



SLOVENSKI STANDARD
SIST EN 302 194-1 V2.1.1:2026

01-september-2026

Navigacijski radarji za uporabo na celinskih vodnih poteh - Harmonizirani standard za dostop do radijskega spektra - 1. del: Magnetronski radarji

Navigation radars used on inland waterways - Harmonised Standard for access to radio spectrum - Part 1: Magnetron Radars

Sample Document

Ta slovenski standard je istoveten z: ETSI EN 302 194-1 V2.1.1 (2026-06)

get full document from standards.iteh.ai

ICS:

33.060.99	Druga oprema za radijske komunikacije	Other equipment for radiocommunications
47.020.70	Navigacijska in krmilna oprema	Navigation and control equipment

SIST EN 302 194-1 V2.1.1:2026 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

Sample Document

get full document from standards.iteh.ai

ETSI EN 302 194-1 V2.1.1 (2026-06)



HARMONISED EUROPEAN STANDARD

**Navigation radars used on inland waterways;
Harmonised Standard for access to radio spectrum;
Part 1: Magnetron Radars**

Sample Document

get full document from standards.iteh.ai

ReferenceDEN/ERM-TGMAR-540

Keywordsharmonised standard, maritime, navigation, radar,
radio**ETSI**650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from the
[ETSI Search & Browse Standards](#) application.

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format on [ETSI deliver](#) repository.

Users should be aware that the present document may be revised or have its status changed, this information is available in the [Milestones listing](#).

If you find errors in the present document, please send your comments to the relevant service listed under [Committee Support Staff](#).

If you find a security vulnerability in the present document, please report it through our [Coordinated Vulnerability Disclosure \(CVD\)](#) program.

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.
In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part of this document may be reproduced in any form, by any means and in any media, without the prior written authorization of ETSI and except as expressly permitted below.

By way of exception and when the document is a normative deliverable (European Standard (EN), Technical Specification (TS), Group Specification (GS) or ETSI Standard (ES)), ETSI authorizes to reproduce and incorporate into products, services and technical documentation only those extracts (e.g. templates) that are strictly necessary for the technical implementation of the normative deliverable, to ensure compliance with the latter. Nothing in this notice shall be construed as limiting any mandatory exceptions to copyright provided by applicable law.

© ETSI 2026.
All rights reserved.

Contents

Intellectual Property Rights	6
Foreword.....	6
Modal verbs terminology.....	7
1 Scope	8
2 References	8
2.1 Normative references	8
2.2 Informative references.....	8
3 Definition of terms, symbols and abbreviations.....	9
3.1 Terms.....	9
3.2 Symbols.....	10
3.3 Abbreviations	10
4 Technical requirements specifications	11
4.1 Environmental profile.....	11
4.2 Conformance requirements	11
4.2.1 Transmitter Requirements.....	11
4.2.1.1 Occupied Bandwidth.....	11
4.2.1.1.1 Definition.....	11
4.2.1.1.2 Limits	11
4.2.1.1.3 Conformance	11
4.2.1.2 Transmitter Peak Power	11
4.2.1.2.1 Definition.....	11
4.2.1.2.2 Limits	12
4.2.1.2.3 Conformance	12
4.2.1.3 Measured Bandwidth (B_{20}).....	12
4.2.1.3.1 Definition.....	12
4.2.1.3.2 Limits	12
4.2.1.3.3 Conformance	12
4.2.1.4 Out of Band Emissions.....	12
4.2.1.4.1 Definition.....	12
4.2.1.4.2 Limits	12
4.2.1.4.3 Conformance	13
4.2.1.5 Spurious Emissions	13
4.2.1.5.1 Definition.....	13
4.2.1.5.2 Limits	13
4.2.1.5.3 Conformance	14
4.2.1.6 Stand-by Mode Emissions.....	14
4.2.1.6.1 Definition.....	14
4.2.1.6.2 Limits	14
4.2.1.6.3 Conformance	14
4.2.2 Receiver Requirements	14
4.2.2.1 Receiver Sensitivity	14
4.2.2.1.1 Definition.....	14
4.2.2.1.2 Limits	14
4.2.2.1.3 Conformance	14
4.2.2.2 Receiver Selectivity	14
4.2.2.2.1 Definition.....	14
4.2.2.2.2 Limits	15
4.2.2.2.3 Conformance	15
4.2.2.3 Receiver Maximum input Level.....	16
4.2.2.3.1 Definition.....	16
4.2.2.3.2 Limits	16
4.2.2.3.3 Conformance	16
4.2.2.4 Receiver non-linearity.....	16
4.2.2.4.1 Definition.....	16

4.2.2.4.2	Limits	16
4.2.2.4.3	Conformance	16
5	Testing for compliance with technical requirements.....	16
5.1	General Requirements	16
5.2	Environmental conditions for testing	17
5.3	Normal Test Conditions	17
5.3.1	Normal temperature and humidity	17
5.3.2	Normal test power supply	17
5.3.2.1	DC test power supply	17
5.4	Extreme test conditions	17
5.4.1	Extreme temperature and humidity.....	17
5.4.2	Extreme test power supply.....	17
5.5	Radio test suites.....	18
5.5.1	Transmitter test specification.....	18
5.5.1.1	Occupied Bandwidth.....	18
5.5.1.2	Transmitter Peak Power	18
5.5.1.3	Measured Bandwidth (B ₋₂₀).....	19
5.5.1.4	Out of Band Emissions.....	19
5.5.1.5	Spurious Emissions	19
5.5.1.6	Stand-by Mode Emissions.....	20
5.5.1.7	Pulse Length.....	20
5.5.1.8	Pulse Rise Time	21
5.5.2	Receiver test specifications.....	22
5.5.2.1	Receiver Sensitivity	22
5.5.2.2	Receiver Selectivity	22
5.5.2.3	Receiver Maximum input Level.....	23
5.5.2.4	Receiver non-linearity.....	24
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	26
Annex B (informative):	Maximum measurement uncertainty.....	28
Annex C (normative):	Transmitter Pulse Power measurement set up	29
Annex D (normative):	Occupied Bandwidth and Measured Bandwidth (B₋₂₀) measurement set up	31
Annex E (normative):	Out of Band Emissions, Spurious Emissions and Stand-by Mode Emissions measurement set up	33
Annex F (normative):	Pulse Length and Pulse Rise Time measurement set up	35
Annex G (normative):	Receiver Sensitivity measurement setup.....	37
Annex H (normative):	Receiver Selectivity, Receiver Maximum input Level and Receiver non-linearity measurement setup	38
Annex I (normative):	Calculation of the -40 dB Bandwidth.....	40
Annex J (normative):	Setting of B_{ref}, B_m, RBW and VBW for Occupied Bandwidth, Measured Bandwidth (B₋₂₀), Out of Band Emissions, Spurious Emissions and Stand-by Emissions	41
Annex K (normative):	Out of Band Emissions, Spurious Emissions and Stand-by Mode Emissions measurement procedure.....	42
K.1	Measurement antenna position.....	42
K.2	Correction for variable measurement antenna gain.....	42
K.3	Measurement system calibration	42

K.4 Measurement procedure	42
Annex L (informative): Checklist	43
Annex M (informative): Bibliography	45
Annex N (informative): Change history	46
History	47

Sample Document

get full document from standards.iteh.ai

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables (European Standard (EN), Technical Specification (TS), Group Specification (GS) or ETSI Standard (ES)) may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the [ETSI IPR online database](#).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™**, **LTE™** and **5G™** logo are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.1] 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.2].

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.

The present document is part 1 of a multi-part deliverable covering navigation radars used on inland waterways, as identified below:

Part 1: "Magnetron Radars";

Part 2: "Solid State Radars".

National transposition dates	
Date of adoption of this EN:	15 June 2026
Date of latest announcement of this EN (doa):	30 September 2026
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2027
Date of withdrawal of any conflicting National Standard (dow):	31 March 2028

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.

Sample Document

get full document from standards.iteh.ai

1 Scope

The present document specifies technical characteristics and methods of measurements for magnetron-based inland waterways navigational radars having the following characteristics:

- Transmitter peak power not exceeding 10 kW.
- Operating on a pulse modulated single, non-tuneable carrier frequency in the range specified in Table 1.
- At the transmitter output, a 4 port RF-circulator or equivalent is used.
- The antenna is passive, rotating and waveguide based.
- The radar display is an integral part of the equipment.

Table 1: Radio navigation service frequencies

Radio navigation service frequencies	
Transmit	9 300 MHz to 9 500 MHz
Receive	9 300 MHz to 9 500 MHz

NOTE: The relationship between the present document and the essential requirements of article 3.2 of Directive 2014/53/EU [i.2] is given in Annex A.

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 in the [ETSI docbox](#).

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.

Not applicable.

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.

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 may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

- [i.1] [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.2] [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.3] ITU Radio Regulations (2024).
- [i.4] Recommendation ITU-R M.1177-4 (04/2011): "Techniques for measurement of unwanted emissions of radar systems".
- [i.5] ETSI EG 203 336 (V1.2.1) (05-2020): "Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".
- [i.6] ETSI EN 303 676 (V1.1.1) (07-2021): "Navigation radar used on inland waterways; operational, functional and technical requirements".
- [i.7] Recommendation ITU-R SM.1541-7 (09/2024): "Unwanted emissions in the Out of Band domain".
- [i.8] [ERC Recommendation 74-01 \(05/2022\)](#): "Unwanted emissions in the spurious domain".
- [i.9] [ECC Recommendation \(02\)05 \(03/2012\)](#): "Unwanted emissions".
- [i.10] IEC 60945:2002/COR1:2008 including corrigendum 1 (04/2008): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".
- [i.11] IEC 60153-2: 2016: "Hollow metallic waveguides. Part 2: Relevant specifications for ordinary rectangular waveguides".
- [i.12] Recommendation ITU-R SM.332-4 (07/1978): "Selectivity of receivers".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

active state: state producing the authorized emission

idle/stand-by state: state where the transmitter is available for traffic but is not in the active state

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 1: This definition is taken from ITU Radio Regulation [i.3].

NOTE 2: For the radars covered by the present document the necessary bandwidth B_N is considered to be $B_{.20}$ (20 dB bandwidth) as defined in Recommendation ITU-R SM.1541-7 [i.7].

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: 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 %.

NOTE 2: This definition is taken from ITU Radio Regulations [i.3], chapter I, 1.153.

NOTE 3: For primary radars $\beta/2$ equals 0,5 %.

Peak Envelope Power (PEP): 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.3], chapter I, 1.157.

product configuration: hardware variant of the same typology of system under test (e.g. different power outputs, magnetrons)

pulse length: 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)

radial resolution capability: shortest distance between two targets on the same bearing that can be discriminated

NOTE: This is defined in ETSI EN 303 676 [i.6], clause 5.2.2.5.

3.2 Symbols

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

B_{-20}	-20 dB bandwidth (in MHz)
B_{-40}	-40 dB bandwidth (in MHz)
B_{IF}	Intermediate frequency bandwidth
B_m	Measurement bandwidth
B_{ref}	Reference bandwidth
dB	decibel
dBm	Power ratio expressed in decibels (dB) with reference to one milli watt
$dBpp$	Power ratio expressed in decibels (dB) with reference to peak power
f_{image}	Image frequency
f_{rx}	Nominal frequency of the receiver
f_o	Operating frequency (in MHz) of the magnetron
G_s	Gain of the measurement system (dB)
k	Boltzmann's constant ($1,38 \times 10^{-23}$ J/K)
P_t	Pulse power of transmission
t	Time
t_p	Pulse length
t_r	Pulse rise time

3.3 Abbreviations

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

ANSI	American National Standards Institute
dBi	Gain in decibels relative to an isotropic antenna
DC	Direct Current
ECC	Electronic Communication Committee
EFTA	European Free Trade Association
EN	European Norm
ERC	Electronic Radiocommunication Committee
EUT	Equipment Under Test
FM	Frequency Modulation
FTC	Fast Time Constant
GHz	GigaHertz
IEC	International Electrotechnical Committee
IF	Intermediate Frequency
IMD	Intermodulation Distortion
ITU-R	International Telecommunication Union - Radiocommunication Sector
kHz	kiloHertz
kW	kiloWatt
LO	Local Oscillator