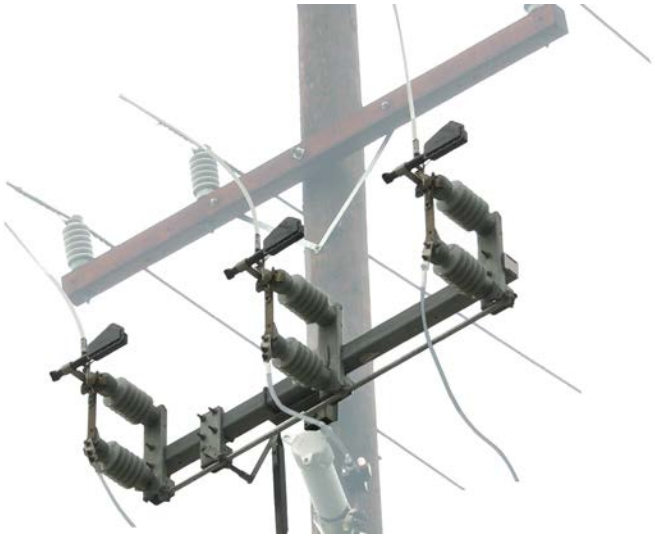
Overhead Distribution Switch, 27 kV, Gang-Operated



1. Scope

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

This standard applies to the following Seattle City Light (SCL) stock numbers:

Switch Stock No.	Interrupter Stock No.	Shunt Kit Stock No.	Disconnect Handle Grounding Jumper Stock No.	Mounting Type	Current Rating (A)
250150	012119	013279	014563	horizontal	600
250151	012119	013279	014563	riser style	600
250152	012121	013280	014563	horizontal	1200
250153	012121	013280	014563	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.

Vertical (tiered outboard) switches are outside the scope of this standard. See SCL 4501.51.

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

3. Industry Standards

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

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

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

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

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

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

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

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

Switches 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 bases 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.

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

The switch bell crank shall be designed to withstand harsh environments.

Vertical control rod shall incorporate square fiberglass sections.

Switches 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 tinned copper flat braid ground strap, equivalent to 2/0 AWG, 36" long with terminals having 3/8" and 1/2" hole diameters, shall be provided for grounding the operating handle and lower galvanized steel rod section.

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

Switches 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 name
- Manufacturer catalog number
- Product description
- Equipment serial number
- Seattle City Light stock number
- Seattle City Light purchase order number

Packages containing interrupters purchased separately shall be legibly marked with:

- Manufacturer name
- Manufacturer catalog number
- Product description
- Seattle City Light 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 packaged 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: Switch: EA
Replacement interrupter, single-pole: EA
Interrupter shunt: EA
Disconnect handle grounding jumper: EA

12. Approved Manufacturers

12.1	**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

12.2	**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

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

12.4	**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

12.5	**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

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

12.7	**Stock Number**	**013279**
	Description	600 A interrupter shunt kit
	Application	Upgrade 600 A Inertia switches (Stock Nos. 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

12.8	**Stock Number**	**013280**
	Description	1200 A interrupter shunt kit
	Application	Upgrade 1200 A Inertia switches (Stock Nos. 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
12.9	**Stock Number**	**014563**
	Description	36" tinned copper flat braid disconnect handle grounding jumper with one 3/8" and one 1/2" hole diameter lug.
	Application	Each Inertia switch comes with an included disconnect handle grounding jumper. Use this stock number only to order standalone jumpers to replace damaged or stolen jumpers.
	Manufacturer	Inertia Engineering
	Catalog Number	6094-36B

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

SCL Material Standard 4501.51; “Overhead Distribution Switches, 27 kV, Gang-Operated, Vertical (Tiered Outboard)”

14. Sources

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

Shetab, Muneer; SCL Standards Engineer and subject matter expert for 4501.50 (muneer.shetab@seattle.gov)