



**Satellite Earth Stations and Systems (SES);  
Mobile Earth Stations (MES),  
including handheld earth stations, for Satellite Personal  
Communications Networks (S-PCN) operating  
in the 1,6 GHz/2,4 GHz frequency band  
under the Mobile Satellite Service (MSS);  
Harmonised Standard for access to radio spectrum**

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**Reference**REN/SES-00442

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**Keywords**earth station, MES, MSS, regulation, satellite, S-PCN

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## Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.3].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

| National transposition dates                                                           |                   |
|----------------------------------------------------------------------------------------|-------------------|
| Date of adoption of this EN:                                                           | 28 September 2026 |
| Date of latest announcement of this EN (doa):                                          | 31 December 2026  |
| Date of latest publication of new National Standard or endorsement of this EN (dop/e): | 30 June 2027      |
| Date of withdrawal of any conflicting National Standard (dow):                         | 30 June 2027      |

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## Modal verbs terminology

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# 1 Scope

The present document applies to Mobile Earth Station (MES) radio equipment which have the following characteristics:

- the MES has both transmit and receive capabilities and operate in a Satellite-Personal Communications Network (S-PCN). An S-PCN MES can be a handheld, portable, vehicle-mounted, host connected, semi-fixed or fixed equipment, or can be an element in a multi-mode terminal. It consists of a number of modules with associated connections and user interface, or can be a self-contained single unit;
- these MESs are controlled and monitored by Control Monitoring Functions (CMF). The CMF is outside the scope of the present document;
- if the MES is an element in a multi-mode terminal, unless otherwise stated in the present document, its requirements apply only to the S-PCN MES element of the terminal operating in the MSS frequency bands given in table 1;
- the MES is capable in operating in all or part of the frequency bands shown in table 1.

**Table 1: Mobile Satellite Service (MSS) frequency bands**

| MES      | MSS frequency bands        |
|----------|----------------------------|
| Transmit | 1 610 MHz to 1 626,5 MHz   |
| Receive  | 1 613,8 MHz to 1 626,5 MHz |
| Receive  | 2 483,5 MHz to 2 500,0 MHz |

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.3] is given in annex A.

## 2 References

### 2.1 Normative references

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- [1] Void.
- [2] [Recommendation ITU-T O.153 \(10/92\)](#): "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [3] Void.
- [4] Void.
- [5] Void.
- [6] [Final Acts of the World Radiocommunication Conference \(WRC '95\); Geneva 1995](#).
- [7] [IEC 60068-2-1 \(2025\)](#): "Environmental testing - Part 2: Tests. Tests A: Cold".
- [8] [IEC 60068-2-2 \(2025\)](#): "Environmental testing - Part 2: Tests. Tests B: Dry heat".

## 2.2 Informative references

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- [i.1] Void.
- [i.2] [Commission Implementing Decision C\(2015\) 5376](#) final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.3] [Directive 2014/53/EU](#) of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.4] [IEC 60068-2-64:2008+AMD1:2019 CSV](#): "Environmental testing. Part 2-64: Tests. Test Fh: Vibration, broadband random and guidance".

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## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the following terms apply:

**carrier-on state (allocated a channel):** state in which the MES is transmitting a carrier

**carrier-off state (idle mode):** radio state in which the MES does not actually transmit a carrier

**CMF control message:** message, normally originating from a network, to a specified terminal or set of terminals of the network which indicates to the terminal or set of terminals that it/they carry out some specific action or enter or maintain some specific state

NOTE: For test purposes CMF control messages can originate from CMF Simulator.

**conducted measurement:** measurement of emissions from an antenna port of the MES made by direct wired connection to the port

**environmental profile:** range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

**Equivalent Isotropically Radiated Power (EIRP):** product of transmitter power and maximum antenna gain, equivalent to an isotropic source radiating uniformly in all directions

**fellow radio station:** another radio station operating in the same service, frequency band, or coordination environment as the station in question, such that it shares allocated spectrum with the mobile satellite earth terminal

**handheld:** MES which is self-contained and is small enough and light enough to be carried and used during a call with one hand

**host-connected:** MES for which connection to or integration with host equipment is necessary to offer functionality

**host equipment:** any equipment which has a complete user functionality when not connected to the MES, and to which the MES provides additional functionality, and to which connection is necessary for the MES to offer functionality

**in-band signals:** signals which are located in the operating band plus an offset of 10 MHz outside this operating band

**Installable Equipment (IE), Internally Mounted Equipment (IME) And Externally Mounted Equipment (EME):** Installable Equipment (IE) is an equipment which is intended to be installed in a vehicle

NOTE: An IE consist of one or several interconnected modules. The IE is composed of modules intended to be externally mounted as defined for the intended use of the MES, and defined as Externally Mounted Equipment (EME) and the remaining modules(s) as Internally Mounted Equipment (IME).

**laboratory test equipment:** logical grouping that contains the standard test equipment provided by a test laboratory

**MSS band:** continuous range of frequencies allocated by the ITU to the MSS

**multi-mode:** equipment that accommodates radio stations of different radio networks

**narrow-band system:** narrow-band system is one in which the nominal carrier frequency spacing for MESs in the earth-to-space direction is less than 300 kHz

**network control channel:** channel by which an MES receives general control information from the CMF(originated by a network control facility) of its S-PCN

**nominated bandwidth (Bn):** Bandwidth of the Mobile Earth Station (MES) radio frequency transmission which is wide enough to encompass all spectral elements of the transmission

NOTE 1: The nominated bandwidth is centred on the transmit frequency and does not exceed 5 times the occupied bandwidth.

NOTE 2: The nominated bandwidth is wide enough to take account of the transmit carrier frequency stability. This definition is chosen to allow flexibility regarding adjacent channel interference levels which will be taken into account by operational procedures depending on the exact transponder carrier assignment situation.

NOTE 3: The Bn is defined relative to the MES actual carrier frequency  $f_c$ .

Bn is the width of the frequency interval ( $f_c - a$ ,  $f_c + b$ ), where a and b can vary with  $f_c$  which are defined for the intended use of the MES. The frequency interval ( $f_c - a$ ,  $f_c + b$ ) does not encompass more than either:

- i) when  $a = b$ , 4 or less carrier frequencies for narrow-band systems;
- ii) when  $a \neq b$ , 1 nominal carrier frequency for narrow-band systems; or
- iii) 1 nominal carrier frequency for wide-band systems.

The frequency interval ( $f_c - a$ ,  $f_c + b$ ) remains within the operational band of the MES.

NOTE 4: Further explanation of nominated bandwidth is presented in annex B.

**operational band:** sub-portion of the 1 610 MHz to 1 626,5 MHz band which has been assigned in the earth-to-space direction to the MSS network within which the MES is operating

**Portable Equipment (PE):** generally intended to be self-contained, free standing and portable. A PE would normally consist of a single module, but can consist of several interconnected modules

**radiated measurement:** measurement of an actual radiated field

**Special Test Equipment (STE):** equipment which allows a test laboratory to control the MES so that the tests required by the present document can be performed

**test laboratory:** laboratory which performs the conformance testing of the MES against the present document

**test load:** test load is a substantially non-reactive, non-radiating power attenuator which is capable of safely dissipating the power from the transmitter(s)

**unwanted emissions:** unwanted emissions are those falling outside the nominated bandwidth in the carrier-on state, and those generated in the carrier-off state

**wide-band system:** wide-band system is one in which the nominal carrier frequency spacing for MESs in the Earth-to-Space direction is equal to or greater than 300 kHz

## 3.2 Symbols

Void.

## 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

|                 |                                                          |
|-----------------|----------------------------------------------------------|
| AK-R            | Air Kerma Rate                                           |
| ASD             | Acceleration Spectral Density                            |
| BE <sub>L</sub> | Lower Band Edge of the operating band                    |
| BE <sub>U</sub> | Upper Band Edge of the operating band                    |
| B <sub>n</sub>  | Nominated Bandwidth                                      |
| BW              | Bandwidth                                                |
| CDMA            | Code Division Multiple Access                            |
| CMF             | Control and Monitoring Functions                         |
| CW              | Continuous Wave                                          |
| dBW             | decibels relative to 1 Watt                              |
| EFTA            | European Free Trade Association                          |
| EIRP            | Equivalent Isotropically Radiated Power                  |
| EMC             | Electro-Magnetic Compatibility                           |
| EME             | Externally Mounted Equipment                             |
| EN              | European Standard                                        |
| ERM             | Electromagnetic compatibility and Radio spectrum Matters |
| ETS             | European Telecommunication Standard                      |
| EU              | European Union                                           |
| EUT             | Equipment Under Test                                     |
| IE              | Installable Equipment                                    |
| IEC             | International Electrotechnical Commission                |
| IME             | Internally Mounted Equipment                             |
| ITU             | International Telecommunication Union                    |
| ITU-T           | ITU Telecommunication Standardization Sector             |
| MES             | Mobile Earth Station                                     |
| MIC             | MES unique Identification Code (within its S-PCN)        |
| MSS             | Mobile Satellite Service                                 |
| OATS            | Open Area Test Site                                      |
| PCN             | Personal Communications Network                          |
| PE              | Portable Equipment                                       |
| R&TTE           | Radio and Telecommunications Terminal Equipment          |
| RE              | Radio Equipment                                          |
| RED             | Radio Equipment Directive                                |
| RF              | Radio Frequency                                          |
| SNR             | Signal to Noise Ratio                                    |
| S-PCN           | Satellite Personal Communications Network                |
| STE             | Special Test Equipment                                   |
| TBR             | Technical Basis for Regulation                           |
| WRC             | World Radiocommunication Conference                      |
| ZVEI            | Zentralverband Elektrotechnik- und Elektronik-industrie  |

## 4 Technical requirements specifications

### 4.1 Environmental profile

#### 4.1.1 General

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be in accordance with its intended use, but as a minimum, shall be that specified in the test conditions contained in the present document. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the specified operational environmental profile defined by its intended use.

The environmental profile for operation of the equipment shall include the ranges of humidity, temperature and supply voltage.

#### 4.1.2 Temperature

The MES shall fulfil all the requirements in the full temperature ranges of:

- -10 °C to +55 °C;

taken from IEC publications 60068-2-1 [7] and 60068-2-2 [8].

#### 4.1.3 Voltage

The nominal, lower and the higher extreme voltages shall be defined for the intended use of the MES and provided with the EUT documentation.

The MES shall fulfil all the requirements in the full voltage range between the extreme voltages.

### 4.2 Conformance requirements

#### 4.2.1 Unwanted emissions outside the band 1 610 MHz to 1 626,5 MHz and the band 1 626,5 MHz to 1 628,5 MHz (carrier-on)

##### 4.2.1.1 Justification

Protection of other radio services operating outside the band 1 610 MHz to 1 628,5 MHz from emissions caused by S-PCN MESs operating within the band 1 610 MHz to 1 626,5 MHz.

##### 4.2.1.2 Technical requirements

The maximum EIRP density of the unwanted emissions from the MES outside the band 1 610,0 MHz to 1 626,5 MHz and the band 1 626,5 MHz to 1 628,5 MHz shall not exceed the limits in table 3.

In table 3, whenever a change of limit between adjacent frequency bands occurs, the lower of the two limits shall apply at the transition frequency.

Table 2: Void

Table 3: Maximum unwanted emissions outside the band 1 610 MHz to 1 626,5 MHz and the band 1 626,5 MHz to 1 628,5 MHz

| Frequency (MHz)    | Carrier-on                 |                       |                      |
|--------------------|----------------------------|-----------------------|----------------------|
|                    | EIRP (dBW)                 | Measurement bandwidth | Measurement method   |
| 0,1 to 30          | -66                        | 10 kHz                | Peak-hold            |
| 30 to 1 000        | -66                        | 100 kHz               | Peak-hold            |
| 1 000 to 1 559     | -60                        | 1 MHz                 | Average              |
| 1 559 to 1 580,42  | -70                        | 1 MHz                 | Average (see note 1) |
| 1 580,42 to 1 605  | -70                        | 1 MHz                 | Average              |
| 1 605 to 1 610     | -70 to -10<br>(see note 2) | 1 MHz                 | Average              |
| 1 610 to 1 626,5   | Not applicable             | Not applicable        | Not applicable       |
| 1 626,5 to 1 628,5 | Not applicable             | Not applicable        | Not applicable       |
| 1 628,5 to 1 631,5 | -60                        | 30 kHz                | Average              |
| 1 631,5 to 1 636,5 | -60                        | 100 kHz               | Average              |
| 1 636,5 to 1 646,5 | -60                        | 300 kHz               | Average              |
| 1 646,5 to 1 666,5 | -60                        | 1 MHz                 | Average              |
| 1 666,5 to 2 200   | -60                        | 3 MHz                 | Average              |
| 2 200 to 12 750    | -60                        | 3 MHz                 | Peak hold            |

NOTE 1: In the sub-band 1 573,42 MHz to 1 580,42 MHz, the average measurement time is 20 ms.  
NOTE 2: Linearly interpolated in dBW vs. frequency offset.

The conformance requirements apply for the full range of environmental conditions corresponding to the type of equipment as specified in clause 4.1.

#### 4.2.1.3 Conformance test

Conformance tests are described in clause 5.2.2.

### 4.2.2 Unwanted emissions within the band 1 610 MHz to 1 626,5 MHz and the band 1 626,5 MHz to 1 628,5 MHz (carrier-on)

#### 4.2.2.1 Justification

Protection of radio services and systems operating within the frequency band 1 610 to 1 628,5 MHz from unwanted emissions caused by S-PCN MESs operating in the band 1 610 MHz to 1 626,5 MHz.

#### 4.2.2.2 Technical requirements

The maximum EIRP spectral density of the unwanted emissions from the MES within the band 1 610 MHz to 1 628,5 MHz shall not exceed the limits in tables 4, 5 or 6, as applicable.

In tables 4, 5 and 6, whenever a change of limit between adjacent frequency bands occurs, the lower of the two limits shall apply at the transition frequency.

When conflicts between multiple requirements exist, the more stringent requirement applies.

**Table 4: Maximum unwanted emissions within the band 1 610,0 MHz to 1 626,5 MHz and the band 1 626,5 MHz to 1 628,5 MHz of MES operating such that the nominated bandwidth is entirely or partially contained in the frequency band 1 618,25 MHz to 1 626,5 MHz**

| Frequency offset (kHz)<br>(see note 1) | Carrier - on               |                                             |                    |
|----------------------------------------|----------------------------|---------------------------------------------|--------------------|
|                                        | EIRP (dBW)<br>(see note 3) | Measurement bandwidth (kHz)<br>(see note 2) | Measurement method |
| 0 to 160                               | -35                        | 30                                          | Average            |
| 160 to 225                             | -35 to -38,5               | 30                                          | Average            |
| 225 to 650                             | -38,5 to -45               | 30                                          | Average            |
| 650 to 1 365                           | -45                        | 30                                          | Average            |
| 1 365 to 1 800                         | -53 to -56                 | 30                                          | Average            |
| 1 800 to 16 500                        | -56                        | 30                                          | Average            |

NOTE 1: Frequency offset is determined from:

- i) the nearest edge of the nominated bandwidth of the nominal carrier closest to the MSS system operating in another operational band within the band 1 610 MHz to 1 626,5 MHz. The frequency offset is measured in the direction of the adjacent MSS system;
- ii) the upper edge of the nominated bandwidth of the carrier under test for emissions within the band 1 626,5 MHz to 1 628,5 MHz.

NOTE 2: The measurement bandwidth used can be 3 kHz if the unwanted EIRP limits are reduced correspondingly.

NOTE 3: Linearly interpolated in dBW vs. frequency offset.

**Table 5: Maximum unwanted emissions within the band 1 610,0 MHz to 1 626,5 MHz and the band 1 626,5 MHz to 1 628,5 MHz of MES operating such that the nominated bandwidth is entirely contained in the frequency band 1 610,0 MHz to 1 618,25 MHz**

| Frequency offset (kHz)<br>(see note 1) | Carrier - on               |                                             |                    |
|----------------------------------------|----------------------------|---------------------------------------------|--------------------|
|                                        | EIRP (dBW)<br>(see note 3) | Measurement bandwidth (kHz)<br>(see note 2) | Measurement method |
| 0 to 160                               | -32                        | 30                                          | Average            |
| 160 to 2 300                           | -32 to -56                 | 30                                          | Average            |
| 2 300 to 18 500                        | -56                        | 30                                          | Average            |

NOTE 1: Frequency offset is determined from:

- i) the nearest edge of the nominated bandwidth of the nominal carrier closest to the MSS system operating in another operational band within the band 1 610 to 1 626,5 MHz. The frequency offset is measured in the direction of the adjacent MSS system;
- ii) the upper edge of the nominated bandwidth of the carrier under test for emissions within the band 1 626,5 to 1 628,5 MHz.

NOTE 2: The measurement bandwidth used can be 3 kHz if the unwanted EIRP limits are reduced correspondingly.

NOTE 3: Linearly interpolated in dBW vs. frequency offset.

**Table 6: Maximum unwanted emissions of MES carriers within the operational band of CDMA carriers**

| Frequency offset (kHz)<br>(see note 1) | Carrier - on               |                             |                    |
|----------------------------------------|----------------------------|-----------------------------|--------------------|
|                                        | EIRP (dBW)<br>(see note 2) | Measurement bandwidth (kHz) | Measurement method |
| 0 to 70                                | -6 to -20                  | 30                          | Average            |
| 70 to 600                              | -20 to -28                 | 30                          | Average            |
| 600 to 2 000                           | -28 to -45                 | 30                          | Average            |
| 2 000 to 5 000                         | -45 to -69                 | 30                          | Average            |
| 5 000 to 16 500                        | -69                        | 30                          | Average            |

NOTE 1: Frequency offset is determined from edge of nominated bandwidth.

NOTE 2: Linearly interpolated in dBW vs. frequency offset.

The conformance requirements apply for the full range of environmental conditions corresponding to the type of equipment as specified in clause 4.1.

### 4.2.2.3 Conformance test

Conformance tests are described in clause 5.2.3.

## 4.2.3 EIRP density within the operational band

### 4.2.3.1 Justification

To ensure that the maximum EIRP spectral density within the band 1 610 MHz to 1 626,5 MHz does not exceed the limits defined by the Final Acts of WRC-95 [6], S5.364.

### 4.2.3.2 Technical requirements

In any frequency sub-band of the band 1 610 MHz to 1 626,5 MHz, where the MES operates, one of the two following requirements shall apply under specific operating conditions:

- a) The MES shall not produce a mean EIRP density exceeding -3 dB (W/4 kHz), (mean limit).

NOTE: In this context, the mean is the mean over time whilst the MES is in the carrier-on mode. Or,

- b) The MES shall not produce a peak EIRP density exceeding -15 dB (W/4 kHz) (peak limit).

The specific frequency sub-band(s) and operating conditions, for which the two different limits apply, shall be defined for the intended use of the MES and provided with the EUT documentation.

These requirements apply to all types of MES, for every transmit channel of the MES in its operational band or sub-bands.

The conformance requirements apply for the full range of environmental conditions corresponding to the type of the equipment as described in clause 4.1.

### 4.2.3.3 Conformance test

Conformance tests are described in clause 5.2.4.

## 4.2.4 Unwanted emissions in carrier-off state

### 4.2.4.1 Justification

Protection of other radio services and systems from unwanted emissions caused by MESs in the carrier-off state.

### 4.2.4.2 Technical requirements

The maximum EIRP of the unwanted emissions from the MESs in the carrier-off state shall not exceed the limits in table 7.

In table 7, whenever a change of limit between adjacent frequency bands occurs, the lower of the two limits shall apply at the transition frequency.

**Table 7: Maximum EIRP of the unwanted emissions in the carrier-off state**

| Frequency (MHz) | EIRP (dBW) | Measurement Bandwidth | Measurement method |
|-----------------|------------|-----------------------|--------------------|
| 0,1 to 30       | -87        | 10 kHz                | peak hold          |
| 30 to 1 000     | -87        | 100 kHz               | peak hold          |
| 1 000 to 12 750 | -77        | 100 kHz               | peak hold          |

The conformance requirements apply for the full range of environmental conditions corresponding to the type of equipment as specified in clause 4.1.