



SLOVENSKI STANDARD SIST EN 303 676 V1.1.1:2021

01-september-2021

Navigacijski radar za uporabo na celinskih vodnih poteh - Operativne, funkcionalne in tehnične zahteve

Navigation radar used on inland waterways - Operational, functional and technical requirements

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: ^{SIST EN 303 676 V1.1.1:2021} ETSI EN 303 676 V1.1.1 (2021-07)

<https://standards.iteh.ai/catalog/standards/sist/ca57859-f6f5-466c-8848-812a1531bed4/sist-en-303-676-v1-1-1-2021>

ICS:

| | | |
|-----------|----------------------------------|----------------------------------|
| 33.060.01 | Radijske komunikacije na splošno | Radiocommunications in general |
| 47.020.70 | Navigacijska in krmilna oprema | Navigation and control equipment |

SIST EN 303 676 V1.1.1:2021

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 303 676 V1.1.1:2021](https://standards.iteh.ai/catalog/standards/sist/ca57859-f6f5-466c-8848-812a1531bed4/sist-en-303-676-v1-1-1-2021)

<https://standards.iteh.ai/catalog/standards/sist/ca57859-f6f5-466c-8848-812a1531bed4/sist-en-303-676-v1-1-1-2021>

ETSI EN 303 676 V1.1.1 (2021-07)



**Navigation radar used on inland waterways;
Operational, functional and technical requirements
(standards.iteh.ai)**

[SIST EN 303 676 V1.1.1:2021](https://standards.iteh.ai/catalog/standards/sist/ca57859-f6f5-466c-8848-812a1531bed4/sist-en-303-676-v1-1-1-2021)

<https://standards.iteh.ai/catalog/standards/sist/ca57859-f6f5-466c-8848-812a1531bed4/sist-en-303-676-v1-1-1-2021>

ReferenceDEN/ERM-TGMAR-609

Keywordsmaritime, navigation, radar, radio

ETSI650 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:

<http://www.etsi.org/standards-search>

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 at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

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 may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2021.
All rights reserved.

Contents

| | |
|---|----|
| Intellectual Property Rights | 9 |
| Foreword..... | 9 |
| Modal verbs terminology..... | 9 |
| 1 Scope | 10 |
| 2 References | 10 |
| 2.1 Normative references | 10 |
| 2.2 Informative references..... | 10 |
| 3 Definition of terms, symbols and abbreviations..... | 11 |
| 3.1 Terms..... | 11 |
| 3.2 Symbols..... | 11 |
| 3.3 Abbreviations | 12 |
| 4 General requirements | 12 |
| 4.1 Purpose of the radar equipment..... | 12 |
| 4.2 Construction and design | 13 |
| 4.3 Operational controls | 13 |
| 4.4 Interfaces..... | 13 |
| 4.4.1 Fail safe design | 13 |
| 4.4.2 Display of data received via interfaces | 13 |
| 4.4.3 Operation of equipment connected via interfaces..... | 14 |
| 4.4.4 Interpretation and presentation of data delivered via interfaces..... | 14 |
| 4.5 Software | 14 |
| 4.5.1 Software performance..... | 14 |
| 4.5.2 Software protection..... | 14 |
| 4.6 Equipment labelling | 14 |
| 4.7 Operating and service manuals..... | 14 |
| 5 Testing requirements specifications..... | 15 |
| 5.1 Environmental profile..... | 15 |
| 5.2 Conformance Requirements | 15 |
| 5.2.1 Tests under extreme conditions | 15 |
| 5.2.1.1 Performance check procedure..... | 15 |
| 5.2.1.1.1 Definition..... | 15 |
| 5.2.1.1.2 Required test results | 15 |
| 5.2.1.1.3 Conformance | 15 |
| 5.2.1.2 Temperature test of the indoor unit..... | 15 |
| 5.2.1.2.1 Definition..... | 15 |
| 5.2.1.2.2 Required test results | 15 |
| 5.2.1.2.3 Conformance | 15 |
| 5.2.1.3 Temperature test of the outdoor unit..... | 16 |
| 5.2.1.3.1 Definition..... | 16 |
| 5.2.1.3.2 Required test results | 16 |
| 5.2.1.3.3 Conformance | 16 |
| 5.2.1.4 Damp heat test of outdoor unit..... | 16 |
| 5.2.1.4.1 Definition..... | 16 |
| 5.2.1.4.2 Required test results | 16 |
| 5.2.1.4.3 Conformance | 16 |
| 5.2.1.5 Extreme power voltage and frequency test | 16 |
| 5.2.1.5.1 Definition..... | 16 |
| 5.2.1.5.2 Required test results | 16 |
| 5.2.1.5.3 Conformance | 16 |
| 5.2.1.6 Extreme vibration test | 16 |
| 5.2.1.6.1 Definition..... | 16 |
| 5.2.1.6.2 Required test results | 16 |
| 5.2.1.6.3 Conformance | 17 |
| 5.2.2 Operational and functional requirements..... | 17 |

| | | |
|------------|---|----|
| 5.2.2.1 | Start-up time..... | 17 |
| 5.2.2.1.1 | Definition..... | 17 |
| 5.2.2.1.2 | Required test results | 17 |
| 5.2.2.1.3 | Conformance | 17 |
| 5.2.2.2 | System sensitivity | 17 |
| 5.2.2.2.1 | Definition..... | 17 |
| 5.2.2.2.2 | Required test results | 17 |
| 5.2.2.2.3 | Conformance | 17 |
| 5.2.2.3 | Gain dynamic range | 17 |
| 5.2.2.3.1 | Definition..... | 17 |
| 5.2.2.3.2 | Required test results | 17 |
| 5.2.2.3.3 | Conformance | 18 |
| 5.2.2.4 | Minimum range..... | 18 |
| 5.2.2.4.1 | Definition..... | 18 |
| 5.2.2.4.2 | Required test results | 18 |
| 5.2.2.4.3 | Conformance | 18 |
| 5.2.2.5 | Radial resolution capability..... | 18 |
| 5.2.2.5.1 | Definition..... | 18 |
| 5.2.2.5.2 | Required test results | 18 |
| 5.2.2.5.3 | Conformance | 18 |
| 5.2.2.6 | Azimuthal resolution capability | 18 |
| 5.2.2.6.1 | Definition..... | 18 |
| 5.2.2.6.2 | Required test results | 18 |
| 5.2.2.6.3 | Conformance | 18 |
| 5.2.2.7 | Range scales and fixed range rings | 19 |
| 5.2.2.7.1 | Definition..... | 19 |
| 5.2.2.7.2 | Required test results | 19 |
| 5.2.2.7.3 | Conformance | 19 |
| 5.2.2.8 | Variable Range Marker (VRM)..... | 19 |
| 5.2.2.8.1 | Definition..... | 19 |
| 5.2.2.8.2 | Required test results | 19 |
| 5.2.2.8.3 | Conformance | 20 |
| 5.2.2.9 | Heading line and radar picture azimuth angular error | 20 |
| 5.2.2.9.1 | Definition..... | 20 |
| 5.2.2.9.2 | Required test results | 20 |
| 5.2.2.9.3 | Conformance | 20 |
| 5.2.2.10 | Bearing facilities and bearing scale..... | 20 |
| 5.2.2.10.1 | Definition..... | 20 |
| 5.2.2.10.2 | Required test results | 20 |
| 5.2.2.10.3 | Conformance | 21 |
| 5.2.2.11 | Nautical information and navigation lines | 21 |
| 5.2.2.11.1 | Definition..... | 21 |
| 5.2.2.11.2 | Required test results | 21 |
| 5.2.2.11.3 | Conformance | 21 |
| 5.2.2.12 | Facilities for suppressing sea and rain clutter..... | 21 |
| 5.2.2.12.1 | Definition..... | 21 |
| 5.2.2.12.2 | Required test results | 22 |
| 5.2.2.12.3 | Conformance | 22 |
| 5.2.2.13 | Suppression of interference from other radars | 22 |
| 5.2.2.13.1 | Definition..... | 22 |
| 5.2.2.13.2 | Required test results | 22 |
| 5.2.2.13.3 | Conformance | 22 |
| 5.2.2.14 | Compatibility with radar beacons and search and rescue radar transponders | 22 |
| 5.2.2.14.1 | Definition..... | 22 |
| 5.2.2.14.2 | Required test results | 23 |
| 5.2.2.14.3 | Conformance | 23 |
| 5.2.2.15 | Special modes of operation | 23 |
| 5.2.2.15.1 | Definition..... | 23 |
| 5.2.2.15.2 | Required test results | 23 |
| 5.2.2.15.3 | Conformance | 23 |
| 5.2.3 | Operation controls and indicators | 23 |
| 5.2.3.1 | Directly accessible operation controls..... | 23 |

| | | |
|-----------|--|----|
| 5.2.3.1.1 | Definition..... | 23 |
| 5.2.3.1.2 | Required test results | 23 |
| 5.2.3.1.3 | Conformance | 24 |
| 5.2.3.2 | Brilliance controls | 24 |
| 5.2.3.2.1 | Definition..... | 24 |
| 5.2.3.2.2 | Required test results | 24 |
| 5.2.3.2.3 | Conformance | 25 |
| 5.2.3.3 | Heading line on/off control (SHM)..... | 25 |
| 5.2.3.3.1 | Definition..... | 25 |
| 5.2.3.3.2 | Required test results | 25 |
| 5.2.3.3.3 | Conformance | 25 |
| 5.2.3.4 | Frequency tuning control and indicator..... | 25 |
| 5.2.3.4.1 | Definition..... | 25 |
| 5.2.3.4.2 | Required test results | 25 |
| 5.2.3.4.3 | Conformance | 25 |
| 5.2.4 | Display unit characteristics | 25 |
| 5.2.4.1 | Display screen dimensions..... | 25 |
| 5.2.4.1.1 | Definition..... | 25 |
| 5.2.4.1.2 | Required test results | 26 |
| 5.2.4.1.3 | Conformance | 26 |
| 5.2.4.2 | Display screen brilliance | 26 |
| 5.2.4.2.1 | Definition..... | 26 |
| 5.2.4.2.2 | Required test results | 26 |
| 5.2.4.2.3 | Conformance | 26 |
| 5.2.4.3 | Display resolution | 26 |
| 5.2.4.3.1 | Definition..... | 26 |
| 5.2.4.3.2 | Required test results | 26 |
| 5.2.4.3.3 | Conformance | 26 |
| 5.2.4.4 | Picture generation characteristics | 27 |
| 5.2.4.4.1 | Definition..... | 27 |
| 5.2.4.4.2 | Required test results | 27 |
| 5.2.4.4.3 | Conformance | 27 |
| 5.2.4.5 | Supplementary displays | 27 |
| 5.2.4.5.1 | Definition..... | 27 |
| 5.2.4.5.2 | Required test results | 27 |
| 5.2.4.5.3 | Conformance | 27 |
| 5.2.4.6 | Screen reflection characteristics..... | 28 |
| 5.2.4.6.1 | Definition..... | 28 |
| 5.2.4.6.2 | Required test results | 28 |
| 5.2.4.6.3 | Conformance | 28 |
| 5.2.5 | Radar picture characteristics | 28 |
| 5.2.5.1 | Radar picture | 28 |
| 5.2.5.1.1 | Definition..... | 28 |
| 5.2.5.1.2 | Required test results | 28 |
| 5.2.5.1.3 | Conformance | 28 |
| 5.2.5.2 | Effective diameter of the radar picture..... | 28 |
| 5.2.5.2.1 | Definition..... | 28 |
| 5.2.5.2.2 | Required test results | 28 |
| 5.2.5.2.3 | Conformance | 28 |
| 5.2.5.3 | Colours of picture presentation | 29 |
| 5.2.5.3.1 | Definition..... | 29 |
| 5.2.5.3.2 | Required test results | 29 |
| 5.2.5.3.3 | Conformance | 29 |
| 5.2.5.4 | Radar picture refresh rate and storage..... | 29 |
| 5.2.5.4.1 | Definition..... | 29 |
| 5.2.5.4.2 | Required test results | 29 |
| 5.2.5.4.3 | Conformance | 29 |
| 5.2.5.5 | Target trails | 29 |
| 5.2.5.5.1 | Definition..... | 29 |
| 5.2.5.5.2 | Required test results | 30 |
| 5.2.5.5.3 | Conformance | 30 |
| 5.2.5.6 | Off-centring..... | 30 |

| | | |
|-----------|---|----|
| 5.2.5.6.1 | Definition..... | 30 |
| 5.2.5.6.2 | Required test results | 30 |
| 5.2.5.6.3 | Conformance | 30 |
| 5.2.6 | Antenna and antenna drive characteristics | 30 |
| 5.2.6.1 | Radiation pattern in the horizontal plane | 30 |
| 5.2.6.1.1 | Definition..... | 30 |
| 5.2.6.1.2 | Required test results | 30 |
| 5.2.6.1.3 | Conformance | 31 |
| 5.2.6.2 | Radiation pattern in the vertical plane..... | 31 |
| 5.2.6.2.1 | Definition..... | 31 |
| 5.2.6.2.2 | Required test results | 31 |
| 5.2.6.2.3 | Conformance | 31 |
| 5.2.6.3 | Antenna drive characteristics | 31 |
| 5.2.6.3.1 | Definition..... | 31 |
| 5.2.6.3.2 | Required test results | 31 |
| 5.2.6.3.3 | Conformance | 31 |
| 5.2.7 | Interfaces..... | 32 |
| 5.2.7.1 | Analogue input and display for ROT indicators..... | 32 |
| 5.2.7.1.1 | Definition..... | 32 |
| 5.2.7.1.2 | Required test results | 32 |
| 5.2.7.1.3 | Conformance | 32 |
| 5.2.7.2 | Analogue output interface for raw radar | 32 |
| 5.2.7.2.1 | Definition..... | 32 |
| 5.2.7.2.2 | Required test results | 32 |
| 5.2.7.2.3 | Conformance | 32 |
| 5.2.7.3 | Interfaces for nautical sensors..... | 32 |
| 5.2.7.3.1 | Definition..... | 32 |
| 5.2.7.3.2 | Required test results | 33 |
| 5.2.7.3.3 | Conformance | 33 |
| 5.2.8 | Safety distance requirements | 33 |
| 5.2.8.1 | Compass safety distance requirements..... | 33 |
| 5.2.8.1.1 | Definition..... | 33 |
| 5.2.8.1.2 | Required test results | 33 |
| 5.2.8.1.3 | Conformance | 33 |
| 5.2.9 | Display of other navigation information..... | 33 |
| 5.2.9.1 | Display of tracking and tracing information | 33 |
| 5.2.9.1.1 | Definition..... | 33 |
| 5.2.9.1.2 | Required test results | 34 |
| 5.2.9.1.3 | Conformance | 35 |
| 5.2.9.2 | Display of navigation guiding lines..... | 35 |
| 5.2.9.2.1 | Definition..... | 35 |
| 5.2.9.2.2 | Required test results | 35 |
| 5.2.9.2.3 | Conformance | 35 |
| 6 | Testing for compliance with technical requirements..... | 35 |
| 6.1 | General requirements | 35 |
| 6.2 | Standard operating mode of the radar equipment..... | 36 |
| 6.3 | Environmental conditions for testing | 36 |
| 6.3.1 | Test conditions..... | 36 |
| 6.3.2 | Normal test conditions..... | 36 |
| 6.3.2.1 | Introduction..... | 36 |
| 6.3.2.2 | Normal temperature and humidity | 37 |
| 6.3.2.3 | Normal test power supply | 37 |
| 6.3.2.3.1 | AC test power supply | 37 |
| 6.3.2.3.2 | DC test power supply | 37 |
| 6.3.3 | Extreme test conditions..... | 37 |
| 6.3.3.1 | Indoor unit..... | 37 |
| 6.3.3.2 | Outdoor unit..... | 37 |
| 6.3.3.3 | Extreme power supply voltage test conditions..... | 37 |
| 6.3.3.4 | Extreme vibration test conditions..... | 38 |
| 6.4 | Interpretation of the measurements results..... | 38 |
| 6.5 | Performance tests | 38 |

| | | |
|-----------------------------|---|-----------|
| 6.5.1 | Tests under extreme conditions | 38 |
| 6.5.1.1 | Performance check procedure | 38 |
| 6.5.1.2 | Temperature test of the indoor unit | 38 |
| 6.5.1.3 | Temperature test of the outdoor unit | 38 |
| 6.5.1.4 | Damp heat test of the outdoor unit | 39 |
| 6.5.1.5 | Extreme power voltage and frequency test | 39 |
| 6.5.1.6 | Extreme vibration test | 40 |
| 6.5.2 | Operational and functional requirements | 40 |
| 6.5.2.1 | Start-up time | 40 |
| 6.5.2.2 | System sensitivity | 40 |
| 6.5.2.3 | Gain dynamic range | 40 |
| 6.5.2.4 | Minimum range | 41 |
| 6.5.2.5 | Radial resolution capability | 41 |
| 6.5.2.6 | Azimuthal resolution capability | 41 |
| 6.5.2.7 | Range scales and fixed range rings | 41 |
| 6.5.2.8 | Variable Range Marker (VRM) | 42 |
| 6.5.2.9 | Heading line and radar picture azimuth angular error | 42 |
| 6.5.2.10 | Bearing facilities and bearing scale | 42 |
| 6.5.2.11 | Nautical information and navigation lines | 42 |
| 6.5.2.12 | Facilities for suppressing sea and rain clutter | 42 |
| 6.5.2.13 | Suppression of interference from other radars | 42 |
| 6.5.2.14 | Compatibility with radar beacons and search and rescue radar transponders | 43 |
| 6.5.2.15 | Special modes of operation | 43 |
| 6.5.3 | Operation controls and indicators | 43 |
| 6.5.3.1 | Directly accessible operation controls | 43 |
| 6.5.3.2 | Brilliance controls | 43 |
| 6.5.3.3 | Heading line on/off control (SHM) | 43 |
| 6.5.3.4 | Frequency tuning control and indicator | 44 |
| 6.5.4 | Display unit characteristics | 44 |
| 6.5.4.1 | Display screen dimensions | 44 |
| 6.5.4.2 | Display screen brilliance | 44 |
| 6.5.4.3 | Display resolution | 44 |
| 6.5.4.4 | Picture generation characteristics | 44 |
| 6.5.4.5 | Supplementary displays | 45 |
| 6.5.4.6 | Screen reflection characteristics | 45 |
| 6.5.5 | Radar picture characteristics | 45 |
| 6.5.5.1 | Radar picture | 45 |
| 6.5.5.2 | Effective diameter of the radar picture | 45 |
| 6.5.5.3 | Colours of picture presentation | 45 |
| 6.5.5.4 | Radar picture refresh rate and storage | 45 |
| 6.5.5.5 | Target trails | 46 |
| 6.5.5.6 | Off-centring | 46 |
| 6.5.6 | Antenna and antenna drive characteristics | 46 |
| 6.5.6.1 | Radiation pattern in the horizontal plane | 46 |
| 6.5.6.2 | Radiation pattern in the vertical plane | 46 |
| 6.5.6.3 | Antenna drive characteristics | 46 |
| 6.5.7 | Interfaces | 46 |
| 6.5.7.1 | Analogue input and display for ROT indicators | 46 |
| 6.5.7.2 | Analogue output interface for raw radar | 47 |
| 6.5.7.3 | Interfaces for nautical sensors | 47 |
| 6.5.8 | Safety distance requirements | 47 |
| 6.5.8.1 | Compass safety distance requirements | 47 |
| 6.5.9 | Display of other navigation information | 47 |
| 6.5.9.1 | Display of tracking and tracing information | 47 |
| 6.5.9.2 | Display of navigation guiding lines | 47 |
| Annex A (normative): | Set-up of the radar reflectors at the test field and preparation of the radar equipment under test | 48 |
| A.1 | Test site | 48 |
| A.2 | Standard reflectors | 48 |

| | | |
|--|---|-----------|
| A.3 | Set-up of the radar reflectors at the test field | 48 |
| A.4 | Preparation of radar equipment to test | 50 |
| Annex B (informative): Minimum range, radial resolution and azimuthal resolutions | | 51 |
| B.1 | Minimum range | 51 |
| B.2 | Radial resolution | 51 |
| B.3 | Azimuthal resolution in all range scales up to and including 1 200 m..... | 52 |
| Annex C (informative): Calculation of the equivalent Radar Cross Section (RCS)..... | | 53 |
| C.1 | Definition | 53 |
| Annex D (normative): Measuring the reflection coefficient | | 54 |
| D.1 | Principle of test..... | 54 |
| D.2 | Preconditions..... | 54 |
| D.3 | Measurement setup..... | 55 |
| D.4 | Measuring the reflection of the radar screen | 55 |
| D.4.1 | Measuring the luminance of the illuminator..... | 55 |
| D.4.2 | Measuring the luminance of radar screen..... | 55 |
| D.5 | Calculating of reflection coefficient..... | 56 |
| History | | 58 |

ITeH STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 303 676 V1.1.1:2021](https://standards.iteh.ai/catalog/standards/sist/ca57859-f6f5-466c-8848-812a1531bed4/sist-en-303-676-v1-1-1-2021)

<https://standards.iteh.ai/catalog/standards/sist/ca57859-f6f5-466c-8848-812a1531bed4/sist-en-303-676-v1-1-1-2021>

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables 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 Web server (<https://ipr.etsi.org/>).

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™** and **LTE™** 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.

ITEH STANDARD PREVIEW
(standards.iteh.ai)

Foreword

SIST EN 303 676 V1.1.1:2021

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

<https://standards.iteh.ai/catalog/standards/sist/en-303-676-v1-1-1-2021>
812a1531bed4/sist-en-303-676-v1-1-1-2021

National transposition dates

| | |
|--|-------------------|
| Date of adoption of this EN: | 30 June 2021 |
| Date of latest announcement of this EN (doa): | 30 September 2021 |
| Date of latest publication of new National Standard or endorsement of this EN (dop/e): | 31 March 2022 |
| Date of withdrawal of any conflicting National Standard (dow): | 31 March 2022 |

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 defines the functional and operational requirements for navigational radar installations used in inland waterways as required by CESNI ES-TRIN standard [i.1].

The present document is applicable to radar equipment and its associated primary navigational display intended for the navigation of vessels on inland waterways with the following characteristics:

- Transmitter Peak Envelope Power up to 10 kW.
- The antenna is rotating and passive.
- Unmodulated single carrier frequency only may be utilized.

The applicable frequencies of operation of this type of radio equipment are given in table 1. These frequencies are allocated to the radio navigation service, as defined in article 5 of the ITU Radio Regulations [i.4].

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 |

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 <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] IMCO Resolution A.278 (VIII) (1973): "Symbols for controls on marine navigational radar equipment".
- [2] ISO 25862:2019: "Ships and marine technology -- Marine magnetic compasses, binnacles and azimuth reading devices".
- [3] IEC EN 60945 (2002): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".

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

- [i.1] CESNI: "European Standard laying down Technical Requirements for Inland Navigation vessels, ES-TRIN".
- [i.2] Recommendation ITU-R M.824-4 (02/2013): "Technical parameters of radar beacons".
- [i.3] Recommendation ITU-R M.628-5 (03/2012): "Technical characteristics for search and rescue radar transponders".
- [i.4] ITU Radio Regulations (2020).
- [i.5] IEC 62388 (2013): "Maritime navigation and radiocommunication equipment and systems - Shipborne radar - Performance requirements, methods of testing and required test results".
- [i.6] IEC 62288 (2014): "Maritime navigation and radiocommunication equipment and systems - Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

conventional radar: radar where the output signal is generated by a magnetron, using pulsed emissions but not using frequency, phase or power modulation

FTC: function to suppress rain clutter

IR: function to suppress interference from other radars

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.4].

Radar Cross-Section (RCS): cross-section determining the power density returned to the radar for a particular power density incident on a target

radar echo: signal reflected by a target to a radar antenna that appears in the radar video signal and radar image

radar equipment: equipment and its associated primary navigational display intended for the navigation of vessels on inland waterways

RAIN: function to suppress rain clutter, other term for FTC

SEA: sea clutter suppression, other term for STC

standard reflector: radar reflector with an equivalent Radar Cross Section (RCS) at a frequency of 9 400 MHz equal to 10 m²

STC: function to suppress sea clutter

3.2 Symbols

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

| | |
|-----------|------------|
| dB | decibel |
| t | time |
| λ | wavelength |

| | |
|----------|--------------------------------------|
| π | mathematical constant: 3,14159265... |
| ρ | reflection coefficient |
| σ | radar cross section |

3.3 Abbreviations

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

| | |
|---------|--|
| AC | Alternating Current |
| ACP | Azimuth Clock Pulse |
| AIS | Automatic Identification System |
| AR | Azimuthal Resolution |
| ARP | Azimuth Reference Pulse |
| AtoN | Aids to Navigation |
| CESNI | European Committee for drawing up standards in the field of inland navigation |
| COG | Course Over Ground |
| DC | Direct Current |
| EBL | Electronic Bearing Line |
| ECDIS | Electronic Chart Display and Information System |
| EN | European Norm |
| ES-TRIN | European Standard laying down Technical Requirements for Inland Navigation vessels |
| EUT | Equipment Under Test |
| FTC | Fast Time Constant |
| GNSS | Global Navigation Satellite System |
| IEC | International Electrotechnical Committee |
| IHO | International Hydrographic Organization |
| IMCO | Inter-Governmental Maritime Consultative Organization |
| IR | Interference Rejection |
| ISO | International Organization for Standardization |
| ITU-R | International Telecommunications Union - Radiocommunications |
| LED | Light Emitting Diode |
| MR | Minimum Range |
| P-Line | Parallel-Line |
| PRF | Pulse Repetition Frequency |
| RCS | Radar Cross-Section |
| ROT | Rate-Of-Turn indicator |
| RR | Radial Resolution |
| SART | Search and Rescue Radar Transponder |
| SHM | Ships Heading Marker |
| SOG | Speed Over Ground |
| SOLAS | Safety Of Life At Sea |
| STC | Sensitivity Time Control |
| Tr | Trigger |
| V | Video |
| VRM | Variable Range Marker |

4 General requirements

4.1 Purpose of the radar equipment

The radar equipment shall facilitate the navigation of vessels on inland waterways by providing an intelligible radar picture of their position in relation to buoys, shorelines and other navigational marks as well as enabling the reliable and timely recognition of other ships and obstructions protruding above the water surface.

4.2 Construction and design

Mechanical and electrical construction and design of the radar equipment shall be suitable for operation on board vessels navigating on inland waterways.

4.3 Operational controls

The equipment shall be designed in such a way that incorrect operation will not cause the equipment to fail.

One person shall be able to operate the radar equipment and watch the display simultaneously.

Control panel shall be provided as a separate unit. It shall contain all controls used directly for radar navigation. The use of cordless remote controls is not permitted.

The equipment shall not have more controls than are necessary for its correct operation. The design, markings and controls of the equipment shall enable simple, unambiguous and fast operation. The arrangement shall be such that the possibility of operating mistakes is minimized.

All controls shall be arranged in such a way that when a control is operated the associated indication remains visible and that the radar navigation can continue without restriction.

The effect of operation of controls shall be such that movements to the right or upwards shall have a positive effect on the manipulated variable, while movements to the left or downwards have a negative effect.

If pushbuttons are used, they shall be designed in such a way that they can also be found by touch. Moreover they shall have a noticeable pressure point (tactile feedback).

Controls to switch off the equipment shall be protected against unintentional operation.

All controls and indicators shall be equipped with a dazzle-free source of lighting suitable for use under all conditions of light which can be adjusted to zero by means of an independent control.

All controls and indicators shall be provided with symbols and/or a description in English and, if possible, switchable to the users language. Symbols shall meet the requirements of IMCO Resolution No. A.278 (VIII) [1].

The height of all indicative markings shall be at least 4 mm unless this is not technically feasible and therefore a reduction to 3 mm will be allowed.

Any functions additional to the minimum functions specified in the present document, as well as any connections for external apparatus, shall not impair the capability to meet the minimum requirements contained in the present document.

The antenna unit shall have a safety switch by means of which the transmitter and the rotator drive can be switched off. After switching the equipment to the STBY or to the ON state, a message shall occur on the display, if the safety switch is activated.

4.4 Interfaces

4.4.1 Fail safe design

All interfaces shall be designed fail safe, so that connecting, disconnecting or a failure of the connected equipment or a short circuit shall not cause any deterioration of the radar equipment performance.

4.4.2 Display of data received via interfaces

Unless otherwise specified, all information received via an interface shall be displayed outside of the radar picture. Existing requirements concerning the presentation of such received data shall be fulfilled.