

## Outdoor, Single-Phase, Dry-Type, General Purpose Transformers



### 1. Scope

This standard details the manufacturer requirements for single-phase, dry-type, general purpose transformers.

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

Stock No.	kVA	Primary Voltage	Secondary Voltage
687730	0.1	277	120
682608	0.25	240/480	120/240
391286	1.5	277	120
391285	3.0	277	120

### 2. Application

This class of transformers is typically used in vaults and handholes to step down streetlight voltage, street grid voltage, and vault voltage in order to serve light fixtures, receptacles, fire protection control cabinets, and network protector monitoring equipment in those spaces.

These units are also installed in select streetlight bases in order to serve seasonal lighting receptacles.

Standard Coordinator  
Brett Hanson

Standards Engineering Supervisor  
John Shipek

Division Director  
Andrew Strong

### 3. Industry Standards

Transformers shall meet the applicable requirements of the most recent revision of the following industry standards:

**IEEE 259**; "Standard Test Procedure for Evaluation of Systems of Insulation for Dry-Type Specialty and General-Purpose Transformers"

**NEMA ST 20**; "Dry Type Transformers for General Applications"

**RCW 19.29.010**; Rule 5; Revised Code of Washington, Rules for Test Tag

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### 4. Ratings

#### 4.1 Kilovolt-Ampere Ratings

Kilovolt-ampere ratings shall be as specified in Table 4.3.

#### 4.2 Voltage Ratings

Transformer voltage ratings shall be as specified in Table 4.3.

#### 4.3 Temperature Rise and Insulation System

Transformers shall have insulation systems as specified in Table 4.3 to comply with NEMA ST-20, Section 3.9.6.

**Table 4.3. Transformer Properties**

Stock No.	kVA	Primary/Secondary (V)	Temperature Rise (°C)	Ins. Class (°C)	Typical Weight (lb)
687730	0.1	277/120	80	130	3
682608	0.25	240/480-120/240	95	130	8
391286	1.5	277/120	115	180	29
391285	3.0	277/120	115	180	55

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### 5. Construction

#### 5.1 General

Transformers shall be manufactured according to the requirements of NEMA ST-20.

#### 5.2 Enclosure Integrity and Finish

For 0.1 and 1.5 kVA units, no enclosure is required. Stock No. 391286 shall be designed and constructed to be installed in a cylindrical metal streetlight housing 9 inches long and 6 inches in diameter.

For all other transformers, the enclosure shall be NEMA 3R, as well as in accordance with NEMA ST-20, Section 3.3.3, Outdoor Construction and Section 3.3.2, Corrosion Resistance.

#### 5.3 Markings

Terminals shall be marked according to the requirements specified in NEMA ST-20, Section 3.29.

#### 5.4 Nameplate

A weatherproof nameplate, complete with connection diagram, shall be affixed to the outside of the enclosure.

The nameplate shall state all information in accordance with NEMA ST-20, Section 3.25.

A connection diagram shall be provided on the nameplate.

## 5.5 Grounding

The transformer enclosure shall be provided with a suitable grounding terminal to provide for a full current ground conductor. This terminal shall be plainly labeled "G" or "GRD."

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## 6. Tests

### 6.1 General

Electrical tests shall be made in accordance with the latest revision of NEMA ST-20 and IEEE 259.

### 6.2 Routine Tests

Routine Tests outlined in NEMA ST-20 section 4, table 4-1, shall be conducted on all transformers before being purchased by SCL to ensure that design performance is maintained in production.

### 6.3 Design Tests

Design Tests in accordance with NEMA ST-20, section 4.1.2, shall be conducted on a sufficient number of transformers to demonstrate compliance with NEMA ST-20 and this Standard. These tests need not be repeated unless the design of the transformer has changed.

### 6.4 Audible Sound Levels

Audible sound levels for each unit shall not exceed a maximum of 40dB according to the requirements of NEMA ST-20, section 3.32. Audible Sound Level tests shall be performed as outlined in NEMA ST-20, section 4.2.10.

### 6.5 Insulation System Tests

All Transformer Insulation System Tests shall be conducted in accordance with the latest revision of IEEE 259.

### 6.6 Documentation

If requested, test reports demonstrating conformance to all tests completed shall be submitted in a single electronic document.

All documentation shall be in English and use customary inch-pound units.

### 6.7 Test Tag

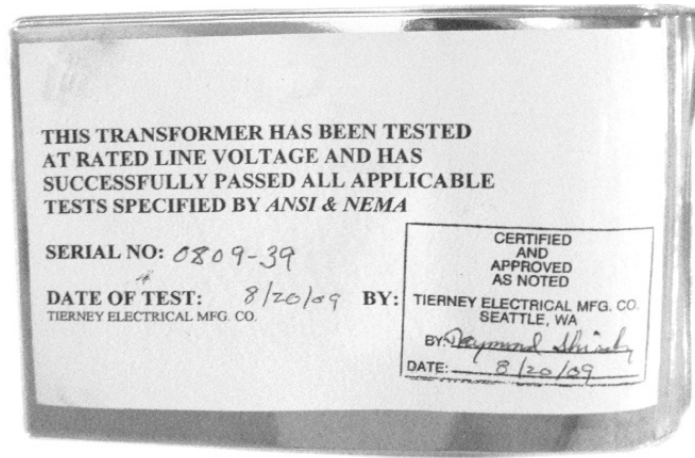
A weatherproof test tag conforming to the requirements of the Revised Code of Washington RCW 19.29.010, Rule 5 shall be firmly attached to each unit.

Tag shall read "THIS TRANSFORMER HAS BEEN SUBJECTED TO AN INSULATION TEST IN ACCORDANCE WITH THE STANDARDIZED RULES OF IEEE/ANSI. THIS TRANSFORMER HAS BEEN TESTED AT RATED LINE VOLTAGE."

Tag shall indicate:

- Transformer serial number
- Date on which the test was made
- Name of the person who performed the test

**Figure 6.7. Test Tag**



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## 7. Shipping and Handling

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

Each standard package shall be legibly marked with the following information:

- Manufacturer identification
- Product description
- SCL stock number
- Quantity

Each shipping container shall be legibly marked with the following information:

- SCL purchase order number

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## 8. Guarantee

Any transformer failing due to defective design, material, and/or workmanship within 12 months after being energized or 18 months after delivery, shall be repaired or replaced without cost to the City of Seattle. Any defect discovered within this period shall be corrected on all transformers furnished on the order at the manufacturer's expense, either by repair or replacement.

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## 9. Approved Manufacturer and Factory

Stock No.	kVA	Hammond Power Solutions, Baraboo, WI
687730	0.1	SP100NJ
682608	0.25	C1FC25LE
391286	1.5	SP1500NJ
391285	3.0	Q003YEKF

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## 10. References

**SCL Material Standard 0039.2 (canceled)**; "Autotransformer, Dry-Type, Outdoor Wall Mount, Single Phase, Through 10 kVA"

**Hanson, Brett**; SCL Standards Engineer; subject matter expert, and originator of 4470.00

**Byrnes, Devyn**; SCL Standards student intern; subject matter expert for 4470.00

**EDBSP1500NJ, "Drawing" (1.5kVA)**; Hammond Power Solutions

**EDBQ00EYEF, "Drawing" (3kVA)**; Hammond Power Solutions

**EDBSP100NJ "Spartan 1 Phase Control Transformer" (0.1kVA)**; Hammond Power Solutions, 9/10/2019

**EDBC1FC25LE "1 Phase Encapsulated Transformer" (0.25kVA)**; Hammond Power Solutions, 8/12/2016