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Radio Equipment and Systems (RES); Float-free maritime satellite Emergency Position Indicating Radio Beacons (EPIRBs) operating on 406,025 MHz; Technical characteristics and methods of measurement

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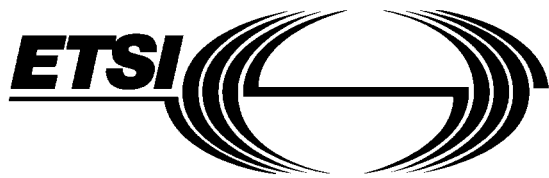
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**Radio Equipment and Systems (RES);
Float-free maritime satellite
Emergency Position Indicating Radio Beacons (EPIRBs)
operating on 406,025 MHz;
Technical characteristics and methods of measurement**

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Foreword

This second edition European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI) is now submitted for the Unified Approval Procedure phase of the ETSI standards approval procedure.

Every ETS prepared by ETSI is a voluntary standard. This ETS contains text concerning conformance testing of the equipment to which it relates. This text should be considered only as guidance and does not make this ETS mandatory.

Transposition dates	
Date of adoption of this ETS:	23 August 1996
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1 Scope

This ETS sets out the minimum performance requirements and technical characteristics for float-free satellite Emergency Position-Indicating Radio Beacons (EPIRB), operating in the COSPAS-SARSAT satellite system, concerning radio communications for the Global Maritime Distress and Safety System (GMDSS).

The equipment covered by this ETS operates on 406 MHz which is provided with a low power 121,5 MHz homing device.

This ETS incorporates the relevant requirements of the International Telecommunications Union (ITU) and the International Maritime Organisation (IMO).

This ETS is applicable for satellite EPIRBs operating over the temperature ranges of :

- -40°C to +55°C (Class 1); or
- -20°C to +55°C (Class 2);

with a float free release mechanism.

NOTE 1: The Class 2 equipment meets the IMO requirements of chapter IV, regulations 7.1.6 and 14.1 of the 1988 amendments to the 1974 International Convention for Safety of Life at Sea (SOLAS) [2].

NOTE 2: The requirements for non float free satellite EPIRBs can be found in annex A.

2 Normative references

This ETS incorporates by dated or undated reference, provision from other publications. These normative references are cited at the appropriate place in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] International Telecommunication Union: "Radio Regulations".
- [2] International Convention for Safety of Life at Sea (SOLAS) (1974), as amended 1988.
- [3] IMO Resolution A.694(17): "General requirements for ship borne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids".
- [4] IMO Resolution A.763(18): "Performance standards for float-free satellite emergency position-indicating radio beacons (EPIRBs) operating on 406 MHz".
- [5] IMO Resolution A.662(16): "Performance standards for float-free release and activation arrangements for emergency radio equipment".
- [6] IMO Resolution A.696(17): "Type approval of satellite emergency position-indicating radio beacons operating in the COSPAS-SARSAT system".
- [7] IMO Resolution A.658 (16): "Use and fitting of retro-reflective materials on life-saving appliances".
- [8] IMO Resolution A.689(17): "Testing of life-saving appliances".
- [9] ITU-R Recommendation M.633-1: "Transmission characteristics of a satellite emergency position-indicating radio beacon (satellite EPIRB) system operating through a low polar-orbiting satellite system in the 406 MHz band".

- [10] C/S T.001 Issue 2-Revision 5 (September 1993): "Specification for COSPAS-SARSAT 406 MHz distress beacons".
- [11] C/S T.007 Issue 3-Revision 1 (December 1993): "COSPAS-SARSAT 406 MHz distress beacon type approval standard".
- [12] ISO Recommendation 694: "Method B".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

satellite EPIRB: An earth station in the Mobile Satellite Service the emissions of which are intended to facilitate search and rescue operations.

release mechanism: An arrangement which allows the satellite EPIRB to float free automatically.

homing device: A 121,5 MHz beacon primarily intended for homing by aircraft.

remote control unit: An unit which allows the satellite EPIRB, while mounted in the release mechanism, to be activated from another position than its installation point.

equipment: A satellite EPIRB which includes the 121,5 MHz homing device, its release mechanism and remote control unit (when provided).

class 1: A satellite EPIRB intended for operation over the temperature range -40°C to +55°C.

class 2: A satellite EPIRB intended for operation over the temperature range -20°C to +55°C.

3.2 Abbreviations

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For the purposes of this ETS, the following abbreviations apply: [300-066-1999](https://standards.iteh.ai/catalog/standards/sist/8653c209-30b8-4d3c-ab74-300-066-1999)

AF	Antenna Factor
BCH	Bose-Chaudhuri-Hocquenghem
CW	Carrier Wave
e.i.r.p.	equivalent isotropically radiated power
EPIRB	Emergency Position Indicating Radio Beacon
EUT	Equipment Under Test
RF	Radio Frequency
GMDSS	Global Maritime Distress and Safety System
ID	Identification
LCM	Lowest Common Multiple
LHCP	Left Hand Circularly Polarised
LSB	Least Significant Bit
MID	Maritime Identification Digits
MMSI	Maritime Mobile Station Identity
MSB	Most Significant Bit
NRZ	Non-Return to Zero
PERP	Peak Effective Radiated Power
PLL	Phase Locked Loop
RHCP	Right Hand Circular Polarised
SOLAS	International Convention for Safety of Life at Sea
VSWR	Voltage Standing Wave Ratio

4 General requirements

4.1 Scope

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

4.2 Operating conditions

The satellite EPIRB shall be mounted in a release mechanism (clause 12) which automatically releases the EPIRB when submerged in water. When so released, the EPIRB shall float to the surface and start transmitting automatically irrespective of the settings of any control.

The satellite EPIRB shall be designed to operate when floating in the sea but shall also operate satisfactorily on a ship's deck and in a survival craft.

The general construction and method of operation shall provide a high degree of proof against inadvertent operation, whilst still providing a simple means of operation in an emergency.

The satellite EPIRB shall be capable of being carried by one person and it shall be possible to release and operate the satellite EPIRB manually.

If the satellite EPIRB is manually removed from its release mechanism, it shall be activated only when floating in the water or manually activated (subclause 4.6).

After automatic or manual activation, no distress signal shall be emitted until at least 47 seconds and at most 5 minutes after the satellite EPIRB has been activated. The satellite EPIRB shall be a single integral unit incorporating a primary battery and a permanently attached antenna. No part of it shall be detachable without the use of tools. The fixed portion of the distress message shall be stored in such a way that it will not be affected by removal of all power sources. Any external connection shall not inhibit the release or activation of the satellite EPIRB.

4.3 Lanyard

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The satellite EPIRB shall be provided with a firmly attached line in order that the equipment may be tethered in use. The lanyard shall be capable of floating in sea water and shall be arranged so as to prevent it being trapped in the ship's structure when floating free.

4.4 Colour and surface

The satellite EPIRB shall be finished with a highly visible yellow/orange colour and shall be fitted with a band of retro-reflecting material, which shall meet the performance requirements of IMO Resolution A.658 (16) [7], shall be at least 25 mm wide, encircling that part of the satellite EPIRBs body which is normally protruding above the waterline.

4.5 Low duty cycle light

The satellite EPIRB shall be provided with a low duty cycle light which fulfils the requirements of subclause 10.1.

4.6 Controls

All controls shall be of sufficient size for simple and satisfactory operation and also be capable of being operated by a person wearing gloves for immersion suits in accordance with Chapter III Regulation 33 of the 1983 amendments to the 1974 SOLAS Convention [2].

Manual activation of the satellite EPIRB shall break a seal which shall not be replaceable by the user and shall require two simple but independent mechanical actions neither of which, on its own, shall activate the equipment. The seal shall not be broken when using the test facility.

If the satellite EPIRB is installed in its release mechanism the manual activation shall require two simple but independent mechanical actions. The means for manual activation shall be protected against inadvertent activation.

After manual or automatic activation it shall be possible to manually deactivate the satellite EPIRB repetitively.

4.7 Indicators

If the satellite EPIRB is activated, the low duty cycle light (subclause 4.5) shall begin flashing within 10 seconds, in any lighting condition.

The satellite EPIRB shall be provided with either an audible or a visual indication that signals are being emitted. The visual indication could be combined with the low duty cycle light (e.g. triggered by the burst).

4.8 Self-test mode

The satellite EPIRB shall be capable of being tested, without using the satellite system, to determine that the satellite EPIRB is capable of operating properly, i. e. the following items under a full-load condition as a minimum shall be tested:

- the battery voltage is sufficient to meet the power input requirements of the EPIRB;
- the 406 MHz Radio Frequency (RF) output stage is operational; and
- if used, the phase lock of the 406 MHz Phase Locked Loop (PLL).

When the self-test mode is activated, the satellite EPIRB shall emit a single burst which shall be identical to its normal transmission burst except that the frame synchronisation pattern (subclause 9.2.2) shall be "011010000" (i. e. the last 8 bits are complemented and the burst duration shall be 440 ms). Successful completion of the self-test shall be indicated after which the test facility shall deactivate automatically. The test mode shall be functional throughout the operating temperature range.

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4.9 Labelling

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The satellite EPIRB and its container, if any, shall be provided with a label or labels containing the following information at least in English:

- type designation, serial number, and the type of battery specified by the manufacturer for use in the equipment;
- the date on which the battery will need to be replaced;
- adequate instruction to enable manual activation and deactivation and self-test;
- a warning to the effect that the satellite EPIRB shall not be operated except in an emergency;
- space on which the ship name, Maritime Mobile Station Identity (MMSI) and call sign may be recorded;
- the class of the satellite EPIRB;
- the identity code programmed into the satellite EPIRB, namely hexadecimal representation of bits 26 to 85 of the digital message;
- the compass-safe distance.

Administrations may require additional labelling.

4.10 Operating instructions

The equipment manufacturer shall provide full instructions and information regarding stowage, installation, and operation of the satellite EPIRB. This shall include proper operation, procedures to limit self-testing to the minimum necessary to ensure confidence in the operation of the satellite EPIRB, battery replacement, and the avoidance of false alarms.

4.11 Homing device

The satellite EPIRB shall be provided with a homing device operating on 121,5 MHz which shall fulfil the requirements of subclause 10.3.

4.12 Accessories

Where a unit of equipment provides a facility which is additional to requirements of this ETS, the operation or malfunction of such an additional facility shall not prevent the satellite EPIRB conforming fully to the requirements of this ETS during normal combined operation.

4.13 Power source

4.13.1 Battery requirements

The battery life as defined by its expiry date shall be at least 3 years.

The expiry date of the battery shall be the battery manufacturing date plus no more than half the useful life of the battery. The expiry date shall be clearly and durably marked.

The useful life of the battery is defined as the period of time after the date of battery manufacture that the battery will continue to meet the input power requirements of the satellite EPIRB.

To define the useful life of the battery, the following losses at the temperature of $+20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ shall be included:

- self testing at a rate of once a week;
- self-discharge of the battery; and
- standby loads, if any.

4.13.2 Safety precautions

It shall not be possible to connect the battery with the polarity reversed.

The battery shall not release toxic or corrosive products outside the satellite EPIRB:

- during or subsequent to storage at temperatures between -55°C and $+75^{\circ}\text{C}$;
- during a full or partial discharge at any rate up to and including an external short circuit;
- during a charge or forced discharge of a cell or cells by another cell or cells within the battery;
- after a full or partial discharge.

The battery shall not be hazardous to any person handling, using or performing manufacturer approved servicing of the device or to any vehicle or equipment in which it is transported, housed or installed under any of the conditions specified in this ETS.