

Evaluation Table

736 Highway and Sign Lighting

736 Luminaire - (LED Type 15L) Horizontal Mount

ADOT Standard Specification: 736-2.01, 736-2.02

Responsible Section: Traffic Group

Product Property	Specification/ Test Method	Requirement
Highway Lighting Materials: LED	736-2.01	Highway lighting materials shall be Light Emitting Diode (LED), conforming to the requirements of this section and be the type and size specified. The LED shall have a nominal Correlated Color Temperature (CCT) equal to 3,000 degrees K \pm 300 degrees K.
Highway Lighting Materials: LED	736-2.01	LED Luminaires shall be listed by a National Recognized Laboratory (NRTL), as defined by the US Department of Labor. The testing laboratory must be listed by OSHA. A list of the recognized testing labs may be found on the US Department of Labor website at; http://www.osha.gov
Highway Lighting Materials: Requirements	736-2.01(A)(1)	Each luminaire shall be listed by NRTL as being in compliance with UL 1598 and suitable for use in wet locations.
Highway Lighting Materials: Requirements	736-2.01(A)(2) 736-2.01(E)	Each luminaire shall have an (IEC)* 529, Ingress Protection (IP) of 65 or greater for the optical assemblies of the luminaire.
Highway Lighting Materials: Requirements	736-2.01(A)(3)	Each Luminaire shall comply with the Electro Magnetic Interference (EMI), as defined by FCC47 Sub Part 15; CISPR15, CISPR22 Class A (120 volt minimum), EN61000-3-2, -3-3, -4-4, -4-5.
Highway Lighting Materials: Requirements	736-2.01(A)(4)	Each Luminaire shall be tested according to the latest version of IESNA** LM-79. (Provide the LM-79 test results).
Highway Lighting Materials: Requirements	736-2.01(A)(5)	Each Luminaire shall have Lumen maintenance measured per the most current version of IESNA** LM-80. (Provide the LM-80 test results).
Highway Lighting Materials: Requirements	736-2.01(A)(6)	Each Luminaire shall have long term maintenance documented according to IESNA** TM-21; per the latest Version. (Provide the TM-21 Test results).

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Highway Lighting Materials: Requirements	736-2.01(A)(7)	Each Luminaire shall have LM-79, LM-80, and in-situ temperature testing conducted per the US Department of Energy, Lighting Facts Program, per an Approved LED Lighting Facts, Testing Lab (Provide the in-situ Temperature Test results).
Highway Lighting Materials: Luminaire Housing	736-2.01(B)	The luminaire housing shall be made of Cast Aluminum, Grade A383, A380, or A360.
Highway Lighting Materials: Luminaire Housing	736-2.01(B)	The luminaire housing shall be painted gray unless otherwise specified.
Highway Lighting Materials: Luminaire Housing	736-2.01(B)(1)	The luminaire housing shall be tested for 1000 hours of salt spray fog exposure per ASTM B117.
Highway Lighting Materials: Luminaire Housing	736-2.01(B)(2)	The luminaire housing shall have corrosion resistance performance testing per ASTM D1654.
Highway Lighting Materials: Luminaire Housing	736-2.01(B)	The luminaire housing shall be compliant (ANSI) IEEE C136.31, Table 2, Roadway Lighting Equipment-Luminaire Vibration, testing for both normal and bridge/overpass applications.
Highway Lighting Materials: Luminaire Housing	736-2.01(B)	The luminaire housing shall have a (NEMA)*** standard decal, with black lettering, that is visible inside the housing that states; operating voltage, wattage, current range, light type, & be compliant with ANSI C136.15-2015.
Highway Lighting Materials: Electrical Requirements	736-2.01(C)	The luminaire shall fully operate from –40 degrees C to 40 degrees C (-40 degrees F to 104 degrees F).
Highway Lighting Materials: Electrical Requirements	736-2.01(C)	The LED engine is composed of the LED modules, the optical system, the electronic driver, & heat sink, shall have a minimum expected life of 100,000 hrs. at 25 degrees C and 70% of initial lumen output (L70) as calculated per TM21-11.
Highway Lighting Materials: Electrical Requirements	736-2.01(C)	The Luminaire shall have an Integral Dimming Electronic Driver that will Operate over the following Voltage ranges, as specified in the project plans:
Highway Lighting Materials; Electrical Requirements	736-2.01(C)(1)	The Luminaire shall operate over the range of 120 to 240 VAC (rms) ± 10 % at 60 Hz or the voltage option 480 VAC (rms) ± 10 % at 60 Hz.

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Highway Lighting Materials: Electrical Requirements	736-2.01(C)(2)(a)	The Electronic Driver shall have a power factor of .90 at full load.
Highway Lighting Materials: Electrical Requirements	736-2.01(C)(2)(b)	The Electronic Driver shall have a total harmonic distortion of 20 % or less at full load per ANSI C82.77, Harmonic Emission Limits.
Highway Lighting Materials: Electrical Requirements	736-2.01(C)(2)(c)	The Electronic Driver shall have thermal overload protection.
Highway Lighting Materials: Electrical Requirements	736-2.01(C)(2)(d)	The Electronic Driver shall have 10 KA overload/overcurrent protection.
Highway Lighting Materials: Electrical Requirements	736-2.01(C)(2)(e)	The Electronic Driver shall have a shielded and replaceable 20 KV surge protective device, that is compliant with ANSI C62.41 Category C
Highway Lighting Materials: Electrical Requirements	736-2.01(C)(2)(f)	The Electronic Driver shall have an NRTL certified dimming driver that is terminated with quick disconnect wire harnesses. Wire nut termination is not acceptable.
Highway Lighting Materials: LED Performance Requirement	736-2.01(D)	The luminaire shall have a minimum luminaire efficacy of 115 lumens/watt at 3,000 degrees K CCT. The luminaire shall meet the chromaticity requirement as follows:
Highway Lighting Materials: LED Performance Requirements	736-2.01(D)(1)	The colors shall conform to the following color regions based on the 1931 CIE chromaticity diagram.
Highway Lighting Materials: LED Performance Requirements	736-2.01(D)(2)	The luminaire shall have a minimum <u>C</u> olor <u>R</u> endering <u>I</u> ndex (CRI) of 70. The Chromaticity as stated above must be confirmed by an independent test lab or as shown on the LM 79 test report.
Highway Lighting Materials: Warranty	736-2.01(F)	The LED unit, including auxiliary equipment shall have a factory warranty of 5 years against defects in workmanship or materials. The warranty shall cover repair or complete replacement.
Horizontally Mounted LED Luminaires	736-2.02	The luminaires shall be, LED type 15L; as specified in subsection 2.01 based on Type V optical distribution & CCT of 3000 K:
Delivered Lumens	736-2.02	15L \geq 13,000 lumens but < 25L (Delivered Lumens)

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Horizontally Mounted LED Luminaires: Luminaire Housing	736-2.02(A)	The luminaire housing shall have a slip fitter type mounting on normal 1-1/2" (1-2/3" OD) to 2"(2-3/8" OD) by minimum of 4" pipe (Tenon); with stainless or zinc plated clamps fixed with four, 2"by 3/8"zinc plated hexagonal bolts with spring washers
Horizontally Mounted LED Luminaires: Luminaire Housing	736-2.02(A)	The luminaire housing shall include an integral bubble level. The luminaire shall have tilt adjustment of ± 5 degrees, in 2.5 degree increments.
Horizontally Mounted LED Luminaires: Luminaire Housing	736-2.02(A)	The luminaire housing shall allow tool less entry with a hinged, removable door that opens downward to allow access to the electronic components and terminal block. The door shall be secured to prevent accidental opening or dropping.
Horizontally Mounted LED Luminaires: Luminaire Housing	736-2.02(A)	The maximum weight for each type when fully assembled shall be as follows: 15L shall not weigh more than 30 lbs.
Horizontally Mounted LED Luminaires: Luminaire Housing	736-2.02(A)	The luminaire housing shall have an <u>E</u> ffective <u>P</u> rojected <u>A</u> rea (EPA) of no more than 1.5 square feet when viewed from either side or end.
Horizontally Mounted LED Luminaires: Luminaire Housing	736-2.02(A)	The luminaire housing shall be equipped with a seven pin <u>P</u> hoto- <u>E</u> lectric <u>C</u> ontrol <u>R</u> eceptacle (PECR) conforming to ANSI Standard C136.10 and shall be provided with a shorting cap.
Horizontally Mounted LED Luminaires: Electrical Requirements	736-2.02(B)	The terminal block shall be a three-station, tunnel lug terminal board that will accommodate American Wire Gauge (AWG) #6 thru #12 wires.
Horizontally Mounted LED Luminaires Optical Requirements	736-2.02(C)	The luminaire shall have an IESNA** <u>B</u> acklight, <u>U</u> p light, and <u>G</u> lare (BUG) rating as follows:
Horizontally Mounted LED Luminaires Optical Requirements	736-2.02(C)(1)	1. Backlight rating shall not exceed 3
Horizontally Mounted LED Luminaires Optical Requirements	736-2.02(C)(1)	2. Up light rating shall not exceed 0
Horizontally Mounted LED Luminaires Optical Requirements	736-2.02(C)(1)	3. Glare rating shall not exceed: 3 for type_15L