# Product Specification Guide – Champ VMV LED Connected Lighting

# SECTION 26 54 00 – Classified Location Lighting

1. **GENERAL**
	1. SCOPE
2. Requirements, Performance, and Installation of lighting fixtures for areas classified as harsh industrial.
3. **References & REgulatory Requirements**
	1. REgulatory requirements
4. The luminaire shall meet the following certifications:
	1. NEC and CEC and ROW

cULus Class I, Division 2, Groups A, B, C, D

cULus Class II, Groups E, F, G

cULus Class III

cULus Class I, Zone 2 nA nR

cULus Zone 21 tb

Simultaneous Presence

Wet Locations, Type 4X, IP66

Marine Listed

R/C for sensor and controller

ATEX/ IECEx nA, nR, ia

CE

* 1. REferences
		1. National Fire Protection Association (NFPA) - NEC NFPA 70
		2. Underwriters Laboratories, Inc. (UL):

UL1598 Luminaires

UL1598A Marine

UL8750 Light Emitting Diode (LED) Equipment for Use in

 Lighting Products

UL 844 Hazardous (Classified)

UL60079-0 General Requirements

UL60079-11 Intrinsically Safe Apparatus

UL60079-15 Type protection “n”

UL60730 Controls

UL913 Intrinsically safe Apparatus

UL508 Industrial control equipment

UL50

UL50E Environmental considerations for electrical

 equipment

* + 1. ISA12.12.01 Non incendive equipments
		2. CSA

cUL listed to CSA Standard C22.2 No. 250 (for Luminaires)

cUL listed to CSA Standard C22.2 No. 137 (electric luminaires for hazardous locations)

CSA 60079-11

CSA 60079-0

* + 1. IEC/EN Standards

IEC/EN 60079-0, IEC/EN 60079-15, IEC/EN 60079-11,

IEC/EN 60079-31

IEC 60529

IEC 60598

* + 1. National Electrical Manufacturers Association (NEMA) - NEMA 250
1. **PRODUCTS, Performance, & Requirements**
	1. **MANUFACTURERS**
		1. Acceptable Manufacturers:

Eaton’s Crouse-Hinds Business

1201 Wolf Street

Syracuse, NY 13208

(866) 764-5454

www.crouse-hinds.com

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the engineer ten (10) days prior to bid date.

* 1. **Requirements**
		+ - 1. **Electrical Performance**
		1. Standard input driver voltage of 120-277 VAC, 50/60 Hz +/-10%
		2. Power factor >0.9 @ 120-277 VAC (at Full load) and THD <20% @ 120-277 VAC (at Full load)
		3. LED fixtures will include a 3 pole terminal block with clearly marked input/output for line, neutral and ground electrical connections
		4. Drivers must have an B10 (L10) reliability of a minimum of 60,000 hours @ 55°C ambient/ 50,000 hours@65°C (i.e. no more than 10% of drivers installed in the field may fail catastrophically in the above specified duration and temperature range).
		5. LED drivers used in the luminaire are dimmable using 0-10V control interface. The dimming interface shall conform to ANSI standard.
		6. Fixture should be dimmable from 0-100%
		7. EFT immunity : Category A at 120/240VAC at > 50% dimming
		8. Surge Protection: Common mode is 2kV, differential mode is 1kV
		9. Voltage dip and interruptions: Category B at 120/240VAC at > 50% dimming
		10. Radiated emission: Meet CISPR 32:2002
		11. Conducted emission: Meet CISPR 32:2002
		12. All electronics internal to the fixture should be able to handle the inrush current at startup without non-recoverable permanent damage.
		13. Maximum desired input power (wattage) and current (amps) by fixture type @ 120 and 277 VAC:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lumen Levels (Typical)** | **Wattage @ 120 VAC** | **Amperes @ 120 VAC** | **Amperes @ 277 VAC** | **Power Factor** |
| 3300 | 26.4 | 0.220 | 0.118 | >0.90 |
| 5300 | 42.4 | 0.353 | 0.164 | >0.90 |
| 7300 | 58.4 | 0.487 | 0.205 | >0.90 |
| 9300 | 74.4 | 0.620 | 0.277 | >0.90 |
| 11300 | 90.4 | 0.753 | 0.338 | >0.90 |

* + - * 1. **Sensor Performance**
		1. Sensor module shall contains occupancy, photo, and temperature sensors that attach external to the fixture.
		2. Sensor mounting height shall be between 8 feet and 40 feet
		3. Minimum sensor radius of coverage needs to be equal to mounting height of the sensor
		4. Sensor coverage pattern is 360°
		5. Sensor must have white light immunity for outdoor installations and EMI immunity for industrial applications
		6. Sensor module must have suitable UV rating for outdoor applications or pass UL light resistance test
		7. Photo-sensor must be able to measure 600lux without saturation
		8. Photo sensor measurement shall be reliably able to detect ±5% change in illuminance within 0 – 600lux
		9. Temperature Measurement range: -40°C to 85°C
			- 1. **Communication performance**
		10. Range between two fixtures in the outdoor environment is 300’ when installed 10’ above ground
		11. Range between two fixtures in indoor environment is 100’ when installed 8’ above ground
		12. The communication frequency Range 2.4GHz to 2.48 GHz (license free ISM band)
		13. Spurious emissions in restricted and unrestricted bands shall meet FCC part 15 requirements
		14. Conducted harmonic emissions shall meet FCC part 15 requirements
		15. Band edge emissions shall meet FCC part 15 requirements
		16. All data communicated between devices shall be encrypted
			- 1. **Optical Performance**

* + 1. LED fixtures must have correlated color temperature options in the range of 3000K- 5000K
		2. Fixtures must use discrete LED packages with a minimum CRI of 70 @ 5000K and L70 > 100,000 hours @ 55°C ambient as per TM21
		3. Luminaire shall have options that generate Type I, III, and V distribution patterns
		4. The following lens options must be available with LED light fixture:

Clear glass standard

Clear Polycarbonate

Diffused glass (non-glare)

* + 1. The fixture must have following typical lumen output ratings for cool white color, clear glass lens, Type V

|  |  |
| --- | --- |
| **System Configuration** | **Lumen Output (25°C) +/-10%** |
| **3L** | 3,300 |
| **5L** | 5,300 |
| **7L** | 7,300 |
| **9L** | 9,300 |
| **11L** | 11,300 |

* + 1. The lumen, efficacy, wattage, CRI, CCT, power factor, THD, amperage, insitu temperature data, and L70 lifetime shall be validated from an NIST accredited lab
			- 1. **System performance**
		2. Control features are occupancy control, day light harvesting, high end trimming (change in max light intensity), zoning, time scheduling, energy monitoring, and temperature monitoring
		3. LED fixtures must have a rated life of a minimum 50,000 hours @ operating ambient temperature of -40°C-55°C, when control packages are used. This must be a complete system life including life of drivers
		4. System efficiency: minimum of R5>120LPW, R1, R3 >110 lumens per watt (LPW) for standard glass, 120-277 VAC fixtures
		5. Standby (at no light output) power consumption of the luminaire must be < 5W
		6. System must be fail safe, i.e. catastrophic failure in control module or sensor module brings luminaire to 100% ON state
		7. In a brown-out or short-term black-out (< 48h) system should be able to revert to its last saved control profile in NVM (non-volatile memory).
		8. System shall be able to collect following data from LED luminaire

Occupancy status

Illuminance (measured in Foot candles or Lux)

Ambient temperature

Input power

Fixture internal temperature

Input current

Input voltage

Current dimming level

* + 1. Sensor module is capable of controlling multiple light fixtures connected to the same wireless mesh network
		2. Minimum dimming resolution shall be 1%
		3. Minimum system level time resolution shall be 1 min (increments)
		4. All LED fixtures should be individually addressable
		5. All software modules should be capable of self-recovery after an abnormal event
		6. Fixtures must successfully be tested for 3 axis (3g 2-30Hz per ANSI C136.31) using all mounting options to withstand extreme vibration-prone environments
			- 1. **Software**
		7. The software solution is a premise solution
		8. Users that intend to control luminaire shall have a web based interface that supports internet explorer 11.0 and above browsers and chrome web browsers
		9. Application software shall be capable of automatically detecting and extracting information from devices for commissioning
		10. Software system shall be access controlled with business driven user hierarchy, who shall have different levels of access based on their role
		11. Software shall have ability to group fixtures and control fixtures as a group
		12. All data shall be stored in a SQL database within the facility, and shall be jointly owned with supplier. Supplier shall provide safe access to data to any authorized person within the facility
		13. All software solutions shall be vetted for cybersecurity and solutions provider shall be able to provide a report on internal cybersecurity tests performed when requested by the IT department
		14. User shall be able to set minimum and maximum light levels for every day in a week with each day broken up into four different time zones
		15. User shall be able to set occupancy delay time, reference light level for daylight harvesting, and photo sensor response time
		16. User shall be able to set special light levels for a specific period during in exceptional circumstances such as holidays, etc
		17. Application software shall be able to commission and integrate data from multiple gateways
		18. User shall have the ability to upload facility map into the application for future reference
		19. Software shall log all critical information related to system usage during the system life cycle
		20. User shall have the ability to view fixture level information
			- 1. **Mechanical Integration**
		21. Overall height of fixture without mounting brackets must not exceed 12” and with mounting brackets must not exceed 17.65”
		22. The fixture design must have serviceable drivers accessible from the back of fixture and field replaceable without removing the fixture from the mount installation
		23. Sensor shall be fully integrated with luminaire and is fully adjustable
		24. Sensor shall be integral to luminaire. Luminaire and sensor shall be one integrated system
		25. Sensor shall be adjustable to ± 30 degrees without need for any hand tools
		26. Sensor shall be field installable without need for any hand tools
		27. Antenna shall be housed within the luminaire
		28. LED driver shall be housed within the luminaire
		29. Fixture shall have secondary retention capability
			- 1. **Material Requirements**
		30. LED housing assembly and heat sink must be of aluminum with low copper content for corrosion protection and heat dissipation
		31. LED (Luminaire window) must be made of heat and impact resistant glass or UV treated domed polycarbonate. Diffused impact resistant glass available
		32. LED chamber should be sealed to prevent significant ingress of chemical vapors
		33. Fixtures must not contain mercury or any other hazardous chemicals
		34. Diffused glass lens options must be available for applications requiring low glare
		35. All non-metallic components used in luminaire construction shall have an RTI value greater than operating temperature, UV resistant, and should be accompanied by list of chemicals that they are resistant to in the product instruction sheet
		36. All electronics shall either be encapsulated, potted or conformal coated with suitable material as a means of protection against humidity and corrosion
		37. All packaging material should be capable of withstanding vibration and shock test
			- 1. **Qualifications**
		38. For the equipment specified herein, the manufacturer must be ISO 9001 certified
		39. All electronic shall be assembled by a manufacturer that has the appropriate QAN & QAR for the protection method used. Supplier shall be able to provide certificate of conformance when requested
		40. The manufacturer of this equipment must have produced similar electrical equipment for a minimum period of five (5) years. When requested by the engineer, an acceptable list of installations with similar equipment will be provided demonstrating compliance with this requirement
		41. Products must be free of defects in material and workmanship
		42. Manufacturer must be in good financial standing to support warranty claims over their committed warranty period
1. **Interface**
	* + - 1. **Communication Interface**
		1. Each fixture needs to contain a wireless communication module that communicates that forms a true mesh network. The mesh of light fixtures are managed by a network manager/gateway.
		2. Physical layer of the RF module: IEEE 802.15.4e complaint
		3. System can be integrated with WirelessHART infrastructure
		4. RF module and antenna should be integrated within the fixture
		5. HART/IP protocol is used for communication between gateway and server
2. **Submittals, Handling, and Installation**
	* + - 1. **SUBMITTALS** - FOR REVIEW/APPROVAL

 The following information shall be submitted to the engineer.

* + 1. Manufacturer’s descriptive literature and technical specifications for each product
		2. Manufacturer’s product drawing (2D or 3D), when requested
		3. Manufacturer’s installation and maintenance document
		4. Lighting layout when requested
		5. Sensor layout
		6. Network diagram
		7. Software user manual
			- 1. **DELIVERY, STORAGE, AND HANDLING**
		8. Store products in manufacturer’s unopened packaging until ready for installation.
		9. Packaged product should be stored in a covered environment protected from weather and extreme temperatures.
		10. Keep within a temperature range of -40°C to 85°C
		11. Fixtures should be stored off of the ground on pallets or a similar type of item that keeps the product elevated in order to reduce the potential of water damage to the box and/or product.
			- 1. **INSTALLATION**

**Hardware**

* + 1. The Champ LED luminaire shall be compatible with the existing current mounts with exception of the Trunnion mount. The Current existing mounts that we must maintain compatibility are Stanchion 25° angled, Stanchion Straight, Pendant, Ceiling, Wall, and Cone Pendant.
		2. The Luminaire shall retrofit to existing Champ VMV top hats
		3. The fixture must have an option for attaching safety chains

**Software**

* + 1. Manufacturers need to have ability to provide support for software installation and commissioning
		2. Manufacturer supported training to installers and provide them certification
		3. Manufacturer’s ability to provide after sales support for hardware and software
		4. Manufacturer must be able to provide basic customer training for software operation tied to product sold by manufacturer
		5. Manufacturer must be able to provide layout design, hardware, software, and networking support
		6. Product and software shall meet state of the art cybersecurity requirements