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Maritime Personal Homing Beacon intended for use on the frequency 121,5 MHz for search and rescue purposes only; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU

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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.4] 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.

National transposition dates	
Date of latest announcement of this EN (doa):	30 November 2016
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 May 2017
Date of withdrawal of any conflicting National Standard (dow):	31 May 2018

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 lays down the minimum requirements for maritime "Personal Homing Radio Beacon for 121,5 MHz search and rescue purposes", and incorporates the relevant provisions of the International Telecommunication Union (ITU) radio regulations.

Operational radio beacons described in the present document are intended only for transmission of radio signals on the frequency 121,5 MHz for locating purposes.

Beacons for training purposes will be frequency programmed in accordance with national licensing. It should be noted that licensing for such use is also dependent on the administration responsible for the waters where the equipment is operated and not the registered flag state.

The present document applies to radio beacons intended for short-range maritime personal homing applications. For this application, both the radiated power and the length of time of operation are reduced to enable the equipment to be sufficiently small and light to be worn comfortably at all times.

The present document also specifies technical characteristics, methods of measurement and required test results.

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].

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] Recommendation ITU-R M.690-3 (03-2015): "Technical characteristics of emergency position-indicating radio beacons (EPIRBs) operating on the carrier frequencies of 121.5 MHz and 243 MHz".

[2] 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".

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] ETSI TR 100 028 (V1.4.1) (12-2001) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

[i.3] 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.4] 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:

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

homing beacon: 121,5 MHz radio beacon primarily intended for transmitting homing signals

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.

3.2 Symbols

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

cSt	centi-Stokes
dB	decibel
div	division
µW	microwatt
min	minutes
ppm	parts per million
S	seconds

3.3 Abbreviations

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

ASK	Amplitude Shift Keying
ASTM	American Society for Testing and Materials
CW	Continuous Wave
DF	Direction Finding
ERP	Effective Radiated Power
ERPEP	Effective Radiated Peak Envelope Power
EUT	Equipment Under Test
RF	Radio Frequency
VSWR	Voltage Standing Wave Ratio

4 General requirements

4.1 Construction

4.1.1 Common Requirements

The manufacturer shall declare that compliance to the requirements of clause 4 is achieved and shall provide relevant documentation.

In all respects, the mechanical and electrical design and the construction and finish of the equipment shall conform with good engineering practice.

The equipment shall be designed to minimize the risk of internal and external damage during use or stowage.

The exterior of the equipment shall have no sharp edges or projections that could easily damage inflatable rafts or injure personnel.

The general construction and method of operation shall provide a high degree of proof against inadvertent operation due to magnetic influences, handling, stowage and transit, whilst still providing a simple means of operation in an emergency.

The equipment shall be portable, lightweight, compact and be designed as one integral unit. The radio beacon shall derive its energy from a battery forming a part of the equipment and incorporate an integral or dedicated antenna which may be either fixed length or extendible.

The radio beacon may be fitted with a test facility by which the functioning of the transmitter and battery can be easily tested without the use of any external equipment.

The equipment shall be capable of being used by an unskilled person.

The radio beacon shall be watertight.

The equipment shall not be unduly affected by sea water or oil and shall be resistant to deterioration by prolonged exposure to sunlight.

Necessary operating instructions shall be provided with the equipment.

4.1.2 Requirements for operational beacons

A substantial part of the equipment shall be of highly visible yellow or orange colour to assist visual location.

It shall not be possible for the user to change the frequency of operation from 121,5 MHz.

4.1.3 Requirements for training beacons

Beacons for training purposes shall not be substantially yellow or orange but shall be another clearly different colour.

It shall not be possible for the user to change the frequency of operation from the designated training frequency.

4.1.4 Categories of equipment

Two categories are defined:

- Category 1 radio beacons shall have sufficient positive buoyancy to float in fresh water.
- Category 2 radio beacons intended to be incorporated into or attached to a buoyancy device are not required to float.

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

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. The second mechanical action may be replaced by an immersion sensor. Where the second action is replaced by an immersion sensor then the first action shall be an arm function thus to ensure the device is armed for automatic activation when submerged.

It shall 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.

The switch that operates any test facility (clause 4.1) shall be so designed that it returns automatically to the off-position when released.

4.3 Indicators

The equipment shall be provided with a visual indication that signals are being emitted. The indicator shall be sufficiently bright to be seen in bright sunlight. The indicator shall not be green in colour.

4.4 Labelling

4.4.1 Common Requirements

The equipment shall be provided with a label, or labels, permanently affixed to the exterior of the equipment, containing the following information:

- frequency of operation of the equipment;
- adequate instructions to enable the equipment to be activated and de-activated;
- the type of battery as specified by the manufacturer of the radio beacon;
- the duty cycle (where a transmitting duty cycle of less than 100 % is used at any time);
- for Category 2 beacons a warning that this radio beacon does not float.

4.4.2 Requirements for operational beacons

For operational beacons the label shall additionally contain the following information:

- a warning to the effect that the radio beacon should not be operated except in an emergency;
- the date on which the battery will need to be replaced. Simple means shall be provided for changing this date when the battery is replaced.

4.4.3 Requirements for training beacons

Training beacons shall be clearly marked "for training use only".

4.5 Power source

4.5.1 Battery requirements

The type of battery and designation specified by the manufacturer for use in the equipment shall be clearly and indelibly marked on the equipment.

For operational beacons the battery shall be clearly and durably marked with the expiry date.

4.5.2 Safety precautions

Provisions shall be made for protecting the equipment from damage due to the accidental reversal of polarity of the battery.

5 Technical requirements

5.1 Radio beacon transmission characteristics

When activated, the radio beacon shall transmit continuously on the frequency 121,5 MHz (or the designated training frequency for training beacons) for at least 60 minutes, thereafter the transmitting duty cycle may be reduced to not less than 25 %.

Duty cycle shall be labelled on the device if less than 100 % after the first hour.

The class of emission shall be A3X as defined in Recommendation ITU-R M.690-3 [1]. However, the signal may include information of the identity of the beacon. If included, this information should be transmitted automatically as defined in clause 8.2.1.

5.2 Radio beacon power source

5.2.1 Battery requirements

The battery provided as a power source shall be a primary battery and have sufficient capacity to operate the equipment for an uninterrupted period of at least 6 hours, under all temperature conditions, (clause 6.5), within the requirements of the present document.

6 General conditions of measurement

6.1 Conformity Test frequencies

For the purpose of conformity testing all radiated measurements shall be performed in an anechoic chamber.

Radio beacons shall be tested on 121,5 MHz.

Beacons solely intended for training purposes shall be tested on their designated frequency.

6.2 Test fixture

In the case of integral antenna equipment, if the equipment does not have an internal permanent 50 Ω connector then it is permitted to supply a second sample of the equipment with a temporary antenna connector fitted to facilitate testing.

Where applicable, tests using this second sample shall be carried out using an artificial antenna which shall be a substantially non-reactive non-radiating load connected to the antenna connector. The Voltage Standing Wave Ratio (VSWR) at the 50 Ω connector or the provider's specified test fixture shall not be greater than 1,5:1 over the frequency range of the measurement.