



UL 2420

STANDARD FOR SAFETY

Belowground Reinforced Thermosetting Resin
Conduit (RTRC) and Fittings



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UL Standard for Safety for Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings, UL 2420

First Edition, Dated July 30, 2009

Summary of Topics

These revisions are being issued to correlate the minimum and maximum socket depth requirements of UL 2420, Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings, with UL 2515, Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings. Revisions to the following tables are included:

- Table 5, Dimension for couplings – IPS DB
- Table 6, Dimensions for couplings – IPS EB
- Table 7, Dimension for couplings – ID DB
- Table 8, Dimensions for couplings – ID EB
- Table 10, Threaded adapter.

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 requirements are substantially in accordance with Proposal(s) on this subject dated June 22, 2012.

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Future Effective Date	Reference
September 23, 2013	Tables 5 – 8, 10.





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Preface

This is the common CSA and UL standard for belowground reinforced thermosetting resin conduit (RTRC) and fittings. It is the first edition of CSA C22.2 No. 2420, and the first edition of UL 2420. Previously, requirements for belowground RTRC were found in the common CSA and UL Standard for Reinforced Thermosetting Resin Conduit and Fittings. This edition of CSA C22.2 No. 2420 supersedes the fourth edition of CSA C22.2 No. 211.3-96 last revised on June 1, 1997, for products covered in this standard, as indicated in the scope of this standard. This edition of UL 2420 supersedes the third edition of UL 1684 last revised on August 11, 2004.

This common standard was prepared by the Canadian Standards Association (CSA) and Underwriters Laboratories Inc. (UL). The efforts and support of the conduit manufacturing industry and 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 Integrated Committee on Nonmetallic Conduit, Tubing, and Fittings, under the jurisdiction of the CSA Technical Committee on Wiring Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

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 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

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 is 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 is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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 September 21, 2012, all products Listed or Recognized by UL must comply with the requirements in this standard except for Tables 5 – 8 and 10 which are effective September 23, 2013.

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

Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

1 Scope

1.1 This Standard specifies the requirements for low-halogen belowground (Type BG) reinforced thermosetting resin conduit (RTRC) and fittings, for installation and use in accordance with CSA C22.1, Canadian Electrical Code (CEC), Part I, and NFPA 70, National Electrical Code (NEC).

1.2 The products specified in this Standard are intended for use at -40°C (-40°F) to 110°C (230°F).

1.3 Type BG conduit has not been evaluated for directional boring applications.

1.4 This Standard covers ID (dimensions based on inside diameters) and IPS (dimensions based on outside diameters of iron pipe sizes) conduit and fittings. Trade sizes (metric designators) are 1/2 (16) to 6 (155).

Note: The values in parenthesis are metric size designations of conduits and fittings and do not necessarily reflect metric trade sizes

1.5 This Standard covers conduit with designations EB (encased burial) and DB (direct burial), which refer to specific wall thicknesses. EB conduit, is suitable for encasement in concrete. DB conduit is suitable for encasement in concrete and direct burial.

1.6 Fittings specified in this Standard include, but are not limited to, straight couplings, 5° angle couplings, adapters, and elbows with plain ends or integral belled ends at one or both ends.

2 Definitions

2.1 The following definitions apply in this standard:

2.2 Integral belled end – a belled end installed at the factory, either integrally wound or a permanently attached coupling.

2.3 Low-halogen – a material having not more than 0.2% by weight of total halogen content.

2.4 Type BG – conduit and associated fittings that have been evaluated for underground use only, for direct burial with or without being encased in concrete.

Note: For other definitions, refer to NEC and/or CEC.

3 Reference publications and units of measurement

3.1 Reference publications

3.1.1 This Standard refers to the following publications; where such reference is made to CSA or UL Standards, it shall be considered to refer to the latest edition and all amendments published thereto; and where such reference is made to other publications, it shall be to the edition listed below.

CSA Standard

C22.1-09

*Canadian Electrical Code (CEC), Part I***ANSI/NFPA* Standard**

NFPA 70-2008

*National Electrical Code (NEC)***ASTM† Standard**

D 638-08

*Standard Test Method for Tensile Properties of Plastics*** American National Standards Institute/National Fire Protection Association**† American Society for Testing and Materials.***3.2 Units of measurement**

3.2.1 The values given in SI (metric) units are mandatory. Any other values are for information only.

4 Construction**4.1 General**

4.1.1 Conduit and fittings shall be fiber impregnated with a cured thermosetting resin compound. The conduit shall have a uniform wall, a smooth interior, and shall not contain any features that can damage wiring installed in the conduit.

4.1.2 Conduit shall be straight, and both ends of each length of conduit shall be perpendicular to the longitudinal axis of the conduit.

4.1.3 Integral and non-integral connections shall provide a mechanically secure and watertight joint.

4.2 Conduit with an integral belled end

4.2.1 The dimensions of conduit with an integral coupling on one end shall be in accordance with Tables 1 to 4. They shall also meet the requirements of Clauses 5.6 and 5.7.

4.3 Couplings

4.3.1 Couplings shall be straight with belled ends, or 5° angle couplings. Dimensions of couplings shall be in accordance with Tables 5 to 8. Couplings shall also meet the requirements of Clauses 5.6 and 5.7.

4.4 Elbows

4.4.1 Elbows shall be provided with plain ends or have an integral belled end at one or both ends. Elbows shall also meet the requirements of Clause 5.6.

4.4.2 The radius and dimension of an elbow shall be as shown in Table 9 and Figure 1.

4.4.3 The straight-end portions (see dimension L_s on Figure 1) of an elbow shall be at least 13 mm (1/2 in) longer than the maximum socket depth.

4.5 Adapters

4.5.1 Threaded adapters and threaded box connectors

4.5.1.1 Adapters for joining conduit to other threaded systems shall be as specified in Table 10.

4.5.2 Other adapters

4.5.2.1 Other adapters shall meet the watertightness test specified in Clause 5.6 and the joint separation requirements specified in Clause 5.7.

4.5.3 Bore of conduit and elbows

4.5.3.1 The internal diameter of a finished elbow shall be such that a round ball or an equivalent mandrel will pass freely through the bore of the conduit and elbow. The diameter of the ball or equivalent mandrel shall be 90% of the original internal diameter for conduit and 85% of the original internal diameter for elbows.

Note: As an alternative to using a ball to check the bore of conduit and elbows, an inside micrometer gauge or a telescopic gauge and micrometer caliper may be used.

5 Qualification tests

5.1 Conditioning

5.1.1 Unless specified otherwise in the description of the test, all specimens shall be preconditioned for at least 24 h in still air at a temperature of $23 \pm 2^\circ\text{C}$ ($73 \pm 4^\circ\text{F}$).

5.2 Compression

5.2.1 General

5.2.1.1 The internal diameter of conduit shall not decrease by more than 25% during application of the force specified in Tables 11 and 12 when tested in accordance with Clauses 5.2.2 to 5.2.4. The conduit shall show no evidence of cracking or buckling after removal from the compression machine.

5.2.2 Apparatus

5.2.2.1 The apparatus for this test shall consist of:

- a) an inside micrometer or telescopic gauges and a micrometer caliper; and
- b) a compression machine having 2 steel platens at least 150 mm (6.0 in) long and 10 mm (0.4 in) thick, and capable of running at a speed within the range of 10 to 15 mm/min (0.4 to 0.6 in/min).

5.2.3 Specimens

5.2.3.1 The specimens shall consist of three 150 ± 3 mm (6.0 ± 0.125 in) lengths of conduit.

5.2.4 Procedure

5.2.4.1 The inside diameter of the specimen shall be measured and recorded. The specimen shall be placed between the plates of the compression machine such that the measured inside diameter is perpendicular to the platens. The machine shall be set in motion until the force specified in Tables 11 and 12 has been applied to the specimen. The machine shall be stopped and the inside diameter re-measured. The percent decrease in the internal diameter shall be calculated and recorded.

5.3 Impact resistance at low temperature

5.3.1 When tested in accordance with Clauses 5.3.2 to 5.3.4, there shall not be any fracture or break in the laminate surface of seven out of ten 200 mm (8.0 in) long specimens of the finished conduit. A fracture or break shall be considered to have occurred where a broken section of the laminate forms a protrusion within the inside diameter or extends beyond the outside diameter of the conduit. The portions of the conduit within 51 mm (2.0 in) from the cut ends of the specimen shall not be examined.

5.3.2 The specimens shall be cut from finished lengths of each trade size of conduit. The specimens, the test apparatus, and the surrounding air shall be in thermal equilibrium with one another at a temperature of $-40^\circ \pm 1^\circ\text{C}$ ($-40^\circ \pm 2^\circ\text{F}$) during the test. Each specimen shall be tested separately while resting on a solid, flat steel plate that is at least 13 mm (1/2 in) thick and shall be firmly anchored with its upper surface horizontal.

5.3.3 When it is necessary to remove the specimen from the low-temperature chamber due to handling difficulties, the impact test shall commence as soon as possible and shall be completed within 15 s of the time of removal.