

November 2, 2012

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UL 567B

OUTLINE OF INVESTIGATION

FOR

OUTLINE FOR INVESTIGATION FOR EMERGENCY BREAKAWAY FITTINGS,
SWIVEL CONNECTORS AND PIPE-CONNECTION FITTINGS FOR DIESEL
FUEL, BIODIESEL FUEL, DIESEL/BIODIESEL BLENDS WITH NOMINAL
BIODIESEL CONCENTRATIONS UP TO 20 PERCENT (B20), KEROSENE,
AND FUEL OIL

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Summary of Topics

This is the first issue of the Outline of Investigation for Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations Up to 20 Percent (B20), Kerosene, and Fuel Oil, UL 567B.

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INTRODUCTION

1 Scope

1.1 These requirements cover emergency breakaway fittings, swivel connectors and pipe-connecting fittings of the threadless compression type. Connectors and fittings covered by these requirements are intended only for the following services.

1.2 A swivel connector is either a hose swivel or joint swivel. The swivel connector will allow radial movement and shall be constructed for use with the fluids shown in 1.4.

1.3 An emergency breakaway fitting is used between the outlet of the dispensing device and the hose nozzle valve and separates in the event that the coupling is subjected to an excessive pull force to safeguard against abnormally excessive pull force on the hose assembly and dispenser and prevent loss of liquid. An emergency breakaway fitting shall be constructed for use with the fluids shown in 1.4. The fittings shall be of the single-break or reconnectable type.

1.4 Emergency breakaway fittings, swivel connectors, and pipe-connecting fittings are intended for use with one or more of the following as applicable:

- 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, 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), ASTM D7467;
- c) Biodiesel (B99.9/B100) formulated in accordance with the Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels, ASTM D6751;
- d) Kerosene formulated in accordance with the Standard Specification for Kerosine , ANSI/ ASTM D3699; or
- e) Fuel oil (heating oil) formulated in accordance with the Standard Specification for Fuel Oils, ASTM D396.

1.5 Requirements for the installation and use of dispensing equipment handling the fuels described in 1.4 are included in the Flammable and Combustible Liquids Code, ANSI/NFPA 30, and the Code for Motor Fuel Dispensing Facilities and Repair Garages, ANSI/NFPA 30A.

1.6 These requirements do not cover devices intended for use with diesel, biodiesel, diesel/biodiesel blends, kerosene or fuel oil, which are covered under the Outline of Investigation for Emergency Breakaway Fittings, Swivel Connectors, and Pipe-Connection Fittings for Gasoline and Gasoline/Ethanol Blends With Nominal Ethanol Concentrations Up To 85 Percent (E0 – E85), UL 567A.

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1.7 These requirements do not cover devices intended for use with LP-Gas or anhydrous ammonia, which are covered under the Standard for Emergency Breakaway Fittings, Swivel Connectors, and Pipe-Connection Fittings for Petroleum Products and LP-Gas, UL 567.

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a product covered by this outline shall comply with the requirements for that component.

2.1.2 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.

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

2.1.4 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.

2.2 Units of measurement

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

2.3 Undated references

2.3.1 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.

3 Glossary

3.1 For the purpose of this outline the following definitions apply.

3.2 DIESEL/BIODIESEL BLENDS – Blended fuels composed of a diesel component and a biodiesel component. The numerical value corresponding to the biodiesel component determines the blend rating (such as B20 for 20 percent biodiesel, 80 percent diesel).

3.3 FITTING, PIPE-CONNECTING – A fitting of the threadless compression seal-ring type for use in the assembly of dispensing devices to facilitate connection of piping or tubing. These fittings shall be made in the straight coupling style, as well as in the tee, ell, reducer, adapter, and other styles.

3.4 FITTING, RECONNECTABLE TYPE – An emergency breakaway fitting designed such that upon separation it is intended to be reconnected and reused when it is not damaged.

3.5 FITTING, SINGLE-BREAK TYPE – An emergency breakaway fitting that, upon separation, is not intended to be reconnected and reused.

3.6 HOSE SWIVEL – A swivel connector with one end attached to a hose and the other end to an appurtenance. The hose swivel will allow radial movement of the hose and/or appurtenance to prevent the hose from twisting or having torsional stress.

3.7 PRESSURE INDICATING DEVICE – As used herein, the pressure indicating device means one of the following:

- a) An analog gauge having a pressure range such that the test pressure is between 30 and 70 percent of the maximum scale reading of the gauge;
- b) A digital pressure transducer, or other digital gauge, that is calibrated over a range of pressure that includes the test pressure; or
- c) Other device that is equivalent to the devices in (a) or (b).

3.8 SEALS, DYNAMIC – A seal that is subject to mechanical movement or other applied forces that result in movement or flexing of the seal under normal use conditions.

3.9 SEALS, STATIC – A seal that is not subject to mechanical movement or other applied forces other than compressing forces that are applied during installation, after which, the seal is held in place during normal use conditions.

3.10 SWIVEL CONNECTOR – A type of swivel categorized as either a hose swivel or swivel joint.

3.11 SWIVEL JOINT – A swivel connector installed in a piping system with at least one end attached to a rigid pipe or other appurtenance that is firmly affixed. The swivel joint will allow radial movement of the pipe or other appurtenance attached to the swivel to prevent torsional stress.

4 Installation and Operating Instructions

4.1 A copy of the installation and operating instructions shall be provided and shall be used as a guide in the examination and test of the device. For this purpose, a final printed edition is not required.

4.2 The instructions shall include directions and information as deemed by the manufacturer to be adequate for proper and safe installation, maintenance and use of the device.

4.3 Each emergency breakaway fitting shall be provided with instructions that indicate how to determine that the maximum rated separation force will not damage the hose assembly or dispensing device.

4.4 Each swivel connector shall be provided with instructions that indicate if it is a hose swivel or swivel joint.

CONSTRUCTION

5 General

5.1 A connector or fitting shall be constructed for an operating pressure of not less than 50 pounds per square inch gauge (psig) (340 kPa) for the fluid confining portion of the device and 0.5 psig (3.45 kPa) for the vapor confining portion of the device, when provided, and an ultimate rupture pressure of not less than five times the design pressure.

5.2 An emergency breakaway fitting shall be constructed to separate in the event that the coupling is subjected to a pull force not less than 100 pounds (445 N), and not to exceed 350 pounds (1557 N).

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. See the Long Term Exposure Test, Section 12.

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 include 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 materials used for fluid confining parts shall be resistant to atmospheric corrosion. In addition, metallic materials that are required to operate to address safety 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 from leakage;
- b) Standard pipe and fittings conforming to the Standard for Welded and Seamless Wrought Steel Pipe, ANSI/ASME B36.10M; and
- c) Fabricated sheet steel parts having a minimum wall thickness of 0.093 inch (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 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 be designated as dynamic and/or static seals. See 3.8 and 3.9, respectively. If the type of seal cannot be determined, then the material shall be treated as both a static and a dynamic seal.

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

6.2.1.4 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
- f) Polyurethane.

6.2.2 Nonmetallic materials – material level

6.2.2.1 Static seals

6.2.2.1.1 Static seals shall be evaluated in accordance with the Standard for Gaskets and Seals, UL 157, modified as indicated in 6.2.2.1.2 – 6.2.2.1.4. If a specific material complies with these requirements, the material can be considered to be qualified for system level testing.

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

6.2.2.1.3 Static 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% swell (increase in volume) or 1% shrinkage (decrease in volume). In addition, the weight loss shall not exceed 10%. For coated fabrics, alternate limits can be used with the average volume change not