



**ElectroMagnetic Compatibility (EMC) standard
for marine radio equipment and services;
Harmonised Standard covering the essential requirements of
article 3.1b of the Directive 2014/53/EU;
Part 6: Specific conditions for Earth Stations on board
Vessels operating in frequency bands above 3 GHz**

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared in reply to the Commission's standardisation request Commission Implementing Decision C(2015) 5376 final of 04.08.2015 to provide a 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.

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 of [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.

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

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document together with ETSI 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 B 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 ETSI 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 CENELEC EN 60945 [i.2].

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

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The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 301 843-1 (V2.1.0) (12-2015): "ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Harmonised Standard covering the essential requirements of article 3.1b of the Directive 2014/53/EU; Part 1: Common technical requirements".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] 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.2] CENELEC EN 60945 (2002-10-01) + Corrigendum 1 (2008): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".

- [i.3] Commission Implementing Decision C(2015) 5376 final of 04.08.2015: Commission Implementing Decision 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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI 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: part of the ESV equipment which is not part of the above-deck unit

NOTE: 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 Symbols

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

emf	electromotive force
rms	root mean square
SINAD	(Signal + Noise + Distortion) / (Noise + Distortion)

3.3 Abbreviations

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

BA	Performance criteria grade A
BB	Performance criteria grade B
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 General and operational requirements

4.1 Environmental profile

For the purposes of the present document, the test conditions of ETSI 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

4.2.0 General

The provisions of ETSI 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:

- 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;
- 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 ETSI 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 ETSI 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 ETSI 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 ETSI 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 ETSI 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) $\pm 10\%$ 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 ETSI 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 ETSI 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 ETSI EN 301 843-1 [1], clause 5.3).

5.2 Equipment which can provide a continuous communication link

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