



# UL 2208

## STANDARD FOR SAFETY

### Solvent Distillation Units

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UL Standard for Safety for Solvent Distillation Units, UL 2208

Third Edition, Dated July 8, 2010

### **Summary of Topics**

***This revisions of ANSI/UL 2208 dated June 2, 2020 adds information regarding commercial and industrial plant oil extraction equipment; [1.7](#)***

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.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated March 13, 2020.

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**JULY 8, 2010**  
(Title Page Reprinted: June 2, 2020)



**ANSI/UL 2208-2020**

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**UL 2208**

**Standard for Solvent Distillation Units**

First Edition – September, 1996  
Second Edition – February, 2005

**Third Edition**

**July 8, 2010**

This ANSI/UL Standard for Safety consists of the Third Edition including revisions through June 2, 2020.

The most recent designation of ANSI/UL 2208 as an American National Standard (ANSI) occurred on May 7, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. Any other portions of this ANSI/UL standard that were not processed in accordance with ANSI/UL requirements are noted at the beginning of the impacted sections.

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 <https://csds.ul.com>.

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## INTRODUCTION

### 1 Scope

1.1 These requirements cover solvent distillation units, with a maximum capacity of 60 gallons (227 l), used for recycling flammable or combustible liquids as indicated in the instruction manual provided with each unit.

1.2 These requirements cover solvent distillation units which utilize electricity, steam, or heated liquids to distill solvents.

1.3 These units are intended for installation and use in accordance with the National Electrical Code, NFPA 70, the Flammable and Combustible Liquids Code, NFPA 30, the Standard for Spray Application Using Flammable or Combustible Materials, NFPA 33, the Uniform Fire Code, NFPA 1, and the International Fire Code, IFC.

1.4 Solvent distillation units investigated for use in laboratories are only intended for installation in facilities that comply with requirements of the Standard for Fire Protection for Laboratories Using Chemicals, NFPA 45.

1.5 Solvent distillation units investigated for use in commercial dry cleaning plants are intended for installation in accordance with requirements of the Standard for Drycleaning Plants, NFPA 32.

1.6 Requirements additional to those specified in this standard are necessary as follows:

a) Electrically powered steam generating units having an electrical input power rating of more than 15 kW per steam generating vessel shall also comply with the applicable requirements in the Standard for Heating, Water Supply, and Power Boilers – Electric, UL 834;

b) Units intended for use in dry cleaning establishments shall also comply with applicable requirements of the Standard for Drycleaning Plants, NFPA 32;

c) Units intended for use in laboratory work areas shall also comply with applicable requirements of the following standards:

1) Standard for Medical Electrical Equipment, Part 1: General Requirements for Safety, UL 60601-1

2) Standard for Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements, UL 61010-1,

3) IEC Publication 1010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements,

4) Fire Protection for Laboratories Using Chemicals, NFPA 45, and

5) Health Care Facilities, NFPA 99;

d) Units intended for use in commercial garages shall comply with the applicable requirements of Article 511 of the National Electrical Code, NFPA 70, and of the Standard for Garage Equipment, UL 201;

e) Units intended for use in aircraft hangars shall comply with the applicable requirements of Article 513 of the National Electrical Code, NFPA 70; and

f) Units intended for use in dispensing and service stations shall comply with the applicable requirements of Article 514 of the National Electrical Code, NFPA 70.

1.7 These requirements do not apply to:

- a) Carbon-bed units;
- b) Units intended to be installed outdoors;
- c) Units used to distill solvents classified as unstable or solvents used for nitrocellulose or other unstable reactives;
- d) Units intended for high volume distillation processes or equipment typical of the petrochemical or distilled spirits industries;
- e) The storage, use, and disposal of any flammable or combustible liquids or hazardous materials used with or produced by the equipment; or
- f) The physiological effects of using the equipment with solvents or hazardous waste.
- g) Units used in processing plant material for extraction of the oil. These units shall comply with the applicable requirements ANSI/CAN/UL/ULC 1389, Standard for Safety for Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations.

## 2 General

### 2.1 Components

2.1.1 Except as indicated in [2.1.2](#), a component of a product covered by this standard shall comply with the requirements for that component. See Appendix [A](#) list of standards covering components used in the products covered by this standard.

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

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

## 2.3 Undated references

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

## 3 Glossary

3.1 For the purpose of this standard, the following definitions apply.

3.2 **AUTOIGNITION TEMPERATURE** – The minimum temperature at which fuel-air mixtures will ignite spontaneously. This temperature is to be determined either at atmospheric pressure (14.7 psig) or at the maximum pressure present in the area of the fuel-air mixture, whichever is higher. At atmospheric pressure, the autoignition temperature of a solvent shall be determined in accordance with the Standard Test Method for Autoignition Temperature of Liquid Chemicals, ASTM E 659.

3.3 **BATCH TYPE UNIT** – A unit that distills a single batch of solvent at a time. Dirty solvent is poured or otherwise manually introduced into the unit from a container, safety can, or similar vessel. After processing, the distilled solvent is discharged into a collection vessel. The unit does not connect directly to solvent utilization equipment.

3.4 **COMBUSTIBLE LIQUID** – A material that has a fluidity greater than 300 penetration asphalt when tested in accordance with the Standard Test of Penetration for Bituminous Materials, ASTM D 5, and that has a closed cup flash point at or above 37.8°C (100°F). Combustible liquids are subdivided as follows:

- a) Class II liquids include those having flash points at or above 37.8°C and below 60°C (140°F).
- b) Class IIIA liquids include those having flash points at or above 60°C and below 93°C (200°F).
- c) Class IIIB liquids include those having flash points at or above 93°C.

3.5 **FLAMMABLE LIQUID** – A material that has a fluidity greater than 300 penetration asphalt when tested in accordance with the Standard Test of Penetration for Bituminous Materials, ASTM D 5, and that has a closed cup flash point below 37.8°C (100°F) and a vapor pressure not exceeding 2068 mm Hg (40 psia). Flammable liquids are Class I liquids, and are subdivided as follows:

- a) Class IA liquids include those having flash points below 22.8°C (73°F) and having a boiling point below 37.8°C.
- b) Class IB liquids include those having flash points below 22.8°C and having a boiling point at or above 37.8°C.
- c) Class IC liquids include those having flash points at or above 22.8°C and below 37.8°C.

3.6 **FLASH POINT** – The minimum temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid within the vessel as specified by the appropriate test procedure and apparatus as follows:

- a) The flash point of a liquid having a viscosity less than 45 Saybold Universal Seconds (SUS) at 37.8°C (100°F) and a flash point below 93°C (200°F) as determined in accordance with the Standard Test Method for Flash Points by Tag Closed Cup Tester, ANSI/ASTM D 56.
- b) The flash point of a liquid having a viscosity of 45 SUS or more at 37.8°C or a flash point of 93°C or higher as determined in accordance with the Standard Test Method for Flash Point by the Pensky-Martens Closed Cup Tester, ANSI/ASTM D 93 REV A.

c) The Standard Test Method for Flash Point of Liquids by Small Scale Closed-Cup Apparatus, ASTM D 3278, may be used for paints, enamels, lacquers, varnishes, and related units and their components having flash points between 0°C (32°F) and 110°C (230°F) and having a viscosity lower than 150 centistokes at 25°C (77°F).

d) The Standard Test Methods for Flash Point by Small Scale Closed Tester, ASTM D 3828, may be used for materials other than those for which specific setaflash methods exist.

3.7 FLOW THROUGH UNIT – A solvent distillation unit that connects to equipment that utilizes the solvent being distilled. Dirty solvent is pumped or otherwise introduced into the unit, and the distilled solvent is returned to the equipment, or a reservoir associated with the equipment.

3.8 IGNITABLE MIXTURE – A vapor-air, gas-air, dust-air mixture or combinations of these mixtures that can be ignited by a static spark.

3.9 INTRINSICALLY SAFE CIRCUIT – A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions.

3.10 LINE-VOLTAGE CIRCUIT – A line-voltage circuit is one involving a potential of not more than 600 V and having circuit characteristics in excess of those of a low-voltage circuit.

3.11 LOW-VOLTAGE CIRCUIT – A low-voltage circuit is one involving a potential of not more than 30 V (42.4 volts peak) and supplied by a primary battery, by a standard Class 2 transformer, or by an impedance which, as a unit, complies with all of the performance requirements for a Class 2 transformer.

3.12 LOWER FLAMMABILITY LIMIT (LFL) – The minimum concentration of vapor in air at which propagation of flame will occur in the presence of an ignition source. LFL is sometimes referred to as LEL, or lower explosive limit.

3.13 SAFETY CAN – A container of not more than 5 gallons (18.9 l) capacity, having a spring closing lid and spout cover and constructed so that it will safely relieve internal pressure when subjected to fire exposure.

3.14 SEMICONDUCTIVE HOSE – A hose with an electrical resistance great enough to limit the flow of stray electric currents to a safe level, yet not so high as to prevent relaxation of static charges to ground.

3.15 SOLVENT – A flammable or combustible liquid capable of dissolving another substance to form a uniformly dispersed mixture at the molecular or ionic level.

3.16 SOLVENT DISTILLATION UNIT – A unit that receives contaminated flammable or combustible liquid and distills the contents to remove the contaminants and recover the solvent.

3.17 STATIC ELECTRICITY – An electrical charge that is significant only for the effects of its electrical field component and that manifests no significant magnetic field component.

3.18 STATIC SPARK – An impulsive discharge of electricity across a gap between two points not in contact.

3.19 UNSTABLE LIQUID – A liquid that, in the pure state or as commercially produced or transported, will vigorously polymerize, decompose, undergo condensation reaction, or become self-reactive under conditions of shock, pressure, or temperature.

3.20 VESSEL – A container, safety can, portable tank, tank, or other receptacle intended to contain contaminated solvent, distilled solvent, or other liquids.

## CONSTRUCTION

### 4 General

#### 4.1 All constructions

4.1.1 Units that do not produce mixtures above 25 percent of the lower flammability limit (LFL) at potential sources of ignition under normal and single fault conditions shall comply with the requirements of this standard for non-hazardous locations.

4.1.2 The following shall comply with the requirements of this standard for non-hazardous locations and Class I, Division 2 Hazardous Locations:

- a) Units that produce mixtures above 25 percent of the lower flammability limit (LFL) at potential sources of ignition only under single fault conditions and
- b) Units intended to be installed in Class I, Division 2 locations.

*Exception: Units intended for use in a laboratory work area in accordance with requirements of the Standard on Fire Protection for Laboratories Using Chemicals, ANSI/NFPA 45, need not be evaluated for Class I, Division 2 locations provided they are marked in accordance with [47.3](#).*

4.1.3 The following shall comply with the requirements of this standard for non-hazardous locations and Class I, Division 1 Hazardous Locations:

- a) Units that produce mixtures above 25 percent of the lower flammability limit (LFL) at potential sources of ignition under normal conditions, and
- b) Units intended to be installed in Class I, Division 1 locations.

*Exception: Units intended for use in a laboratory work area in accordance with requirements of the Standard on Fire Protection for Laboratories Using Chemicals, ANSI/NFPA 45, need not be evaluated for Class I, Division 1 locations provided that they are marked in accordance with [47.3](#).*

4.1.4 Only materials determined to be acceptable for the particular use shall be used. All nonmetallic components and polymeric materials likely to be exposed to flammable liquids or vapors during normal operation of the unit and that are required to comply with other requirements of this standard shall be investigated and determined compatible with the solvents to which they are exposed.

4.1.5 If the operation of a unit involves the generation and confining under pressure of steam or other gas, consideration is to be given to the possibility of risk of explosion incident to such operation. This applies in the case of a unit having immersed electrodes, where the electrolysis of water may result in the accumulation of oxygen and hydrogen. The unit is not acceptable unless its strength has been investigated with respect to any risk of explosion that may be involved.

#### 4.2 Class I, Division 1 hazardous (classified) location construction

4.2.1 The requirements for Class I, Division 1 locations supersede those for non-hazardous locations, where any conflict exists.

4.2.2 The unit shall be evaluated for use in a Class I, Division 1 hazardous location per Articles 500 and 501 of the National Electrical Code, NFPA 70.