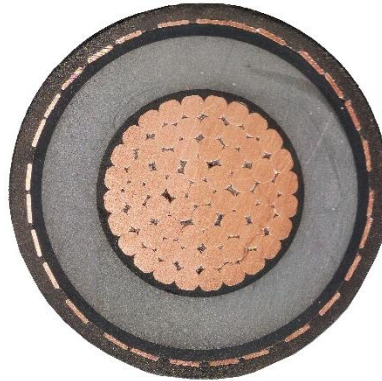


Properties of Medium Voltage Cables



1. Scope

This standard lists basic physical properties for the variety of medium-voltage cables in use on the Seattle City Light (SCL) Looped Radial and Network systems.

Paper-insulated-lead-covered (PILC) cable, 600 V cable, weatherproof cable, control cable, and bare conductor are outside the scope of this standard.

2. Application

Cable properties are as described in tables 5a and 5b.

This work practice is intended to be used by SCL engineers, warehouse personnel, installation crews, suppliers, consultants, and contractors to more easily identify the wide variety of cable in use at Seattle City Light and to improve access to useful cable attributes.

3. Discussion

Application information and graphics may be found in the SCL Stock Catalog.

In addition to information provided in the tables, the following attributes may be found in SCL 6015.00 or the pertinent detailed material standard:

- Governing industry standards
- Normal, emergency overload, and short circuit operating temperatures
- Metallic shield dimensional properties
- Conductor diameter, minimum
- Conductor diameter, maximum
- Conductor, number of strands
- Conductor shield thickness, minimum point
- Insulation thickness, minimum point

- Insulation thickness, maximum point
- Basic impulse level (BIL)
- Insulation level
- Extruded insulation shield thickness, minimum point
- Extruded insulation shield thickness, maximum point
- Metallic shield cross-sectional area, minimum
- Jacket thickness, minimum point
- Jacket thickness, maximum point
- Special identification, if any
- Packaging information
- Approved suppliers

Because medium voltage cable is a constantly evolving product, it is not practical to summarize all characteristics with 100 percent accuracy. For more accurate information, refer to the vintage of requirements used to purchase the product.

Cited material standards may be current and up-to-date or canceled. In some cases, data is provided for historical purposes only.

A stock number does not imply a material item is in stock. Refer to Material Control for product availability.

Maximum sidewall pressure values were provided by General Cable, 2003. General Cable comments: When dealing with sidewall pressure, the calculated tension on the cable assembly at the exit of a bend cannot exceed the Maximum Pulling Tension limit of the cable.

See Section 4 for list of abbreviations used in tables.

4. Abbreviations and Terminology

The following terms are used in the tables in Section 5.

Abbreviation	Description
1/C	Single conductor with metallic shield
1/C+N	Phase conductor with neutral, also known as a two-conductor cable
3/C	Three conductors under a single jacket
3/C+1G	Three conductors and one bare ground conductor under one jacket
3/C+3G	Three conductors and three (bare) ground conductors under one jacket
3-1/C	Three single conductors twisted, also known as triplex
3-1/C+2N	Three single conductors and two (bare) neutral conductors, twisted
DW	Drain wire metallic shield
EPR ^a	Ethylene propylene rubber
FS	Flat strap metallic shield
LLDPE	Linear low density polyethylene
n/a	Not applicable or not available
PP	Polypropylene
PVC	Polyvinyl chloride
RW/CN	Round wire concentric neutral
TRXLPE	Tree retardant, crosslinked polyethylene

^a In 2016, SCL determined ethylene alkene copolymer (EAM) to be equal to EPR insulation. Any EPR-insulated cable purchased after 2016 could be insulated with either EPR or EAM.

5. Cable Data Tables**Table 5a. Cable Data Sorted by Stock No. (two-page spread)**

Stock No.	Cable Assembly		Conductor				Diameter, Nominal (in)	Insulation		
	Rated Circuit Voltage (kV)	Construction	Size (AWG/ kcmil)	Alloy	Temper	Shape		Type	Thickness, nominal (mil)	Minimum Diameter, Over (in)
1	2	3	4	5	6	7	8	9	10	11
010128	15	3/C	500	Cu	Soft	Compact	0.736	EPR	175	1.13
012098	28	1/C+1N	1/0	Al-1350	1/2 hard	Solid	0.325	TRXLP	280	0.88
012099	28	1/C	350	Al-1350	3/4 hard	Compact	0.616	TRXLP	280	1.22
012100	28	1/C	500	Cu	Soft	Compact	0.736	TRXLP	280	1.34
012101	28	1/C	750	Cu	Soft	Compact	0.908	TRXLP	280	1.52
012102	28	1/C	1000	Cu	Soft	Compact	1.060	TRXLP	280	1.67
012735	15	3-1/C	500	Cu	Soft	Compressed	0.789	EPR	175	1.16
013306	15	3/C+1G	4/0	Cu	Soft	Compact	0.475	EPR	220	n/a
601025	5	1/C	500	Al	n/a	Class B	0.813	XLPE	90	n/a
602025	28	1/C+1N	1/0	Al-1350	1/2 hard	Solid	0.325	TRXLP	280	0.88
602027	28	1/C	#1	Al	3/4 hard	Class B	0.332	XLPE	275	0.88
602044	28	1/C	350	Al	3/4 hard	Class B	0.681	XLPE	275	1.23
602119	28	1/C	750	Al	n/a	Compact	0.908	XLPE	275	1.49
613212	5	1/C	#6	Cu	Soft	Compressed	0.178	TRXLP	90	0.37
613222	5	1/C	350	Cu	Soft	Compressed	0.661	TRXLP	90	0.88
613520	15	3/C	2/0	Cu	Soft	Compressed	0.405	XLPE	175	0.76
613521	15	3/C	3/0	Cu	Soft	Compressed	0.456	TRXLP	175	0.84
613522	15	3/C	#1	Cu	Soft	Compressed	0.322	TRXLP	175	0.70
613523	15	3/C	#1	Cu	Soft	Compressed	0.322	TRXLP	175	0.70
613526	15	3/C	3/0	Cu	Soft	Compressed	0.456	TRXLP	175	0.84
613530	15	3/C	350	Cu	Soft	Compact	0.616	TRXLP	175	1.03
613531	15	3/C	500	Cu	Soft	Sector	n/a	XLPE	n/a	n/a
613532	15	3/C	500	Cu	Soft	Compact	0.736	XLPE	n/a	1.14
613533	15	3/C	750	Cu	Soft	Sector	n/a	XLPE	n/a	n/a
613534	15	3/C	750	Cu	Soft	Compact	0.908	XLPE	n/a	1.29
613540	28	3/C+3G	#1	Cu	Soft	Compressed	0.322	TRXLP	280	0.91
613543	28	3/C+3G	350	Cu	Soft	Compact	0.616	TRXLP	280	1.23
613613	28	1/C	350	Al	n/a	Compact	0.616	XLPE	n/a	1.23
613615	28	1/C	500	Cu	Soft	Compact	0.736	XLPE	n/a	1.35
613618	28	1/C	750	Cu	Soft	Compact	0.908	XLPE	275	1.49
613619	28	1/C	1000	Cu	Soft	Compact	1.060	XLPE	n/a	1.68
613645	28	1/C	500	Cu	Soft	Compressed	0.789	TRXLP	280	1.40
613655	28	1/C	1000	Cu	Soft	Compressed	1.117	TRXLP	280	1.74
623640	15	1/C	500	Cu	Soft	Compact	0.736	EPR	220	tbd
623650	27	3-1/C+2N	#8	Cu	Soft	Compressed	0.142	EPR	280	0.70
623655	35	1/C	1000	Cu	Soft	Compact	1.060	TRXLP	420	1.97
623660	35	1/C	750	Al	3/4 hard	Compact	0.908	XLPE	345	n/a
623670	15	3-1/C	1000	Cu	Soft	Compressed	1.117	EPR	175	1.52
974050	28	3/C	750	Cu	Soft	Sector	n/a	XLPE	280	n/a

Table 5a. Cable Data Sorted by Stock No. (two-page spread), continued

Insulation		Insulation Shield	Jacket	Cable Assembly							
Nom. Dia. Over (in)	Max. Dia. Over (in)	Type	Material	Typical Dia. Over (in)	Max. Dia. Over (in)	Weight per ft (lb)	Max. Sidewall Pressure, (lb/ft of Bend Radius)	Max. Pulling Tension (lb)	Typical Application	Mtl. Std. No.	▼ Stock No.
12	13	14	15	16	17	18	19	20	21	22	23
1.14	1.19	Tape	LLDPE	2.85	2.92	6.8	1,500	8,000	NET	6025.10	0120128
0.93	0.97	RW/CN	LLDPE	1.27	1.35	0.8	1,500	634	URD	6020.06	012098
1.25	1.28	FS	LLDPE	1.48	1.57	1.2	1,500	2,100	URD	6020.07	012099
1.37	1.40	FS	LLDPE	1.62	1.70	2.5	1,500	4,000	URD	6020.07	012100
1.55	1.58	FS	LLDPE	1.88	2.00	3.5	1,500	6,000	URD	6020.07	012101
1.70	1.73	FS	LLDPE	2.03	2.10	4.4	1,500	8,000	URD	6020.07	012102
1.19	1.21	FS	LLDPE	3.02	3.34	6.7	1,500	n/a	NET	6025.60	012735
0.96	n/a	Tape	PVC	2.97	n/a	8.4	n/a	n/a	NET	6025.02	013306
n/a	n/a	DW	PVC	n/a	1.15	1.4	1,000	3,000	URD	6010.2	601025
0.93	0.97	RW/CN	Bare	1.02	1.30	0.6	750	423	URD	6020.03	602025
0.93	0.98	RW/CN	Bare	n/a	n/a	n/a	750	502	URD	6020.2	602027
1.30	1.38	RW/CN	Bare	1.50	n/a	n/a	750	2,100	URD	6020.2	602044
1.55	1.59	DW	PVC	1.90	2.01	n/a	1,000	4,500	URD	6021.1	602119
0.42	0.45	Tape	LLDPE or PP	n/a	0.67	0.2	1,500	210	URD	6010.20	613212
0.91	0.94	Tape	LLDPE or PP	1.16	1.20	1.5	1,500	2,800	URD	6010.20	613222
n/a	0.84	Tape	Armored	n/a	n/a	n/a	n/a	n/a	NET	none	613520
0.85	0.90	Tape	Armored	n/a	2.55	6.8	n/a	n/a	NET	6020.02	613521
0.74	0.76	Tape	Armored	n/a	2.25	n/a	n/a	n/a	NET	6020.02	613522
0.74	0.76	Tape	LLDPE	2.10	2.25	2.1	1,500	1,339	NET	6020.01	613523
0.85	0.90	Tape	LLDPE	2.35	2.45	3.3	1,500	2,685	NET	6020.01	613526
1.03	1.05	Tape	LLDPE	2.61	2.85	5.4	1,500	5,600	NET	6020.01	613530
n/a	n/a	Tape	LLDPE	n/a	n/a	9.6	n/a	n/a	NET	6020.01	613531
1.15	1.15	Tape	LLDPE or PP	2.80	3.15	7.1	1,500	8,000	NET	6020.01	613532
n/a	n/a	Tape	LLDPE or PP	n/a	n/a	n/a	n/a	n/a	NET	6020.01	613533
1.34	1.39	Tape	LLDPE	3.44	3.65	10.2	1,500	12,000	NET	6020.01	613534
0.94	0.97	Tape	LLDPE	2.60	2.65	3.2	1,500	1,339	NET	6020.05	613540
1.25	1.28	Tape	LLDPE	3.33	3.45	6.7	1,500	5,600	NET	6020.05	613543
1.24	1.29	DW	PVC	1.55	1.75	1.2	1,000	2,100	URD	none	613613
1.37	1.41	DW	PVC	1.70	1.80	2.7	1,000	4,000	URD	6020.4	613615
1.55	1.59	DW	PVC	1.90	2.05	3.5	1,000	6,000	URD	6021.1	613618
1.71	1.74	DW	PVC	2.09	2.20	4.3	1,000	8,000	URD	none	613619
1.44	1.46	FS	LLDPE	1.75	1.95	2.6	1,500	4,000	URD	6020.14	613645
1.76	1.80	FS	LLDPE	2.15	2.40	4.6	1,500	8,000	URD	6020.14	613655
tbd	tbd	Tape	PVC	1.50	1.63	2.5	1,500	4,000	NET	6025.70	623640
0.77	0.79	Tape	PVC	n/a	n/a	1.6	n/a	n/a	NET	none	623650
1.99	2.03	Tape	LLDPE	2.43	2.45	4.7	1,500	8,000	special	6236.60	623655
1.66	n/a	DW	PVC	2.07	n/a	n/a	1,000	4,500	URD	6236.5	623660
1.54	1.58	FS	LLDPE	3.94	4.29	12.8	1,500	16,000	NET	6025.60	623670
n/a	n/a	Tape	n/a	n/a	3.65	n/a	n/a	n/a	NET	6020.0	974050

Table 5b. Cable Data Sorted by Voltage and Conductor Diameter (two-page spread)

Stock No.	Cable Assembly		Conductor				Insulation			
	1st ▼ Rated Circuit Voltage (kV)	Construction	Size (AWG/kcmil)	Alloy	Temper	Shape	2nd ▼ Diameter, Nominal (in)	Type	Thickness, Nominal (mil)	Diameter, Minimum Over (in)
1	2	3	4	5	6	7	8	9	10	11
613212	5	1/C	#6	Cu	Soft	Compressed	0.178	TRXLP	90	0.37
613222	5	1/C	350	Cu	Soft	Compressed	0.661	TRXLP	90	0.88
601025	5	1/C	500	Al	n/a	Class B	0.813	XLPE	90	n/a
613522	15	3/C	#1	Cu	Soft	Compressed	0.322	TRXLP	175	0.70
613523	15	3/C	#1	Cu	Soft	Compressed	0.322	TRXLP	175	0.70
613520	15	3/C	2/0	Cu	Soft	Compressed	0.405	XLPE	175	0.76
613521	15	3/C	3/0	Cu	Soft	Compressed	0.456	TRXLP	175	0.84
613526	15	3/C	3/0	Cu	Soft	Compressed	0.456	TRXLP	175	0.84
013306	15	3/C+1G	4/0	Cu	Soft	Compact	0.475	EPR	220	n/a
613530	15	3/C	350	Cu	Soft	Compact	0.616	TRXLP	175	1.03
613531	15	3/C	500	Cu	Soft	Sector	n/a	XLPE	n/a	n/a
010128	15	3/C	500	Cu	Soft	Compact	0.736	EPR	175	1.13
613532	15	3/C	500	Cu	Soft	Compact	0.736	XLPE	n/a	1.14
623640	15	1/C	500	Cu	Soft	Compact	0.736	EPR	220	tbd
012735	15	3-1/C	500	Cu	Soft	Compressed	0.789	EPR	175	1.16
613533	15	3/C	750	Cu	Soft	Sector	n/a	XLPE	n/a	n/a
613534	15	3/C	750	Cu	Soft	Compact	0.908	XLPE	n/a	1.29
623670	15	3-1/C	1000	Cu	Soft	Compressed	1.117	EPR	175	1.52
623650	27	3-1/C+2N	#8	Cu	Soft	Compressed	0.142	EPR	280	0.70
602027	28	1/C	#1	Al	3/4 hard	Class B	0.332	XLPE	275	0.88
613540	28	3/C+3G	#1	Cu	Soft	Compressed	0.322	TRXLP	280	0.91
602025	28	1/C+1N	1/0	Al-1350	1/2 hard	Solid	0.325	TRXLP	280	0.88
012098	28	1/C+1N	1/0	Al-1350	1/2 hard	Solid	0.325	TRXLP	280	0.88
602044	28	1/C	350	Al	3/4 hard	Class B	0.681	XLPE	275	1.23
012099	28	1/C	350	Al-1350	3/4 hard	Compact	0.616	TRXLP	280	1.22
613613	28	1/C	350	Al	n/a	Compact	0.616	XLPE	n/a	1.23
613543	28	3/C+3G	350	Cu	Soft	Compact	0.616	TRXLP	280	1.23
012100	28	1/C	500	Cu	Soft	Compact	0.736	TRXLP	280	1.34
613615	28	1/C	500	Cu	Soft	Compact	0.736	XLPE	n/a	1.35
613645	28	1/C	500	Cu	Soft	Compressed	0.789	TRXLP	280	1.40
602119	28	1/C	750	Al	n/a	Compact	0.908	XLPE	275	1.49
613618	28	1/C	750	Cu	Soft	Compact	0.908	XLPE	275	1.49
974050	28	3/C	750	Cu	Soft	Sector	n/a	XLPE	280	n/a
012101	28	1/C	750	Cu	Soft	Compact	0.908	TRXLP	280	1.52
012102	28	1/C	1000	Cu	Soft	Compact	1.060	TRXLP	280	1.67
613619	28	1/C	1000	Cu	Soft	Compact	1.060	XLPE	n/a	1.68
613655	28	1/C	1000	Cu	Soft	Compressed	1.117	TRXLP	280	1.74
623660	35	1/C	750	Al	3/4 hard	Compact	0.908	XLPE	345	n/a
623655	35	1/C	1000	Cu	Soft	Compact	1.060	TRXLP	420	1.97

Table 5b. Cable Data Sorted by Voltage and Conductor Diameter (two-page spread), continued

Insulation		Insulation Shield	Jacket	Cable Assembly								
Nom. Dia. Over (in)	Max. Dia. Over (in)	Type	Material	Typical Dia. Over (in)	Max. Dia. Over (in)	Weight per ft (lb)	Max. Sidewall Pressure lb/ft of Bend Radius	Max. Pulling Tension (lb)	Typical Application	Mtl. Std. No.	Stock No.	
12	13	14	15	16	17	18	19	20	21	22	23	
0.42	0.45	Tape	LLDPE or PP	n/a	0.67	0.2	1,500	210	URD	6010.20	613212	
0.91	0.94	Tape	LLDPE or PP	1.16	1.20	1.5	1,500	2,800	URD	6010.20	613222	
n/a	n/a	DW	PVC	n/a	1.15	1.4	1,000	3,000	URD	6010.2	601025	
0.74	0.76	Tape	Armored	n/a	2.25	n/a	n/a	n/a	NET	6020.02	613522	
0.74	0.76	Tape	LLDPE	2.10	2.25	2.1	1,500	1,339	NET	6020.01	613523	
n/a	0.84	Tape	Armored	n/a	n/a	n/a	n/a	n/a	NET	None	613520	
0.85	0.90	Tape	Armored	n/a	2.55	6.8	n/a	n/a	NET	6020.02	613521	
0.85	0.90	Tape	LLDPE	2.35	2.45	3.3	1,500	2,685	NET	6020.01	613526	
0.96	n/a	Tape	PVC	2.97	n/a	8.4	n/a	n/a	NET	6025.02	013306	
1.03	1.05	Tape	LLDPE	2.61	2.85	5.4	1,500	5,600	NET	6020.01	613530	
n/a	n/a	Tape	LLDPE	n/a	n/a	9.6	n/a	n/a	NET	6020.01	613531	
1.14	1.19	Tape	LLDPE	2.85	2.92	6.8	1,500	8,000	NET	6025.10	010128	
1.15	1.15	Tape	LLDPE or PP	2.80	3.15	7.1	1,500	8,000	NET	6020.01	613532	
tbd	tbd	Tape	PVC	1.50	1.63	2.5	1,500	4,000	NET	6025.70	623640	
1.19	1.21	FS	LLDPE	3.02	3.34	6.7	1,500	n/a	NET	6025.60	012735	
n/a	n/a	Tape	LLDPE or PP	n/a	n/a	n/a	n/a	n/a	NET	6020.01	613533	
1.34	1.39	Tape	LLDPE	3.44	3.65	10.2	1,500	12,000	NET	6020.01	613534	
1.54	1.58	FS	LLDPE	3.94	4.29	12.8	1,500	16,000	NET	6025.60	623670	
0.77	0.79	Tape	PVC	n/a	n/a	1.6	n/a	n/a	NET	None	623650	
0.93	0.98	RW/CN	Bare	n/a	n/a	n/a	750	502	URD	6020.2	602027	
0.94	0.97	Tape	LLDPE	2.60	2.65	3.2	1,500	1,339	NET	6020.05	613540	
0.93	0.97	RW/CN	Bare	1.02	1.30	0.6	750	423	URD	6020.03	602025	
0.93	0.97	RW/CN	LLDPE	1.27	1.35	0.8	1,500	634	URD	6020.06	012098	
1.30	1.38	RW/CN	Bare	1.50	n/a	n/a	750	2,100	URD	6020.2	602044	
1.25	1.28	FS	LLDPE	1.48	1.57	1.2	1,500	2,100	URD	6020.07	012099	
1.24	1.29	DW	PVC	1.55	1.75	1.2	1,000	2,100	URD	None	613613	
1.25	1.28	Tape	LLDPE	3.33	3.45	6.7	1,500	5,600	NET	6020.05	613543	
1.37	1.40	FS	LLDPE	1.62	1.70	2.5	1,500	4,000	URD	6020.07	012100	
1.37	1.41	DW	PVC	1.70	1.80	2.7	1,000	4,000	URD	6020.4	613615	
1.44	1.46	FS	LLDPE	1.75	1.95	2.6	1,500	4,000	URD	6020.14	613645	
1.55	1.59	DW	PVC	1.90	2.01	n/a	1,000	4,500	URD	6021.1	602119	
1.55	1.59	DW	PVC	1.90	2.05	3.5	1,000	6,000	URD	6021.1	613618	
n/a	n/a	Tape	n/a	n/a	3.65	n/a	n/a	n/a	NET	6020.0	974050	
1.55	1.58	FS	LLDPE	1.88	2.00	3.5	1,500	6,000	URD	6020.07	012101	
1.70	1.73	FS	LLDPE	2.03	2.10	4.4	1,500	8,000	URD	6020.07	012102	
1.71	1.74	DW	PVC	2.09	2.20	4.3	1,000	8,000	URD	None	613619	
1.76	1.80	FS	LLDPE	2.15	2.40	4.6	1,500	8,000	URD	6020.14	613655	
1.66	n/a	DW	PVC	2.07	n/a	n/a	1,000	4,500	URD	6236.5	623660	
1.99	2.03	Tape	LLDPE	2.43	2.45	4.7	1,500	8,000	Special	6236.60	623655	

6. References

- SCL Material Standard 6010.20;** “5 KV, 1/C, TRXLPE Insulated, Tape Shielded Cable”
- SCL Material Standard 6015.00;** “Medium Voltage Cable - General”
- SCL Material Standard 6020.01;** “15 kV, 3/C, TRXLPE Insulated, Tape Shielded Cable”
- SCL Material Standard 6020.02;** “15 KV, 3/C, Armored, TRXLPE Insulated, Tape Shielded Cable”
- SCL Material Standard 6020.03;** “28 KV, 1/C, TRXLPE Insulated, Bare CN Cable”
- SCL Material Standard 6020.05;** “28 KV, 3/C, TRXLPE Insulated, Tape Shielded Cable with Ground Connectors”
- SCL Material Standard 6020.06;** “28 KV, 1/C, TRXLPE Insulated, Jacketed CN Cable”
- SCL Material Standard 6020.07;** “28 kV, 1/C, TRXLPE Insulated, Flat Strap Shielded Cable”
- SCL Material Standard 6020.14;** “28 KV, 1/C, TRXLPE Insulated, Flat Strap Shielded Cable”
- SCL Material Standard 6025.02;** “15 kV, 3/C, Armored, EPR Insulated, Tape Shielded Cable”
- SCL Material Standard 6025.10;** “15 KV, 3/C, EPR Insulated, Tape Shielded Cable”
- SCL Material Standard 6025.60;** “15 kV, 3-1/C, EPR Insulated, Flat Strap Shielded Cable”
- SCL Material Standard 6025.70;** “15 kV, 1/C, EPR Insulated, Tape Shielded Cable”
- SCL Material Standard 6236.60;** “35 KV, 1/C, TRXLPE Insulated, Tape Shielded Cable”

7. Sources

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