

## Schedule 40 PVC Conduit and Fittings



### 1. Scope

This standard covers the requirements for Schedule 40 extruded rigid polyvinyl chloride (PVC) conduit and fittings consisting of elbows, couplings, and adapters.

### 2. Application

Schedule 40 PVC conduit and fittings are used to construct smooth raceways for the pulling in of cable installed in a variety of Looped Radial and Network system applications:

- Service
- Secondary
- Primary
- Communication
- Control

See SCL 0222.02.

Five-inch (IPS) size conduit may have both straight ends or a standard bell end and straight end.

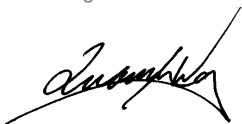
Elbows are also known as bends. Large-radius elbows are also known as sweeps.

The straight-cut end of a section of conduit or elbow is also known as the spigot end.

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### 3. Industry Standards

Schedule 40 PVC conduit and fittings shall meet the applicable requirements of the latest revision of the following industry standard:

**UL 651** - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings, 7th Edition, dated October 4, 2005

The following clarifications apply:

- Five-inch (IPS) size shall meet the requirements for specific applications, Section 4.5 (straight cut, without couplings or adapters).
- All other (IPS) sizes shall meet the requirements for general use, Section 4.6 (one bell end).

### 4. Detailed Requirements

#### 4.1 General

Conduit and fittings shall be suitable for above ground use indoors or outdoors exposed to sunlight and weather, and for underground use by direct burial or encasement in concrete.

Conduit and fitting dimensions shall conform to UL 651 and the Iron Pipe Standard (IPS), where dimensions are based on outside diameters of iron pipe sizes.

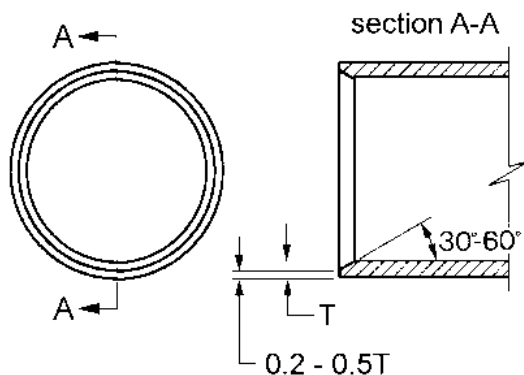
Conduit and fitting color shall be medium to dark gray.

Conduit and fittings shall not have any features that can abrade or otherwise damage cable.

All straight-cut ends from conduit, reducers, and elbows with a diameter of 2 in (IPS) and larger shall be chamfered according to Figure 4.1.

Conduit, elbows, and fittings shall be designed and manufactured to be a system intended to guarantee complete interchangeability and compatibility between components.

**Figure 4.1. Chamfer Detail**



## 4.2 Conduit

Conduit shall be certified by Underwriters Laboratories (UL) or one of the following NRTLs (Nationally Recognized Testing Laboratories) as meeting the minimum requirements of Standard UL 651:

- CSA (Canadian Standards Association)
- ETL
- NSF International

Manufacturer shall inform SCL in writing of all design changes that could affect the product's understood or published capabilities or attributes.

Dimensional information cited in Sections 4.2, 4.3, and 4.4 should be consistent with UL requirements and is provided for the convenience of SCL design engineers, construction crews, inspectors, and quality assurance personnel who do not have ready access to UL 651.

Conduit shall meet the performance requirements as described in Table 4.2a.

**Table 4.2a. Conduit Performance Requirements**

<b>Description</b>	<b>UL 651 Section</b>
Tensile strength	7
Deflection under heat and load	8
Extrusion process	9
Low-temperature handling	10
Water absorption	11
Resistance to crushing	12
Resistance to impact	13
Flame	14
Conduit for use with 90 degree C wire	17
Resistance to specific reagents	18
Sunlight resistance	19
Pipe stiffness	20
Pull-joint separation	21
Bending and pull-joint separation	22
Joint water tightness	23
Elastomeric materials accelerated aging	24
Permanency of printing	25

**Table 4.2b. Conduit Dimensions, Straight (str)**

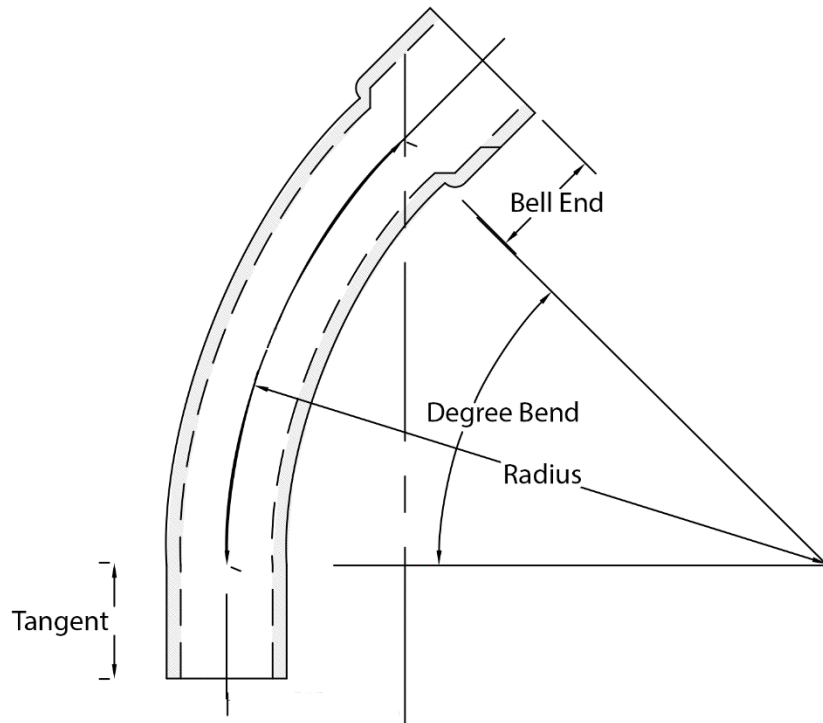
Stock No.	Trade Size, IPS (in)	End #1	End #2	Outside Diameter, Min (in)	Outside Diameter, Average, (in)	Outside Diameter, Max (in)	Inside Diameter, Min, Average (in)	Wall Thickness, Min (in)	Weight, Nominal, (lb / ft)
734525	1/2	Bell	Str cut	0.832	0.840	0.848	0.578	0.109	0.16
734526	3/4	"	"	1.040	1.050	1.060	0.780	0.113	0.22
734527	1	"	"	1.305	1.315	1.325	1.004	0.133	0.32
734528	1-1/4	"	"	1.648	1.660	1.672	1.335	0.140	0.43
734529	1-1/2	"	"	1.888	1.900	1.912	1.564	0.145	0.52
734530	2	"	"	2.363	2.375	2.387	2.021	0.154	0.70
734531	2-1/2	"	"	2.860	2.875	2.890	2.414	0.203	1.11
734532	3	"	"	3.485	3.500	3.515	3.008	0.216	1.45
734533	3-1/2	"	"	3.950	4.000	4.050	3.486	0.226	1.74
734523	4	"	"	4.450	4.500	4.550	3.961	0.237	2.10
734524	5	Str cut	"	5.513	5.563	5.613	4.975	0.258	2.80
"	5	Bell	Str cut	5.513	5.563	5.613	4.975	0.258	2.80



**4.3 Elbows**

Elbows shall have attributes as shown in Figure 4.3, Tables 4.3a and Table 4.3b.

**Figure 4.3. Elbow Attributes**



**Table 4.3a. Elbow Dimensions, 90 and 45 Degree**

Stock No.	Trade Size, IPS (in)	Degree Bend	End #1	End #2	Radius (in)	Tangent (in)
734551	1/2	90	Bell	Str. cut	4	1-1/2
734671	3/4	90	"	"	4-1/2	1-1/2
734550	1	90	"	"	5-3/4	1-7/8
734546	1-1/4	90	"	"	7-1/4	2
734547	1-1/2	90	"	"	8-1/4	2
734548	2	90	"	"	24	2
734549	2-1/2	90	"	"	24	3-1/8
014572	3	90	"	"	24	3-1/8
014573	4	90	"	"	24	3-3/8
734553	1-1/4	45	"	"	7-1/4	2
734554	1-1/2	45	"	"	8-1/4	2
734555	2	45	"	"	18	2
014574	3	45	"	"	24	3-1/8
014575	4	45	"	"	24	3-3/8
734557	3	45	"	"	36	3-1/8
734559	4	45	"	"	36	3-3/8



90-degree elbow



45-degree elbow

**Table 4.3b. Elbow Dimensions, 22-1/2 and 5 Degree**

Stock No.	Trade Size, IPS (in)	Degree Bend	End #1	End #2	Radius (in)	Tangent (in)
734561	2	22-1/2	Bell	Str. cut	18	3
734562	2-1/2	22-1/2	"	"	18	3
734563	3	22-1/2	"	"	24	3-1/4
734566	4	22-1/2	"	"	24	3-3/8



22-1/2 degree elbow

#### 4.4 Fittings

Female adapters shall have straight threads. Coupling fittings, 2 inch (IPS) and larger, shall be of molded manufacture, not expanded.

**Table 4.4a. Fittings, Female (F), Male (M), and Slip (S)**

Stock No.	Trade Size, IPS (in)	Description	Ends
734508	1/2	Female adapter	S x F
734540	3/4	"	"
734541	1	"	"
734542	1-1/4	"	"
734543	1-1/2	"	"
734544	2	"	"
734545	2-1/2	"	"
734537	3	"	"
734539	4	"	"
734536	5	"	"
734920	1/2	Male adapter	S x M
734914	3/4	"	"
734918	1	"	"
734924	1-1/4	"	"
734925	1-1/2	"	"
734926	2	"	"
734921	3	"	"
734923	4	"	"



female adapter



male adapter

Coupling fittings, 2 inches (IPS) and larger, shall be of molded manufacture, not expanded.

**Table 4.4b. Fittings, Straight Couplings, Slip (S)**

Stock No.	Trade Size, IPS (in)	Description	Ends
734512	1/2	Straight coupling	S x S
734513	3/4	"	"
734514	1	"	"
734515	1-1/4	"	"
734516	1-1/2	"	"
734517	2	"	"
734518	2-1/2	"	"
734519	3	"	"
734521	4	"	"
734522	5	"	"



straight coupling

**Table 4.4c. Fitting, Swedge Reducer**

Stock No.	End #1 Trade Size, IPS (in)	End #2 Trade Size, IPS (in)	Description	End #1	End #2
734470	3	2-1/2	Reducer	Chamfered Str. Cut	Chamfered Str. Cut
012503	4	3-1/2	Reducer	Chamfered Str. Cut	Chamfered Str. Cut



Long sleeve repair couplings shall have no center stop.

Long sleeve repair couplings shall have a minimum length of 10 in.

**Table 4.4d. Fittings, Long Sleeve Couplings without Center Stop, Slip (S)**

Stock No.	Trade Size, IPS (in)	Description	Ends
013705	2	Long sleeve coupling	S x S
013706	3	"	"
013707	4	"	"
013708	5	"	"

Long sleeve swedged couplings shall have a minimum length of 8.25 in.

Long sleeve swedged couplings shall have minimum bell depth of 3.25 in at each end.

**Table 4.4e. Fittings, Long Sleeve Couplings, Swedged, Slip (S)**

Stock No.	Trade Size, IPS (in)	Description	Ends
014576	4	Long sleeve swedged coupling	S x S
014577	5	Long sleeve swedged coupling	"



**Table 4.4f. Reducer Bushing (Slip)**

Stock No.	Trade Size, IPS (in)	Description	Ends
734480	3/4 to 1/2	Reducing bushing	S x S



Reducer bushings shall fit into the bell end of the conduit.

## 5. Marking

Each conduit section shall be marked according to the requirements of UL 651, Section 25.

The outer surface of each conduit section shall be marked with the following minimum information:

- Trade size
- Schedule number or equivalent information
- Manufacturer's name or symbol
- Date (or period) of manufacture
- UL or NRTL mark

Each fitting shall be marked according to the requirements of UL 651, Section 46.

The outer surface of each fitting shall be marked with the following minimum information:

- Manufacturer name or symbol
  - Catalog number
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## 6. Testing

Conduit and fitting test data that establishes compliance with the requirements of UL 651 and this material standard shall be provided upon request.

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## 7. Packaging

Fittings shall be packaged to prevent damage during shipping, handling, and storage.

Straight conduit shall be furnished in 10-ft sections unless specified otherwise on the purchase order.

Master bundles shall be secured with at least two bands of steel or UV-resistant plastic strapping.

Each master bundle of straight conduit shall be legibly marked with the following information:

- Manufacturer identification
  - Product description
  - Seattle City Light purchase order number
  - Seattle City Light stock number
  - Gross, net, and tare weight
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## 8. Shipping

Conduit may be delivered on enclosed, covered, or flatbed trucks. If conduit is delivered on a flatbed truck, conduit shall be side-loaded.

Because Washington State law requires a 10-in minimum side board when driving a forklift or pallet jack onto the bed of a truck or trailer, most flatbed trucks or trailers must be side-loaded to ease off-loading.

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## 9. Issuance

Conduit: FT

Elbows: EA

All other fittings: EA



## 10. Approved Manufacturers

### 10.1 Products Approved for Purchase by SCL

#### Conduit Straight Sections

- Cantex (Mitsubishi Corp.)
- Cresline NW
- Heritage Plastics Inc. (Atkore Int'l)
- IPEX
- JM Eagle
- Prime Conduit (Mitsubishi Corp.)
- Ridgeline Pipe Mfg. (Atkore Int'l)
- NAPCO (formerly Royal Pipe and Fittings)

#### Elbows

- Cantex (Mitsubishi Corp.)
- Heritage Plastics Inc. (Atkore Int'l)
- Scepter (IPEX)
- JM Eagle
- Kraloy (IPEX)
- Raceways Technology & Mfg.
- Ridgeline Pipe Mfg. (Atkore Int'l)
- Carlon (ABB)
- NAPCO (formerly Royal Pipe Systems)

#### All Other Fittings

- Cantex (Mitsubishi Corp.)
- Heritage Plastics Inc. (Atkore Int'l)
- Scepter (IPEX)
- JM Eagle
- Kraloy (IPEX)
- Ridgeline Pipe Mfg. (Atkore Int'l)
- Carlon (ABB)
- NAPCO (formerly Royal Pipe Systems)

### 10.2 Products Approved for Purchase and Installation by SCL Contractors

SCL contractors may purchase and install cellular core PVC conduit straight sections from Rocky Mountain Colby Company.

SCL contractors may purchase and install solid PVC conduits, elbows, and fittings from the approved manufacturers cited in section 10.1.

SCL contractors may purchase and install 5-in conduit with belled end and spigot end from approved manufacturers cited in Section 10.1, "Conduit Straight Sections."

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## 11. References

**SCL Construction Standard 0222.02**; "Requirements for Duct Banks in the Public Right-of-Way"

**SCL Material Standard 7345.2**; "Conduit and Fittings, EPC 40 and EPC 80 Rigid Polyvinyl Chloride" (canceled)

## 12. Sources

**ASTM F 512**; “Standard Specification for Smooth-Wall Poly Vinyl Chloride (PVC) Conduit and Fittings for Underground Installation”

**ASTM F891**; “Standard Specification for Coextruded Poly Vinyl Chloride (PVC) Plastic Pipe With a Cellular Core”

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