



UL 2225

STANDARD FOR SAFETY

Cables and Cable-Fittings For Use In Hazardous
(Classified) Locations

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UL Standard for Safety for Cables and Cable-Fittings For Use In Hazardous (Classified) Locations, UL 2225

Fourth Edition, Dated September 30, 2013

Summary of Topics

This new edition of ANSI/UL 2225 is being issued to include the following:

Addition of Type TC-ER-HL cable for use in Class I, Zone 1 as permitted by the 2014 NEC to the scope.

Editorial revisions and error corrections.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated April 19, 2013 and June 28, 2013.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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UL 2225

Standard for Cables and Cable-Fittings For Use In Hazardous (Classified)

Locations

First Edition – July, 1996
Second Edition – December, 2005
Third Edition – February, 2011

Fourth Edition

September 30, 2013

This ANSI/UL Standard for Safety consists of the Fourth edition.

The most recent designation of ANSI/UL 2225 as an American National Standard (ANSI) occurred on September 30, 2013. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

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

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INTRODUCTION

1 Scope

1.1 These requirements cover Type MC-HL metal-clad cable for use in hazardous (classified) locations, Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class I, Zone 1, Groups IIA, IIB, and IIC; and Zone 20, 21, and 22 in accordance with the National Electrical Code, NFPA 70.

1.2 These requirements cover Type ITC-HL instrumentation tray cable for use in hazardous (classified) locations, Class I, Division 1, Groups A, B, C, and D, and Class I, Zone 1, Groups IIA, IIB, and IIC; and Zone 20, 21, and 22 in accordance with the National Electrical Code, NFPA 70.

1.3 These requirements cover Type TC-ER-HL tray cable for use in hazardous (classified) locations, Class I, Zone 1, Groups IIA, IIB, and IIC in accordance with the National Electrical Code, NFPA 70.

1.4 These requirements cover explosionproof and dust-ignitionproof cable sealing fittings for use in hazardous (classified) locations, Class I, Division 1 and 2, Groups A, B, C, and D; Class II, Division 1 and 2, Groups E, F, and G in accordance with the National Electrical Code, NFPA 70.

1.5 These requirements cover explosionproof and dust-ignitionproof cable sealing fittings intended for use on mobile offshore oil rigs and drilling platforms, and other marine vessels. Investigations of these fittings include an evaluation for conformity to the installation and use provisions of Title 46 Code of Federal Regulations Sub-part 111.105 and Subpart 111.60 of the United States Coast Guard Electrical Engineering Regulations, Subchapter J (Parts 110 to 113 inclusive) as applied by the authority having jurisdiction.

1.6 These requirements cover increased safety "e" cable fittings and flameproof "d" cable sealing fittings for use in Class I, Zone 1 Groups IIA, IIB and IIC hazardous (classified) locations, in accordance with the National Electrical Code, NFPA 70.

1.7 These requirements cover increased safety "e" cable fittings and flameproof "d" cable sealing fittings for use in hazardous (classified) locations, Class I, Zone 1 for use on mobile offshore oil rigs and drilling platforms, and other marine vessels. Investigations of these fittings include an evaluation for conformity to the installation and use provisions of Title 46 Code of Federal Regulations Sub-part 111.105 and Subpart 111.60 of the United States Coast Guard Electrical Engineering Regulations, Subchapter J (Parts 110 to 113 inclusive) as applied by the authority having jurisdiction.

1.8 These requirements cover increased safety "e" cord connectors and flameproof "d" cord connectors for use only with extra-hard usage cord in hazardous (classified) locations, Class I, Zone 1 in accordance with the National Electrical Code, NFPA 70.

1.9 These requirements cover dust ignition protection by enclosure "t" and "tD" cable fittings for use in Zone 20, 21, and 22 hazardous (classified) locations in accordance with the National Electrical Code, NFPA 70.

1.10 These requirements cover dust ignition protection by enclosure "t" and "tD" extra-hard usage cord connectors for use in Zone 20, 21, and 22 in accordance with the National Electrical Code, NFPA 70.

1.11 These requirements apply to cables, cable fittings and cord connectors for hazardous locations under the following atmospheric conditions:

- a) A minimum ambient temperature of minus 50°C (minus 58°F);
- b) An oxygen concentration of not greater than 21 percent by volume; and
- c) A nominal barometric pressure of one atmosphere.

2 Units of Measurement

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

3 Undated References

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.

4 Glossary

4.1 The following definitions apply in this standard.

4.2 DUST-IGNITIONPROOF CABLE SEALING FITTING – A cable sealing fitting capable of meeting the requirements for dust-ignitionproof construction and performance as given in this standard.

4.3 DUST-IGNITION-PROTECTION BY ENCLOSURE FITTING – A cable or cord fitting capable of meeting the requirements for dust-ignition-protection by enclosure construction and performance as given in this standard for use in Zone 21 or Zone 22 locations.

4.4 EXPLOSIONPROOF CABLE SEALING FITTING – A device or combination of devices intended to provide a means of entry of a cable into a hazardous location explosionproof enclosure and which also provides strain relief and provides required sealing characteristics, either by an integral means or when combined with a separate sealing fitting for use in Class I, Division 1 or Division 2 locations.

4.5 FLAMEPROOF CABLE SEALING FITTING – A cable or cord sealing fitting capable of meeting the requirements for flameproof construction and performance as given in this standard for use in Class I, Zone 1 or Zone 2 locations.

4.6 INCREASED SAFETY CABLE FITTING – A cable or cord fitting capable of meeting the requirements for increased safety construction and performance as given in this standard for use in Class I, Zone 1 or Zone 2 locations.

4.7 SEALING CHARACTERISTICS – Those characteristics necessary to minimize the migration of gases through the seal and to prevent the propagation of flame from enclosures required to be explosionproof, and/or exclude hazardous dusts or readily ignitable fibers from an enclosure required to be dust-ignitionproof.

PART I – CABLES

CONSTRUCTION

5 General

5.1 Type MC-HL and ITC-HL cables for use in Division 1 and Zone 1 hazardous locations shall comply with all construction and test requirements in the Standard for Metal-Clad Cables, UL 1569, or in the Standard for Instrumentation Tray Cable, UL 2250, as applicable, except where modified by this standard.

5.2 Type TC-ER-HL cables for use in Class I, Zone 1 hazardous locations shall comply with all construction and test requirements in the Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members, UL 1277, as applicable, except where modified by this standard.

5.3 Type MC-HL and Type ITC-HL cables for use in Division 1, Zone 1, Zone 20, Zone 21, and Zone 22 hazardous locations shall have the following construction features:

- a) A gas/vapor tight continuous corrugated metallic sheath; and
- b) An overall jacket of polymeric material.

Type MC-HL cable shall have separate grounding conductors sized in accordance with Section 6, Tables in the Standard for Metal Clad Cables, UL 1569.

5.4 Type TC-ER-HL cable shall have the additional following construction features:

- a) Conductor insulation rating of 600 volts nominal;
- b) Overall cable diameters 25 mm (1 inch) or less; and
- c) At least one copper equipment grounding conductor sized in accordance with the grounding conductor tables in Section 8 of Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members, UL 1277.

5.5 The sheath, jacket, and grounding conductors required by 5.2 shall also comply with all applicable construction requirements in the Standard for Metal-Clad Cables, UL 1569, or the Standard for Instrumentation Tray Cable, UL 2250, as applicable.

PERFORMANCE

6 General

6.1 Type MC-HL and Type ITC-HL cables for use in hazardous (classified) locations shall comply with all applicable performance requirements in the Standard for Metal-Clad Cables, UL 1569, or the Standard for Instrumentation Tray Cable, UL 2250, as applicable and also the requirements in Sections 7 – 10 of this standard.

6.2 Type TC-ER-HL cables for use in Class I, Zone 1 hazardous locations shall additionally comply with the requirements in Sections 7 – 10 of this standard.

7 Impact Test – Low Temperature

7.1 The non-metallic components of at least eight specimens of finished cable shall not crack when the nonmetallic components of 10 specimens of finished cable are tested. The test is to consist of an impact of a 3 pound (1.36 kg) mass falling through a distance of 3 feet (0.91 m) at a temperature of minus 25 $\pm 1^{\circ}\text{C}$ (minus 13 $\pm 1.8^{\circ}\text{F}$), or at the minimum ambient rated and marked on the cable, if rated lower than minus 25 $^{\circ}\text{C}$ (minus 13 $^{\circ}\text{F}$).

7.2 The 10 specimens are to be placed in an environmental chamber and maintained at the required temperature for a period of 4 hours. Immediately following this conditioning, each of the 10 specimens are to be placed on a solid supporting surface and then subjected to the impact specified in 7.1 by means of a steel head. This steel head is to have an overall diameter of 1.1 inches (28.5 mm) and is to have a flat striking surface that is 1 inch (25.4 mm) in diameter with slightly rounded edges. Flat cable is to be placed such that the major cross-sectional axis is parallel with the supporting surface.

8 Mechanical Damage – Impact

8.1 An Impact Test shall be conducted using the requirements, including sample selection, specified for the Impact Test in the Standard for Metal-Clad Cables, UL 1569. However, the weight of the falling mass shall be 25 pounds (11.34 kg) through a distance of 1 foot (0.31 m) for the tests with the 14 AWG conductors. ITC-HL cables are to be tested only with 14 AWG conductors to represent sizes 22 to 12. ITC-HL cables are permitted to be tested with smaller conductor sizes that represent only the size tested.

9 Crushing Test

9.1 A Crushing Test shall be conducted using the requirements, including sample selection, specified for the Crushing Test – All Cable, in the Standard for Metal-Clad Cables, UL 1569. However, the crushing force is to be 1500 pound-force (6670 N) for the test with the 14 AWG conductors. ITC-HL cables are to be tested ~~only~~ with 14 AWG conductors to represent sizes 22 to 12. ITC-HL cables are permitted to be tested with smaller conductor sizes that represent only the size tested.

10 Flame Test

10.1 The Flame Test shall be performed in accordance with the FT4/IEEE 1202 Flame Exposure Test in the Standard for Fire-Propagation and Smoke-Release Test for Cables, UL 1685, (smoke measurements are not applicable).

MARKING

11 General

11.1 Cables complying with the requirements of this standard shall be surface marked Type MC-HL, Type "TC-ER-HL" or Type ITC-HL as appropriate, and shall comply with all applicable marking requirements in the Standard for Metal-Clad Cables, UL 1569, the Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members, UL 1277 or the Standard for Instrumentation Tray Cable, UL 2250, as applicable.

PART II – EXPLOSIONPROOF AND DUST-IGNITIONPROOF CABLE SEALING FITTINGS

CONSTRUCTION

12 General

12.1 Cable sealing fittings shall comply with the applicable construction requirements in the Standard for Conduit, Tubing, and Cable Fittings, UL 514B, and with the construction requirements in this standard, except as modified by this standard. Where requirements conflict, the requirements in this standard shall apply.

12.2 Design tolerances of the cable sealing fitting shall be considered in determining compliance with 12.1 of this standard.

12.3 The width of all joint surfaces or the length of path through or across any joint surface or opening in the cable sealing fitting, including threadless joints and threaded joints, shall be dimensionally measured for compliance with the appropriate requirements contained in 15.1 or in the Standard for Explosionproof and Dust-ignitionproof Electrical Equipment for Use in Hazardous (Classified) Locations, UL 1203, for the specific hazardous locations for which the sealing fitting is intended.

12.4 All joint surfaces shall have the gap between joint surfaces examined by means of appropriate measuring tools. The gap between the joint surfaces shall not exceed the dimensions specified in 15.1 or the requirements for Class I Joints in Enclosures or the Alternative Joints in Enclosures in the Standard for Explosionproof and Dust-ignitionproof Electrical Equipment for Use in Hazardous (Classified) Locations, UL 1203 for the specific hazardous locations for which the cable sealing fitting is intended.