

Evaluation Table

736 Highway and Sign Lighting

736 Luminaire - (LED Type 40L) 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 <u>E</u> lectro <u>M</u> agnetic <u>I</u> nterference (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).

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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).
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)	Each luminaire 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 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 with (ANSI) IEEE C136.31, Table 2, Roadway Lighting Equipment-Luminaire Vibration, for both normal and bridge/overpass applications.

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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)	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 Voltages as specified in the project plans:
Highway Lighting Materials; Electrical Requirements	736-2.01(C)(1)	The luminaire shall operate over the of 120 to 240 VAC (rms) ± 10 % at 60 Hz or the voltage option of 480 VAC (rms) ± 10 % at 60 Hz.
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.

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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 Requirements	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 luminaire LED 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 Color Rendering Index (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 entire 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 of the entire LED unit.
Horizontally Mounted LED Luminaires	736-2.02	The luminaires shall be, LED type 40L; as specified in subsection 2.01 based on Type V optical distribution & CCT of 3000 K:
Horizontally Mounted LED Luminaires	736-2.02	40L ≥ 29,000 lumens (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 shall include an integral bubble level. The luminaire shall have tilt adjustments 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: 40L shall not weigh more than 45 lbs.
Horizontally Mounted LED Luminaires: Luminaire Housing	736-2.02(A)	The luminaire housing shall have an Effective Projected Area (EPA) of no more than 1.5 square feet when viewed from either side or either end.
Horizontally Mounted LED Luminaires: Luminaire Housing	736-2.02(A)	The luminaire housing shall be equipped with a seven pin photo-electric control receptacle (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** Backlight, Up light, and Glare rating as follows:
Horizontally Mounted LED Luminaires Optical Requirements	736-2.02(C)(1)	1. Backlight rating shall not exceed 3

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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: 4 for type 40L