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1

**SUBJECT 1349**

**OUTLINE OF INVESTIGATION**

**FOR**

**LP-GAS VAPORIZERS**

**Issue Number: 1**

**MAY 24, 2007**

***Summary of Topics***

***This first issue of the Outline of Investigation for LP-Gas Vaporizers, Subject 1349, covers requirements for stationary vaporizers used in LP-Gas systems in accordance with LP-Gas Code, NFPA 58.***

The UL Foreword is no longer located within the UL Standard. For information concerning the use and application of the requirements contained in this Standard, the current version of the UL Foreword is located on ULStandardsInfoNet at: <http://ulstandardsinfo.net.ul.com/ulforeword.html>

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## CONTENTS

### INTRODUCTION

|                                                 |   |
|-------------------------------------------------|---|
| 1 Scope .....                                   | 4 |
| 2 General .....                                 | 4 |
| 2.1 Components .....                            | 4 |
| 2.2 Units of measurement .....                  | 4 |
| 2.3 Undated references .....                    | 5 |
| 3 Glossary .....                                | 5 |
| 4 Pressure and Temperature Rating .....         | 6 |
| 5 Installation and Operating Instructions ..... | 6 |

### CONSTRUCTION

|                                               |   |
|-----------------------------------------------|---|
| 6 General Requirements – All Vaporizers ..... | 6 |
| 7 Direct Fired Vaporizers .....               | 8 |
| 8 Containers and Piping .....                 | 8 |
| 9 Materials .....                             | 9 |

### PERFORMANCE

|                                                        |    |
|--------------------------------------------------------|----|
| 10 General .....                                       | 10 |
| 11 Deformation Test .....                              | 10 |
| 12 External Leakage Test .....                         | 11 |
| 13 Operation Test .....                                | 11 |
| 14 Seat Leakage and Endurance Tests .....              | 12 |
| 15 Hydrostatic Pressure Test .....                     | 12 |
| 16 Input Test .....                                    | 13 |
| 17 Temperature Test .....                              | 13 |
| 18 Dielectric Voltage Withstand Test .....             | 13 |
| 19 Accelerated Aging Test .....                        | 13 |
| 20 LP-Gas Compatibility Test .....                     | 13 |
| 21 Low Temperature Test .....                          | 14 |
| 22 10-Day Moist Ammonia Air Stress Cracking Test ..... | 14 |

### MANUFACTURING AND PRODUCTION TESTS

|                  |    |
|------------------|----|
| 23 General ..... | 15 |
|------------------|----|

### MARKING

|                  |    |
|------------------|----|
| 24 General ..... | 15 |
|------------------|----|

### APPENDIX A

|                               |    |
|-------------------------------|----|
| Standards for Components..... | A1 |
|-------------------------------|----|

## INTRODUCTION

### 1 Scope

1.1 These requirements cover liquefied petroleum gas (LP-Gas) vaporizers of the stationary type.

1.2 Vaporizers covered by these requirements are intended for use, and installation in propane systems and applications covered by the Liquefied Petroleum Gas Code, NFPA 58, and electrical components installed in accordance with the National Electrical Code, NFPA 70.

### 2 General

#### 2.1 Components

2.1.1 Except as indicated in this clause, a component of a product covered by this standard shall comply with the requirements for that component. See the Standards for Components appendix for a list of standards covering components generally 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.

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## 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 outline, the following definitions apply.

3.2 LIQUEFIED PETROLEUM GAS (LP-GAS or LPG) – Any material having a vapor pressure not exceeding that allowed for commercial propane composed predominantly of the following hydrocarbons, either by themselves (excluding propylene) or as mixtures: propane, propylene, butane (normal butane or iso-butane) and butylenes.

3.3 VAPORIZER – A piece of equipment, which includes a container, that receives LP-Gas in liquid form and adds sufficient heat energy to convert the liquid to a gaseous state. They are further classified by the type of energy used and how the energy is applied to the LP-Gas.

3.4 VAPORIZER, DIRECT-FIRED – A type of vaporizer in which the heat energy is furnished by direct flame impingement onto a heat exchange surface in contact with liquid LP-Gas.

3.5 VAPORIZER, ELECTRIC – A type of vaporizer in which electrical energy is used as a source of heat. They are further classified by how the electrical energy is applied to the LP-Gas.

3.6 VAPORIZER, ELECTRIC, DIRECT-IMMERSION – A type of vaporizer that has an electric element immersed directly into the LP-Gas liquid and vapor.

3.7 VAPORIZER, ELECTRIC, INDIRECT – An immersion-type vaporizer that has the electric element immersed into an interface solution that is in contact with the LP-Gas heat exchanger or applies electrical energy to an intermediate heat sink.

3.8 VAPORIZER, INDIRECT (or Indirect-Fired) – A vaporizer in which heat energy is furnished by steam, hot water, the ground, surrounding air, or other heated medium to a vaporizing chamber or to tubing, pipe coils, or other heat exchange surface containing the liquid LP-Gas. The heating of the medium is at a point remote from the vaporizer portion containing the LP-Gas. This definition includes a direct-fired water-bath vaporizer (the water bath is the heat transfer medium).

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#### 4 Pressure and Temperature Rating

4.1 The pressure rating of each type of LP-Gas vaporizer shall not be less than 250 psig (1.725 MPa).

4.2 LP-Gas vaporizers covered by these requirements are intended for use at ambient air temperatures within the range of minus 40°F to plus 130° F (minus 40°C to plus 55°C).

#### 5 Installation and Operating Instructions

5.1 A copy of the installation and operating instructions shall be provide with each vaporizer, and it shall be used as a guide in the examination and testing of the unit.

5.2 The instructions shall include operating procedures including maintenance of the vaporization rate, pressure and temperature control, specific actions that need to be taken when normal operation is exceeded, and actions needed for emergency shutdown. The instructions shall state that the vaporizer be installed in accordance with Liquefied Petroleum Gas Code, NFPA 58, and electrical components installed in accordance with the National Electrical Code, NFPA 70.

### CONSTRUCTION

#### 6 General Requirements – All Vaporizers

6.1 LP-Gas vaporizers shall include all of the components necessary for its intended function and installation, and shall be furnished as a single unit or assembly. The container(s) shall meet the requirements of 8.1.

6.2 Electrical components, when incorporated into the assembly of a LP-Gas vaporizer, including the means provided in the assembly for electrical connections, shall comply with the requirements for equipment for use in hazardous locations, Class I, Group D, Division 1 or 2, (or Zone 1 or 2, respectively), as appropriate, in the National Electrical Code, NFPA 70, Articles 500 and 501 (Article 505 for Zone Classification), depending upon the installation in accordance with Liquefied Petroleum Gas Code, NFPA 58. Such components shall comply with the applicable standard for the protection technique employed; for example explosion proof equipment shall comply with the Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations, UL 1203.

*Exception No. 1: When electrical components are provided in the assembly of a direct-fired vaporizer, or the direct fired water-bath vaporizer, the above described electrical components need only to comply with the requirements for ordinary (nonhazardous) locations and for outdoor use locations.*

*Exception No. 2: When electrical components are provided in the assembly of an indirect vaporizer, and the electrical components are installed 15 feet (4.5 meters), or more, measured in a horizontal distance from any LP-Gas connections or joints in the LP-Gas equipment, the above described electrical components need only to comply with the requirements for ordinary (nonhazardous) locations and for outdoor use locations, as appropriate.*

*Exception No. 3: Immersion heating elements for use in direct immersion electric vaporizers need only to comply with the requirements for ordinary (nonhazardous) locations and for outdoor use locations.*

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