UL 1121

STANDARD FOR SAFETY

Marine Through-Hull Fittings and Sea-Valves

UL Standard for Safety for Marine Through-Hull Fittings and Sea-Valves, UL 1121

Fifth Edition, Dated November 18, 1998

Summary of Topics

This revision:

Changes requirements for the external flanges of a through-hull fittings; and

Deletes 7.4, adds seacock zerk fitting requirements in 7.9 and adds in 7.10 optional requirements for seacocks to accept BSPP threaded through-hull fittings.

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Standard for Marine Through-Hull Fittings and Sea-Valves

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Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at http://csds.ul.com.

No Text on This Page

CONTENTS

INTRODUCTION

CONSTRUCTION

PERFORMANCE

MARKING

INTRODUCTION

1 Scope

1.1 These requirements cover marine through hull fittings intended to be used above or below the water line and marine sea valves for use as shut off devices to effect positive closure of boat hull penetrations.

1.2 These requirements do not cover the use of shut off devices as a means of establishing or controlling the flow rate of a liquid.

1.3 Requirements for the installation and use of marine through-hull hull fittings and seacocks covered by these requirements are included in Recommended Practices and Standards Covering Seacocks, Through-hull Hull Connections, and Drain Plugs, ABYC H 27, and the Recommended Practices and Standards Covering Installation and Protection of Hull Openings Between Waterline and Sheer Line, ABYC H 15.

1.4 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 Units of Measurement

2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

3 Component

3.1 Except as indicated in 3.2, a component of a product covered by this standard shall comply with the requirements for that component.

3.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

3.3 A component shall be used in accordance with its rating established for the intended conditions of use.

3.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

4 Glossary

4.1 For the purpose of these requirements the following definitions apply.

4.2 THROUGH-HULL FITTING – A device intended to provide a means of conveying liquid or vapor into or out of the hull of a boat without leakage of liquid or vapor to the boat interior.

4.3 SEACOCK – A type of valve used to control the intake or discharge of water through the hull. It is operated by a lever type handle usually operating through a 90 degree arc, giving a clear indication of whether it is open or closed.

CONSTRUCTION

5 All Devices

5.1 A through-hull fitting or sea valve shall have a nonclogging passageway.

5.2 A through-hull fitting or sea valve shall be constructed to prevent loosening from the hull or shifting in position in service when mounted as intended.

6 Through-Hull Fittings

6.1 A through-hull fitting may be machined with NPSM threads or BSPP threads to accept a similarly threaded seacock and shall be constructed to provide the necessary rigidity and strength to withstand:

a) The pressures developed by the expansion and contraction of typical hull constructions resulting from moisture absorption and thermal effects.

b) The vibration and shock stress that can be anticipated in the intended service.

c) A 500 pound (227 kg) static load for 30 seconds when installed with a seacock and tested in accordance with Section 20.

6.2 A through-hull fitting may be independently secured by means of the clamping nut, if intended to be installed above the water line or connected directly to a seacock. If a through-hull fitting or the fitting attached to the seacock is intended for use with a hose, the hose connection shall:

a) Have a bead or a series of annular grooves or serrations not less than 0.015 inch (0.38 mm) deep.

b) Be of such length that a 1/2 inch (12.7 mm) wide clamp can be positioned beyond the bead or over the serrations of the spud with a minimum of one clamp width from the clamp to the hose end.

6.3 The threaded portion intended to extend through the hull planking or shell, and the doubler block, shall be sufficient length to provide at least five full threads engagement with a retaining nut or with the matching threaded body of a sea valve when installed as intended.

6.4 With reference to 6.2, if the flange of a flanged seacock is to be drilled in the field to match a particular installation, instructions shall be provided that describe in detail the intended mounting method: including number, size, and edge distance of holes and type and size of fastenings.

6.5 The a through-hull fitting shall:

a) Have provision for holding or turning the through-hull hull fitting.

b) Permit the optional installation and use of strainers, scoops, or deflectors.

c) Be formed to reduce the likelihood of the through-hull fitting snagging on lines, sea growth, and the like.

d) Be resistant to ultraviolet weathering, as determined in Section 20, if of polymeric material.

7 Seacocks

7.1 A seacock may have an integral flange to individually and securely mount the device directly to the boat hull structure or may be without a flange if designed to be supported entirely by the through-hull fitting which is secured to the hull with its retaining nut.

7.2 A seacock, with or without a flange, when installed with a through-hull fitting shall be capable of withstanding the application of a 500 pound (227 kg) static load for 30 seconds when tested in accordance with Section 20.

7.3 A seacock shall be provided with a lever type handle which operates through an arc of about 90 degrees and if the handle is removed, it shall be possible to operate the seacock with ordinary tools such as crescent or ordinary wrenches, pliers, or pipe wrenches.

7.4 Deleted July 27, 2016

7.5 The position (open or closed) of a seacock shall be obvious.

7.6 A seacock shall be constructed so that its position (open or closed) will not be altered by vibration or shock.

7.7 A seacock shall be provided with a means to permit draining of any entrapped fluid, such as in the bore of a plug cock valve when the valve is closed.

Exception: A seacock capable of passing the freeze test without permanent damage when tested in accordance with Section 10 need not comply with this requirement.

7.8 The construction of a seacock shall permit operation in the intended manner when marine growth or encrustation (sea shells and marine grasses) are placed in the valve bore in accordance with 17.4.

7.9 A seacock shall be provided with a means to permit draining of any entrapped fluid, such as in the bore of a plug cock or ball valve when the valve is closed. The means to permit draining may be a pipe plug or a ″zerk″ fitting. The zerk fitting has pipe thread (like a pipe plug), so it serves as a means for draining. The zerk also enables the injection of grease to lubricate internal valve parts.

7.10 A seacock may be machined at its inlet with NPSM or BSPP threads to accept a similarly threaded through-hull fitting, and may be machined at its outlet with NPT or BSPP threads to accept a similarly threaded pipe fitting or adaptor.

8 Materials

8.1 The components of a through-hull fitting or sea valve shall be formed of galvanically compatible materials having the strength and resistance to corrosion necessary to withstand intended and abnormal use to which they are likely to be subjected.

8.2 With reference to 8.1:

a) Intended use includes:

1) Exposure to the various fuels, fluids, and compounds used on boats.

2) Exposure to varying temperatures.

3) Exposure to salt water erosion, varying from conditions of sustained stagnation to conditions of turbulence at maximum hull speeds.

b) Abnormal use include:

1) Improper dry docking, and the like.

2) Running aground.

8.3 A part made of drawn brass or machined from brass rod containing more than 15 percent zinc shall be subjected to the 10-Day Moist Ammonia-Air Stress Cracking Test, Section 19.

PERFORMANCE

9 General

9.1 Representative samples of a through-hull fitting or sea valve are to be subjected to the tests described in Sections 10 – 18.

9.2 A through-hull fitting is to be tested using either a retaining nut to simulate above water line installation or a closure device to simulate below water line installation, depending on the intended use.

9.3 The mechanical stresses normally imposed on or within a part as a result of the assembly and installation of the through-hull fitting or sea-valve are to be applied in tests involving the complete device.

9.4 For the purpose of these requirements, mechanical malfunction is defined as a malfunction of the device that would necessitate repair or replacement, including any malfunction that would impair intended operation.

9.5 Two samples of the device are to be installed in a test rig in accordance with the manufacturer's installation instructions. The mounting portion of the rig is to consist of simulated hull sections of trade size 1 inch thick [nominally 3/4 inch (19.1 mm)] southern yellow long leaf pine or equivalent (unpainted, kiln dried) wood with a backing block of the same material and in the same thickness, or constructed of the material for which the device is intended for use (for example, glass reinforced plastic, steel, aluminum, and the like). The simulated hull section is to be inclined 45 degrees above the horizontal plane.

9.6 A threaded through-hull fitting or sea valve is to be tested while connected to a 1 foot (0.3 m) length of iron pipe size (IPS) pipe. A through-hull fitting or sea valve intended for use with a hose only is to be tested with a 3 foot (0.9 m) length of 30R2, Type 2 hose, complying with theStandard for Fuel and Oil Hoses, SAE J30, and supported at the free end by a bracket connected directly to the specific test table.

9.7 A complete assembly, consisting of the samples of the device being tested in the arrangement described in 9.5 and9.6, is to be subjected to each of the following tests. For a sea valve, one of the samples is to be in the open position and the other in the locked position during the tests described in the Vibration Test, Section 14 and the Shock Test, Section 15.

10 Thermal Conditioning Test

10.1 There shall be no mechanical malfunction or distortion of a through-hull fitting or sea valve, or of any component of the device, following thermal conditioning for 50 hours at a temperature of 60°C (140°F) and 50 hours at a temperature of minus 30°C (minus 22°F).

10.2 The assembled sample is to be placed in an air oven maintained at 60 ±5°C (140 ±9°F) and a second assembly placed in a cold chamber maintained at minus 30 ±3°C (minus 22°F) for 50 hours.

10.3 For a sea valve, immediately following the initial exposure period the samples in the air oven and the cold chamber are to be subjected to a minimum of six complete cycles of operation, their conditioning environments interchanged, and then the samples are to be conditioned for an additional 50 hours. Following this second exposure period, the test samples are to be operated at least once and then examined for evidence of mechanical malfunction.

10.4 A seacock which has no drain plug (see Exception to 7.6) shall additionally be tested in the cold chamber in accordance with 10.3 with the bore filled completely with fresh water. The valve is to be closed during the test.

11 Mechanical and Thermal Shock Test (Sea Valves)

11.1 A sea valve shall withstand mechanical and thermal shock without mechanical malfunction.

11.2 Upon completion of the final 50 hour thermal conditioning period specified in 10.2, each of the test assemblies is to be mounted on a shock table within 30 seconds of its removal from the chamber and the assembly subjected to 25 shock impacts of 20 g [approximately 644 feet per second per second (196 m/s^2)] acceleration and 20 – 5 milliseconds duration as measured at the base of the half sine shock envelope.

11.3 The machine used for this test is to be of the automatic cycling type producing a half sine shock pulse at the acceleration level and duration specified. The acceleration and shock pulse duration is to be measured by a piezoelectric accelerometer mounted on the test machine platform on an axis parallel to the axis of motion.

11.4 The test rig is to be mounted so that the center of gravity of the sample is as close as possible to the geometric center of the machine platform.

11.5 Following the test described in 11.2 – 11.4, each sample is to be preconditioned to a temperature of minus 30°C (minus 22°F). Water at 82°C (180°F) then is to be made to flow through the sample.

12 Moisture Absorption Test

12.1 While submerged in water, a through-hull fitting or sea valve and its mounting or supporting materials shall withstand, without mechanical malfunction, the contraction and expansion forces resulting from intended mounting and tightening of the device.

12.2 The test assembly is to be dried for 8 hours in an air oven maintained at 60°C (140°F). Following this drying period, the samples are to be tightened as intended in service, and the samples are to be submerged for 8 hours in fresh water maintained at room ambient [approximately 23°C (73°F)].

13 Resistance to Liquids Test

13.1 There shall be no degradation of an assembly or component formed of a nonmetallic material to the extent that the operation of a through-hull fitting or sea valve is impaired, following 30 days of continuous immersion in each of the specified liquids in Table 13.1maintained at a temperature of 23°C (73°F).

Table 13.1
Test liquids

Fluid with which the device is intended to be in contact	Test liquid to be used
Fuel Oils, Nos. 1 and 2, and Kerosene	IRM immersion oil 903
Gasoline	Reference Fuels A and C D471-96(ASTM D 471-96)

13.2 The following test liquids also are to be used for the test specified in 13.1:

a) Sodium hypochlorite (5.25 percent by weight).

b) Commercial-type household ammonia.

c) Fresh water.

d) Salt water (5 percent sodium chloride).

13.3 Following exposure to the designated liquids, the nonmetallic materials are to be examined for evidence of swelling, decomposition, or deformation and the sample tested for intended operation.

14 Vibration Test

14.1 A through-hull fitting or sea valve shall withstand, without mechanical malfunction, the vibration specified in 14.2 and 14.3.

14.2 The test assembly is to be subjected to variable frequency vibration in each of three rectilinear axes (horizontal, vertical, and lateral) for 4 hours in each plane (total 12 hours), at a peak to peak amplitude of 0.030 ±0.001 inch (0.76 ±0.03mm). The frequency of vibration is to be continuously varied, at a uniform rate, from 10 to 60 to 10 hertz every 4 minutes.

14.3 For this test, peak to peak amplitude is defined as the maximum displacement of sinusoidal motion of the vibration table in one complete cycle.

15 Shock Test

15.1 A through-hull fitting or sea valve shall withstand 5000 shock impacts without development of mechanical malfunction or leakage.

15.2 The test assembly is to be mounted on a shock machine and subjected to 5000 shock impacts having a 10 g (98 m/s^2) acceleration and a 20 – 25 millisecond duration, as measured at the base of the one half wave shock envelope.

16 Abrasion and Rough Usage Test (Through-Hull Fittings)

16.1 A through-hull fitting shall withstand exposure to conditions of abrasion and rough usage without development of mechanical malfunction.

16.2 The test assembly is to be driven through a 6 inch (150 mm) depth of clean, dry sand at a velocity of approximately 14 feet per second (4.3 m/s) over a distance of approximately 2 feet (0.6 m) for a total of 10,000 passes.

17 Operation Test (Sea Valves)

17.1 A sea valve shall withstand the test conditions specified in 17.2 – 17.4 without mechanical malfunction, or the development of leakage in excess of 2 gallons (7.57 L) of water per 24 hours.

17.2 A sample of the valve is to be mounted with a through-hull fitting on a simulated hull section in accordance with the manufacturer's installation instructions, and the assembly secured to a test chamber capable of maintaining a controlled hydrostatic head on the external opening of the through-hull fitting.

17.3 The chamber is to be filled with water and purged of all air. The pressure in the chamber then is to be raised to 10 psig (69 kPa) and the sample subjected to 25 complete cycles of operation from the fully open to fully closed positions.

17.4 Upon completion of the 25 operating cycles, the chamber pressure is to be lowered to atmospheric pressure, the sample is to be opened, and a mixture of marsh grass and broken clam shells, or equivalent material, is to be inserted through the opening of the through-hull fitting. The sample then is to be closed. This procedure is to be repeated for a total of five times. The sample then is to be tested for leakage.

18 Leakage Test (Sea Valves)

18.1 There shall be no evidence of leakage at the points of connection of a sea valve when the device is installed and connected in accordance with the manufacturer's installation instructions and subjected to an aerostatic pressure of 50 psig (345 kPa) for 1 minute.

18.2 The pressure source is to be connected to the inlet of the sample and the outlet of the sample is to be provided with a 5 foot (1.5 m) length of pipe or hose that is capped or otherwise blocked at its free end.

19 10-Day Moist Ammonia Air Stress Cracking Test

19.1 After being tested as described in 19.2 – 19.5, a brass part containing more than 15 percent zinc shall show no evidence of cracking or delamination when examined using 25X magnification.

19.2 The sample is to be subjected to the mechanical stresses normally imposed on or within the part as the result of intended assembly with other components of the through-hull fitting or sea valve, or with tubing or piping. Such stresses are to be applied to the sample prior to and remain effective during the test. Samples with threads, intended to be used for installing the product in the field, are to have the threads engaged and tightened to the torque specified in Table 19.1. Teflon tape or pipe compound are not to be used on the threads.