

## Bus Tie Switches, 216Y/125 V – 480Y/277 V



### 1. Scope

This standard covers the requirements for combination 216Y/125 V – 480Y/277 V, three-phase, submersible, wall-mounted, roll out bus tie switches and accessories. This standard applies to the following Seattle City Light (SCL) stock numbers:

Stock No.	Description
335205	1875 A bus tie switch
335207	2825 A bus tie switch
335605	1875 A bus tie switch with special top bushings
335607	2825 A bus tie switch with special top bushings

### 2. Application

Bus tie switches are network protectors modified with a second set of bushings on the bottom or back of the unit. Bus tie switches are manually-closed, three-phase air circuit breakers installed in network transformer vaults and set to trip electrically open when excessive heat is detected by the fire protection system cabinet located in the vault. Bus tie switches contain no fuses or relays.

Bus tie switches are typically used in smaller Network vaults and connect to the street grid to take the place of an additional transformer and its network protector. These switches are intended for wall or floor mounting instead of transformer mounting.

### 3. Industry Standards

Bus tie switches shall meet the applicable requirements of the following industry standards:

**IEEE C57.12.32-2002**; IEEE Standard for Submersible Equipment—Enclosure Integrity

**IEEE C57.12.40-2011**; IEEE Standard for Network, Three-Phase Transformers, 2500 kVA and Smaller; High Voltage, 34 500 GrdY/19 920 and Below; Low Voltage, 600 V and Below; Subway and Vault Types (Liquid Immersed)

**IEEE C57.12.44-2014**; IEEE Standard Requirements for Secondary Network Protectors

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#### 4. Conflict

Where conflict exists, the following order of precedence shall apply:

1. Seattle City Light purchase order (PO)
2. City of Seattle General Terms and Conditions
3. This standard
4. Other industry standards

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#### 5. General Requirements

Each unit shall be wired for a four-wire, solidly grounded neutral, and hard wired for 1-3-2 counterclockwise phase rotation.

Cables and terminal block shall be labeled to ensure correct phase rotation.

The enclosure shall be submersible.

The bus tie switches shall be suitable for wall mounting without the removal of any external housing components. A 13/16-in diameter mounting hole shall be provided at each of the four rear corners of the protector. The mounting holes shall be accessible from the front and not covered or blocked by the cable bushings or other accessories. The bus tie switches shall have removable feet capable of supporting the weight of the protector and providing 9 inches of clearance between the studs and the floor. See Figure 5.

**Figure 5. Bus Tie Switch Mounting Holes and Feet**



Bus tie switches shall have threaded copper studs supplied for the line and load side. For ratings of 1875 A or less, the studs shall be 1-1/2 inches in diameter. For ratings of 2825 A the studs shall be 3 inches in diameter.

The interior shall be coated with white epoxy paint.

The door shall include hinges that allow for 160 degrees of opening when installed on either side.

Fuses are not required.

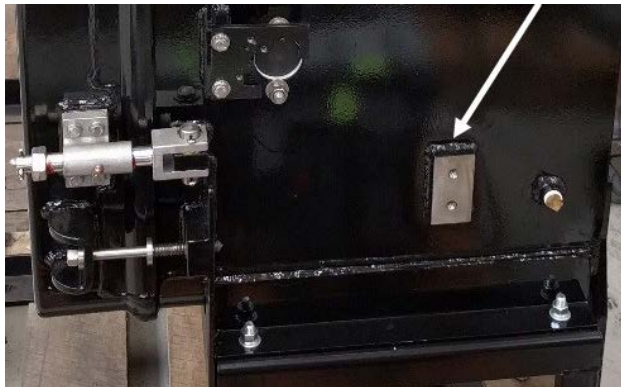
Relays are not required.

### 5.1 Ground Pad

An exterior ground pad shall be provided that meets the requirements of IEEE C57.12.44 Section 10.5.8.

Install ground pad on the lower portion of the protector right side wall. See Figure 5.1.

**Figure 5.1. Bus Tie Switch with Exterior Ground Pad**



### 5.2 Penetration for Future Use

One hole with an NPT threaded tap and plug, 1/2 inch in diameter, shall be provided on the right hand side of the bus tie switch case for future use. The hole shall be located on the side wall of the bus tie switch case (not the door side or the wall side), 6 inches up from the bottom of the case and 3 inches from the wall side. See Figure 5.2.

**Figure 5.2. Penetration on Right Hand Side for Future Use**



### 5.3 External Pilot Lights

A nominal 125 V to neutral (ground), single-phase circuit shall be provided from the transformer side of the breaker for external pilot lights. This 125 V circuit may also be used for control circuits as required. The external pilot load will not exceed 100 W at 125 V. Transformer supplying this circuit shall not exceed 140°F when subjected to testing under no load.

Two spark plug insulated bushings shall be installed on the side of the enclosure for the installation of external pilot lights. See Figure 5.3.

Two stages (one "a" and one "b") on the auxiliary switch shall be wired for external pilot light control with a common point of the two stages connected to the 125 V source (see Section 5.4) and the "a" and "b" terminals connected to the spark plug bushings.

One "b" stage on the auxiliary switch shall be wired to a terminal block.

**Figure 5.3. Spark Plug Bushings**

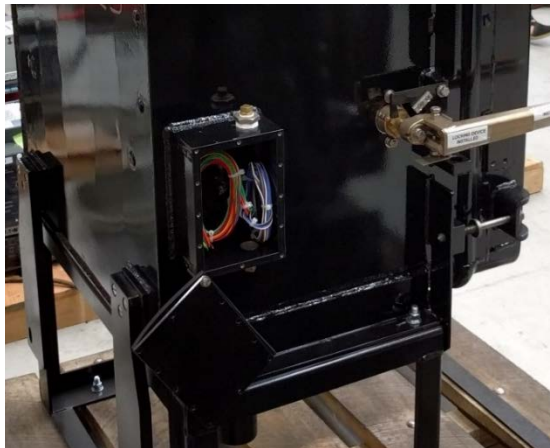


#### **5.4 External Trip and Lockout Circuits**

All switches shall have provisions for an external trip and lockout circuits including two normally closed lockout terminals and two normally open trip terminals. The protector shall be configured such that, when the trip terminals are externally connected, the protector trips and blocks the closing circuit (locked out).

The external terminals of the waterproof connectors that penetrate the case shall be covered by a welded-on waterproof junction box with two 3/4-in threaded taps and plugs, one tap and plug located on the top of the junction box and the other tap and plug on the bottom of the box. The two trip terminals shall be labeled. See Figure 5.4.

**Figure 5.4. Penetration and Junction Box on NP Left Hand Side for External Trip**



### 5.5 Voltage Selection Switch

Each bus tie switch shall be supplied with a voltage selection switch. See Figure 5.5.

**Figure 5.5. Voltage selection switch**



### 5.6 Copper Links

Each bus tie switch shall be supplied with copper links, typically a total of 6: 3 for installation on the line (bottom) side and 3 for the load (top) side of the breaker assembly. See Table 5.6. See Figure 5.6 for an example of one such link. Copper links are installed instead of fuses because cable limiters are used on line side cables and selected to open in the event of a fault.

**Table 5.6. Copper Links**

Item		Description
1875 A copper links	line side	Set of (3) copper links to be installed on the line (bottom) side of the breaker
	load side	Set of (3) copper links to be installed on the load (top) side of the breaker
2825 A copper links	line side	Set of (3) copper links to be installed on the line (bottom) side of the breaker
	load side	Set of (3) copper links to be installed on the load (top) side of the breaker

**Figure 5.6. Copper Link Example**



## 5.7 Special Top Bushings

For stock numbers 335605 and 335607, spades rated to carry the current listed shall be supplied for the line and load side connections. The line side connections shall be installed on the back and top of the switch. See Figure 5.7.

**Figure 5.7. Bus Tie Switch with Top-Mounted Line Side Spades**



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## 6. Testing

Manufacturer shall perform all appropriate tests as outlined in IEEE C57.12.44, sections 5 and 6.

Test results shall be provided upon request.

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## 7. Design Changes

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

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## 8. Packaging

Each switch shall be supplied on its own pallet.

The pallet and all pallet accessories shall be constructed of unpainted wood and suitable for yard storage through all weather conditions.

The pallet shall be 4 inches high to accommodate lifting by both forklifts and pallet jacks. The most central pallet stringer shall be centered and a maximum of 7 inches wide to insure picking by pallet jacks.

Each switch shall be centered on pallet and bolted to pallet via its feet. Switch shall be oriented on the pallet to prevent accessories (terminals, etc.) from coming into contact with pallet moving equipment or otherwise shall be enclosed by protective devices to prevent damage.

## 9. Shipping

Switches may be delivered on enclosed, covered, or flatbed trucks. If switches are delivered on flatbed trucks, they 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.

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## 10. Seattle City Light Processes

### 10.1 Bid Process

Bid process details are available at [www.Seattle.gov](http://www.Seattle.gov).

Bids shall include details demonstrating conformance to this standard. Order of submittal details shall follow same as is presented in this standard.

Any exceptions taken to the standard shall be summarized in an attached letter, complete with section number in this standard to which exception relates. Requests for approved equal components must be submitted with first bid documents; all subsequent requests will be rejected.

### 10.2 Bid Completion

Upon completion of the bidding process, the successful bidder shall submit in a single electronic file the following:

- All product dimensions, including construction and mounting dimensions
- Nameplate drawing, including switch weight
- Instructional materials demonstrating the proper installation, connection, operation, and maintenance of the equipment
- Certified test report data for all factory tests
- Parts catalog including renewal parts for the protectors and accessories

### 10.3 Inspection and Electrical Testing

Upon delivery, all switches will be tested and inspected by SCL. Switches that fail to pass the tests will be returned to the manufacturer. The cost of retesting switches that have been returned to the manufacturer for correction of defects will be charged to the manufacturer.

### 10.4 Guarantee

Any protector failing, due to defective design, material, and/or workmanship, within twelve months after being energized or eighteen months after delivery, whichever comes first, shall be replaced or repaired without cost to the City of Seattle. Any defect in design, material, and/or construction discovered within this period shall be corrected on all units furnished on this order, at the manufacturer's expense, either by repair or replacement.

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## 11. Issuance

Stock Unit: EA

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## 12. Approved Manufacturers

Stock No.	Description	Richards	Eaton
335205	1875 A bus tie switch	BTS-1875-DWS	CM22-1875A-BTS
335207	2825 A bus tie switch	BTS-2825-DWS	CM22-2825A-BTS
335605	1875 A bus tie switch with special top bushings	313NP-1875-BTS	8231A75G30
335607	2825 A bus tie switch with special top bushings	313NP-2825-BTS	8231A75G31

### 13. Sources

**Hanson, Brett**; SCL Standards Engineer, subject matter expert, and originator of 4388.88 (brett.hanson@seattle.gov)

**Mahar, Charles**; Network Crew Chief and subject matter expert for 4388.88 (charles.mahar@seattle.gov)

**Ratsavong, Virakone**; Network Protector Supervisor, subject matter expert for 4388.88 (virakone.ratsavong@seattle.gov)

**SCL Material Standard 4381.72 (canceled)**; "Modified Protector, Secondary Network, Wall-Mounted, Submersible"