

November 2, 2012

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UL 331B

OUTLINE OF INVESTIGATION

FOR

STRAINERS FOR DIESEL FUEL, BIODIESEL FUEL, DIESEL/BIODIESEL
BLENDS WITH NOMINAL BIODIESEL CONCENTRATIONS UP TO 20
PERCENT (B20), KEROSENE, AND FUEL OIL

Issue Number: 1

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Summary of Topics

This is the first issue of the Outline of Investigation for Strainers for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations Up to 20 Percent (B20), Kerosene, and Fuel Oil, UL 331B.

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INTRODUCTION

1 Scope

1.1 These requirements cover complete, self-contained strainer or filter assemblies intended for use with the fuels designated in 1.2. Although these devices are designated strainers, they may be either strainers or filters according to the common terminology of the industry.

1.2 Strainers and filter assemblies covered by these requirements are intended for use with one or more of the following:

- a) Diesel fuel and diesel/biodiesel blends with nominal biodiesel concentrations up to 5 percent (B0 – B5) formulated in accordance with the Standard Specification for Diesel Fuel Oils, ANSI/ASTM D975;
- b) Diesel/biodiesel blends with nominal biodiesel concentrations from 5 percent up to 20 percent (B6 – B20) formulated in accordance with the Standard Specification for Diesel Fuel Oil, Biodiesel Blends (B6 – B20), ANSI/ASTM D7467;
- c) Biodiesel (B99.9/B100) formulated in accordance with the Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels, ANSI/ASTM D6751;
- d) Kerosene formulated in accordance with the Standard Specification for Kerosene, ANSI/ASTM D3699;
- e) Fuel oil (heating oil) formulated in accordance with the Standard Specification for Fuel Oils, ANSI/ASTM D396.

1.3 These requirements do not cover the following:

- a) Strainers for handling liquids under cryogenic conditions;
- b) Strainers for marine use;
- c) Strainers for automotive fuel lines;
- d) Strainers for handling refrigerants;
- e) Strainers for use in such facilities as chemical, petrochemical, petroleum, and utility power plants;
- f) Strainers for use in fluid-power (hydraulic and pneumatic) applications;
- g) Strainers or filter assemblies for use with gasoline or gasoline/ethanol blends, which are covered under the Outline of Investigation for Strainers for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations Up to 85 Percent (E0 – E85), UL 331A
- h) Strainers or filter assemblies for use with LP-Gas, Natural Gas, Manufactured Gas, and Anhydrous Ammonia, which are covered under the Standard for Strainers for Flammable Fluids and Anhydrous Ammonia, UL 331.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this Outline shall comply with the requirements for that component.

2.2 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 Outline, or
- b) Is superseded by a requirement in this Outline.

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

2.4 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.

3 Units of Measurement

3.1 If a value for measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this Outline shall be interpreted as referring to the latest edition of that code or standard.

CONSTRUCTION

5 General

5.1 A strainer shall include all of the components necessary for its intended function and installation, and shall be furnished as a complete assembly. Strainers may be one of two types:

- a) Removable assemblies, or
- b) Non-removable assemblies with removable strainer elements.

In this Outline, the term strainer applies to both types, and requirements that apply to a specific type will designate that type in the text of the requirement.

5.2 The construction of a strainer shall be such that parts can be reassembled in the intended manner after being dismantled to the extent needed for servicing.

5.3 A strainer shall be constructed so that, when in its intended operating position, any air trapped within will not reduce the rate of liquid flow or the effective strainer element capacity.

5.4 A non-removable strainer employing a strainer element intended to be cleaned or replaced shall permit the removal of the element without disconnecting piping.

5.5 A strainer element shall be constructed so that joints or seals required to prevent fluid bypass of the element will be maintained.

5.6 A non-removable strainer shall be constructed so that when the screen or filter element is removed for cleaning, all foreign matter (sediment and dirt) will be removed or can be removed without the probability of any foreign matter being deposited in the outlet side of the strainer.

6 Materials

6.1 Metallic materials

6.1.1 General

6.1.1.1 A metallic part, in contact with the fuels anticipated by these requirements, shall be resistant to the action of the fuel if degradation of the material will result in leakage of the fuel or if it will impair the function of the device. For non-removable strainer assemblies for all fuel ratings covered by this Outline, see the Long Term Exposure Test, Section 11. For removable strainer assemblies, the Long Term Exposure Test does not apply.

6.1.1.2 The exposed surfaces of metallic parts shall be resistant to atmospheric corrosion if this corrosion will lead to leakage of the fluid or if it will impair the function of the device. The material shall comply with the requirements in Atmospheric corrosion, 6.1.2.

6.1.1.3 Metallic parts in contact with the fuels anticipated by these requirements shall not be constructed of lead, or materials that are substantially lead. In addition, no coatings or platings containing lead shall be used, such as terne-plated steel.

6.1.1.4 With reference to the above requirements, metallic parts including metallic materials used to form fluid confining parts as well as metallic coatings, or plating that may be applied to a base material.

6.1.2 Atmospheric corrosion

6.1.2.1 Metallic material used for fluid confining parts shall be resistant to atmospheric corrosion. Ferrous materials of the thickness specified in the following items are acceptable for the preceding when uncoated:

- a) A casting having a wall thickness of not less than $\frac{1}{4}$ inch (6.4 mm) if shown by production test to be free of leakage, and
- b) Fabricated sheet steel parts having a minimum wall thickness of 0.093 inches (2.36 mm).

6.1.2.2 A protective coating shall provide resistance against atmospheric corrosion to a degree not less than that provided by the protective coatings specified in 6.1.2.3.

6.1.2.3 Cadmium plating shall not be less than 0.0003 inch (0.008 mm) thick, and zinc plating shall not be less than 0.0005 inch (0.013 mm) thick, except on parts where threads constitute the major portion of the area, in which case the cadmium or zinc plating shall not be less than 0.00015 inch (0.0038 mm) thick. Metallic parts are also considered to comply with 6.1.2.1 when they are protected against atmospheric corrosion by:

- a) Hot dipped, mill galvanized sheet steel complying with the coating designation G90 in Table I of the Specification for Sheet Steel, Zinc Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot Dip Process, ASTM A653/A653M, or
- b) Coatings which have been determined to be equivalent to G90 under the requirements of the Standard for Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment, UL 1332.

6.1.2.4 A metallic material other than as described in 6.1.2.1 – 6.1.2.3 shall be painted or protected in a manner that has been determined to be equivalent.

6.2 Nonmetallic materials

6.2.1 General

6.2.1.1 A nonmetallic part in contact with the fuels anticipated by these requirements, shall be resistant to the action of the fuel if degradation of the material will result in leakage of the fuel, or if it will impair the function of the device.

6.2.1.2 Gaskets or seals shall comply with the requirements as outlined in Nonmetallic materials – material level, 6.2.2, and Nonmetallic materials – system level, 6.2.3.

6.2.1.3 Nonmetallic materials in contact with the fuels anticipated by these requirements shall not be constructed of the following:

- a) Polysulfide rubber;
- b) Ethylene propylene diene monomer (EPDM) rubber;
- c) Methyl-Methacrylate;
- d) Polyvinyl Chloride (PVC);
- e) Nylon 6/6; or

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f) Polyurethane.

6.2.2 Nonmetallic materials – material level

6.2.2.1 Seals shall be evaluated in accordance with the Standard for Gaskets and Seals, UL 157, modified as indicated in 6.2.2.2 – 6.2.2.4. If a specific material complies with these requirements, the material can be considered to be qualified for system level testing.

6.2.2.2 A seal shall be constructed of a material that is acceptable in accordance with the scope of the Standard for Gaskets and Seals, UL 157.

6.2.2.3 Seals shall be subjected to the Volume Change and Extraction Test in accordance with the Standard for Gaskets and Seals, UL 157, except for the following modifications:

- a) The test duration shall be 1000 hours;
- b) The applicable test fluids shall be as described in Supplement SA; and
- c) For all materials, the average volume change shall not exceed 40 percent swell (increase in volume) or 1 percent shrinkage (decrease in volume). In addition, the weight loss shall not exceed 10 percent. There shall be no visual evidence of cracking or other degradation as a result of the exposure for any material.

6.2.2.4 Seals shall be subjected to the Compression Set Test in accordance with the Standard for Gaskets and Seals, UL 157, except for the following modifications:

- a) The test duration shall be 1000 hours;
- b) The samples shall be immersed, at room temperature, in the test fluids [see item (c)] while compressed for the entire test duration. No oven conditioning is required;
- c) The applicable test fluids shall be as described in Supplement SA.
- d) The recovery period shall consist of removing the sample from the compression device and immersing it in the applicable test fluid for 30 minutes at room temperature. The sample shall not be allowed to dry out due to exposure to air. The 30 minute immersion should use the same fluid as the test fluid for each sample.
- e) For all materials, the average compression set is calculated and shall not exceed 35 percent.

Exception: This requirement does not apply to composite gasket materials as defined in accordance with the Standard for Gaskets and Seals, UL 157.