

ETSO-2C169b

VHF RADIO COMMUNICATIONS EQUIPMENT OPERATING WITHIN THE RADIO FREQUENCY RANGE 117.975 TO 137.000 MEGAHERTZ

1 Applicability

This ETSO gives the requirements which new models of VHF Radio Communications Equipment Operating within the Radio Frequency Range 117.975 to 137.000 Megahertz that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

2 Procedures

2.1 General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 Specific

This ETSO applies to equipment intended for aircraft VHF amplitude modulated (AM) communications operating within 117.975 to 137.000 MHz. This includes 25 and 8.33 kHz channel spacing capabilities. VHF communication equipment covered by this ETSO is primarily intended for aeronautical operational control (AOC) and air traffic services (ATS) safety communications.

3 Technical Conditions

3.1 Basic

3.1.1 Minimum Performance Standard

a. Receiver–Transmitter Equipment

Standards set forth in EUROCAE document ED-23C ‘Minimum Operational Performance Standards for Airborne VHF Receiver-Transmitter Operating within the Radio Frequency Range 117.975-137.000 MHz’, dated June 2009 for the equipment classes defined in the following table.

Table of Equipment Classes for VHF Communication Equipment

Equipment Class	Description
C	Receiver used in a 25 kHz channel separation environment having off-set carrier operation
D	Receiver used in a 25 kHz channel separation environment not having off-set carrier operation
E	Receiver used in an 8.33 kHz channel separation environment not having off-set carrier operation
H1 and H2	Receivers which are to be used in an 8,33 kHz channel separation environment and

Equipment Class	Description
	intended for off-set carrier operation with only two carriers.
3	Transmitter used in a 25 kHz channel separation environment and intended to operate with a range of 200 nautical miles.
4	Transmitter used in a 25 kHz channel separation environment and intended to operate with a range of 100 nautical miles.
5	Transmitter used in an 8.33 kHz channel separation environment and intended to operate with a range of 200 nautical miles.
6	Transmitter used in an 8.33 kHz channel separation environment and intended to operate with a range of 100 nautical miles.

It is recommended that, when applying for ETSO-2C169a authorisation, the applicant also applies for ETSO-2C128 ‘Devices that Prevent Blocked Channels Used in Two-Way Radio Communications due to Unintentional Transmission’ authorisation.

For equipment embedded with audio intercom functions for more than two intercom users (two microphones and two audio outputs), the applicant also has to apply for ETSO-C139a, ‘Aircraft Audio Systems and Equipment’.

For equipment that also provides control panel functionalities, the additional requirements set forth in Appendix 1 of this standard also apply.

b. Antenna Equipment

Requirements set forth in paragraphs 2.1, 2.2.14, 2.2.15, 2.3.9 and 2.3.10 of RTCA document DO-186B, ‘Minimum Operational Performance Standards for Airborne Radio Communications Equipment Operating within the Radio Frequency Range 117.975–137.000 MHz’, dated 8 November 2005, and associated testing procedures.

The antenna shall be qualified according to the applicable sections of the environmental standard referenced in Section 3.1.2 below.

3.1.2 Environmental Standard

See CS-ETSO Subpart A paragraph 2.1.

3.1.3 Computer Software

See CS-ETSO Subpart A paragraph 2.2.

3.1.4 Electronic Hardware Qualification.

See CS-ETSO Subpart A paragraph 2.3.

3.2 Specific

3.2.1 Failure Condition Classification

See CS-ETSO Subpart A paragraph 2.4.

Failure of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a major failure condition.

4 Marking

4.1 General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 Specific

None

5 Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

[Amdt ETSO/6]

[Amdt ETSO/18]

Appendix 1 to ETSO-C169b — ADDITIONAL REQUIREMENTS FOR CONTROL PANELS

In a system that provides an interface for human interaction, such as a control panel and/or a display screen, human performance becomes an essential part of overall system performance. It is therefore essential that human-machine interface designers conduct early evaluations of the capabilities of the human and the system to perform the intended functions. For this reason, the following additional requirements apply to communications equipment with embedded control panels.

1.1 Definitions

Control Panel: a set of controls used by the operator to select and adjust the operational settings of the communications equipment, including, but not limited to, the following functionalities:

- adjusting the volume of the audio output;
- tuning the operative frequency;
- adjusting the squelch level;
- monitoring the current operational status.

1.2 General

The design of the physical and functional features of the communications equipment control panel shall be as simple as possible to enable easy, fast and intuitive operation of the equipment under any potential flight conditions and to avoid any misled or erroneous operation.

For knob controls, the following notes apply:

- clockwise turn: increase in values or digits, or item selection to the right, scrolling down;
- counterclockwise turn: decrease in values or digits, or item selection to the left, scrolling up.

For push-button controls, the following notes apply:

- the legend shall be consistent with the intended function;
- either the control can be a toggle or the function shall not require more than two pushes to revert to the previous values/setting.

If the physical controls are shared between different functions (e.g. a volume knob used for tuning), there must be a clear indication of the active function.

The Control Panel layout shall be designed to prevent any inadvertent use of the controls while operating the equipment.

1.3 Volume Control

The volume of the audio output shall be set by means of a physical control that can be accessed immediately (i.e. adjusting the volume by means of a menu setting is not acceptable).

If the physical control is shared with other functions, there must be a means to automatically revert to the volume control after a predetermined time.

1.4 Tuning Control

The tuning function shall be implemented by a physical control not requiring more than two actions to operate.

1.5 Squelch Level

The squelch function shall be implemented by a physical control not requiring more than two actions to operate.

1.6 Monitoring of the Equipment Status

The monitoring of the equipment status (i.e. the display) shall be simple, intuitive and effective under any potential lighting condition.

[Amdt ETSO/18]