



SPECIFICATION FOR RADIO ANTENNA COMBINING EQUIPMENT SPC-00865

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Revision 5.00

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DOCUMENT AUTHORISATION

FUNCTION	NAME	TITLE & DIVISION	SIGNATURE	DATE
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I DISTRIBUTION

Once updated, a copy of the latest revision will be published in the document management system in use. E-mail to this effect will be sent to the relevant personnel or heads of department

II DOCUMENT CHANGE HISTORY

ISSUE NO.	DATE ISSUED	ISSUED BY	HISTORY DESCRIPTION
1.00	November 2004	Access	New document
2.00	November 2006	Transmission Engineering	Converted to ISO 900 Standard
3.00	June 2011	Transmission Engineering	Converted to TFR standard, obsolete clauses removed and referred to QA standard testing measurements
4.00	January 2015	Radio Engineering	Revised
5.00	August 2022	Radio Access Networks	Removed clause-by-clause

III CHANGES SINCE LAST REVISION

CLAUSES	DESCRIPTION
All clauses	Converted to ISO standard

IV ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABBREVIATIONS AND ACRONYMS	DESCRIPTION
BS	British Standard
SANS	South African National Standards

V. RELEVANT DOCUMENTATION

DOCUMENT NO.	DESCRIPTION	LOCATION
ISO 9000	Quality Management Systems	External
BBD 8635 latest version	Specification and Methods of Measurement for Angle Modulated Radio Equipment	Internal - Project wise
BS 3939	Standard Graphic Symbols for Circuit	External

1. SCOPE

This specification covers the requirements of Transnet Freight Rail for the supply of UHF radio antennae combining equipment.

2. COMPLIANCE

2.1 Tenderers may offer additions or modifications for consideration. Alternative offers are to be reflected on a separate schedule and the following particulars are to be provided:

2.1.1 A fully detailed technical description explaining the functioning of the individual components, the operation of the items of equipment as well as the procedure to be followed in clearing faults and maintenance.

2.1.2 Drawings and brochures supporting the offer.

2.1.3 Details of deviations from the specifications of Transnet Freight Rail

2.1.4 The value of imported and local components of complete items is to be stated separately.

3. SERVICE CONDITIONS

3.1 The equipment must be suitable for continuous operation under the following conditions:

Altitude: 0 to 1 800 metres above sea level.

Ambient temperatures: Minus 5 °C to plus 60 °C.

Air pollution: Heavily saline laden industrial and locomotive fumes.

Relative humidity: As high as 95%.

Lightning: Severe.

3.2 All component parts, including wiring, etc. must be manufactured and processed to ensure reliable operation under these conditions.

4. TECHNICAL REQUIREMENTS

The technical requirements for the combining equipment are listed in the attached appendix. Technical performance must comply with BBD 8635.

5. SCHEDULE OF REQUIREMENTS

5.1 Where only equipment in terms of this specification is required by Transnet Freight Rail, a Schedule of Requirements or Bill of Quantities will accompany this specification. Where a system, including other equipment, is to be supplied, a main specification will be included in the tender documents together with a Schedule of Requirements for all the equipment.

5.2 The equipment required is listed in the Schedule of Requirements. The equipment must comply with the details therein, in, addition to the requirements of the relevant clauses of this specification.

6. QUALITY OF MATERIAL

6.1 Materials which may, under the influence of heat, light or pressure, decompose or liberate elements or compounds likely to corrode or affect other materials or cause electrolytic corrosion will not be acceptable.

6.2 Mounting screws, where used, must not be self-tapping. Bushes and threaded inserts must be used.

6.3 All covers, jacks, sockets etc. must be provided with adequate seals.

6.4 Solid-state boards must be provided on a plug-in or other approved basis so that they can, when necessary, be readily removed for repairs.

6.5 The equipment layout must be planned to facilitate fault clearance and maintenance.

7. ACCEPTANCE TESTS

7.1 Transnet Freight Rail will conduct acceptance tests on the equipment. The equipment will not be accepted, nor did payment authorise until these tests have been completed and it has been confirmed that the equipment supplied is fully in accordance with the requirements of this specification and/or the stated claims of the tenderer as accepted by Transnet Freight Rail.

7.2 The successful tenderer must agree to rectify any defects at no cost to Transnet Freight Rail, where the equipment does not meet the tender requirements and/or the stated claims of the tenderer.

8. SPARES

The equipment must be supplied complete with spare fuses and pilot/indicator lamps as specified in the Schedule of Requirements.

9. MAINTENANCE AND SERVICE

9.1 The tenderer must give full particulars of the maintenance, spare parts and service facilities which will be available in the Republic of South Africa. The names and addresses of the companies concerned must be furnished.

9.2 The tenderer must list the major centres where maintenance facilities can be provided and must state if repairs under guarantee can be undertaken at these centres.

9.3 Tenderers must state what provision will be made to ensure an adequate supply of locally available spare components for a period of 10 years after the order is placed.

9.4 Transnet Freight Rail will not consider tenders from tenderers who cannot provide an efficient spares and maintenance service. Tenderers must state whether they are prepared to agree to an inspection of their maintenance premises by the engineering personnel of Transnet Freight Rail.

10. TECHNICAL HANDBOOKS

10.1 Technical handbooks must be clearly and professionally printed in English on quality paper. CD or DVD versions are acceptable.

10.2 The technical handbooks must be packed with the equipment.

10.3 Each set of handbooks must include the following:

10.3.1 Operating instructions.

10.3.2 Complete maintenance instructions.

10.3.3 Complete and detailed alignment procedures in a proven and easy to follow order.

10.3.4 A detailed technical description of the equipment.

10.3.5 Complete circuit diagrams, drawings, and photographs of the equipment. The photographs and drawings must clearly indicate component and module location in the equipment. All component numbers must be clearly indicated.

10.3.6 A list of parts, giving the values of all components, i.e., resistive, capacitive, inductive, integrated circuit and semi-conductor numbers for each schematic, drawing.

10.3.7 Detailed printed circuit board wiring diagrams showing component numbers and positions and the wiring itself. Multilayer board wiring must be shown to include all layers of printed wiring clearly and discernible.

10.3.8 Voltage levels, current values and test points, clearly indicated on circuit diagrams and printed circuit board layouts.

10.3.9 Complete circuit diagrams of all individual modules.

10.4 All symbols and notations used on drawings and circuit diagrams preferably comply with the requirements laid down in BS 3939. Where symbols and notations do not comply with these requirements, each drawing shall be accompanied by a legend clearly detailing BS 3939 equivalent.

10.5 Transnet Freight Rail reserves the right to reproduce in whole or in part, by any means whatsoever, any technical handbook or instruction manual supplied by the successful Contractor. Any such reproductions will be for the sole use of Transnet Freight Rail.

11. GENERAL

The tenderer must submit technical specification pamphlets and schematic diagrams covering the equipment offered. Photographs and complete drawings clearly displaying the external dimensions and physical appearance of the equipment must also be submitted with the tender.

12. TECHNICAL SCHEDULE: SPECIFICATIONS FOR A FOUR CHANNEL UHF COMBINER

TS1. INTRODUCTION

The Four Channel UHF Combining System (Combiner) is to be used in the upgrade of Transnet Freight Rail UHF Trunking Network. The purpose of the Combiner is to reduce the number of antennae in this multi-channel system.

TS2. ELECTRICAL CHARACTERISTICS

TS2.1 Transmit Path

TS2.1.1 Transmitter Frequencies (for HS): 455, 0000 MHz – 456, 6375 MHz

TS2.1.2 Transmitter Frequencies (for LS) 465, 0000 MHz – 466, 6375 MHz

TS2.1.3 Transmitter Power : 50 Watt

TS2.1.4 Number of Channels : 4

TS2.1.5 Impedance Matching : 50 ohm all ports

TS2.1.6 VSWR: 1, 5: 1

TS2.1.7 TX – TX Isolation : = 60 dB Typical

TS2.1.8 TX – Antenna Insertion Loss : = 10 dB Typical

TS2.1.9 TX Rejection of Rx Frequencies: = 100 dB Typical

TS2.1.10 2 and 3 Harmonic Protection: = 35 dB Typical

TS2.1.11 Termination: N – Type Female

TS2.2 Receive Path

TS2.2.1 Receive Frequencies (for HS): 465,0000 MHz – 466,6375 MHz

TS2.2.2 Receive Frequencies (for LS): 455,0000 MHz – 456,6375 MHz

TS2.2.3 Number of Channels: 4

TS2.2.4 Impedance Matching: 50 Ohm all ports

TS2.2.5 VSWR: 1, 5: 1

TS2.2.6 Rx – Rx Isolation: 20 dB Typical

TS2.2.7 Rx Rejection of TX Frequencies: 100 dB Typical

TS2.2.8 Gain of Receiver Multi-Coupler: 0 dB $\pm$ 0, 5 dB (with amplifier)

TS2.2.9 2nd and 3rd Harmonic Protection: 50 dB Typical

TS2.2.10 Termination: N – Type Female

TS3. MECHANICAL CHARACTERISTICS

TS3.1 19" Rack Compatible

TS3.2 Height: 8 U Maximum

TS3.3 Temperature Range: -5° C to +60° C

END OF DOCUMENT