UL 2238

STANDARD FOR SAFETY

Cable Assemblies and Fittings for Industrial Control and Signal Distribution

UL Standard for Safety for Cable Assemblies and Fittings for Industrial Control and Signal Distribution, UL 2238

Third Edition, Dated October 2, 2018

Summary of Topics

This revision of ANSI/UL 2238 dated April 20, 2022 includes the following changes in requirements:

– Jacket Retention Test; 27.1

– Vibration Test Rack Construction; 26.1.5

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 11, 2022.

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UL 2238

Standard for Cable Assemblies and Fittings for Industrial Control and Signal Distribution

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Third Edition

October 2, 2018

This ANSI/UL Standard for Safety consists of the Third Edition including revisions through April 20, 2022.

The most recent designation of ANSI/UL 2238 as an American National Standard (ANSI) occurred on April 20, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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 devices intended for inter-connection of equipment, sensors, and actuators in remote-control, signaling, and power-limited circuits. Included are cable assemblies and fittings, feeder-tap cable systems, feed-through connectors, multi-outlet fittings, panel-mount fittings, and splitters. These devices are rated not more than 60 A and not more than 600 V.

1.1.1 These devices are not intended for disconnect means and are marked as described in 40.1.6.

1.1.2 Devices may be investigated for use as a disconnecting means under load conditions, if so requested and the device complies with the overload, temperature, resistance to arcing and dielectric voltage withstand testing as described in Table 18.1.

1.2 This standard also contains Supplement SA – Short Circuit Current Rated (SCCR) Cable Assemblies and Fittings for Industrial Control and Signal Distribution.

1.3 Unless otherwise noted, all devices are intended for indoor use.

1.4 These devices are for use on alternating current, direct current, or both.

1.5 The cable assembly fittings and panel-mount fittings are intended to be installed in accordance with the manufacturer's installation instructions. The cable assembly fittings are intended to be assembled or molded on flexible cord.

1.6 Each type of device covered by this standard is described in generic terms where practicable. Reference to use locations identified in the National Electrical Code or specific applications are omitted unless they are required for the identification of the device type. Such additional information is included in the applicable standards for the end-use product involved or in markings for the device.

1.7 This standard does not cover male-to-male cable assemblies with the exception of Class 2 circuits.

1.8 This standard does not directly apply to the following but may supplement other applicable standards:

a) Devices produced integrally with flexible cord or cable that are covered by the Standard for Cord Sets and Power-Supply Cords, UL 817;

b) Devices intended for connection to the branch circuit, such as attachment plugs, cord connectors, receptacles, inlets, and outlets, that are covered by the Standard for Attachment Plugs and Receptacles, UL 498;

c) Devices solely intended for direct connection to the branch circuit in accordance with the National Electrical Code, NFPA 70, and that are provided with contacts of the pin and sleeve type, covered by the Standard for Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type, UL 1682;

d) Devices intended to interconnect industrial machinery and to be installed in accordance with the Electrical Standard for Industrial Machinery, NFPA 79 that are covered by the Outline of Investigation for Multi-point Interconnection Power Cable Assemblies For Industrial Machinery, UL 2237;

e) Connectors intended for use in Data, Signal, Control and Power Applications within and between electrical equipment and intended for factory assembly as covered by the Standard for Component

Connectors for Use in Data, Signal, Control and Power Applications, UL 1977; and the Standard for Telephone Equipment, UL 1459, or the Standard for Communications Circuit Accessories, UL 1863;

1.9 Fittings and devices that employ surge protective devices and/or circuitry to provide surge protection of internal functionality, in addition to complying with the requirements of this standard, shall also comply with the construction and performance requirements for Type 4 component assemblies or for Type 5 components, as appropriate, in accordance with the Standard for Surge Protective Devices, UL 1449.

1.10 Fittings and devices that are intended to provide surge protection of connected equipment and wiring, in addition to the requirements of this standard, shall also be evaluated to the requirements (including ratings and markings) for either Type 2 or Type 3 (surge protective devices) applications in accordance with the Standard for Surge Protective Devices, UL 1449.

2 Glossary

2.1 For the purpose of this standard the following definitions apply.

2.2 CABLE ASSEMBLY – A length of flexible cord or cable with an male cable fitting as a line fitting and a female cable fitting as a load fitting.

2.2A CLASS 2 CIRCUIT – A control circuit supplied from a source having limited voltage (30 V rms (42 V peak) or less, such as from the secondary of a Class 2 transformer, and rated for use with Class 2 remote-control or signaling circuits. The potential shall not be greater than 15V rms (21.2 V peak) under conditions where wet access may occur, including products identified for use outdoors.

2.3 CORD or CABLE TAG – An adhesive backed label that is wrapped around the cord or cable and secured to itself forming a flag that protrudes from the cord or cable. A label without adhesive that is secured to the cord or cable using a securement strap such as a cable tie is also consider a cord tag.

2.4 CURRENT-CARRYING CONDUCTOR – A cord conductor excluding both the grounding conductor and the neutral conductor.

2.5 ENCLOSURE – That part of the device that renders inaccessible all or any parts of the device that otherwise present a risk of electric shock, propagate of flame initiated by electrical disturbances occurring within, or both.

2.6 FEEDER-TAP CABLE SYSTEM – A connector provided with field-wiring terminals for feed-through connection to power-limited tray cable or other appropriate cable and either a female connector to connect to a cable assembly or field-wiring terminals to connect to flexible cord.

2.7 FEED-THROUGH CONNECTOR – A male and female device directly connected through the pins or contacts. This device is not assembled on a cable or conductor.

2.8 FEMALE CABLE FITTING – A female contact device intended to be molded or assembled to flexible cord to make an electrical connection to a male cable fitting or an inlet.

2.9 GROUNDED CONDUCTOR – The circuit conductor that is intentionally grounded.

2.10 GROUNDING-CONDUCTOR PATH – A path between the grounding pin or contact and the grounding terminal.

2.11 INLET – A male contact device intended to be mounted on equipment where the conductors are internal to the equipment to provide an integral means for the connection of a female cable fitting.

2.12 INSULATION, BASIC – Insulation applied to live parts to provide basic protection against a risk of electric shock. This insulation does not necessarily include insulation used exclusively for functional purposes.

2.13 INSULATION, FUNCTIONAL – The insulation necessary for the proper functioning of the fitting and for basic protection against a risk of electric shock. This includes all parts relied upon to support live parts in place, all internal barriers necessary to maintain spacing, and the outlet face portion of all female fittings.

2.14 MALE CABLE FITTING – A male contact device intended to be molded or assembled to a flexible cord or cable to make an electrical connection to a female panel-mount fitting, a female cable fitting, or outlet.

2.15 OUTLET – A female contact device intended to be mounted on equipment where the conductors are internal to the equipment to provide an integral means for the connection of a male cable fitting.

2.16 POLARIZED DEVICE – A device constructed for connection to a mating fitting only in the position that connects related poles of an electrical circuit.

2.17 SMALL PARTS – A small part is considered to be not more than 0.122 in^3 (2 cm^3) in volume.

2.18 SPLITTER – A male fitting that terminates in two or more outlets or that terminates in two or more female cable fittings.

2.19 TERMINAL, INSULATION-DISPLACEMENT – A terminal having a contacting member that forces the conductor insulation aside and presses to contact the current-carrying conductor.

2.20 TERMINAL, PIN TYPE (INSULATION-PIERCING) – A terminal having a contact pin that punctures the conductor insulation to contact the current-carrying conductor.

2.21 TERMINAL, PRESSURE WIRE – A terminal that establishes a connection between one or more conductors and a terminal plate by means of mechanical pressure without the use of solder. The terminal is one of the following types:

a) Clamp-type – A terminal in which the conductor is held under a pressure plate or saddle clamp by one or more screws. This type of terminal may be provided in combination with a wire-binding screw terminal.

b) Setscrew-type – A terminal in which the pressure is applied by the end of the screw bearing on the conductor, either directly or through a wire-protecting pad.

2.22 TERMINAL, WIRE-BINDING SCREW – A terminal in which the conductor is bent around the screw and is clamped directly under the head of the screw when it is tightened.

2.23 TERMINAL, CRIMP TYPE – A terminal in which an electro-mechanical connection is made between the terminal lug and a conductor by compressing the lug onto the conductors.

2.24 UNIT CONTAINER – The smallest carton, package, or container, in which a fitting is packaged. A unit container may contain more than one fitting if the devices are not intended to be removed from the container for individual sale.