



A division of Transnet Limited

INFRASTRUCTURE ENGINEERING

PROJECT SPECIFICATION

**PROJECT SPECIFICATION FOR INFRARED THERMOGRAPHIC  
SCANNING OF OVERHEAD TRACK EQUIPMENT.**

**Statement of authorization:**

There is no SANS specification available for similar material / equipment and as far as can be ascertained no other specification / standard suitably covers Transnet Freight Rail requirements. The specification has been compiled in a manner which shall favour / encourage local manufacture of material / equipment to maximum degree.

Author: Engineering Technician - S.P. Mokobake  
Infrastructure Engineering

Authorised: Act. Principal Engineer, C.F. du Toit  
Infrastructure Engineering

Two handwritten signatures in black ink, one above the other, positioned to the right of the author and authorized person information.

Date: 2009/03/12.

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PRIEVIEW COPY ONLY

**1. SCOPE**

1.1 This project specification covers Transnet Freight Rail's requirements for infrared thermographic scanning of railway electrification equipment, processing of data and the presentation of results for the purpose of preventative maintenance on 3kVDC, 25kVAC and 50kVAC overhead track equipment of Transnet Freight Rail countrywide.

**2. STANDARDS**

<b>Item no.</b>	<b>Specification no.</b>	<b>Description</b>
2.1	E4E (August 2006)	Safety arrangements and procedural compliance with the Occupational Health and Safety Act, Act 85 of 1993 and regulations
2.2	BBD5814	Specification for Infra-red Thermographic Scanning of Overhead Track Equipment
2.3	E7/1	Specification for Works On-, Over-, Under- or Adjacent to Railway Lines and near High Voltage Equipment

**3. DESCRIPTION OF WORK**

- 3.1 The Working Area shall be the overhead track equipment owned and maintained by Transnet Freight Rail at any Work location within the borders of the Republic of South Africa.
- 3.2 The estimated total distance of overhead lines to be scanned is **13 000 km**. The overhead lines will be scanned during the night. It is expected between 50 km and 500 km and an average of five hours can be scanned per night. Transnet Freight Rail does not guarantee the estimated km scanned will be achieved on the night. The depot will, therefore determine the total number of runs per year to suit their needs.
- 3.3 The Supervisor will determine the Working Areas where the scanning of the overhead track equipment shall be done, and shall instruct the Contractor regarding the priorities and programme for performance of the Work with regular updates.
- 3.4 The Contractor shall perform the following within Transnet Freight Rail's territories countrywide and according to the scope of work:
  - 3.4.1 Mount and dismount under supervision, the infrared camera onto- or from the stationary locomotive.
  - 3.4.2 Perform the job only during the night.
  - 3.4.3 The Contractor shall test his/her equipment prior to starting a scanning trip.
  - 3.4.4 The Contractor shall set the infrared camera to clearly view the conductors and or track switches to be scanned.
  - 3.4.5 The Contractor shall record the exception events and GPS co-ordinates continuously.
  - 3.4.6 After every scan, the Contractor shall label the recordings according to the depot name and section scanned.
  - 3.4.7 The Contractor shall sign the site diary and site instruction book on every scanning trip.

**4. CONTRACTUAL OBLIGATIONS**

- 4.1 Over and above the conditions mentioned in the general conditions of contract, the Contractor shall also be responsible for the conditions mentioned hereunder.
- 4.1.1 The Contractor shall take full responsibility for and shall warrant the suitability and operational compliance of the equipment provided by him for performing the work in accordance with the contract specifications.
- 4.1.2 The Contractor shall be competent to perform the work required in terms of the contract and shall warrant the competence of persons appointed by him to perform the work.
- 4.1.3 The Contractor shall perform all the duties and functions required in terms of the contract and shall comply with all reasonable instructions and directions of the Supervisor or his duly authorised deputy in respect of performing the contract work and compliance with Transnet Freight Rail's health and safety requirements.
- 4.1.4 The Contractor shall not make use of any sub-contractor to perform the works or parts thereof without prior permission from the Project Manager or Supervisor.
- 4.1.5 The Contractor shall supply a site diary (triplicate copies). This book shall be used to record daily happening such as identifying the sections scanned, and 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 scanning being cancelled, etc. The appointed Project Manager or Supervisor must be informed and such delays must be countersigned by the Transnet Freight Rail depot personnel accompanying the scan.
- 4.1.6 The Contractor shall supply a site instruction book (triplicate copies). 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 Project Manager, Supervisor or Supervisor deputy and must be countersigned by the Contractor.
- 4.1.7 Both books mentioned above shall be the property of Transnet Freight Rail and shall be handed over to the Project Manager or Supervisor on the very last day of submitting payment for work done.
- 4.1.8 Should a planned equipment scan be cancelled at short notice (less than 12 hours) through no fault of the Contractor, the Contractor may claim compensation for his staff at the agreed rate in the schedule of quantities and prices.
- 4.1.9 The Contractor is responsible for transport of his staff and equipment between centres/infra-areas.
- 4.1.10 All post-processed reports shall be submitted to the Supervisor within two weeks after a successful scan within a depot's boundaries. This may exclude sections that have to be rescanned for whatever reason, and which were done later or will still be done. Failure to comply with this clause will result in a 2.5% penalty per day calculated on the normal payment for sections represented in the delayed report.
- 4.1.11 Payment for reports shall be made after the information is verified. Transnet Freight Rail will, prior to payment but within ten calendar days from receiving the reports, perform verification of the physical defect locations and of data format purity. Should quality shortcomings be identified, the Contractor will be expected to redo the post processing where after the Transnet Freight Rail will repeat the verification process. If there is no improvement, the non-performance clause, which forms part of the general conditions of contract shall govern/ enforced.

**5. INSTALLATION**

- 5.1 The Contractor shall design clamps and fasteners that will fit to all Transnet Freight Rail's locomotive consist. The design shall be such as to facilitate the equipment to be quickly and securely attached near "LIVE" equipment while stationary in a yard or station area, and in compliance with Transnet Freight Rail's safety requirements.
- 5.2 No drilling or other method shall be used which cause damage to the locomotive.
- 5.3 The Contractor shall, under supervision, be responsible for mounting, connecting his/her equipment in such a way that the wires are not preventing the staff free movement and dismantling of the equipment from the locomotive.

**6. WORK TO BE DONE BY TRANSNET FREIGHT RAIL**

- 6.1 Transnet Freight Rail shall, subject to its access control, security and safety arrangements; provide to the Contractor such access as is required to perform the works.
- 6.2 Transnet Freight Rail will provide transport for the Contractor's staff between the point of rendezvous as agreed and the point of arrival or departure of the train within a maximum range of 20km.
- 6.3 Transnet Freight Rail's Electrical Officer shall be available to co-ordinate the Contractor's performance of the work and to supervise the Contractor performing work in close proximity to "LIVE" overhead electrical equipment, such as mounting or detaching the equipment onto- or from a locomotive.
- 6.4 The Supervisor or his deputy shall determine on which train and/or locomotive the infrared scanning equipment shall be mounted in order to optimise, as far as possible, the scanning time. He shall advise the Contractor seven (7) calendar days in advance of the section, time and rendezvous for accompanying the Contractor to the locomotive.
- 6.5 The Supervisor or his deputy shall do verification audits on each report, before making payments and dispatching reports to respective depots.
- 6.6 The Supervisor or his deputy accompanying the Contractor shall monitor and record all scanning operations and certify payment therefore in accordance with the contract.
- 6.7 The Supervisor or his deputy shall ensure that parties involved in making payments sign the site diary and instruction book accordingly.
- 6.8 Transnet authorization Category-C is required of any person who works on electrification equipment near (within 3-m of) "live" equipment. A Category-C authority certificate is issued on the successful completion of a training module and written test to persons who are working near "LIVE" equipments. The training module is presented over four days.

**7. TENDERING PROCEDURE**

- 7.1 The term of the Contract shall be 12 months. Notwithstanding the conditions mentioned in the general conditions of contract, the price shall hold firm for the term of the contract and escalation shall only be applicable should Transnet exercise its option to extend the contract for a further 12 months.
- 7.2 Tenderers shall complete the attached "Schedule of Quantities and Prices". Items not reflected in this Schedule, but covered in the Project Specification or agreed at the

- inspection meeting shall all be added to the 'Schedule of Work and Prices' by the Tenderer and quoted for accordingly.
- 7.3 An addendum reflecting changes to the Project Specification and "Schedule of Quantities and Prices" may be forwarded to Tenderers after the site meeting and Tenderers should quote accordingly.
- 7.4 Tenderers shall indicate clause-by-clause (including sub clauses) compliance with the specification. This shall take the form of a separate document listing all the specifications clause numbers indicating the individual statement of compliance or non-compliance. This document can be used by Tenderers to elaborate on their clause.
- 7.5 Tenderers shall motivate a statement of non-compliance.
- 7.6 Where equipment offered does not comply with standards or publications referred to in the specification, Tenderers shall state which standards apply and submit a copy in English or certified translation.
- 7.7 Tenderers shall submit equipment type test certificates as specified with the Tender. These shall be in English or certified translation.
- 7.8 The quantities in the Schedule of Prices and Quantities are estimated and may be more or less than stated.
- 7.9 The Schedule of Prices makes provision for tenderers to quote the following unit prices:-
- 7.9.1 A rate per km to scan overhead track equipment. This rate shall include the cost of all reports compiled per section.
- 7.9.2 A rate per hour for overtime. This rate shall cover the cost of all personnel.
- 7.9.3 A rate per hour for Sunday time. This rate shall cover the cost of all personnel.
- 7.9.4 A rate per hour for work on public holidays. This rate shall cover the cost of all personnel.
- 7.9.5 A rate per for accommodation. This rate shall cover all costs of accommodation associated expenses for the Contractor's personnel while away from their headquarters.
- 7.9.6 A rate per kilometre for travelling. This rate shall cover the costs per kilometre travelled by the Contractor's personnel between the Contractor's headquarters and the departure site in an Infrastructure Area. The Transnet Freight Rail railway network country-wide is divided into "Infrastructure Areas" and work places/route lengths are designated with reference to the Infrastructure Area where work is to be performed. (See annexure 2 for details of the Infrastructure Areas.)
- 7.9.7 A rate per day to compensate the Contractor for cancellation of trains at short notice.
- 7.9.8 A rate per hour for waiting for trains will only be in effect if the minimum of five hours of scanning is not achieved.
- 7.10 Tenderers shall quote unit prices that shall be applied in the Schedule of Prices and Quantities to determine the approximate tender price.
- 7.11 The contract price shall be ascertained as the sum of all scanning costs, report costs, overtime costs, travelling, accommodation and other associated costs.
- 7.12 Tenderers shall submit proposals of how they will operate to achieve the specified results and also submit specimens of reports to be produced.



9. ANNEXURE 2: INFRASTRUCTURE AREAS COUNTRYWIDE

Depot	Approximate Sections	Scans/year	Approx. km's	Elect Type	Methods of Scanning
Isando East	Pyramid South-Ogies	Twice/year	130	3kV DC	Heavy Haul
	Sentrarand-Sybrand	Twice/year	64	3kV DC	Heavy Haul

Krugersdorp	Randfontein-Bank	Twice/year	68	3kV DC	Heavy Haul
	Bank-Welverdiend	Twice/year	96	3kV DC	Heavy Haul
	Welverdiend-Lichtenburg	Twice/year	252	3kV DC	Heavy Haul
	Welverdiend-Potchefstroom	Twice/year	128	3kV DC	Heavy Haul
	Potchefstroom-Klerksdorp	Twice/year	200	3kV DC	Heavy Haul
	Klerksdorp-Veertienstrome	Twice/year	452	3kV DC	Heavy Haul

Ladysmith	Ladysmith-Petermarizburg	Twice/year	200	3kV DC	Consists/YQ
	Ladysmith-Harrismith	Twice/year	120	3kV DC	Consists/YQ
	Ladysmith-Glencoe	Twice/year	84	3kV DC	Consists/YQ
	Glencoe-Vryheid	Twice/year	200	3kV DC	Consists/YQ

Ermelo	Ermelo-Boodsniersplaas L1	Twice/year	194	3kV DC	Heavy haul
	Ermelo-Boodsniersplaas L2	Twice/year	194	3kV DC	Heavy haul
	Landau-Gelukplaas L3	Twice/year	126	3kV DC	Heavy haul
	Witbank-Boodsniersplaas L2	Twice/year	170	3kV DC	Heavy haul
	Ermelo-Piet Retief L1	Twice/year	210	25kV AC	Heavy haul
	Ermelo-Piet Retief L2	Twice/year	210	25kV AC	Heavy haul
	Wonderfontein-Gelukplaas L1	Once/year	60	3kV DC	Heavy haul

	Vryheid East – Ulundi L1	Once/year	200	25kV	Heavyhaul
	Vryheid East – Ulundi L2	Once/year	100	25kV	Heavyhaul
	Ulundi L1 - Vryheid East	Once/year	100	25kV	Heavyhaul
Vryheid	Vryheid East – Piet Retief L1	Once/year	99	25kV	Heavyhaul
	Vryheid East – Piet Retief L2	Once/year	198	25kV	Heavyhaul
	Piet Retief L2– Vryheid East	Once/year	99	25kV	Heavyhaul

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Depot	Approximate Sections	Scans/year	Approx. km's	Elect Type	Methods of Scanning
Polokwane	Pyramid-Polokwane	Once/year	300	25kV AC	Heavy Haul
Nelspruit	Waterval Boven-Komatipoort	Once/year	260	3kV DC	Heavy Haul
	Kaapmuiden-Hoedspruit	Once/year	165	3kV DC	Heavy Haul
	Hoedspruit-Phalaborwa	Once/year	50	3kV DC	Heavy Haul
Bellville	De Aar - Beaufort West	Once/year	259	25kV AC	Heavy Haul
	Beaufort West – Worcester	Once/year	365	3kV DC	Heavy Haul
	Worcester - Bellville	Once/year	155	3kV DC	Heavy Haul
	Bellville - Wellington	Once/year	56	3kV DC	Heavy Haul
Durban	Booth- Pietermaritzburg	Once/year	204	3KV DC	Heavy Haul
	Bayhead-Pietermaritzburg L2	Once/year	97	3kV DC	Heavy Haul
	Simuma NPC-Kelso	Once/year	60	3kV DC	Heavy Haul
Koedoespoort	Thabazimbi-Pyramid South	Once/year	250	25kVAC	Heavy Haul
	Witbank-Pyramid South	Once/year	123	3kVDC	Heavy Haul
	Roosenekal-Derwent	Once/year	97	3kVDC	Heavy Haul
	Goedgeluk-Witbank	Once/year	140	3kVDC	Heavy Haul
Kimberley	Erts-Warrenton	Once/year	380	3kVDC	Heavy Haul
	Beaconsfield-De Aar	Once/year	230	25kVAC	Heavy Haul
	De Aar-Noupoort	Once/year	120	25kVAC	Heavy Haul
Heidelberg	Rooikop-Val No.1	Once/year	105	3kVDC	Consists/YQ
	Val-Vooruitsig No.1	Once/year	114	3kVDC	Consists/YQ
	Vooruitsig-Glencoe No.1	Once/year	108	3kVDC	Consists/YQ
	Glencoe-Vooruitsig No.2	Once/year	108	3kVDC	Consists/YQ
	Vooruitsig-Val No.2	Once/year	114	3kVDC	Consists/YQ
	Val-Rooikop No.2	Once/year	105	3kVDC	Consists/YQ
Saldanha	Saldanha-Halfweg Loop10	Once/year	446	50kV AC	Heavy Haul
	Loop 10-Erts	Once/year	862	50kV AC	Heavy Haul

**SPECIFICATION NO. BBD5815**

<b>Depot</b>	<b>Approximate Sections</b>	<b>Scans/year</b>	<b>Approx. km's</b>	<b>Elect Type</b>	<b>Methods of Scanning</b>
<b>Isando Central</b>	Cachet-Houtheuwel L17	Once/year	160	3kV DC	Consists/YQ
	Houtheuwel-Vereeniging LXE	Once/year	20	3kV DC	Consists/YQ
	Vereeniging-Angus LZC	Once/year	80	3kV DC	Consists/YQ
	Angus-Union LZ1	Once/year	20	3kV DC	Consists/YQ
	Union-Germiston LXA	Once/year	20	3kV DC	Consists/YQ
	Elsburg-Kaserne West LEE	Once/year	28	3kV DC	Consists/YQ
	Rooikop-Witbok LYP	Once/year	28	3kV DC	Consists/YQ
	Rooikop-Natalspruit LEA	Once/year	16	3kV DC	Consists/YQ
	Vereeniging-Vereeniging South LXD	Once/year	8	3kV DC	Consists/YQ
	Vereeniging South-Saolburg L34	Once/year	40	3kV DC	Consists/YQ
	Sasolburg-Wolwehok L66	Once/year	20	3kV DC	Consists/YQ
	Jupiter-Germiston (RML) LEE	Once/year	10	3kV DC	Consists/YQ
	Bank-Midway L06	Once/year	34	3kV DC	Consists/YQ
<b>Total km's=</b>			<b>10774</b>		

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