



**SLOVENSKI STANDARD**  
**SIST EN 301 447 V1.1.1:2008**

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nYa Y'g\_Y'dcghUYY]bU'UX'U žXYi 'c Yj 'ZY\_j Yb b] 'dUgcj ]\ '(#'; <nžfUndcfY'Yb]\  
nUz\_gbY'gUHf]hg\_Y'g]cf]hj Y'f GGž\_'nUYa UV]ghj YbY'nU h]j Y' `YbU' "&'X]fY\_hj Y  
F/ HH9

Satellite Earth Stations and Systems (SES) - Harmonized EN for satellite Earth Stations on board Vessels (ESVs) operating in the 4/6 GHz frequency bands allocated to the Fixed Satellite Service (FSS) covering essential requirements of article 3.2 of the R&TTE directive

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33.060.30	Radiorelejni in fiksni satelitski komunikacijski sistemi	Radio relay and fixed satellite communications systems
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# ETSI EN 301 447 V1.1.1 (2007-08)

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*Harmonized European Standard (Telecommunications series)*

**Satellite Earth Stations and Systems (SES);  
Harmonized EN for satellite Earth Stations on board  
Vessels (ESVs) operating in the 4/6 GHz frequency bands  
allocated to the Fixed Satellite Service (FSS)  
covering essential requirements of  
article 3.2 of the R&TTE directive**

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**ETSI**

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## Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Directive 98/34/EC [3] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [1] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Technical specifications relevant to Directive 1999/5/EC [1] are given in annex A.

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## Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive. The modular structure is shown in EG 201 399.

### Remarks on the present document

The determination of the parameters of the user earth stations using a given geo-stationary satellite for the protection of the spectrum allocated to that satellite, is considered to be under the responsibility of the satellite operator or the satellite network operators.

The requirements have been selected to ensure an adequate level of compatibility with other radio services. The levels, however, do not cover extreme cases which may occur in any location but with a low probability of occurrence.

The present document is based on the application of ITU-R Resolution 902 (WRC-03) (see bibliography).

The present document may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or a continuous phenomenon is present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference, or the interfered part or both.

The present document does not contain any requirement, recommendation or information about the installation of the ESV.

All parts of the below-deck unit related to reception, processing and presentation of the received information except the control channel are not within the scope of the present document. The syntax of the control channel messages is outside the scope of the present document.

The present document is based upon the standard for environmental conditions for marine navigational equipment, EN 60945 [4]. In addition, attention should be paid to clause 11.1 (Acoustic noise and signals), and clause 11.2 (Compass safe distance) of EN 60945 [4].

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# 1 Scope

The present document applies to Earth Stations located on board Vessels (ESVs) which have the following characteristics:

- The ESV is comprised of all the equipment, electrical and mechanical, from the antenna itself to the interface with other communications equipment on board (usually referred to as the terrestrial interface).
- The ESV transmits in the frequency range from 5 925 MHz to 6 425 MHz allocated to the Fixed Satellite Services (FSS) (earth-to-space).
- The ESV receives in one or more frequencies within the range from 3,700 GHz to 4,200 GHz in the bands allocated to the Fixed Satellite Services (FSS) (space-to-earth), depending on the ITU Region where the ESV is located.
- The ESV transmits a single carrier.
- The ESV uses linear or circular polarization.
- The ESV operates through a geostationary satellite at least 2° to 3° away from any other geostationary satellite operating in the same frequency band and covering the same area.

NOTE 1: The satellite spacing is mainly equal to 3° in ITU Regions 1 and 3 and 2° in ITU Region 2.

The ESV transmits at elevations greater or equal to the minimum elevation angle declared by the applicant.

- The ESV antenna diameter is not smaller than 2,4 m.
- The ESV is designed for transmission and reception of radio-communications signals in accordance with any of the frequency bands specified above.
- The ESV is usually designed for unattended operation.
- The ESV is operating as part of a satellite network (e.g. star, mesh or point-to-point) used for the distribution and/or exchange of information between users.
- The ESV is controlled and monitored by a Network Control Facility (NCF). The NCF is outside the scope of the present document.

The present document applies to the ESV with its ancillary equipment and its various telecommunication ports, and when operated within the boundary limits of the operational environmental profile declared by the applicant and when installed as required by the applicant by declaration or in the user documentation.

The present document is intended to cover the provisions of Directive 1999/5/EC [1] (R&TTE Directive) Article 3.2, which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

The present EN incorporates the technical limitations listed in annex 2 of ITU-R Resolution 902 (WRC-03), ECC Report (05)69, and ECC Report (06)91 (see bibliography).

NOTE 2: According to Res. 902, any transmission from ESVs within the 300 km minimum distance of each country where the ESV transmit frequency band is used by the Fixed Service will be subject to the prior agreement of the concerned administration(s), which may specify additional operational requirements, or to the relevant ECC Decision.

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of Article 3 of the Directive 1999/5/EC [1] (R&TTE Directive) may apply to equipment within the scope of the present document.

NOTE 3: A list of such ENs is included on the web site <http://www.newapproach.org/>.

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## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] CISPR 16-1 (2003): "Specification for radio disturbance and immunity measuring apparatus and methods".
- [3] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.
- [4] IEC EN 60945 (2002): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".
- [5] ITU-R Radio Regulations (2004).
- [6] CISPR 16-1-5 (2003): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-5: Radio disturbance and immunity measuring apparatus - Antenna calibration test sites for 30 MHz to 1 000 MHz".

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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in the Directive 1999/5/EC [1] and the following apply:

**above-deck unit:** part of the ESV intended to be installed above deck, as declared by the applicant, or as indicated in the user documentation

The above-deck unit usually comprises the following main parts:

- a) the antenna sub-system which converts the incident radiation field into a guided wave and vice versa;
- b) the Low Noise Block (LNB) down converter, which is a device that amplifies, with very low internal noise, the received signals in the Radio Frequency (RF) band and converts them to intermediate frequencies;
- c) the up-converter and the power amplifier which convert from the intermediate frequency to RF and amplify the low level RF signals for transmission through the antenna subsystem;

- d) the stabilization and tracking subsystems that ensure pointing of the antenna main beam towards the satellite within the required accuracy.

NOTE: The installation equipment (means of attachment) is outside the scope of the present document. However, the antenna structures and other components directly mounted on the antenna and forming an integral part of it, are subject to the specifications of the present document.

**ancillary equipment:** equipment used in connection with an ESV is considered as ancillary if the three following conditions are met:

- the equipment is intended for use in conjunction with the ESV to provide additional operational and/or control features (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis, to provide user functions independently of the ESV; and
- the absence of the equipment does not inhibit the operation of the ESV.

**applicant:** manufacturer or his authorized representative within the European Community or the person responsible for placing the apparatus on the market

**below-deck unit:** part of the ESV equipment which is installed inside the vessel (i.e. below deck) and its connection cables with the above deck units

**carrier-off radio state:** radio state in which the ESV may transmit and does not transmit any carrier

NOTE 1: The phrase "the ESV may transmit" means that all the conditions for transmission are satisfied (e.g. in a state where transmissions are permitted, no failure detected, and the ESV is correctly pointed towards the satellite).

NOTE 2: The existence of a "Carrier-off" radio state depends on the system of transmission used. For ESVs designed for continuous transmission mode there may be no "Carrier-off" radio state.

**carrier-on radio state:** radio state in which the ESV may transmit and transmits a carrier

**Control Channel (CC):** channel or channels by which ESVs receive control information from the NCF

**EIRP<sub>max</sub>:** maximum e.i.r.p. capability of the ESV as declared by the applicant

**emissions disabled radio state:** radio state in which the ESV must not emit

NOTE: Examples of cases where the ESV is in this radio state: before system monitoring pass, before information of the control channel is correctly received, when a failure is detected, when the ESV is commanded to disable, and when the ESV is in a location requiring cessation of emissions.

**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

**external control channel:** control channel which is either (i) carried by the ESV network via the same or another satellite, but not within the internal protocol of the ESV system, or (ii) carried by any other radio communication system

**external response channel:** response channel which is either (i) carried by the ESV network via the same or another satellite, but not within the internal protocol of the ESV system, or (ii) carried by any other radio communication system

**integral antenna:** antenna which may not be removed during the tests according to the applicant's statement

**internal control channel:** control channel which is carried by the ESV network via the same satellite as used for transmission of user data and within the internal protocol structure of the ESV system

**internal response channel:** response channel which is carried by the ESV network via the same satellite as used for transmission of user data and within the internal protocol structure of the ESV system

**network:** a network is any network configuration including star, mesh and point-to-point configurations

**Network Control Facility (NCF):** set of functional entities that, at system level, monitor and control the correct operation of all ESVs in a network

**nominated bandwidth:** bandwidth of the ESV radio frequency transmission nominated by the applicant

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 encompass all spectral elements of the transmission which have a level greater than the specified spurious radiation limits. 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.

**occupied bandwidth:**

- for a digital modulation scheme: the width of the signal spectrum between the points 10 dB below the maximum in-band density;
- for an analogue modulation scheme-the width of a frequency band such that, below the lower and above the upper frequency limits, the mean power emitted is equal to 0,5 % of the total mean power of the emission.

**off-axis angle:** angle between the direction of the axis of the antenna main beam and the considered direction

**removable antenna:** antenna which may be removed during the tests according to the applicant's statement

**Response Channel (RC):** channel by which the ESV transmits monitoring information to the NCF

**spurious radiation:** any radiation outside the nominated bandwidth

**Transmission disabled state:** ESV is in this state when it is not authorized by the NCF to transmit

**Transmission enabled state:** ESV is in this state when it is authorized by the NCF to transmit

**XPD<sub>ESV</sub>:** maximum cross polar discrimination capability of the ESV antenna as declared by the applicant

## 3.2 Symbols

SIST EN 301 447 V1.1.1:2008

<https://standards.iteh.ai/catalog/standards/sist/b3b94843-238a-4fa3-b97c->

[a2118ad36e4b/sist-en-301-447-v1-1-1-2008](https://standards.iteh.ai/catalog/standards/sist/b3b94843-238a-4fa3-b97c-a2118ad36e4b/sist-en-301-447-v1-1-1-2008)

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

dBc	Ratio expressed in decibels relative to the e.i.r.p. of the unmodulated carrier
dB <sub>i</sub>	Ratio of an antenna gain to the gain of an isotropic antenna, expressed in decibels
dBW	Ratio of a power to 1 watt, expressed in decibels
dBpW	Ratio of a power to 1 pico watt, expressed in decibels
dBμV/m	Ratio of an electric field to 1 μV/m, expressed in decibels (20 log(electric field / 1 μV/m))

## 3.3 Abbreviations

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

CC	Control Channel
CCF	Control Channel reception Failure
CCR	Control Channel correctly Received
CENR	Cessation of Emissions Not Requested
CEPT	Conférence Européenne des Postes et Télécommunications (European Conference of Postal and Telecommunications Administrations)
CER	Cessation of Emissions Requested
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference)
CMF	Control and Monitoring Functions
e.i.r.p.	equivalent isotropically radiated power
ECC	Electronic Communications Committee (of CEPT)
EMC	Electro-Magnetic Compatibility
EN	European Standard
ESV	Earth Station on board a Vessel
EUT	Equipment Under Test

FEC	Forward Error Correction
FSS	Fixed Satellite Service
GSO	Geostationary Satellites Orbit
IPR	Intellectual Property Rights
ITU	International Telecommunications Union
LHCP	Left Hand Circular Polarization
LNB	Low Noise Block
LO	Local Oscillator
LV	Low Voltage
NCF	Network Control Facility
p.s.d	power spectral density
R&TTE	Radio and Telecommunications Terminal Equipment
RC	Response Channel
RF	Radio Frequency
RHCP	Right Hand Circular Polarization
SMF	System Monitoring Fail
SMP	System Monitoring Pass
STE	Special Test Equipment
TxD	Transmission Disable command
TxE	Transmission Enable command
WRC	ITU World Radio Conference
XPD	cross Polar Discrimination

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## 4 Technical requirements specifications

iTeh STANDARD PREVIEW

### 4.1 General (standards.iteh.ai)

#### 4.1.1 Environmental profile

<https://standards.iteh.ai/catalog/standards/sist/b3b94843-238a-4fa3-b97c-42115a030c49/sist-en-301-447-v1-1-2008>

Before carrying out any other tests specified in the present document, survivability testing of the ESV shall be conducted under the following clauses of EN 60945 [4]:

- Clause 8.1: General.
- Clause 8.3: Damp heat.
- Clause 8.7: Vibration.

The components of the ESV may be subject to different operational environmental conditions and shall maintain their performance in accordance with the present document under all environmental circumstances for the environmental classes applicable to them as defined in EN 60945 [4]. Specifically, the operational environmental conditions for:

- "protected" class shall apply to the below deck equipment; and
- "exposed" class shall apply to the above deck equipment.

#### 4.1.2 Operational configurations

Under operational conditions an ESV may dynamically change the occupied bandwidth and other transmission parameters (e.g. FEC, modulation, symbol rate) of the transmitted signal. For each occupied bandwidth an  $EIRP_{max}$  and a nominated bandwidth shall be declared by the applicant. The nominated bandwidth shall be centred on the transmit frequency and does not exceed 5 times the occupied bandwidth.

The following specifications apply to the ESV for each occupied bandwidth and other transmission parameters.