

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: COCKPIT VOICE RECORDER SYSTEMS

1 – Applicability

This ETSO gives the requirements that new models of cockpit voice recorder systems 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

None

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standards set forth in the applicable sections of EUROCAE document ED-112, dated March 2003 that pertain to the CVR type, as modified by **Appendix 1** of this ETSO, except:

- a) *Recorder start and stop times, Section 2-1.5:* Start and stop times must comply with applicable operational regulations.
- b) *Recorder location, Section 2-5.4.1:* Recorder location must comply with applicable EASA Certification Specifications.
- c) *Equipment Installation and Installed Performance (Deployable recorders) Section 3-4.*
- d) *Equipment Installation and Installed Performance, Part 1-6.*
- e) *Other ED-112 requirements for installation, flight testing, aircraft maintenance, and others that do not pertain to MPS specific criteria.*

The first two exceptions above to ED-112 are related to compliance with the operational regulations and certification specifications. The last three items are exceptions to requirements for installation, flight testing, aircraft maintenance, and others that do not pertain to MPS criteria specific to the ETSO equipment.

Table 1 below lists recorder types and the ED-112 Section and part containing the MPS for each type:

Table 1. Recorder MPS Requirements

Recorder Type	ED-112 Reference
Single CVR	Section 2 and Part I
CVR function in a deployable recorder	Section 2, Section 3 and Part I
CVR function in a combined recorder	Section 2, Section 4, and Part I

See Appendix 1 for size, shape, and identification standards for crash protected enclosures.

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

Failure of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a minor failure condition. The applicant must develop the system to at least the design assurance level commensurate with this failure condition.

Note: The failure classification is driven by the accident investigation need.

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2

4.2 – Specific

4.2.1 - Lettering

EUROCAE ED112-Section 2-1 paragraph 2-1.16.3 requires the lettering on the recorder to be at least 25 mm in height. Where it is considered impractical to incorporate lettering of this height due to the size of the recorder case, the applicant may propose an alternative height provided that the size is adequate in relation to the size of the unit and allows easy readability.

4.2.2 - Marking recommendation

Marking in French: "ENREGISTREUR DE VOL NE PAS OUVRIR" is optional.

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3

APPENDIX 1

STANDARDS FOR CRASH PROTECTED ENCLOSURE

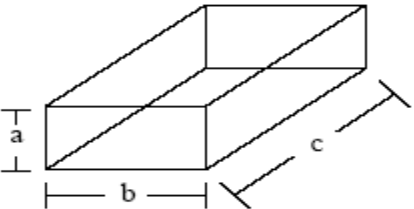
1 - Physical Size.

As technology allows for increased miniaturisation, manufacturers continue to shrink the crash enclosure. Now, the enclosure can be very difficult to find in wreckage. The sum of the height (a), width (b), and depth (c) of the crash enclosure must be 23 cm (9 inches) or greater. Each of these major dimensions must be 5 cm (2 inches) or greater. Here are five examples of a crash enclosure and the minimum required dimensions:

NOTE: The dimensions of the crash protected enclosure shall not include the underwater locator beacon (ULB) or its attachment hardware.

2 - Identification.

Paint the crash enclosure according to CS 23.1457(g), 25.1457(g), 27.1457(g), or 29.1457(g) and mark in accordance with paragraph 4 of this ETSO.

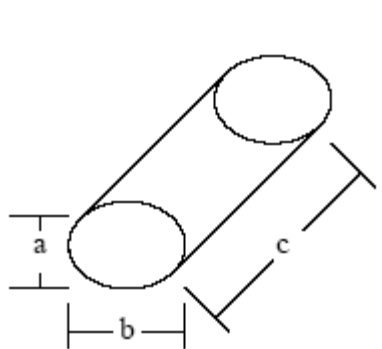


$a, b, c \geq 5 \text{ cm (2 inches)}$
 $a+b+c \geq 23 \text{ cm (9 inches)}$

Figure 1. Crash enclosure shaped like a rectangular prism.



Apply minimum dimensions to the major axis (a), minor axis (b), and length (c) of the enclosure.

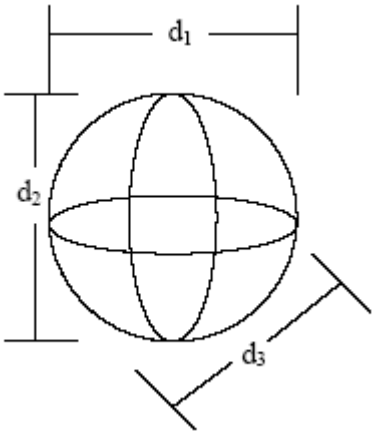


$a, b, c \geq 5 \text{ cm (2 inches)}$
 $a+b+c \geq 23 \text{ cm (9 inches)}$

Figure 2. Crash enclosure shaped like an elliptical cylinder.



Height, width, and depth are all equal to the diameter of the sphere which must be equal to or greater than 7.7 cm (3.0 inches) because of the, $a + b + c \geq 23$ cm (9 inches), requirement.

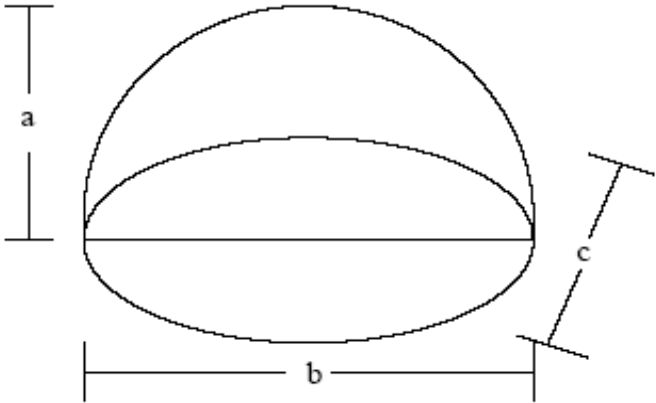


$d_i \geq 7.7$ cm (3 inches)

$d_1 + d_2 + d_3 \geq 23$ cm (9 inches)

Figure 3. Crash enclosure shaped like a sphere.

Dimensions a, b, and c are not necessarily equal

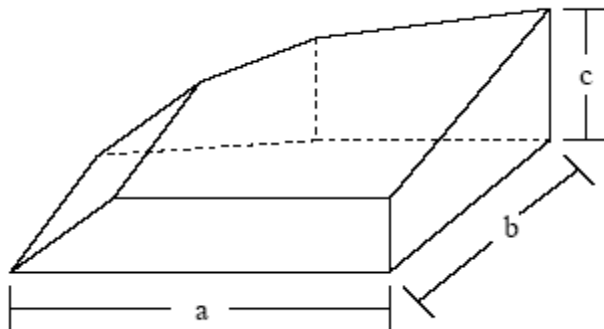


$a, b, c \geq 5$ cm (2 inches)

$a + b + c \geq 23$ cm (9 inches)

Figure 4. Crash enclosure shaped like an ellipsoid hemisphere.

Width (a) is the largest width of the enclosure, depth (b) is the largest depth of the enclosure and height (c) is the largest height of the enclosure. Take each of these major dimensions from the outer surface of the enclosure. Do not include any protrusions such as mounting flanges or plates.



$$a, b, c \geq 5 \text{ cm (2 inches)}$$

$$a+b+c \geq 23 \text{ cm (9 inches)}$$

Figure 5. Crash enclosure is generically shaped.