UL 1105

STANDARD FOR SAFETY

Marine Use Filters, Strainers, and Separators

UL Standard for Safety for Marine Use Filters, Strainers, and Separators, UL 1105

Fourth Edition, Dated May 2, 2006

Summary of Topics

This revision to UL 1105 includes changes to corrosion protection requirements, paragraph 6.7.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin. Changes in requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated June 25, 2012.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a ″SUPERSEDED REQUIREMENTS″ notice.

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UL 1105

Standard for Marine Use Filters, Strainers, and Separators

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Second Edition – October, 1977
Third Edition – November, 1998

Fourth Edition

May 2, 2006

This UL Standard for Safety consists of the Fourth Edition including revisions through August 15, 2012.

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.

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INTRODUCTION

1 Scope

1.1 These requirements cover marine filters, strainers, and separators intended to separate impurities and/or water from the fuel in gasoline or diesel oil fuel systems on boats.

1.2 These requirements do not cover filters, strainers or separators which are incorporated as integral parts of fuel tanks, fuel pumps, or other items of equipment whose prime functions are not that of filters, strainers, or separators.

1.3 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 General

2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information. SI units as employed are in accordance with the American National Standard for Metric Practice, ANSI Z210.1.

3 Components

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 this Standard, the following definitions apply.

4.2 FILTER – A device designed to separate particles, 40 microns and smaller in size, from the fuel.

4.3 FLAMMABLE AND COMBUSTIBLE FLUIDS – Liquids which are used to power internal combustion engines of motor vessels.

4.4 SEPARATOR – A device designed to separate water from fuel.

4.5 STODDARD SOLVENT – A colorless liquid petroleum distillate mixture of hydrocarbons, also know as mineral spirits.

4.6 STRAINER – A device designed to separate particles 40 to 150 microns in size from the fuel.

CONSTRUCTION

5 General

5.1 General

5.1.1 A copy of the draft of the operating and installation instructions intended to accompany each product as produced, or equivalent information, is to be used as a guide in the examination and test of a product.

5.2 Assembly

5.2.1 Filters, strainers, and separators shall include all of the components necessary for the intended function and installation of the device.

5.2.2 The construction of the device shall facilitate easy cleaning and minimize fuel spillage when serviced under adverse conditions, such as in a congested engine space under poor lighting conditions.

5.2.3 A separator, filter, or strainer intended to be cleaned or replaced, shall be designed to permit the removal of the element without disconnecting any piping.

5.2.4 The element shall be held in its intended position so that the joints or seals required to prevent fluid bypass of the element will be maintained. The construction is to be such that the components are sufficiently self-aligning to permit assembly under adverse conditions.

5.2.5 When the screen or filter element is removed for cleaning, it shall be possible to remove all foreign matter (sediment and dirt) without the probability of any foreign matter being deposited in the outlet side of the unit.

5.2.6 All pipe threads shall be threaded in accordance with the American National Standard for Pipe Threads (Except Dry Seal), ANSI B2.1.

5.2.7 Clean-out and drain openings shall be closed by a standard pipe plug or a threaded shouldered plug. The plugs shall not create a galvanic cell with the housing that will accelerate corrosion.

5.2.8 Both external and internal parts of the assembly shall be free of rough or sharp edges that are likely to cause injury to persons servicing the unit.

5.2.9 The assembly shall be capable of disassembly and reassembly with ordinary tools. The assembly shall be constructed to withstand the stresses and strains likely to be encountered in service.

5.2.10 Gasketed or sealed joints shall be such as to prevent misalignment of, or damage to, the gasket or seal. All gaskets and seals used shall be complete without splits or joints and be of a composition suitable for the fuel(s) specified.

5.2.11 The filter, strainer, or separator shall be capable of withstanding a 2-1/2 minute exposure to a fire without leakage. The flammable or combustible liquid used to produce the fire shall be the same as the fuel for which the unit is designed. See Fire and Thermal Shock Test, Section 16.

6 Materials

6.1 A synthetic rubber part which contacts any of the fluids indicated in Table 6.1 shall not show a volume change or loss of weight that would impair its intended function following partial immersion (approximately one-half) for 70 hours at 23 ±2°C (73.4 ±3.6°F) in the specified test liquid.

Table 6.1
Test liquids for synthetic rubber materials

Fluid in contact with part	Test liquid
Fuel Oils, Nos. 2 – 6 and kerosene	IRM immersion oil 903
Gasoline	A and C Reference Fuels (ASTM D471-1996)

6.2 A change in volume of not more than 25 percent swelling (40 percent in Reference Fuel C) or 1 percent shrinkage, and a weight loss (extraction) of not more than 10 percent is considered as indicating compliance with 6.1.

6.3 A gasket or ″O″ ring shall be retained by the body, or cover, when the part is removed.

6.4 A plant fiber gasket shall be not more than 1/32 inch (0.8 mm) thick.

6.5 Cork gaskets are not permitted where failure of the gasket might result in external leakage.

6.6 All parts other than gaskets or seals used in filters, strainers, or separators shall be inherently resistant or finished to inhibit corrosion.

6.7 Steel components shall be plated with zinc or cadmium. Finished coatings on exterior surfaces of a filter, strainer, or separator shall be resistant to atmospheric corrosion, and finished coatings on interior surfaces shall be resistant to salt and petroleum products. See Salt Spray Exposure Test, Section 14. Finished coatings on exterior surfaces complying with the requirements of Standard For Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment, UL 1332 are considered to meet this requirement.

6.7 revised August 15, 2012

6.8 The composition of metal alloys shall be of known characteristics to provide normal corrosion resistance, dezincification resistance, and galvanic compatibility with other parts of the device and of the system or shall be subjected to the Salt Spray Test, Section 14. Brass fittings shall have less than 38 percent zinc content or include inhibitors to attain equivalent resistance to dezincification.

6.9 A part made of synthetic rubber which is able to be affected by aging shall not crack or show visible evidence of deterioration such as discoloration, shrinking, swelling, melting, or warping following exposure in an air oven for 70 hours at 100°C ±2°C (212°F ±3.6°F).

PERFORMANCE

7 General

7.1 Fuel filters, strainers, and separators shall be subjected to the following tests. The same samples are to used for the tests described in Sections 8 – 10 and 11 – 13.

8 Disassembly/Assembly Test

8.1 The unit shall be disassembled and reassembled for a total of 25 times without encountering difficulty or damage to the various parts. This test is to be conducted under simulated adverse conditions, such as in a congested engine space under poor lighting conditions.

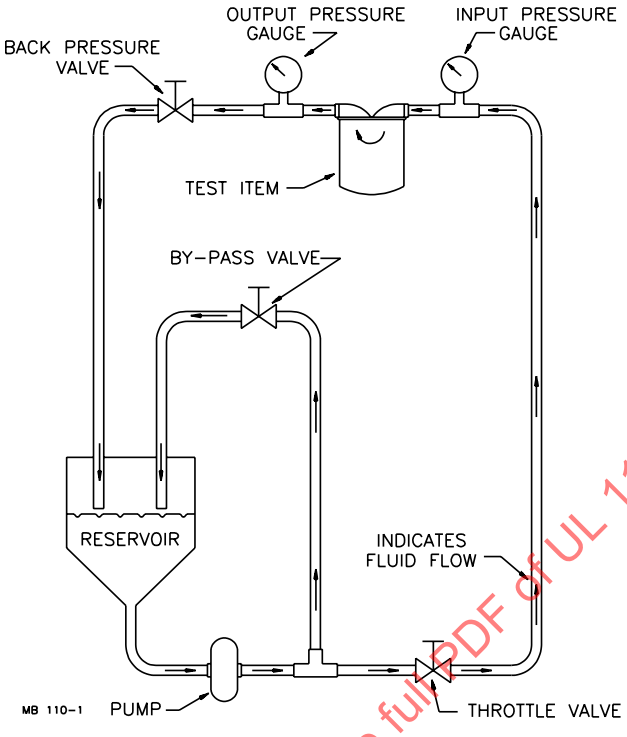
9 Operational Test

9.1 Following the Operational Test described in 9.2 – 9.7, there shall be no leakage.

9.2 The sample is to be thoroughly cleaned and free of foreign particles. When the device is of the renewable filter type, a new filter element is to be installed.

9.3 The sample is to be mounted in accordance with the manufacturer's instructions and the piping diagram as shown in Figure 9.1.

Figure 9.1
Test stand



9.4 The reservoir is to be filled with stoddard solvent or other equivalent fluid. The pump is to be started with the bypass, throttle, and back-pressure valves open. When a steady flow into the reservoir has been obtained, the bypass valve is to be closed gradually until a reading of 30 psig (0.21 MPa) is obtained on the input pressure gauge. If, when the bypass valve is fully closed, the desired pressure is not obtained, the back-pressure valve may be closed until the pressure is at the desired value. The fuel flow at 30 psig is to be maintained for 15 minutes.

9.5 In the case of devices intended for use with diesel oil, the pressure is to be increased to 100 psig (0.7 MPa). This pressure is to be maintained for 15 minutes with no evidence of damage or leakage in the test unit or its fittings.

9.6 Upon completion of the Operational Test, the bypass valve is to be opened to reduce pressure to a valve of 12 psig (0.08 MPa) and the pumps are to be operated continuously for a 1/2 hour.

9.7 Devices designated as water separators (see 10.1 and 10.2) are to have 500 ml of water introduced into the reservoir and allowed to circulate through the system with the throttle valve closed for a 1/2 hour. The valve is then to be opened and the fuel/water mix allowed to circulate through the test unit. After 1/2 hour of circulation, the separator is to be opened and the contents drained into a settling chamber. The contents of the separator shall consist of water.

10 Separation Test

10.1 Following the Operational Test, to determine whether a unit is to be considered a filter, strainer, or separator, it is to be subjected to the procedure described in 10.2 – 10.3. See definitions in the Glossary, Section 4.

10.2 A slurry, consisting of 4 grams of ″AC Fine Dust″ in 100 milliliters (ml) of Stoddard solvent or other equivalent fluid, is to be introduced into the reservoir with sufficient, clean solvent to bring the contents up to 19 liters. This mixture is to be circulated through the test unit for 10 minutes with the throttling valve closed and the bypass valve open. The throttle valve is then to be opened and circulation is to be permitted through the test unit for 2 hours. A 500 ml sample is then to be drawn from the sampling tube. This sample is to be run through retentive filter paper. Solid residue remaining on the filter paper is to be examined microscopically to determine the size of the largest particles. In case of devices designed without a sampling tube, the canister body is to be opened to provide access to the particles captured.

10.3 The particles captured shall be as follows:

a) Filters – 40 microns or smaller;

b) Strainers 150 microns or smaller; and

c) Separators – Water only.

11 Hydrostatic Pressure Test

11.1 All parts of a filter, strainer, or separator shall withstand, without rupture or deformation, a hydrostatic pressure of four times the rated pressure of the device, but not less than 100 psig (0.7 MPa).

11.2 The sample is to be assembled and connected into a system of piping in a manner permitting the removal of all air in the piping and sample. A calibrated pressure gauge having a range of at least 150 percent of the anticipated maximum test pressure is to be connected in the piping system.

11.3 The hydrostatic pressure is to be increased at a uniform rate of not more than 10 psig (0.07 MPa) per minute until a pressure equal to four times the maximum rated pressure or a minimum of 100 psig (0.7 MPa) is attained.

12 Vibration Test

12.1 A filter, strainer, or separator shall withstand 12 hours of vibration (24 hours for devices intended for mounting directly on an engine) at the resonant frequency [or 55 cycles per second (cps), see 12.3] without development of physical failure which would impair intended operation, that is, physical failure of components that would require repair or replacement before return to service.

12.2 The sample is to be secured to the vibration machine in its intended operating position in accordance with the manufacturer's installation instructions. Lengths of flexible tubing, secured to the sample, are to be fitted to the inlet and outlet ports. The tubing is to be connected externally so that a constant flow of Stoddard solvent or other equivalent fluid can be recirculated through the test unit during the test. The maximum rated flow rate is to be maintained. For separators, 500 ml of water is to be introduced into the solvent once during each plane of vibration.

12.3 The assembly is to be vibrated for a period of 12 hours (4 hours in the x, y, and z planes) at a resonant frequency of the unit. The resonance is to be determined by cycling the vibration machine frequency from 0 – 60 cps. The vibration table is to be set at a 0.030 inch (0.76 mm) double amplitude [0.040 ±0.001 (1.02 ±0.025 mm) peak-to-peak when engine-mounted]. If no resonance is found, the unit is to be vibrated at 55 cps.

12.4 For these tests, amplitude is defined as the maximum displacement of sinusoidal motion from position of rest or one-half of the total table displacement. Resonance is defined as the maximum magnification of the applied vibration.

13 Shock Test

13.1 A filter, strainer, or separator shall withstand 5000 impacts of 10-G peak at a rate of 6 impacts per minute without development of physical failure or leakage.

13.2 When mounted on the shock machine, the test unit is to be subjected to 5000 10-G peak impacts having a duration of 20 – 25 milliseconds measured at the base of a 1/2 sine wave shock envelope.

14 Salt Spray Exposure Test

14.1 A filter, strainer, or separator shall withstand, without leakage, a hydrostatic test pressure of 40 psig (0.28 MPa) maintained for 10 minutes following being subjected to 1800 hours of salt spray exposure.

14.2 Three samples are to be tested in the as-received condition with no liquid inside; three samples are to be tested in the as-received condition while being approximately one-half filled with a mixture consisting of 50 percent gasoline and 50 percent salt solution (5 percent by weight sodium chloride). For steel samples, a third set of three is to be tested, filled one-half full with this solution, and having the protective coating(s) scribed so as to expose the underlying steel.

14.3 The apparatus for salt spray (fog) testing is to consist of a fog chamber, the inside of which measures 48- by 30- by 36-inches (1.2 by 0.8- by 0.9-m), a salt solution reservoir, a supply of suitably conditioned compressed air, one dispersion tower constructed in accordance with the Standard for Salt Spray (Fog) Testing, ASTM B117-73, for producing a salt fog, specimen supports, provision for heating the chamber, and the necessary means of control.