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UL 2249

Outline of Investigation for Hydrogen Fuel Dispensing Systems

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Summary of Topics

This first issue of the Outline of Investigation for Hydrogen Fuel Dispensing Systems, UL 2249, applies to site-assembled and modular gaseous hydrogen fueling stations (HFS) intended to dispense hydrogen to hydrogen fuel vehicles for automotive applications.

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APPENDIX A

INTRODUCTION

1 Scope

1.1 This outline covers site-assembled and modular gaseous hydrogen fueling stations (HFS) intended to dispense hydrogen to hydrogen fuel vehicles for automotive applications. The systems may include electronic controls and software to compress, store, cool and transfer the hydrogen from the station storage and/or compressor systems to the vehicle fuel tank. The system may include modular delivery, compression, storage and dispensing equipment that is intended to operate in conjunction as a system.

1.2 The systems are intended to be installed outside of buildings and used at service stations in accordance with ANSI/NFPA 2, "Hydrogen Technologies Code," ANSI/NFPA 70, "National Electrical Code," the "International Building Code," "International Fire Code," "International Fuel Gas Code," and the "International Mechanical Code."

1.3 These requirements do not cover the following:

- a) Periodic inspection and maintenance by qualified personnel.
- b) The release of any flammable gas or hazardous material used by the HFS.
- c) The physiological effects of the released gas or material.
- d) The quality of the hydrogen fuel being dispensed.
- e) Approving the installation.
- f) The use of any uncertified equipment or accessories independent of the HFS.

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- b) Is superseded by a requirement in this outline.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 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 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 HYDROGEN REFUELING SYSTEM – Single or multiple pieces of equipment that includes controls for the overall operation of the complete system that is intended to fill vehicle fuel tanks with gaseous hydrogen. The system could contain a hydrogen compressor, refrigeration system, dry air compressor, industrial control panels, a Basic Process Control System (BPCS), safety-related electronic controls and software, dispenser, refueling devices and storage for the overall station or storage for delivery to vehicles.

CONSTRUCTION

4 Equipment

4.1 Equipment that contains wetted hydrogen parts or controls the delivery of hydrogen and is used as part of the Hydrogen Refueling System shall comply with the requirements of the standards shown below for each piece of equipment used within a system as applicable.

4.2 The basic standards used to investigate products in this category are one or more of the following as applicable:

ANSI/CSA HGV 4.1-2013, *Standard For Hydrogen Dispensing Systems*

ANSI/CSA HGV 4.2-2013, *Standard for hoses for compressed hydrogen fuel stations, dispensers and vehicle fuel systems*

ANSI/CSA HGV 4.3-2016, *Test methods for hydrogen fueling parameter evaluation*

ANSI/CSA HGV 4.4-2013, *Standard for breakaway devices for compressed hydrogen dispensing hoses and systems*

ANSI/CSA HGV 4.5-2013, *Standard for priority and sequencing equipment for hydrogen vehicle fueling*

ANSI/CSA HGV 4.6-2013, *Manually operated valves for use in gaseous hydrogen vehicle fueling stations*

ANSI/CSA HGV 4.7-2013, *Automatic valves for use in gaseous hydrogen vehicle fueling stations*

ANSI/CSA HGV 4.8-2012, *Hydrogen gas vehicle fueling station compressor guidelines*

ANSI/CSA HGV 4.10-2012, *Standard For Fittings for compressed hydrogen gas and hydrogen rich gas mixtures*

CSA HGV 4.9-2016, *Hydrogen fueling stations*

NEMA ANSI/IEC 60529, IEC 60079-10-1, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IEC 61511-1, *Functional safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and application programming requirements*

UL 508A, *Industrial Control Panels*

UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*

UL 991, *Tests for Safety-Related Controls Employing Solid-State Devices*

UL1450, *Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment*

UL 1836, *Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations*

UL 1995, *Heating and Cooling Equipment*

UL 1998, *Software in Programmable Components*

UL 60079-0, *Explosive Atmospheres – Part 0: Equipment - General Requirements*

UL 60079-1, *Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures "d"*

UL 121201, *Nonincendive Electrical Equipment for Use In Class I and II, Division 2 and Class III, Divisions*