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ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Avalanche Beacons;
 Transmitter-receiver systems; Part 1: Technical characteristics and test methods

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European Standard (Telecommunications series)

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Avalanche Beacons;
Transmitter-receiver systems;
Part 1: Technical characteristics and test methods**

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Contents

Intellectual Property Rights	6
Foreword	6
1 Scope	7
2 References	7
3 Definitions, symbols and abbreviations	7
3.1 Definitions	7
3.2 Abbreviations	8
3.3 Symbols	8
4 General	8
4.1 Presentation of equipment for testing	8
4.2 Mechanical and electrical design	8
4.2.1 General	8
4.2.2 Controls and indicators	9
4.2.3 Maintaining the transmit mode	9
4.2.4 Battery type	9
4.2.5 Operating time	9
4.2.6 Battery check	9
4.2.7 Carrying system	9
4.2.8 Operating Frequency	9
4.2.9 Operating instructions	9
4.2.10 Short form operating instructions	10
4.2.11 Operating and storage temperatures	10
4.3 Interpretation of the measurement results	10
5 Test conditions, power sources and ambient temperatures	10
5.1 Normal and extreme test conditions	10
5.2 External test power source	10
5.3 Normal test conditions	11
5.3.1 Normal temperature and humidity	11
5.3.2 Normal test voltage	11
5.4 Extreme test conditions	11
5.4.1 Extreme temperatures	11
5.5 Extreme test voltages	11
5.5.1 Procedure for tests at extreme temperatures	11
6 General conditions	12
6.1 Normal test signals	12
6.2 Test fixture	12
6.3 Test sites and general arrangements for radiated measurements	12
6.4 Measuring receiver	12
7 Environmental tests	13
7.1 Procedure	13
7.2 Drop test on hard surface	13
7.2.1 Definition	13
7.2.2 Method of measurement	13
7.2.3 Requirements	13
7.3 Temperature tests	13
7.3.1 General	13
7.3.2 Dry heat cycle	13
7.3.3 Low temperature cycle	14
7.3.4 Requirements	14
7.4 Immersion test	14
7.4.1 Method of measurement	14
7.4.2 Requirements	14

7.5	Solar radiation.....	14
7.5.1	Method of measurement.....	14
7.5.2	Requirements.....	14
7.6	Tensile test.....	15
7.6.1	Method of measurement.....	15
7.6.2	Requirements.....	15
8	Transmitter parameters	15
8.1	Modulation and carrier keying	15
8.1.1	Definition	15
8.1.2	Method of measurement.....	15
8.1.3	Limits.....	15
8.2	Frequency error	16
8.2.1	Definition	16
8.2.2	Method of measurement.....	16
8.2.3	Limits.....	16
8.3	Output field strength (H-field)	16
8.3.1	Definition	16
8.3.2	Method of measurement.....	16
8.3.3	Limits.....	16
8.3.3.1	Minimum transmitted field.....	16
8.3.3.2	Maximum transmitted field.....	17
8.4	Transmitter spurious emissions.....	17
8.4.1	Definition	17
8.4.2	Radiated H-field.....	17
8.4.2.1	Method of measurement (< 30 MHz)	17
8.4.2.2	Limits.....	17
8.4.3	Effective radiated power	17
8.4.3.1	Method of measurement (≥ 30 MHz).....	17
8.4.3.2	Limits.....	18
9	Receiver parameters.....	18
9.1	Receiver sensitivity	18
9.1.1	Definition	18
9.1.2	Method of measurement.....	19
9.1.3	Limits.....	19
9.2	Changes in the received signal.....	19
9.2.1	Definition	19
9.2.2	Requirement	19
9.3	Receiver spurious emissions.....	19
9.3.1	Definition	19
9.3.2	Radiated H-field.....	19
9.3.2.1	Method of measurement (< 30 MHz)	19
9.3.2.2	Limits.....	20
9.3.3	Effective radiated power	20
9.3.3.1	Method of measurement (≥ 30 MHz).....	20
9.3.3.2	Limits.....	21
10	Measurement uncertainty	21
Annex A (normative): Radiated measurements.....		22
A.1	Test sites and general arrangements for measurements involving the use of radiated fields	22
A.1.1	Outdoor test site	22
A.1.1.1	Standard position	22
A.1.2	Test antenna.....	23
A.1.2.1	Below 30 MHz.....	23
A.1.2.2	Above 30 MHz	23
A.1.3	Substitution antenna	23
A.1.4	Optional additional indoor site.....	24
A.2	Guidance on the use of radiation test sites	25
A.2.1	Measuring distance.....	25
A.2.2	Test antenna.....	25

A.2.3	Substitution antenna	25
A.2.4	Artificial antenna.....	25
A.2.5	Auxiliary cables	25
A.3	Further optional alternative indoor test site using an anechoic chamber	26
A.3.1	Example of the construction of a shielded anechoic chamber.....	26
A.3.2	Influence of parasitic reflections in anechoic chambers	26
A.3.3	Calibration of the shielded RF anechoic chamber	27
Annex B (normative):	Spurious limits, radiated H-field at 10 m distances	29
Annex C (normative):	Simulated solar radiation source.....	30
Annex D (informative):	E-fields in the near field at low frequencies	31
Annex E (normative):	H-field limit correction factor for generated E-fields	33
History		34

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Foreword

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

For non-EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document is part 1 of a multi-part deliverable covering the Avalanche Beacons; Transmitter-receiver systems, as identified below:

- Part 1:** "Technical characteristics and test methods";
- Part 2: "Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 3: "Harmonized EN covering essential requirements of article 3.3e of the R&TTE Directive".

National transposition dates	
Date of adoption of this EN:	18 May 2001
Date of latest announcement of this EN (doa):	31 August 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	28 February 2002
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1 Scope

The present document covers requirements for avalanche beacons. Avalanche beacons are portable radio systems used for locating avalanche victims, for the purpose of direct rescue, i.e. for rescue by comrades not buried by the avalanche.

These systems comprise a transmitter as well as a receiver part operating at 457 kHz.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] ETSI ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".
- [3] CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1: Radio disturbance and immunity measuring apparatus".
- [4] ITU Radio Regulations (1998), Appendix S1 "Classification of emissions and necessary bandwidths".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [1], and the following apply.

environmental profile: range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

artificial antenna: tuned reduced-radiating dummy load equal to the nominal impedance specified by the applicant

conducted measurements: measurements which are made using a direct connection to the equipment under test

E-field: electric component of the field measured as voltage per unit length

H-field: magnetic component of the field measured as current per unit length

H-field test antenna: electrically screened loop or equivalent antenna, with which the magnetic component of the field can be measured

integral antenna: antenna designed as an indispensable part of the equipment, with or without the use of an antenna connector

radiated measurements: measurements which involve the absolute measurement of a radiated field

(S + N)/N: ratio, expressed in Decibels, between the sum of the wanted signal plus the noise floor and the noise floor

3.2 Abbreviations

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

R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency

3.3 Symbols

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

A1A	Class of emission (ITU Radio Regulations [4])
E	Electrical field strength
E _o	Reference electrical field strength, (see annex A)
f	Frequency
H	Magnetic field strength
H _o	Reference magnetic field strength, (see annex A)
N	Newton
P	Power
R	Distance
R _o	Reference distance, (see annex A)
t	Time
Z	Wave impedance
l	Wavelength (see annex A)

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4 General

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4.1 Presentation of equipment for testing

The applicant shall supply all relevant ancillary equipment needed for testing.

The applicant should also supply an operating manual for the device(s).

4.2 Mechanical and electrical design

4.2.1 General

The equipment shall be designed, constructed and manufactured in accordance with good engineering practice, and with the aim of minimizing harmful interference to other equipment and services.

Transmitter and receiver shall be combined in one unit and be capable of being attached to the user's body.

The equipment shall be portable and capable of being used for rescue operations, caused by avalanche, between persons that are in snowy, arctic areas or in similar areas.

The equipment shall in one unit comprise at least:

- an transmitter/receiver including antenna and battery;
- a control unit including an on/off switch; and
- a means for conveying information about the received signals to the user.

4.2.2 Controls and indicators

The equipment shall have the following controls:

- on/off switch for the equipment with a visual indication that the equipment is switched on;
- a mean for conveying information about the received signals to the user; and
- a battery check feature.

4.2.3 Maintaining the transmit mode

A safety feature against involuntary or accidental leaving of the transmit mode shall be provided in the equipment.

4.2.4 Battery type

The equipment shall use a widely obtained battery type.

4.2.5 Operating time

With a set of batteries as recommended by the applicant, the equipment shall be capable of at least 200 hours of transmitting at a temperature of +10°C and subsequent receiving for 1 hour at a temperature of -10°C, in compliance with the requirements as stated in clauses 8.3 and 9.1.

4.2.6 Battery check

The equipment shall include a battery check feature. A positive check shall indicate the capability of at least 20 hours of transmitting at a temperature of +10°C and subsequent receiving for 1 hour at a temperature of -10°C, in compliance with the requirements as stated in clauses 8.3 and 9.1.

4.2.7 Carrying system

The equipment shall include a carrying system that gives the possibility for easy operation and safe placing. The carrying system can be a part of the equipment or an accessory device. The carrying system shall have a joint tensile strength of at least 50 N.

4.2.8 Operating Frequency

The equipment shall operate at the nominal frequency of 457 kHz in the transmit as well as in the receive mode.

4.2.9 Operating instructions

Operating instructions shall be delivered with every equipment. They shall cover the following subjects:

- a) a statement on avalanche danger;
- b) instruction for checking the battery, transmitter and receiver performance and range;
- c) instructions for turning on the transmitter and strapping the beacon to the body;
- d) instructions for changing to the receive mode and the search strategy (coarse search and fine search);
- e) instructions for changing back to the transmit mode, in particular in the case of secondary avalanche;
- f) a statement on the temperature sensitivity of essential parts;
- g) a statement on the battery lifetime;
- h) device-specific measures on a tour.

4.2.10 Short form operating instructions

A short form of the operating instructions shall be printed onto the case. The printing shall be clearly visible and abrasion proof. Also, the proper positioning of the batteries shall be indicated.

4.2.11 Operating and storage temperatures

The equipment shall be able to operate correctly in the temperature range from -20 to +45°C and shall be stored without damage in the temperature range from -25 to +70°C.

4.3 Interpretation of the measurement results

The interpretation of the results recorded in the appropriate test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit shall be used to decide whether an equipment meets the requirements of the present document;
- the measurement uncertainty value for the measurement of each parameter shall be separately included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in the table of measurement uncertainty in clause 10.

5 Test conditions, power sources and ambient temperatures (standards.iteh.ai)

5.1 Normal and extreme test conditions

Type testing shall be made under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in clauses 5.2 to 5.4.

5.2 External test power source

During type tests, the power source of the equipment shall be replaced by an external test power source capable of producing normal and extreme test voltages as specified in clauses 5.3.2 and 5.4.2. The internal impedance of the external test power source shall be low enough for its effect on the test results to be negligible. For the purpose of the tests, the voltage of the external test power source shall be measured at the input terminals of the equipment.

The non-grounded terminal of the batteries shall be disconnected, but batteries shall be left in place. The external test power source shall be suitably de-coupled and applied as close to the equipment battery terminals as practicable. The power leads shall be as short as practicable and properly dressed. For radiated measurements fully charged internal batteries should be used. The batteries used should be as supplied or recommended by the applicant.

During tests the external test power source voltages shall be within a tolerance ± 1 % relative to the voltage at the beginning of each test.