

1. GENERAL

1.1 References Standards

- .1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE C62.41-2002, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
- .2 ASTM International Inc.
 - .1 ASTM F1137-00(2006), Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
- .3 CSA Group (CSA).
- .4 CAN/CSA-C22.2 No.65 Wire Connectors.
- .5 CAN/CSA-C22.2 No.18.1-13 Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .6 EEMAC 1Y-2 Bushing Stud Connectors and Aluminum Adapters.
- .7 ICES-005-07, Radio Frequency Lighting Devices.
- .8 Underwriters' Laboratories of Canada (ULC).

1.2 Action and Informational Submittals

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide complete photometric data for approval by Departmental Representative.
- .3 Samples:
 - .1 Provide samples for approval by Departmental Representative.
- .4 Quality assurance submittals: provide following in accordance with Section 01 45 00- Quality Control :
 - .1 Provide CSA certified equipment.
 - .2 Where CSA certified equipment is not available, submit such equipment to inspection authorities for approval before delivery to site.
- .5 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.3 Quality Assurance

- ~~.1 Quality Assurance: in accordance with Section 01 45 00- Quality Control.~~



- .2 Qualifications: electrical work to be carried out by qualified, licensed electricians, by a master electrician or by an electrical contractor who holds a valid license as per the conditions of the Act of the territory in which work is to be executed.
 - .1 Employees registered in provincial apprentice program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

1.4 **Delivery, Storage and Handling**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

2. **PRODUCTS**

2.1 **Lamps**

- .1 Light Emitting Diodes (LED) as indicated in luminaire description.

2.2 **Ballasts**

- .1 Not applicable.

2.3 **LED Drivers**

- .1 Drivers for LED modules as indicated in luminaire description.

2.4 **Finishes**

- .1 Light fixture finish and construction to meet ULC listing and CSA certification related to intended installation.

2.5 **Optical Control Devices**

- .1 As indicated in luminaire description.

2.6 Luminaires

.1 Type L1-04:

- .1 ~~Description: Dynamic White suspended direct/indirect LED luminaire, to be suspended on aircraft cables from ceiling. Open aperture dosing with fully luminous interior. No horizontal lenses or diffusers. No direct view of the light source.~~
- .2 ~~Housing: Anodised, extruded and machined architectural grade aluminium. Stainless steel fasteners.~~
- .3 ~~Mounting method : Suspended by stainless steel aircraft cable. Site adjustable with cable grippers.~~
- .4 ~~Optics : Anidolic optical structures with linear light extraction elements. Precision extruded high transmittance clear acrylic lenses. Dynamic white LED array with range from 2700-6500K.~~
- .5 ~~Lighting Distribution: Diffuse 15% Up, 85% Down.~~
- .6 ~~Enclosure rating: Dry locations.~~
- .7 ~~Enclosure color: Clear anodized.~~
- .8 **Driver: 120V integral electronic driver, dimmable and color temperature control. Driver Lumenetix, eldoLED DUALdrive LightShape or equivalent. The driver must be 100% compatible with the Network lighting control system, to be coordinated with the control supplier.**
- .9 ~~LV power cords and aircraft cables: to be coordinated, variable from 1,5 meter to 3.~~
- .10 ~~Light source: LEDs source, 38 watts/4ft, 4550 lumens/4ft. Tested in accordance with LM-79/LM-80-8 (results and calculated per IESNA TM-21-11 methodology). 200 000hrs@L70.~~
- .11 ~~Color temperature: Dynamic white LED (variable from 2700°K to 6500°K).~~
- .12 ~~Light output: 4550 Lumens/4ft or higher at 25°C.~~
- .13 ~~Power and Voltage: 38W/4ft at 120V, 60 Hz.~~
- .14 ~~Dimensions: Length: 1230mm x Width: 83 mm x Height: 79 mm.~~
- .15 ~~Fixture weight = ± 3.6 Kg/4ft.~~
- .16 ~~Operating Temperature: max.: 35°C.~~
- .17 ~~Controls: Network lighting control (dimmable and color temperature control).~~
- .18 ~~Standard Certification: CSA.~~
- .19 ~~Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.~~
- .20 ~~Typical appearance for type L1-04:~~



- .21 **Acceptable Product:**
- .1 ~~Lumenpulse serie FLUXWERX model PF1 F D D W2 A 04 S M 12 (Network lighting control driver).~~
- .22 **Equivalent to acceptable product: Axis Lighting, Lumenwerx.**

~~.2 Types L1-06:~~

- ~~.1 Dimensions: Length: 1828mm x Width: 83 mm x Height: 79 mm.~~
- ~~.2 Typical appearance for type L1-06:~~

~~.3 Acceptable Product:~~

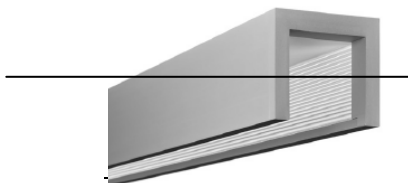
- ~~.1 Lumenpulse serie FLUXWERX model PF1 F D D W2 A 06 S M 12 (Network lighting control driver).~~
- ~~.4 Equivalent to acceptable product: Axis Lighting, Lumenwerx.~~

~~.3 Type L1A:~~

- ~~.1 Description: Suspended direct/indirect LED luminaire, to be suspended on aircraft cables from ceiling. Open aperture design with fully luminous interior. No horizontal lenses or diffusers. No direct view of the light source.~~
- ~~.2 Housing: Anodised, extruded and machined architectural grade aluminium. Stainless steel fasteners.~~
- ~~.3 Mounting method : Suspended by stainless steel aircraft cable. Site adjustable with cable grippers.~~
- ~~.4 Optics : Anidolic optical structures with linear light extraction elements. Precision extruded high transmittance clear acrylic lenses.~~
- ~~.5 Lighting Distribution: Diffuse 15% Up, 85% Down.~~
- ~~.6 Enclosure rating: Dry locations.~~
- ~~.7 Enclosure color: Clear anodized.~~
- ~~.8 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.~~
- ~~.9 LV power cords and aircraft cables: to be coordinated, variable from 1,5 meter to 3.~~
- ~~.10 Light source: LEDs source, 38 watts, 4550 lumens. Tested in accordance with LM-79/LM-80-8 (results and calculated per IESNA TM-21-11 methodology). 200-000hrs@L70.~~
- ~~.11 Color temperature: 3000°K.~~
- ~~.12 Light output: 4550 Lumens or higher at 25°C.~~
- ~~.13 Power and Voltage: 38W at 120V, 60 Hz.~~
- ~~.14 Dimensions: Length: 1230mm x Width: 83 mm x Height: 79 mm.~~
- ~~.15 Fixture weight = ± 3.6 Kg.~~
- ~~.16 Operating Temperature: max.: 35°C.~~
- ~~.17 Controls: Switch On/Off.~~
- ~~.18 Standard Certification: CSA.~~
- ~~.19 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.~~



.20 Typical appearance for type L1A:



.21 Acceptable Product:

.1 Lumenpulse serie FLUXWERX model PF1-F-D-D-30-A-04-S-F2-M-12.

.22 Equivalent to acceptable product: Axis Lighting, Lumenwerx.

4 Type L1-04:

.1 Description: Dynamic White suspended direct/indirect LED luminaire, to be suspended on aircraft cables from ceiling. Wide 3D light distribution between ceiling and wall. The lighting distribution should reduce the "cave effect" and increase the perceived brightness.

.2 Glare mitigation: Spotless lenses yield lower luminance on the luminaire's light-emitting area.

.3 Housing: Extruded aluminium fixture complete with end cap.

.4 Mounting method : Suspended by stainless steel aircraft cable. Site adjustable with cable grippers.

.5 Optics : Spotless lens. Dynamic white LED array with range from 2700-6500K.

.6 **Lighting Distribution: Diffuse 40% Up, 60% Down.**

.7 **Lighting Distribution: Diffuse 60% Up, 40% Down.**

.8 Enclosure rating: Dry locations.

.9 Enclosure color: Clear anodized.

.10 Driver: 120V integral electronic driver, dimmable and color temperature control. Driver Lumenetix or equivalent. The driver must be 100% compatible with the Network lighting control system, to be coordinated with the control supplier.

.11 LV power cords and aircraft cables: to be coordinated, variable from 1,5 meter to 3.

.12 **Light source: LEDs source, 19 watts/ft, 1750 lumens/ft. Minimum 50 000h with 85% of lumen maintenance in 25°C ambient temperature, in compliance with IES LM-80 testing measurement.**

.13 **Color temperature: Dynamic white LED to simulate the human circadian rhythm (variable from 2700°K to 6500 °K).**

.14 **Light output: 1750 Lumens/ft or higher at 25°C.**

.15 **Light output: 2250 Lumens/ft or higher at 25°C.**

.16 **Power and Voltage: 19W/ft at 120V, 60 Hz.**

.17 **Power and Voltage: 26W/ft at 120V, 60 Hz.**

.18 Dimensions: Length: 1220mm x Width: 105 mm x Height: 140 mm.

.19 Fixture weight = ± 8.2 Kg/4ft.

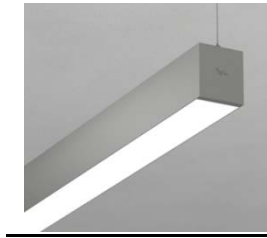
.20 Operating Temperature: max.: 35°C.

.21 Controls: Network lighting control (dimmable and color temperature control to simulate the human circadian rhythm).

.22 Standard Certification: CSA.



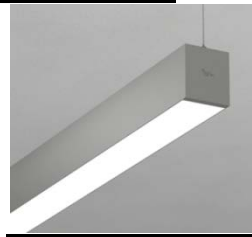
- .23 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
- .24 Typical appearance for type L1-04:



- .25 Acceptable Product :
- .1 Axis Lighting, Beam4 Surroundlite, model BBLED2-SL-700-1000-80-SO-4-AP-120-1(Network lighting control driver).
- .2 Axis Lighting, Beam4 Surroundlite, model BBLED2-SL-1250-1000-80-SO-4-AP-120-1(Network lighting control driver).
- .26 Equivalent to acceptable product: Lumenpulse, Lumenwerx.



- .5 Types L1-06:
- .1 Description: Same characteristic as type L1-04, except for the following features:
- .2 Dimensions: Length: 1860mm x Width: 105 mm x Height: 140 mm.
- .3 Typical appearance for type L1-06:



- .4 Acceptable Product :
- .1 Axis Lighting, Beam4 Surroundlite, model BBLED2-SL-700-1000-80-SO-6-AP-120-1(Network lighting control driver).
- .2 Axis Lighting, Beam4 Surroundlite, model BBLED2-SL-1250-1000-80-SO-6-AP-120-1(Network lighting control driver).
- .5 Equivalent to acceptable product: Lumenpulse, Lumenwerx.



- .6 Type L1A:
- .1 Description: Suspended direct/indirect LED luminaire, to be suspended on aircraft cables from ceiling. Wide 3D light distribution between ceiling and wall. The lighting distribution should reduce the "cave effect" and increase the perceived brightness.
- .2 Glare mitigation: Spotless lenses yield lower luminance on the luminaire's light-emitting area.
- .3 Housing: Extruded aluminium fixture complete with end cap.



- .4 Mounting method : Suspended by stainless steel aircraft cable. Site adjustable with cable grippers.
- .5 Optics : Spotless lens. Dynamic white LED array with range from 2700-6500K.
- .6 ~~Lighting Distribution: Diffuse 40% Up, 60% Down.~~
- .7 Lighting Distribution: Diffuse 60% Up, 40% Down.
- .8 Enclosure rating: Dry locations.
- .9 Enclosure color: Clear anodized.
- .10 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
- .11 LV power cords and aircraft cables: to be coordinated, variable from 1.5 meter to 3.
- .12 Light source: LEDs source, ~~19 watts/ft, 1750 lumens/ft.~~ Minimum 50 000h with 85% of lumen maintenance in 25°C ambient temperature, in compliance with IES LM-80 testing measurement.
- .13 Color temperature: 3000°K.
- .14 Light output: 1750 Lumens/ft or higher at 25°C.
- .15 Light output: 2250 Lumens/ft or higher at 25°C.
- .16 Power and Voltage: 19W/ft at 120V, 60 Hz.
- .17 Power and Voltage: 26W/ft at 120V, 60 Hz.
- .18 Dimensions: Length: 1220mm x Width: 105 mm x Height: 140 mm.
- .19 Fixture weight = ± 8.2 Kg/4ft.
- .20 Operating Temperature: max.: 35°C.
- .21 Controls: Network lighting control (dimnable and color temperature control).
- .22 Standard Certification: CSA.
- .23 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
- .24 Typical appearance for type L1A :



- .25 Acceptable Product :
- .1 ~~Axis Lighting, Beam4 Surroundlite, model BBLED2-SL-700-1000-80-30-SO-4-AP-120-DP-1.~~
- .2 Axis Lighting, Beam4 Surroundlite, model BBLED2-SL-1250-1000-80-30-SO-4-AP-120-DP-1.
- .26 Equivalent to acceptable product: Lumenpulse, Lumenwerx.

- .7 Type L2:
- .1 Description: Indoor, recessed 2x2 LED panel light with lightweight aluminum frame. The frame houses three layers, LED chips, a light guide and an opal PMMA lens for soft illumination.
- .2 Housing: Aluminum frame with anti-static thermoplastic coating.

- .3 Mounting method: Mounting with spring clips brackets on housing sides; to ceiling framing.
- .4 Optics: Opal PMMA lens. The fixture lens provides 110° beam spread.
- .5 Lighting Distribution: symmetrical diffuse
- .6 Accessories: Recessed mounting clips for use with LED panel.
- .7 Enclosure rating: Dry locations
- .8 Enclosure color: White
- .9 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
- .10 Light source: LEDs, 40 watts, 4200 lumens/603x603mm. Tested in accordance with LM-79/LM-80 8 (results and calculated per IESNA TM-21-11 methodology). Designed to 50 000hrs@L70.
- .11 Light output: 4200 Lumens or higher at 25°C.
- .12 Color temperature at 3000°K and CRI >=80.
- .13 Power and Voltage: 40W at 120V, 60 Hz;
- .14 Dimensions: Square form, Length: 603 mm x Width: 603 mm x Height: 10 mm (48 mm total height with the driver).
- .15 Operating Temperature: max.: 40°C.
- .16 Controls: Switch On/Off.
- .17 Standard Certification: CSA
- .18 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
- .19 Typical appearance for type L2:



- .20 Acceptable Product :
 - .1 Liteline model LEDP-22-WH-30-40-120/277.
- .21 Equivalent to acceptable product: RayonLED, STANPRO.

.8 Type L3-04:

- .1 Description: Dynamic White Cove linear LED luminaire, to be surface mount.
- .2 Housing: Extruded aluminium and die cast aluminum end cap.
- .3 Mounting method : Surface mount.
- .4 Optics : SurroundLite optics with 180 degree distribution. Dynamic white LED array with range from 2700-6500K.
- .5 Lighting Distribution: Diffuse 15% Up, 85% Down.
- .6 Enclosure rating: Dry locations.
- .7 Enclosure color: Clear anodized.
- .8 **Driver: 120V integral electronic driver, dimmable and color temperature control. Driver Lumenetix or equivalent. The driver must be 100% compatible with the Network lighting control system, to be coordinated with the control supplier.**
- .9 Light source: LEDs source, 13.5 watts/ft, 1100lumens/ft. Tested in accordance with LM-79/LM-80 8 (results and calculated per IESNA TM-21-11 methodology). 50 000hrs@L80.
- .10 Color temperature: Dynamic white LED (variable from 2700°K to 6500 °K).

- .11 Light output: 1100 Lumens/feet or higher at 25°C.
- .12 Power and Voltage: 13.5W/feet at 120V, 60 Hz.
- .13 Dimensions: Length: 1230mm x Width: 90 mm x Height: 41 mm.
- .14 Fixture weight = \pm 2.7 Kg.
- .15 Operating Temperature: max.: 35°C.
- .16 Controls: Network lighting control (dimnable and color temperature control).
- .17 Standard Certification: CSA.
- .18 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
- .19 Typical appearance for type L3-04:



- .20 Acceptable Product :
 - .1 Axislighting serie CovePerfect model: CCH-SL-1100-80-CL2-W-120((Network lighting control driver).
- .21 Equivalent to acceptable product: Lumenpulse, Philipps, Lithonia.

.9 Types L3-02:

- .1 Description: Same characteristic as type L3-04, except for the following features:
- .2 Dimensions: Length: 609mm x Width: 90 mm x Height: 41 mm.

- .3 Typical appearance for type L3-02:



- .4 Acceptable Product :
 - .1 Axislighting serie CovePerfect model: CCH-SL-1100-80-CL2-W-120((Network lighting control driver).
- .5 Equivalent to acceptable product: Lumenpulse, Philipps, Lithonia.

.10 Types L3-05:

- .1 Description: Same characteristic as type L3-04, except for the following features:
- .2 Dimensions: Length: 1524mm x Width: 90 mm x Height: 41 mm.
- .3 Typical appearance for type L3-05:



- .4 Acceptable Product :
 - .1 Axislighting serie CovePerfect model: CCH-SL-1100-80-CL2-W-120((Network lighting control driver).
- .5 Equivalent to acceptable product: Lumenpulse, Philipps, Lithonia.

- .11 Type L4:
 - .1 Description: Architectural Downlight, round 100mm aperture for general lighting distribution recessed in tile or gypsum ceiling. Design for new construction. Light engine, optics, and driver accessible from below ceiling.
 - .2 Enclosure: 16-gauge galvanised steel construction, standard 51mm aperture throat to accommodate all standard and extra-thick ceilings and provide flexibility in mounting within grid. Housing and trim to be supplied as one complete unit.
 - .3 Housing finish: Initial color within a 3-step MacAdam Ellipse.
 - .4 Mounting method: Recessed in tile or gypsum ceiling. When use in tile ceiling, T - bar clips are included. Provided with quick mounting brackets and carrying channels.
 - .5 Optics: Low brightness parabolic spun Alzak aluminum cone, 2mm thick with polished radius and continuous self-flange.
 - .6 Enclosure rating: Dry location
 - .7 Enclosure color: White
 - .8 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
 - .9 Light source: High efficiency and performance LEDs mixing the light from red and unsaturated yellow LEDs to create beautiful, warm, white light. 60,000 hour rated life (defined as 70% lumen maintenance.).
 - .10 Color temperature: 3000 °K.
 - .11 Light output: Initial Delivered Lumens 2500 lumens or higher at 25°C Ambient.
 - .12 Power and Voltage: 29 W at 120V, 60 Hz; P.F.: >0.9
 - .13 Dimensions: Round form, diameter: 133mm mm x Height: 168mm.
 - .14 Controls: Switch On/Off.
 - .15 Standard Certification: ETL or cUL
 - .16 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
 - .17 Typical appearance for type L4:



- .18 Acceptable Product :
 - .1 Gotham, model: EVO-30-25-4AR-WD-LSS-120-EZ10
- .19 Equivalent to acceptable product: Axis Lighting, Philips, Lithonia.

- .12 Type L5:
 - .1 Description: Suspended direct LED strip, to be suspended on cables from ceiling.
 - .2 Housing: Channel and cover are formed from code-gauge, cold-rolled steel.
 - .3 Housing finish: Baked white enamel and five-stage phosphate pre-treatment
 - .4 Mounting method: Suspended by aircraft cable with hook.
 - .5 Optics: Diffuse lens.
 - .6 Lighting Distribution: Diffuse 100% Down.
 - .7 Enclosure rating: Damp locations.
 - .8 Enclosure color: White
 - .9 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
 - .10 Light source: LEDs, 42 watts. Tested in accordance with LM-79-08/LM-80 (results and calculated per IESNA TM-21-11 methodology). Designed to 100 000hrs@L70.
 - .11 Color temperature: 3500 °K.
 - .12 Light output: 3000 Lumens or higher at 25°C.
 - .13 Power and Voltage: 42W at 120V, 60 Hz
 - .14 Dimensions: Length: 1222mm x Width: 8.3 mm x Height: 8.9 mm.
 - .15 Fixture weight = ± 3.6 Kg.
 - .16 Operating Temperature: max.: 35°C.
 - .17 Controls: Switch On/Off.
 - .18 Standard Certification: CSA
 - .19 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
 - .20 Typical appearance for type L5:



- .21 Acceptable Product :
 - .1 Lithonia Lighting, model ZL2N-L48-3000LM-MDD-MVOLT-35K-80CRI-WH-ZACVH
- .22 Equivalent to acceptable product:
 - .1 Philips, Cooper, Hubbell.

- .13 Type L6:
- .1 Description: Wall mounted direct/indirect double optic linear LED luminaire with integral line voltage driver. Fixtures are slim footprint with no visible LED dots or socket shadows.
 - .2 Housing: Extruded aluminum housing with cast aluminum end caps
 - .3 Housing finish: Electro-statically applied polyester powder coat finish.
 - .4 Mounting method: Wall mounted.
 - .5 Optics: Frosted extruded acrylic lens with wide flood direct/indirect optic.
 - .6 Enclosure rating: Dry location with IK05 rating.
 - .7 Enclosure color: White.
 - .8 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
 - .9 Light source: LEDs, 6 watts/ft, direct 492 lumens/305mm, indirect 506 lumens/ft. Tested in accordance with LM-79-08/LM-80 (results and calculated per IESNA TM-21-11 methodology). Designed to 100 000hrs@L70.
 - .10 Color temperature: 3000°K.
 - .11 Light output: direct 985 lumens/ft, indirect 492 lumens/ft or higher at 25°C.
 - .12 Power and Voltage: Direct 12W/ft, indirect 6W/ft at 120V, 60 Hz.
 - .13 Dimensions: Length: 1216 mm, Width: 115 mm x Height: 84 mm.
 - .14 Fixture weight = 0.95 kg/314mm
 - .15 Operating Temperature: max.: -25 to 50°C.
 - .16 Controls: Switch On/Off.
 - .17 Standard Certification: CUL
 - .18 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
 - .19 Typical appearance for type L6:



- .20 Acceptable Product :
 - .1 LUMENPULSE serie Lumenline Direct/Indirect, model LLI2S-WM-DI-120-SU4-dHO30K-WFL- iRO30K-WFL-DIM-WH
 - .21 Equivalent to acceptable product:
 - .1 Axis Lighting, Lithonia Lighting, Philipps.
- .14 Type L7:
- .1 Description: Surface mounted fixture to use for under cabinet task lighting with on/off rocker switch.
 - .2 Housing: Aluminum housing.
 - .3 Mounting method: surface mounted to millwork.
 - .4 Optics: Frosted acrylic lens
 - .5 Lighting Distribution: Diffuse direct
 - .6 Enclosure rating: Damp location
 - .7 Enclosure color: White
 - .8 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.

- .9 Light source: 7.5watts/ft, 420lumens/ft. Tested in accordance with LM-79-08/LM-80 (results and calculated per IESNA TM-21-11 methodology). Designed to 50 000hrs@L70.
- .10 Color temperature at 3000°K and CRI >=90.
- .11 Light output: 67lumens/ft or higher at 25°C.
- .12 Power and Voltage: 6W/ft at 120V, 60 Hz;
- .13 Dimensions: Width: 9.2 mm x Height: 2.54 mm, Length: as indicated in drawings.
- .14 Fixture weight = 0.66kg
- .15 Operating Temperature: max.: -25 to 50°C.
- .16 Controls: on/off rocker switch.
- .17 Standard Certification: CUL
- .18 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
- .19 Typical appearance for type L7:



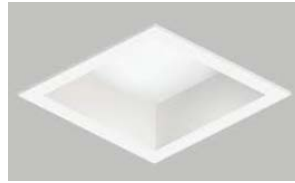
- .20 Acceptable Product :
 - .1 Lithonia Lighting, model UCLD-30K-90CRI-SWR-WH (Length as indicated in drawings, to be coordinated with furniture).
- .21 Equivalent to acceptable product: Philips, Cooper, Hubbell.

- .15 Type L9:
 - .1 Description: Vandal resistant Outdoor LED wall pack fixture. Fixture with full cut-off optics to achieve completely unobtrusive illumination. It provides water protection in the form of a drip cap over the doorway.
 - .2 Housing: Marine grade extruded aluminum.
 - .3 Housing Finish: Polyester powder coat.
 - .4 End caps: Die-cast marine grade aluminum continuously welded to housing. All welds ground smooth.
 - .5 Mounting method: Wall mounted, designed to provide quick mounting to housing and secured with two captive stainless steel head TORX screws.
 - .6 Lens frame: Marine grade heat treated extruded aluminum, clear anodises. Secured to fixture via integral concealed hinge and three captive stainless steel TORX head screws.
 - .7 Lens: UV stabilized diffused extruded polycarbonate.
 - .8 Reflector: Electrostatically brightened anodised aluminum PVD coated and absolutely color free of iridescence. Shaped to provide full cutoff, LED point dispersion and maximum efficiency.
 - .9 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
 - .10 Gaskets: Closed cell self-adhesive neoprene to provide watertight seal between fixture and wall and fixture and lens frame.
 - .11 Controls: Control via exterior lighting control panel.
 - .12 Color temperature: 3500°K and CRI >=70.
 - .13 Light output: 1230 lumens/ ft or higher at 25°C.

- .14 Power and Voltage: 12 W/ft at 120V, 60 Hz; P.F.:>0.9, T.H.D.:<20% .
- .15 Dimensions: Length: 320mm x Width: 54 mm x Height: 36 mm.
- .16 Enclosure rating: Suitable for WET location.
- .17 Enclosure color: Silver.
- .18 Operating Temperature: Min.-40°C, max.: 40°C.
- .19 Standard Certification: cUL.
- .20 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
- .21 Typical appearance for type L9:

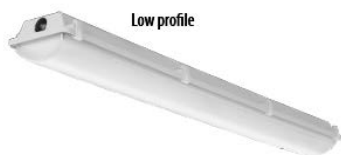


- .22 Acceptable Product :
 - .1 Kenall, model FNL6-12-CC-CP-1-12L35K-DCC-1-120-9500
- .23 Equivalent to acceptable product:
 - .1 Philips, Lithonia, Cooper, Hubbell.
- .16 Type L11:
 - .1 Description: Exterior LED Downlight, square aperture for general lighting distribution recessed in exterior ceiling. Design for new construction. Light engine, optics, and driver accessible from below ceiling.
 - .2 Enclosure: 20 gauge steel, black powder coated finish. Housing and trim to be supplied as one complete unit.
 - .3 Mounting method: Recessed in exterior ceiling. Provided with quick mounting brackets and carrying channels.
 - .4 Enclosure rating: Wet location IP54.
 - .5 Enclosure color: White
 - .6 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
 - .7 Light source: High efficiency and performance LEDs mixing the light from red and unsaturated yellow LEDs to create beautiful, warm, white light. 50,000 hour rated life (defined as 70% lumen maintenance.).
 - .8 Color temperature: 3500 °K.
 - .9 Light output: Initial Delivered Lumens 1300 lumens or higher at 25°C Ambient.
 - .10 Power and Voltage: 12 W at 120V, 60 Hz; P.F.: >0.8
 - .11 Dimensions: Square form, 148mm x 148mm.
 - .12 Controls: On/Off.
 - .13 Standard Certification: ETL or cUL
 - .14 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
 - .15 Typical appearance for type L11:



- .16 Acceptable Product :
 - .1 USAI Lighting, model BeveLED-LSTD4-9012-C3-35KS-50-GGBO-WIP54 c/w trim 3110INT-W-B1-S-10.
- .17 Equivalent to acceptable product: Philips, Lithonia.

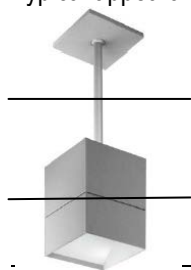
- .17 Type L12:
 - .1 Description: Indoor/ Outdoor vapor resistant LED lighting fixture. Can be surface (wall/ceiling) or suspended mounted.
 - .2 Housing: Non-conductive, non-corrosive housing. Smooth exterior surface for easy cleaning. Continuous closed cell, foam in-place gasket. Inner chassis parts are die-formed code gauge cold rolled steel.
 - .3 Enclosure: IP 65 vapor resistant.
 - .4 Housing finish: Inner chassis exterior - phosphate undercoating, baked white polyester enamel, 84% minimum reflectivity. White molded fiberglass reinforced polyester body. Two gasketed threaded (1/2" trade size) wet location hubs installed on ends.
 - .5 Latches: ABS cam action latches. Lock-tight molded cam-action tension latches, securely clamps lens to fixture.
 - .6 Mounting method: Surface.
 - .7 Optics: High Impact DR acrylic molded lens. Injection molded, one piece impact resistant .125" starting thickness smooth virgin acrylic with crepe inner surface. Lens enclosure fully gasketed to seal fixture from dirt, moisture and other contaminates. Lighting channel has a high reflectance baked white enamel finish.
 - .8 Enclosure rating: Dry or Wet Location UL1598.
 - .9 Enclosure color: White
 - .10 Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
 - .11 Light source: High efficiency LEDs, 60,000 hour rated life at L70. (defined as 70% lumen maintenance.)
 - .12 Color temperature at 3500°K and CRI >=80.
 - .13 Light output: 4000 lumens or higher at 25°C Ambient.
 - .14 Power and Voltage: 31 W at 120V, 60 Hz;
 - .15 Dimensions: Length: 1263 mm, Width: 172 mm x Height: 106 mm.
 - .16 Operating Temperature: max.: -30°C to 40°C.
 - .17 Controls: Switch on/off.
 - .18 Standard Certification: cETL or cUL.
 - .19 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
 - .20 Typical appearance for type L12:



- .21 Acceptable Product :
 .1 Lithonia Lighting, model FEM-448-4000-LPAFL-MD-120-GZ10-35K-8CRI
 .22 Equivalent to acceptable product: Philipps, Cooper, Hubbell.

.18 Type L13:

- .1 ~~Description: Wall wash pendant lighting fixture.~~
 .2 ~~Housing: Die-cast aluminum housing.~~
 .3 ~~Housing finish: Powder coat finish.~~
 .4 ~~Mounting method: Rigid pendant stem mount, 5/8" diameter steel stem complete with canopy.~~
 .5 ~~Lighting Distribution: Wall wash.~~
 .6 ~~Enclosure rating: Dry location.~~
 .7 ~~Enclosure color: White~~
 .8 ~~Driver: Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.~~
 .9 ~~Color temperature at 3000°K and CRI >=80, R9>=10.~~
 .10 ~~Light output: 2400 lumens or higher at 25°C.~~
 .11 ~~Power and Voltage: 24W at 120V, 60 Hz;~~
 .12 ~~Dimensions: Cubic form, Length: 132 mm, Width: 132 mm x Height: 170 mm. Fixture weight = 2.5kg~~
 .13 ~~Controls: On/Off.~~
 .14 ~~Standard Certification: cUL~~
 .15 ~~Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.~~
 .16 ~~Typical appearance for type L13:~~



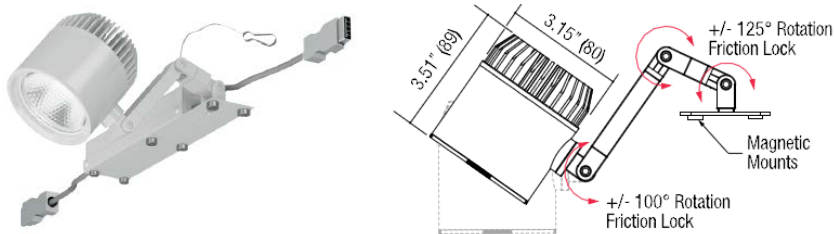
- .17 ~~Acceptable Product:~~
 .1 ~~USAI Lighting, serie BeveLED Block Wall Wash BLSW5-24C3-30KH-WH-PR3-UNV.~~
 .18 ~~Equivalent to acceptable product: Philips, Lithonia, Cooper, Hubbell.~~

.19 Type L13:

- .1 Description: Adjustable cylindrical spotlight fixture, 3.15" diameter cylinder.
 .2 Housing: Die-cast aluminum housing.
 .3 Housing finish: Powder coat finish.



- .4 Mounting method: Side channel magnetic mount with safety cable that should be securely anchored to angle or wall.
- .5 Arm: Adjustable arm that has four points of swiveling adjustment, 125°x125° arm articulation, 90°x90° head rotation, c/w friction lock.
- .6 Enclosure rating: Dry location.
- .7 Enclosure color: White
- .8 Driver: Driver: High efficiency constant current driver. Power Factor: >0.9, THD: <20%.
- .9 Color temperature at 3000°K and CRI =95, R9>=10.
- .10 Light output: 2200 lumens or higher at 25°C.
- .11 Power and Voltage: 28W at 120V, 60 Hz;
- .12 Dimensions: Cylindrical form, Diameter: 80 mm, Height: 89 mm.
- .13 Optical accessories: wallwash optical and linear spread lens.
- .14 Jumper cable: 4' jumper cable for each luminaire, to be coordinated.
- .15 Controls: On/Off.
- .16 Standard Certification: cUL
- .17 Warranty: (5) years including LED boards and driver from the date of shipment to the site, each product will be free from any defects in materials and workmanship which cause the product to fail to operate in accordance with the product's performance specifications as they exist at the time of shipment.
- .18 Typical appearance for type L13:



- .19 Acceptable Product :
- .1 LFillumination, model EF408B-28C-9530-V-D1-1-WW- BLSW5-24C3-30KH-WH-PR3-UNV. Accessories: Wallwash: OPT-EF-208B-WWWW and Linear spread Lens: OPT-EF208B-P-LSL.
- .20 Equivalent to acceptable product: Philips, Lithonia, Cooper, Hubbell.

3. EXECUTION

3.1 Installation

- .1 Locate and install luminaires as indicated.
- .2 Provide adequate support to suit ceiling system.

3.2 Wiring

- .1 Connect luminaires to lighting circuits:
 - .1 Install flexible or rigid conduit for luminaires as indicated.

3.3 Luminaire Alignment

- .1 Align luminaires mounted in continuous rows to form straight uninterrupted line.
- .2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 Lighting Control Sequences

- .1 Program and test all lighting control sequences.
- .2 In addition to base building commissioning, contractor must undertake to program, or subcontract a technician to program, the network lighting control system as per contractual documents/scripting instructions. All dynamic white fixture addresses must be compatible with the network lighting control. Following fixture and controller installation, scene intensity and sequencing must be reviewed and accepted on site by architect and client. Contractor or subcontracted technician is responsible for supplying necessary equipment to access controller and coordinating with Departmental Representative to review final settings.
- .3 To validate functionality of the lighting control system and the program sequence, simulate all different conditions apply to the lighting control system.
- .4 Produce a detailed report confirming lighting control sequence for each room.

End of Section