

Streetlight Luminaire, LED, Side-mount, Principal Arterial-grade



1. Scope

This standard covers the requirements for principal arterial-grade, side-mount, outdoor type, light-emitting-diode (LED) streetlight luminaires and their accessories. LED luminaires are also known as solid state light (SSL) source fixtures.

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

Stock No.	Description
013495	Luminaire
013895	House-side shield for Leotek GC2-90F luminaire
013496	House-side shield for Leotek GC2-120 luminaire

2. Application

Principal arterial-grade LED streetlight luminaires are side-mounted on 2-inch nominal pipe size (NPS) tenons on poles to provide light to arterial roadways as defined by the Seattle Department of Transportation.

Principal arterial-grade LED streetlights are rated for installation in bridge and overpass applications.

Principal arterial-grade LED streetlights are intended for installation at a 35-foot mounting height.

LED life is greater than 100,000 hours. LED streetlight luminaires are 100 percent mercury- and lead-free.

Streetlight Engineering must pre-approve all installations of luminaire shields. Contact Streetlight Engineering for details.

3. Industry Standards

LED streetlight luminaires shall meet the applicable requirements of the following industry standards:

ANSI/NEMA/ANSLG C78.377-2008; Specifications for the Chromaticity of Solid State Lighting (SSL) Products

ANSI C136.10–2010; Locking-Type Photocontrol Devices and Mating Receptacles.

ANSI C136.31–2010; American National Standard for Roadway Lighting Equipment – Luminaire Vibration

ANSI C136.37–2011; American National Standard for Roadway and Area Lighting Equipment – Solid State Light Sources Used in Roadway and Area Lighting

ANSI C136.41–2013; Dimming Control Between an External Locking Type Photocontrol and Ballast or Driver

ASTM B117-09; Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM D1654-08; Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

ASTM D523-08; Standard Test Method for Specular Gloss

ASTM G154-06; Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

C136.15–2011 (or latest); American National Standard for Roadway and Area Lighting Equipment – Internal Labeling of Luminaires

C136.22–2004 (R2009); American National Standard for Roadway and Area Lighting Equipment – Ingress Protection (Resistance to Dust, Solid Objects and Moisture) for Luminaire Enclosures

Federal Trade Commission (FTC); Green Guides, 16 CFR Part 260; Guides for the Use of Environmental Marketing

IEC 60529; Degrees of protection provided by enclosures (IP Code), consolidated edition

IEEE C62.41.2–2002; IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits

IES LM-79-08; Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

IES LM-80-08; Approved Method: Measuring Lumen Maintenance of LED Lighting Sources

IESNA TM-15-11 (revised); Luminaire Classification System for Outdoor Luminaires

RoHS (European Union Directive 2002/95/EC for Restriction of Hazardous Substances)

Title 47 of the Code of Federal Regulations (CFR), Part 15; Radio Frequency Devices

UL 1598; Luminaires; UL

4. Requirements

4.1 Luminaire Performance

Operating temperature, range	
°C	-20 to +50
°F	-4 to +122
Correlated Color Temperature (CCT), nominal, °K, per ANSI/NEMA/ANSI C78.377	4000 ± 300
Color rendering index (CRI), minimum	70
Lumen depreciation of LED light sources per IES LM-80	LED module(s)/ array(s) shall deliver at least 70% of initial lumens (L ₇₀), when installed for a minimum of 100,000 hours
Light distribution per IES Handbook, chapter 22	Type II Medium
Backlight, Uplight and Glare (BUG) rating per IESNA TM-15, Addendum A	B3, U0, G3
Zonal luminance distribution, of maintained lumen output, per IESNA TM-15	
FL + FM + FH	50–75%
FVH	1–3%
BL + BM	15–35%
BH + BVH	0–10%
UL + UH	0%
Luminaire efficacy, type II distribution, lumens/watt, minimum, per IES LM-79, Section 11.0	90
Off-state power consumption, W, maximum	0.5
On-state power consumption, excluding control device, watt, maximum	195
Luminous flux distribution at median driver current, lumens, minimum	18850
Effective projected area (EPA), maximum, ft ²	1.0
Total harmonics distortion at full power across specified voltage range, maximum	20%
Vibration withstand, minimum, per ANSI C136.31	Level 2 (bridge/overpass application)

4.2 Power Supply/Driver

Input voltage, functional range, 60 Hz, VAC	120 to 277
Power factor, minimum	0.90
Surge protection, per ANSI C136.37 and ANSI/ IEEE C62.41.2	
High exposure	10 kV
Low exposure	6 kV
Interference	FCC 47 CFR part 15/18, Class A
Dimming signal, control range, VDC	0 to 10

4.3 Construction

4.3.1. General

The luminaire shall be designed and constructed to meet the requirements of ANSI C136.37.

Luminaire features conforming to ANSI C136.37 shall include, but not be limited to: mounting provisions, latching and hinging, terminal blocks, dimming, ingress protection, wiring and grounding, and photo-control receptacle.

Luminaire shall be RoHS (European Union Directive 2002/95/EC for Restriction of Hazardous Substances) compliant. Luminaire shall have less than the maximum concentration values of the following RoHS restricted substances:

- Mercury (Hg)
- Cadmium (Cd)
- Chromium VI (Cr +6)
- Polybrominated biphenyl (PBB)
- Polybrominated biphenyl ether (PBDE)
- Lead (Pb).

4.3.2. Fixture Housing

Luminaire housing shall be cast aluminum.

Luminaire housing shall allow tool-less entry.

Luminaire housing shall be provided with a level bubble to facilitate installation.

Luminaire external housing shall have a minimum rating of IP65 as specified in IEC 60529, with the ability to shed water from inside the housing (i.e.; weep holes).

Luminaire door shall be securely hinged and incapable of involuntary separation from housing when accessed in field-installed position.

The luminaire optical chamber shall have a minimum rating of IP66 as specified in IEC 60529.

Luminaire cooling system shall consist of a passive heat sink with no fans, pumps, or liquids.

All fasteners shall be stainless steel.

All polycarbonate components shall be UV stabilized.

Complete assembly weight shall not exceed 40 lb.

Maximum estimated projected area shall not exceed 0.9 sq ft.

Luminaire design shall facilitate hose-down cleaning and discourage debris accumulation.

4.3.3. Electrical

Power supply/driver shall be provided with a control signal interface with operating range of 0 to 10 Vdc for dimming.

Luminaire photocontrol receptacle shall be designed and constructed to accept a standard plug type, locking, three-pole, three-wire, streetlight photo control. Photocontrol receptacle shall also be configured with the addition of a minimum of two conductive pads, as defined in ANSI C136.41. Four conductive pads are optional.

The two conductive pads shall be connected to the 0-10 Vdc control signal interface on the power supply/driver with quick-disconnect connectors.

Rotational adjustment of the photo control shall be tool-less.

Luminaire circuitry shall include *quick connect/disconnects*.

Wire harnesses shall be protected with a spiral wrap to prevent damage to the wire insulation when operating the power door.

A three-pole terminal block capable of accepting #14 to #6 AWG wire shall be mounted to the housing inside the electrical compartment.

Terminal block shall be capable of operation with a standard #2 flat blade screwdriver.

Luminaire shall meet the requirements of Title 47 of the Code of Federal Regulations (CFR), Part 15 – Radio Frequency Devices.

4.3.4. Mounting

Luminaire shall be 4 bolts and designed to mount on a 2-in nominal pipe size (NPS) tenon.

Luminaire shall be capable of ± 5 degrees of tilt, minimum, for leveling adjustment and labeled properly.

Tenon mounting area opening shall be limited to 1/4-inch over the range of tenon sizes and leveling adjustment to prevent entrance of wildlife as specified in ANSI C136.37.

Methods of limiting tenon mounting area shall provide safe access for temporary service feeds entering directly through the tenon opening without damaging service wires.

4.3.5. Backlight Control

Luminaire shall be provided with the capability for optional, field-installed backlight control.

Backlight control shall be no more than two pieces.

Backlight control shall be installed using stainless steel fasteners and be provided by the manufacturer. Screw drive type shall be slotted or Phillips.

In addition to required amount, each backlight shield shall be supplied with two additional fasteners.

4.4 Finish

Luminaire housing finish shall be gray.

Painted or finished luminaire components exposed to the environment shall exceed a rating of six per ASTM D1654 after 1000 hours of testing per B117.

Painted or finished luminaire components exposed to the environment shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.

4.5 Certification and Listing

Power supply/driver shall be UL recognized for dry and damp locations.

All other electrical components shall be UL listed or recognized for wet locations.

5. Testing

Test data that establishes compliance with the requirements of this material standard shall be provided upon request.

Certificate of RoHS (European Union Directive 2002/95/EC for Restriction of Hazardous Substances) compliance shall be provided upon request.

6. Product Approval

Manufacturers interested in having their luminaire(s) approved for purchase by Seattle City Light must participate in the stepped process summarized below. Contact Streetlight Engineering for the details.

- Review fixture test reports
- Computer modeling of fixture light distribution
- Laboratory testing of sample fixture and shield
- Field trial of sample fixture(s) and shield(s)
- Field trial review and evaluation

Manufacturers are encouraged to plan accordingly. The approval process can take up to six months to complete.

7. Design Changes

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

8. Marking

8.1 Internal Labeling

A readily visible label shall be permanently affixed to the inside surface of each luminaire housing.

Internal label shall meet the requirements of ANSI C136.22.

Internal label shall include, but not be limited to, the following information:

- Manufacturer's name and catalog number
- Month and year of manufacture
- Line input voltage
- Frequency if other than 60 hertz
- Driver type (if applicable)(may be on Driver if readily visible)
- Photo control voltage if different from line input voltage
- Lamp type, wattage, and voltage (if applicable; may be on Driver if readily visible)
- Descriptive wiring diagram showing input terminals, ballast, capacitors, starting aid, photo control receptacle, lamp, and the like, as necessary
- Plant location
- Input power consumption
- Driver output current
- Driver output adjustment
- IEC IP rating
- Correlated color temperature (CCT)
- IES light distribution type
- IESNA TM-15 BUG ratings
- Serial number.

8.2 External Marking

A readily visible marker shall be permanently affixed to the outside surface of each luminaire housing.

External marker shall meet the requirements of ANSI C136.15.

External marker type shall be large per ANSI C136.15.

8.3 Barcode

A barcode label shall be provided as specified in the purchase order.

8.4 Component Identification

All UL listed components shall be labeled or recognized as such.

9. Packaging

Luminaires shall be individually packaged to prevent damage during shipping, inside storage, and casual handling prior to installation.

Each package shall be legibly marked with:

- Manufacturer's name
- Manufacturer's catalog number
- Product description
- Date of manufacture (month and year)
- Seattle City Light's stock number
- Seattle City Light's purchase order number.

Accessories shall be individually packaged to prevent damage during shipping, inside storage, and casual handling prior to installation.

Each package shall be legibly marked with:

- Product description
- Seattle City Light's stock number.

10. Issuance

EA

11. Approved Manufacturers – Luminaires, Stock Number 013495

Manufacturer: Leotek

Catalog No.: GC2-90F-MV-NW-2-GY-700-WL-PCR7

where:

- GC2 = product
- 90F = number/LED type, 90F
- MV = voltage, 120–277 V
- NW = nominal color temperature, 4000 K
- 2 = light distribution, type II
- GY = finish, gray
- 700 = options, factory set 700 mA
- WL = accessories, wattage label = "195"
- PCR7 = photocell option, seven pins

12. Approved Manufacturers – Accessories

12.1 Leotek Shield, Current Generation

Stock No.:	013895
Description:	House-side shield for Leotek, type GC2-90F, LED streetlight luminaires
Application:	Installed on Leotek, type GC2-90F, LED streetlight luminaires to mitigate house side backlighting problems. Streetlight Engineering must pre-approve all installations of luminaire shields. Contact Streetlight Engineering for details.
Manufacturer:	Leotek
Catalog No.:	HSS-GC2-90F

12.2 Leotek Shield, Previous Generation

Stock No.:	013496
Description:	House-side shield for Leotek, type GC2-120E, LED streetlight luminaires
Application:	Installed on Leotek, type GC2-120E.
Manufacturer:	Leotek
Catalog No.:	HSS-GC2-120

13. Sources

Chao, Yaochiem; SCL Standards Engineer, originator and subject matter expert for 5723.71; (yaochiem.chao@seattle.gov)

Darrat, Ahmed; SDOT Traffic Engineer and subject matter expert for 5723.71; (ahmed.darrat@seattle.gov)

City of Seattle, Standard Specifications; Section 9 -31.1(2)-Luminaires

Federal Communications Commission Title 47 CFT; Part 15/18, revision 05/10/11; www.fcc.gov

IESNA Lighting Handbook; Chapter 22,9th Edition; Roadway Lighting

IESNA Lighting Ready Reference, A Compendium of Materials from the IESNA Lighting Handbook; 9th Edition, RR-03 Fourth Edition

Leotek GC2_010716; Leotek Documentation; revision 01/07/16

Los Angeles Bureau of Street Lighting; Credit for cover photo on page 1

RW-ATB2; Autobahn Series ATB2 Roadway Lighting; American Electric Lighting, revision 11/21/13

Specification for LED Roadway Luminaires; Seattle City Light, January 2012

UL 1012 - Power Units Other Than Class 2

UL 1310 - Class 2 Power Units

UL 2108 - Low Voltage Lighting Systems

UL 8750 - Light-Emitting Diode (LED) Light Sources for Use in Lighting Products