

**DMS - 11021****HIGH MAST ILLUMINATION ASSEMBLY KITS****EFFECTIVE DATE: AUGUST 2014**

**11021.1. Description.** This Specification governs the materials, composition, quality, sampling, and testing of high mast illumination assembly kits as specified in Item 614.

**11021.2. Units of Measurements.** The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

**11021.3. Material Producer List.** The Traffic Operations Division (TRF) maintains the Material Producer List (MPL) of all materials conforming to the requirements of this Specification. High mast illumination assembly kits appearing on the MPL, entitled "[Roadway Illumination and Electrical Supplies](#)," require no additional sampling and testing, unless deemed necessary by the Project Engineer or TRF.

**11021.4. Bidders' and Suppliers' Requirements.** The Department will purchase or allow on projects only those materials listed by manufacturer and product code or designation shown on the MPL. Use of pre-qualified product does not relieve the Contractor of the responsibility to provide materials that meet this Specification. The Department may inspect or test material at any time and reject any material that does not meet the specifications. Testing of failing materials will be at the manufacturer's expense.

**11021.5. Pre-Qualification Procedure.**

**A. Pre-Qualification Request.** Submit a request for evaluation to the Texas Department of Transportation, Traffic Operations Division, Traffic Engineering Section (TRF-TE), 125 East 11th Street, Austin, Texas 78701-2483 for evaluation.

**B. Pre-Qualification Submittals.** With the pre-qualification request, include two legible copies of catalog cut sheets for all components required, marked to indicate the specific components submitted for pre-qualification.

Provide samples when directed, following Department submittal guidelines. Submit all products for pre-qualification evaluation at no cost to the Department.

**C. Evaluation.** The Traffic Operations Division, Traffic Engineering Section (TRF-TE) reviews submittals, tests samples for specification compliance, and updates the MPL to include materials that meet specification requirements. TRF-TE will notify prospective suppliers after completion of material evaluation.

**1. Qualification.** If approved for Department use, TRF-TE will add the material to the MPL.

All approved submittal materials become Department property for comparison testing.

Report changes in the composition or in the manufacturing process of any material to TRF-TE. Significant changes reported by the manufacturer, as determined by the Director of TRF, may require a re-evaluation of performance. Unapproved changes will result in rejection and removal from the MPL for 1 year.

- 2. Failure.** Materials not qualified under this Specification may not be furnished on Department projects and must be corrected of all deficiencies before reconsideration for qualification.

The Department normally bears the costs of sampling and testing; however, the Contractor will bear the costs of sampling and testing materials failing to conform to the requirements of this Specification. The Director of TRF will assess this cost at the time of testing.

The Department will deduct amounts due from monthly or final estimates on Contracts or from partial or final payments on direct purchases by the State. The Department will not retest products until costs for previously failed tests have been paid.

- D. Periodic Evaluation.** TRF may periodically test products from projects for compliance with this Specification. TRF may remove products from the MPL that inconsistently pass testing or are inconsistent with product guidelines. Re-testing of failing materials will be at the manufacturer's expense.

- E. Disqualification.** The following conditions are cause for immediate removal from the MPL.

- Manufacturer makes changes in the composition or in the manufacturing process of any material without prior testing and approval by TRF-TE.
- Pre-qualified material does not meet the requirements of this Specification as a result of periodic evaluation or is inconsistent with product guidelines.
- Pre-qualified material provided on a project does not match the pre-qualified submittals.

- F. Re-Qualification.** Producers may submit material for re-evaluation after 1 year has elapsed from the date of removal from the MPL or after providing documentation from an independent testing facility stating the materials meet all requirements of this Specification. TRF-TE will reinstate the 1-year time limit if, after retesting, the material again fails any of the specification requirements.

#### **11021.6. Material Requirements.**

- A. General Requirements.** Meet National Electrical Code (NEC®) requirements.

Furnish rings, ring support assemblies, obstruction lights, hoisting assemblies, power drive assemblies, electrical equipment, power cord, enclosures, and other materials as detailed on the High Mast Illumination Detail (HMID) standard sheets.

Provide high mast fixtures in accordance with DMS-11020.

Ensure shop drawings are in accordance with the plans and Item 441. [JG1]The Department will inspect rings for compliance with the HMID standard sheets.

Provide conduit in accordance with DMS-11030.

Provide electrical conductors and heat shrink tubing in accordance with DMS-11040.

Stainless-steel hose clamps may be provided where stainless-steel bands are shown on the standard sheets.

**B. Obstruction Lights.** When obstruction lights are required by the layout sheets, summary sheets, or general notes, they must be:

- FAA Type L-810,
- red LED color,
- 120 V, and
- with 1-in. or 1-1/4-in. bottom hub.

Control the entire high mast assembly using a 240-V photocontrol that complies with FAA Advisory Circular AC 70/7460-1K for red obstruction lights, mounted inside the electrical service. Ensure the FAA photocell is capable of turning on the luminaires below 35 foot-candles and turning off the luminaires above 58 foot-candles.

Control the ring-mounted luminaires with up to four additional 480-V ring mounted photocells, each photocell controlling three fixtures. Ensure the ring-mounted photocells are capable of turning on the luminaires below 1 ( $\pm$  0.5) foot-candle and turning off the luminaires at 2 foot-candles higher than the turn-on level.

Provide 480-V ring-mounted photocontrol that:

- meets ANSI 136.10 requirements;
- contains time-delay relay or bimetallic switch with normally closed contacts;
- contains an internal surge arrester rated at 2.5 kV spark over with 5000 amps follow-through;
- has an enclosure constructed of ANSI color coded, high impact, UV stabilized polypropylene with a clear UV stabilized acrylic window;
- has a high-impact polycarbonate chassis with polyethylene gasket; and
- is rated for 1800 VA minimum.

When obstruction lights are not required, eliminate the obstruction light fixtures, ring-mounted photocells, 480/120 V transformer, and 120 V wiring.

**C. Electrical Power Cable.** Provide a three-conductor, 8 AWG, round, Type W power cord rated 90°C for 600 V or 2000 V. Use copper conductors consisting of at least 133 strands. Use ethylene-propylene rubber insulation for individual conductors. Encase the three insulated individual conductors with a chlorinated polyethylene (CPE) jacket made with glass fiber or nylon reinforcing mesh between two layers of the CPE. Ensure the diameter of the cord is 0.91 in. (nominal). Use a non-wicking rubber compound filler.

**D. Cord Connectors for Electrical Power Cable.** Provide UL listed, watertight, 480 V, 30 amp, 2P3W pin and sleeve devices for power cable connections.

Ensure pin and sleeve male plugs are IEC 60309 type 330P7W and female connectors are type 330C7W.

Provide UL listed, 600 V, 50 A, two-pole three-wire grounding twist lock plugs, inlets, and connectors for maintenance jumper and terminal box connections.

**E. Mounting Ring and Support Assembly.** Fabricate ring and support assembly from steel with a minimum yield strength of 36 KSI.

Hot-dip galvanize hardware in accordance with ASTM A 153 or provide stainless steel hardware.

**F. Winch.** Fabricate housing from high tensile strength, die-cast silicon aluminum.

Fabricate the cable drum from seamless steel tubing with stamped steel flanges. Hot-dip galvanize cable drum. Ensure cable drum is 4.5 in. minimum diameter. Key drum to shaft. Size drum and flanges so that when the fixture mounting ring is in the raised position, the cable, including one full layer, will fill the drum to no more than 2/3 of full capacity. Grind drum shaft from stainless steel and mount on lubricated bronze bearings with seals. Fabricate worm gear from nickel-bronze. Fabricate worm shaft from high-strength, stress-proofed steel. Grind and polish worm shaft. Support worm shaft with tapered roller bearings.

Provide 36:1 gear ratio with a safe hoisting capacity of not less than 4,000 lb.

Provide an adjustable automatic brake to assure positive load suspension. Provide multiple disc brakes with friction plates running in an oil bath. Use a one-direction clutch that operates only when load is suspended or lowered. Do not use a throw-out type clutch.

**G. Wire Rope and Terminals.** Provide pre-formed, factory-lubricated Strand Core (SC) stainless steel wire rope with:

- a diameter of 5/16 in. and strand configuration of 7 × 19; and
- a diameter of 3/8 in. and strand configuration of 19 × 7.

The 5/16 in. product should meet the requirements of MIL-DTL-83420 Stainless Steel with a minimum breaking strength of 9,000 lb. Submit mill test reports.

The 3/8-in. product should meet construction and strength requirements of MIL-DTL-83140A and Federal Specification RR-W-410D, Type 4, Class 2, modified for stainless steel, with a nominal breaking strength of 11,100 lb. Submit mill test reports.

Provide wire rope from the manufacturer to the job site on a reel.

Provide solid stud-type stainless steel wire rope terminals for each size in accordance with the plans. Use 303 SE or 304 stainless steel with a maximum tensile strength of 115,000 psi. Drill wire rope terminals for cotter pins. Furnish mill test reports to the Engineer.

**H. Springs.** Provide three zinc-plated steel springs with an uncompressed length of approximately 8 in. Fabricate springs from 1/4 in. diameter oil-tempered MB steel wire treated for overstress. Close and grind ends of springs.

Ensure springs contain approximately nineteen total coils with an inside diameter of 0.875 in. and an outside diameter 1.375 in. Ensure springs compress 3 in. when subjected to a 700-lb. load. Ensure springs do not develop permanent set from 3-in. compression.

Evidence of hydrogen embrittlement, such as springs that break under load, will be justification for rejection of the entire lot.

**I. Power Drive Assembly.** Provide a 1-1/4 in., heavy-duty reversible, portable electric drill:

- that includes:
  - a minimum of six radial ball bearings;
  - one thrust bearing;
  - one needle bearing; and
  - a No. 3 Morse Taper socket.
- is designed for:
  - 115 V, 60 Hz, single-phase operation, 250 RPM at no load; and
  - continuous rated duty of 160 RPM and 15 amperes at 115 V with delivery of 33 ft-lb of torque.
- develops 240 ft-lb of torque at stalled rotor condition.

Provide a torque-limiter coupling consisting of a standard torque limiter with a Type A center-sprocket member coupled to a chrome-plated Type B sprocket using an ASA double strand roller chain.

Ensure the Type A center sprocket has a ground face (63 micro-in.) and is run-in for 4 min. at approximately 60 RPM at a torque setting 70% to 80% of spring rating.

Provide a torque-limiter coupling with a minimum torque capacity of 15 ft-lb and a maximum torque capacity of 55 ft-lb.

Ensure the limiter section of the coupling consists of the following:

- integral hub and pressure plate;
- two friction facings;
- sintered iron bushing;
- pilot plate and disk spring; and
- lock washer and hex adjustment nut.

Cadmium plate major components of torque-limiter coupling, except spring and friction facings, with dichromate treatment.

Provide slip type universal joints with 4-in. barrels. Locate grease fitting in the spider so that all caps and needle bearings may be serviced. Disassemble and zinc-plate the assembly, then reassemble and provide enough lubricant to ensure that the parts never lock up after repeated use. Ensure universal joints have a minimum torque rating of 850 in-lb at 200 RPM. Provide a set-screw and keyed coupling in accordance with the plans.

**11021.7. Archived Versions.** Archived versions are available.