Recommendation T/R 24-02 (Cannes 1983)

DEVICES FOR DETECTING AVALANCHE VICTIMS BY MEANS OF LOW-POWER RADIO EQUIPMENT

Recommendation proposed by the "Radiocommunications" Working Group T/WG 3 (R)

Text of the Recommendation adopted by the "Telecommunications" Commission:

"The European Conference of Postal and Telecommunications Administrations,

considering

(a) that the rapidly expanding interest in mountaineering leads to a growing need for means of detecting people in danger, in particular avalanche victims,

(b) that various types of radio equipment for detecting avalanche victims have been developed, operating on different frequencies,

(c) that harmonising the main technical characteristics would increase the chances of success in rescue operations,

(d) that it would therefore be desirable for the administrations to apply common regulations in order to advance the harmonisation of equipment,

recommends

1. that the CEPT members encourage the production of radio equipment for detecting avalanche victims in accordance with the technical specifications set out in Annex I,

2. that the CEPT members take the necessary measures with a view to promoting the use of radio equipment of an approved type in accordance with the specifications set out in Annex I,

3. that the CEPT members take the necessary measures to guarantee the freedom of transport and use of this life-saving equipment."

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Annex I

SPECIFICATIONS OF EQUIPMENT FOR THE RADIOLOCATION OF AVALANCHE VICTIMS

1. INTRODUCTION

— These specifications define the minimum technical characteristics required for transmitters and receivers intended for the radiolocation of avalanche victims.

— These specifications do not guarantee the efficiency of such devices, for example their range, positioning accuracy, period of self-sufficient operation, interference sensitivity, etc.

2. GENERAL CONDITIONS

The devices must carry a permanently fixed set of instructions.

All controls must be marked to indicate their function or the manner in which they should be used, or both.

For the purposes of approval, complete technical documentation must be supplied by the manufacturer.

The devices must be permanently marked with an indication of the manufacturer, the model and, where appropriate, the approval number.

The equipment must have the following controls:

— Adjustment of receiver sensitivity for the purpose of positioning.
— A function selector: transmitter-beacon or reception.
— It must also be possible to check whether the device is indeed transmitting signals when it is being operated as a beacon.
— The device must have a visual or aural control for the purposes of detection and positioning. It would be desirable for the device to be able to detect the presence of a jammer.

3. OPERATING FREQUENCY

The equipment must operate on either 2,275 Hz or 457 kHz, or on both of these frequencies. It would however be desirable for the receiver at least to be able to operate on both frequencies.

4. CHARACTERISTICS OF TRANSMISSION

Transmission may be intermittently cut to economise on consumption.

Transmission and cut-off rates must be such as to allow positioning to be carried out without difficulty.

The 2,275 Hz signal shall be a pure carrier.

The 457 kHz signal shall be a pure or double-sideband amplitude-modulated carrier.

5. TEST CONDITIONS: POWER SUPPLY AND TEMPERATURE

5.1. Normal and extreme test conditions

Approval tests shall be carried out under normal test conditions and, where specified, under extreme conditions.

The test conditions are described below.

5.2. Test power supplies

During approval tests, the power supply of the equipment will be replaced by a test power source able to supply normal and extreme test voltages as specified in paragraphs 5.3.2. and 5.4.2. The internal impedance of the test power source will be low enough to ensure that its influence on the results is negligible. During tests, the voltage of the power source will be measured at the input terminals of the devices.

In the case of equipment with built-in batteries, the test power source will be connected as near as possible to the battery clips.

During tests, the voltage of the power source will be kept at the voltage at the start of each test within a tolerance of ± 3 %.

5.3. Normal test conditions

5.3.1. *Normal temperature and humidity conditions*

During tests, the normal temperature and humidity conditions will correspond to any appropriate combination of temperature and humidity within the following limits:

— Temperature: + 15° C to + 35° C.
— Degree of humidity: 20% to 75%.

Note. In cases where it is impossible to carry out the tests under the conditions described above, a note will be added to the test report indicating the temperatures and degrees of humidity during the tests.

5.3.2. *Normal test power supply*

The normal test voltage will be as indicated by the manufacturer with the agreement of the persons carrying out the tests.

5.4. Extreme test conditions

5.4.1. *Extreme temperatures*

For tests carried out at extreme temperatures, measurements shall be made in accordance with paragraph 5.5. The extreme temperatures shall be:
– 15° C and + 40° C.

The manufacturer may request that the measurements be carried out at – 20° C or – 25° C instead of – 15°C.

5.4.2. *Extreme test values for power supply*

The lower extreme test voltage, in the case of equipment powered by batteries, will be as follows:

1. Leclanché-type batteries:
   0.85 times the nominal voltage of the battery;
2. Alkaline batteries:
   0.9 times the nominal voltage of the battery;
3. Other types of batteries:
   the voltage at the end of use as indicated by the manufacturer of the equipment.

In the case of equipment using other power sources or able to operate with several power sources, the extreme test voltages shall be as indicated by the manufacturer with the agreement of the persons carrying out the tests. They will be specified in the measurement report.

5.5. **Performance of tests at extreme temperatures**

Before the measurements are made, the equipment must have reached its thermal equilibrium in the test chamber. The power supply to the equipment will be cut until such time as thermal equilibrium has been reached.

If the thermal equilibrium is not checked by measurement, a period of at least one hour or any other period determined by the persons carrying out the tests will be chosen as being the time necessary for this equilibrium to be reached.

In order to avoid excessive condensation, a suitable order for the measurements and a suitable humidity setting in the test chamber shall be selected.

Before starting tests at the extreme temperatures, the equipment shall be placed in the test chamber and shall remain there until such time as thermal equilibrium has been reached.

An electric current shall then be passed through the equipment for four minutes in transmission conditions, after which time the equipment must meet the specifications.

In addition, the equipment must be placed in a chamber in which the temperature has been reduced to – 25° C (± 3° C) and kept at this temperature for a period of at least ten hours. The temperature must then be increased to – 15° C (± 3° C) and kept at this temperature for at least 2 hours.

5.6. **Humidity cycle**

The equipment (device 1 and device 2) must be placed in a chamber at a temperature of 30° C (± 3° C) with a degree of humidity of 95% (± 2%). The temperature shall then be reduced to 7° C (± 3° C) with a degree of humidity of 95% (± 2%) in such a way as to produce condensation.

The chamber shall be kept in these conditions for 30 minutes. The temperature shall then be increased again to 30° C with a humidity of 95%, and the cycle shall recommence. This must be repeated three times in total. At the end of the test the chamber shall be kept at a temperature of 7° C and at a degree of humidity of 95% for 30 minutes.

Once this period has been completed, a performance check must be made.

6. MEASUREMENTS ON THE TRANSMITTER AND THE RECEIVER

6.1. Frequency deviation of the transmitter

6.1.1. *Definition*

The frequency deviation of the transmitter is the difference between the measured frequency of the carrier wave and its nominal value.

6.1.2. *Method of measurements*

A coupler shall be used between the transmitter and the frequency meter.

The manufacturer may be asked by the persons carrying out the tests to supply means of eliminating any intermittent transmission system from the carrier for the convenience of the tests.

The measurement shall be made under normal test conditions (paragraph 5.3.) then under extreme test conditions, whereby paragraphs 5.4.1. and 5.4.2. shall be applied simultaneously.

6.1.3. *Limits*

Transmission on 2,275 Hz:
The frequency deviation must not exceed ± 20 Hz
Transmission on 457 kHz:
The frequency deviation must not exceed ± 200 Hz.

6.2. Field intensities produced by the transmitter

6.2.1. *Definition*

For the purposes of these specifications, the field intensity produced by the transmitter shall be the field intensity at a specific distance defined by the method of measurement.

6.2.2. *Method of measurement*[1)]

The transmitter shall be placed in any position at a distance of 3 m from a magnetic-field measuring selective receiver, calibrated to peak value. The field intensity shall be recorded for the position of the receiver which produces the maximum field intensity.

6.2.3. *Limits*

In the case of 2,275 Hz: 4 mA/m.
In the case of 457 kHz: 80 µA/m.

6.3. Spurious radiation from the equipment

6.3.1. *Definition*

For the purposes of these specifications, spurious radiation shall be transmissions on any frequency other than those of the carrier and sideband components resulting from the normal modulation process.

6.3.2. *Method of measurement*[1)]

The equipment shall be placed in any position at a distance of 3 m from a magnetic-field measuring selective receiver, calibrated to peak value, for frequencies up to 30 MHz. The field intensity shall be recorded for the position of the equipment which produces the maximum field intensity.

6.3.3. *Limits*

80 µA/m below 5 MHz;
40 µA/m between 5 and 10 MHz;
10 µA/m above 10 MHz.

[1)] Under certain conditions, it may be necessary to reduce the measuring distance to 1 m (resulting in limit values 27 times higher), this must then be mentioned in the test report.