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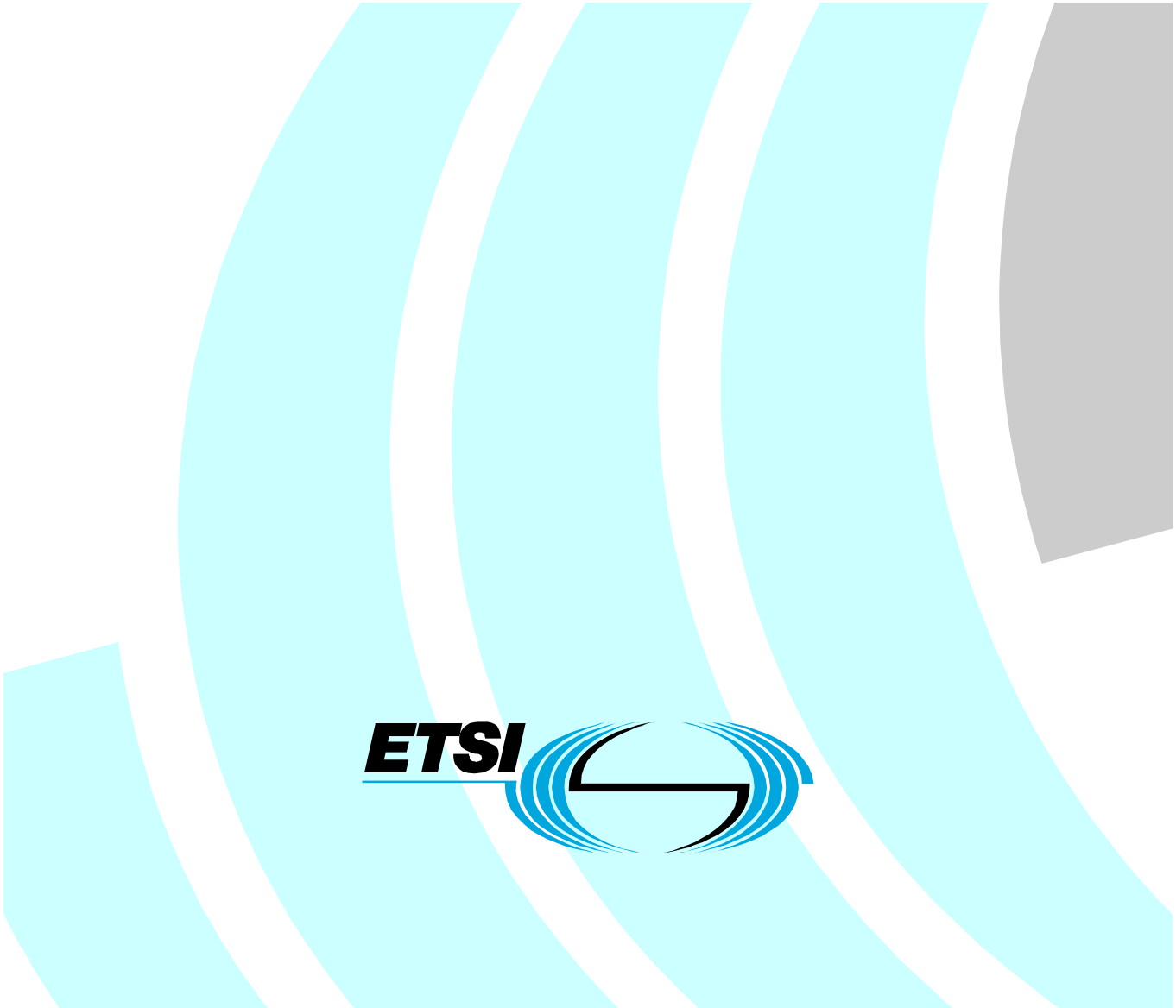
Candidate Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 6: Specific conditions for Earth Stations on board Vessels operating in frequency bands above 3 GHz



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Contents

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Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under the Council Directive 98/34/EC [5] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulation.

The present document, together with EN 301 843-1 [1], is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC [3] as amended), and 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 (the "R&TTE Directive" [2]).

EN 301 843-1 [1] is based upon the standard for marine navigational equipment EN 60945 [4] particularly clauses 9 (Electromagnetic emission) and 10 (Immunity to electromagnetic environment).

The present document is part 6 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

1 Scope

The present document together with EN 301 843-1 [1], covers the assessment of Earth Stations on board Vessels (ESVs) transmitting above 3 GHz in the Fixed Satellite Service (FSS) as defined in annex A and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

Technical specifications related to the antenna port and emissions from the enclosure port of Earth Stations on board Vessels are not included in the present document. Such technical specifications are found in the related product standards for the effective use of the radio spectrum.

The present document specifies the applicable test conditions, performance assessment, and performance criteria for Earth Stations on board Vessels and the associated ancillary equipment.

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and EN 301 843-1 [1], the provisions of the present document take precedence.

The electromagnetic environment used in the present document to develop the technical specifications encompasses the electromagnetic environment onboard ships as identified in EN 60945 [4].

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.

[1] ETSI EN 301 843-1 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements".

[2] 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).

[3] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).

[4] CENELEC EN 60945 (2002): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".

[5] 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.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 301 843-1 [1] and the following apply:

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

NOTE 1: 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 2: 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.

below-deck unit: is composed of that part of the ESV equipment which is not part of the above-deck unit. This unit is installed inside the vessel and is connected to the above-deck unit. The connection cable between the above and below-deck units is considered part of the below-deck unit

carrier-off state: ESV is in this state when it is authorized by the Centralized Control and Monitoring Functions (CCMF) to transmit, but when it does not transmit any signal

NOTE: The existence of a carrier-off state depends on the system of transmission used. For ESV designed for continuous transmission mode there may be no carrier-off state.

carrier-on state: ESV is in this state when it is authorized by the CCMF to transmit and when it transmits a signal

transmission enabled state: ESV is in this state when it is authorized by the CCMF to transmit

transmission disabled state: ESV is in this state when it is not authorized by the CCMF to transmit

3.2 Abbreviations

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

CCMF	Centralized Control and Monitoring Functions
EIRP	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
ESV	Earth Station on board a Vessel
EUT	Equipment Under Test
FSS	Fixed Satellite Service
IF	Intermediate Frequency
LNB	Low Noise Block converter
QTMA	Quality of Transmission Measurement Apparatus
RF	Radio Frequency

4 Test conditions

4.1 General

For the purposes of the present document, the test conditions of EN 301 843-1 [1], clause 4, shall apply as appropriate. Further product type related test conditions for Earth Stations on board Vessels are specified in the present document.

For emission and immunity tests the normal test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5 shall apply.

For Earth Stations on board Vessels with or without ancillary equipment, and/or various telecommunication ports, the number of test configurations shall be determined. The assessment shall include sufficient representative configurations of the ESV to adequately exercise the equipment. These configurations shall be recorded in the test report.

In the following clauses, the Equipment Under Test (EUT) is an ESV with the selected configuration of ancillary equipment.

4.2 Arrangements for test signals

The provisions of EN 301 843-1 [1], clause 4.2 shall apply with the following modifications.

In order to measure the unwanted emissions and electromagnetic immunity under operational conditions, the following arrangements shall be provided by the manufacturer:

a) the specific test equipment and/or procedures to put the ESV terminal in its normal operating mode, and providing the ESV with a receive signal to emulate the operational conditions of reception. This equipment shall control the EUT, when it is capable of transmission, so that it switches between the transmission disabled, carrier-on and carrier-off states;

b) the specific Quality of Transmission Measurement Apparatus (QTMA). The QTMA shall also monitor and record the stability of the antenna tracking during testing.

For the measurement of the quality of transmission a communications link shall be established and the wanted input signal shall be applied to the Radio Frequency (RF) input of the receiver via the antenna.

4.2.1 Arrangements for test signals at the input of the transmitter

The provisions of EN 301 843-1 [1], clause 4.2.1 shall apply.

4.2.2 Arrangements for test signals at the output of the transmitter

The provisions of EN 301 843-1 [1], clause 4.2.2 shall apply.

4.2.3 Arrangements for test signals at the input of the receiver

The provisions of EN 301 843-1 [1], clause 4.2.3 shall apply with the following modification.

For tests on the receiver, due to the fact that for satellite earth stations the receive margin is considerably lower than 40 dB, the level of the signal received from the test transmitter shall be as close as possible to the normal operation level of the EUT receiver.

4.2.4 Arrangements for test signals at the output of the receiver

The provisions of EN 301 843-1 [1], clause 4.2.4 shall apply as appropriate.

4.2.5 Arrangements for testing transmitter and receiver together (as a system)

The provisions of EN 301 843-1 [1], clause 4.2.5 shall apply as appropriate. For ESVs that are normally able to transmit and receive simultaneously on different frequencies, no special arrangements for testing transmitter and receiver together are required.

4.3 Exclusion bands

There are no exclusion bands for ESVs at the operating frequencies. However an exclusion band(s) equal to the Intermediate Frequency (IF) bandwidth(s) ±10 % may be declared by the manufacturer.

For the tests in the present document, the cable lengths between the above and below deck units should be the maximum lengths declared by the manufacturer. For maximum cable lengths longer than 10 m the tests may be performed with cables limited to 10 m.

4.4 Narrow band responses of receivers

Narrow band responses are not allowed for ESVs within the scope of the present document.

4.5 Normal test modulation

The provisions of EN 301 843-1 [1], clause 4.5 shall apply with the following modifications. The characteristics of the test signal (e.g. test patterns or message simulator or test voice signal) used for immunity testing shall be declared by the manufacturer.

5 Performance assessment

5.1 General

The provision of EN 301 843-1 [1], clause 5.1 shall apply. In addition the manufacturer shall provide the following information to be recorded in the test report:

- the dedicated grade (A or B) for the EUT in accordance with the information contained in the instructions accompanying the ESV (see EN 301 843-1[1], clause 5.3).

5.2 Equipment which can provide a continuous communication link

The provisions of EN 301 843-1 [1], clause 5.2 shall apply.

5.3 Equipment which does not provide a continuous communication link

The provisions of EN 301 843-1 [1], clause 5.3 shall apply.

5.4 Ancillary equipment

The provisions of EN 301 843-1 [1], clause 5.4 shall apply.

5.5 Equipment classification

ESVs belong solely to the category of mobile marine radio equipment as defined in EN 301 843-1 [1], clause 5.5.

5.6 Equipment configuration(s)

For the purpose of measurements in the carrier-on state, the ESV shall be put in a continuous transmit mode or to the maximum burst rate where applicable. The ESV shall be operated at the highest normal operating Equivalent Isotropically Radiated Power (EIRP) or, if that is the maximum attainable, then 3 dB below such maximum.

An example of a test configuration is shown in figure 1.

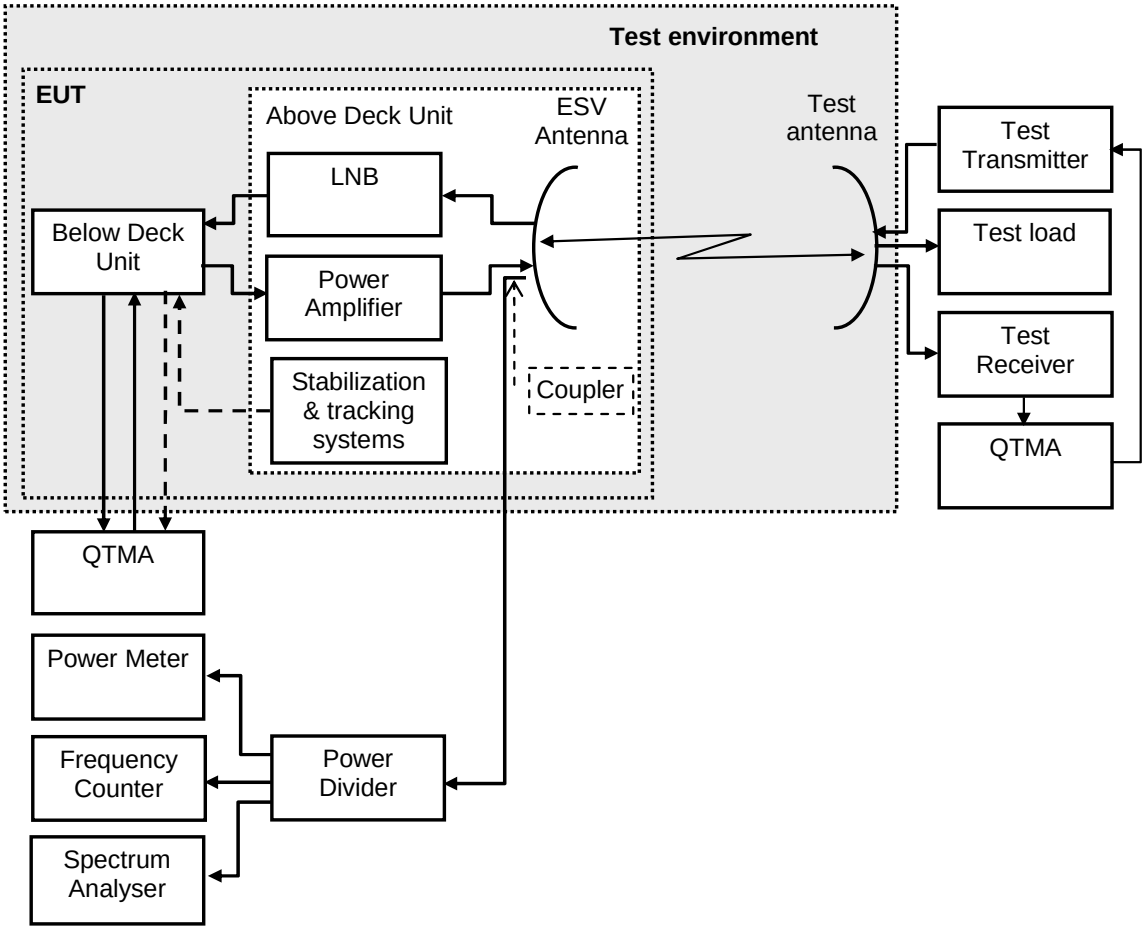

Figure 1: Example test configuration

For the tests, the ESV antenna reflector and the test antenna may be removed at their flanges and be replaced by a direct connection. In which case, the manufacturer shall provide a means to monitor tracking deviations generated by the ESV during the test procedures.

The following test equipment may be used to verify the correct operation of the EUT:

a) the power meter measures the output power and is used to confirm the transmission disabled, carrier-on and carrier-off states and output level consistency;

b) the frequency counter measures the centre frequency of the radiated carrier in the absence of modulation;

c) the spectrum analyser measures the bandwidth of the transmission;

d) the test receiver is used to demodulate the transmitted signal;

e) the QTMA is used to assess the quality of transmission and tracking deviations;

f) the test transmitter is used to control the switching between transmission disabled, carrier-on and carrier-off states by transmitting the control and monitoring signals.

6 Performance criteria

The provisions of EN 301 843-1 [1], clause 6 shall apply.

The equipment are classified into the two grades of service, each with specific performance criteria:

- grade A of ESV for which short interruptions of transmission are accepted during immunity testing with EMC transient phenomena;
- grade B of ESV for which no short interruption of transmission is accepted during immunity testing with EMC transient phenomena.

The applicable grade A or B shall be declared by the manufacturer, it shall be in accordance with the information contained in the instructions accompanying the ESV, and shall be recorded in the test report.

The definition of the functions of the EUT, including its ancillary equipment, to be checked during and after the EMC tests shall be declared by the manufacturer and recorded in the test report.

The equipment shall meet the minimum performance criteria as specified in clauses 6.1 to 6.3 and additionally the functions as declared by the manufacturer.

6.1 Performance criteria A for continuous phenomena applied to transmitters and receivers

The provisions of EN 301 843-1 [1], clause 6.1 shall apply with the following modification.

The EUT shall be considered to satisfy the immunity if the following conditions are met during and after the exposure:

a) the quality of transmission observed is no worse than that declared by the manufacturer;

b) the EUT is able to be placed in the transmission disabled state, and does not leave that state without being commanded;

c) when the EUT is in the transmission disabled state there is no change in the signal level;

d) when the EUT is in the carrier-on state there is no change in the signal level or frequency;

e) when the EUT is in the carrier-off state there is no increase of the signal level;

f) for ESVs capable of transmitting, under no circumstances does the transmitter operate unintentionally during the test;

g) the tracking deviations shall be no worse than that declared by the manufacturer;

h) the EUT operates as intended with no loss of user control functions, stored data and the communications link.

6.2 Performance criteria B for transient phenomena applied to transmitters and receivers

6.2.1 Performance criteria (B_A) for transient phenomena applied to a grade A EUT

The provisions of EN 301 843-1 [1], clause 6.2 shall apply with the following modification.

The EUT shall be considered to satisfy the immunity specifications if the following conditions are met:

- during and after the series of individual exposures:

  a) the EUT is able to be placed in the transmission disabled state, and does not leave that state without being commanded;

  b) when the EUT is in the transmission disabled state there is no change in the signal level;

  c) when the EUT is in the carrier-on state there is no change in the signal frequency or increase of the signal level;

  d) when the EUT is in the carrier-off state there is no increase of the signal level;

  e) for ESVs capable of transmitting, under no circumstances does the transmitter operate unintentionally during the test;

  f) the tracking deviations shall be no worse than that declared by the manufacturer;

- at the conclusion of each exposure the quality of transmission observed shall be no worse than that declared by the manufacturer;

- at the conclusion of the total test comprising the series of individual exposures the EUT shall operate as intended with no loss of user control functions or stored data and the communications link shall remain maintained.

6.2.2 Performance criteria (B_B) for transient phenomena applied to a grade B EUT

The provisions of EN 301 843-1 [1], clause 6.2 shall apply with the following modification.

The EUT shall be considered to satisfy the immunity specifications if the following conditions are met during and after the series of individual exposures:

a) the quality of transmission observed is no worse than that declared by the manufacturer;

b) under the test conditions the EUT is able to be placed in the transmission disabled state, and does not leave that state without being commanded;

c) when the EUT is in the transmission disabled state there is no change in the signal level within the manufacturers specified limits;

d) when the EUT is in the carrier-on state there is no change in the signal level or frequency beyond the manufacturers specified limits;

e) when the EUT is in the carrier-off state there is no increase of the signal level beyond the manufacturers specified limits;

f) for ESVs capable of transmitting, under no circumstances does the transmitter operate unintentionally during the test;

g) the tracking deviations shall be no worse than that declared by the manufacturer;

h) the EUT shall operate as intended with no loss of user control functions, stored data and the communications link.

6.3 Performance criteria C applied to power supply failure

The provisions of EN 301 843-1 [1], clause 6.3 shall apply.

After power on reset the EUT shall meet the requirements of the performance check.

6.4 Performance check

The provisions of EN 301 843-1 [1], clause 6.4 shall apply with the following modification.

The EUT shall be considered to satisfy the performance check if the following conditions are met:

a) the EUT is able to be placed in the transmission disabled state, and does not leave that state without being commanded;

b) when the EUT is in the transmission disabled state there is no change in the signal level beyond the manufacturers specified limits;

c) when the EUT is in the carrier-on state there is no change in the signal frequency or increase of the signal level beyond the manufacturers specified limits;

d) when the EUT is in the carrier-off state there is no increase of the signal level beyond the manufacturers specified limits;

e) for ESVs capable of transmitting, under no circumstances does the transmitter operate unintentionally during the test;

f) the tracking deviations shall be no worse than that declared by the manufacturer within the manufacturers specified limits;

g) the quality of transmission observed shall be no worse than that declared by the manufacturer;

h) the EUT operates as intended with no loss of user control functions or stored data and the communications link remain maintained.

6.5 Performance criteria for equipment which does not provide a continuous communication link

The provisions of EN 301 843-1 [1], clause 6.5 shall apply.

6.6 Performance criteria for ancillary equipment tested on a stand alone basis

The provisions of EN 301 843-1 [1], clause 6.6 shall apply.

7 Applicability overview

7.1 Emission

7.1.1 General

EN 301 843-1 [1], table 1 contains the applicability of EMC emission measurements to the relevant ports of radio and/or associated ancillary equipment.

7.1.2 Special conditions

No special conditions shall apply to ESVs and associated ancillary equipment in the scope of the present document.

7.2 Immunity

7.2.1 General

EN 301 843-1 [1], table 2, contains the applicability of EMC immunity measurements to the relevant ports of radio and/or associated ancillary equipment.

7.2.2 Special conditions

No special conditions shall apply to ESVs and associated ancillary equipment in the scope of the present document.

Annex A (normative): Definitions of Earth Stations on board Vessels equipment within the scope of the present document

The provisions of the present document apply to earth stations on board vessels , and associated ancillary equipment, as set out in this annex.

A.1 Earth Stations on board Vessels operating in the 11GHz, 12GHz and 14 GHz frequency bands allocated to the Fixed Satellite Service (FSS)

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 (usually referred to as the telecommunication interface) and ancillary equipment.
- The ESV transmits in the frequency range from 14,00 GHz to 14,50 GHz allocated to the Fixed Satellite Services (FSS) (earth-to-space).
- The ESV receives in one or more frequencies within the range from 10,70 GHz to 12,75 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 operates through a geostationary satellite.
- The ESV is controlled and monitored by a Centralized Control and Monitoring Function (CCMF). The CCMF 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 manufacturer and when installed as required by the manufacturer by declaration or in the user documentation.

A.2 Earth Stations on board Vessels operating in the 6/4 GHz frequency bands allocated to the Fixed Satellite Service (FSS)

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 (usually referred to as the telecommunication interface) and ancillary equipment.
- 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 3 400 MHz to 4 200 MHz in the bands allocated to the Fixed Satellite Services (FSS) (space-to-earth).
- The ESV operates through a geostationary satellite.

- The ESV is controlled and monitored by Centralized Control and Monitoring Function (CCMF). The CCMF 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 manufacturer and when installed as required by the manufacturer by declaration or in the user documentation.

Annex B (informative): The EN title in the official languages

Language	EN title
Czech	
Danish	
Dutch	
English	
Estonian	
Finnish	
French	
German	
Greek	
Hungarian	
Icelandic	
Italian	
Latvian	
Lithuanian	
Maltese	
Norwegian	
Polish	
Portuguese	
Slovak	
Slovenian	
Spanish	
Swedish	

History

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