Government of India
Department of Telecommunication
Telecommunication Engineering Centre
FA Division
Gate No. 5, Khurshid Lal Bhawan, Janpath, New Delhi-110001.

File No. 33-6/2025-FA/TEC Dated: 23.05.2025

Subject: Consultation on revision of standard for GR on "Electronic Locator System TEC 73070:2014 (Old No. TEC/GR/TX/TIE-07/02 MAR 14)-Reg.

The revision of Standard for GR on Electronic Locator System TEC 73070:2014 (Old No. TEC/GR/TX/TIE-07/02 MAR 14) is being taken up under TEC Annual Action Plan 2025-26.

2. The electronic copy of existing standard is enclosed for your reference, study and technical inputs/comments. It is requested to go through the enclosed draft Standard and your inputs/comments may please be furnished in the template sheet enclosed as Annexure-A.

3. The comments / inputs on the various clauses of the enclosed existing GR may be furnished in the prescribed format (**Annexure -A)** at the earliest and within **sixty days from the date issue of the notice** to adgfa-tec-dot@gov.in with copy to dirfa.tec@gov.in and ddgfla.tec@gov.in .

4. This consultation process is being undertaken in accordance with provisions in the Telecommunications (Framework to Notify Standards, Conformity Assessment and Certification) Rules, 2025.

----Sd---
(Deo Pratap)
AD (FA)

Encl: 1. Annexure A
2. Existing GR as above.

To
1. All Stakeholders.

Copy to:
1. AD (IT), TEC- with request for uploading on TEC website.

ANNEXURE-A

NAME OF ……. (MANUFACTURER / STAKEHOLDER)

I. **COMMENTS ON Electronic Locator System TEC 73070:2014**

Clause No.	Clause Description	Comments, if any	Remarks, if any

DRAFT

FIXED LINE ACCESS

ISSUE-II: March.2014

ELECTRONIC LOCATOR SYSTEM

ISO 9001: 2008

GENERIC REQUIREMENTS

No. TEC/GR/TX/TIE-007/02.MAR-14

(supersedes No. G/TIE-07/01.JUN.98)

TELECOMMUNICATION ENGINEERING CENTRE
KHURSHIDLAL BHAWAN, JANPATH,
NEW DELHI-110001 (INDIA).

Release 2: MARCH, 2014
Price: ₹ 800/-

CONTENTS

HISTORY SHEET

Name of the Generic Requirements	No. of the Generic Requirements	Remarks
Electronic Locator System	G/TIE-07/01.JUN.98	First issue
Electronic Locator System	No. TEC/GR/TX/TIE-07/02.MAR.2014	Second issue

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.

CISPR 22{2005}	IEC, CISPR Publication 22 (2008), Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.
CISPR 11 {2004}	Industrial, scientific and medical (ISM) radio- frequency equipment- Electromagnetic disturbance characteristics- Limits and methods of measurement
IEC61000-4-2{2001)	Testing and measurement techniques of Electrostatic discharge immunity test.
IEC61000-4-3(2006)	Testing and measurement techniques-Radiated RF Electromagnetic Field Immunity test.
IEC 61000-4-4{2004)	Testing and measurement techniques of electrical fast transients/burst immunity test.
IEC61000-4-5(2005)	Testing & Measurement techniques for Surge immunity test.
IEC 61000-4-6 (2003) with amendment1(2004) & amendment 2(2006)	Testing & measurement techniques-Immunity to conducted disturbances induced by radio- frequency fields.
IEC 61000-4-11 (2004)	Testing& measurement techniques- voltage dips, short interruptions and voltage variations immunity tests"
IS 8437 {1993}	Guide on the effects of current passing through the human body [equivalent to IEC publication 60479-1 (1984)].
IS-13252 {2003}	Safety of information technology equipment including electrical business equipment [equivalent to IEC publication 60950 (2001)
IS 10437 {1986}	Safety requirements of radio transmitting equipments" [equivalent to IEC 60215].
TEC GR No. SD: QM-333 for Issue: March 2010	Specification for Environmental Testing of Electronic Equipment Transmission and Switching use.

DEPARTMENT OF TELECOMMUNICATIONS
TELECOM ENGINEERING CENTRE
GENERIC REQUIREMENTS FOR ELECTRONIC LOCATOR SYSTEM
GR No.TEC/GR/TX/TIE - 07/02. MARCH.2014

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

Fig.1. Electronic Locator

Fig.2 Disc and Ball marker

1.1 The Marker Locator unit consists of a transmitter, tuned frequency receiver and a suitable antenna 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	:	< ±..l %
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 along with its fixers to be specified by the manufacturer.
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	:	Audible indication in the loudspeaker and deflection in the meter.
2.10 Power Requirements	:	a) Transmitter/Receiver 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 instrument with these dry cells should work continuously for 8 hours. c) 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 $+55^0$ 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. 104.4 KHz, orange colour for Telecommunication cables.'
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 CI. 2.2)
2.21 RFID Memory	:	Markers having RFID memory should have at least 1024 bits of memory to support storage of data on the marker.

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 I 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. SD QM-333. Issue March 2010- Standard for environment testing of Telecommunicationequipment'. 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 Each sub-assembly/components shall be clearly marked to show its functions and schematic reference so that they are identifiable from the component layout diagram in the manual. These shall be easily accessible for removal and testing.

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.

3.9 The Electronic Locater 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 etc.

3.10.2 The electronic locator system shall be in two Parts :
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 sign 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 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**
104.4 kHz	**Telecommunication cables**	**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.

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 9001:2008 for which the manufacturer should be duly accredited. ‘

3.11.3 The instrument shall conform to the requirements for Environment specified TEC GR No. SD QM-333. Issue March 2010-Standard for environment testing of Telecommunication equipment’". 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 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.

CHAPTER 4

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 IS-13252 {2003} - "Safety of information technology equipment including electrical business equipment" [equivalent to IEC publication 60950 (2001) and IS 10437 {1986} "Safety requirements of radio transmitting equipments" [equivalent to IEC 60215].The Manufacturer/supplier shall submit a certificate in respect of compliance to these requirements.

4.3 The instrument should follow proper construction practice to minimise 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 $1mW/cm^2$ 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 (applicable to telecom equipment):
Name of EMC Standard: "CISPR 22 (2005) with amendment 1 (2005) & amendment 2 (2006) - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment".

Limits:-

i) To comply with Class A or B (to be mentioned in the GR / IR as per the specific requirement) of CISPR 22 (2005) with amendment 1 (2005) & amendment 2(2006).

ii) The values of limits shall be as per TEC Standard No. TEC/EMI/TEL-001/01/ FEB-09**.**

OR

Conducted and radiated emission (applicable to instruments such as power meter, frequency counter etc.):

Name of EMC Standard: "CISPR 11 {2004}- Industrial, scientific and medical (ISM) radio- frequency equipment-Electromagnetic disturbance characteristics-Limits and methods of measurement"

Limits :-

i) To comply with the category of Group 1 of Class A of CISPR 11 {2004}

ii) The values of limits shall be as per clause No. 8.5.2 of TEC Standard No. TEC/EMI/TEL-001/01/FEB-09**.**

b) Immunity to Electrostatic discharge:
Name of EMC Standard: IEC 61000-4-2 {2001) "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) "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) "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) "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 (2004) "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.

Alternatively EMC test report from a non-accredited test lab, which is audited by an accredited lab / accrediting authority for the availability of all the essential facilities (test equipment, test chamber, calibrations in order, test instructions, skilled personnel etc.), required for performing the tests according to the EMC test methods audited, may be acceptable.

However, such accredited lab / accrediting authority should take responsibility of the test results of the "non accredited lab" along with indication of period of such delegation and the submitted test report should be of such valid period of delegation. The audit report, mentioning above facts, should be provided along with EMC test report.

Note 3 :- For checking compliance with the above EMC requirements, the method of measurements shall be in accordance with TEC Standard No. TEC/EMI/TEL-001/01/FEB-09 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/EMI/TEL-001/01/FEB-09. The details of IEC/CISPR and their corresponding Euro Norms are as follows:

IEC/CISPR	**Euro Norm**
CISPR 11	EN 55011
CISPR 22	EN 55022
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

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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 MAINTENANCE REQUIREMENTS:

6.2.1 The calibration of the instrument shall be valid for at least one year.

6.2.2 The instrument shall have easy access for servicing and maintenance.

6.2.3 Ratings and types of fuses used are to be indicated by the supplier.

6.2.4 The manufacturer/supplier shall furnish the list of recommended spares for three years maintenance.

6.2.5 The supplier shall have maintenance/repair facility in India.

6.2.6 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.

6.3 ACCESSORIES:

6.3.1 The supplier shall provide one complete set of all the necessary accessories like antenna, connecting cables 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.

6.3.2 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.

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

6.4.4 The electronic marker locator shall be compatible with the external GPS device which may be connected with the locator. However this feature shall be optional and shall be as per the purchaser's requirement.

6.5 DOCUMENTATION:

6.5.1 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. 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.

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.

LIST OF ABBRIVIATIONS

1.	DOT	:	DEPARTMENT OF TELECOMMUNICATIONS
2.	TEC	:	TELECOMMNICATONS 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 ELECTROTECHNICAL COMMISSION
14.	CISPR	:	INTERNATIONAL SPECIAL COMMITIEE ON RADIO INTERFERENCE

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