complies/Does not comply

5.4 ON LOAD DRY-OUT

5.4.1 When using an on load dry-out plant the Contractor shall work in close conjunction with the Regional Engineer Electrical staff, who will lay down the requirements for safe operation of the plant.

Complies/Does not comply

6.0 REGENERATION OF OIL (Purification)

6.1 In order to remove acidic and colloidal contaminants an activated clay or Fuller's earth process shall be used to achieve the results required as per clause 9.0.

Complies/Does not comply

SPECIFICATION No. CEE.0229.95

- 6.1.1 The purification plant shall include provision for heating, automatic vacuum degasser, and shall be able to draw a vacuum in the transformer as well as circulate the oil in the transformer.

Complies/Does not comply

- 6.2 In the event of reclaiming of oil only being required, the complete volume of oil in the transformer may be replaced with new or factory regenerated oil as alternative to clause 6.1. When pumping oil into electrical equipment, the following precautionary measures shall be taken:

- 6.2.1 A paper filter (0,5 micron) shall always be installed between the pump and the equipment.

Complies/Does not comply

- 6.2.2 Pumps shall not have metal-to-metal friction which can release conductive metal particles into the oil.

Complies/Does not comply

- 6.2.3 The Contractor shall ensure that no air is trapped in the transformer while new oil is being added to the transformer. The tenderer shall indicate what method will be used to prevent air being trapped.

Complies/Does not comply

7.0 DE-SLUDGING OF TRANSFORMERS

- 7.1 The transformer shall be de-sludged in situ, completely filled with oil in accordance with the following process:-

Complies/Does not comply

- 7.1.1 The oil shall be heated and maintained at a temperature of approximately 90 degrees Celsius in the transformer, where the sludge in the transformer will go from a solid to a solution, re-entering the oil. A temperature of approximately 80 degrees Celsius should be reached in the core of the transformer and shall then be subjected to multiple passes of hot oil, for sufficient time to dissolve the sludge inside the transformer. The dissolved sludge is to be removed from the oil by passing the oil through an activated clay or Fuller's earth medium.

Complies/Does not comply

- 7.2 If required, and in agreement with Spornet, the transformer may be kept on load to minimise the amount of external energy to obtain the laid down temperature of approximately 80 degrees Celsius in the core.

SPECIFICATION NO. CEE.0229.95

8.0 REPLACEMENT OF LOST OIL

On completion of the process the oil level in the conservator shall be at the original level prior to the commencement of the dry-out, reclaiming or the de-sludging processes.

Complies/Does not comply

9.0 TESTS ON OIL

9.1 The oil shall be tested by Spornet immediately after completion of the process to confirm compliance with the requirements of SABS 555 for both reclaiming and de-sludging. The requirements for dielectric strength shall be 65kV.

Comply/Does not comply

9.2 During the filtration dry-out process the oil shall be tested by the contractor periodically and the process shall be stopped if the moisture content in the oil leaving the transformer core is in accordance with the moisture content values as stipulated in appendix 4.

Complies/Does not comply

9.2.1 Tests shall be carried out 2 weeks after termination of the dry-out process to ensure that the moisture content in the oil is still within the permissible limits (see Appendix 4).

Complies/Does not comply

10.0 PRECAUTIONARY MEASURES

10.1 If reclamation is done on the transformer oil in the main tank with positive head pressure, a non-return check valve shall be installed between the transformer and the outlet hose from the filtration plant, in order to prevent excessive spilling of oil in the event of failure of the outlet hose.

Complies/Does not comply

10.2 An automatic isolating valve must be coupled to the transformer valve on the inlet side of the plant which will be closed automatically, in the event of a plant malfunction or when the oil level in the tank drops due to an inlet hose failure.

Complies/Does not comply

10.2.1 The following protection alarms must be provided on the dry-out plant if not attended full time:

10.2.1.1 Thermal motor failure.

Complies/ Does not comply

10.2.1.2 Pressure loss by using pressure switches.

Complies/ Does not comply

SPECIFICATION NO. CEE.0229.95

10.2.1.3 The plant must have a leak proof base, with an automatic detection device to shut off the plant.

Complies/ Does not comply

10.2.2 The above alarms can be coupled via the Spornet tellecontrol to give an alarm indication to Electrical Control.

10.2.3 Precautionary measures shall be taken to prevent environmental pollution.

Complies/Does not comply

11.0 INSPECTION

11.1 Spornet reserves the right to be present during any stage of the process and must be timeously advised of dates of recommencement of any process.

Complies/Does not comply

12.0 GUARANTEE

12.1 The Contractor shall guarantee the transformer oil for a period of 12 months after the reclaiming and de-sludging process has been completed to comply with the requirements of clause 9.1, except for dielectric strength and water content.

Complies/Does not comply

12.2 The moisture content of the transformer shall be guaranteed to comply with the requirements of clause 9.2.1.

Complies/ Does not comply

12.3 Should the oil fail the tests as stated in clause 9.0, the Contractor shall repeat the process at his own cost.

Complies/Does not comply

TENDERER'S SIGNATURE

DATE

CHIEF ENGINEER (INFRASTRUCTURE)
(ELECTRICAL)

SCHEDULE OF TRANSFORMERS TO BE REGENERATED

Identification / Location: _____			
1. Type of transformer: _____			
2. Volume of oil inside transformer: _____ litres.			
Oil Properties	Before	After	After 12 Months
3. Acid content (mg KOH/g oil):	_____	_____	_____
4. Moisture content (ppm):	_____	_____	_____
5. Dielectric strength (kV):	_____	_____	_____
6. Sludge content (< 0,02%):	_____	_____	_____

Identification / Location: _____			
1. Type of transformer: _____			
2. Volume of oil inside transformer: _____ litres.			
Oil Properties	Before	After	After 12 Months
3. Acid content (mg KOH/g oil):	_____	_____	_____
4. Moisture content (ppm):	_____	_____	_____
5. Dielectric strength (kV):	_____	_____	_____
6. Sludge content (< 0,02%):	_____	_____	_____

CHIEF ENGINEER (INFRASTRUCTURE)
(ELECTRICAL)

REFERENCE :

"PREVIEW COPY ONLY"

SCHEDULE OF TRANSFORMERS TO BE DE-SLUDGED

Identification / Location: _____			
1. Type of transformer: _____			
2. Volume of oil inside transformer: _____ litres.			
Oil Properties	Before	After	After 12 Months
3. Acid content (mg KOH/g oil):	_____	_____	_____
4. Moisture content (ppm):	_____	_____	_____
5. Dielectric strength (kV):	_____	_____	_____
6. Sludge content (> 0,02%):	_____	_____	_____

Identification / Location: _____			
1. Type of transformer: _____			
2. Volume of oil inside transformer: _____ litres.			
Oil Properties	Before	After	After 12 Months
3. Acid content (mg KOH/g oil):	_____	_____	_____
4. Moisture content (ppm):	_____	_____	_____
5. Dielectric strength (kV):	_____	_____	_____
6. Sludge content (> 0,02%):	_____	_____	_____

CHIEF ENGINEER (INFRASTRUCTURE)
(ELECTRICAL)

REFERENCE :

SCHEDULE OF TRANSFORMERS TO BE DRIED-OUT

Identification / Location: _____			
1. Type of transformer: _____			
2. Volume of oil inside transformer: _____ litres.			
3. Maximum permissible tank vacuum: _____ torr			
Oil Properties	Before	After	After 2 Weeks
4. Moisture content (ppm):	_____	_____	_____
5. Transformer oil temp (deg C)	_____	_____	_____
6. Dielectric strength (kV):	_____	_____	_____

Identification / Location: _____			
1. Type of transformer: _____			
2. Volume of oil inside transformer: _____ litres.			
3. Maximum permissible tank vacuum: _____ torr			
Oil Properties	Before	After	After 2 Weeks
4. Moisture content (ppm):	_____	_____	_____
5. Transformer oil temp (deg C)	_____	_____	_____
6. Dielectric strength (kV):	_____	_____	_____

CHIEF ENGINEER (INFRASTRUCTURE)
(ELECTRICAL)

REFERENCE :

SPECIFICATION No. CEE.0229.95

APPENDIX 4

PAGE 1 OF 1

MOISTURE CONTENT OF OIL LEAVING TRANSFORMER AT WHICH DRY-OUT PROCESS MUST BE TERMINATED FOR VARIOUS TRANSFORMER TEMPERATURES.

Oil Temperature Degrees Celsius	Moisture Content of Oil ppm (mg/kg)	Oil Temperature Degrees Celsius	Moisture Content of Oil ppm (mg/kg)
10	1,5	55	16,0
15	2,0	60	21,0
20	2,5	65	28,0
25	3,3	70	35,5
30	4,2	75	44,0
35	5,5	80	54,0
40	7,2		
45	9,3		
50	12,0		

Note 1: This table is based on moisture content of not more than 2,0 percent in the paper.

Note 2: The oil temperature shall be the top oil temperature of the transformer.

Note 3: For temperatures falling in between the numbers in the table, use the next lower value.

CHIEF ENGINEER (INFRASTRUCTURE)
(ELECTRICAL)

REFERENCE :

TRANSNET LIMITED

S420 (1999)

SPECIFICATION FOR CONCRETE WORK

“PREVIEW COPY ONLY”

TRANSNET LIMITED

S420 (1999)

SPECIFICATION FOR CONCRETE WORK

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S420 (1999)

SPECIFICATION FOR CONCRETE WORK.**1. SCOPE**

This specification covers requirements for plain, reinforced and prestressed concrete.

2. INTERPRETATION**Supporting Specifications**

Plain and reinforced concrete shall comply with SABS 1200 G and with the supplementary requirements contained herein. Prestressed concrete shall comply with SABS 1200 GF. In addition, the following specifications shall apply where relevant:

SABS 763 : 1988	Hot-dip (galvanised) zinc coatings
SABS 1083 : 1994	Aggregates from natural sources
SABS 0100-2 : 1992	The Structural use of concrete - Part 2 : Materials and execution of work.
SABS ENV 197-1	Cement - composition, specifications and conformity criteria. Part 1 : Common cements
SABS 1491-1 : 1989	Portland cement extenders - Part 1 : Ground granulated blast furnace slag.
SABS 1491-2 : 1989	Portland cement extenders - Part 2 : Fly ash
SABS 1491-3 : 1989	Portland cement extenders - Part 3 : Condensed Silica Fume

3. MATERIALS

3.1 Cementitious Binders

3.1.1 Cement

Common cements, complying with SABS ENV 197.1, as summarised in Annex A, shall be used for all concrete work. On no account shall masonry cements be used for concrete work, even if the strength designations are the same as for common cements.

3.1.2 Coastal Zones

In all wet applications and within one kilometre of the sea, unless otherwise specified in the project specifications, one or more of the following cementitious binders shall be used in all applications including prestressed concrete.

- (i) Portland blastfurnace cement, type III/A, certified as containing not less than 40% and not more than 50% milled granulated blastfurnace slag (MGBS), or a blend of Type I Portland cement with not less than 40% and not more than 50% MGBS. MGBS shall comply with SABS 1491 Part 1.
- (ii) Portland fly ash cement type II/B-V or Portland fly ash cement type II/B-W, certified as containing not less than 25% and not more than 30% fly ash shall comply with SABS 1491 Part 2.

3.1.3 Alkali Reactive Aggregate

If coarse aggregate known to be alkali reactive, are to be used in the proposed concrete, then one or more of the cementitious binders listed under (i) and (ii) above shall be used.

The equivalent Na_2O content, defined as $\% \text{Na}_2\text{O} = \% \text{Na}_2\text{O} + (0,658\% \text{K}_2\text{O})$ shall be limited as follows:

Malmesbury Group metasediments	:	2,1 kg/m^3
Table Mountain Group orthoquartzite:		2,8 kg/m^3
Cape Granite	:	4,0 kg/m^3

3.1.4 Alkali Reactive Cement

In addition to, or as an alternative to the precautions specified under 3.1.3 above, the equivalent alkali content of the Portland cement type I and the quantity of alkali per cubic metre of concrete shall be limited as directed by the Engineer. This applies to both site mixed and ready mix concrete. Certificates stating the equivalent alkali content of each delivery of cement to

site or to the ready mix depot supplying concrete to site, shall be provided by the Contractor.

3.1.5 Sulphate Resisting Cement

Where sulphate resisting Portland cement is specified, the fly ash cement specified in 3.1.2.(ii) may be used as a substitute.

3.2 Aggregates

3.2.1 Fine and coarse aggregate shall comply with the relevant clauses of SABS 1083.

3.2.2 Where aggregates have constituents which, in the opinion of the Engineer, may give rise to damage due to alkali-aggregate reactions, the provisions of 3.1.3 and 3.1.4 shall be applicable.

3.3 Curing Compound

In all cases where a concrete curing compound is specified, the curing compound shall be a clear or white pigmented membrane forming material complying with ASTM specification C 309, except that the maximum permissible water loss in the test shall be 0,40 kilogram per square metre.

Alternatively, the concrete curing compound shall be acceptable if the treated concrete retains 90% or more of its mixing water when subjected to the test set out in British Standard Specification 8110 Part 1 - Chapter 6.6.

3.4 Admixtures

Admixtures containing chlorides will not be permitted in reinforced concrete.

3.5 Cover Blocks

Cover blocks used to ensure the cover to reinforcement shall be made of cement mortar. They shall be dense and have a minimum 28 day crushing strength of 50 MPa, and shall be cured in water for at least 14 days before being used. Steeldale cover blocks or similar approved proprietary items shall be used - site made blocks will not be permitted. Spacer blocks made of plastic will not be permitted.

3.6 Underwater Concrete

3.6.1 The maximum size of aggregate shall be 50mm, and the aggregates shall be well graded. To ensure a plastic, cohesive mix, at least 10% of the fine aggregate shall pass the 300 μ m sieve, and at least 2%, the 150 μ m sieve.

3.6.2 Except in the cases of concrete placed in sacks or grouted concrete the slump shall be between 140 and 200mm.

3.6.3 Sacks shall be made of jute or other porous material.

- 3.6.4 The requirement in clause 5.5.5.7 of SABS 1200 G for concrete placed by tremie, that the quantity of cement in the concrete mix shall be increased by 20%, shall also apply to concrete placed underwater by other means.

4. PLANT AND EQUIPMENT

4.1 Tremie

A tremie shall consist of a hopper and a watertight tube, of diameter to suit the size of aggregate. The tube shall extend from slightly below concrete level to above the water surface, and shall be constructed in sections with watertight couplings so that it can be shortened as the concrete level rises, by removing sections above the water surface. It shall be strong enough to withstand the full hydrostatic pressure, even if a partial vacuum develops in the pipe. The tremie shall be supported so as to permit rapid lowering when necessary to retard or stop the flow of concrete. If required, the discharge end of the pipe shall be equipped with a valve to allow for dewatering of the tremie and control of concrete distribution.

4.2 Underwater Buckets

Underwater buckets shall have bottom doors of the drop bottom or roller gate type. The doors shall be latched in such a way that they cannot be opened until the bucket has reached the bed upon which the concrete is to be deposited. If air is used to open the bottom doors, the air shall discharge through a pipe to the surface. The doors shall be surrounded by a steel skirt. The top of the bucket shall be fitted with double canvas flaps to protect the concrete from wash when it enters the water and descends.

5. CONSTRUCTION

5.1 Approval of aggregates

Evidence of compliance of the aggregates with the requirements of 3.2 above, shall be furnished as early as practicable. If required by the Engineer, the Contractor shall submit 40kg samples for approval at least 6 weeks before concrete construction is to be commenced. No aggregate shall be delivered for use in the works until approval is given.

5.2 Concrete Quality

5.2.1 Quality Assurance Plan

Before the start of any concrete work on site, the Contractor shall submit a quality assurance plan which will ensure compliance with specification and provide acceptable documentary proof that all specified operations have been carried out satisfactorily.

5.2.2 Potential heat Generation

Measures, subject to the approval of the Engineer, shall be applied to reduce heat development in concrete of which the minimum dimension to be placed during a single pour is larger than 600mm, provided that the cement content exceeds the following :

Cement types I and II/ * S	Cement types II/B-V and II/B-W
kg/m ³	kg/m ³
Reinforced concrete 400	450
Prestressed concrete 500	550

5.3 Batching

5.3.1 Cement

All cementitious binders shall be batched by full sack or by mass batching with approved precision weighing equipment.

5.3.2 Aggregates

- (i) All aggregates shall be precisely measured by mass using approved precision weighbatching equipment, unless otherwise permitted by the Engineer:
- (ii) Should any variation in the composition of the aggregate become apparent, the Engineer shall be notified and a further sample of aggregate submitted immediately for his approval.

5.4 Concrete Placing

5.4.1 Inspection of Excavation

The size, shape and depth of any excavation shall be approved by the Engineer before concrete is placed.

5.4.2 Inspection of Reinforcement

Unless otherwise permitted by the Engineer, no concrete shall be placed until the fixed reinforcement has been accepted by him.

5.5 Concrete placed under water

- 5.5.1 The Contractor shall furnish to the Engineer in good time for his approval, details of the method of construction that he proposes to use.

- 5.5.2 Underwater concrete for piles shall be placed by tremie in accordance with SABS 1200 F.
- 5.5.3 Underwater concrete shall not be placed in water colder than 2°C.
- 5.5.4 Unless otherwise permitted, the technique adopted for placing of concrete, and any cleaning of the bed, shall be designed to prevent the washing out of cement from the concrete mixture, minimise the segregation of materials and the formation of laitance, and prevent the flow of water through or over new concrete less than 24 hours old. Concrete shall not be moved after placing, e.g. by lateral movement of tremie pipes. No vibration shall be carried out until the top of the concrete is above water level.
- 5.5.5 Unless otherwise permitted, concreting of any element shall be continuous to completion.
- 5.5.6 The bed shall be cleaned of silt and loose material. No concrete shall be placed until the Engineer has approved the bed.
- 5.6 **Concrete placed by Tremie**
- 5.6.1 Concreting by tremie shall be done in accordance with clause 5.5.2.2 of SABS 1200 F, but with the words "bore" and "casing" replaced by "space to be filled with concrete".
- 5.6.2 When concrete is deposited, the tremie shall penetrate into the concrete and shall be slowly raised to discharge a uniform flow of concrete.
- 5.6.3 Concreting shall continue to a level such that when unsound concrete has been removed, a sound surface will be left at the specified finished level.
- 5.6.4 When concreting over a wide area, tremie spacing shall not exceed 5m.
- 5.7 **Concrete placed by Underwater Bucket**
- The bucket used in underwater concreting shall be completely filled, lowered to the bed and then raised slowly as concrete is discharged.
- 5.8 **Concrete placed in sacks**
- 5.8.1 Immediately prior to placing, sacks shall be filled with concrete to two-thirds capacity. The openings shall be securely tied or, when directed, sewn up.
- 5.8.2 The sacks of concrete shall be placed by a diver in header and stretcher bond, with their mouths away from the outside surface, so that the whole mass becomes interlocked. Where necessary, steel spikes shall be driven through the sacks after placing to hold them in position.

5.9 Grouted Concrete

- 5.9.1 Coarse aggregate for grouted concrete, 25mm or larger, shall first be placed and compacted in position.
- 5.9.2 Grout, in a colloidal state, shall be pumped into the voids through pipes which shall reach to the bottom of the aggregate. Grout pipes shall be spaced at not more than 1.5m, and shall be withdrawn in such a way that a head of at least 1m of grout is maintained above the grout outlets.

5.10 Concrete placed by pumping

The requirements of clauses 4.2, 5.4, 5.7 and 5.5.5.7 of SABS 1200 G and clause 5.5.2.2 of SABS 1200 F, for concrete placed by a tremie tube, shall also apply to concrete placed by pumping.

5.11 Construction Joints

- 5.11.1 Unless otherwise shown on the drawings, the exact position of horizontal construction joints shall be marked on the formwork by means of grout checks in order to obtain truly horizontal joints.
- 5.11.2 Stub columns, stub walls and stays on footings shall be cast integrally with the footings and not afterwards, even where another class of concrete is being used.
- 5.11.3 Joint lines shall be so arranged that they coincide with features of the finished work.
- 5.11.4 Where new concrete is to be cast against a hardened concrete surface a neat cement slurry mixed to a creamy consistency shall be brushed onto the cleaned concrete surface.
- 5.11.5 At contraction joints (joints having no reinforcement passing through the joint) no bond is required between casts. Contraction joints shall be smooth and shall have one coat of limewash or PVA applied to the older surface prior to casting the newer concrete.

5.12 Curing

5.12.1 Curing Compound

Unless otherwise directed by the Engineer, an approved trafficable, resin-based, white pigmented, membrane-forming curing compound shall be used on slopes flatter than 1 in 1.

On all other concrete surfaces, including beam and slab soffits, an approved clear, aesthetically acceptable membrane-forming curing compound shall be used, unless otherwise directed by the Engineer.

5.12.2 Application Rate

The total application rate shall be as specified by the Supplier, or 0,30 litres per square metre, whichever is the greater. On textured concrete surfaces e.g. concrete roads, the total application rate shall be 0,50 litres per square metre.

5.12.3 Additional Coats

In the case of concrete surfaces with run-off problems, it may be necessary to apply more than one coat of membrane forming curing compound to obtain the specified total or cumulative application rate.

5.12.4 Application

Curing in accordance with SABS 1200 G shall commence on all concrete surfaces as soon as it is practicable in the opinion of the Engineer. For unformed surfaces the compound shall be applied after finishing and as soon as the free water on the surface has disappeared and no water sheen is visible, but not so late that the liquid curing compound will be absorbed into the concrete. For formed surfaces, when forms are removed, the exposed concrete surface shall be wet with water immediately and kept moist until the curing compound is applied. Immediately prior to application, the concrete shall be allowed to reach a uniformly damp appearance with no free water on the surface. Application of the compound should then begin at once. The compound should be applied at a uniform rate with two applications at right angles to each other to ensure complete coverage, and may be applied by hand or power sprayer. Pigmented compounds must be adequately stirred to assure even distribution of the pigment during application, unless the formulation contains a thixotropic agent which prevents settlement.

5.12.5 Windy Conditions

When the wind velocity exceeds 5 m/s and/or the ambient temperature is above 25 °C and/or the relative humidity is below 60%, the initial 24 hour curing of concrete surfaces not covered by formwork shall be carried out by ponding, covering with constantly wetted sand or mats, or continuous spraying in accordance with SABS 1200 G, unless otherwise permitted by the Engineer.

If plastic shrinkage cracks occur, the concrete, while still plastic, shall be re-vibrated and floated. Thereafter it shall be re-coated with curing compound as if no curing has previously taken place.

5.12.6 Marine Structures

For reinforced concrete marine structures moist curing methods shall be used except as otherwise permitted in writing by the Technical Officer. Only fresh, clean water shall be used for curing. The use of seawater shall not be permitted under any circumstances.

5.12.7 Curing Time

The curing period for concrete containing CEM I only shall be 7 days. The curing period for concrete's containing CEM I plus cement extenders (GGBS, FA) shall be 10 days. The period will start on completion of the concrete pour and for formed surfaces shall include the time for which forms are still in place after the pour.

5.12.8 Steam Curing

Steam curing under atmospheric pressure will be permitted, subject to approval by the Technical Officer. Steam curing shall not commence sooner than 5 hours after completion of concrete placement. Temperatures shall be raised to between 60 and 70°C at a rate not exceeding 20°C per hour. The rate of cooling shall also not exceed 20°C per hour.

Records of temperatures recorded on an hourly basis at sufficient locations to ensure that the prescribed temperatures and rates of heating are not exceeded at any point shall be provided to the Technical Officer on a daily basis.

5.13 Records

The Contractor shall maintain the following daily records for every part of the concrete structure and shall make these available at all times during the progress of the work for inspection by the Engineer:

- (i) The date and times during which concrete was placed.
- (ii) Identification of the part of the structure in which the concrete was placed.
- (iii) The mix proportions and specified strength
- (iv) The type and brand of cement.
- (v) The slump of the concrete
- (vi) The identifying marks of test cubes made
- (vii) Curing procedure applied to concrete placed
- (viii) The times when shuttering was stripped and props were removed.
- (ix) The date of despatch of the cubes to the testing laboratory
- (x) The test results.

The records shall be delivered to the Engineer each week except in the case of sub-standard concrete, when the Engineer shall be informed immediately.

6. TOLERANCES

Deviations shall be within the limits listed in SABS 1200 G for Degree of Accuracy II unless otherwise specified in the project specification.

7. TESTING

7.1 Frequency of Sampling

Frequency of sampling and testing shall be as specified in SABS 1200 G.

- (i) If the quantity from which these samples were taken exceeds 40 m³, it shall be subject to the testing of a minimum of 3 sets of samples per day from each grade of concrete placed in each independent structure.
- (ii) If the quantity from which these samples were taken is less than 40 m³, it shall be subject to the testing of a minimum of 2 sets of samples per day.

7.2 Acceptance Criteria

7.2.1 If the Contractor disputes the results of the tests on concrete cubes, the concrete represented by the cubes will be considered acceptable if the Contractor, at his own cost, proves to the satisfaction of the Engineer that the estimated actual strength of cores taken from the structure, determined in accordance with SABS Method 856, is not less than the specified strength.

7.2.2 If the strength of concrete fails to meet the acceptance criteria stipulated, the Engineer may in his sole discretion and in addition to the options listed in SABS 1200 G:

- (i) accept the concrete subject to approved remedial measures being undertaken by the Contractor; or
- (ii) permit the concrete to remain subject to the payment of a penalty.

7.3 Penalty

The penalty referred to in 7.2.2 (ii) will be determined as follows:

$$\text{Penalty} = V \times R \times F$$

where

V = Volume (in the opinion of the Engineer) of concrete of unsatisfactory strength represented by the test result.

R = Relevant scheduled rate.

$$F = 1 - \sqrt{\frac{\text{Average strength of unsatisfactory concrete}}{\text{Specified strength} + 6 \text{ MPa}}}$$

when the relevant scheduled rate (R) includes the cost of formwork or

$$F = 1 - \frac{\text{Average strength of unsatisfactory concrete}}{\text{Specified strength} + 6 \text{ MPa}}$$

when the relevant scheduled rate (R) excludes the cost of formwork or where no formwork was involved.

7.4 Underwater Concrete

In view of the 20% additional cement added in accordance with 3.6.5, replace the words "specified strength" by "specified strength plus 10 MPa" in clauses 7.3.1 to 7.3.3 of SABS 1200 G.

8. MEASUREMENT AND PAYMENT

- 8.1 Unless otherwise provided for in the schedules of quantities, only permanent work will be measured for payment. The cost of temporary work shall be included in the rates tendered.
- 8.2 If the drawings and/or specifications provide for any item which is not separately listed in the schedules of quantities, such item shall be considered as an integral portion of the structure, and its cost shall be included in the rates for related items listed in the schedules of quantities.
- 8.3 All costs arising out of compliance with 3.2.2 including removal of unsatisfactory materials, shall be borne by the Contractor.

ANNEX A

Extract from SABS Specification ENV 197-1

CEMENT : STANDARDS AND SELECTION

In 1996 South Africa adopted new specifications for cement. These ready-to-use, Portland based cements used in building and construction are divided by the specifications into two broad categories: "common" cement intended for use in concrete, although some may be suitable for mortar and plaster mixes, and "masonry" cements intended for bedding mortars and plasters.

"Common" cement types and compositions by mass^[1]

Cement Type	Description	Notation	Clinker K	Granulated Blastfurnace Slag S	Silica Fume D ^[3]	Fly ash		Limestone L	Minor additions & constituents [2]
						Siliceous V	Calcareous W		
I	Portland cement	I	95-100						0-5
II	Portland slag cement	II/A-S	80-94	6-20					0-5
		II/B-S	65-79	21-35					0-5
	Portland silica fume cement	II/A-D	90-94		6-10				0-5
	Portland fly ash cement	II/A-V	80-94			6-20			0-5
		II/B-V	65-79			21-35			0-5
		II/A-W	80-94				6-20		0-5
		II/B-W	65-79				21-35		0-5
	Portland limestone cement	II/A-L	80-04					6-20	0-5
II/B-L		65-79					21-35	0-5	
Portland composite cement	II/A-M	80-94				6-20 ^[4]			
	II/B-M	65-79				21-35 ^[4]			
III	Blastfurnace cement	III/A	35-64	36-65					0-5
		III/B	20-34	66-80					0-5
		III/C	5-19	81-95					0-5
IV	Pozzolan cement	IV/A	65-89			11-35			0-5
		IV/B	45-64			36-55			0-5
V	Composite cement	V/A	40-64	18-30		18-30			0-5
		V/B	20-39	31-50		31-50			0-5

NOTES:

- ^[1] The values in the table refer to the cement nucleus, excluding calcium sulphate and any additives.
- ^[2] Minor additional constituents may be filler or may be one or more of the main constituents unless these are included as main constituents in the cement.
- ^[3] The proportion of silica fume is limited to 10%.
- ^[4] The proportion of filler is limited to 5%.



freight rail

MINIMUM COMMUNAL HEALTH REQUIREMENTS IN AREAS OUTSIDE THE JURISDICTION OF A LOCAL AUTHORITY : TEMPORARY FACILITIES FOR CONTRACTOR'S PERSONNEL

1. **CAMPS**

- 1.1 Prior to the erection of any camp, the Contractor shall submit to the Employer's Deputy, for his approval, details of his proposals as to the site, water supply, sanitation, and size and type of buildings. Where the site is on private land, the Contractor shall submit the written approval for the use of the site of the relevant statutory authority and of the owner and occupier of the land (as applicable).
- 1.2 Camps must not be erected on land infested with field rodents.
- 1.3 Adequate drainage shall be provided to carry off storm and waste water.
- 1.4 Buildings shall be built to a neat and orderly pattern.
- 1.5 All buildings shall have smooth, hard, impervious floors, graded to provide effective drainage and to permit washing.
- 1.6 Camps shall be maintained by the Contractor at his own expense in a clean and tidy condition. The Contractor shall take such steps as the Employer's Deputy and landowner/occupier may demand to prevent the creation of a nuisance.
- 1.7 When so instructed by the Employer's Deputy, the Contractor shall, at his own expense, erect suitable screens between the camp and any public road, thoroughfare or railway line.
- 1.8 After removal of a camp, the Contractor shall, at his own expense, restore the site to its original condition to the satisfaction of the Employer's Deputy and of the landowner and occupier where the site is on private land.

2. **HOUSING**

- 2.1 Every living room shall have cross ventilation, both constant and occasional. Where only one window is provided, it shall not be in the same wall as the door.
- 2.2 Dimensions of living rooms shall be sufficient to allow 3.5 square metres of floor area and 11 cubic metres of air space for each person over the age of 10 years. The floor area of any living room shall not be less than 7,8 square metres.

- 2.3 Flat-roofed quarters shall have a minimum roof height of 3 metres above floor level. For quarters with pitched roofs, the wall height shall be not less than 2,6 metres above the floor with a minimum height above floor of 3 metres at the top of the pitch.
- 2.4 Doors shall not be less than 2m x 0,75m and must be halved.
- 2.5 Windows of each living room shall have an area not less than one twelfth of the floor area and shall be capable of opening to at least half their full area.
- 2.6 In areas where malaria is prevalent, doors and windows must be fitted with gauze screens.
- 2.7 Cooking shelters shall comprise roofed structures, three sides of which shall be enclosed by a weatherproof material, approved by the Employer's Deputy to a height of at least 1m above ground level.
 - 2.7.1 Sleeping quarters shall not accommodate more than 8 persons per room.
 - 2.7.2 Pegboards shall be carried on metal or concrete supports and shall be separated by partitions not less than 0,4 metres high extending to within 150mm of the end of the bunk. Pegboards shall be removable for cleaning.

3. WATER SUPPLY AND ABLUTION FACILITIES

- 3.1 The Contractor shall ensure that an adequate and conveniently situated supply of potable water is provided.
- 3.2 Separate buildings for ablution facilities shall be provided. Where approval has been obtained for the housing of both males and females, separate facilities for each sex shall be provided. The proportion shall be 1 cubicle for 20 persons.
- 3.3 Waste water shall be hygienically disposed of.

4. SANITATION

- 4.1 Separate buildings for latrine facilities shall be provided. Where housing are provided for both males and females, separate facilities for each sex shall be provided. The proportions shall be at least one squatting seat for every 15 persons or less in the case of pit latrines, or one for every 10 persons or less in case of pail latrines.

Latrines shall be fly proof and sited at least 10 metres from any other building, and shall not face on any public road, thoroughfare, railway line or residential property. Pits shall not be less than 2,5 metres deep and sited not less than 120 metres from nearest underground water source.

- 4.2 Latrines shall be so constructed, situated and maintained, and night soil so disposed of as to prevent access by animals, breeding of flies, pollution of streams and domestic water supplies, and other nuisances. Where a night soil removal service is operated by a competent authority, use of such service shall be obligatory, and the use of pit latrines and atria pits will not be permitted.

- 4.3 At least one refuse bin of adequate size with close fitting lid shall be provided for each building. Refuse bins shall be emptied and cleaned out daily.
- 4.4 Labour shall be employed on camp sanitation duties on the following basis:-
 - 4.4.1 Where the number of persons living at the camp is 20 or less - one unit.
 - 4.4.2 For additional numbers over 20 living at the camp - one unit per 100 or part thereof.
- 4.5 Unless refuse is removed by a competent authority, it shall be disposed of in pits and covered over daily with a layer of earth or ash of sufficient thickness to prevent depredations by rodents and the breeding of flies.
- 4.6 Adequate measures shall be taken against all vermin and insects responsible for the spread of disease. Any instructions of a competent health authority shall be carried out promptly and implicitly.
- 4.7 Buildings and bedboards shall be treated whenever necessary with an approved insecticide.
- 4.8 The Contractor shall permit and facilitate inspection of the camp and structures on the site by the staff of Transnet or any other competent authority, and shall comply with any reasonable request by such staff or any other competent authority to eliminate any unsanitary condition.
- 4.9 Any outbreak of infectious disease shall immediately be reported telephonically and confirmed in writing to the Employer's Deputy.
- 4.10 The keeping of animals of any sort is not permitted.
- 4.11 The Contractor shall have on hand at the camp the necessary tools, disinfectants and cleaning materials to maintain and clean the sanitary facilities.

5. RATIONS

Rations, where supplied by the Contractor, shall be stored in a suitable and rodent proof building with sufficient shelving.

P02b-06 (JLH)

TRANSNET SOC LIMITED

(Registration no. 1990/000900/30)

SAFETY ARRANGEMENTS AND PROCEDURAL COMPLIANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT (ACT 85 OF 1993) AND APPLICABLE REGULATIONS

1. General

- 1.1 The Contractor and Transnet SOC Limited (hereinafter referred to as "Transnet") are individual employers, each in its own right, with their respective duties and obligations set out in the Occupational Health and Safety Act, Act 85 of 1993 (the Act) and applicable Regulations.
- 1.2 The Contractor accepts, in terms of the General Conditions of Contract and in terms of the Act, his obligations as an employer in respect of all persons in his employ, other persons on the premises or the Site or place of work or on the work to be executed by him, and under his control. He shall, before commencement with the execution of the contract work, comply with the provisions set out in the Act, and shall implement and maintain a Health and Safety Plan as described in the Construction Regulations, 2003 and as approved by Transnet, on the Site and place of work for the duration of the Contract.
- 1.3 The Contractor accepts his obligation to complying fully with the Act and applicable Regulations notwithstanding the omission of some of the provisions of the Act and the Regulations from this document.
- 1.4 Transnet accepts, in terms of the Act, its obligations as an employer of its own employees working on or associated with the site or place of work, and the Contractor and Project Manager or his deputy shall at all times, co-operate in respect of the health and safety management of the site, and shall agree on the practical arrangements and procedures to be implemented and maintained during execution of the Works.
- 1.5 In the event of any discrepancies between any legislation and this specification, the applicable legislation will take precedence.

2. Definitions

- 2.1 In this Specification any word or expression to which a meaning has been assigned in the Construction Regulations, shall have the meaning so assigned to it, unless the context otherwise indicates: -
- 2.2 The work included in this Contract shall for the purposes of compliance with the Act be deemed to be "**Construction Work**", which, in terms of the Construction Regulations, 2003 means any work in connection with: -
- (a) the erection, maintenance, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure;

- (b) the installation, erection, dismantling or maintenance of fixed plant where such work includes the risk of a person falling;
 - (c) the construction, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system or any similar civil engineering structure; or
 - (d) the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work;
- 2.3 “**competent person**” in relation to construction work, means any person having the knowledge, training and experience specific to the work or task being performed: Provided that where appropriate qualifications and training are registered as per the South African Qualifications Authority Act, 1995 these qualifications and training shall be deemed to be the required qualifications and training;
- 2.4 “**contractor**” means principal contractor and “subcontractor” means contractor as defined by the Construction Regulations, 2003.
- 2.5 “**fall protection plan**” means a documented plan, of all risks relating to working from an elevated position, considering the nature of work undertaken, and setting out the procedures and methods applied to eliminate the risk;
- 2.6 “**health and safety file**” means a file, or other record in permanent form, containing the information required to be kept on site in accordance with the Act and applicable Regulations;
- 2.7 “**Health and Safety Plan** ” means a documented plan which addresses the hazards identified and include safe work procedures to mitigate, reduce or control the hazards identified;
- 2.8 “**Risk Assessment**” means a programme to determine any risk associated with any hazard at a construction site, in order to identify the steps needed to be taken to remove, reduce or control such hazard;
- 2.9 “**the Act**” means the Occupational Health and Safety Act No. 85 of 1993.

3. Procedural Compliance

3.1 The Contractor who intends to carry out any construction work shall, before carrying out such work, notify the Provincial Director in writing if the construction work:-

- (a) includes the demolition of a structure exceeding a height of 3 metres; or
- (b) includes the use of explosives to perform construction work; or
- (c) includes the dismantling of fixed plant at a height greater than 3m,

and shall also notify the Provincial Director in writing when the construction work exceeds 30 days or will involve more than 300 person days of construction work and if the construction work:-

- (a) includes excavation work deeper than 1m; or

- (b) includes working at a height greater than 3 metres above ground or a landing.
- 3.2 The notification to the Provincial Director shall be on a form similar to Annexure A of the Construction Regulations, 2003, also shown in Annexure 1 of this Specification. The Contractor shall ensure that a copy of the completed notification form is kept on site for inspection by an inspector, Project Manager or employee.
- 3.3 The Contractor shall, in accordance with the Act and applicable Regulations, make all the necessary appointments of competent persons in writing on a form similar to Annexure 2 of this Specification and deliver copies thereof to the Project Manager. Copies should also be retained on the health and safety file.
- 3.4 Subcontractors shall also make the above written appointments and the Contractor shall deliver copies thereof to the Project Manager.
- 3.5 In the case of a self-employed Contractor or any subcontractor who has the appropriate competencies and supervises the work himself, the appointment of a construction supervisor in terms of regulation 6.1 of the Construction Regulations, 2003 will not be necessary. The Contractor shall in such a case execute and sign a declaration, as in Annexure 3, by which he personally undertakes the duties and obligations of the "Chief Executive Officer" in terms of section 16(1) of the Act.
- 3.6 The Contractor shall, before commencing any work, obtain from the Project Manager an access certificate as in Annexure 4 executed and signed by him, permitting and limiting access to the designated site or place of work by the Contractor and any subcontractors under his control.
- 3.7 Procedural compliance with Act and Regulations, as above, shall also apply to any subcontractors as employers in their own right. The Contractor shall furnish the Project Manager with full particulars of such subcontractors and shall ensure that they comply with the Act and Regulations and Transnet's safety requirements and procedures.

4. Special Permits

Where special permits are required before work may be carried out such as for hotwork, isolation permits, work permits and occupations, the Contractor shall apply to the Project Manager or the relevant authority for such permits to be issued. The Contractor shall strictly comply with the conditions and requirements pertaining to the issue of such permits.

5. Health and Safety Programme

- 5.1 The Tenderer shall, with his tender, submit a Health and Safety Programme setting out the practical arrangements and procedures to be implemented by him to ensure compliance by him with the Act and Regulations and particularly in respect of: -
- (i) The provision, as far as is reasonably practical, of a working environment that is safe and without risk to the health of his employees and subcontractors in terms of section 8 of the Act;

- (ii) the execution of the contract work in such a manner as to ensure in terms of section 9 of the Act that persons other than those in the Contractor's employment, who may be directly affected by the contract work are not thereby exposed to hazards to their health and safety;
 - (iii) ensuring, as far as is reasonably practical, in terms of section 37 of the Act that no employee or subcontractor of the Contractor does or omits to do any act which would be an offence for the Contractor to do or omit to do.
- 5.2 The Contractor's Health and Safety Programme shall be based on a risk assessment in respect of the hazards to health and safety of his employees and other persons under his control that are associated with or directly affected by the Contractor's activities in performing the contract work and shall establish precautionary measures as are reasonable and practical in protecting the safety and health of such employees and persons.
- 5.3 The Contractor shall cause a risk assessment contemplated in clause 5.2 above to be performed by a competent person, appointed in writing, before commencement of any Construction Work and reviewed during construction. The Risk Assessments shall form part of the Health and Safety programme to be applied on the site and shall include at least the following:
- (a) The identification of the risks and hazards that persons may be exposed to;
 - (b) the analysis and evaluation of the hazards identified;
 - (c) a documented Health and Safety Plan, including safe work procedures to mitigate, reduce or control the risks identified;
 - (d) a monitoring and review plan.
- 5.4 The Health and Safety Plan shall include full particulars in respect of: -
- (a) The safety management structure to be instituted on site or place of work and the names of the Contractor's health and safety representatives and members of safety committees where applicable;
 - (b) the safe working methods and procedures to be implemented to ensure the work is performed in compliance with the Act and Regulations;
 - (c) the safety equipment, devices and clothing to be made available by the Contractor to his employees;
 - (d) the site access control measures pertaining to health and safety to be implemented;
 - (e) the arrangements in respect of communication of health and safety related matters and incidents between the Contractor, his employees, subcontractors and the Project Manager with particular reference to the reporting of incidents in compliance with Section 24 and General Administrative Regulation 8 of the Act and with the pertinent clause of the General Conditions of Contract forming part of the Contract and

- (f) the introduction of control measures for ensuring that the Safety Plan is maintained and monitored for the duration of the Contract.
- 5.4 The Health and Safety programme shall be subject to the Project Manager's approval and he may, in consultation with the Contractor, order that additional and/or supplementary practical arrangements and procedures be implemented and maintained by the Contractor or that different working methods or safety equipment be used or safety clothes be issued which, in the Project Manager's opinion, are necessary to ensure full compliance by the Contractor with his obligations as an employer in terms of the Act and Regulations. The Project Manager or his deputy shall be allowed to attend meetings of the Contractor's safety committee as an observer.
- 5.5 The Contractor shall take reasonable steps to ensure that each subcontractor's Health and Safety Plan is implemented and maintained on the construction site: Provided that the steps taken, shall include periodic audits at intervals mutually agreed to between the them, but at least once every month.
- 5.6 The Contractor shall stop any subcontractor from executing any construction work, which is not in accordance with the Contractor's, and/or subcontractor's Health and Safety Plan for the site or which poses a threat to the health and safety of persons.
- 5.7 The Contractor shall ensure that a copy of the Health and Safety Plan is available on site for inspection by an inspector, Project Manager, agent, subcontractor, employee, registered employee organisation, health and safety representative or any member of the health and safety committee.
- 5.8 The Contractor shall consult with the health and safety committee or, if no health and safety committee exists, with a representative group of employees, on the development, monitoring and review of the Risk Assessment.
- 5.9 The Contractor shall ensure that all employees under his control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences, and thereafter at such times as may be determined in the Risk Assessment.
- 5.10 The Contractor shall ensure that all subcontractors are informed regarding any hazard as stipulated in the Risk Assessment before any work commences, and thereafter at such times as may be determined in the Risk Assessment.
- 5.11 The Contractor shall ensure that all visitors to a construction site undergoes health and safety induction pertaining to the hazards prevalent on the site and shall be provided with the necessary personal protective equipment.

6. Fall Protection Plan

- 6.1 In the event of the risk and hazard identification, as required in terms of clause 5.3 of this Specification, revealing risks relating to working from an elevated position the contractor shall cause the designation of a competent person, responsible for the preparation of a fall protection plan;

6.2 The Contractor shall implement, maintain and monitor the fall protection plan for the duration of Contract. The Contractor shall also take such steps to ensure the continued adherence to the fall protection plan.

6.3 The fall protection plan shall include:-

- (a) A Risk Assessment of all work carried out from an elevated position;
- (b) the procedures and methods to address all the identified risks per location;
- (c) the evaluation of the employees physical and psychological fitness necessary to work at elevated positions;
- (d) the training of employees working from elevated positions; and
- (e) the procedure addressing the inspection, testing and maintenance of all fall protection equipment.

7. Hazards and Potential Hazardous Situations

The Contractor and the Project Manager shall immediately notify one another of any hazardous or potentially hazardous situations which may arise during performance of the Contract by the Contractor or any subcontractor and, in particular, of such hazards as may be caused by the design, execution and/or location and any other aspect pertaining to the contract work.

8. Health and Safety File

8.1 The Contractor shall ensure that a health and safety file is opened and kept on site and shall include all documentation required as per the Act and applicable regulations, and made available to an inspector, the Project Manager, or subcontractor upon request.

8.2 The Contractor shall ensure that a copy of the both his Health and Safety Plan as well as any subcontractor's Health and Safety Plan is available on request to an employee, inspector, contractor or the Project Manager.

8.3 The Contractor shall hand over a consolidated health and safety file to the Project Manager upon completion of the Construction Work and shall in addition to documentation mentioned in the Act and applicable Regulations include a record of all drawings, designs, materials used and other similar information concerning the completed structure.

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ANNEXURE 1

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993

Regulation 3(1) of the Construction Regulations

NOTIFICATION OF CONSTRUCTION WORK

-
-
- 1(a) Name and postal address of principal contractor:

 - (b) Name and tel. no of principal contractor's contact person:

 2. Principal contractor's compensation registration number:

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

 - (b) Name and tel no of client's contact person or agent:

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

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

 5. Name and telephone number of principal contractor's construction supervisor on site appointed in terms of regulation 6(1).

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

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

 8. Nature of the construction work:

 9. Expected commencement date: _____
 10. Expected completion date: _____

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

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

13. Name(s) of contractors already chosen.

Principal Contractor

Date

Client

Date

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

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

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ANNEXURE 2

(COMPANY LETTER HEAD)

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT 85 OF 1993) :

SECTION/REGULATION: _____

REQUIRED COMPETENCY: _____

In _____ terms of _____
I, _____

representing the Employer) do hereby appoint _____

As the Competent Person on the premises at _____

(physical address) to assist in compliance with the Act and the applicable Regulations.

Your designated area/s is/are as follows :-

Date : _____

Signature :- _____

Designation :- _____

ACCEPTANCE OF DESIGNATION

I, _____ do hereby accept this Designation and acknowledge that I understand the requirements of this appointment.

Date : _____

Signature :- _____

Designation :- _____

ANNEXURE 3

(COMPANY LETTER HEAD)

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT 85 OF 1993) :

DECLARATION

In terms of the above _____ am personally assuming the
Act I, _____ duties
and obligations as Chief Executive Officer, defined in Section 1 of the Act and in terms of
Section 16(1), I will, as far as is reasonably practicable, ensure that the duties and obligations
of the Employer as contemplated in the above Act are properly discharged.

Signature :- _____

Date : _____

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ANNEXURE 4

(LETTER HEAD OF BUSINESS DIVISION OR UNIT OF TRANSNET SOC LIMITED)

SITE ACCESS CERTIFICATE

Access to : _____ (Area)
Name of _____
Contractor/Builder :- _____
Contract/Order No.: _____

The contract works site/area described above are made available to you for the carrying out of associated works
In terms of your contract/order
with
(company)

Kindly note that you are at all times responsible for the control and safety of the Works Site, and for persons under your control having access to the site.

As from the date hereof you will be responsible for compliance with the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended, and all conditions of the Contract pertaining to the site of the works as defined and demarcated in the contract documents including the plans of the site or work areas forming part thereof.

Signed : _____ **Date :** _____

PROJECT MANAGER

ACKNOWLEDGEMENT OF RECEIPT

Name _____ **of** _____ **I,**
Contractor/Builder :- _____

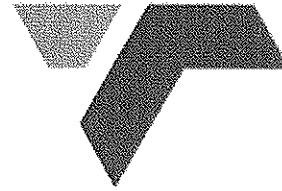
**do hereby acknowledge and accept
the duties**

**and obligations in respect of the Safety of the site/area of Work in terms of the
Occupational Health and Safety Act; Act 85 of 1993.**

Name : _____ **Designation :** _____

Signature : _____ **Date :** _____

TRANSNET



Transnet SOC Limited Registration Number 1990/00900/06

TRANSNET SPECIFICATION

**E7/1 - SPECIFICATION FOR GENERAL WORK AND
WORKS ON, OVER, UNDER OR ADJACENT TO RAILWAY
LINES AND NEAR HIGH VOLTAGE EQUIPMENT**

(This specification shall be used in network operator contracts)

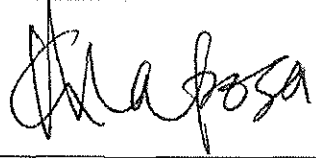




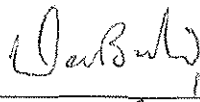

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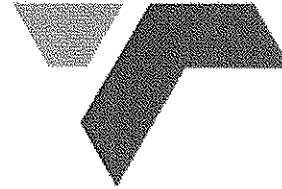
SPECIFICATION FOR GENERAL WORK AND WORKS ON, OVER, UNDER OR ADJACENT TO RAILWAY LINES AND NEAR HIGH VOLTAGE EQUIPMENT

Author:	Project Manager Capital Program (Electrical)	G. Maposa	
Approved:	Senior Engineer Infra Engineering (Train Authorisation Systems)	J. van den Berg	
"	Principal Engineer Infra Engineering (Track)	M. Marutla	
"	Principal Engineer Infra Engineering (Structures)	J. Homan	
"	Principal Engineer Infra Engineering (Electrical)	J. Vosloo	
"	Principal Engineer Technology Management (Electrical)	W. Coetzee	
"	Chief Engineer Transport Telecoms	D. Botha	 17 June 11
Authorised:	Chief Engineer Infrastructure Engineering	J. van Aardt	 2011/06/30

Date: May 2011

(This page not to be issued with contract)

TRANSNET



Transnet SOC Limited Registration Number 1990/00900/06

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1.0 SCOPE

- 1.1 This specification covers the network operator's requirements for general work and works on, over, under or adjacent to railway lines and near high voltage equipment.

2.0 DEFINITIONS

The following definitions shall apply:

"Authorised Person" - A person whether an employee of the network operator or not, who has been specially authorised to undertake specific duties in terms of Transnet' publication Electrical Safety Instructions, and who holds a certificate or letter of authority to that effect.

"Barrier" Any device designed to restrict access to "live" high-voltage electrical equipment.

"Bond" - A short conductor installed to provide electrical continuity.

"Contractor" - Any person or organisation appointed by the network operator to carry out work on its behalf.

"Contract Supervisor" - The person or juristic person appointed by the network operator from time to time as the Contract Supervisor, to administer the Contractor's performance and execution of the Works according to the powers and rights held by and obligations placed upon the Contract Supervisor in terms of the Contract.

"Dead" - Isolated and earthed.

"Electrical Officer (Contracts)" - The person appointed in writing by the Project Manager in terms of this specification as the person who shall be consulted by the Contractor in all electrical matters to ensure that adequate safety precautions are taken by the Contractor.

"Executive Officer" - The person appointed by the network operator from time to time as the Executive Officer to act according to the rights and powers held by and obligations placed upon him in terms of the Contract.

"High-Voltage" - A voltage normally exceeding 1000 volts.

"Live" - A conductor is said to be "live" when it is at a potential different from that of the earth or any other conductor of the system of which it forms a part.

"Near" - To be in such a position that a person's body or the tools he is using or any equipment he is handling may come within 3 metres of "live" exposed high-voltage electrical equipment.

"Occupation" - An authorisation granted by the network operator for work to be carried out under specified conditions on, over, under or adjacent to railway lines.

"Occupation Between Trains" - An occupation during an interval between successive trains.

"Optical Fibre Cable" - Buried or suspended composite cable containing optical fibres used in:

- telecommunication networks for transmission of digital information and
- safety sensitive train operations systems.

"Project Manager" - As defined in the special conditions of the contract. The person or juristic person appointed by the network operator from time to time as the Project Manager, to administer the Contract according to the powers and rights held by and obligations placed upon him in terms of the Contract.

"Responsible Representative" - The responsible person in charge, appointed by a contractor, who has undergone specific training (and holds a certificate) to supervise (general or direct) staff under his control who perform general work or to work on, over, under or adjacent to railway lines and in the vicinity of high-voltage electrical equipment.

"Total Occupation" - An occupation for a period when trains are not to traverse the section of line covered by the occupation.

"Work on" - Work undertaken on or so close to the equipment that the specified working clearances to the "live" equipment cannot be maintained.

"Work Permit" - A combined written application and authority to proceed with work on or near dead electrical equipment.

"Works" - The contractual intent for the work to be done as defined in the contract at a defined work site.

PART A - GENERAL SPECIFICATION**3.0 AUTHORITY OF OFFICERS OF TRANSNET**

- 3.1 The Contractor shall co-operate with the officers of the network operator and shall comply with all instructions issued and restrictions imposed with respect to the Works which bear on the existence and operation of the network operator's railway lines and high-voltage equipment.
- 3.2 Without limiting the generality of the provisions of clause 3.1, any duly authorised representative of the network operator, having identified himself, may stop the work if, in his opinion, the safe passage of trains or the safety of the network operator's assets or any person is affected. **CONSIDERATIONS OF SAFETY SHALL TAKE PRECEDENCE OVER ALL OTHER CONSIDERATIONS.**

4.0 CONTRACTOR'S REPRESENTATIVES AND STAFF

- 4.1 The Contractor shall nominate Responsible Representatives of whom at least one shall be available at any hour for call-out in cases of emergency. The Contractor shall provide the Contract Supervisor with the names, addresses and telephone numbers of the representatives.
- 4.2 The Contractor guarantees that he has satisfied himself that the Responsible Representative is fully conversant with this specification and that he shall comply with all his obligations in respect thereof.
- 4.3 The Contractor shall ensure that all contractor staff receives relevant awareness, educational and competence training regarding safety as prescribed.

5.0 OCCUPATIONS AND WORK PERMITS

- 5.1 Work to be done during total occupation or during an occupation between trains or under a work permit shall be done in a manner decided by the Contract Supervisor and at times to suit the network operator requirements.
- 5.2 The Contractor shall organise the Works in a manner which will minimise the number and duration of occupations and work permits required.
- 5.3 The network operator will not be liable for any financial or other loss suffered by the Contractor arising from his failure to complete any work scheduled during the period of an occupation or work permit.
- 5.4 The Contractor shall submit to the Contract Supervisor, in writing, requests for occupations or work permits together with details of the work to be undertaken, at least 21 days before they are required. The network operator does not undertake to grant an occupation or work permit for any particular date, time or duration.
- 5.5 The network operator reserves the right to cancel any occupation or work permit at any time before or during the period of occupation or work permit. If, due to cancellation or change in date or time, the Contractor is not permitted to start work under conditions of total occupation or work permit at the time arranged, all costs caused by the cancellation shall be born by the Contractor except as provided for in clauses 5.6 to 5.8.
- 5.6 When the Contractor is notified less than 2 hours before the scheduled starting time that the occupation or work permit is cancelled, he may claim reimbursement of his direct financial losses caused by the loss of working time up to the time his labour and plant are employed on other work, but not exceeding the period of the cancelled occupation or work permit.
- 5.7 When the Contractor is notified less than 2 hours before the scheduled starting time, or during an occupation or work permit, that the duration of the occupation or work permit is reduced, he may claim reimbursement of his direct financial losses caused by the loss of working time due to the reduced duration of the occupation or work permit.
- 5.8 Reimbursement of the Contractor for any loss of working time in terms of clause 5.6 and 5.7, shall be subject to his claims being submitted within 14 days of the event with full details of labour and plant involved, and provided that the Contract Supervisor certifies that no other work on which the labour and plant could be employed was immediately available.
- 5.9 Before starting any work for which an occupation has been arranged, the Contractor shall obtain from the Contract Supervisor written confirmation of the date, time and duration of the occupation.
- 5.10 Before starting any work for which a work permit has been arranged, the Responsible Representative shall read and sign portion C of the Work Permit, signifying that he is aware of the work boundaries within which work may be undertaken. After the work for which the permit was granted has been completed, or when the

work permit is due to be terminated, or if the permit is cancelled after the start, the same person who signed portion C shall sign portion D of the Work Permit, thereby acknowledging that he is aware that the electrical equipment is to be made "live". The Contractor shall advise all his workmen accordingly.

6.0 SPEED RESTRICTIONS AND PROTECTION

6.1 When speed restrictions are imposed by the network operator because of the Contractor's activities, the Contractor shall organise and carry out his work so as to permit the removal of the restrictions as soon as possible.

6.2 When the Contract Supervisor considers protection to be necessary the Contractor shall, unless otherwise agreed, provide all protection including flagmen, other personnel and all equipment for the protection of the network operator's and the Contractor's personnel and assets, the public and including trains.

6.2.1 The network operator will provide training free of charge of the Contractor's flagmen and other personnel performing protection duties. The Contractor shall consult with the Contract Supervisor, whenever he considers that protection will be necessary, taking into account the minimum permissible clearances set out in the Manual for Track Maintenance (Document no. BBB0481):

- Drawing no. BE-97 Sheet 1: Horizontal Clearances: 1065mm gauge (Annexure 1 sheet 1)
- Drawing no. BE-97 Sheet 2: Vertical Clearances: 1065mm gauge (Annexure 1 sheet 2)
- Drawing no. BE-97 Sheet 3: Clearances: Platform (Annexure 1 sheet 3)
- Drawing no. BE-97 Sheet 5: Clearances: 610mm Gauge (Annexure 1 sheet 5)

6.3 The Contractor shall appoint a Responsible Representative to receive and transmit any instruction which may be given by the network operator personnel providing protection.

7.0 ROADS AND ROADS ON THE NETWORK OPERATOR'S PROPERTY

7.1 The Contractor shall take every reasonable precaution to prevent damage to any roads or bridges used to obtain access to the site, and shall select routes, use vehicles, and restrict loads so that any extraordinary traffic as may arise from the moving of plant or material to or from the site shall be limited as far as is reasonably possible.

7.2 The Contractor shall not occupy or interfere in any way with the free use of any public or private road, right-of-way, path or street unless the Contract Supervisor has obtained the approval of the road authority concerned.

8.0 CLEARANCES

8.1 No temporary works shall encroach on the appropriate minimum clearances set out in the Manual for Track Maintenance (Document no. BBB0481):

- Drawing no. BE-97 Sheet 1: Horizontal Clearances: 1065mm gauge (Annexure 1 sheet 1)
- Drawing no. BE-97 Sheet 2: Vertical Clearances: 1065mm gauge (Annexure 1 sheet 2)
- Drawing no. BE-97 Sheet 3: Clearances: Platform (Annexure 1 sheet 3)
- Drawing no. BE-97 Sheet 5: Clearances: 610mm Gauge (Annexure 1 sheet 5)

9.0 STACKING OF MATERIAL

9.1 The Contractor shall not stack any material closer than 3m from the centre line of any railway line without prior approval of the Contract Supervisor.

10.0 EXCAVATION, SHORING, DEWATERING AND DRAINAGE

10.1 Unless otherwise approved by the Contract Supervisor any excavation adjacent to a railway line shall not encroach on the hatched area shown in Figure 1.

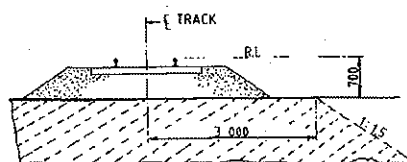


Fig. 1.

- 10.2 The Contractor shall provide, at his own cost any shoring, dewatering or drainage of any excavation unless otherwise stipulated elsewhere in the Contract.
- 10.3 Where required by the Contract Supervisor, drawings of shoring for any excavation under or adjacent to a railway line shall be submitted and permission to proceed, obtained before the excavation is commenced.
- 10.4 The Contractor shall prevent ingress of water to the excavation but where water does enter, he shall dispose of it as directed by the Contract Supervisor.
- 10.5 The Contractor shall not block, obstruct or damage any existing drains either above or below ground level unless he has made adequate prior arrangements to deal with drainage.
- 11.0 FALSEWORK FOR STRUCTURES**
- 11.1 Drawings of falsework for the construction of any structure over, under or adjacent to any railway line shall be submitted to the Contract Supervisor and his permission to proceed obtained before the falsework is erected. Each drawing shall be given a title and a distinguishing number and shall be signed by a registered professional engineer certifying that he has checked the design of the falsework and that the drawings are correct and in accordance with the design.
- 11.2 After the falsework has been erected and before any load is applied, the Contractor shall submit to the Contract Supervisor a certificate signed by a registered professional engineer certifying that he has checked the falsework and that it has been erected in accordance with the drawings. Titles and numbers of the drawings shall be stated in the certificate. Notwithstanding permission given by the Contract Supervisor to proceed, the Contractor shall be entirely responsible for the safety and adequacy of the falsework.
- 12.0 PILING**
- 12.1 The Contract Supervisor will specify the conditions under which piles may be installed on the network operator's property.
- 13.0 UNDERGROUND SERVICES**
- 13.1 No pegs or stakes shall be driven or any excavation made before the Contractor has established that there are no underground services which may be damaged thereby.
- 13.2 Any damage shall be reported immediately to the Contract Supervisor, or to the official in charge at the nearest station, or to the traffic controller in the case of centralised traffic control.
- 14.0 BLASTING AND USE OF EXPLOSIVES**
- 14.1 When blasting within 500m of a railway line, the Contractor shall observe the requirements stipulated in this specification.
- 14.2 No blasting shall be carried out except with the prior written permission of the Contract Supervisor and under such conditions as he may impose.
- 14.3 On electrified lines the Contractor shall also obtain the permission of the Electrical Officer (Contracts) before blasting, and shall give at least 21 days notice of his intention to blast. No blasting shall be done in the vicinity of electrified lines unless a member of the network operator's electrical personnel is present.
- 14.4 The Contractor shall arrange for the supply, transport storage and use of explosives.
- 14.5 The Contractor shall have labour, tools and plant, to the satisfaction of the Contract Supervisor, available on the site to clear immediately any stones or debris deposited on the track or formation by blasting, and to repair any damage to the track or formation immediately after blasting. Repairs to the track shall be carried out only under the supervision of a duly authorised representative of the network operator.
- 14.6 The Contractor shall notify the Contract Supervisor of his intention to blast at least 21 days before the commencement of any blasting operations.
- 14.7 Before any blasting is undertaken, the Contractor and the Contract Supervisor shall jointly examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting to establish the extent of any existing cracking or damage to such structures, etc. The Contractor, shall, subject to the provisions stipulated in the Contract Insurance Policy, make good any deterioration of such buildings, houses, or structures, which, in the opinion of the Contract Supervisor, was directly caused by the blasting.
- 14.8 After completion of the blasting the Contractor shall obtain a written clearance from each landowner in

the vicinity of the blasting operations to the effect that all claims for compensation in respect of damage caused by the blasting operations to their respective properties, have been settled.

14.9 The Contractor shall provide proof that he has complied with the provisions of clauses 10.17.1 to 10.17.4 of the Explosives Regulations (Act 26 of 1956 as amended).

14.10 Blasting within 500m of a railway line will only be permitted during intervals between trains. A person appointed by the Contract Supervisor, assisted by flagmen with the necessary protective equipment, will be in communication with the controlling railway station.

Only this person will be authorised to give the Contractor permission to blast, and the Contractor shall obey his instructions implicitly regarding the time during which blasting may take place.

14.11 The flagmen described in clause 14.10, where provided by the network operator, are for the protection of trains and the network operator's property only, and their presence does not relieve the Contractor in any manner of his responsibilities in terms of Explosives Act or Regulations, or any obligation in terms of this Contract.

14.12 The person described in clause 14.10 will record in a book provided and retained by the network operator, the dates and times:-

(i) when each request is made by him to the controlling station for permission to blast;

(ii) when blasting may take place;

(iii) when blasting actually takes place; and

(iv) when he advises the controlling station that the line is safe for the passage of trains.

14.13 Before each blast the Contractor shall record in the same book, the details of the blast to be carried out. The person appointed by the Contract Supervisor and the person who will do the blasting shall both sign the book whenever an entry described in clause 14.12 is made.

15.0 RAIL TROLLEYS

15.1 The use of rail trolleys or trestle trolleys on a railway line for working on high voltage equipment will be permitted only if approved by the Contract Supervisor and under the conditions stipulated by him.

15.2 All costs in connection with trolley working and any train protection services requested by the Contractor shall, be borne by the Contractor, unless otherwise agreed.

16.0 SIGNAL TRACK CIRCUITS

16.1 Where signal track circuits are installed, the Contractor shall ensure that no material capable of conducting an electrical current makes contact between rails of railway line/lines.

16.2 No signal connections on track-circuited tracks shall be severed without the Contract Supervisor's knowledge and consent.

17.0 PENALTY FOR DELAYS TO TRAINS

17.1 If any trains are delayed by the Contractor and the Contract Supervisor is satisfied that the delay was avoidable, a penalty will be imposed on the Contractor as stipulated in the contract, for the period and number of trains delayed.

18.0 SURVEY BEACONS AND PEGS

18.1 The Contractor shall not on any account move or damage any beacon, bench mark, reference mark, signal or trigonometrical station in the execution of the Works without the written approval of the Contract Supervisor.

Should the Contractor be responsible for any such occurrence, he shall report the circumstances to the Contract Supervisor who will arrange with the Director-General of Surveys for replacement of the beacon or mark at the cost of the Contractor.

18.2 The Contractor shall not move or damage any cadastral or mining beacon without the written approval of the Contract Supervisor and before it has been referenced by a registered land surveyor. Any old boundary beacon, which becomes an internal beacon on creation of new boundaries, shall not be moved without the written approval of the Contract Supervisor.

Should the Contractor move or damage any cadastral or mining beacon without authority, he shall be responsible for having it replaced, at his cost, by a land surveyor.

- 18.3 The Contractor shall preserve all pegs and bench marks. Such survey points shall not be removed without the written approval of the Contract Supervisor. Should any peg or benchmark be removed without authority, the Contract Supervisor will arrange for its replacement and the cost will be recovered from the Contractor. No claim will be considered for delay in replacing any such peg or bench mark. Each peg replaced shall be checked by the Contractor.
- 18.4 Where a new boundary has been established, beacons on the fence line shall not be disturbed, and fence posts or anchors may not be placed or excavations made within 0,6 m of any beacon without the prior written approval of the Contract Supervisor.

19.0 TEMPORARY LEVEL CROSSINGS

- 19.1 The Contract Supervisor may, on request of the Contractor, and if necessary for the purpose of execution of the Works, permit the construction of a temporary level crossing over a railway a line at a position approved by the Contract Supervisor and at the Contractor's cost. The period for which the temporary level crossing is permitted will be at the discretion of the Contract Supervisor.
- 19.2 The Contractor will provide protection and supervise the construction of the road over the track(s) and within the railway servitude at the level crossing, as well as the erection of all road signs and height gauges. All cost to be borne by the applicant.

The Contractor shall exercise extreme caution in carrying out this work, especially in respect of damage to tracks, services, overhead power and communications routes and prevent contact with "live" overhead electrical equipment.

Unless otherwise agreed, the Contractor will provide the service deviations or alterations to the network operator's track-, structure-, drainage-, electrical-, telecommunications- and train authorisation systems to accommodate the level crossing.

- 19.3 The Contractor shall take all necessary steps including the provision of gates, locks and, where necessary, watchmen to restrict the use of the temporary level crossing to himself and his employees, his subcontractors and their employees, the staff of the network operator and to such other persons as the Contract Supervisor may permit and of whose identity the Contractor will be advised. If so ordered by the Contract Supervisor, the Contractor shall provide persons to control road traffic using the temporary level crossing. Such persons shall stop all road traffic when any approaching train is within seven hundred and fifty (750) metres of the temporary level crossing, and shall not allow road traffic to proceed over it until the lines are clear.
- 19.4 The Contractor shall maintain the temporary level crossing within the railway servitude in good condition for the period it is in use. A temporary agreement with the road authority to be concluded for the maintenance of the level crossing outside the railway servitude.
- 19.5 When the temporary level crossing is no longer required by the Contractor, or permitted by the network operator, the Contractor shall at his own cost remove it and restore the site and the network operator's track-, structure-, drainage-, electrical-, telecommunications- and train authorisation systems to its original condition. Work over the tracks and within the railway servitude will be supervised by the network operator.

20.0 COMPLETION OF THE WORKS

- 20.1 On completion of the works, the Contractor shall remove all the remaining construction plant and material from the site, other than material which is the property of the network operator, and leave the site in a clean, neat and tidy condition. If material and plant is required for the liability and maintenance period the Contract supervisor must authorise it's retention on site.

21.0 PROTECTION OF PERSONS AND PROPERTY

- 21.1 The Contractor shall provide and maintain all lights, guards, barriers, fencing and watchmen when and where necessary or as required by the Contract Supervisor or by any statutory authority, for the protection of the Works and for the safety and convenience of the public.

Red, yellow, green or blue lights may not be used by the Contractor as they can be mistaken for signals. Red, yellow, green or white flags shall only be used for protection by the Contractor. Within the precincts of a port the Contractor shall obtain the permission of the Port Captain before installing any light.

- 21.2 The Contractor shall take all the requisite measures and precautions during the course of the Works to:
- (i) protect the public and property of the public,
 - (ii) protect the property and workmen of both the network operator and the Contractor,
 - (iii) avoid damage to and prevent trespass on adjoining properties, and
 - (iv) ensure compliance with any instruction issued by the Contract Supervisor or other authorised person, and with any stipulation embodied in the contract documents which affects the safety of any person or thing.
- 21.3 The network operator will provide, at its own cost, protection for the safe working of trains during such operations as the Contract Supervisor may consider necessary. Protection by the network operator for any purpose whatsoever, does not absolve the Contractor of his responsibilities in terms of the Contract.
- 21.4 The Contractor shall take all precautions and appoint guards, watchmen and compound managers for prevention of disorder among and misconduct by the persons employed on the Works and by any other persons, whether employees or not, on the work site and for the preservation of the peace and protection of persons and property in the direct neighbourhood. Any relocation of camps because of disorder shall be at the Contractor's expense.
- 21.5 All operations necessary for the execution of the Works, including the provision of any temporary work and camping sites, shall be carried out so as not to cause veldt fires, ground and environmental pollution, soil erosion or restriction of or interference with streams, furrows, drains and water supplies.
- If the original surface of the ground is disturbed in connection with the Works, it shall be made good by the Contractor to the satisfaction of the land owner, occupier or responsible authority.
- 21.6 The Contractor shall take all reasonable steps to minimise noise and disturbance when carrying out the Works, including work permitted outside normal working hours.
- 21.7 Dumping of waste or excess materials by the Contractor shall, in urban areas, be done under the direction and control of, and at sites made available by the local authority. Dumping outside local authority boundaries shall be done only with the express permission and under the direction and control of the Contract Supervisor.
- 21.8 The Contractor shall comply with environmental protection measures and specifications stipulated by the Contract Supervisor and/or local and environmental authorities.
- 22.0 INTERFERENCE WITH THE NETWORK OPERATOR'S ASSETS AND WORK ON OPEN LINES**
- 22.1 The Contractor shall not interfere in any manner whatsoever with an open line, nor shall he carry out any work or perform any act which affects the security, use or safety of an open line except with the authority of the Contract Supervisor and in the presence of a duly authorised representative of the network operator.
- 22.2 The Contractor shall not carry out any work or operate any plant, or place any material whatsoever nearer than three metres from the centre line of any open line except with the written permission of the Contract Supervisor and subject to such conditions as he may impose.
- 22.3 Care must be taken not to interfere with or damage any services such as overhead wire routes, cables or pipes and optical fibre cable, except as provided for the work specified. The Contractor will be held responsible for any damage to or interruption of such services arising from any act or omission on his part or of any of his employees, or persons engaged by him on the Works. The cost of repairing, replacing or restoring the services, as well as all other costs arising from any damage to services, shall be borne by, and will be recovered from the Contractor.
- 22.4 Authority granted by the Contract Supervisor and the presence of an authorised representative of the network operator in terms hereof, shall not relieve the Contractor of his duty to comply with this specification.
- 23.0 ACCESS, RIGHTS-OF-WAY AND CAMPSITES**
- 23.1 Where entry onto the network operator's property is restricted, permission to enter will be given only for the purpose of carrying out the Works and will be subject to the terms and conditions laid down by the network operator.
- 23.2 The Contractor shall arrange for campsites, workplaces and access thereto as well as for any right-of-

way over private property to the site of the Works, and for access within the boundaries of the network operator's property. The owners of private property to be traversed shall be approached and treated with tact and courtesy by the Contractor, who shall, if necessary, obtain a letter of introduction to such property owners from the Contract Supervisor.

The Contractor shall be responsible for the closing of all gates on roads and tracks used by him or his employees. Except with the prior approval of the Contract Supervisor and the owner or occupier of any private land to be traversed, the Contractor shall not cut, lower, damage, remove or otherwise interfere with any fence or gate which is either on the network operator's property or on private property and which restricts access to the Works. Where such approval has been given, the Contractor shall prevent entry of animals or unauthorised persons onto the network operator's or private property, and shall make the fences safe against trespass at the close of each day's work.

23.3 The Contractor shall take all reasonable steps to confine the movement of vehicles and plant to the approved right-of-way to minimise damage to property, crops and natural vegetation.

23.4 When access is no longer required, and before completion of the Works, the Contractor shall repair, restore or replace any fence or gate damaged during execution of the Works to the satisfaction of the Contract Supervisor and shall furnish the Contract Supervisor with a certificate signed by the owner and occupier of land over which he has gained access to a campsite, workplace and the Works, certifying that the owner and occupier have no claim against the Contractor or the network operator arising from the Contractor's use of the land. Should the Contractor be unable to obtain the required certificate, he shall report the circumstances to the Contract Supervisor.

24.0 SUPERVISION

24.1 The Contract Supervisor will provide overall technical superintendence of the Works, and may direct the Contractor in terms of the provisions of the Contract or in respect of any measures which the Contract Supervisor may require for the operations of the network operator, the safety of trains, property and workmen of the network operator, and for the safety of other property and persons. The Contractor shall carry out the directions of the Contract Supervisor. The superintendence exercised by the Contract Supervisor, including any agreement, approval, refusal or withdrawal of any approval given, shall not relieve the Contractor of any of his duties and liabilities under the Contract, and shall not imply any assumption by the network operator or by the Contract Supervisor of the legal and other responsibilities of the Contractor in carrying out the Works.

24.2 The Contract Supervisor may delegate to any deputy or other person, any of his duties or functions under the Contract. On receiving notice in writing of such delegation, the Contractor shall recognise and obey the deputy or person to whom any such duties or functions have been delegated as if he were the Contract Supervisor.

24.3 The Contractor shall exercise supervision over the Works at all times when work is performed or shall be represented by an agent having full power and authority to act on behalf of the Contractor. Such agent shall be competent and responsible, and have adequate experience in carrying out work of a similar nature to the Works, and shall exercise personal supervision on behalf of the Contractor. The Contract Supervisor shall be notified in writing of such appointment which will be subject to his approval.

24.4 The Contractor or his duly authorised agent shall be available on the site at all times while the Works are in progress to receive the orders and directions of the Contract Supervisor.

25.0 HOUSING OF EMPLOYEES

25.1 The Contractor shall, where necessary, make his own arrangements for suitable housing of his employees. Where temporary housing is permitted by the Contract Supervisor on any part of the site, the Contractor shall provide suitable sanitation, lighting and potable water supplies in terms of the requirements of the local authority or the current network operator's specification; Minimum Communal Health Requirements in Areas outside the Jurisdiction of a Local Authority - E.4B, as applicable.

25.2 Fouling the area inside or outside the network operator's boundaries shall be prevented. The Contractor will be called upon by the Contract Supervisor to dispose of any foul or waste matter generated by the Contractor.

26.0 OPTICAL FIBRE CABLE ROUTES

26.1 The Contractor shall not handle, impact, move or deviate any optical fibre cable without prior approval.

26.2 Works that in any way affect the optical fibre cable requires prior approval from the Contract Supervisor

who will determine the work method and procedures to be followed.

“PREVIEW COPY ONLY”

PART B - SPECIFICATION FOR WORK NEAR HIGH-VOLTAGE ELECTRICAL EQUIPMENT
27.0 GENERAL

27.1 This specification is based on the contents of Transnet's publication ELECTRICAL SAFETY INSTRUCTIONS, as amended, a copy of which will be made available on loan to the Contractor for the duration of the contract.

These instructions apply to all work near "live" high-voltage equipment maintained and/or operated by the network operator, and the onus rests on the Contractor to ensure that he obtains a copy.

- 27.2 This specification must be read in conjunction with and not in lieu of the Electrical Safety Instructions.
- 27.3 The Contractor's attention is drawn in particular to the contents of Part I, Sections 1 and 2 of the Electrical Safety Instructions.
- 27.4 The Electrical Safety Instructions cover the minimum safety precautions which must be taken to ensure safe working on or near high-voltage electrical equipment, and must be observed at all times. Should additional safety measures be considered necessary because of peculiar local conditions, these may be ordered by and at the discretion of the Electrical Officer (Contracts).
- 27.5 The Contractor shall obtain the approval of the Electrical Officer (Contracts) before any work is done which causes or could cause any portion of a person's body or the tools he is using or any equipment he is handling, to come within 3 metres of any "live" high-voltage equipment.
- 27.6 The Contractor shall regard all high-voltage equipment as "live" unless a work permit is in force.
- 27.7 Safety precautions taken or barriers erected shall comply with the requirements of the Electrical Officer (Contracts), and shall be approved by him before the work to be protected is undertaken by the Contractor. The Contractor shall unless otherwise agreed, bear the cost of the provision of the barriers and other safety precautions required, including the attendance of the network operator's staff where this is necessary.
- 27.8 No barrier shall be removed unless authorised by the Electrical Officer (Contracts).

28.0 WORK ON BUILDINGS OR FIXED STRUCTURES

- 28.1 Before any work is carried out or measurements are taken on any part of a building, fixed structure or earthworks of any kind above ground level situated within 3 metres of "live" high-voltage equipment, the Electrical Officer (Contracts) shall be consulted to ascertain the conditions under which the work may be carried out.
- 28.2 No barrier erected to comply with the requirements of the Electrical Officer (Contracts) shall be used as temporary staging or shuttering for any part of the Works.
- 28.3 The shuttering for bridge piers, abutments, retaining walls or parapets adjacent to or over any track may be permitted to serve as a barrier, provided that it extends at least 2,5 metres above any working level in the case of piers, abutments and retaining walls and 1,5 metres above any working level in the case of parapets.

29.0 WORK DONE ON OR OUTSIDE OF ROLLING STOCK, INCLUDING LOADING OR UNLOADING

- 29.1 No person may stand, climb or work, whilst on any platform, surface or foothold:
- 29.1.1 higher than the normal unrestricted access way, namely -
- 29.1.1.1 external walkways on diesel, steam and electric locomotives, steam heat vans, etc. and
- 29.1.1.2 walkways between coaches and locomotives.
- 29.1.2 of restricted access ways in terms of the Electrical Safety Instructions namely -
- 29.1.2.1 the floor level of open wagons
- 29.1.2.2 external walkways or decks of road-rail vehicles, on-track maintenance machines and material trains.
- 29.1.3 Unauthorised staff working on these platforms must be directly supervised by duly authorised persons in terms of clause 607.1.3 of the Electrical Safety Instructions. These persons must attend the relevant electrical safety module training. A letter of training must then be issued by an accredited training authority. A Category C Certificate of Authority must be obtained from the

local depot examining officer.

- 29.2 When in the above positions no person may raise his hands or any equipment he is handling above his head.
- 29.3 In cases where the Contractor operates his own rail mounted equipment, he shall arrange for the walkways on this plant to be inspected by the Electrical Officer (Contracts) and approved, before commencement of work.
- 29.4 The handling of long lengths of material such as metal pipes, reinforcing bars, etc should be avoided, but if essential they shall be handled as nearly as possible in a horizontal position below head height.
- 29.5 The Responsible Representative shall warn all persons under his control of the danger of being near "live" high-voltage equipment, and shall ensure that the warning is fully understood.
- 29.6 Where the conditions in clauses 30.1 to 30.4 cannot be observed the Electrical Officer (Contracts), shall be notified. He will arrange for suitable Safety measures to be taken. The Electrical Officer (Contracts), may in his discretion and in appropriate circumstances, arrange for a suitable employee of the Contractor to be specially trained by the network operator and at the Contractor's cost, as an Authorised Person to work closer than 3 metres from "live" overhead conductors and under such conditions as may be imposed by the senior responsible electrical engineer of the network operator.

30.0 USE OF EQUIPMENT

30.1 Measuring Tapes and Devices

- 30.1.1 Measuring tapes may be used near "live" high-voltage equipment provided that no part of any tape or a person's body comes within 3 metres of the "live" equipment.
- 30.1.2 In windy conditions the distance shall be increased to ensure that if the tape should fall it will not be blown nearer than 3 metres from the "live" high-voltage equipment.
- 30.1.3 Special measuring devices longer than 2 metres such as survey sticks and rods may be used if these are of non-conducting material and approved by the responsible Electrical Engineer of the network operator, but these devices must not be used within 3 metres of "live" high-voltage equipment in rainy or wet conditions.
- 30.1.4 The assistance of the Electrical Officer (Contracts) shall be requested when measurements within the limits defined in clauses 31.1.1 to 31.1.3 are required.
- 30.1.5 The restrictions described in 31.1.1 to 31.1.3 do not apply on a bridge deck between permanent parapets nor in other situations where a barrier effectively prevents contact with the "live" high-voltage equipment.

30.2 Portable Ladders

- 30.2.1 Any type of portable ladder longer than 2 metres may only be used near "live" high-voltage equipment under the direct supervision of the Responsible Representative. He shall ensure that the ladder is always used in such a manner that the distance from the base of the ladder to any "live" high-voltage equipment is greater than the fully extended length of the ladder plus 3 metres. Where these conditions cannot be observed, the Electrical Officer (Contracts) shall be advised, and he will arrange for suitable safety measures to be taken.

31.0 CARRYING AND HANDLING MATERIAL AND EQUIPMENT

- 31.1 Pipes, scaffolding, iron sheets, reinforcing bars and other material which exceeds 2 metres in length shall be carried completely below head height near "live" high-voltage equipment. For maximum safety such material should be carried by two or more persons so as to maintain it as nearly as possible in a horizontal position. The utmost care must be taken to ensure that no part of the material comes within 3 metres of any "live" high-voltage equipment.
- 31.2 Long lengths of wire or cable shall never be run out in conditions where a part of a wire or cable can come within 3 metres of any "live" high-voltage equipment unless the Electrical Officer (Contracts) has been advised and has approved appropriate safety precautions.
- 31.3 The presence of overhead power lines shall always be taken account of especially when communications lines or cables or aerial cables, stay wires, etc. are being erected above ground level.

32.0 PRECAUTIONS TO BE TAKEN WHEN ERECTING OR REMOVING POLES, ANTENNAE, TREES ETC.

- 32.1 A pole may be handled for the purpose of erection or removal near high-voltage equipment under the following conditions:

(i) If the distance between the point at which the pole is to be erected or removed and the nearest "live" high-voltage equipment is more than the length of the pole plus 3 metres, the work shall be supervised by the Responsible Representative.

(ii) If the distance described in (i) is less than the length of the pole plus 3 metres, the Electrical Officer (Contracts) shall be consulted to arrange for an Authorised Person to supervise the work and to ensure that the pole is earthed where possible. The pole shall be kept in contact with the point of erection, and adequate precautions shall be taken to prevent contact with "live" high-voltage equipment.

32.2 The cost of supervision by an Authorised Person and the provision of earthing shall, unless otherwise agreed, be borne by the Contractor.

32.3 The provisions of clauses 33.1 and 33.2 shall also apply to the erection or removal of columns, antennae, trees, posts, etc.

33.0 USE OF WATER

33.1 No water shall be used in the form of a jet if it can make contact with any "live" high-voltage equipment or with any person working on such equipment.

34.0 USE OF CONSTRUCTION PLANT

34.1 "Construction plant" entails all types of plant including cranes, piling frames, boring machines, excavators, draglines, dewatering equipment and road vehicles with or without lifting equipment.

34.2 When work is being undertaken in such a position that it is possible for construction plant or its load to come within 3 metres of "live" high-voltage equipment, the Electrical Officer (Contracts) shall be consulted. He will arrange for an Authorised Person to supervise the work and to ensure that the plant is adequately earthed. The Electrical Officer (Contracts) will decide whether further safety measures are necessary.

34.3 The cost of any supervision by an Authorised Person and the provision of earthing shall, unless otherwise agreed, be borne by the Contractor.

34.4 When loads are handled by cranes, non-metallic rope hand lines shall be used, affixed to such loads so as to prevent their swinging and coming within 3 metres of "live" high-voltage equipment.

34.5 Clauses 35.1 to 35.4 shall apply *mutatis mutandis* to the use of maintenance machines of any nature.

35.0 WORK PERFORMED UNDER DEAD CONDITIONS UNDER COVER OF A WORK PERMIT

35.1 If the Responsible Representative finds that the work cannot be done in safety with the high-voltage electrical equipment "live", he shall consult the Electrical Officer (Contracts) who will decide on the action to be taken.

35.2 If a work permit is issued the Responsible Representative shall-

(i) before commencement of work ensure that the limits within which work may be carried out have been explained to him by the Authorised Person who issued the permit to him, and that he fully understands these limits;

(ii) sign portion C of the permit before commencement of work;

(iii) explain to all persons under his control the limits within which work may be carried out, and ensure that they fully understand these limits;

(iv) care for the safety of all persons under his control whilst work is in progress; and

(v) withdraw all personnel under his control from the equipment on completion of the work before he signs portion D of the work permit.

36.0 TRACTION RETURN CIRCUITS IN RAILS

36.1 DANGEROUS CONDITIONS CAN BE CREATED BY REMOVING OR SEVERING ANY BOND.

36.2 Broken rails with an air gap between the ends, and joints at which fishplates are removed under "broken bond" conditions, are potentially lethal. The rails on either side of an air gap between rail ends on electrified lines shall not be touched simultaneously until rendered safe by the network operator personnel.

36.3 The Contractor shall not break any permanent bonds between rails or between rails and any structure. He shall give the Contract Supervisor at least 7 days written notice when removal of such bonds is necessary.

36.4 No work on the track which involves interference with the traction return rail circuit either by cutting or removing the rails, or by removal of bonds shall be done unless the Electrical Officer (Contracts) is consulted. He will take such precautions as may be necessary to ensure continuity of the return circuit before permitting the work to be commenced.

37.0 HIGH-VOLTAGE ELECTRICAL EQUIPMENT NOT MAINTAINED AND/OR OPERATED BY THE NETWORK OPERATOR

Where the work is undertaken on or near high-voltage electrical equipment which is not maintained and/or operated by the network operator, the Occupational Health and Safety Act No. 85 of 1993, and Regulations and Instructions, or the Mines Health and Safety Act (Act 29 of 1996), shall apply.

Such equipment includes:-

- (i) Eskom and municipal equipment;
- (ii) The Contractor's own power supplies; and
- (iii) Electrical equipment being installed but not yet taken over from the Contractor.

END

“PREVIEW COPY ONLY”

Contract Data

Site Information

The works shall be performed at Waterval Onder, Westaffin, Mkhuhlu and Hoedspruit 3kV DC Traction Substations.

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