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Maritime low power VHF personal locating beacons employing Digital Selective Calling (DSC Class M); Harmonised Standard for access to radio spectrum and for features for emergency services

Reference
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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.2] 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.

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 specifies technical characteristics and methods of measurements for low power maritime personal locating beacons employing class M DSC signalling according to ETSI EN 300 338-6 [1], on the VHF maritime mobile channel 70.

Maritime personal locating beacons employing DSC signalling also include AIS with an integrated GNSS receiver to provide the locating function according to Recommendation ITU-R M.2135.0 [i.6]. The present document incorporates the relevant provisions of the International Telecommunication Union (ITU) radio regulations [i.4] included in Recommendation ITU-R M.493-15 [2] and Recommendation ITU-R M.1371-5 [i.7].

The present document does not provide technical requirements for conformance with the essential requirements of Directive 2014/53/EU [i.1] for any integrated GNSS receiver providing locating function.

NOTE: The relationship between the present document and essential requirements of article 3.2 and 3.3(g) of Directive 2014/53/EU [i.1] 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 at http://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] ETSI EN 300 338-6 (V1.2.1) (2020-06): "Technical characteristics and methods of measurement for equipment for generation, transmission and reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and/or VHF mobile service; Part 6: Class M DSC".

[2] Recommendation ITU-R M.493-15 (01/2019): "Digital selective-calling system for use in the maritime mobile service".

[3] ETSI TS 103 052 (V1.1.1) (03-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".

[4] Recommendation ITU-T O.153 (10/1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".

[5] IEC 60945 (2002 with COR1:2008): "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] 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] 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.3] ETSI EG 203 336 (V1.2.1): "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.4] ITU-R Radio Regulations (2020).

[i.5] ETSI TS 101 570-6 (V1.1.1): "Interoperability Testing for Maritime Digital Selective Calling (DSC) Radios; Part 6: VHF Class M Test Descriptions".

[i.6] Recommendation ITU-R M.2135.0 (10/2019): "Technical characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz".

[i.7] Recommendation ITU-R M.1371-5 (02/2014): "Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band".

[i.8] Recommendation ITU-R M.585-8 (10/2019): "Assignment and use of identities in the maritime mobile service".

[i.9] IMO Annex 11 - Resolution MSC.149 (77) - (adopted on 3 June 2003): "Adoption of the revised performance standards for survival craft portable two-way VHF radiotelephone apparatus".

[i.10] EUROCAE ED-14G "Environmental conditions and test procedures for airborne equipment".

[i.11] IEC EN 60068-2-64:2008/A1:2019 "Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

acknowledged: automated procedure it indicates that the objective of the initial DSC message has been achieved

activation: initial triggering of the MOB beacon i.e. both parts of the two-step procedure are performed

active mode: activated mode, transmitting in an emergency situation

closed loop: individual transmission to own vessel

dedicated antenna: removable antenna supplied and tested with the equipment, designed as an indispensable part of the equipment

default: value selected or an action taken by the equipment software in the absence of any operator input

distress alert: name given to the single distress DSC message with the format symbol 112

distress DSC message: DSC message or acknowledgement containing the distress information

distress information: symbols within a DSC message describing a distress situation consisting of the MMSI of the vessel in distress, the nature of distress, the position of the vessel in distress, the UTC time of that position and the mode of subsequent communication

factory default: default value that is set by the manufacturer such that the field or behaviour is defined prior to any operator intervention

information characters: set of symbols in a DSC message that contains the items of interest for the recipient and is used to compute the ECC symbol that terminates the message

integral antenna: antenna designed to be connected to the equipment without the use of a 50 Ω external connector and considered to be part of the equipment

NOTE: An integral antenna may be fitted internally or externally to the equipment.

non distress DSC message: DSC messages or acknowledgements that do not have the format specifier or category of "distress"

open loop: transmitting to all ships (broadcast)

personal floatation device: buoyancy aid, life jacket or vest worn by person

symbol (as part of the DSC sentence): 7 binary bits of a 10 bit DSC word that have the information content

test mode: self testing mode, an individual test call to own vessel

UTC lock: GNSS has precisely locked to UTC so that it can determine SOTDMA slot timing correctly

UTC parameters: "Coordinated Universal Time (UTC) offset parameters" GNSS data that contains leap second offset information

word (as part of the DSC sentence): used to describe the 10 binary bits that make up the coded entities of a transmitted DSC message

NOTE: The 10 bits consist of a 7 bit "symbol" that gives the information content and 3 bit error check that gives the number of 0 binary bits in the 7 bit symbol.

3.2 Symbols

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

cSt	centi-Stokes
dB	decibel
dBc	Decibels referenced to the carrier power
dBm	Decibels referenced to 1 milliwatt
dBµV	dB refence to 1 µV (e.m.f)
GHz	GigaHertz
kHz	kiloHertz
MHz	MegaHertz
ms	milliseconds
mW	milliWatts
nW	Nanowatts
P_{Norm}	conducted power measured under normal conditions
P_{-20}	conducted power measured at the lower extreme temperature
P_{+55}	conducted power measured at the upper extreme temperature
pps	pulses per second
µT	microtesla
µW	Microwatts

3.3 Abbreviations

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

AIS	Automatic Identification System
CIRM	Comite International Radio-Maritime
COG	Course Over Ground
CRC	Cyclic Redundancy Check
CSP	Channel SPacing
DSC	Digital Selective Calling
EIRP	Effective Isotropic Radiated Power
EN	European Norm
ERP	Effective Radiated Power
EUT	Equipment Under Test
FSK	Frequency Shift Keying
GLONASS	GLObal NAvigation Satellite System
GMDSS	Global Maritime Distress and Safety System
GMSK	Gaussian Minimum Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ID	Identity
IERS	International Earth Reference and Rotation System Service
IMO	International Maritime Organization
LBT	Listen Before Talk
MMSI	Maritime Mobile Service Identity
MOB	Man Over-Board
MSC	Maritime Safety Committee
NRZI	Non Return to Zero, Inverted
OOB	Out Of Band
RAIM	Receiver Autonomous Integrity Monitoring
RBW	Reference BandWidth
RF	Radio Frequency
SINAD	(Signal+Noise+Distortion) to (Noise + Distortion)
SOG	Speed Over Ground
SOTDMA	Self-Organized Time Division Multiple Access
TDMA	Time Division Multiple Access
UTC	Coordinated Universal Time
VDL	VHF Data Link
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio

4 Requirements that can be visually inspected

4.0 Compliance

Compliance to the requirements of this clause (clause 4) shall be achieved by inspection of the supplied user documentation and by simple inspection of the equipment.

4.1 Construction

4.1.1 General

The exterior of the equipment should have no sharp edges or projections that could easily damage inflatable rafts or injure personnel so as to minimize the risk of internal and external damage during use or stowage.

The equipment shall be portable and be designed as one integral unit. The locating beacon shall derive its energy from a battery forming a part of the equipment and incorporate a permanently attached antenna or a detachable antenna that is supplied with the equipment for fitting in a personal floatation device. At least 50 % of the equipment shall be of highly visible yellow or orange colour to assist visual location.

4.1.2 Categories of equipment

Two categories are defined:

- Category 1 locating beacons with sufficient positive buoyancy to float in fresh water (see clause 7.9 for the buoyancy test).
- Category 2 locating beacons intended to be incorporated into or attached to a buoyancy aid (personal floatation device) are not required to float.

Category 1 beacons that can float free may have a lanyard to attach them to a person or personal floatation device. Where a lanyard is employed it should meet the requirements of IMO MSC 149(77) [i.9], paragraph 2.3.11. The user manual or instructions shall include necessary information to allow the user to properly attach the locating beacon lanyard.

The user manual or instructions for Category 2 beacons shall include necessary information to allow the user to fit or attach the locating beacon to a personal floatation device.

4.2 Controls

The equipment shall be initially activated by the use of two simple, but independent mechanical actions, neither of which on its own shall activate the equipment. If the second mechanical action is replaced by an immersion sensor, then the first mechanical action should be an arming or enabling function thus to ensure the beacon is armed for automatic activation when submerged.

It should only be possible to activate the equipment after a seal or other mechanical restraint has been removed from the first mechanical action. After activation it shall be simple to de-activate the equipment and the means to deactivate the equipment shall be clearly marked. It should be possible to determine that the equipment has been previously activated, either by the absence of a seal or restraint or by a non-resettable electronic witness.

The switch that operates any test facility shall be so designed that it returns automatically to the off-position when released.

4.3 Indicators

4.3.1 General

The equipment shall be provided with visual indications to show the operation of the MOB beacon as specified in clause 4.3.2.

The equipment may also be provided with audible indications that show the operation of the MOB beacon.

4.3.2 Visual indicators

4.3.2.1 Alarm indicators

The visual indicator shall clearly distinguish the following states with each indicator being described in the user manual:

i) The locating beacon has been activated and is transmitting in active mode.

ii) The locating beacon has GNSS position lock and is transmitting in active mode.

iii) The locating beacon has received a DSC acknowledgement and the DSC transmitter has been deactivated remotely.