



A Division of Transnet SOC Limited

## TECHNOLOGY MANAGEMENT

### SPECIFICATION

# SPECIFICATION FOR PORTABLE GLASS REINFORCED POLYESTER (GRP) EXTENTION TRESTLE TROLLEY LADDER FOR Ohte inspection.

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**1.0 SCOPE**

This specification covers Transnet requirements for portable glass reinforced polyester (GRP) extension trestle trolley ladders for use of maintenance and inspection on overhead track equipment (OHTE).

**2.0 REFERENCE**

2.1 Unless otherwise specified this specification shall comply with the current edition of the relevant SANS, ANSI or Transnet publication where applicable.

2.2 The following publications are referred to in this specification:

**2.2.1 SOUTH AFRICAN NATIONAL STANDARDS**

SANS 121: 2011 Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods.

ANSI A14.5: 2007 Safety requirements for portable reinforced plastic ladders.

SANS 1304: 1980 Standard Specification for light ladders.

**2.2.2 TRANSNET FREIGHT RAIL SPECIFICATIONS/ ENGINEERING INSTRUCTIONS**

BBB 0868: Portable glass reinforce polyester (GRP) extension ladder

BBF 3690 version 1(2012): Electrical Safety Instructions

**TRANSNET FREIGHT RAIL DRAWINGS**

BBG 9229: OHTE ladder Trolley Handle

BBG 9230: OHTE ladder Trolley wheel

**2.2.4 QUALITY ASSURANCE**

Shall comply with SABS/ ISO 9001: 2008 series.

**3.0 METHOD OF TENDERING**

3.1 Tenderers shall indicate clause by clause with this 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.

3.2 The tenderer shall motivate a statement of non-compliance.

3.3 Appendix 1 to be completed by the tenderer.

3.4 Tenderers shall submit descriptive literature consisting of detailed technical specifications, general constructional details and principal dimensions, together with clear illustrations of the equipment offered.

3.5 Failure to comply with clauses 3.1, 3.2, 3.3 and 3.4 could preclude a tender from consideration.

**4.0 SERVICE CONDITIONS**

4.1 The ladders are required for service outdoors, under the following conditions:

Altitude : 0 - 1800 m above sea level.

Ambient temperature : -10° C to +50° C

Relative humidity : 10% to 90%

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Lightning conditions	: 20 ground flashes/km <sup>2</sup> per annum
Pollution	: Heavily salt laden with industrial pollutants including Diesel-electric Locomotive emission

## **5.0 GENERAL REQUIREMENTS**

- 5.1 The collapsed ladder shall have a profile height when viewed from the side of not more than 245 mm in order that it may take up minimum space during transport.
- 5.1.1 The length of a fully extended ladder must be 5.1 m with at least 1.12 m overlap.
- 5.1.2 The safe working load must be 113 kg on type 1 and the maximum working length is 5 m.
- 5.1.3 The length of the stiles of the front base section must be 3680 mm  $\pm$  5 mm and those of the rear base section 3040 mm  $\pm$  5 mm.
- 5.1.4 The length of the stiles of the fly section must be 2850 mm  $\pm$  5 mm.
- 5.1.5 The outside width of the base section must be 450 mm  $\pm$  5 mm and the fly section must suit this base.
- 5.1.6 The rung spacing of the ladder must be 275 mm  $\pm$  5 mm.
- 5.1.7 The lowest rung of the base section must be approximately 150 mm from the bottom.
- 5.1.8 The mass of the extension ladder must not exceed 45 kg.

## **5.2. DESIGN**

### **5.2.0 EXTENSION LADDER**

- 5.2.1 The design shall comply, generally, with the American National Standard Institute specification ANSI A14.5:2007, heavy duty Type 1 ladder. Specific requirements of Transnet are however included in this specification.
- 5.2.2 The ladder stiles must be manufactured from GRP material, complying in all respects with specification ANSI: 14.5:2007 and BBB 0868.
- 5.2.3 Locks must be nylon type. Locks and hinges must be reliable and extremely robustly constructed and Parts shall not bend easily when the ladder is handled in a rough manner.
- 5.2.4 Nylon locks should be used similar to Durethan AKV 30 H2.0 901510 (PA 66, 30% Glass fibre, injection molding, heating- aging stabilized) data sheet and tested according to ANSI: A14.5:2007
- 5.2.5 The locks shall not damage the rungs with extensive use.
- 5.2.6 All steel parts, including bolts, nuts and rivets shall be hot dip galvanised in accordance with specification SANS 121:2011 or manufactured from a corrosion resistant material. (Verification tests may be called for).
- 5.2.7 The surface of the stiles shall be painted with at least one coat of a special polyurethane paint, for extra ultra violet protection. Plascon Glatex No 8 or approved coating.
- 5.2.8 The stiles of the fly section shall be protected against abrasion damage when sliding over the rungs and through the guides by using PVC colon and poxy gel code.
- 5.2.9 The bottom ends of the stiles of the base section must be at an angle of 75°  $\pm$ 0.5° to the vertical.

- 5.2.10 The bottom ends of the fly section shall be supplied with suitable robust impact resisting end fittings, which will be able to protect the ends against damage when the fly section is dropped at speed.
- 5.2.11 All other ends of stiles shall be finished off with suitable durable metal caps of sufficient strength.
- 5.2.12 The colour of the stiles must be painted yellow.
- 5.2.13 Suitable holes in the base plate for connecting the loose clip are required and the base plate should be at least 9 mm.
- 5.2.14 The base plate must have 5 mm aluminium (Al) plate for the protection of loose clip.
- 5.2.15 Side's supports should be 1.3 m from the top to the bottom of the fixed ladder and the width of the support.
- 5.2.16 Aluminium stoppers should be included to prevent the extension ladder from sliding down.

### **5.3 RUNGS**

- 5.3.1 Rungs may be of the metal type tested according to ANSI:14.5:2007
- 5.3.2 Rungs must have a suitable flat top surface for greater comfort and be suitably dimpled or serrated to prevent slipping.
- 5.3.3 The rungs shall be fitted to the stiles so that the top flat surface is horizontal when the ladder is standing at an angle of  $75 \pm 1$  degree to the horizontal.
- 5.3.4 All rungs of the fly section shall be arranged in such a manner that it will not injure a person's foot placed against the bottom rung on the base section to stabilise the ladder when the fly section is lowered or dropped.

### **5.4 TRESTLE TROLLEY**

- 5.4.1 The maximum weight of the trolley is 76 kg and the length is 1850 mm  $\pm$  10 mm, depth 76 mm  $\pm$  5 mm, width 990 mm  $\pm$  10 mm and the height of the platform 100 mm  $\pm$  5 mm.
- 5.4.2 The trolley must have loose clip and the ladder should be interchangeable with other trolleys.
- 5.4.3 The trolley should have four carry handles on the corner and the carry handles shall be in accordance to drawing BBG 9229.
- 5.4.4 The trestle trolley should be made accordingly, to run on the rail track gauge 1067 mm (between rail tracks) of Transnet Freight Rail.
- 5.4.5 The counter sink screws must be used inside the platform.
- 5.4.6 The platform should be protected from ultraviolet (UV) and must be robust, reinforce at the corners and sides.
- 5.4.7 The platform must have non slip grid
- 5.4.8 The axle must be stainless steel grade 304 and  $\varnothing$ 19 mm fitted at suitable base plate 450 mm.
- 5.4.9 The axle must be 500 mm in length furnished with suitable axle mounting plate.
- 5.4.10 The axle must be isolated between the wheels  $\pm$  100 mm apart.
- 5.4.11 The width and the length of the axle mounting plate should be 100 mm, 450 mm thickness stainless steel and there should be cut out of (35x5 mm) to suit the handles.
- 5.4.12 The dimensions of the wheels shall be in accordance to drawing BBG 9230.

- 5.4.13 The serial number should be stamped on the trestle trolley and also reflecting on the ladder.
- 5.4.14 Prismatic fluorescent yellow green reflective tape with rounded corners shall be applied on the 990 mm sides of the trolley, 50 mm wide by 850 mm long and coated with a clear varnish. The warranty of the reflective tape shall be at least 7 years.

## **6.0 ELECTRICAL PROPERTIES**

- 6.1 The electrical properties shall comply in all respects with ANSI A14.5: 2007, clause 7.10.

## **7.0 TESTS**

### **7.1 Tests-general**

- 7.1.1 The ladders shall be subjected to type tests as specified under clause 7.2 hereunder and sample tests as per clause 7.3 hereunder.
- 7.1.2 The responsibility for arranging these tests rests with the tenderer.
- 7.1.3 Transnet freight rail reserves the right to call for further additional type tests if considered necessary.
- 7.1.4 Transnet freight rail reserves the right to be present when type tests and routine test are conducted.
- 7.1.5 Tenders who are not an approved supplier shall submit a pre-production ladder shall be submitted for evaluation purposes. Manufacturing shall not commence before written approval has been granted by Transnet. The approved sample ladder shall be retained and be available during final inspection of the batch produced.

### **7.2 Type tests**

- 7.2.1 The complete ladder shall be subjected to the tests applicable as described in section 8 of ANSI A14.5: 2007 and shall not fail any of the tests.
- 7.2.2 Rung fixing and strength shall comply with the tests in accordance with specification ANSI A14.5: 2007 table 17 clause 8.3.7.2 (rung torque in service test) with a minimum of 1000 inch pounds (113 Nm).
- 7.2.3 The complete ladder shall be tested in a horizontal position to determine the maximum permissible deflection and should not exceed the values as laid down in table 2 of SANS 1304: 1980.

### **7.3 Sample tests**

- 7.3.1 Sample testing of the "GRP" material shall be done in accordance with specification SANS 1304: 1980, clause 6.

### **7.4 Routine tests**

- 7.3.1 Data will be recorded on each ladder for horizontal bending test and the deflection tests as per ANSI A14.5: 2007 clause 8.

## **8.0 MARKING**

- 8.1 The ladders shall all be clearly and permanently marked with the following:
- Date of manufacture.
  - Manufacturers name.
  - Manufacturer's serial number.
  - Approved by Transnet Freight Rail (Technology Management)

- SWL 113 kg on type 1 ladder.
- The maximum working length 5 m.
- The lettering shall not be less than 5mm in height.

## **9.0 TECHNICAL DATA**

- 9.1 Tenderers who have not previously supplied "GRP" ladders to Transnet shall furnish full details of their previous experience in the manufacture of similar equipment, together with one representative sample ladder, which can be tested to destruction if considered necessary.
- 9.2 The technical data requested in the annexure of this specification shall be furnished for each type of ladder offered.
- 9.2 The following additional data shall be submitted:
- (a) Properties of the "GRP" used for the stiles tested as per clause 7 of ANSI A14.5: 2007 and BBB 0868 (clause 5.3.2: mechanical properties of "GRP" material)
  - (b) Results of the type tests as per clause 7.2 and 7.3.
- 9.3 All tests shall be done by an accredited test authority such as SABS, a University with the necessary laboratory equipment or other institutions acceptable to Transnet and results shall be presented in the form of an official test certificate.

## **10.0 PACKING**

- 10.1 Ladders shall be packed in a manner that it will be protected during handling and transport.
- 10.2 Ladders must not be loaded with other materials which may cause damage in any way.

End

## APPENDIX 1

## DATA SHEET.

(Shall be completed for each type offered)

1. Make \_\_\_\_\_ Type \_\_\_\_\_
2. Mass \_\_\_\_\_ kg
3. Electrical test results of "GRP" material. \_\_\_\_\_
4. Water absorption of "GRP" material as per ANSI A14.5: 2007 (75% maximum). \_\_\_\_\_
5. Method of manufacture of "GRP" material for stiles. \_\_\_\_\_
6. Percentage glass in "GRP" material used in stiles, (by mass) \_\_\_\_\_ % (51% min)
7. Description of method and material for preventing wear of stiles. \_\_\_\_\_
8. Material used for protection against weather and ultra violet radiation. \_\_\_\_\_
9. Deflection as per SANS 1304 Table 2 \_\_\_\_\_ mm.