DMS - 11131

PEDESTRIAN LED COUNTDOWN SIGNAL MODULES

EFFECTIVE DATE: JULY 2012

11131.1. Description. This Specification describes the minimum acceptable design and performance requirements for the LED pedestrian signal modules that include “walking person” and “upraised hand” icons and numeric countdown (hereafter called module or modules).

11131.2. 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.

11131.3. Material Producer List. The Traffic Engineering Section of the Traffic Operations Division (TRF-TE-CP) maintains the Material Producer List (MPL) of all materials conforming to the requirements of this Specification. Materials appearing on the MPL, entitled “Traffic Signals,” require no further testing, unless deemed necessary by the Project Engineer or TRF-TE.

11131.4. Bidders’ and Suppliers’ Requirements. The Department will purchase or allow on projects only those products 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 product that meets this Specification. The Department may inspect or test material at any time and reject any material that does not meet the specifications.

11131.5. 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-CP), 125 E. 11th Street, Austin, Texas, 78701.

B. Pre-Qualification Sample. Prior to shipping any samples, contact the Traffic Signals Branch at (512) 506-5100. Ship three samples from a normal production run of the module requesting acceptance to the Texas Department of Transportation, Traffic Operations Division, Traffic Engineering Section (TRF-TE-CP), 9500 North Lake Creek Parkway, Austin, Texas 78717.

Provide additional samples when directed by the Department. All products submitted for pre-qualification tests must be at no cost to the Department. Provide the following with the pre-qualification sample:

- Manufacturer name and contact information
- Brand and model number
- Letter from the manufacturer confirming compliance to this Specification
- Manufacturer’s recommended drive current and degradation curves
• One schematic diagram for model, along with any necessary installation instructions
• Copy of the manufacturer’s International Organization for Standardization ISO 9000 certification, or latest revision, (including date)
• Copy of the manufacturer’s quality assurance (QA) testing procedures
• Manufacturer’s written warranty against defects in materials, design, and workmanship for the module for a period of 60 months after installation
• Warranty compliance letter specified in Article 11131.8
• Warranty certification document specified in Article 11131.8
• Certified independent laboratory reports confirming the module’s compliance with this Specification. Submit a copy of a test report stating that the module submitted meets or exceeds the latest ITE Pedestrian Traffic Control Signal Indicators - Light Emitting Diode (LED) Signal Modules (ITE PTCSI.) The laboratory report must include documentation of tests and verification of compliance to the additional provisions of this standard. Tests performed by the independent lab must follow all the instructions documented in the latest ITE PTCSI Specification as it pertains to the product being tested. Criteria in Section 11131.9.B, “Photometric Requirements,” must be documented in the test report.
• Testing procedures explaining compliance to the additional requirements of this Specification
• Proof of independent laboratory’s Nationally Recognized Testing Laboratory (NRTL) status (Notify the Department in writing prior to changing testing labs.)
• Completed checklist detailing the page and paragraph in the laboratory report where ITE and Department compliance has been tested

C. Sampling and Testing. TRF will connect all samples to the Department’s TS-2 Traffic Signal Control Cabinet and will test to NEMA TS-2 2003 environmental standards.

All modules must be operational at the conclusion of the test and must not cause MMU trip conditions in the controller/cabinet during testing.

During the environmental testing, TRF may evaluate the samples for chromaticity and intensity after 8 hours of soaking at -30°F (-34°C) and 165°F (74°C), at low (89 VAC) and high (135 VAC) voltages.

TRF will conduct destructive testing to determine that the module is in conformance with the catastrophic LED failure clause.

D. Evaluation. TRF will return to the submitting party a letter of confirmation or rejection for each model submitted. For each rejected model, TRF will issue a test report along with the letter of rejection.

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

Any deviation in product design after testing and approval from the Department constitutes a new model, which must be resubmitted for acceptance.
Manufacturers that determine there is reason to remove a model from the MPL must submit a letter to TRF identifying the problem. TRF will remove the model without prejudice. Once the problem has been resolved to TRF’s satisfaction, the manufacturer may apply for re-qualification for the new model.

All submitted materials become the property of the Department.

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

If products fail to meet any of the specification requirements, the producer may not resubmit for pre-qualification until one year from original evaluation date. TRF may waive this time limit if provided with documentation from an independent testing facility stating the product meets all requirements. TRF will enforce the one-year time limit if, after retesting, the product again fails any of the specification requirements.

Costs of sampling and testing are normally borne by the Department; however, the costs of sampling and testing products failing to conform to the requirements of this Specification are borne by the contractor or supplier. The Director of TRF will assess this cost at the time of testing for each recurring non-compliant submittal.

The Department will deduct amounts due from monthly or final estimates on contracts or from partial or final payments on direct purchases by the Department.

E. Periodic Evaluation. TRF may perform random sample testing on shipments, to be completed within 30 days after delivery.

TRF will perform optical testing with the module mounted in a standard pedestrian clam-shell housing, but without a Z-crane and a visor attached to the module or housing. The quantity of each model in the shipment will determine the number of modules tested. The sample size will conform to ANSI/ASQC Z1.4. TRF will determine the sampling parameters used for the random sample testing. All parameters of the specification may be tested on the modules. Acceptance or rejection of the shipment will conform to ANSI/ASQC Z1.4 for randomly sampled shipments.

F. Disqualification. The following conditions are cause for immediate removal from the MPL:

- A problem is found to exist with a module (e.g., unsafe failure condition or excessive failure rate)
- Excessive complaints about a manufacturer’s compliance with Article 11131.8, “Warranty Requirements”
- Manufacturer deviates the module from pre-qualified units without prior testing and approval by the Department

If TRF removes a model from the MPL for cause other than manufacturer’s recommendation, the manufacturer may not resubmit for approval for a minimum of one year.
TRF may reinstate a model on the MPL under a different model number, if all problems identified have been corrected and the new model does not exhibit the same problems. TRF must approve of the new model as a successful replacement.

G. Re-Qualification. The module may not be re-qualified under the same model number. The module must be submitted under a different model number and undergo the entire qualification process as required by this Specification.

11131.6. Quality Assurance (QA).

A. Quality Assurance Program (QAP). Modules must be manufactured in accordance with a vendor QAP. The QAP will include two types of quality assurance:

1. Design Quality Assurance. As stated in ITE PTCSI, Section 6.4.1, design qualification testing must be performed on new module designs, when a major design change has been implemented on an existing design, or after every 5 years that a design is in service. Modules used in design qualification testing must be representative of the manufacturer’s proposed normal production. A third-party lab with NRTL status must perform all parts of the design qualification testing, as stated in ITE PTCSI, Section 6.4. The failed state impedance test is mandatory, must be performed in accordance with ITE PTCSI, Section 6.4.8, and must be documented in the test report from the NRTL.

2. Production Quality Assurance. Production quality assurance must include statistically controlled routine tests to ensure minimum performance levels of modules built to meet this Specification. All modules tendered for sale must undergo production testing and inspection in accordance with ITE PTCSI, Section 6.3, prior to shipment. Failure of a module to meet the requirements of production testing and inspection will be cause for rejection. Test results must be maintained in accordance with ITE PTCSI, Section 6.1.2. A NRTL must review the factory’s QA process.

B. Conformance. Module designs not satisfying design qualification testing and the production quality assurance testing performance requirements will not be labeled, advertised, or sold as conforming to ITE PTCSI. Intertek ETL or a third-party lab with NRTL status must certify all lamps in a LED Countdown Pedestrian Signal Module Certification Program.

Label modules meeting this Specification in accordance with Section 11131.9.A.6.

C. Burn-In. Each new module must be energized at the manufacturer’s facility for a minimum of 24 hours at nominal operating voltage (120 VAC RMS) at room temperature in order to ensure electronic component reliability prior to shipment.

11131.7. Documentation Requirements. Provide all modules with the following documentation:

- Complete and accurate installation wiring guide
- Contact name, address, telephone number, and email address or webpage for the representative, manufacturer, or distributor for warranty repair
- Schematics for all electronics, if requested by the purchaser
Warranty compliance letter specified in Article 11131.8
Warranty certification document specified in Article 11131.8

Bidders must submit a copy of a test report, certified by an independent (NRTL) laboratory, stating that the LED countdown pedestrian signal model submitted meets or exceeds the latest ITE PTCSI. The laboratory report must include documentation of tests and verification of compliance to the additional provisions of this Standard. Tests performed by the independent lab must follow all the instructions documented in the latest ITE PTCSI. The test report must document the criteria of Section 11131.9.B.

Manufacturers must be International Organization for Standardization ISO 9000 certified or latest revision.

11131.8. Warranty Requirements. Manufacturer must comply with all requirements of the following warranty. Failure to comply with the requirements of this warranty is cause for removal from the MPL.

The manufacturer/provider must submit a letter of compliance indicating understanding and willingness to abide by the provisions of this Specification. The manufacturer/provider must provide the name and telephone number of the person to contact regarding potential claims under the provisions of this warranty. Address the compliance letter to Texas Department of Transportation, TRF-TE Signal & Radio Operations Branch Manager, 125 E. 11th Street, Austin, Texas 78701.

The module must be warranted against any failure due to design, workmanship, material defects, or intensity within the first 60 months of field operation. The module must meet or exceed minimum requirements of this Specification for at least 60 months of field operation.

Repair or full replacement will be required if a module fails to operate as specified under normal operating conditions. Provide repaired or replaced units at no cost to the Department. The repaired or replaced module will inherit the remainder of the failed unit’s warranty.

Repair or replace module within 5 business days after receipt of failed module at no cost to the Department. The cost of shipping, both directions, will be borne by the responsible vendor or manufacturer.

If a module fails with no visible damage to electronic/electrical components, (not including fuses or components designed to act as a fuse,) or wiring, the module is considered to have failed under normal operating conditions. A blown fuse or a component acting as a fuse, without any other permanent failure to electronic components, will be considered to have failed under normal operating conditions. Natural phenomena (e.g., lightning) are not acceptable as excusable module failures without visible damage.

The manufacturer/provider must submit a certification document with each lot or shipment stating that the module provided meets all the requirements of this Specification. The certification document must show individual lot numbers and manufacturer dates.

The Department reserves the right to select a sample from the field during the warranty period and perform evaluation tests to determine extended compliance and/or deterioration of the module. The Department will immediately remove from the MPL any model that shows...
deterioration causing the module to fail the evaluation tests during the warranty period, and the submitting party may be held legally responsible for all damages.

11131.9. Material Requirements.

A. Physical and Mechanical Requirements.

1. General.

a. Minimum Message Bearing Surface Size. The minimum size of a model’s message bearing surface must not be less than 16 in. × 18 in. (406 mm × 457 mm). The sizes of the message bearing surfaces must be in accordance with the dimensions given in Table 1.

<table>
<thead>
<tr>
<th>Class</th>
<th>Message Bearing Surface (Height × Width)</th>
<th>Minimum Size of Walking Person and Upraised Hand Icons (Height × Width)</th>
<th>Minimum Size of Countdown Display (Height × Width)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>16 × 18 in. (406 × 457 mm)</td>
<td>1 × 7 in. (297 × 178 mm)</td>
<td>9 × 7 in. (229 × 178 mm)</td>
</tr>
</tbody>
</table>

b. Countdown. The countdown digits must be internally integrated into the module. Countdown display attachments will not be accepted.

2. LED Signal Module.

a. Hard Coat. The module lens must be hard coated or otherwise made to comply with the UV material exposure and weathering effects requirements of the Society of Automotive Engineers (SAE) J576.

b. Non-Replaceable Lens. The module lens must be a permanent part of the complete module. The module must be a self-contained, sealed unit with no user-configurable options.

c. Countdown Signal Module. The countdown part of the module must consist of two digits and must be located immediately adjacent to the associated “upraised hand” icon and integrated into the module. Each segment of each countdown digit must consist of more than one circuit of LEDs, or the LEDs in the segment must be derated such that the LED drive current cannot exceed 50% of the maximum rated LED drive current.

d. Learning Cycle. The countdown learning cycle, when applicable, may only be initiated after the initial installation, a return from a power failure greater than 2 seconds, a repeated demand to change programming, or preemption. During the learning cycle, the countdown display must remain blank. The learning cycle must not last more than two complete cycles.
e. **Preemption.** If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption sequence, the countdown pedestrian signal display must be discontinued and go dark upon activation of the preemption transition. See TMUTCD 2011, Section 4E.07, “Countdown Pedestrian Signals,” for more information.

f. **Countdown Timer.** During the pedestrian change interval, the display of each number in the countdown sequence, the interval from the display of one number to the display of the subsequent number in the sequence, and the display of the “0” at the end of the countdown cycle (before going blank) must be $1 \pm 0.04$ seconds. At no point during the countdown interval will the digit display go entirely blank, except in the cases of preemption—see Section 11131.9.A.2.e.

g. **Module Operation Modes.** No user-selectable options will be allowed. The user must not have access to the module internals. Module must be completely sealed.

3. **Environmental Requirements.** The module must maintain all programmed functions when the temperature and humidity ambients are within the following limits:
   - The operating ambient temperature range is $-30–165^\circ F (-34–74^\circ C)$. The storage temperature is $-50–185^\circ F (-45–85^\circ C)$.
   - The rate of change in ambient temperature must not exceed $30^\circ F (17^\circ C)$ per hour, during which the relative humidity must not exceed 95 percent.
   - The relative humidity must not exceed 95 percent non-condensing over the temperature range of $40–110^\circ F (4.4–43.3^\circ C)$. At temperatures above $110^\circ F (43.3^\circ C)$, constant absolute humidity will be maintained

4. **Construction.**
   a. **Configuration.** A module must be a self-contained device, not requiring on-site assembly for installation into an existing signal housing. The power supplies for the module must be integral (inside the module) and not packaged as a separate component.
   b. **Shock and Vibration Resistance.** Furnish a module that will withstand mechanical shock and vibration due to high winds, transportation, shipping, and other foreseeable sources with no adverse effect.

5. **Flammability Resistance.** Enclosures containing either the power supply or electronic components of the module must be constructed of UL 94 flame retardant materials.

6. **Module Identification.**
   a. **Identification Label.** Label in accordance with ITE PTCSI, Section 3.6.1. In addition, identify each module with manufactured date (minimum week and year) and other necessary identification.
   b. **PTCSI Conformance Label.** Modules conforming to all non-optional requirements of this Specification must have the following statements on an attached label:
B. Photometric Requirements. Photometric requirements will be in accordance with ITE PTCSI, Section 4.

C. Electrical Requirements.

1. **General.** All wiring and terminal blocks must meet the requirements of the current VTCSH standard, Section 13.02. Conductors must have a 600 V insulation rating, a minimum size of 18 AWG, be at least 3 ft. (94 cm) in length, conform to the NFPA 70, National Electrical Code, and be rated for service at 105°C. The conductors must be color coded with orange for the hand, blue for the walking person, orange with blue stripes for countdown, and white as the common lead.

   The conductor ends outside the module must be terminated with a spade terminal with #8 stud size. Quick disconnect terminals will not be accepted.

2. **Icon Power Supplies.** LED pedestrian countdown modules must have three separate power supplies: one for powering the Walking Person icon, one for powering the Upraised Hand icon, and one for powering the countdown numerical digits. The circuitry must be unrelated to powering the LED Walking Person icon, the LED Upraised Hand icon, or countdown numerical digits, in order to eliminate the risk of displaying the wrong icon.

3. **Voltage Range.** Voltage range will be in accordance with ITE PTCSI, Section 5.2.

4. **Transient Voltage Protection.** Transient voltage protection will be in accordance with ITE PTCSI, Section 5.3.

   The module must have on-board circuitry including voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in NEMA Standard TS 2-2003, Section 2.1.8, except voltage must be 2000 V instead of 1000 V. The circuitry must also be able to withstand high-repetition low-energy transients as stated in NEMA Standard TS 2-2003, Section 2.1.6.

5. **Electronic Noise.** Electronic noise will be in accordance with ITE PTCSI, Section 5.4.

6. **Power Factor (PF) and AC Harmonics.** PF and AC harmonics will be in accordance with ITE PTCSI, Section 5.5.

7. **Controller Assembly Compatibility.** Controller assembly must be compatible with equipment on the MPL.

8. **Failed State Impedance.** The module must detect catastrophic loss of the LED load, the Walking Person icon (Walk), and the Upraised Hand (Don’t Walk) icon. Upon sensing the loss of the LED load, the module must present a resistance of at least 250 kΩ across the input power leads within 300 msec. The LED light source will be manufactured in conformance with the ITE Pedestrian Traffic Control Signal Indicators - Light Emitting Diode (LED) Signal Modules Date of Latest Publication and ETL Verified or from a third-party NRTL to demonstrate compliance to ITE PTCSI, Section 6, “Quality Assurance”.
considered to have failed catastrophically if it fails to show any visible illumination when energized according to in accordance with ITE PTCSI, Section 5.2.1, after 75 msec.

The module must trip a MMU when the catastrophic LED failure occurs for the Walk/Man indication.

9. **Nighttime Dimming.** No light output dimming features will be allowed.