

GENERAL SPECIFICATION

TELECOMMUNICATIONS

GS EP TEL 133

Trunked radio networks

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1. Scope

This general specification identifies the minimum requirements for the Trunked Radio Networks – also referred to as the Trunk Radio Communication Networks – on offshore and onshore installations.

The UHF or VHF Trunk Radio Communication Network shall provide two way voice communications in all areas of the installation or plant site.

The verbal forms used to indicate levels of requirement are specified in [ISO/IEC Directives, Part 2](#) and [Characteristics of good requirements INCOSE symposium 1996](#).

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of the contract.

Reference	Title
MPT 1327	Signalling Standard for Trunked Radio Systems
ETSI TS 102 361	Digital Mobile Radio Tier III Trunking Standard
ETSI EN 300 392	TETRA – Voice and Data (V+D)
ETSI EN 300 394	TETRA – Inter Operability (IOP)
ETSI EN 300 396	TETRA – Direct Mode Air Interface (DMO AI)
ETSI EN 300 827	TETRA – CEM
ETSI EN 301 489-18	CEM – Part 18 : Specific TETRA part.
IEC 60050	International Electrotechnical Vocabulary
ISO/IEC Directives, Part 2	Rules for the structure and drafting of International Standards
IEC 60268-16	Objective rating of speech intelligibility by speech transmission index
ATEX Directive 94/9/EC	Directive of the European parliament and the council on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres
Characteristics of good requirements, INCOSE symposium 1996	Requirements Working Group of the International Council on Systems Engineering (INCOSE symposium 1996)

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Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP SAF 216	Area classification
GS EP TEL 410	Installation rules
GS EP TEL 700	Telecommunications Engineering services
GS EP TEL 710	Telecom equipment numbering

3. General

3.1 System design criteria

The system design criteria shall conform to the following:

- Modular system, allowing for ease of expandability , upgrading and maintenance
- Continuous duty cycle for repeaters, controllers and associated equipment
- Fail over redundancy on all critical system elements
- Priority settings for emergency calls
- In addition, the complete system shall meet the protection requirement as per [GS EP SAF 216](#).
- All equipment shall be tagged according to [GS EP TEL 710](#)

3.2 Influencing factors

The main influencing factors to consider in the systems design are as follows:

- A analysis of all actual communication requirements in the consideration and selection of the required radio standards technology [MPT 1327](#), [ETSI TS 102 361](#), [ETSI EN 300 392](#), [ETSI EN 300 394](#), [ETSI EN 300 396](#), [ETSI EN 300 827](#), [ETSI EN 301 489-18](#), ITU RR.
- Local, Regional and International Standards.
- Service Coverage Area
- Minimum signal strength requirements
- Antenna Height and radiation pattern
- Potential Interference problems
- Training and maintenance

3.3 System Architecture

The Trunk radio communication network system architecture shall be design according to the Company scope of requirements.

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The following studies and analyses shall be provided:

- Radio coverage study.
 - This study shall define the number and the details of radio sites, including at least the antennae characteristics and installation height. It shall be done as defined in section 3.4.
- Global calls and data traffic analysis.
 - This analysis shall define the needed radio and interfaces network resources. This analysis shall be based on the number of radios and on the real (existing system to be replaced) or supposed traffic.
- Security policies analysis
 - This analysis shall provide the needed security levels, i.e. radios authentication and encryption levels.
- Inter equipments links study.
 - This study shall define the number and the details of inter equipments links. It shall be done according to the other studies and analyses results.
- Inter sites links study
 - When applicable (multi sites), this study shall define the bandwidth between different sites, the security policy to implement (dedicated link, firewalls, etc.) and the impact on the existing equipment.

All trunk radio communication network equipment shall be described including all the interfaces and inter-links.

All the Engineering required in order to respond to Company requirements shall be provided.

A detailed analysis shall be submitted with a technology recommendation for approval by Company.

All Frequencies shall be proposed as per **GS EP TEL 700**

3.4 Range calculations and prediction of coverage

The range calculation shall be based on a preliminary link budget to be established using the following parameters:

- Base station (BS) to Mobile Station (MS) direction (aka DownLink –DL)
- BS' transmit power (in dBm): as per system specification, transmitted power measured at the input of the transmit antenna feeder line including the total loss to this point.
- BS' transmit feeder line losses (in dB): as per worst case line length evaluation from the combiners/duplexer output to the transmit antenna, including jumpers, connectors and surge arrestors losses.
- BS' transmit Antenna isotropic gain (in dBi)
- For portables only: mean body loss at belt level (in dB, 12dB as a minimum unless otherwise demonstrated by the vendor)

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- MS' antenna isotropic gain –or loss- in dBi
- For Mobiles and portables with antenna adapter mounting: feeder loss including connectors and surge arrestors losses.
- MS' receive dynamic sensitivity (faded, TU50): as per product specification for 4% BER measured in TCH/7,2 channel or 10% MER measured in AACH channel
- Mobile station (BS) to Base Station (MS) direction (aka UpLink –UL)
- MS' transmit power (in dBm): as per product specification, transmitted power measured at the antenna connector.
- For Mobiles and portables with antenna adapter mounting: feeder loss including connectors and surge arrestors losses.
- MS' antenna isotropic gain –or loss- in dBi
- For portables only: mean body loss at head level (in dB, 6dB as a minimum unless otherwise demonstrated by the vendor)
- BS' receive Antennae isotropic gain (in dBi)
- BS' receive antennae spatial or cross-polar diversity gain (in dB, 3dB mean gain minimum with convenient mechanical arrangement to be justified by vendor)
- For 800 MHz frequency band systems only: BS' tower top low noise amplifiers' gain (in dB)
- BS' receive feeder line losses (in dB): as per worst case line length evaluation from the receive antennae to the multicouplers' input, including jumpers, connectors, filters and surge arrestors losses.
- BS' receive dynamic sensitivity (faded, TU50): as per system specification for 4% BER measured in TCH/7.2 channel or 10% MER measured in SCH/F channel.

Once the link budgets for each usage scenario (hand-held pedestrian, in vehicle with and without external antenna, fixed mount ...), has been consistently calculated the following additional parameters shall be part of the range and area coverage calculation process:

- BS antennae heights resulting from the project antennae layout specifications
- BS antennae radiation patterns
- the MS antenna height for each usage scenario (belt worn and/or hand held portables, mobile and/or fixed mounted antennae ...)
- the project specific targeted area coverage reliability

The resulting range and coverage area calculations should be completed using the convenient HATA propagation models by default or any other model which can be demonstrated to be more suitable for the project situation.

3.5 Functional Requirements

The Trunk Radio Communication Network shall comprise, but not be limited to, the following functionalities and features.