



वर्गीय आवश्यकताओं के लिए मानक

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STANDARD FOR GENERIC REQUIREMENTS

TEC 73070:2025

(Supersede No. TEC/GR/TX/TIE07/02.MAR.2014)

इलेक्ट्रॉनिक लोकेटर सस्टम
ELECTRONIC LOCATOR SYSTEM



ISO 9001:2015

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इस सर्वाधिकार सुरक्षित प्रकाशन का कोई भी हिस्सा, दूरसंचार अभ्यांत्रिकी केंद्र, नई दिल्ली की लखत स्वीकृति के बिना, किसी भी रूप में या किसी भी प्रकार से जैसे -इलेक्ट्रॉनिक, मैकेनिकल,फोटोकॉपी, रिकॉर्डिंग, स्कैनिंग आदि रूप में प्रेषित, संग्रहीत या पुनरुत्पादित न किया जाए ।

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FOREWORD

Telecommunication Engineering Centre (TEC) is the technical arm of the Department of Telecommunications (DOT), Government of India. Its activities include:

- Framing of Standards for Generic Requirements for a Product/Equipment, Standards for Interface Requirements for a Product/Equipment, Standards for Service Requirements
- Formulation of Essential Requirements (ERs) under Mandatory Testing and Certification of Telecom Equipment (MTCTE) Policy
- Field evaluation of Telecom Products and Systems
- Designation of Conformity Assessment Bodies (CABs)/Testing facilities
- Testing & Certification of Telecom products
- Adoption of Standards
- Support to DoT on technical/technology issues

For the purpose of testing, four Regional Telecom Engineering Centers (RTECs) have been established which are located in New Delhi, Bangalore, Mumbai, and Kolkata.

ABSTRACT

This document contains the generic requirements of the Electronic Locator System which is a precise method of marking and subsequently locating the underground cable system. This locator system helps to establish a direct linkage between the cable route map and the actual field cable route so that the operator can exactly locate the underground point where the marker is buried. Electronic marker consists of passive RFID or without RFID marker. This system also consists of an Inbuilt GNSS e.g. NAVIC/GPS etc. to take the Geo-coordinates of a particular location. This document also explains the latest features (optional) like seamless synchronization of marker-related data with a secure cloud storage platform, accessibility of the marker data via an Android-based mobile application or similar devices.

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HISTORY SHEET

<i>S. NO.</i>	<i>Standard/ Document No.</i>	<i>Title</i>	<i>Remarks</i>
1	G/TIE-07/01.JUN.98	Electronic Locator System	First issue
2	No. TEC/GR/TX/TIE-07/02.MAR.2014	Electronic Locator System	Second issue
3	TEC 73070:2025	Electronic Locator System	Third issue: Changes in few parameters have been incorporated to accommodate advancement and for better clarity.

REFERENCES

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

<i>S No.</i>	<i>Document No</i>	<i>Title/Document Name</i>
1	CISPR 11 {2004}	Industrial, scientific and medical (ISM) radio-frequency equipment- Electromagnetic disturbance characteristics- Limits and methods of measurement
2	IEC61000-4-2{2001}	Testing and measurement techniques of Electrostatic discharge Immunity test.
3	IEC61000-4-3(2006)	Testing and measurement techniques-Radiated RF Electromagnetic Field Immunity test.
4	IEC 61000-4-4{2004}	Testing and measurement techniques of electrical fast transients/burst immunity test.
5	IEC61000-4-5(2005)	Testing & Measurement techniques for Surge immunity test.
6	IEC 61000-4-6 (2003) with amendment1(2004) & amendment 2(2006)	Testing & measurement techniques- Immunity to conducted Disturbances induced by radio- frequency fields.
7	IEC 61000-4-11 (2004)	Testing& measurement techniques- voltage dips, short interruptions and voltage variations immunity tests
8	IEC 61010- 1: 2010 + AMD1:2016 + COR1:2019	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

9	IS 8437 {1993}	Guide on the effects of current passing through the human body [equivalent to IEC publication 60479-1 (1984)].
10	IS-13252 {2003}	Safety of information technology equipment including electrical business equipment [equivalent to IEC publication 60950 (2001)]
11	IS 10437 {1986}	Safety requirements of radio transmitting equipment's [equivalent to IEC 60215].
12	IS 17724 (Part 1): 2023	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
13	ISO 9001:2015	Quality management systems — Requirements
14	TEC GR No. 11016:2016 (Old no. TEC/SD/DD/EMC-221/05/OCT-16)	Electromagnetic Compatibility Standard for telecommunication Equipment
15	TEC GR No. 14016: 2010. (Old SD: QM333)	Specification for Environmental Testing of Electronic Equipment for Issue: March 2010 Transmission and Switching use.
16	TEC GR No. 10009: 2024	SAFETY REQUIREMENTS OF TELECOMMUNICATION EQUIPMENT

Note: Unless otherwise explicitly stated, the latest approved issue of the standard/GR/IR, with all amendments in force listed in this References Table, on the issuance date of this GR/IR applies.

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

The Electronic Locator System is a precise method of marking and subsequently locating the underground cable system. To effectively manage the outside plant, there is a need for a direct linkage between the cable route map and the actual field cable route. The map presently provides the general information about location of the cable route but does not pin point underground plant such as for cable joint, bend, road crossing etc. The Electronic Locator System can be used so that the operator can exactly locate the underground point where the marker is buried. Electronic marker consists of passive RFID or without RFID marker. Each marker contains a unique identification number and once installed, the marker's location is recorded using the Electronic Locator System, which features an integrated GNSS (Global Navigation Satellite System) module. This enables accurate geotagging (latitude and longitude) of every marker.

Additionally, the purchaser may order the system having additional optional functionalities like seamless synchronization of marker-related data with a secure cloud storage platform, accessibility of the marker data via an Android-based mobile application or from Personal Digital Assistant (PDA) [b-ITU-T L.362/Ex.L.69] or similar devices.

The system consists of electronic locator unit and underground buried electronic markers (Fig.1& Fig.2).

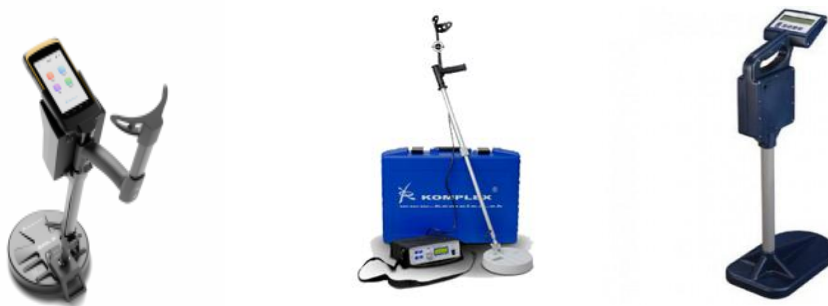


Fig.1 Different types of Electronic Locator Systems



Fig.2 Different types of Disc and Ball marker

- 1.1 Marker Locator unit consists of an Inbuilt GNSS (Global Navigation Satellite System) (e.g. NAVIC/GPS etc.) to take the geo-coordinates of a particular location, tuned Transceiver antenna having a day readable display unit and Loudspeaker, housed in a light weight probe.

- 1.2 The Electronic locator generates and transmits a specific frequency signal to the buried electronic marker. The Electronic Marker, tuned to this frequency, reflects the signal back to the locator. The locator verifies the reflected signal picked up through the probe and the location is indicated with a visual indication and an audible tone.

CHAPTER 2

TECHNICAL REQUIREMENTS

2.0 TECHNICAL REQUIREMENTS:

- 2.1 Cable Route Tracing Mode : Radio Frequency Mode.
- 2.2 Accuracy of Location : The Electronic Locator System shall be capable of Locating the Marker buried upto a Max. depth of 220 cms. The Marker shall be located within a radius of 30 cms from the spot where the peak signal has been detected.
- 2.3 Transmitter Frequencies : i) 101.4 KHz. OR ii) 121.6 KHz. OR iii) 145.7 KHz.
(as per the requirement of the user depending upon the application.)
- 2.4 Frequency Tolerance & Drift : $< \pm 0.1\%$
- 2.5 Transmitter Output Power : 1.5 Watts (Max.)
- 2.6 Type of Modulation : Output Carrier 100% modulation, with 500 Hz. Carrier (varying tone). Carrier ON time 800 Micro Seconds (approx.)
- 2.7 Antenna : Type of antenna to be specified by the manufacturer.
Fixed Type OR Removable type.

- 2.8 Receiver : Detects the radio frequencies reflected by the buried Marker. The Locator shall have facilities of Peak & Null reception.
- (a) 'PEAK' Reception: Tone/deflection shall be at highest.
 - (b) 'NULL' Reception: Tone/deflection shall be weak or cancelled.
- 2.9 Indications : a) Audible indication in the loudspeaker and deflection in the meter.
Tone/ Deflection shall be highest when Marker Locator antenna is over the buried marker.
- b) **Marker ID read function:** Marker locator shall able to read the Marker Unique ID and shall indicate over the display.
- 2.10 Power Requirements : a) The instrument / System to work on dry cells for outdoor working. The cells used shall be of standard type and commonly available like AA/AAA type.
- b) The purchaser may opt for pre-fitted Li-ion battery rechargeable cells in place of dry cells.
 - c) In case of requirement of dry cells, the instrument with the dry cells should work continuously for 8 hours.
 - d) Low battery indication to be provided.

- 2.11 Dimensions & Weight : The electronic locator with its probe and marker shall be portable, compact and robust. The dimensions and weight shall be specified and furnished by the manufacturer.
- 2.12 Environment : Operating Temperature -10 °C to +55⁰ C
- 2.13 Cabinet/Casting for locator : Suitable sheet metal or reinforced plastic or ABS
- 2.14 Painting : Enamel Painting for metal cabinet preferred.
- 2.15 Marker Casing : The Marker shall have passive resonant network and sealed with HDPE material or any other suitable engineering plastic which is resistant to rodents or any other insects in the underground environment, and shall have suitable holes for fixing purpose.
- 2.16 Colour/application of Marker : The marker shall follow internationally accepted frequencies and colour conventions i.e. 101.4 KHz, orange colour for underground Telecommunication cables/ plants.”
- 2.17 Tensile Strength & Elongation: The tensile strength and elongation of the Marker shall be carried out. The tensile strength at yield for finished material shall be 20 N/sq. mm. minimum. & elongation at break shall not be less than 350%.
- 2.18 Thermal stress crack resistance: The Marker shall be under compression load test of 10 Kg at a temperature of 55°C for 750 hours. There shall not be any indication of stress

cracking or split on the surface of the marker.

- 2.19 Hot-Cold Cycle : The marker is kept between -10°C and 55°C for one week with weight. There shall not be any indication of stress cracking.
- 2.20 Sealing of marker : This consists of one minute immersion in mineral oil at 100°C. The sealing shall not show any functional abnormalities (It should meet Cl. 2.2)
- 2.21 RFID Memory : Markers with RFID tag shall have a non-volatile memory chip embedded. Memory of RFID marker must be sized in order to store either unique identification ID or minimum information about the underground utilities viz. cable, name of the owner, etc as per the requirement of the purchasers for their applications.
- 2.22 Marker Type : Electronic Marker with passive RFID (buried underground), Ball Marker of diameter atleast 10cm or Disc Type marker of diameter atleast 20cms with RIFD chip. N.B. The type of marker to be used shall be as per purchaser's requirement.
- 2.23 Storage on System/Instrument: The locator device shall have internal memory to store data for a minimum of 500 markers.

2.24 Additional Requirements (Optional and as per Purchaser's Requirements):

2.24.1 Data Saving and Security

- 2.24.1.1 External Storage : System /instrument shall be capable to extend storage capacity by connecting external hard disk / pen drive to the system to store more data of the markers.
- 2.24.1.2 Local PC Storage : The system shall support data transfer and storage to a local computer using manufacturer-provided software.
- 2.24.1.3 Cloud Storage : The system shall provide an option to upload all marker data to a secure cloud-based platform. Access to the cloud must be protected by user-specific login credentials to maintain data confidentiality and security.
- 2.24.1.4 Above storage options shall function independently to provide redundancy and ensure that critical data is not lost under any circumstance.
- 2.24.2 **Data base management software (DBMS):** This software is to be provided by the OEM/Manufacturer as per purchaser's requirements and it shall have the capability to store comprehensive marker information as per data structure determined by the purchaser and support for upload image of location where marker has been installed. The software must facilitate seamless synchronization of this data with a cloud storage platform, ensuring that all marker information is consistently and reliably accessible through the associate Android-based mobile application or through PDA or similar devices. DBMS software shall

also supply advanced features and data sharing for effective and efficient use of marker information as per the requirements of the purchaser. The software shall be supplied either via a CD or through an official web download link provided by the OEM/ Manufacturer. The installation process must be simple and user - friendly, requiring minimal technical expertise.

2.24.3 The instrument / System shall be able to extend connectivity to external high-accuracy GNSS devices (RTK, DGPS, etc.) if specified by the purchaser.

2.24.4 In case of sharing of data / information related to marker, applicable regulation / rule of Government of India shall be complied by the OEM/ Manufacturer wherever applicable.

CHAPTER 3

GENERAL REQUIREMENTS

3.0 GENERAL REQUIREMENTS:

- 3.1 The Electronic Locator System shall be fully solid state and field proven employing state of the art technology.
- 3.2 The instrument shall be portable and light weight. The actual dimensions and weight of the instrument shall be furnished by the manufacturer.
- 3.3 All connectors and cables shall be of low loss, suitably shielded, reliable and of standard type to ensure failure free operation over long periods and under specified environmental conditions.
- 3.4 The mechanical design and construction of each card/unit shall be inherently robust and rigid under all conditions of operation, adjustment, replacement, storage and Transport and conforming to para 12 (Vibration Test) of „TEC GR No. 14016: 2010 (Old no. SD QM-333), Standard for environment testing of Telecommunication equipment“. The instrument shall have self cooling arrangement without use of fans.
- 3.5 Manufacturer's Name, Model, Sl. No. and month/year of manufacturing shall be clearly indicated on the instrument and in the operating manual. Printing and finishing shall be of high quality.

3.6 Detailed information for components/module accessories used shall be clearly indicated in the manual / handbook.

3.7 All controls, switches and indicators shall be clearly marked to show their circuit designation and functions.

3.8 The Electronic Locator shall be IP54 compliant or above.

3.9 The Electronic Locator shall have high Contrast Display Suitable for all weather and light conditions.

3.10 OPERATIONAL REQUIREMENTS:

3.10.1 The Electronic Locator System shall be able to pin point earmarked buried Telecom facilities such as cables, joints telecom ducts etc where markers have been installed.

3.10.2 The electronic locator system shall be in two Part:

a) Electronic Marker with passive RFID or without RFID (buried underground)

b) Electronic Marker Locator Unit"

N.B. The type of marker to be used shall be as per purchaser's requirement

3.10.3 The Marker Locator unit shall compose of a transmitter, tuned frequency receiver and a suitable antenna housed in a light weight probe.

3.10.4 The Electronic locator shall generate and transmit a specific frequency signal to the buried electronic marker. The Electronic

Marker, tuned to this frequency, reflects the signal back to the locator. The locator verifies the reflected signal picked up through the probe and the location is indicated with a visual indication and an audible tone.

3.10.5 The Electronic locator shall be provided with sensitivity control facility so that the indicator system viz., needle deflection/ display graph and audible signal can be conveniently set during the use.

3.10.6 The locator shall be capable of locating markers of any of the frequencies through a selection feature on the front panel of the locator.

83.0 kHz	Gas pipelines	Yellow
101.4 kHz	Telecommunication cables / plants	Orange
121.6 kHz	Waste water pipelines	Green
134.0 kHz	Energy cables	Red
145.7 kHz	Water pipelines	Blue

3.10.7 Electronic locator should have facility to be able to read & write data on the marker RFID memory. RFID memory should be on the marker. However, the purchaser may not opt the requirement of Electronic marker having ability to write data on the marker RFID memory in case of marker is having only unique identification ID embedded in its memory chip and no other data is stored in the marker memory.

3.10.8 The electronic marker part which is buried underground consists of a passive tuned resonant circuit sealed in a casing. This casing shall be made of HDPE or any other suitable engineering plastic material. It shall not be affected by chemicals, minerals and temperature

variations normally found in underground environments. It shall not be prone to damage due to rodents or any other insects in the underground environment.

Type of Marker	Distance(in feet's)
Full Range Disc Marker (with or without RFID)	8"
Medium Range Disc(with or without RFID)	6"
Near Surface Disc Marker (with or without RFID)	2"
Ball Marker (with or without RFID)	5"

N.B.: The purchaser shall decide the type of electronic marker to be ordered as per the requirements.

3.10.9 The marker shall be buried sufficiently clear of (with a minimum clearance of 30 cms all round) any metallic objects such as water conduits, power cables etc., and when the marker is buried as stated herein the Electronic Locator system shall not be affected by such objects.

3.10.10 The Marker shall be colour coded to a specific frequency, as given in this GR.

3.11 QUALITY REQUIREMENTS:

3.11.1 The manufacturer shall furnish the MTBF and MTTR values. The calculations shall be based on the guidelines given in BSNL QA document No.QM-115 (January 1997) "Reliability Methods and Predictions" or any other international standard.

3.11.2 The instrument shall be manufactured in accordance with international quality standards ISO 9001: 2015 or latest issue for which the manufacturer should be duly accredited. A quality plan describing the quality assurance system followed by the manufacturer would be required to be submitted by the manufacturer.

3.11.3 The instrument shall conform to the requirements for Environment specified TEC GR No. 14016:2010 (old SD QM-333, Issue March 2010). The applicable tests shall be for environmental category 'D' including those for dust, vibration and corrosion.

3.12 POWER SUPPLY:

3.12.1 The instrument shall work on dry cells for outdoor working. The purchaser may also opt for pre-fitted Li-ion battery rechargeable cells in place of dry cells. In case of requirement of dry cells, the cells used shall be of standard type and commonly available like AA/AAA type. The instrument with these dry cells should work continuously for 8 hours.

3.12.2 The manufacturer shall furnish the power consumption of the instrument.

3.13 PROTECTION REQUIREMENTS:

3.13.1 All switches/controls on front panel shall have suitable safeguards against accidental operation.

3.13.2 The instrument shall be adequately safeguarded to "prevent entry of dust. Insects and lizards.

3.14 MAINTENANCE REQUIREMENTS:

- 3.14.1 The calibration of the instrument shall be valid for at least one year.
- 3.14.2 The instrument shall have easy access for servicing and maintenance.
- 3.14.3 Ratings and types of fuses used are to be indicated by the supplier.
- 3.14.4 The manufacturer/supplier shall furnish the list of recommended spares for three years maintenance.
- 3.14.5 The supplier shall have maintenance/repair facility in India.
- 3.14.6 Supplier should guarantee the spares so long as the instrument is in service, at least for 10 years from the date of supply. The purchaser would like to stock spares as and when the supplier decides to close down the production of the offered instrument. In such an event, supplier shall give a two years notice to the purchaser so as to stock the spares.

3.15 ACCESSORIES:

- 3.15.1 The supplier shall provide one complete set of
 - a) All the necessary accessories like antenna, connecting cables, power cord, etc. as required for proper operation of the instrument. Types of connectors, adopters to be used and the accessories of the approved quality shall be clearly indicated in the operating manuals.
 - b) Software (if any), along with software version and the arrangement to load the software at site. Any updating of software shall be

supplied free of cost. (Additional sets may be ordered optionally). This upgrade shall be done at the site via internet / /OTA (over the air) / external storage devices, if required.

3.15.2 Special tools, extender boards, extender cables and accessories essential for installation, operation maintenance and repair of the instrument shall be clearly indicated and supplied along with the instrument, as per the user's requirement.

3.15.3 Suitable carrying case shall be supplied for ease of transportation and safety of the instrument.

3.16 DOCUMENTATION:

3.16.1 Technical literature in English with complete layout, detailed block schematic and circuit diagram of various assemblies with test voltages / waveforms at different test points of the units shall be provided in hard copy. Additionally, a soft copy /QR code on the system in respect of technical literature shall also be provided both in Hindi and English. All aspects of installation operation, maintenance and repair shall be covered in the manuals. The manuals shall include the following: -

i) Installation, operation and maintenance manual

- a) Safety measures to be observed in handling the Instrument
- b) Precautions for setting up, measurements and maintenance;
- c) Test equipment required for routine maintenance and calibration including their procedures;
- d) Illustration of internal and external mechanical parts.
- e) The detailed description about the operation of the software used in the equipment, if any, including its configuration procedure, installation, loading and debugging etc.

ii) Repair Manual

- a) List of replaceable parts used including their sources and the approving authority;
- b) Detailed ordering information for all the replaceable parts shall be listed to facilitate reordering of spares as and when required;
- c) Procedure for trouble shooting of instrument shall be provided. Test fixtures and accessories required for repair shall also be indicated. Systematic trouble shooting charts (fault tree) shall be given for the probable faults with their remedial actions.

CHAPTER 4

SAFETY REQUIREMENTS

4.0 SAFETY REQUIREMENTS:

- 4.1 The operating personnel shall be protected against shock hazards as per IS 8437 {1993} - "Guide on the effects of current passing through the human body" [equivalent to IEC publication 60479-1 (1984)]. The Manufacturer/supplier shall submit a certificate in respect of compliance to these requirements.
- 4.2 The equipment shall conform to relevant safety requirements as per IS 17724 (Part 1): 2023/IEC 61010- 1: 2010 + AMD1:2016 + COR1:2019, as prescribed under Table no. 1 of the TEC document 'SAFETY REQUIREMENTS OF TELECOMMUNICATION EQUIPMENT- TEC 10009: 2024'. The Manufacturer/supplier shall submit a certificate in respect of compliance to these requirements.

4.3 The instrument should follow proper construction practice to minimize unintended radiation due to leakage from any gap or monitoring points. All unused ports and monitoring points should be terminated. The power flux density shall not exceed $1\text{mW}/\text{cm}^2$ at a distance of 2.5 cms.

CHAPTER 5

EMI/EMC Requirements

5.0 EMI/EMC Requirements:

5.1 **General Electromagnetic Compatibility (EMC) Requirements:** - The equipment shall conform to the EMC requirements as per the following standards and limits indicated therein. A test certificate and test report shall be furnished from a test agency.

a) Conducted and radiated emission:

Name of EMC Standard: "CISPR 11 {2024} - Industrial, scientific and medical equipment- radio- frequency disturbance characteristics- Limits and methods of measurement"

Limits:-

- i) To comply with the category of Group 1 of ClassA of CISPR 11 {2024} or latest.
- ii) The values of limits shall be as per relevant tables under CISPR11 (2015) or latest.

b) Immunity to Electrostatic discharge:

Name of EMC Standard: IEC 61000-4-2 {2001} IEC 61000-4-11 (2020)
"Testing and measurement techniques of Electrostatic discharge immunity test".

Limits: -

- i) Contact discharge level 2 {± 4 kV} or higher voltage;
- ii) Air discharge level 3 {± 8 kV} or higher voltage;

c) Immunity to radiated RF:

Name of EMC Standard: IEC 61000-4-3 (2006) IEC 61000-4-11 (2020)
"Testing and measurement techniques-Radiated RF Electromagnetic Field Immunity test"

Limits:-

For Telecom Equipment and Telecom Terminal Equipment with Voice interface(s)

- i) Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and
- ii) Under test level 3 (10 V/m) for protection against digital radio telephones and other RF devices in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 6.0 GHz.

For Telecom Terminal Equipment without Voice interface (s)

Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and for protection against digital radio telephones and other RF devices in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 6.0 GHz.

d) Immunity to fast transients (burst):

Name of EMC Standard: IEC 61000- 4- 4 {2004} IEC 61000-4-11 (2020)
"Testing and measurement techniques of electrical fast transients/burst immunity test"

Limits:-

Test Level 2 i.e. a) 1 kV for AC/DC power lines; b) 0. 5 kV for signal / control / data /telecom lines;

e) Immunity to surges:

Name of EMC Standard: IEC 61000-4-5 (2005) IEC 61000-4-11 (2020)

"Testing & Measurement techniques for Surge immunity test"

Limits:-

- i) For mains power input ports : (a) 1.0 kV peak open circuit voltage for line to ground coupling (b) 0.5 kV peak open circuit voltage for line to line coupling
- ii) For telecom ports : (a) 0.5 kV peak open circuit voltage for line to ground (b) 0.5 kV peak open circuit voltage for line to line coupling.

f) Immunity to conducted disturbance induced by Radio frequency fields:

Name of EMC Standard: IEC 61000-4-6 (2003) with amendment 1 (2004) & amd. 2 (2006) "Testing & measurement techniques-Immunity to conducted disturbances induced by radio- frequency fields"

Limits:- Under the test level 2 {3 V r.m.s.} in the frequency range 150 kHz-80 MHz for AC / DC lines and Signal /Control/telecom lines.

g) Immunity to voltage dips & short interruptions (applicable to only ac mains power input ports, if any):

Name of EMC Standard: IEC 61000-4-11 (2020) "Testing & measurement techniques- voltage dips, short interruptions and voltage variations immunity tests"

Limits:-

- i) a voltage dip corresponding to a reduction of the supply voltage of 30% for 500ms(i.e. 70 % supply voltage for 500 ms)
- ii) a voltage dip corresponding to a reduction of the supply voltage of 60% for 200ms; (i.e. 40% supply voltage for 200ms) and
- iii) a voltage interruption corresponding to a reduction of supply voltage of > 95% for 5s.

Note 1: Classification of the equipment:

Class B: Class B is a category of apparatus which satisfies the class B disturbance limits. Class B is intended primarily for use in the domestic environment and may include:

- Equipment with no fixed place of use; for example, portable equipment powered by built in batteries;
- Telecommunication terminal equipment powered by the telecommunication networks;
- Personal computers and auxiliary connected equipment.

Please note that the domestic environment is an environment where the use of broadcast radio and television receivers may be expected within a distance of 10 m of the apparatus connected.

Class A: Class A is a category of all other equipment, which satisfies the class A limits but not the class B limits.

Note 2: The test agency for EMC tests shall be an accredited agency and details of accreditation shall be submitted.

Note 3:- For checking compliance with the above EMC requirements, the method of measurements shall be in accordance with TEC Standard No. TEC 11016:2016 (Old no. TEC/SD/DD/EMC-221/05/OCT-16) or latest release and

the references mentioned therein unless otherwise specified specifically. Alternatively, corresponding relevant Euro Norms of the above IEC/CISPR standards are also acceptable subject to the condition that frequency range and test level are met as per above mentioned sub clauses (a) to (g) and TEC Standard No. TEC 11016:2016 (Old no. TEC/SD/DD/EMC-221/05/OCT-16) or latest release. The details of IEC/CISPR and their corresponding Euro Norms are as follows:

IEC/CISPR

Euro Norm

CISPR 11

EN 55011

IEC 61000-4-2

EN 61000-4-2

IEC 61000-4-3

EN 61000-4-3

IEC 61000-4-4

EN 61000-4-4

IEC 61000-4-5

EN 61000-4-5

IEC 61000-4-6

EN 61000-4-6

IEC 61000-4-11

EN 61000-4-11

CHAPTER 6

PURCHASER'S REQUIREMENTS

- 6.0 This chapter describes the requirements which may be included in the tender by the purchaser as per its needs.
- 6.1 The purchaser shall decide the type of electronic marker to be ordered as per the requirements.
- 6.2 The purchaser / procurer shall specify the additional requirements related to Data Saving, DBMS Software, data security, external high-accuracy GNSS devices, etc as explained at clause 2- Technical Requirements of this document while ordering the Electronic locator system.
- 6.3 The purchaser shall also specify the data structure for the information to be stored in RFID memory and on the Electronic locator unit / device.
- 6.4 The purchaser shall specify the requirement of dry cells or Li-Ion rechargeable battery cells as power source to the instrument / device.
- 6.5 In the document, some features (which have been marked as per purchaser / procurer requirements) needs to be examined by the purchaser / procurer and suitably specified in the tender conditions / ordering information as per their requirement.

LIST OF ABBRIVIATIONS

1. DOT : DEPARTMENT OF TELECOMMUNICATIONS
2. TEC : TELECOMMUNICATONS ENGINEERING CENTRE
3. QA : QUALITY ASSURANCE
4. OFC : OPTICAL FIBRE CABLE
5. GR : GENERIC REQUIREMENTS
6. HDPE : HIGH DENSITY POLYETHYLENE
7. RF : RADIO FREQUENCY
8. MTBF : MEAN TIME BEFORE FAILURE
9. MTTR : MEAN TIME TO RESTORE
10. EMC : ELECIRO MAGNETIC COMPA TABILITY
11. ISO : INTERNATIONAL STANDARDS ORGANISATION
12. IS : INDIAN STANDARDS
13. IEC : INTERNATIONAL ELECTRO TECHNICAL COMMISSION
14. CISPR : INTERNATIONAL SPECIAL COMMITIEE ON RADIO INTERFERENCE
