



UL 6

Underwriters Laboratories Inc. Standard for Safety

Electrical Rigid Metal Conduit – Steel



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UL Standard for Safety for Electrical Rigid Metal Conduit – Steel, UL 6

Fourteenth Edition, Dated November 30, 2007

Summary of Topics

UL 6 is being revised to incorporate the following requirements for clauses in 5.3.1 and new clause 7.11:

1. Use of Two or More Primary Corrosion Protection Systems

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 September 3, 2010.

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The Department of Defense (DoD) has adopted UL 6 on May 10, 1982. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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Preface

This is the common ANCE, CSA, and UL standard for electrical rigid metal conduit – steel. It is the second edition of NMX-J-534-ANCE-2007, the second edition of CSA C22.2 No. 45.1, and the 14th edition of UL 6. This edition of CSA C22.2 No. 45.1 supersedes the previous edition published in 2004. This edition of UL 6 supersedes the previous edition published June 30, 2004.

This common standard was prepared by the Association of Standardization and Certification (ANCE), Canadian Standards Association (CSA), and Underwriters Laboratories Inc. (UL), and the conduit manufacturing industry. The efforts and support of the Technical Harmonization Subcommittee for Conduit and Tubing, of the Council of the Harmonization of Electrotechnical Standards for the Nations of the Americas (CANENA), are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Subcommittee on Metal Conduit and Tubing, under the jurisdiction of the Technical Committee on Wiring Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the Technical Committee.

This standard will be submitted to the Standards Council of Canada for approval as a National Standard of Canada.

This standard has been approved by the American National Standards Institute as an American National Standard.

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: *Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.*

Level of harmonization

This standard uses an IEC format, but is not based on, nor is it to be considered an IEC standard. This standard is published as an equivalent standard for ANCE, CSA, and UL. An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical deviations are allowed for codes and governmental regulations and those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental, climatic, geographical, technological or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is to be word for word except for editorial changes.

Reasons for differences from IEC

The Technical Harmonization Subcommittee identified several IEC standards that address electrical conduit and tubing included in the scope of this standard. The IEC standards for electrical conduit and tubing are recognized as being generally system-specific, containing the requirements for the relevant conduits and cables and associated fittings in several discrete IEC standards.

The THSC determined the safe use of electrical conduit and tubing is dependent on the design and performance of the conduit and tubing systems with which they are intended to be installed. Significant investigation is required to assess safety and system compatibility issues that may lead to harmonization

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of traditional North American electrical conduit and tubing and associated fittings with those presently addressed in the known IEC standards. The THSC agreed such future investigation might be facilitated by completion of harmonization of the North American standards for electrical conduit and tubing and their fittings.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard shall be based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision shall be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

ANCE effective date

The effective date for ANCE will be announced through the Diario Oficial de la Federación (Official Gazette) and is indicated on the cover page.

CSA effective date

The effective date for CSA International will be announced through CSA Informs or a CSA Certification Notice.

UL effective date

As of November 30, 2010 all products Listed or Recognized by UL must comply with the requirements in this standard. |

A UL effective date is established by Underwriters Laboratories Inc. and is not part of the ANSI approved standard.

Electrical Rigid Metal Conduit – Steel

1 Scope

1.1 These requirements cover electrical rigid metal conduit – steel (ERMC-S), elbows, couplings, and nipples for use as a metal raceway for installation of wires and cables in accordance with CSA C22.1, Canadian Electrical Code, Part 1, NOM-001-SEDE, Standard for Electrical Installations, and NFPA 70, National Electrical Code (see Reference Item No. 1, Annex A). ERMC-S is provided with a zinc, zinc-based, nonmetallic, or other alternate corrosion-resistant exterior coating and an organic or zinc interior coating. It is the user's responsibility to determine the appropriate product for their application.

1.2 Non-ferrous and stainless steel conduit are covered by the standards listed in Reference Item No. 2, Annex A.

2 Normative references

2.1 Products covered by this standard shall comply with the reference installation codes and standards as appropriate for the country where the product is to be used. When the product is intended for use in more than one country, the product shall comply with the installation codes and standards for all countries where it is intended to be used. A "Reference Item No." is provided at the point of use for each reference in this standard. See Annex A for a list of reference publications and the correlating list of reference item numbers to applicable country publications.

2.2 For undated references to standards, such reference shall be considered to refer to the latest edition and all revisions to that edition up to the time when this standard was approved. For dated references to standards, such reference shall be considered to refer to the dated edition and all revisions published to that edition up to the time the standard was approved.

3 Definitions

3.1 The following definitions apply in this standard.

3.2 Bare threaded tube. A standard length of threaded tube intended to be coated with an alternate corrosion-resistant coating and having a separate coupling.

3.3 Coating(s), alternate corrosion-resistant. A primary coating(s) other than one consisting solely of zinc, which upon evaluation has demonstrated the ability to provide the level of corrosion resistance required on the exterior of conduit. See Clause 6.2.4.

Note: The coating(s) may include zinc.

3.4 Coating(s), organic. An interior coating(s), other than one consisting solely of zinc, which, upon evaluation, has demonstrated the ability to provide the level of corrosion resistance necessary where the coating is not subject to physical damage. See Clause 6.2.3.

Note: The coating(s) may include zinc.

3.5 Coating(s), zinc. A primary coating consisting solely of zinc, which upon evaluation has demonstrated the ability to provide the level of corrosion resistance required on the exterior or interior of conduit as applicable. See Clause 6.2.2.

3.6 Elbow. A manufactured curved section of ERMC-S threaded on each end.

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3.7 Electrical rigid metal conduit – steel (ERMC-S). ERMC-S is a threadable steel raceway of circular cross-section designed for the physical protection and routing of wire conductors and use as an equipment grounding conductor when installed utilizing appropriate fittings.

3.8 Finished conduit. A straight conduit with one coupling attached.

3.9 Nipple. A straight section of ERMC-S generally not more than 0.6 m (2 ft) long and threaded on each end.

3.10 Primary coating. A coating on the outside of the conduit for protection against corrosion. See Clause 5.3.1.1.

3.11 Sleeved coupling. A steel threaded coupling with a PVC coating that extends beyond the ends of the coupling to provide corrosion protection to the joints.

3.12 Straight conduit. A straight length of ERMC-S with the protective coating applied but without coupling.

3.13 Supplementary coating. A coating on the outside of the conduit, in addition to the primary coating, for protection against severe corrosive conditions. See Clause 5.3.5.

3.14 Threaded coupling. An internally threaded cylinder that connects two sections of ERMC-S.

4 Units of measurement

4.1 In Canada and Mexico, the values given in SI (metric) units shall be normative. Any other values given shall be for information purposes only.

In the United States, the values stated in either SI units or inch-pound units shall be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems can result in nonconformance with the standard.

5 Construction

5.1 Tube

5.1.1 Each tube shall be of steel, shall be straight, and shall have a circular cross-section, with dimensions as specified in Table 5.1, thereby facilitating the cutting of clean, true threads. The wall thickness shall be uniform throughout the length of the tube. All seams shall be thoroughly welded.

5.1.2 A welded seam shall not have metal trimmings, sharp edges, or sharp projections on the interior or exterior surfaces of the tube. A slight bead on the interior wall at the weld line shall be allowed if the bead is not sharp and if the bead does not exceed 0.38 mm (0.015 in) in height for the trade size 12 – 53 (3/8 – 2) or 0.51 mm (0.020 in) in height for the trade size 63 – 155 (2-1/2 – 6).

5.1.3 Before the protective coating is applied, the interior and exterior surfaces of each tube shall be free from scale, flash, or any other protrusion other than as specified in Clause 5.1.2.

Table 5.1
Dimensions of ERM-C-S

Metric Designator	Outside Diameter, ^a mm	Trade Size	Outside Diameter, ^a in
12 ^b	17.15	3/8 ^b	0.675
16	21.34	1/2	0.840
21	26.67	3/4	1.050
27	33.40	1	1.315
35	42.16	1-1/4	1.660
41	48.26	1-1/2	1.900
53	60.33	2	2.375
63	73.03	2-1/2	2.875
78	88.90	3	3.500
91	101.60	3-1/2	4.000
103	114.30	4	4.500
129	141.30	5	5.563
155	168.28	6	6.625

^a Tolerances: Trade Size 12 – 41 (3/8 – 1-1/2) ± 0.38 mm (±0.015 in)
Trade Size 53 – 155 (2 – 6) ± 1%

^b In the United States and Mexico, 12 (3/8) trade size is permitted for special applications. In Canada, 12 (3/8) trade size is not permitted according to the Canadian Electrical Code, Part I.

5.2 Finished conduit

5.2.1 The length of straight conduit, and the weight of finished zinc-coated conduit or bare threaded tube to be coated with an alternate corrosion-resistant coating with one coupling, shall be as indicated in Clause 5.2.2 and Table 5.2. Typical dimensions of conduit complying with the requirements in this standard are provided for information only in Annex B.

5.2.2 The production of lengths shorter or longer than the standard length specified in Table 5.2 shall be allowed, whether threaded or unthreaded and with or without couplings. Lengths other than standard lengths shall have a minimum acceptable weight proportional to the weights specified in Table 5.2. The length tolerances in Table 5.2 shall be applicable for standard and non-standard lengths.

5.2.3 Standard lengths of finished conduit with a primary coating of zinc shall be provided with one threaded coupling attached or shall have one assembled-on integral coupling. Conduit produced from bare threaded tube provided with an alternate corrosion-resistant coating shall have one separate coupling.

5.2.4 The exterior and interior surfaces of the finished conduit shall be free of poor coatings, hard scale, burrs, fins, or other defects. See Annex D.

Table 5.2
Length and weight of standard 3.05-m (10-ft) lengths of conduit

Metric Designator	Length of Straight Conduit ^a ±6 mm	Minimum Acceptable Weight of Ten Lengths of Conduit with Ten Couplings, kg		Trade Size	Length of Straight Conduit, Feet and Inches ^a ±1/4 in	Minimum Acceptable Weight of Ten Lengths of Conduit with Ten Couplings, lbs	
		Finished Zinc Coated Conduit ^b	Bare Threaded Tube ^c			Finished Zinc Coated Conduit ^b	Bare Threaded Tube ^c
12 ^d	3035	23.4	22.0	3/8 ^d	9 – 11-1/2	51.5	48.6
16	3030	35.8	34.2	1/2	9 – 11-1/4	79.0	75.4
21	3030	47.6	45.5	3/4	9 – 11-1/4	105.0	100.4
27	3025	69.4	66.8	1	9 – 11	153.0	147.2
35	3025	91.2	87.8	1-1/4	9 – 11	201.0	193.5
41	3025	112.9	109.0	1-1/2	9 – 11	249.0	240.4
53	3025	150.6	145.6	2	9 – 11	332.0	321.1
63	3010	239.0	233.1	2-1/2	9 – 10-1/2	527.0	513.9
78	3010	309.6	302.4	3	9 – 10-1/2	682.0	666.6
91	3005	376.9	368.6	3-1/2	9 – 10-1/4	831.0	812.6
103	3005	441.0	431.6	4	9 – 10-1/4	972.3	951.6
129	2995	595.8	584.2	5	9 – 10	1313.6	1288.0
155	2995	791.7	777.8	6	9 – 10	1745.3	1714.7

^a The lengths indicated are designed to produce a 3.05 m (10 ft) length of conduit when a straight-tapped conduit coupling is attached.

^b This conduit is protected with a zinc or zinc-based coating consisting primarily of zinc.

^c This conduit is intended to be protected with an alternate corrosion-resistant coating.

^d In the United States and Mexico, 12 (3/8) trade size is permitted for special applications. In Canada, 12 (3/8) trade size is not permitted according to the Canadian Electrical Code, Part I.

5.3 Protective coatings

5.3.1 General

5.3.1.1 The exterior surface of ERM-C-S shall be protected against corrosion by a coating solely of zinc as described in Clause 5.3.2 or an alternate corrosion-resistant coating as described in Clause 5.3.3. If evaluated for two or more primary coatings, the conduit shall be marked in accordance with Clause 7.11. The interior surface of ERM-C-S shall be protected against corrosion by a coating of zinc or an organic coating, as described in Clauses 5.3.2 and 5.3.4 respectively. See Annex C for an overview.

5.3.1.2 Primary coatings applied over other primary coatings on conduit, elbows, and nipples shall comply with Clause 6.2.4.9.

5.3.1.3 Conduit, elbows, or nipples provided with a primary coating that is prepared or modified for the application of an additional primary coating shall undergo the preparation process before being subjected to the tests in Section 6.2.