UL 651

STANDARD FOR SAFETY

Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings

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UL Standard for Safety for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings, UL 651

Eighth Edition, Dated October 25, 2011

Summary of Topics

This revision for ANSI/UL 651 dated April 8, 2026 includes the following changes in requirements:

– 6.16.5 No. 50-2/20 unbleached cotton braid tape;

– Inclusive Language Update; 7.2.6.1

– Update to Metric Designation Table 6.2;

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated March 6, 2026.

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UL 651

Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings

Prior to the fourth edition, the requirements for the Schedule 40 products covered by this standard were included in the Standard for Rigid Nonmetallic Conduit, UL 651. Prior to the eighth edition, the requirements for Type EB and A products covered by this standard were included in the Standard for Type EB and A Rigid PVC Conduit, UL 651A.

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The most recent designation of ANSI/UL 651 as an American National Standard (ANSI) occurred on April 8, 2026. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 651 on August 5, 1983. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Comments or proposals for revisions on any part of the Standard may be submitted to ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 General

1.1.1 These requirements cover Schedule 40, Schedule 80, Type EB and Type A extruded rigid PVC (polyvinyl chloride) electrical conduit and fittings. These requirements also cover elbows, couplings, adapters, expansion, expansion-deflection, or deflection joints, conduit hubs fittings, and similar fittings that are constructed at least in part of rigid PVC. The designations "Schedule 40", "Schedule 80", "Type EB", "Type A" refer to USA trade sizes of conduit having iron pipe-size outside diameters and specific wall thicknesses. Couplings, adapters, expansion, expansion-deflection, or deflection joints, and similar fittings are intended to be used with Schedule 40, Schedule 80, Type EB and Type A rigid PVC conduit, and elbows in accordance with the National Electrical Code (NEC), NFPA 70.

1.1.2 Rigid PVC conduit and fittings covered in these requirements are intended for use as rigid nonmetallic raceway for wires and cables in accordance with the National Electrical Code (NEC), NFPA 70.

1.1.3 Conduit bodies (pull boxes) and covers, flush-device boxes and covers, and outlet boxes and covers that are constructed of rigid PVC or another nonmetallic material and are for use with the rigid PVC conduit and fittings covered in these requirements are covered separately in the Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers, UL 514C.

1.1.4 Rigid PVC conduit and fittings covered in these requirements are intended to be joined to each other and to rigid PVC boxes, conduit bodies, and fittings in the field by such means as a push-fit or a cement that is or contains a solvent for polyvinyl chloride.

1.1.5 Unless the wording of a requirement that applies to rigid PVC conduit and fittings specifically limits the requirement to Schedule 40, Schedule 80, Type EB or to Type A, each such requirement in this standard applies to all types.

1.1.6 Reinforced thermosetting resin conduit and associated fittings are covered separately in the Standard for Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings, UL 2515 and the Standard for Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings, UL 2420.

1.2 Schedule 40 and 80 conduit and fittings

1.2.1 Schedule 40 rigid PVC conduit and fittings are for aboveground use indoors or outdoors exposed to sunlight and weather, and for underground use by direct burial or encasement in concrete. Schedule 40 rigid PVC conduit, elbows, that are specifically marked for underground use are suitable for use underground only by direct burial or encasement in concrete.

1.2.2 Schedule 80 rigid PVC conduit and fittings are for use wherever Schedule 40 rigid PVC conduit may be used and are for installation on poles in accordance with the National Electrical Code (NEC), NFPA 70.

1.2.3 The following restrictions apply to use of the Schedule 40 and Schedule 80 rigid PVC conduit and fittings mentioned in 1.1.1:

a) Use at 50°C (122°F) and lower ambient temperatures and

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b) Use with 75°C (167°F) wiring, but the conduit and fittings may be used with 90°C (194°F) wiring if they comply with the construction (see Conduit for Use with 90°C Wire, 6.15) and marking (see 8.2.1, 8.2.4 and 8.2.5) requirements covering use with 90°C (194°F) wiring.

1.2.4 In addition to the applicable requirements specified in this standard, Schedule 40 and Schedule 80 rigid PVC conduit intended for directional boring shall be subjected to the performance requirements in 6.12.

1.2.5 *Deleted.*

1.3 Type EB and A conduit and fittings

1.3.1 The Type EB and Type A rigid PVC conduit and fittings mentioned in 1.1.1 are intended for use at 50°C (122°F) and lower ambient temperatures. Type A rigid PVC conduit and fittings are intended for use with 75°C (167°F) wiring. Type A and Type EB rigid PVC conduit and fittings, where encased in concrete in trenches outside of buildings, may be used with 90°C (194°F) wiring.

1.3.2 Type EB (encased burial) rigid PVC conduit is intended for encasement in concrete in trenches outside of buildings. Type A rigid PVC conduit is intended for encasement in concrete in any location.

1.4 Applications

1.4.1 Couplings covered by these requirements are fittings intended for joining:

a) Two lengths of rigid PVC conduit,

b) A length of rigid PVC conduit to a rigid PVC elbow and

c) In conjunction with a junction-box adapter, a length of rigid PVC conduit or a rigid PVC elbow to a box.

1.5 Fittings

1.5.1 Junction-box adapters covered by these requirements are fittings intended to connect a length of rigid PVC conduit, a PVC elbow to a rigid PVC box (not limited to junction boxes) with a coupling.

1.5.2 Internally-threaded adapters covered by these requirements are fittings intended for joining a length of rigid PVC conduit, a PVC elbow to threaded rigid metal conduit or other externally-threaded devices.

1.5.3 Externally-threaded adapters (also referred to as terminal adapters) covered by these requirements are fittings intended for joining a length of rigid PVC conduit or elbow to:

a) The knockout area of a metal box with a metal locknut,

b) A threaded metal hub or fitting on a metal box,

c) A threaded hub on a phenolic box, or

d) A knockout in a phenolic box.

1.5.4 Reducers covered by these requirements are fittings intended for joining lengths of two different sizes of rigid PVC conduit.

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1.5.5 Caps covered by these requirements are fittings intended for closing the ends of unused lengths of rigid PVC conduit.

1.5.6 End bells covered by these requirements are fittings intended to provide a bushed opening at the open end of a length of rigid PVC conduit. (See 5.8.1.)

1.5.7 Construction requirements for fittings covered by this standard are specified in Section 5. Performance requirements are specified in Section 7.

1.5.8 Conduit hub fittings covered by these requirements are two-piece fittings with an internal and external threaded hub pair intended to connect a length of PVC conduit, a PVC elbow solvent-cemented to the socket of the internal hub piece to a rigid PVC box (not limited to junction boxes) with the connecting externally threaded hub piece.

2 Units of Measurement

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

2.2 Unless otherwise indicated, all voltage and current values mentioned in this standard are root-mean-square (rms).

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.

CONSTRUCTION

4 Rigid PVC Conduit

4.1 General

4.1.1 The compound of which rigid PVC conduit and fittings are made shall equal or exceed the cell classification 12123 as described in Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC Compounds), ASTM D 1784.

4.1.2 Clean rework compound, generated from the manufacturer's own production and reused by the manufacturer, meets the intent of these requirements when the finished product complies with all of the requirements of this standard.

4.1.3 Clean rigid PVC pre-consumer (post-industrial) recycled material, as defined in UL 2809-2 shall be permitted to be used if:

a) Each source has been qualified in accordance with the requirements of the Standard for Polymeric Materials – Fabricated Parts, UL 746D and

b) The conduit and fittings produced meet all the requirements of this standard.

4.1.4 Rigid PVC conduit and fittings are inherently resistant to the corrosive influences of common industrial atmospheres including the vapors and mists of bases, hydrofluoric and chromic acids, and pickling and plating baths. Resistance to wetting by and immersion in specific reagents is covered in Resistance to Specific Reagents, 6.13 and 7.2.10 and related markings in 8.2.2, 8.2.3, 9.2.1 and 9.2.2.

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4.1.5 Rigid PVC conduit shall provide a smooth raceway for the pulling in of wires and cables. They shall not have any features that can abrade or otherwise damage wires and cables. The outside surfaces of conduit and fittings shall be smooth and without any chips, blisters, cracks, or other defects. There shall not be any tendency for conduit or fittings to peel, scale, flake, chalk, or crumble.

4.1.6 Both ends of each length of rigid PVC conduit shall be perpendicular to the longitudinal axis of the conduit.

Exception: An interior chamfer on the spigot end of conduit is not prohibited. The chamfer shall be constructed as shown in Figure 1 of Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation, ASTM F 512. A chamfered end is not considered to be a taper.

4.1.7 Rigid PVC conduit and elbows shall not be threaded. There shall not be any taper to the conduit unless one end is formed as an integral coupling. In that case, only the interior surface of the integral coupling may be tapered.

4.1.8 For specific applications or uses, lengths may be shipped from the factory with or without couplings an adapter or conduit hub fitting instead of a coupling. A coupling with a center stop need not be cemented to the conduit when the conduit is shipped but may be separately packaged.

4.1.9 For general use, a PVC coupling or similar fitting shall be cemented, heat-fused, or molded (see 4.1.10) to one end of each length of conduit before the conduit is shipped from the factory. The coupling or similar fitting shall comply with the requirements concerning reagent resistance in Resistance to Specific Reagents, 7.2.10, and 9.2.1, and 9.2.2 if the conduit to which it is attached complies with the requirements for wetting by or immersion in reagents. If a stopless coupling is used, the end of the conduit shall be within 1/8 inch (3 mm) of the center of the coupling.

4.1.10 A PVC coupling shall be capable of being secured to rigid PVC conduit by means of the type of cement mentioned in 1.1.4. When assembled to conduit to which solvent cement is freshly applied, both of the following shall be complied with:

a) The coupling shall be hand-tight on the conduit when the end of the conduit is against the stop or, in the case of a stopless coupling, within 1/8 inch (3 mm) of the center of the coupling. The coupling shall not be loose nor shall anything other than a person's hands be needed to assemble the coupling to the conduit; and

b) Around the junction of the coupling socket and the conduit circumference to which the coupling is attached, there shall not be any void that is not essentially filled by cement.

4.2 Measurements

4.2.1 Each length of rigid PVC conduit on which measurements are made is to be finished, smooth and clean wherever it is to touch any part of a measuring device or tool. While measurements are being made, the conduit and the air around it are to be in thermal equilibrium with one another at a temperature of 23.0 ±2.0°C (73.4 ±3.6°F). All of the average and individual outside diameter measurements are to be performed at the center and at least one end of the conduit.

4.2.2 The measurements from which the average outside diameters of a length of each type of finished conduit are to be determined for comparison with the limits specified in inches or in millimeters in the appropriate tables in 4.3 for Schedule 40 and 80 conduit and 4.5 for Type EB and A conduit. Measurements are to be made by one of the following means:

a) A machinist’s micrometer caliper that has a flat-ended spindle, a flat anvil and is calibrated to read directly to at least 0.001 inch or 0.01 mm;

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b) A vernier caliper calibrated to read directly to at least 0.001 inch or 0.01 mm;

c) A vernier wrap tape, calibrated to read directly to at least 0.001 inch or 0.01 mm;

d) A tapered sleeve gauge accurate to ±1 percent of its taper and ±0.001 inch or ±0.01 mm of its diameter; or

e) A sleeve window gauge accurate to within ±1 percent of its tape and ±0.001 inch of its diameter.

4.2.3 Wall thicknesses of a length of finished rigid PVC conduit shall be measured and compared with the limits specified in inches or millimeters in the appropriate tables in 4.3 for Schedule 40 and 80 conduit and 4.5 for Type EB and A conduit. Measurements are to be made by a machinist's micrometer caliper that has a ratchet, a flat-ended spindle, and a hemispherical anvil and is calibrated having a minimum resolution of 0.001 inches or 0.01 mm

4.2.4 When employing a tapered sleeve gauge, the entrance and exit diameters of the gauge shall correspond to the maximum and minimum outside diameters for the trade size of rigid PVC conduit being measured.

4.2.5 When employing a sleeve window gauge, the window shall extend beyond the two scribed marks which shall represent the minimum and maximum required diameters.

4.2.6 The measurements from which the minimum and maximum outside diameters (ovality or out-of-roundness) of a length of each type of finished conduit are to be determined for comparison with the limits specified in inches or in millimeters in the appropriate tables in 4.3 for Schedule 40 and 80 conduit and 4.5 for Type EB and A conduit. Measurements are to be made by one of the following means:

a) A machinist's micrometer caliper that has a flat-ended spindle, a flat anvil and is calibrated to read directly to at least 0.001 inch or 0.01 mm;

b) A vernier caliper calibrated to read directly to at least 0.001 inch or 0.01 mm; or

c) An out-of-roundness gauge accurate to ±0.01 mm.

4.2.7 In disputes that may arise between measuring techniques, the vernier caliper is to act as the referee in determining compliance with the requirements for minimum and maximum outside diameters.

4.2.8 To determine the average outside diameter when using a micrometer caliper or vernier caliper, at least four measurements (every 45 degrees) are necessary at each place to ensure that the largest and smallest diameters are found. The average of all the recorded diameters is to be determined and compared with the average diameter for the trade size of rigid PVC involved that is found in the following tables:

a) For Schedule 40 and 80 conduit, Table 4.1 (inches) or Table 4.2 (millimeters);

b) For Type EB and A conduit, Table 4.6 (inches) or Table 4.7 (millimeters).

The average of the recorded diameters shall not differ from the average diameter in the applicable table by more than the specified tolerances.

4.2.9 To determine the average outside diameter when using vernier wrap tape, place the vernier wrap tape around the rigid PVC conduit making sure that it is at right angles to the conduit axis and is flat against the conduit surface. The observed reading is to be compared with the average diameter for the trade size of conduit involved as specified in 4.2.8 (a) or (b). The observed reading shall not differ from the average diameter in the applicable table by more than the specified tolerances.

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