

## Evaluation Table

<b>PEP ID:</b>	<b>XXXXX</b>
<b>Manufacturer:</b>	<b>Name of Manufacturer</b>
<b>Product Name:</b>	<b>Name of Product</b>

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

<b>Product Property</b>	<b>Specification/ Test Method</b>	<b>Requirement</b>	<b>Results</b>	<b>Pass/ Fail</b>
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; <a href="http://www.osha.gov">http://www.osha.gov</a>		
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.		

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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).		
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.		

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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)	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.		
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		

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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>Color Rendering Index (CRI)</u> 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)		
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		

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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 $\pm 5$ 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>Effective Projected Area</u> (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>Photo-Electric Control Receptacle</u> (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>Backlight</u> , <u>Up light</u> , and <u>Glare</u> (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		