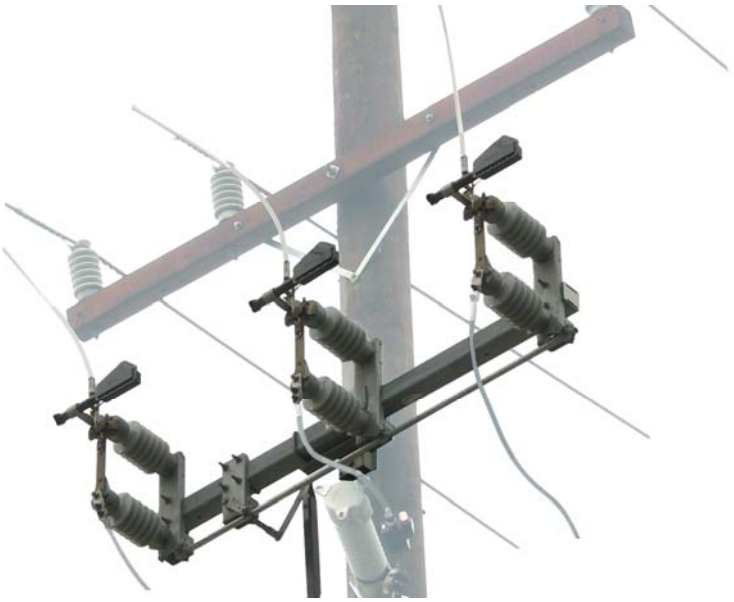
OVERHEAD DISTRIBUTION SWITCH, 27 KV, GANG-OPERATED



1. Scope

This material standard covers the requirements for 27 kV, overhead, three-phase, gang-operated, load-break switches and replacement interrupters.

This material standard applies to Seattle City Light Stock Numbers:

Switch Stock No	Interrupter Stock No	Shunt Kit Stock No	Mounting Type	Amps
250150	012119	013279	horizontal	600
250151	012119	013279	riser style	600
250152	012121	013280	horizontal	1200
250153	012121	013280	riser style	1200

2. Application

Overhead distribution switches are mounted on wood poles to break or pick up load, loop, and line charging current on Seattle City Light's 26.4 kV, looped radial distribution system.

Horizontally-mounted (upright) switches are used for sectionalizing feeders. Riser style switches are installed on terminal poles.

Inertia switches purchased after March 2011 are provided with interrupter shunts. This feature improves a switch's operability. 600A and 1200A shunt interrupter upgrade kits are available as separate stock items.

3. Industry Standards

Overhead distribution switches shall meet the applicable requirements of the following industry standards:

ASTM A153-2005 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware

IEEE 1247-2005 – Interrupter Switches for Alternating Current, Rated Above 1000 V

IEEE C37.32-2002 - High Voltage Switches, Bus Supports, and Accessories Schedules of Preferred Ratings, Construction Guidelines, and Specifications

IEEE C37.34-1994 - Test Code for High-Voltage Air Switches

IEEE C37.37-1996 - Loading Guide for AC High-Voltage Air Switches (in Excess of 1000 V)

standards coordinator	*standards supervisor*	*unit director*
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4. Requirements

4.1 General

Complete switch assembly shall be integrally designed and produced. Manufacturer shall be solely responsible for the performance of the basic switch components as well as the complete integrated assembly.

4.2 Switch Ratings

Switches shall be distribution class as defined by IEEE C37.32.

Temperature rise tests shall be performed according to IEEE C37.32.

600 and 1200 A switches shall have the following electrical ratings:

Continuous Current, A, rms	600	1200
Voltage		
Nominal, kV, rms	25	25
Maximum, kV, rms	27	27
Number of phases	3	3
Power frequency, Hz	60	60
Lightning-impulse withstand voltage (BIL), kV, crest	170	170
Short-time (3 s) withstand current, kA, rms symmetrical	25	44
Momentary (10 cycles) withstand current, kA, rms symmetrical	40	70
Allowable continuous current class (ACCC) designation, per IEEE C37.37	DO6	DO6

4.3 Interrupter Ratings

Interrupters shall be tested according to IEEE 1247.

Interrupters shall have the following electrical ratings:

Interrupter Style	Expulsion Tube, A, rms	Vacuum Bottle, A, rms
Load current	900 (at 23 kV)	1500
Parallel current	900 (at 5 kV)	1500
Cable charging	26 (at 27 kV)	600
Magnetizing current	2.7 (at 27 kV)	600

4.4 Construction

Switch shall be designed for installation on wood poles with pole-top diameters ranging from 8 to 14 inches in diameter.

Switch shall be capable of ice breaking according to the requirements of IEEE C37.34, section 10. Ice thickness for ice tests shall be 3/4 inches.

Switch mounting base shall consist of a unitized, galvanized steel beam with three conductor dead-ending brackets.

Switches rated 600 A continuous shall be provided with two-hole terminal pads according to IEEE C37.32, figure 1.

Switches rated 1200 A continuous shall be provided with four-hole terminal pads according to IEEE C37.32, figure 1.

Terminal pads shall be tinned copper, 99% conductive with a maximum surface roughness of 32 micro inches, intended for use with aluminum or bronze connectors.

Insulators shall be silicone rubber, post type, with 3-inch bolt circles, meeting the applicable requirements of ANSI/NEMA C29.9 for TR 208.

Lifting eyes or hoisting brackets shall be provided and clearly identified to allow safe installation.

Switch shall be operated by means of a reciprocating manual handle.

Vertical control rod shall incorporate square fiberglass sections.

Switch shall be capable of being padlocked in both the open and the closed positions.

Each switch shall be supplied with sufficient operating mechanism, rods, guides, guide bearings, and couplings to allow the operating handle to be mounted (centerline of throw) 49 feet below the centerline of the steel mounting base (arm).

The operating rod shall be a combination of galvanized steel and square insulating fiberglass rod to meet the following criteria:

- The first 10 feet, which will be attached to the operating handle, shall be galvanized steel with a welded 3/8-inch diameter steel eyelet with an open diameter of 1-1/2 inches and pole mounted swing arm provision for attaching a secondary operating rod padlock in both the switch open and switch closed positions.
- The remaining upper sections (39 feet) shall be ultraviolet-inhibited, 1-3/4-inch square fiberglass tube with Nexus Veil coating. Upper section BIL shall be 10,000 volts/inch minimum.

A ground strap and connector shall be provided for grounding the operating handle and lower galvanized steel rod section.

4. Requirements, continued

4.4 Construction, continued

Switches rated 600 A continuous shall be provided with a three-phase set of expulsion tube interrupters.

Switches rated 1200 A continuous shall be provided with a three-phase set of vacuum bottle interrupters.

4.5 Quality

Switch shall be of high quality design and construction providing safe and reliable operation with minimal maintenance over the life of the product.

5. Documentation

One set of installation instructions, operating procedures, maintenance instructions, spare parts list, and outline drawings shall be securely attached to each switch in a waterproof, ultraviolet-light-resistant envelope.

6. Testing

Test data that establishes compliance with the requirements of the industry standards listed in Section 3 of this material standard shall be provided upon request.

7. Design Changes

Manufacturer shall inform Seattle City Light in writing of all design changes that could affect the switch's understood or published capabilities.

8. Marking

Switch crates shall be legibly and permanently marked with:

- Manufacturer's name
- Manufacturer's catalog number
- Product description
- Equipment serial number
- Seattle City Light's Stock Number
- Seattle City Light's Purchase Order Number

Packages containing interrupters purchased separately shall be legibly marked with:

- Manufacturer's name
- Manufacturer's catalog number
- Product description
- Seattle City Light's Stock Number

9. Packaging

Each switch shall be packaged in its own crate and delivered on its own pallet.

Pallet shall be designed for clearance and movement by either pallet jack or forklift.

The two openings for the pallet jack or forklift shall have a minimum vertical height of 4 inches and horizontal width of 21 inches.

Crate and pallet, including slates, blocking, and wedges, shall be unpainted wood

Interrupter sets supplied with a switch shall be shipped uninstalled and packaged within the switch crate.

Interrupters purchased separately shall be individually package to prevent damage during shipping, inside storage, and casual handling prior to installation.

10. Shipping

Switches may be delivered on enclosed, covered, or flatbed trucks. If switches are delivered on flatbed truck, switches shall be side-loaded. Because Washington State law requires a 10-inch 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.

11. Issuance

Stock unit:

EA, switch

EA, replacement interrupter, single-pole

EA, interrupter shunt kit

12. References

ANSI/IEEE C37.71-2001; “Three-Phase, Manually Operated Subsurface and Vault Load-Interrupting Switches for Alternating-Current Systems”

ANSI/NEMA C29.9-1983 (R2002); “Wet-Process Porcelain Insulators - Apparatus, Post Type”

Inertia 040930G; “High Voltage Switchgear & Automation Equipment, Section 2, Overhead Distribution Switches”; Inertia Engineering; Catalog Number 040930G; May 2008

SCL 2501.5; “Load Break Switch, Three-Pole, Gang-Operated for Wood Pole Mounting” (canceled); Material Standard

Shipek, John; SCL Standards Engineer, originator and subject matter expert and major revision for 4501.50 (john.shipek@seattle.gov)

13. Approved Manufacturers

13.1	**Stock Number**	**250150**
	Description	Overhead distribution switch, horizontally-mounted, 600 A, with set of expulsion tube interrupters
	Manufacturer	Inertia Engineering
	Catalog Number	L26SLSH-SCLS *where:* L = LineBOSS Unitized Sidebreak Line Switch 2 = 25.8 kV voltage class 6 = 600 A current rating, ANSI 30 degree rise S = silicone rubber insulators L = loadbreak Amprupter interrupters S = galvanized steel crossarm H = horizontal upright mounting SCLS = Seattle City Light special, reciprocating manual handle, 1-3/4-inch square fiberglass control rod, interrupter shunts
	Main Drawing	9265-1S R01
	Bill of Material	9265-1SB R01

13.2	**Stock Number**	**250151**
	Description	Overhead distribution switch, riser style mounting, 600 A, with set of expulsion tube interrupters
	Manufacturer	Inertia Engineering
	Catalog Number	L26SLSR-SCLS *where:* L = LineBOSS Unitized Sidebreak Line Switch 2 = 25.8 kV voltage class 6 = 600 A current rating, ANSI 30 degree rise S = silicone rubber insulators L = loadbreak Amprupter interrupters S = galvanized steel crossarm R = riser style mounting SCLS = Seattle City Light special, reciprocating manual handle, 1-3/4-inch square fiberglass control rod, interrupter shunts
	Main Drawing	9265-3S R01
	Bill of Material	9265-3SB R01

13.3	**Stock Number**	**012119**
	Description	Replacement expulsion tube interrupter, single pole, for switches Stock Numbers 250150 and 250151 respectively
	Manufacturer	Inertia Engineering
	Catalog Number	I62-1XH-1R

13. Approved Manufacturers, continued

13.4	**Stock Number**	**250152**
	Description	Overhead distribution switch, horizontally-mounted, 1200 A, with set of vacuum bottle interrupters
	Manufacturer	Inertia Engineering
	Catalog Number	L21SVSH-SCLS

where:

L	=	LineBOSS Unitized Sidebreak Line Switch
2	=	25.8 kV voltage class
1	=	1200 A current rating, ANSI 30 degree rise
S	=	silicone rubber insulators
V	=	vacuum bottle interrupters
S	=	galvanized steel crossarm
H	=	horizontal upright mounting
SCLS	=	Seattle City Light special, reciprocating manual handle, 1-3/4-inch square fiberglass control rod, interrupter shunts

Main Drawing	9265-2S R01
Bill of Material	9265-2SB R01

13.5	**Stock Number**	**250153**
	Description	Overhead distribution switch, riser style mounting, 1200 A, with set of vacuum bottle interrupters
	Manufacturer	Inertia Engineering
	Catalog Number	L21SVSR-SCLS

where:

L	=	LineBOSS Unitized Sidebreak Line Switch
2	=	25.8 kV voltage class
1	=	1200 A current rating, ANSI 30 degree rise
S	=	silicone rubber insulators
V	=	vacuum bottle interrupters
S	=	galvanized steel crossarm
R	=	riser style mounting
SCLS	=	Seattle City Light special, reciprocating manual handle, 1-3/4-inch square fiberglass control rod, interrupter shunts

Main Drawing	9265-4S R01
Bill of Material	9265-4SB R01

13. Approved Manufacturers, continued

13.6	**Stock Number**	**012121**
	Description	Replacement interrupter, single pole, for switches Stock Numbers 250152 and 250153
	Manufacturer	Inertia Engineering
	Catalog Number	6220-12

13.7	**Stock Number**	**013279**
	Description	600 A interrupter shunt kit
	Application	Upgrade 600 A Inertia switches (Stock Numbers 250150 and 250151) that were not originally provided with interrupter shunt accessory. Only one kit is required per three-phase switch.
	Manufacturer	Inertia Engineering
	Catalog Number	6255-3A

13.8	**Stock Number**	**013280**
	Description	1200 A interrupter shunt kit
	Application	Upgrade 1200 A Inertia switches (Stock Numbers 250152 and 250153) that were not originally provided with interrupter shunt accessory. Only one kit is required per three-phase switch.
	Manufacturer	Inertia Engineering
	Catalog Number	6255-3A-12