



**SLOVENSKI STANDARD**  
**oSIST prEN 303 135 V2.1.0:2016**  
**01-maj-2016**

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**Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) - Obalni nadzor, sistemi za nadzor plovbe in pristaniški radarji (CS/VTS/HR) - Harmonizirani EN, ki zajema bistvene zahteve člena 3.2 direktive 2014/53/EU**

Electromagnetic compatibility and Radio spectrum Matters (ERM) - Coastal Surveillance, Vessel Traffic Services and Harbour Radars (CS/VTS/HR) - Harmonized EN covering the essential requirements of article 3.2 of the Directive 2014/53/EU

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**Electromagnetic compatibility and  
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Coastal Surveillance,  
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Harmonized EN covering the essential requirements  
of article 3.2 of the Directive 2014/53/EU**

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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 under the Commission's standardisation request C(2015) 5376 final [i.12] 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.1].

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.

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Proposed National transposition dates	
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
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## 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).

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## Executive Summary

The present document covers the essential requirements for efficient use of radio spectrum by Coastal Surveillance, Vessel Traffic Services and Harbour Radars (CS/VTS/HR) in the bands between 8 500 MHz to 10 000 MHz using pulsed signals and a transmitting power up to 100 kW. The present document includes necessary changes due to adaption to the new Radio Equipment Directive [i.1].

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## Introduction

The present document intends to present a harmonized way of proving compliance to the essential requirements of the RE Directive [i.1] for important types of radar like Coastal Surveillance (CS), Vessel Traffic Services (VTS) and possibly harbour radars.

The emission limits implemented arise from ECC/Recommendation (02)05 [i.3] and ERC/Recommendation 74-01 [i.4].

The test methods used arise from Recommendation ITU-R M.1177-4 [2] and Recommendation ITU-R SM.1541-5 [1].

**NOTE:** The present document is closely related to ETSI EN 303 213-6-1 [i.11] which covers essential requirements for radars used in airport SMGCS systems, but which use largely the same type of radar technology.

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 RE Directive [i.1]. The modular structure is shown in ETSI EG 201 399 [i.7].

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# 1 Scope

The present document applies to X-band radar sensors intended for use in Vessel Traffic Services (VTS), Coastal Surveillance (CS) or Harbour Radar Systems with the following characteristics:

- Utilizing modulated or unmodulated pulses.
- Transmitter Peak Envelope Power up to 100 kW.
- The transceiver-antenna connection is using a hollow metallic rectangular waveguide.
- The antenna is rotating, waveguide- based and passive.
- At the transceiver output an RF-circulator is used.

NOTE 1: Since transceiver and antenna are hollow metallic rectangular waveguide based, the frequency range for measurements that needs to be addressed covers 6,56 GHz to 26 GHz. The lower limit of this frequency range is obtained as cut-off frequency of the combination of WR112/R84 taper section and a WR90/R100 Waveguide as defined by IEC 60153-2 [i.2]. The upper limit corresponds to the upper limit stated in ERC/Recommendation 74-01 [i.4]. Other types of waveguide may be used by the same principles to obtain complete measurement coverage of the frequency range of the output flange of the equipment under test.

NOTE 2: Since at the transceiver output an RF circulator is used, it is assumed that the transceiver characteristics remain independent from the antenna.

NOTE 3: According to article 5 of the ITU Radio Regulations [i.5] there are a number of bands between 8,5 GHz and 10 GHz that are allocated to Radiolocation service. There are national deviations to the detailed band usages, but the basic spectrum usage regulation is the same.

**Table 1: Radiolocation service frequency bands [GHz]**

8 500 - 8 550
8 550 - 8 650
8 650 - 8 750
8 750 - 8 850
8 850 - 9 000
9 000 - 9 200
9 200 - 9 300
9 300 - 9 500
9 500 - 9 800
9 800 - 9 900
9 900 - 10 000

The present document contains requirements to demonstrate that "...radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference" [i.1].

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 Radio Equipment Directive [i.1] may apply to equipment within the scope of the present document.

## 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 reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://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.

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

- [1] Recommendation ITU-R SM.1541-5 (08-2013): "Unwanted emissions in the out-of-band domain".
- [2] Recommendation ITU-R M.1177-4 (04-2011): "Techniques for measurement of unwanted emissions of radar systems".

## 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 reference 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] IEC 60153-2 (Edition 2.0, 1974): "Hollow metallic waveguides. Part 2: Relevant specifications for ordinary rectangular waveguides".
- [i.3] ECC/Recommendation (02)05 (2012): "Unwanted emissions".
- [i.4] ERC/Recommendation 74-01 (2011): "Unwanted emissions in the spurious domain".
- [i.5] ITU Radio Regulations (2012).
- [i.6] Void.
- [i.7] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of Harmonized Standards for application under the Radio & Telecommunication Terminal Equipment Directive 1999/5/EC (R&TTE) and a first guide on the impact of the Radio Equipment Directive 2014/53/EU (RED) on Harmonized Standards".
- [i.8] Void.
- [i.9] ETSI TR 100 028 (all parts) (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.10] ETSI TR 100 028-2 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".
- [i.11] ETSI EN 303 213-6-1: "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 6: Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU for deployed surface movement radar sensors; Sub-part 1: X-band sensors using pulsed signals and transmitting power up to 100 kW".
- [i.12] 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.

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

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

**necessary bandwidth:** width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions for a given class of emission

NOTE: This definition is taken from ITU Radio Regulations [i.5].

**occupied bandwidth:** width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage  $\beta/2$  of the total mean power of a given emission

NOTE 1: This definition is taken from ITU Radio Regulations [i.5].

NOTE 2: Unless otherwise specified in a Recommendation ITU-R for the appropriate class of emission, the value of  $\beta/2$  should be taken as 0,5 %.

**peak envelope power:** average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions

NOTE: This definition is taken from ITU Radio Regulations [i.5]).

**pulse duration:** time between the 50 % amplitude (voltage) points

**pulse rise time:** time taken for the leading edge of the pulse to increase from 10 % to 90 % of the maximum amplitude (voltage)

### 3.2 Symbols

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

$B_{-40}$	-40 dB bandwidth
$B_C$	Chirp bandwidth
$B_N$	Necessary bandwidth
$B_S$	Maximum range over which the carrier frequency is shifted
$B_{res}$	3 dB resolution bandwidth of transceiver
dB/dec	dB per decade
$dB_{pp}$	dB with respect to peak power
$P_t$	Pulse power of transmission
$t$	Time
$t_p$	Pulse duration
$t_r$	Pulse rise time
$t_f$	Pulse fall time
$\tau$	Pulse length including rise & fall times
$\lambda$	Wavelength

### 3.3 Abbreviations

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

AC	Alternating Current
CS	Coastal Surveillance
FM	Frequency Modulation
HR	Harbor Radar
LNA	Low Noise Amplifier
OoB	Out-of-Band
PEP	Peak Envelope Power
RED	Radio Equipment Directive