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Small craft — Automatic watertight ventilation shutdown system

Petits navires — Dispositif de fermeture étanche et automatique des systèmes de ventilation

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Foreword

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This document was prepared by Technical Committee ISO/TC 188, *Small craft*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Automatic watertight ventilation systems help to prevent ingress of water, which can also help to maintain buoyancy of small crafts. The air space trapped in the compartment can provide buoyancy to help to keep the boat afloat.

Small craft — Automatic watertight ventilation shutdown system

1 Scope

This document specifies requirements for the design and testing of an automatic watertight ventilation shutdown system (AWVSS) activated electrically or hydrostatically on small craft.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6509-1, *Corrosion of metals and alloys — Determination of dezincification resistance of copper alloys with zinc — Part 1: Test method*

ISO 8846, *Small craft — Electrical devices — Protection against ignition of surrounding flammable gases*

ISO 11812, *Small craft — Watertight or quick-draining recesses and cockpits*

ISO 12216, *Small craft — Windows, portlights, hatches, deadlights and doors — Strength and watertightness requirements*

ISO 12217-1, *Small craft — Stability and buoyancy assessment and categorization — Part 1: Non-sailing boats of hull length greater than or equal to 6 m*

ISO 12217-2, *Small craft — Stability and buoyancy assessment and categorization — Part 2: Sailing boats of hull length greater than or equal to 6 m*

ISO 12217-3, *Small craft — Stability and buoyancy assessment and categorization — Part 3: Boats of hull length less than 6 m*

ISO 14993, *Corrosion of metals and alloys — Accelerated testing involving cyclic exposure to salt mist, dry and wet conditions*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
automatic watertight ventilation shutdown system
AWVSS
system which automatically closes the ventilation openings to a set level of *watertightness* (3.5) once activated

3.2
corrosion resistant
inherent ability of a material (metallic or non-metallic) to withstand corrosion damage caused by either oxidation or other chemical reactions

3.3
small craft
recreational boat, and other watercraft using similar equipment, of up to 24 m length of hull (L_H)

Note 1 to entry: The measurement methodology for the length of hull (L_H) is defined in ISO 8666.

[SOURCE: ISO 8666:2020, 3.15, modified — The referred term “craft” has been deleted and replaced with "small craft" (previously the admitted term). Note 1 to entry has been added.]

3.4
uninterruptible power system
UPS
power system for maintaining continuity of load power in the event of failure of the main power supply

3.5
watertightness
capacity of an appliance or a fitting to prevent ingress of water inside the boat

4 Requirements

4.1 General requirements

Where an AWVSS is installed on an inlet and/or outlet of the ventilation system, it shall automatically close the inlet and/or exhaust openings within the conditions specified by the appliance manufacturer and fulfil the requirements of Clause 5 (hydrostatic AWVSS) or Clause 6 (electric AWVSS).

Installation and operation instructions shall be provided with each AWVSS by the device manufacturer. The following information shall be included in the instructions:

a) the minimum and maximum pressure value under which the AWVSS system will operate;

b) the installation location;

c) the angle of heel/trim conditions for AWVSS operation;

d) the opening section area of the equipment.

An AWVSS as a part of a ventilation system shall be installed in accordance with the relevant watertightness requirements given in ISO 12216, ISO 12217-1, ISO 12217-2, ISO 12217-3 and ISO 11812.

The consequence of the closure of air-intake, including potential damages to the engine while running and/or potential damages to its compartment, shall be considered by the small craft manufacturer.

Potential consequences of closing the air intake of an engine room with a running engine can include following.

— Underpressure, leading to collapse of the AWVSS itself, of hatches, or of decks and/or bulkheads, compromising integrity, initiating structural damage and potentially initiating total collapse of the craft.

— Underpressure, leading to misalignment and potential failure of shafting.

— Underpressure, leading to failure of (fuel) tanks ventilated from outside.

— Loss of propulsion power because of stalled engine

NOTE It is possible that the engine will not be able to restart due to hatches sucked closed.

The user shall verify proper functioning of AWVSS on a regular basis, and if applicable, every time before leaving port.

All parts of the AWVVS shall be easily inspectable.

Where craft are potentially operated in freezing temperatures, means shall be provided to ensure proper de-icing.

4.2 Specific requirements for electric AWVSS

A visible indicator lamp and audible buzzer shall be installed and clearly perceptible from the main steering position to indicate the activation of the AWVSS.

The electrical power source shall be connected to the on-board electrical supply or be independently powered.

4.3 Material requirements

4.3.1 Material combinations

The materials used shall be galvanically compatible and shall not prevent the device and/or system from acting as intended.

4.3.2 Resistance to deterioration/corrosion

The materials used shall be resistant to or protected from deterioration, taking into account the environment and various and changing media that pass through the system (e.g. fresh, salt or brackish water with impurities).

There shall be no degradation of metallic components after the required tests described in Clause 5 that will impair operation of the AWVSS. For brass materials, the test shall be as specified in ISO 6509-1. If necessary, the tests should be assessed in accordance with ISO 6509-2.

There shall be no degradation of metallic components after the required tests of this clause that will impair operation of the AWVSS.

For all other metallic materials, the test shall be as specified in ISO 14993.

All metallic components shall be corrosion resistant. The requirement for corrosion resistance can be met through testing in accordance with ISO 9093:2020, Annex B.

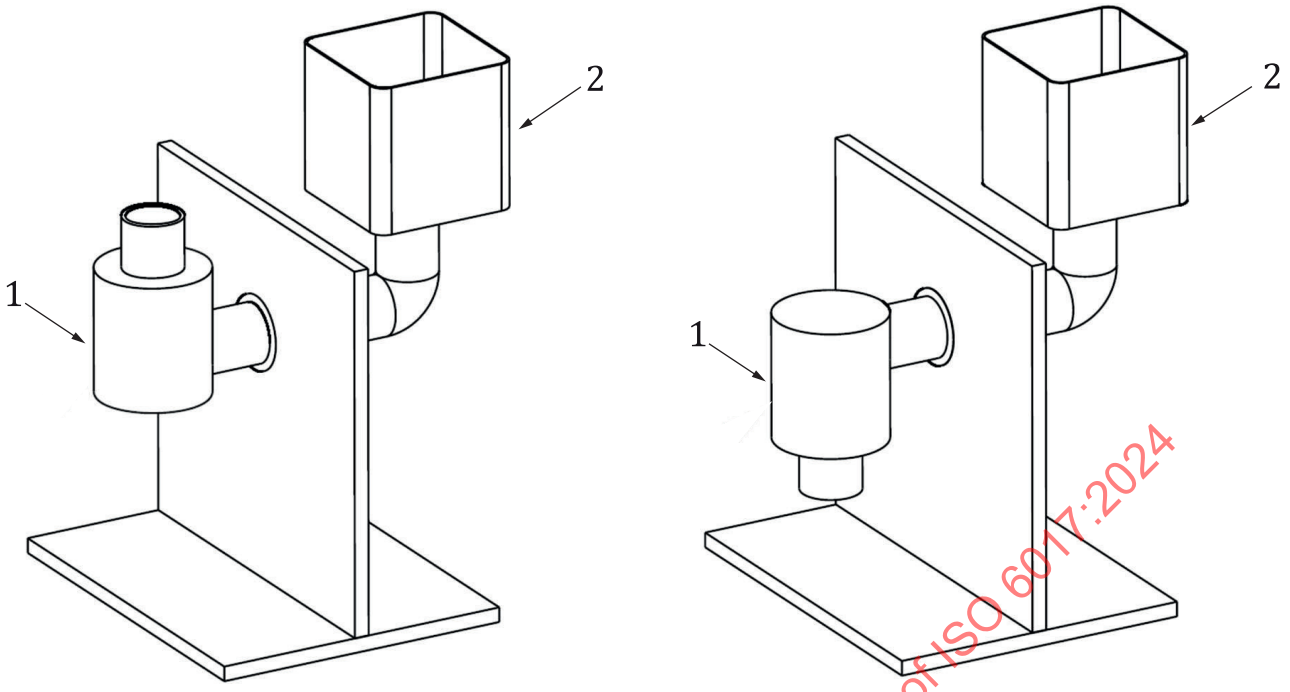
All non-metallic parts shall be stabilized against oxidation and ultraviolet (UV) radiation. The requirement for UV stabilization can be met through testing in accordance with ISO 9093:2020, Annex C.

5 Hydrostatic AWVSS — Pressure test

5.1 General

The test described in 5.2 shall be carried out on a representative sample.

The AWVSS shall be subjected to pressure tests according to the requirements of 5.2 and Figure 1.



a) AWVSS in standard position **b) AWVSS at 180° from standard position**

Key

1 AWVSS

2 external water pressure

Figure 1 — Test layout of hydrostatic AWVSS for different positions

5.2 Test

The test bench shall comprise a hydrostatic AWVSS sample, installed in accordance with the manufacturer's instructions, on an opening installed on a vertical plane plate, representing the face of the engine compartment.

On the other side of this plate, the opening shall be connected in a watertight manner to an external hydrostatic water pressure system consisting of a water column.

The test shall be performed with the AWVSS installed in the following two different positions:

— the standard position of use as described by the manufacturer;

— at the maximum heel of angle specified by the manufacturer.

The AWVSS shall be tested on an appropriate pressure test bench for at least 3 min under an external water pressure of at least 35 kPa.

The AWVSS shall automatically close with the increase of water level. No leak, nor permanent deformation of any part of the appliance shall be observed during the test.

6 Electric AWVSS

6.1 General/design requirements

6.1.1 System components for AWVSS

The AWVSS shall include the following components:

a) closing appliances (such as shutters or valves);

b) sensors;

c) controller;

d) electric actuator.

6.1.2 Electric/electronic installation

6.1.2.1 General

Instructions for proper installation and use of the system shall be supplied by the manufacturer.

6.1.2.2 IP grade

All electrical components which are subject to flow (or intrusion) of water shall be IP graded appropriately.

Components used in the electric AWVSS system shall be IP 56 at minimum, in accordance with IEC 60529.

6.1.2.3 Ignition protection

Electrical components of the system that can be operated in compartments or spaces that can contain an explosive atmosphere shall have ignition protection in accordance with ISO 8846.

EXAMPLE Compartments containing petrol, LPG, CNG, etc.

6.1.2.4 Sensors

Sensors required for the proper operation of the system shall be able to measure any variables required by the system for activation, including but not limited to:

a) angle of heel;

b) angle of trim;

c) ingress of water.

6.1.3 Additional functions

The system shall allow the operator to open and close the openings independently from the angle of heel/trim.

A means of manual operation shall be provided to override the AWVSS, in case of system failure, to allow the users to manually open and close the openings.

The system may be connected to an emergency power source.

6.2 Operation test for electric AWVSS

6.2.1 General

The purpose of this subclause is to ensure that the AWVSS properly operates while under rotation. This test shall be performed on each type of appliance before its installation on the small craft. A sample of each type of prefabricated appliance shall be tested in a suitable jig following the procedure given in 6.2.2.

6.2.2 Preparation of the test

6.2.2.1 Test facility

The test facility shall include:

a) a test jig to simulate the rotation of the test specimen;

b) sensors necessary during the test to measure any changes in the status of the specimen, i.e. rotation, open/close status, etc. Such sensors shall include but not be limited to:

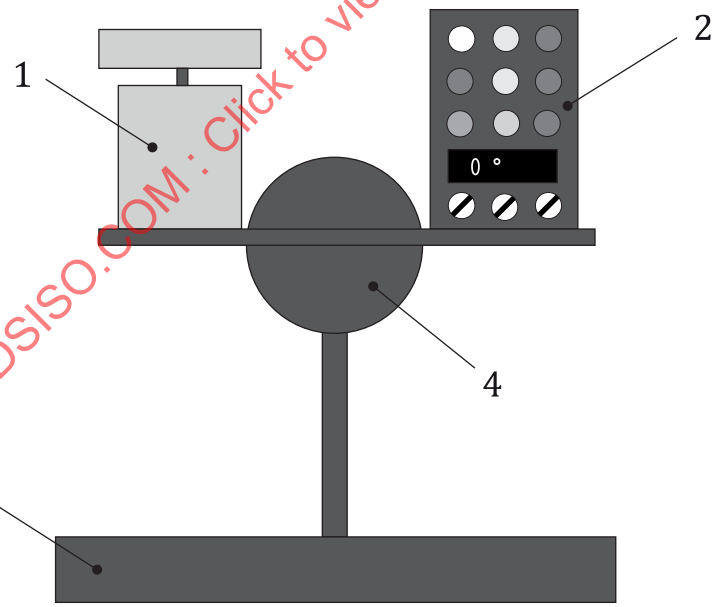
   1) instruments for measuring the angle of heel/trim;

   2) time taken for the AWVSS to open and close;

   3) open/close status of the closing appliance verified by using appropriate sensors to confirm that the opening is completely opened/closed;

c) monitoring system to record and monitor any measurement taken by the sensors used to verify the performance of the specimen during the test.

A sample layout of the operation test facility is shown in Figure 2.



Key

1 opening/damper
2 controller
3 test jig
4 rotator

Figure 2 — Sample layout of the rotating test jig

6.2.2.2 Test specimen

Each part of the test specimen shall be prepared as follows:

a) install closing appliances to the jig to open/close the ventilation system;

b) attach sensors to measure the angle of heel and trim of the AWVSS;

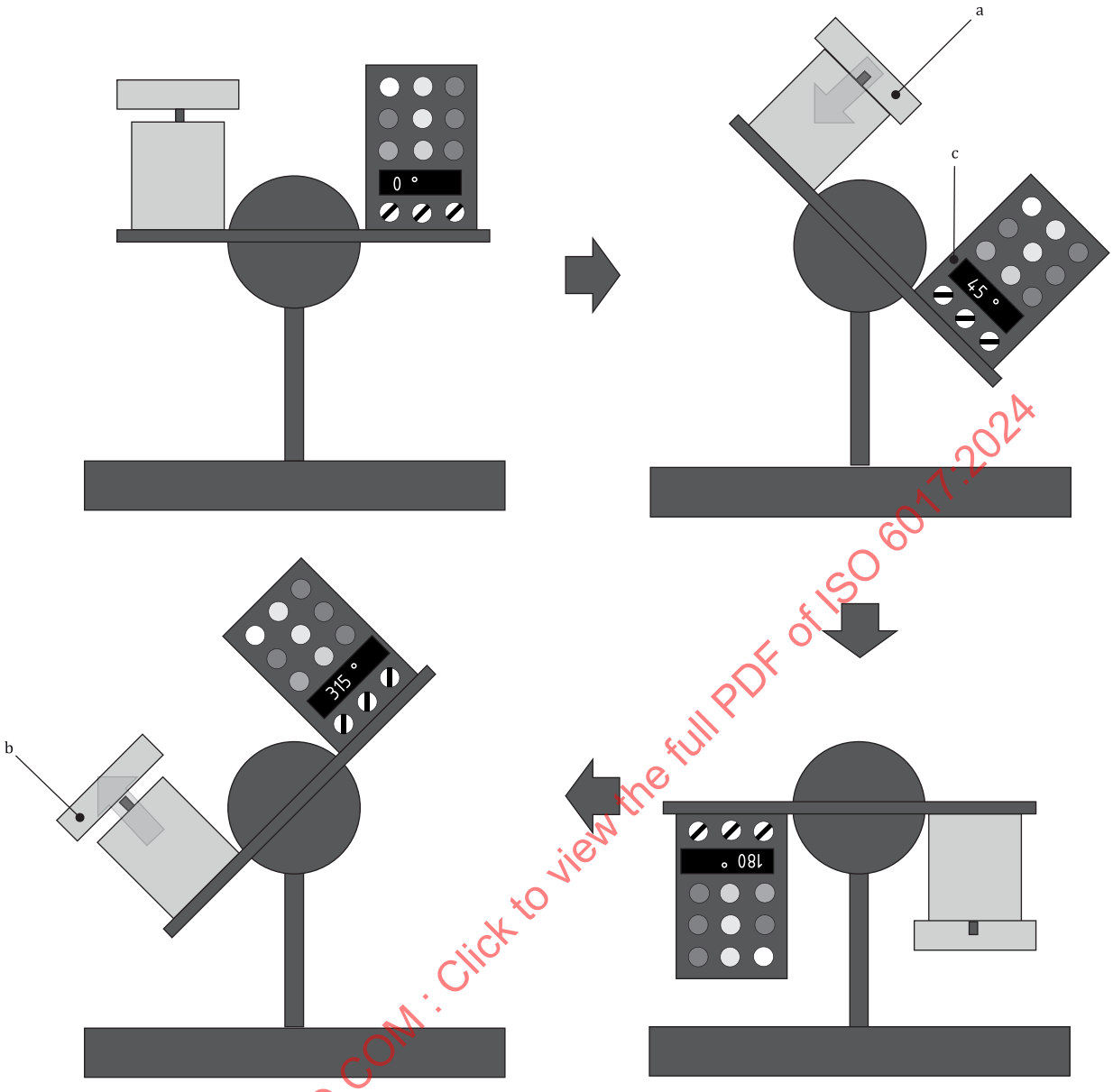
c) electrically connect a UPS and controller to the specimen throughout the test period.

6.2.3 Operation test requirements

The test specimen shall be rotated from 0° to 360°.

The time taken to completely open/close the opening shall be automatically measured by the sensor and recorded in the monitoring system. The measuring shall start when the rotation reaches the set angle defined by agreement between the manufacturer and the user as described in Figure 3.

The test shall be re-conducted by using a UPS instead of the main power supply.



a Closed at 45°.

b Opened at 315°.

c Controller to open/close at set angles.

Figure 3 — Example on open/close status for each angle

6.3 Pressure test for electric AWVSS

6.3.1 General

The tests specified in this subclause shall be performed on at least one sample of the appliance installed on a small craft. The purpose of the pressure test is to ensure that the deflection of the device while under pressure does not impair its watertightness to prevent the ingression of water. This test shall be performed on each type of appliance before its installation on the small craft.

6.3.2 Preparation of the test

Closing appliances shall be maintained completely closed by the means provided by the manufacturer.