



UL 651

STANDARD FOR SAFETY

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

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 May 10, 2022 includes changes to the following:

- [Table 5.1](#)
- **PVC Offset Fittings; [5.2.3](#) and [5.2.4](#)**
- **Editorial update to correct reference from Table 6.1 to Table 6.3; [6.9.2](#)**

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 new and revised requirements are substantially in accordance with Proposal(s) on this subject dated December 10, 2021 and April 1, 2022.

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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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Eighth Edition

October 25, 2011

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The most recent designation of ANSI/UL 651 as an American National Standard (ANSI) occurred on May 10, 2022. 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 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 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, 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

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.

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](#).

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 industrial scrap material (single or blended) originating entirely from operations in the same plant as that in which the conduit is manufactured) that is not commingled with other plastic materials and originates from a single manufacturing process 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](#).

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 or with an adapter 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;
- 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.

4.2.10 To determine the average outside diameter when using a tapered sleeve gauge or sleeve window gauge, cut the end of the rigid PVC conduit square and remove burrs. Insert the conduit into the sleeve

gauge and observe the position of the end with respect to the ends of the tapered sleeve gauge or the position of the end with respect to the minimum and maximum scribed marks of the sleeve window gauge.

4.2.11 When using a tapered sleeve gauge, the rigid PVC conduit shall enter the larger end of the gauge and shall not pass through the smaller end of the gauge.

4.2.12 When using a sleeve window gauge, the end of the rigid PVC conduit shall be visible between the two scribed marks when the conduit is inserted into the gauge.

4.2.13 The average of the recorded diameters mentioned in [4.2.8](#) – [4.2.13](#) is to be determined and compared with the average diameter in inches or millimeters for the size of rigid PVC conduit involved as specified in [4.2.8](#) (a) or (b). The average of the recorded diameters shall not differ from the average diameter in the applicable table by more than the specified tolerances.

4.2.14 Additionally, the wall thickness is to be measured at one or both ends of the rigid PVC conduit by means of the caliper with the hemispherical anvil. At least four measurements are necessary at each end, measured to make certain that the thickest and thinnest parts of the wall are found. The maximum and minimum of all the recorded thicknesses are to be compared with the maximum and minimum wall thicknesses found in the following tables for the size of conduit involved:

- 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).

Neither limit shall be exceeded.

4.2.15 If desired, methods, tools, and measurement techniques may be employed to determine compliance with the above dimensional requirements provided they are accurate to within ± 0.001 inch or ± 0.01 mm and as such have been determined to be acceptable.

4.3 Schedule 40 and 80 conduit

4.3.1 Limits on the wall thickness and outside diameter of Schedule 40 and 80 rigid PVC conduit shall be as specified in inches in [Table 4.1](#) and in millimeters in [Table 4.2](#). Limits on inside diameters shall be as specified in [Table 4.3](#).

Table 4.1
Limits in inches on outside diameters and wall thicknesses of Schedule 40 and 80 conduit

Trade size of conduit	Outside diameters,			Minimum wall thicknesses,	
	Average	Maximum	Minimum	Schedule 40	Schedule 80
1/2	0.840 ± 0.004	0.848	0.832	0.109	0.147
3/4	1.050 ± 0.004	1.060	1.040	0.113	0.154
1	1.315 ± 0.005	1.325	1.305	0.133	0.179
1-1/4	1.660 ± 0.005	1.672	1.648	0.140	0.191
1-1/2	1.900 ± 0.006	1.912	1.888	0.145	0.200
2	2.375 ± 0.006	2.387	2.363	0.154	0.218
2-1/2	2.875 ± 0.007	2.890	2.860	0.203	0.276
3	3.500 ± 0.008	3.515	3.485	0.216	0.300
3-1/2	4.000 ± 0.008	4.050	3.950	0.226	0.318
4	4.500 ± 0.009	4.550	4.450	0.237	0.337
5	5.563 ± 0.010	5.613	5.513	0.258	0.375
6	6.625 ± 0.011	6.675	6.575	0.280	0.432

Table 4.2
Limits in millimeters on outside diameters and wall thicknesses of Schedule 40 and 80 conduit

Metric designator	Outside diameters,			Minimum wall thicknesses,	
	Average	Maximum	Minimum	Schedule 40	Schedule 80
16	21.34 ±0.10	21.54	21.13	2.77	3.73
21	26.67 ±0.10	26.92	26.42	2.87	3.91
27	33.40 ±0.13	33.66	33.15	3.38	4.55
35	42.16 ±0.13	42.47	41.86	3.56	4.85
41	48.26 ±0.15	48.56	47.96	3.68	5.08
53	60.32 ±0.15	60.63	60.02	3.91	5.54
63	73.02 ±0.18	73.41	72.64	5.16	7.01
78	88.90 ±0.20	89.28	88.52	5.49	7.62
91	101.60 ±0.20	102.87	100.33	5.74	8.08
103	114.30 ±0.23	115.57	113.03	6.02	8.56
129	141.30 ±0.25	142.57	140.03	6.55	9.52
155	168.28 ±0.28	169.54	167.00	7.11	10.97

Table 4.3
Minimum average inside diameter of Schedule 40 and 80 rigid PVC conduit

Trade size (metric design)		Minimum average inside diameter			
		Schedule 40		Schedule 80	
		inches	(mm)	inches	(mm)
1/2	(16)	0.578	(14.68)	0.502	(12.75)
3/4	(21)	0.780	(19.81)	0.698	(17.72)
1	(27)	1.004	(25.50)	0.910	(23.11)
1-1/4	(35)	1.335	(33.90)	1.227	(31.16)
1-1/2	(41)	1.564	(39.72)	1.446	(36.72)
2	(53)	2.021	(51.33)	1.881	(47.77)
2-1/2	(63)	2.414	(61.31)	2.250	(57.15)
3	(78)	3.008	(76.40)	2.820	(71.62)
3-1/2	(91)	3.486	(88.54)	3.280	(83.31)
4	(103)	3.961	(100.60)	3.737	(94.91)
5	(129)	4.975	(126.36)	4.713	(119.71)
6	(155)	5.986	(152.04)	5.646	(143.41)

4.4 Couplings for Schedule 40 and 80 conduit

4.4.1 The dimensions of an integral coupling shall comply with [Table 4.4](#) (inches) or [Table 4.5](#) (millimeters) when measured with a machinist's inside micrometer caliper (socket diameter) having a ratchet, a machinist's inside-depth gauge (socket depth), and the machinist's micrometer caliper (socket wall thickness) mentioned in [4.2.2](#). Each instrument is to be calibrated to read directly to at least 0.001 inch or 0.01 mm.

Table 4.4
Dimensions in inches of integral couplings for Schedule 40 and 80 conduit

Trade size of conduit	Socket diameters						Minimum socket depth ^a	Minimum thickness at any point of socket	
	At entrance			At bottom				Schedule 40	Schedule 80
	Maximum	Minimum	Average	Maximum	Minimum	Average			
1/2	0.860	0.844	0.852 ±0.004	0.844	0.828	0.836 ±0.004	0.652	0.095	0.129
3/4	1.074	1.054	1.064 ±0.004	1.056	1.036	1.046 ±0.004	0.719	0.095	0.136
1	1.340	1.320	1.330 ±0.005	1.320	1.300	1.310 ±0.005	0.875	0.100	0.158
1-1/4	1.689	1.665	1.677 ±0.005	1.667	1.643	1.655 ±0.005	0.938	0.120	0.168
1-1/2	1.930	1.906	1.918 ±0.006	1.906	1.882	1.894 ±0.006	1.062	0.120	0.166
2	2.405	2.381	2.393 ±0.006	2.381	2.357	2.369 ±0.006	1.125	0.130	0.181
2-1/2	2.905	2.875	2.890 ±0.007	2.883	2.853	2.868 ±0.007	1.469	0.165	0.229
3	3.530	3.500	3.515 ±0.008	3.507	3.477	3.492 ±0.008	1.594	0.179	0.249
3-1/2	4.065	3.965	4.015 ±0.008	4.007	3.977	3.992 ±0.008	1.687	0.188	0.264
4	4.565	4.465	4.515 ±0.009	4.506	4.476	4.491 ±0.009	1.750	0.197	0.280
5	5.643	5.543	5.593 ±0.010	5.583	5.523	5.553 ±0.010	1.937	0.214	0.311
6	6.708	6.608	6.658 ±0.011	6.644	6.584	6.614 ±0.011	2.125	0.232	0.359

Tests are not needed on sockets complying with these minimums.

Table 4.5
Dimensions in millimeters of integral couplings for Schedule 40 and 80 conduit

Metric desig	Socket diameters						Minimum socket depth ^a	Minimum thickness at any point of socket	
	At entrance			At bottom				Schedule 40	Schedule 80
	Maximum	Minimum	Average	Maximum	Minimum	Average			
16	21.84	21.44	21.64 ±0.10	21.44	21.03	21.23 ±0.10	16.56	2.41	3.28
21	27.28	26.77	27.03 ±0.10	26.82	26.31	26.57 ±0.10	18.26	2.41	3.45
27	34.04	33.53	33.78 ±0.13	33.53	33.02	33.27 ±0.13	22.22	2.54	4.01
35	42.90	42.30	42.60 ±0.13	42.34	41.73	42.04 ±0.13	23.83	3.05	4.28
41	49.02	48.41	48.72 ±0.15	48.41	47.80	48.11 ±0.15	26.97	3.05	4.22
53	61.09	60.48	60.78 ±0.15	60.48	59.87	60.17 ±0.15	28.58	3.30	4.60
63	73.79	73.02	73.41 ±0.18	73.23	72.47	72.85 ±0.18	37.31	4.19	5.82

Table 4.5 Continued on Next Page

Table 4.5 Continued

Metric desig	Socket diameters						Minimum socket depth ^a	Minimum thickness at any point of socket	
	At entrance			At bottom				Schedule 40	Schedule 80
	Maximum	Minimum	Average	Maximum	Minimum	Average			
78	89.66	88.90	89.28 ±0.20	89.08	88.32	88.70 ±0.20	40.49	4.55	6.32
91	103.25	100.71	101.98 ±0.20	101.78	101.02	101.40±0.2 0	42.85	4.78	6.71
103	115.95	113.41	114.68 ±0.23	114.45	113.70	114.07±0.2 3	44.45	5.00	7.11
129	143.33	140.80	142.06 ±0.25	141.80	140.28	141.05±0.2 5	49.20	5.44	7.90
155	170.38	167.84	169.11±0.2 8	168.76	167.23	168.00 ±0.28	53.98	5.89	9.12
^a Tests are not needed on sockets complying with these minimums.									

4.5 Type EB and A conduit

4.5.1 Limits on the wall thickness and outside diameter of Type A and Type EB rigid PVC conduit shall be as specified in [Table 4.6](#) (inches) and [Table 4.7](#) (millimeters).

Table 4.6
Outside diameter and wall thickness of Type A and EB rigid PVC conduit in inches

Trade size of conduit	Avg.	Outside diameters				Wall thicknesses			
		Type A PVC conduit		Type EB PVC conduit		Type A PVC conduit		Type EB ^b PVC conduit	
		Max	Min	Max	Min	Max	Min	Max	Min
1/2	0.840 ±0.004	0.848	0.832	a	a	0.080	0.060	a	a
3/4	1.050 ±0.004	1.060	1.040	a	a	0.080	0.060	a	a
1	1.315 ±0.005	1.325	1.305	a	a	0.080	0.060	a	a
1-1/4	1.660 ±0.005	1.672	1.648	a	a	0.090	0.070	a	a
1-1/2	1.900 ±0.006	1.912	1.888	a	a	0.100	0.080	a	a
2	2.375 ±0.006	2.387	2.363	2.405	2.345	0.120	0.100	0.094	0.060
2-1/2	2.875 ±0.007	2.890	2.860	a	a	0.130	0.110	a	a
3	3.500 ±0.008	3.515	3.485	3.530	3.470	0.145	0.125	0.109	0.061
3-1/2	4.000 ±0.008	4.050	3.950	4.050	3.950	0.165	0.145	0.124	0.072
4	4.500 ±0.009	4.550	4.450	4.550	4.450	0.170	0.150	0.129	0.082
5	5.563 ±0.010	5.613	5.513	5.613	5.513	a	a	0.144	0.103
6	6.625 ±0.011	6.675	6.575	6.675	6.575	a	a	0.164	0.125

^a Additional requirements will be added as these sizes are determined to be acceptable.

^b Length – Standard lengths are 10 feet and 20 feet. Other lengths may be shipped for specific applications.

Table 4.7
Limits on outside diameters and wall thicknesses of Type A and EB PVC conduit in millimeters

Metric designator	Avg.	Outside diameters				Wall thicknesses			
		Type A PVC conduit		Type EB PVC conduit		Type A PVC conduit		Type EB ^b PVC conduit	
		Max	Min	Max	Min	Max	Min	Max	Min
16	21.34 ±0.10	21.54	21.13	a	a	2.03	1.52	a	a
21	26.67 ±0.10	26.92	26.42	a	a	2.03	1.52	a	a
27	33.40 ±0.13	33.66	33.15	a	a	2.03	1.52	a	a
35	42.16 ±0.13	42.47	41.86	a	a	2.29	1.78	a	a
41	48.26 ±0.15	48.56	47.96	a	a	2.54	2.03	a	a
53	60.32 ±0.15	60.63	60.02	61.09	59.56	3.05	2.54	2.39	1.52
63	73.02 ±0.18	73.41	72.64	a	a	3.30	2.80	a	a
78	88.90 ±0.20	89.28	88.52	89.60	88.14	3.68	3.18	2.77	1.55
91	101.60 ±0.20	102.87	100.33	102.87	100.33	4.20	3.68	3.15	1.83
103	114.30 ±0.23	115.57	113.03	115.57	113.03	4.32	3.80	3.28	2.08
129	141.30 ±0.25	142.57	140.03	142.57	140.03	a	a	3.66	2.62
155	168.28 ±0.28	169.54	167.00	169.54	167.00	a	a	4.17	3.18
^a Additional requirements will be added as these sizes are determined to be acceptable.									
^b Length – Standard lengths are 10 feet and 20 feet. Other lengths may be shipped for specific applications.									

4.6 Couplings for Type EB and A conduit

4.6.1 The dimensions of an integral coupling on Type EB rigid PVC conduit shall comply with [Table 4.8](#) (inches) or [Table 4.9](#) (millimeters) when measured with a machinist's inside micrometer caliper (socket diameter) having a ratchet, a machinist's inside depth gauge (socket depth), and the machinist's micrometer caliper (socket wall thickness) mentioned in [4.2.2](#). Each instrument is to be calibrated to read directly to at least 0.001 inch or 0.01 mm.

Table 4.8
Dimensions in inches of integral coupling for Type EB rigid PVC conduit

Trade size of conduit	Inside diameter at inner end of socket			Inside diameter at entrance to socket			Minimum socket depth ^a	Minimum thickness at any point of socket
	Average	Maximum	Minimum	Average	Maximum	Minimum		
2	2.378 ±.008	2.408	2.348	2.396 ±.009	2.426	2.366	1.750	0.060
3	3.503 ±.010	3.533	3.473	3.529 ±.014	3.559	3.499	2.875	0.061

Table 4.8 Continued on Next Page

Table 4.8 Continued

Trade size of conduit	Inside diameter at inner end of socket			Inside diameter at entrance to socket			Minimum socket depth ^a	Minimum thickness at any point of socket
	Average	Maximum	Minimum	Average	Maximum	Minimum		
3-1/2	4.003 ±.011	4.053	3.953	4.031 ±.015	4.081	3.981	3.125	0.72
4	4.502 ±.012	4.552	4.452	4.533 ±.016	4.583	4.483	3.375	0.082
5	5.565 ±.013	5.615	5.515	5.601 ±.018	5.651	5.551	4.000	0.103
6	6.627 ±.014	6.677	6.577	6.669 ±.023	6.719	6.619	5.000	0.125

^a Socket depth shall be measured from the entrance edge to the shoulder stop. Tests are not needed on sockets complying with these minimums.

Table 4.9
Dimensions in millimeters of integral couplings for Type EB rigid PVC conduit

Metric designator	Inside diameter at inner end of socket			Inside diameter at entrance to socket			Minimum socket depth ^a	Minimum thickness at any point of socket
	Average	Maximum	Minimum	Average	Maximum	Minimum		
53	60.40 ±0.20	61.16	59.64	60.86 ±0.23	61.62	60.10	44.45	1.52
78	88.98 ±0.25	89.74	88.21	89.64 ±0.36	90.40	88.87	73.02	1.55
91	101.68 ±0.28	102.95	100.40	102.39 ±0.38	103.66	101.12	79.38	1.83
103	114.35 ±0.30	115.62	113.08	115.14±0.41	116.40	113.87	85.72	2.08
129	141.35 ±0.33	142.62	140.08	142.27 ±0.46	143.54	141.00	101.60	2.62
155	168.33 ±0.36	169.60	167.06	168.40±0.58	170.66	168.12	127.00	3.18

^a Socket depth shall be measured from the entrance edge to the shoulder stop. Tests are not needed on sockets complying with these minimums.

4.7 Elbows

4.7.1 Elbows for use with rigid PVC conduit shall be formed from lengths of straight conduit that are of any convenient length (see [4.7.2](#)) but otherwise comply with the requirements in this standard. The axial length of a finished elbow shall not exceed 10 feet (3.05 m). Each finished elbow shall not have any kinks or creases. A coupling need not be attached to an elbow if it is shipped from the factory.

4.7.2 If the lengths of rigid PVC conduit from which elbows are formed are longer or shorter than 10 feet (3.05 m), and are shipped to another of the conduit manufacturer's factories or to a second manufacturer, each length or bundle of lengths shall be tagged or otherwise marked to indicate that the conduit is intended for further processing.

4.7.3 Examples of elbows are illustrated in [Figure 4.1](#). No bend other than at the end curve of a gooseneck shall be sharper than 90 ±2 degrees. No end curve shall be sharper than 135 degrees. No elbow shall be shallower than 11.25 degrees. The length Ls of the straight portions at the ends of an elbow

and the radius R of an elbow shall not be smaller than indicated in [Table 4.10](#) for each size of rigid PVC conduit. The straight end portions of elbows shall comply with the dimensions specified in [Table 4.10](#).

Figure 4.1

Elbows

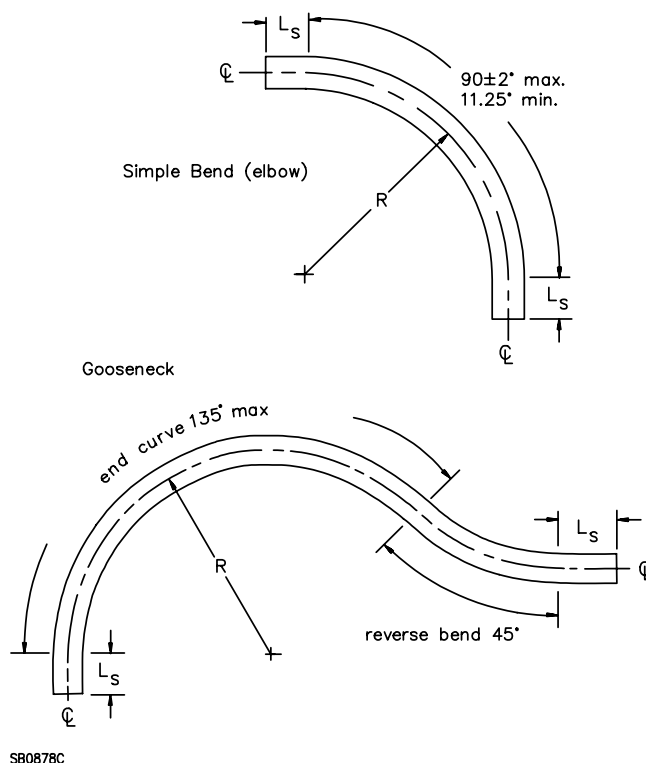


Table 4.10
Minimum dimensions of elbows

Trade size of conduit in inches	(metric designator)	Radius R of bend to center line of conduit,		Length L_s of straight end portion,	
		inches	(mm)	inches	(mm)
1/2	(16)	4	(100)	1-1/2	(38)
3/4	(21)	4-1/2	(114)	1-1/2	(38)
1	(27)	5-3/4	(146)	1-7/8	(48)
1-1/4	(35)	7-1/4	(184)	2	(50)
1-1/2	(41)	8-1/4	(210)	2	(50)
2	(53)	9-1/2	(241)	2	(50)
2-1/2	(63)	10-1/2	(267)	3	(76)
3	(78)	13	(330)	3-1/8	(79)
3-1/2	(91)	15	(380)	3-1/4	(83)
4	(103)	16	(400)	3-3/8	(86)
5	(129)	24	(600)	3-5/8	(92)
6	(155)	30	(760)	3-3/4	(95)

5 Rigid PVC Conduit Fittings

5.1 General

5.1.1 A rigid PVC conduit fitting shall be constructed of an unplasticized polyvinyl chloride material, with or without components made of other materials, that has been determined to be acceptable for the application.

5.1.2 The inner and outer surfaces of a fitting shall not be subject to peeling, scaling, or flaking and shall be smooth and free from blisters, cracks, and other defects. The fitting shall have a smooth rounded inlet hole to afford protection to the conductors. In the case of a molded product, excess flashing shall be removed from the mold line of all interior surfaces so that there are no sharp edges or obstructions to the passage of wiring or mating of parts in the intended use of the product.

5.1.3 A fitting shall be constructed so that it can be secured to polyvinyl chloride (PVC) conduit without damage to the fitting or conduit.

5.1.4 To preclude snags and restrictions in a finished rigid PVC conduit system, the socket and threaded surfaces of an internally or externally threaded polyvinyl chloride (PVC) adapter or a coupling shall have a circular cross section. The socket shall be tapered. The socket shall be provided, other than noted in [5.1.5](#) with an end or centering stop:

- a) On which there are no burrs or sharp edges to damage wires being pulled over the stop; and
- b) That limits the depth of penetration of rigid PVC conduit and, in the case of an internally threaded adapter, also limits the depth of penetration of threaded rigid metal conduit.

5.1.5 A centering stop is not required in a coupling that is intended for attachment to rigid PVC conduit only at the conduit factory. If a factory-applied coupling is provided with a centering stop:

- a) The minimum throat diameter shall comply with the last two columns of [Table 5.1](#);
- b) The stop need not extend entirely around the circumference of the coupling; and
- c) The stop shall not project into the conduit for which the coupling is intended; for example, the minimum acceptable throat diameter is the maximum acceptable inside diameter of the thin- or heavywall conduit for which the coupling is intended.

Table 5.1
Throat diameters at any point in fittings other than adapters

Trade size of conduit	(metric designator)	Minimum throat diameter, in (mm)					
		Field-attached couplings and fittings other than adapters ^a		Factory-applied couplings with stops			
				For use with heavy-wall conduit		For use with thin-wall conduit	
1/2	(16)	0.630	(16.00)	0.630	(16.00)	0.728	(18.49)
3/4	(21)	0.834	(21.18)	0.834	(21.18)	0.840	(21.34)
1	(27)	1.059	(26.90)	1.059	(26.90)	1.205	(30.61)
1-1/4	(35)	1.392	(35.36)	1.392	(35.36)	1.532	(38.91)
1-1/2	(41)	1.622	(41.20)	1.622	(41.20)	1.752	(44.50)
2	(53)	2.079	(52.81)	2.079	(52.81)	2.187	(55.55)

Table 5.1 Continued on Next Page

Table 5.1 Continued

Trade size of conduit	(metric designator)	Minimum throat diameter, in (mm)					
		Field-attached couplings and fittings other than adapters ^a		Factory-applied couplings with stops			
				For use with heavy-wall conduit		For use with thin-wall conduit	
2-1/2	(63)	2.484	(63.09)	2.484	(63.09)	2.670	(67.82)
3	(78)	3.083	(78.31)	3.083	(78.31)	3.365	(85.47)
3-1/2	(91)	3.598	(91.39)	3.598	(91.39)	3.760	(95.50)
4	(103)	4.076	(103.53)	4.076	(103.53)	4.250	(107.95)
5	(129)	5.097	(129.46)	5.097	(129.46)	—	—
6	(155)	6.115	(155.32)	6.115	(155.32)	—	—
^a For reducers, the throat for the smaller of the two sizes of conduit applies.							
^b It is not prohibited that the minimum average throat diameters of fittings described in 5.4 comply with Table 4.3 .							

5.1.6 The walls of a polyvinyl chloride (PVC) conduit fitting shall be at least as thick as specified in [Table 5.2](#). The dimensions of a PVC externally threaded adapter with tapered threads shall be as specified in [Table 5.3](#).

Table 5.2
Dimensions of fittings and conduit connections

Trade size of conduit (metric designator)	Socket diameter, in (mm)						Minimum socket depth, in (mm)	Minimum thickness, in (mm)	
	At entrance			At bottom					Over male or female threads ^a
	Max	Min	Avg	Max	Min	Avg			
1/2 (16)	0.860 (21.84)	0.844 (21.44)	0.852±0.004 (21.64±0.10)	0.844 (21.44)	0.828 (21.03)	0.836±0.004 (21.23±0.10)	0.652 (16.56)	0.109 (2.77)	0.095 (2.41)
3/4 (21)	1.074 (27.28)	1.054 (26.77)	1.064±0.004 (27.03±0.10)	1.056 (26.82)	1.036 (26.31)	1.046±0.004 (26.57±0.10)	0.719 (18.26)	0.113 (2.87)	0.095 (2.41)
1 (27)	1.340 (34.04)	1.320 (33.53)	1.330±0.005 (33.78±0.13)	1.320 (33.53)	1.300 (33.02)	1.310±0.005 (33.27±0.13)	0.875 (22.23)	0.133 (3.38)	0.100 (2.54)
1-1/4 (35)	1.689 (42.90)	1.665 (42.29)	1.677±0.005 (42.60±0.13)	1.667 (42.34)	1.643 (41.73)	1.655±0.005 (42.04±0.13)	0.938 (23.83)	0.140 (3.56)	0.120 (3.05)
1-1/2 (41)	1.930 (49.02)	1.906 (48.41)	1.918±0.006 (48.72±0.15)	1.906 (48.41)	1.882 (47.80)	1.894±0.006 (48.11±0.15)	1.062 (26.97)	0.145 (3.68)	0.120 (3.05)
2 (53)	2.405 (61.09)	2.381 (60.48)	2.393±0.006 (60.78±0.15)	2.381 (60.48)	2.357 (59.87)	2.369±0.006 (60.17±0.15)	1.125 (28.58)	0.154 (3.91)	0.130 (3.30)
2-1/2 (63)	2.905 (73.79)	2.875 (73.03)	2.890±0.007 (73.41±0.18)	2.883 (73.23)	2.853 (72.47)	2.868±0.007 (72.85±0.18)	1.469 (37.31)	0.203 (5.16)	0.165 (4.19)
3 (78)	3.530 (89.66)	3.500 (88.90)	3.515±0.008 (89.28±0.20)	3.507 (89.08)	3.477 (88.32)	3.492±0.008 (88.70±0.20)	1.594 (40.49)	0.216 (5.49)	0.216 (5.49)
3-1/2 (91)	4.065 (103.25)	3.965 (100.71)	4.015±0.008 (101.98±0.20)	4.007 (101.78)	3.977 (101.02)	3.992±0.008 (101.40±0.20)	1.687 (42.85)	0.226 (5.74)	0.226 (5.74)
4	4.565	4.465	4.515±0.009	4.506	4.476	4.491±0.009	1.750	0.237	0.237

Table 5.2 Continued on Next Page

Table 5.2 Continued

Trade size of conduit (metric designator)	Socket diameter, in (mm)						Minimum socket depth, in (mm)	Minimum thickness, in (mm)	
	At entrance			At bottom				Over male or female threads ^a	Wall of unthreaded portion
	Max	Min	Avg	Max	Min	Avg			
(103)	(115.95)	(113.41)	(114.68±0.23)	(114.45)	(113.69)	(114.07±0.23)	(44.45)	(6.02)	(6.02)
5	5.643	5.543	5.593±0.010	5.583	5.523	5.553± 0.010	1.937	0.258	0.258
(129)	(143.33)	(140.79)	(142.06±0.25)	(141.81)	(140.28)	(141.05±0.25)	(49.20)	(6.55)	(6.55)
6	6.708	6.608	6.685±0.011	6.644	6.584	6.614±0.011	2.125	0.280	0.280
(155)	(170.38)	(167.84)	(169.11±0.28)	(168.76)	(167.23)	(168.00±0.28)	(53.98)	(7.11)	(7.11)

^a The thickness is to be measured at the end of the fitting from the crest of the thread through the material to the smooth wall surface.

Table 5.3
Dimensions of polyvinyl chloride externally threaded adapters with tapered threads

Trade size of conduit (metric designator)	Minimum wall thickness over tapered threads,		Effective thread length for five full, perfect threads,	
	in	(mm) ^a	in	(mm) ^b
1/2 (16)	0.097	(2.46)	0.357	(9.07)
3/4 (21)	0.102	(2.59)	0.357	(9.07)
1 (27)	0.119	(3.02)	0.435	(11.05)
1-1/4 (35)	0.126	(3.20)	0.435	(11.05)
1-1/2 (41)	0.131	(3.33)	0.435	(11.05)
2 (53)	0.140	(3.56)	0.435	(11.05)
2-1/2 (63)	0.183	(4.65)	0.625	(15.88)
3 (78)	0.197	(5.00)	0.625	(15.88)
3-1/2 (91)	0.207	(5.26)	0.625	(15.88)
4 (103)	0.217	(5.51)	0.625	(15.88)
5 (129)	0.239	(6.07)	0.625	(15.88)
6 (155)	0.261	(6.63)	0.625	(15.88)

^a The thickness is to be measured at the end of the fitting from the crest of the tread through the material to the inner wall surface

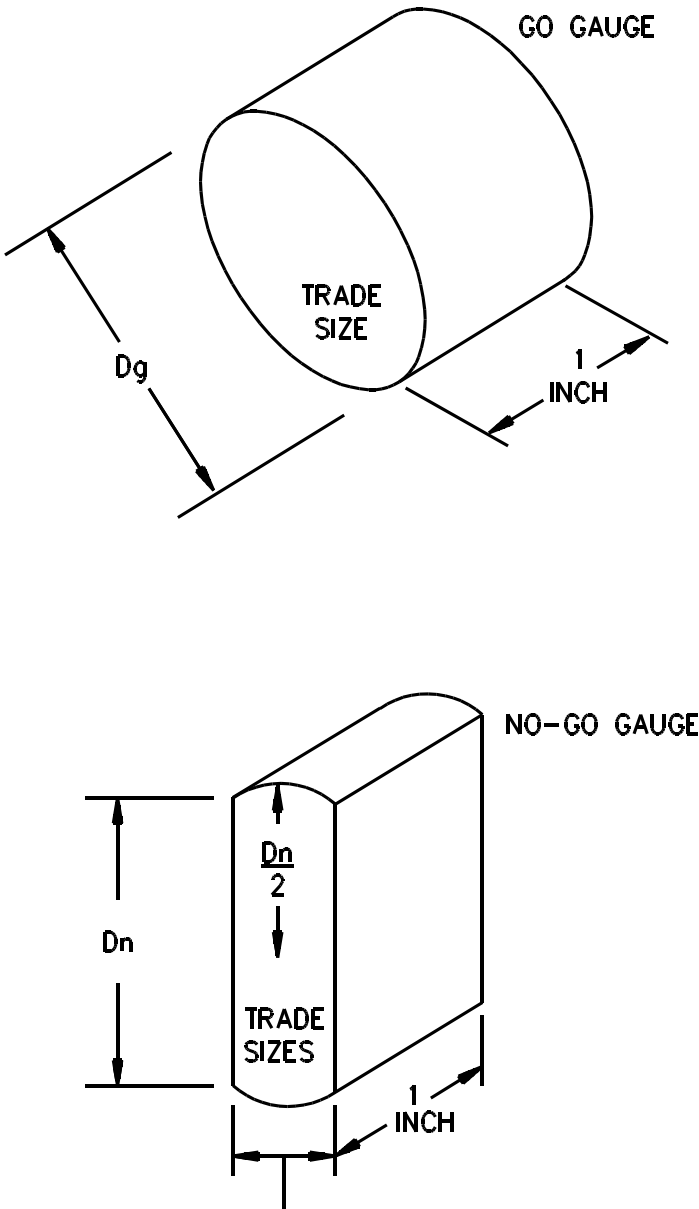
^b See [5.5.3](#).

5.1.7 The socket depth and diameters of a conduit fitting shall be within the limits specified in [Table 5.2](#) and shall permit assembly to polyvinyl chloride (PVC) conduit in a manner that provides acceptable strength for both the joint and the assembly. Sockets complying with the minimum dimensions specified in [Table 5.2](#) are considered to permit assembly to polyvinyl chloride (PVC) conduit in a manner that provides acceptable strength for both the joint and the assembly. Sockets that have dimensions less than the minimum dimensions specified in [Table 5.2](#) shall to be evaluated by the bending and pull tests in Bending Test, [7.2.8](#), and Pull Test, [7.2.9](#) to demonstrate their ability to permit assembly to polyvinyl chloride (PVC) conduit in a manner that provides acceptable strength for both the joint and the assembly.

Exception: A socket depth greater than the maximum specified in [Table 5.2](#) is acceptable if the fitting is marked in accordance with [9.2.3](#).

5.1.8 The throat diameter of a coupling and a fitting other than an internally and externally threaded adapter shall not be less than specified in [Table 5.1](#) as determined either by application of the limit gauges illustrated in [Figure 5.1](#) or by measurement as described in [5.1.10](#) and [5.1.11](#). The dimensions of the gauges are given in [Table 5.4](#) and [Table 5.5](#).

Figure 5.1
Hardened tool steel limit gauges for throats of fittings



$\frac{1}{4}$ INCH FOR THE $\frac{1}{2}$ -2 TRADE SIZES
 $\frac{1}{2}$ INCH FOR THE $2\frac{1}{2}$ -6 TRADE SIZES
SB0911A

Note – SI values for the dimensions in this figure are:

Inch	(mm)
1/4	(6.4)
1/2	(12.7)
1	(25.4)

Table 5.4
Dimensions of limit gauges for throats of fittings

Trade size of conduit	(metric designator)	For internally and externally threaded adapters				Diameter (Dg) of go gauge for factory- attached couplings that have stops and are for use with thin- wall PVC conduit,	Diameter (Dg) of go gauge for all field- attached couplings and for factory- attached couplings that have stops and are for use with heavy- wall PVC conduit and for fittings other than adapters,		
		Diameter (Dg) of go gauge,		Diameter (Dn) of no-go gauge,			in	(mm) ^a	
		in	(mm) ^a	in	(mm) ^a				
1/2	(16)	0.5900	(14.986)	0.6230	(15.824)	0.7270	(18.466)	0.6290	(15.977)
3/4	(21)	0.7820	(19.863)	0.8250	(20.955)	0.8390	(21.311)	0.8330	(21.158)
1	(27)	0.9960	(25.298)	1.0500	(26.670)	1.2040	(30.582)	1.0580	(26.873)
1-1/4	(35)	1.3100	(33.274)	1.3810	(35.077)	1.5310	(38.887)	1.3910	(35.331)
1-1/2	(41)	1.5280	(38.811)	1.6110	(40.919)	1.7510	(44.475)	1.6210	(41.173)
2	(53)	1.9630	(49.860)	2.0680	(52.527)	2.2860	(58.064)	2.0780	(52.781)
2-1/2	(63)	2.3450	(59.593)	2.4700	(62.738)	2.6690	(67.793)	2.4830	(63.068)
3	(78)	2.9140	(74.016)	3.0690	(77.953)	3.3640	(85.446)	3.0820	(78.283)
3-1/2	(91)	3.3700	(85.598)	3.5490	(90.145)	3.7590	(95.479)	3.5970	(91.364)
4	(103)	3.8240	(97.130)	4.0270	(102.286)	4.2490	(107.925)	4.0750	(103.505)
5	(129)	4.7940	(121.768)	5.0480	(128.219)	5.0960	(129.438)	5.0960	(129.438)
6	(155)	5.7610	(146.329)	6.0660	(154.076)	6.1140	(155.296)	6.1140	(155.296)

^a A tolerance of ± 0.0005 inch (0.013 mm) applies.

Table 5.5
Diameters of limit gauges for throats of bushings

Trade size of conduit	(metric designator)	Diameter (Dg) of go gauge,		Diameter (Dn) of no-go gauge,	
		in ^a	(mm)	in ^a	(mm)
3/8	(12)	0.4430	(11.252)	0.4940	(12.548)
1/2	(16)	0.5590	(14.199)	0.6230	(15.824)
3/4	(21)	0.7410	(18.821)	0.8250	(20.955)
1	(27)	0.9430	(23.952)	1.0500	(26.670)
1-1/4	(35)	1.2410	(31.521)	1.3810	(35.077)
1-1/2	(41)	1.4480	(36.779)	1.6110	(40.919)
2	(53)	1.8590	(47.219)	2.0680	(52.527)
2-1/2	(63)	2.2210	(56.413)	2.4700	(62.738)
3	(78)	2.7600	(70.104)	3.0690	(77.953)
3-1/2	(91)	3.1920	(81.077)	3.5490	(90.145)
4	(103)	3.6220	(91.999)	4.0270	(102.286)
5	(129)	4.5410	(115.341)	5.0480	(128.219)
6	(155)	5.4570	(138.608)	6.0660	(154.076)

^a A tolerance of ± 0.0005 inch (0.013 mm) applies.