**PRASA METRORAIL**



**PROJECT SPECIFICATION AND BILL OF QUANTITY**

**FOR**

**\_\_\_/2020/CTN/INFRA:**

**Supply and Deliver of Telecoms Radio system in Western Cape Region**

**2020**

CONTENTS

[PART A: SPECIAL CONDITIONS 4](#_Toc47002546)

[A.1 SCOPE OF WORK 4](#_Toc47002547)

[A.2 BUSINESS NAME 4](#_Toc47002548)

[A.3 COMPLETION OF WORK 4](#_Toc47002549)

[A.4 PENALTIES FOR LATE COMPLETION 4](#_Toc47002550)

[A.5 PLANT AND MATERIAL TO BE SUPPLIED BY PRASA RAIL 5](#_Toc47002551)

[A.6 ADVANCE PAYMENT FOR MATERIAL AND/OR PLANT AND/OR EQUIPMENT SUPPLIED BY THE CONTRACTOR 5](#_Toc47002552)

[A.7 CONTRACT PRICE ADJUSTMENT FACTOR AND PAYMENTS 5](#_Toc47002553)

[A.8 PROVISION OF GAURANTEE OF MATERIAL AND EQUIPMENT SUPPLIED AND DELIVERED 6](#_Toc47002554)

[A.9 INSURANCE AGAINST PERILS INSURABLE THROUGH SASRIA 6](#_Toc47002555)

[A.10 STANDARD SPECIFICATIONS OF PRASA RAIL 6](#_Toc47002556)

[A.11 DISCREPANCY IN DOCUMENTS 6](#_Toc47002557)

[A.12 SCHEDULE OF QUANTITIES 7](#_Toc47002558)

[A.13 PRELIMINARY AND GENERAL AND SITE ESTABLISHMENT 8](#_Toc47002559)

[A.14 CONTRACTOR AVAILABILITY 11](#_Toc47002560)

[A.15 SITE OF THE WORKS 11](#_Toc47002561)

[A.16 SERVICES 11](#_Toc47002562)

[A.17 SAMPLES AND TESTING 12](#_Toc47002563)

[A.18 SITE MEETINGS 12](#_Toc47002564)

[A.19 OCCUPATION AND WORK PERMITS 12](#_Toc47002565)

[A.20 HOURS OF WORK 12](#_Toc47002566)

[A.21 CONSTRUCTION PROGRAMME 12](#_Toc47002567)

[A.22 CO-OPERATION WITH METRORAIL STAFF 12](#_Toc47002568)

[A.23 LABOUR AND PLANT RETURNS 13](#_Toc47002569)

[A.27 PROJECT MANAGER and TECHNICAL OFFICER 13](#_Toc47002570)

[PART B: SPECIFICATION 14](#_Toc47002571)

[B.1 BACKGROUND 14](#_Toc47002572)

[B.2 SPECIFICATION AND REQUIREMENTS 15](#_Toc47002573)

[B.2.1 PORTABLE TRUNK RADIO 15](#_Toc47002574)

[B.3 TRAIN RADIOS AND TRAIN HANDSET 25](#_Toc47002575)

[B.3.1 TRAIN RADIO 25](#_Toc47002576)

[**GENERAL TRAIN RADIO SPECIFICATION** 27](#_Toc47002577)

[Key Features 27](#_Toc47002578)

[PART D: SCHEDULE OF QUANTITIES 35](#_Toc47002579)

# PART A: SPECIAL CONDITIONS

## SCOPE OF WORK

This contract covers the **Supply and Deliver of Trunk Radios, Train Radios in Western Cape Region** as per specifications of the tender document, hereinafter referred to as the “Works”, and any other work arising out of or incidental to the above, or required of the Contractor for the proper completion of the Works in accordance with the true meaning and intent of the contract.

1. **BUSINESS NAME**

PRASA RAIL a DIVISION OF PASSENGER RAIL AGENCY OF SOUTH AFRICA (PRASA) will for the purpose of this Contract be trading and hereinafter be referred to as PRASA Rail.

1. **COMPLETION OF WORK**

PRASA Rail requires that the Works be completed within **150** calendar days, which shall include any statutory holidays falling within this period. The completion date will be determined by adding the period specified above to the date of notification of acceptance of tender or the date stated in the notice of acceptance of tender whichever is the later.

Once the tender has been awarded the contractor shall liaise with Mr. M. Ligwa Tel (021) 507 2249 and/or (c) 071 8538308

1. **PENALTIES FOR LATE COMPLETION**

Should the Contractor fail to complete the Works by the date stipulated in the contract, or such extended date as may be allowed by PRASA Rail, he shall pay to PRASA Rail as penalties in terms of the Conventional Penalties Act, 1962 as amended, the amount of **R 1875.00** for each day or part thereof during which the Works remains incomplete.

1. **PLANT AND MATERIAL TO BE SUPPLIED BY PRASA RAIL**

Except where otherwise specified, the Contractor shall provide all labour, material, transport, plant, equipment, consumables, tools and services of every description required to carry out and complete the works included in this Contract and any other work arising from it.

The contractor shall undertake to make themselves familiar with required material covered in terms of this contract.

Based on the above, such material as might reasonably be expected to be used by the contractor should be readily available to the contractor.

All materials and labour performed shall be subject to the approval of the Technical Officer, and shall be used in accordance with the manufacturer’s specifications.

No second-hand materials other than that supplied by PRASA Rail must be used

1. **ADVANCE PAYMENT FOR MATERIAL AND/OR PLANT AND/OR EQUIPMENT SUPPLIED BY THE CONTRACTOR**

No advance payment for material and/or plant and/or equipment supplied by the Contractor for the purpose of incorporation/installation as part of the Works, will be made by PRASA Rail.

1. **CONTRACT PRICE ADJUSTMENT FACTOR AND PAYMENTS**

A.7.1 The Contractor shall, due to the relative short contract period allow for any increase or decrease in costs in his rates tendered for the Works as this contract will not be subject to escalation.

A.7.2 The Technical Officer/Project Manager may, at the request of the Contractor, make a progress measurement of the work done, including any duly authorized alteration, extra, addition or omission.

1. **PROVISION OF GAURANTEE OF MATERIAL AND EQUIPMENT SUPPLIED AND DELIVERED**

The Contractor must provide certified and supporting documents indicating that the material and equipment supplied are guaranteed for **at least one year (12 months)** from the date the material and equipment is delivered and approved by PRASA Rail. This guarantee will be free of charge.

This means that the material and equipment purchased and delivered to PRASA Rail should be guaranteed for a minimum of one year.

1. **INSURANCE AGAINST PERILS INSURABLE THROUGH SASRIA**

Insurance of the Works against damage caused as a result of perils insurable through SASRIA will not be affected by PRASA Rail.

1. **STANDARD SPECIFICATIONS OF PRASA RAIL**

N/A

1. **DISCREPANCY IN DOCUMENTS**

In the event of any discrepancy or inconsistency between the Project Specifications and any other specification or drawings, the Project Specifications shall prevail.

1. **SCHEDULE OF QUANTITIES**

**A12.1** The quantities in the schedule of quantities are estimated and may be more or less than stated. The Contractor shall submit with his tender a complete and detailed priced schedule (prepared in ink) for the Works. All work covered by the schedule including work resulting from modifications, etc shall be measured and paid for according to the completed schedule. No additional payment will be made for travelling costs and must therefore be included in schedule of quantities.

**A12.2** The absence of stated quantities in the schedule is no guarantee that none will be required. Reasonable and sufficient rates and/or prices shall therefore be inserted to every item, as such prices will be considered when awarding the contract.

**A12.3** Items in the schedule marked/indicated as “PROVISIONAL” will not be subject to the provisions of clauses 33.2 and 33.3 of the E5 (Nov 1996) General Conditions of Contract and the rates tendered will be applicable to the actual quantities measured.

**A12.4** In the event that a tenderer leaves any item/s blank which are materially important for the award of the contract/business or fails to tender in an amount expressed or calculable in Rands and cents (e.g. total amount, unit price, hourly rate), PRASA Rail reserves the right to disqualify such a tender.

1. PRELIMINARY AND GENERAL AND SITE ESTABLISHMENT

A.13.1 General

(i) Provision in the schedule of prices

Provision is made in the schedule of prices for lump sums to cover the Contractor's cost to supply, obtain, deliver, and eventually store the Trunk Radio Handsets equipment, and for the Contractor to comply with any other obligations of a preliminary and general nature in terms of the contract.

(ii) Tendered sums

The sum tendered in the schedule of prices for any preliminary and general item shall cover the Contractor's direct and overhead costs, profit and all other costs for the provision of the item and/or compliance with the obligations, liabilities, risks and requirements associated with the item.

A.13.2 Scheduled fixed-charge items

A.13.2.1 Initial financing

N/A

A.13.2.2 Establishing facilities on site

N/A

A.13.2.3 Final removal of site establishment

N/A

A.13.2.4 Payment for fixed-charge items

N/A

A.13.3 Scheduled time-related items

A.13.3.1 Continuing finance charges

N/A

A.13.3.2 Operation and maintenance of facilities on site

N/A

A.13.3.3 Supervision

The sum tendered shall cover the costs for on-site supervision and such local administration as the Contractor considers necessary for the proper completion of the Works and shall include for the salaries, wages and allowances paid to the site agent, general and/or section foremen, site surveyors, timekeepers, assistants and other site supervisory staff, and on-site transport costs required for the staff mentioned herein.

A.13.3.4 Company and head office overhead costs

The sum tendered shall cover the Contractor's company and head office overhead costs.

A.13.3.5 Other obligations

The sum tendered, shall cover the cost of all obligations of a preliminary and general nature, which are required for the proper execution of the Works in accordance and compliance with the requirements of the contract and which are not specifically covered in sub clauses A.12.3.1 to A.12.3.4.

A.13.3.6 Payment

Payment for time-related items will, subject to the provisions of sub clause A.12.5 hereof, is affected as follows:

(i) For finance charges and operation and maintenance of facilities on site and after payment for the relevant fixed-charge item has been made in terms of sub clauses A.12.2.1 and A.12.2.2 hereof, incremental amounts calculated by dividing the sums tendered by the number of months of the original period of contract then remaining, will be paid in each of the subsequent payment certificates until the sums tendered have been paid.

(ii) For supervision, company and head office overhead costs and other obligations and after all the obligations provided for in sub clauses A.12.2.1 and A.12.2.2 hereof have been discharged, incremental amounts calculated by dividing the sum tendered by the number of months of the original period of contract then remaining, will be paid in each of the subsequent payment certificates until the sums tendered, have been paid.

A.13.4 Omission of payment for time-related items

Should the Contractor fail to discharge all or part of his continuing obligations in respect of a time-related item, then the amount or part of the amount for the item will be omitted and the total amount of the contract reduced accordingly.

A.13.5 Contractor to price all items

The Contractor shall price individually, each and every item.

1. CONTRACTOR AVAILABILITY

The Contractor or his duly authorized agent shall at all times be in possession of a cellular phone, in working condition, so as to enable the Technical Officer to communicate with the Contractor at all times during the duration of the contract.

1. SITE OF THE WORKS

The site delivery point of the Works is based in Metrorail’s Salt River Offices/Depot, Off Malta Road. The Technical will provide the necessary to directions to the store to the successful tenderer. The Contractor shall deliver and load off the equipment and material as directed by the Technical Officer in the store room. The contractor shall provide for labour to off load the equipment and material into the store room. The Contractor is to include these rates into the schedule of quantities.

1. SERVICES

Information regarding the location of known existing services will be pointed out at the time of the site inspection but Metrorail will accept no responsibility for the accuracy of this information.

The Contractor shall take all reasonable precautions to protect existing services during his activities on the site, and any known service damaged as a result of the Contractor's operations, shall be repaired and reinstated by the Contractor or the Authority concerned, all at the expense of the Contractor and to the satisfaction of the Technical Officer.

1. SAMPLES AND TESTING

Where applicable all material supplied by the Contractor shall comply with the specifications. The Contractor shall obtain a certificate of compliance from the manufacture/supplier of such material. These documents are to be forwarded to the Technical Officer.

The Contractor shall make available, without charge, a sufficient quantity of material which are to be used for the Works, for testing by PRASA Rail, if and when so required by the Technical Officer.

While all items need to comply with Transnet network it is compulsory also to be tested by Transnet and pass bench mark, normal bench mark is about 20% of the procured items.

1. SITE MEETINGS

The Technical Officer will arrange Site liaison meetings as necessary. The Contractor or his duly authorized representative shall be available when called upon to attend site meetings with the Technical Officer or his representative.

1. OCCUPATION AND WORK PERMITS

N/A

1. HOURS OF WORK

Normal working hours shall mean the period from 07:00 to 16:30 on normal weekdays.

1. CONSTRUCTION PROGRAMME

N/A

1. CO-OPERATION WITH METRORAIL STAFF

The Contractor shall liaise and co-operate with the staff of PRASA Rail during any type of occupation at all times and in all respects to obviate any delays.

Should any train services be effected due to the negligence on the part of the Contractor, penalties will be raised in terms of Clause 16 of the E7/1 (1998) Specification.

1. LABOUR AND PLANT RETURNS

N/A

1. PROJECT MANAGER and TECHNICAL OFFICER

The Project Manager for this contract will be the Facilities Manager, Facilities Department, Infrastructure, PRASA Rail; Cape Town. The Technical Officer will be appointed by the Project Manager to administer the performance and the execution of the Works according to the powers and rights held by and obligations placed upon him in terms of the Contract.

# PART B: SPECIFICATION

## B.1 BACKGROUND

Reliable and safe communication during work operations is an important and mandatory requirement within the Railway environment which is dictated and instructed through Railway safety standards.

Radio communication plays a crucial role in the daily operations of PRASA Rail ensuring that employees within the engineering, maintenance, operations, safety and customer service environment are able to clearly, safely, efficiently and reliably communicate to one another during working operations.

The trunk, train and two-way radios have been the long standing safe and reliable communication tools within the PRASA Rail environment. These tools plays a crucial role within this large environment in providing communication in all areas of the PRASA in a reliable and safe manner.

All radio communications within PRASA Rail is via Transnet’s Freight Rail (TFR) MPT1327 Radio Network. The radios are programmed onto this network by TFR which operates on a transmit frequency of 455MHz and a receive frequency of 465MHz.

## B.2 SPECIFICATION AND REQUIREMENTS

### B.2.1 PORTABLE TRUNK RADIO

The trunk radio shall be able to function with complicated communications requirement of a large organization such as PRASA Rail.

It shall be **fully compliant to MPT1327** signaling to be **compatible and programmable** on the TFR radio network. It shall be a digital portable radio with ONLY Analogue mode plus the MPT1327 compliance. The radios shall be configurable for up to a minimum of 4 configurations, two of which should include Talk group and conventional signaling. The digital portable trunk radio shall operate with a UHF range of 403 – 470MHz.

**The trunk radio must comply to the approved TFR trunk radio list**

The digital portable trunk radio shall be endowed with ergonomic design, all-round digital functions and remarkable quality to increase the management efficiency and enable quick responsiveness to emergent situations.

It shall have a large-size color display which allows good visibility even under extremely strong light. The design of the antenna shall ensure convenient operation and excellent GPS performance.

The digital portable trunk radio shall be strictly compliant with MIL-STD-810 C/D/E/F/G and IP67 standards, ensuring outstanding performance even in harsh environments.

It shall be capable of ensuring you superior voice in noisy environments and/or at the edge of the coverage area through a combined application of narrowband codec and digital error-correction technologies. The adoption of AGC technology can be used to optimize voice. It shall also be equipped with at least a 1W speaker to ensure clear and crisp voice communication.

It shall have a durable long lasting battery.

The trunk radio shall make us of TDMA technology, allowing for twice the channels based on the same spectrum resource. This relieves stress of increasing shortage in spectrum resource.

It shall feature “Dual-slot Pseudo Trunk” where in this feature; the free slot can be allocated to a member that needs to communicate, effectively enhancing frequency efficiency and allowing you to communicate timely under emergency situations.

The portable trunk radio shall have secure communication through intrinsic encryption of the digital technology where encryption capability in enhanced (i.e. 256-bit encryption algorithm) and has the scrambler feature.

It shall have versatile services where in addition to conventional communication services, it shall feature rich data services and selectable functions such as Text Message, Scan, Emergency, Man Down (optional), vibration Auto Registration, High-speed Data Transmission and Lone Worker.

It shall have a reserved side port to allow users or any third party partner to further develop other helpful applications to extend the radio functionalities.

The portable trunk radio shall support option board interfaces to radio, allowing third party partners to develop various applications to interconnect with radios to control the radio to expand its functionalities. Among the supported features shall be voice recording, encryption etc.

**Main Functions of Digital Portable Trunk Radio:**

The portable trunk radio shall be able to operate in dual mode (i.e. in either analog or digital mode). It must be compatible with the prevalent analog system, ensuring a smooth analog-to-digital transition.

It shall have versatile voice calls function where the intelligent signaling of the portable trunk radio supports various voice call types, including Private Call, Group Call, All Call and Emergency Call.

GPS positioning information and sending of GPS text message shall be a function of the portable trunk radio.

It shall support data services such as data capabilities of sending Private, Group text message. It shall also support third party to control the radio via third party API (GPS, Radio Registration Services, Radio and Call Control, Telemetry, Data Transfer), via Telemetry control to radio.

It shall also support various analog signaling types (HDC1200, DTMF\*, 2-Tone and 5-Tone), various squelch control types (CTCSS/CDCSS), thus providing higher function expansion capacity to the analog world. Note: Must be compatible to MPT1327.

Supplementary services such as Radio Check, Remote Monitor,

Call Alert, Radio Enable and Radio Disable shall be supported by the portable trunk radio.

It shall support multiple languages; however the required language setting is English.

The portable trunk radio shall support One Touch features that comprise of Text Message, Voice Calls and Supplementary Services. It shall also support scanning of pure analog voice and signaling, pure Digital voice and data, and also mix mode scan that comprise of Analog and Digital activities.

It shall support automatic roaming of all sites in a IP Multi-site Connect system. It shall also support Analog scrambling, and digital encryption using

Advanced Encryption Standard (AES) and ARCFOUR (ARC4) encryption methodology to both voice and data.

The portable trunk radio shall have an Analog/Digital Telephone Interconnect (via DTMF signaling) function where it supports simplex voice communications between radio and telephone users. It allows a radio user to make a telephone call; or a telephone user to make either a Group or Private call to radio users. This feature utilizes the Commercial Off The Shelf (COTS) Analog Phone Patch boxes and a Plain Old Telephone Service (POTS) line to connect the radio users to the Corporate Office Phone System (PBX) or Public Switched Telephone Network (PSTN).

The portable trunk radio shall be software upgradable.

**Portable Trunk Radio Features Summary required:**

* Up to 1024 channels
* 12.5/20/25 selectable channel spacing
* Mixed mode scanning( analogue & digital channel)
* IP67 and MIL-STD-810 G to ensure outstanding performance in harsh environments
* Supporting Global Positioning System(GPS)(PD785G series only)
* Digital voice call function
* Digital text message function (preprogrammable message and editable message)
* Supplemental services (remote monitor, radio enable, radio disable, call alert)
* Man Down (factory optional)
* Lone worker
* Basic Scrambler and Encryption
* Advanced Encryption optional
* Pseudo trunk operation (DMO&RMO)
* Multi-Site Roaming (optional)
* Supporting Option Board Interface
* Channel Change Voice Notification
* 5 tone , HDC1200, 2 tone signaling selectable ( in analogue mode)
* Analogue & Digital DTMF
* One touch call/text message/supplemental services
* Telemetry
* Home screen dial
* Multi-language menu display
* Vibration
* Power on & off user logo programming
* Analogue & Digital Emergency

**In addition to the portable trunk radio, pack shall include the following as a standard:**

* Radio x 1
* Li-ion Battery (2500mAh) x 2
* MCU Rapid Rate Single Unit Charger x 1
* Switching Power Adapter x 1
* Standard UHF1 Antenna x 1
* Leather Strap x 1
* Belt Clip x 1
* User Manual x 1

The portable trunk radio shall have availability to a variety of accessory options such as Audio accessories, batteries, and chargers, carry options and much more. This provides the option to PRASA Rail if and when such accessories are required.

The trunk radio should be compatible with the current portable trunk radios. used within PRASA Rail Western Cape to enable clear, strong and reliable communication between groups and employees during railway operations.

The current portable trunk radio is as follow Motorola GP680 Portable Trunk Radio

**The approved portable for the TFR MPT Network is as follow:**

 **PD 785 (Digital Portable Radio, MPT1327 + Analogue mode ONLY):**

**• Radio x 1**

**• Li-ion Battery (2500mAh) x 2**

**• MCU Rapid Rate Single Unit Charger x 1**

**• Switching Power Adapter x 1**

**• Standard UHF1 Antenna x 1**

**• Leather Strap x 1**

**• Belt Clip x 1**

**• User Manual x 1**

The trunk radio shall comply at least to the *ETSI EN 300 113 Standard: Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile service, Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector*  and shall conform to *Electromagnetic Compatibility Directive 89/336/EEC.* The radio shall comply with all applicable regulatory standards and requirements.

**DETAILED SPECIFICATIONS FOR PORTABLE TRUNK RADIO (Minimum)**

|  |  |
| --- | --- |
| General data | |
| Frequency range | VHF: 66 – 88 MHz / 136 – 174 MHz  UHF: 400 – 470 MHz |
| Supported operating modes | * DMR Tier II (ETSI TS 102 361-1/2/3) * Simulcast * XPT Digital Trunking * DMR Tier III (ETSI TS 102 361-   1/2/3/4)   * Analog, MPT 1327 |
| Number of channels | 1024 |
| Number of zones | 64 (with up to 16 channels each) |
| Channel spacing | 12.5 / 20 / 25 kHz (analog)  12.5 kHz (digital) |
| Operating voltage | 7.4 V (nominal) |
| Standard battery | 2000 mAh (lithium-ion battery) |
| Battery service life, analog  (5-5-90 duty cycle, high transmitting  power, standard battery) | VHF: approx. 14.5 hours / 13 hours  (GPS mode)  UHF: approx. 15.5 hours / 13.5 hours  (GPS mode) |
| Battery service life, digital  (5-5-90 duty cycle, high transmitting  power, standard battery) | VHF: approx. 19 hours / 16.5 hours  (GPS mode)  UHF: approx. 20 hours / 17 hours  (GPS mode) |
| Frequency stability | ±0.5 ppm |
| Antenna impedance | 50 Ω |
| Dimensions  (H × W × D, without antenna) | 125 x 55 x 35 mm |
| Weight  (with antenna and standard battery | 355 g |
| LCD display | 160 × 128 pixels, 65,536 colors,  1.8 inches, 4 rows |
| Programmable keys | 5 + numerical keys |

|  |  |
| --- | --- |
| Environmental conditions | |
| Operating temperature range | - 30 °C bis + 60 °C |
| Storage temperature range | - 40 °C bis + 85 °C |
| ESD | IEC 61000-4-2 (Level 4),  ± 8 kV (Kontakt),  15 kV (Luft) |
| Protection against dust and  moisture | P67 |
| Shock and vibration resistance | MIL-STD-810 C / D / E / F / G |
| Relative humidity | MIL-STD-810 C / D / E / F / G |

|  |  |
| --- | --- |
| GPS characteristics only PD785G | |
| Time to fi rst fi x (TTFF) | < 1 minute (cold start)  < 10 seconds (warm start) |
| Horizontal accuracy | < 10 meter |

**• Leather Strap x 1**

**• Belt Clip x 1**

**• User Manual x 1**

## B.3 TRAIN RADIOS AND TRAIN HANDSET

Train radios play a vital role in the daily operations within the railway environment. The train radio (including the train handset) has direct effect on the daily running of trains. According to railway safety regulations a train driver may not start a journey without a direct means to communicate from the train to the central control and the relevant operations departments and groups. As such the train radio with train handsets provides such a means of communication

### B.3.1 TRAIN RADIO

The train radio shall be **fully compliant to MPT1327** signaling to be **compatible and programmable** on the TFR radio network.

**The trunk radio must comply to the approved TFR trunk radio list**

It shall be of a rugged and robust design such as to withstand the harsh railway environment. It shall have the following features:

Multi – Network Capability

Multi Registration Capability

Common and Inter Fleet Calls

Individual and Group Calls

Access to Telephone Network PABX/PSTN Dialing

Status Message Calls

Priority Calls

Emergency Calls

Driver/Guard and TCO Calls

Data Calls (Short data on control channel and long data on traffic channel)

Last number redial

User Controlled Incoming Call Stacking

10 Programmable Memory Locations

Test Mode

The technical specification of the train radio must be compatible or similar and equivalent in design to the existing train radio that is currently used by PRASA RAIL. The existing train radio used is a **TIAT RADIO Wideband Metro Radio.**

The radio shall comply with all applicable regulatory standards and requirements.

**3.2 GENERAL TRAIN RADIO SPECIFICATION**

Key Features

* Large LCD display – four lines of alphanumeric text
* Six programmable function keys and alphanumeric keypad
* 1500 conventional channels with built-in CTCSS and DCS
* Data capable – supports 1200/2400 baud FFSK data as standard
* Internal high-speed data modem (12 kbps on NB channels/19.2 kbps on WB channels) (software option)
* All MPT 1327 call types
* Multiple network capability - up to four different trunked networks
* Voice inversion scrambling
* Built-in MAP 27 interface as standard
* Supports short data messages and ANI
* Incoming calls can be queued for future reference and call back
* Lone Worker function to improve worker safety
* Multiple auxiliary ports and expansive internal options area
* Direct connect GPS and GPS display option

|  |  |  |  |
| --- | --- | --- | --- |
| GENERAL SPECIFICATION | | | |
| VHF | **Band** | **Operational Frequency** | **Transmit Power** |
|  | A4 | 66–88MHz | 25W |
|  | B1 | 136–174MHz | 25W |
|  | B1 | 136–174MHz | 50W |
|  | C0 | 174–225MHz | 25W |
|  | D1 | 216–266MHz | 25W |
| UHF | G2 | 350–400MHz | 40W |
|  | H5 | 400–470MHz | 25W |
|  | H5 | 400–470MHz | 40W |
|  | H6 | 450–530MHz | 25W |
|  | H7 | 450–520MHz | 40W |
| 700/800MHz | **K5** | **Transmit Receive** | **30W (<806MHz)**  **35W (>806MHz)** |
|  |  | 762–776MHz |  |
|  |  | 762–776MHz |  |
|  |  | 792–825MHz |  |
|  |  | 850–870MHz |  |
|  |  | 850–870MHz |  |
| 900MHz | L3 | 896–941MHz  935–941MHz | 30W |
| Frequency Stability | ±1.5ppm | | |
| Channel/Network Capacity | 1500 Conventional Channels 300 Scan/Vote Groups  4 MPT 1327 Trunked Networks | | |
| Power Supply | 10.8–16VDC | | |
| Channel Spacing | 12.5/20/25kHz | | |
| Channel Increment | 7.5/12.5/15/20/25/30kHz | | |
| Dimensions (WxDxH)  25W/30/35/40/50W | 7.3 x 7.2 x 2.8in (185 x 182 x 70mm)  8.1 x 7.2 x 2.8in (205 x 182 x 70mm) | | |
| Weight |  | | |
| 25W | 49.4oz (1.4kg) | | |
| 30/35/40/50W | 56.4oz (1.6kg) | | |
| Operational Temperature | -22ºF to +140ºF (-30ºC to +60ºC) | | |
| Sealing | IP54 | | |
| RF Connecter | 50 ohm BNC or Mini UHF | | |
| Interface Connecters | 3 Interface Connecters with Serial Ports | | |
| Speaker Output | Supplied with 10W external speaker | | |

|  |  |  |
| --- | --- | --- |
| TRANSMITTER | | |
| OUTPUT | **VHF/UHF (TIA/EIA )** | **700/800/900MHz (TIA /EIA )** |
| 25W | 25W, 12W, 5W, 1W |  |
| 30W |  |  |
| 35W |  | 30W, 15W, 5W, 2W |
| 40W UHF | 40W, 20W, 15W, 10W | 35W, 15W, 5W, 2W |
| 50W VHF | 50W, 25W, 15W, 10W |  |
| MODULATION |  |  |
| 12.5kHz | ±2.5kHz | ±2.5kHz |
| 20kHz | ±4kHz | ±4kHz |
| 25kHz | ±5kHz | ±5kHz |
|  |  |  |
| FM Hum and Noise |  |  |
| 12.5kHz | -38dB | -33dB |
| 20kHz | -41dB | -38dB |
| 25kHz | -43dB | -40dB |
|  |  |  |
| Conducted/Radiated Emissions | -36dBm < 1GHz |  |
|  | -30dBm > 1GHz |  |
|  |  |  |
| Audio Response Bandwidth | 300Hz–3kHz | 300Hz–3kHz |
| Audio Response | Flat or pre-emphasized | Flat or pre-emphasized |
|  |  |  |
| Audio Distortion | < 3% at 1kHz 60% deviation | < 3% at 1kHz 60% deviation |
|  |  |  |
| Transmit Rise Time | 20ms | 20ms |
|  |  |  |
| Duty Cycle |  |  |
| 25W | 33% |  |
| 30/35W |  | 20% |
| 40/50W | 20% |  |

|  |  |  |
| --- | --- | --- |
| RECEIVER SPECIFICATION | | |
| VHF/UHF (TIA/EIA) | 700/800mHz (TIA/EIA) | |
| Sensitivity\*\* | 0.28μV (<-118dBm) for 12dB SINAD | 0.22μV (-120dBm) for 12dB SINAD  0.35μV (<-116dBm) for 20dB SINAD |
| Intermodulation | 75dB | 82dB |
| Selectivity |  |  |
| 12.5kHz | 65dB | 67dB |
| 20kHz | 70dB | 75dB |
| 25kHz | 75dB | 79dB |
| Spurious Response | 75dB | > 90dB\*\*\* |
| Hum and Noise |  |  |
| 12.5kHz | -40dB | -44dB |
| 20kHz | -41dB | -47dB |
| 25kHz | -43dB | -48dB |
| Audio Response Bandwidth | 300Hz–3kHz  Flat or de-emphasized | 300Hz–3kHz  Flat or de-emphasized |
| Audio Response |  |  |
| Audio Distortion | < 3% at 1kHz 60% deviation | < 3% at 1kHz 60% deviation |

|  |  |  |
| --- | --- | --- |
| Military Standard 810 F\* | | |
| Applicable MIL-STD | **Method** | **Procedure** |
| Low Pressure | 500.4 | 2 |
| High Temperature | 501.4 | 1, 2 |
| Low Temperature | 502.4 | 1, 2 |
| Temperature Shock | 503.4 | 1 |
| Solar Radiation | 505.4 | 1 |
| Rain | 506.4 | 1, 3 |
| Humidity | 507.4 | 1 |
| Salt Fog | 509.4 | 1 |
| Dust | 510.4 | 1 |
| Vibration | 514.5 | 1 |
| Shock | 516.5 | 1, 6 |

|  |  |  |  |
| --- | --- | --- | --- |
| REGULATORY DATA | | | |
| 25W | **Frequency** | **FCC Description** | **IC Description** |
| 136-174 | CASTMAB1C | 737A-TMAB1C |
| 216-266 | CASTMAD1C |  |
| 400-470 | CASTMAH5C | 737A-TMAH5C |
| 450-530 | CASTMAH6C | 737A-TMAH6C |
| 30W | 896-941 | CASTMAL3D | 737A-TMAL3D |
| 35W | 806-869 | CASTMAK5D | 737A-TMAK5D |
|  |  |  |  |
| 40W | 400-470 | CASTMAH5D |  |
| 450-520 | CASTMAH7D |  |
| 50W | 136-174 | CASTMAB1D |  |

Please note the train handset must be compatible with the train radio.

**Functional**

This is for mounting against a flat surface to support and secure the handset in a convenient position for the drivers. It has mounting holes, a magnet and side plates to prevent the handset from sliding off the magnet. Stronger magnetic mounts in the mounting brackets are to be supplied

# PART D: SCHEDULE OF QUANTITIES

**The price, excluding VAT, set against each item shall be held to include for all , material, making, conveying, delivering, unloading, storing, unpacking, hoisting, setting, fitting, fixing in position, compliance with the specification, general and special conditions of contract, cutting and waste, patterns, plant, temporary works, return of packing, establishment charges, profit, etc and all other obligations arising out of the Conditions of Contract. NOTE: All equipment, tools, components and systems, should include the brochures, catalogues, data sheets, fact sheets, specifications and the like such as to determine the items being offered on tender and for evaluation.**

| **Item No.** | **Description** | **Unit** | **Qty** | **Rate (Rands)** | **Total (Rands)** |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| **A** | **TRAIN RADIO HANDSET** |  |  |  |  |
| 1 | Supply and Deliver complete set (with handset) of Train Radio.  **Refer to specification in Part B3.2**  and/or similar or equivalent in design and specification. | **Each** | **30** |  |  |
| **B** | **TRUNK RADIO** |  |  |  |  |
| 3 | Supply and Deliver Digital Portable Radio handset, MPT1327 ONLY, Operating frequency range UHF1 400-470MHz:  *All Digital Portable trunk radios shall include:*   * Radio x 1 * Li-ion Battery (2500mAh) x 2 * MCU Rapid Rate Single Unit Charger x 1 * Switching Power Adapter x 1 * Standard UHF1 Antenna x 1 * Leather Strap x 1 * Belt Clip x 1 * User Manual x 1   and/or similar or equivalent in design and specification.  **Refer to specification in Part B2.1** | **Each** | **50** |  |  |
|  |  |  |  |  |  |
|  | **SUB TOTAL (excl. VAT)** | | | **R** | |
|  | **VAT** | | | **R** | |
|  | **TOTAL (incl. VAT)** | | | **R** | |