

INCH-POUND

MIL-PRF-32213

12 March 2009

## PERFORMANCE SPECIFICATION

## LIGHT EMITTING DIODE (LED) CLEARANCE/ SIDEMARKER AND IDENTIFICATION LAMPS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This standard establishes, unless otherwise specified, the minimum requirements for engineering acceptance for the operation, performance, and reliability of Exterior Lighting Devices, for military vehicles, with Light Emitting Diodes as the base of their technology for illumination and compliance with applicable SAE, United States FMVSS, Canadian CMVSS, STANAG, MIL Standards and Military Performance Specifications. The lamps will be designed to conform to the photometric requirements of this standard and the associated standards referenced within this document where applicable. Representative production level samples will be used for verification of compliance as specified below in this document.

1.2 Classification. The LED Composite Clearance/Sidemarkers and Identification Lamps will be the following types and styles.

## Type I – LED MARKER LIGHT ASSEMBLY

- Style 1 – Red Lamp, Green Bracket
- Style 2 – Yellow Lamp, Green Bracket
- Style 3 – Red Lamp, Tan Bracket
- Style 4 – Yellow Lamp, Tan Bracket
- Style 5 – Red Lamp, Black Bracket
- Style 6 – Yellow Lamp, Black Bracket
- Style 7 – Red Lamp
- Style 8 – Yellow Lamp

## Type 2 – LIGHT, MARKER, CLEARANCE, ISOLATED GROUND LAMP ASSEMBLY

- Style 1 – Red Lamp, Green Bracket
- Style 2 – Yellow Lamp, Green Bracket
- Style 3 – Red Lamp, Tan Bracket
- Style 4 – Yellow Lamp, Tan Bracket
- Style 5 – Red Lamp, Black Bracket
- Style 6 – Yellow Lamp, Black Bracket
- Style 7 – Red Lamp
- Style 8 – Yellow Lamp

Comments, suggestions, or questions on this document should be addressed to: U.S. Army Tank-automotive and Armaments Command, ATTN: AMSRD-TAR-E/268, MS-268, Warren, MI 48397-5000 or emailed to [dami\\_standardization@conus.army.mil](mailto:dami_standardization@conus.army.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil>

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## Type 3 – LED LIGHT, MARKER, CLEARANCE-SERVICE LAMP ASSEMBLY

- Style 1 – Red Lamp, Green Bracket
- Style 2 – Yellow Lamp, Green Bracket
- Style 3 – Red Lamp, Tan Bracket
- Style 4 – Yellow Lamp, Tan Bracket
- Style 5 – Red Lamp, Black Bracket
- Style 6 – Yellow Lamp, Black Bracket
- Style 7 – Red Lamp
- Style 8 – Yellow Lamp

## Type 4 – LED LIGHT, MARKER, CLEARANCE LAMP

- Style 1 – Red Lamp Assembly
- Style 2 – Yellow Lamp Assembly
- Style 3 – Red Lamp
- Style 4 – Yellow Lamp
- Style 5 – Bracket

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents in other sections of this specification, and is not recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether they are listed or not.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those, cited in the solicitation or contract.

## FEDERAL STANDARDS

- FED-STD-595/34083 – Green, Flat or Lusterless
- FED-STD-595/33446 – Yellow, Flat or Lusterless
- FED-STD-595/37030 – Miscellaneous, Flat or Lusterless

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/>, or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

## FEDERAL MOTOR VEHICLE SAFETY STANDARDS

- |               |   |   |
|---------------|---|---|
| FMVSS 571.108 | - | Code of Federal Regulations (CFR), Title 49, Chapter V - National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT), Part 571 - Federal Motor Vehicle Safety Standards (FMVSS) Standard |
|---------------|---|---|

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## No. 108: Lamps, reflective devices, and associated equipment

(Copies of the above document is available from the Code of Federal Regulations from their website: [http://www.access.gpo.gov/nara/cfr/waisidx\\_06/49cfr571\\_06.html](http://www.access.gpo.gov/nara/cfr/waisidx_06/49cfr571_06.html))

2.3 Non-Government publications: The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified are the issue of the documents cited in the solicitation or contract.

## SOCIETY OF AUTOMOTIVE ENGINEERS, INC (SAE)

SAE J592	- Lamps, Sidemarker, for Use on Road Vehicles Less Than 2032 mm in Overall Width
SAE J2042	- Clearance, Sidemarker, and Identification Lamps for Use on Motor Vehicles 2032 mm or More in Overall Width
SAE J575	- Test Methods and Equipment for Lighting Devices and Components for Use on Vehicles Less Than, Greater Than, or Equal To 2032 mm in Overall Width
SAE J578	- FMVSS-571.108: Red and Yellow Color Specification
SAE J1889	- L.E.D. Signal and Marking Lighting Devices
SAE J2139	- Tests for Signal and Marking Devices Used on Vehicles 2032 mm or More in Overall Width
SAE J1455	- Joint SAE/TMC Recommended Environmental Practices For Electronic Equipment Design (Heavy-Duty Trucks)

(Application for copies should be addressed to the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001, or at [www.sae.org](http://www.sae.org)).

2.4 Order of precedence: Unless otherwise noted herein or in the contract in the event of a conflict between the text of this document and the references cited herein (*except for related associated specifications or specification sheets*), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 First article: When specified, samples shall be subjected to first article inspection in accordance with 4.1.1.

3.2 Design, materials, and manufacturing processes: Unless otherwise specified, the design, materials and manufacturing process selection is the prerogative of the contractor as long as all articles submitted to the Government fully meet the operating, interface, support and ownership, and environmental requirements specified.

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3.2.1 Recycled, recovered, or environmentally preferable materials: Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.2.2 Materials: All metallic parts shall be made from corrosion resistant materials or treated for corrosion resistance. Separation of dissimilar metals shall be done by insulation between mating surfaces. Except where necessary to complete an electrical circuit, contact between dissimilar metals that would promote galvanic corrosion shall be avoided. All non-metallic materials shall be fungus resistant or treated to resist fungus growth. Lens shall be made from approved lens grade material IAW SAE J576 as specified in FMVSS 571.108 except for Luminous Transmittance. Asbestos and cadmium materials shall not be used in any form in any part of the device. No item, part or assembly shall contain radioactive materials in which the specific activity is greater than 0.002 microcuries per gram or total activity per item exceeds 0.01 microcuries.

3.2.3 Materials and Military LED Lamp Operational Temperatures: Materials shall be as specified herein, applicable specifications, and on applicable drawings. Materials not specifically designated shall be suitable for use in the LED lamp finished assemblies for operational temperature range, in degrees, of - 40 C (- 40 F) to 70 C (158 F), + or - 5 C (+ or - 9 F), without any adverse physical or dimensional properties that would cause lamp to fail or seal degradation resulting in moisture intrusion.

3.2.4 Finished Product Color: Unless otherwise specified by the procuring activity; the external finished lamp color (not lens) shall be matched to Federal Standard 595 Color Chip #34083 for Green, #33446 for Tan, and #37030 for Black.

3.2.5 Lens Marking(s): When lamp function(s) must meet the requirements of FMVSS 571.108, the external optical lens shall be marked with the Lighting Identification Code (LIC) IAW SAE J759. The device or multifunction device shall be designed to conform to the requirements of FMVSS-571.108 in the production year of the original certification (indicated on the lens). The LIC indicates the SAE specification(s) to which the device is "designed to conform". Please note that lens markings denote the functions of the lamp which apply to the color of the light emitted by the lamp.

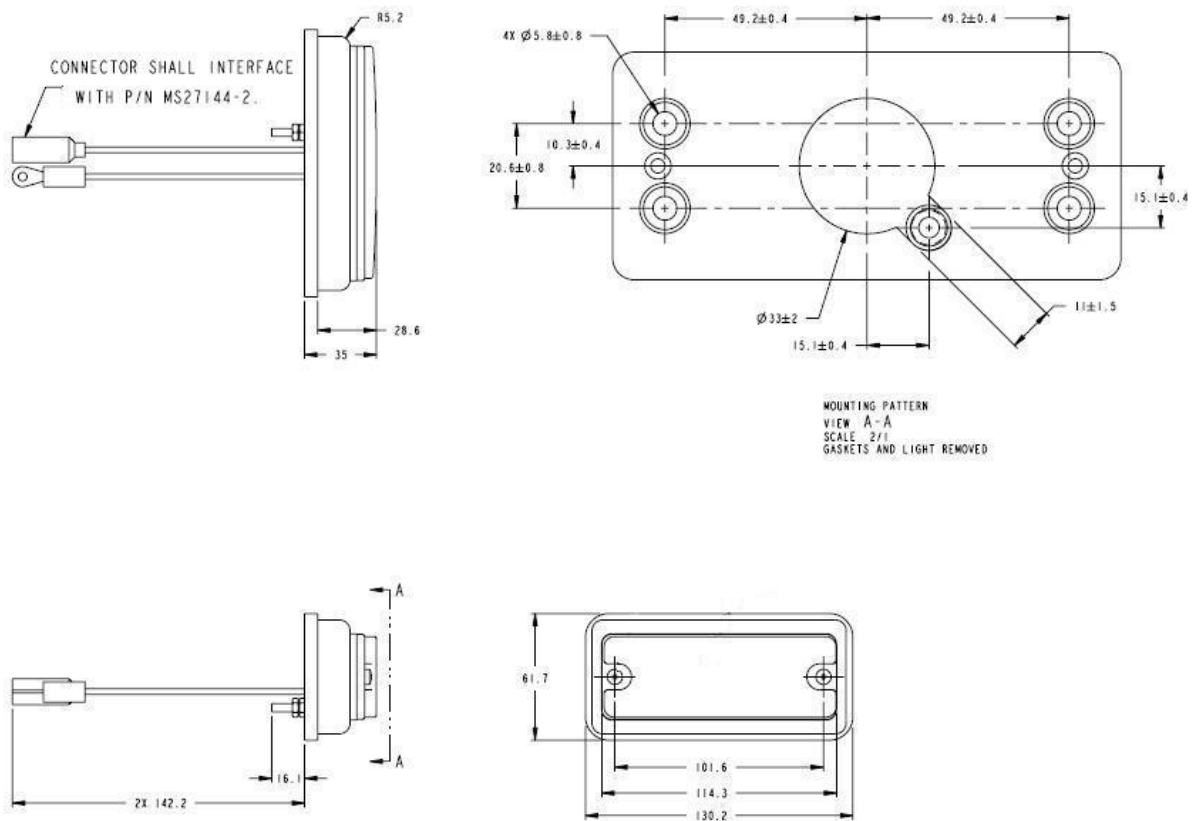
3.3 Design and Construction: Potential suppliers of external LED Military Vehicle Lighting Lamps shall be aware of form, fit and functional parameters so as to produce a part that shall be backwards compatible with previously produced vehicle lamps. Lamp assembly form, the wire leads length and connector types can be found on Drawings I through VII, which are included in this document. The use of circuit board potting materials such as epoxies; sealing gels or silicon derivatives is not acceptable as a finished external surface on the lamp.

Notes below apply to all Drawings I through VII:

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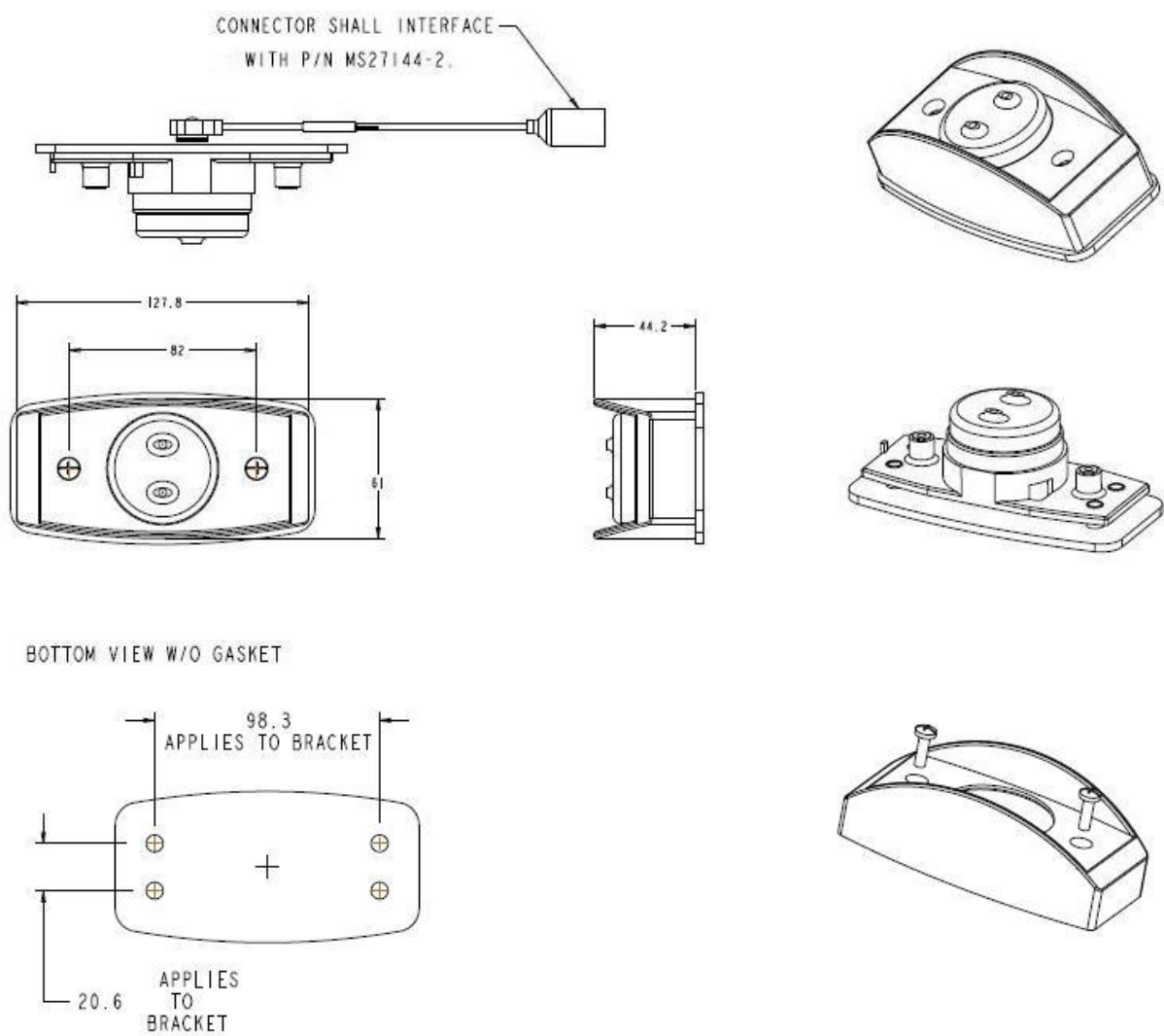
1. APPLICABLE STANDARDS/SPECIFICATIONS:
  - A. ASME Y14.100-2000
  - B. ASME Y14.5M-1994
2. IEEE/ASTM SI 10 SHALL BE USED IN CONVERTING AND ROUNDING OFF. 1 INCH = 25.4 mm APPLIES.
3. GASKET SHALL HAVE THE SAME INTERFACE TO THE VEHICLE AS THE ITEM. GASKET (LENGTH & WIDTH ARE OPTIONAL, DIMENSIONED AS REQUIRED TO ACCOMMODATE SEALING OF THE ITEM. THE APPROPRIATE HOLE PATTERN SHALL BE INCLUDED TO ACCOMMODATE THE STD. INTERFACE HOLE PATTERN).
4. DIMENSIONS WITHOUT TOLERANCES SPECIFIED ARE FOR REFERENCE ONLY AND SHALL NOT BE USED FOR INSPECTION PURPOSES.
5. PERFORMANCE REQUIREMENTS IAW MIL-PRF-32213.
6. ITEM IDENTIFICATION: APPLY THE FOLLOWING MARKING IAW MIL-STD-130
 

19207-  ← PART NO.  
 MFR-  ← MANUFACTURER'S CAGE CODE



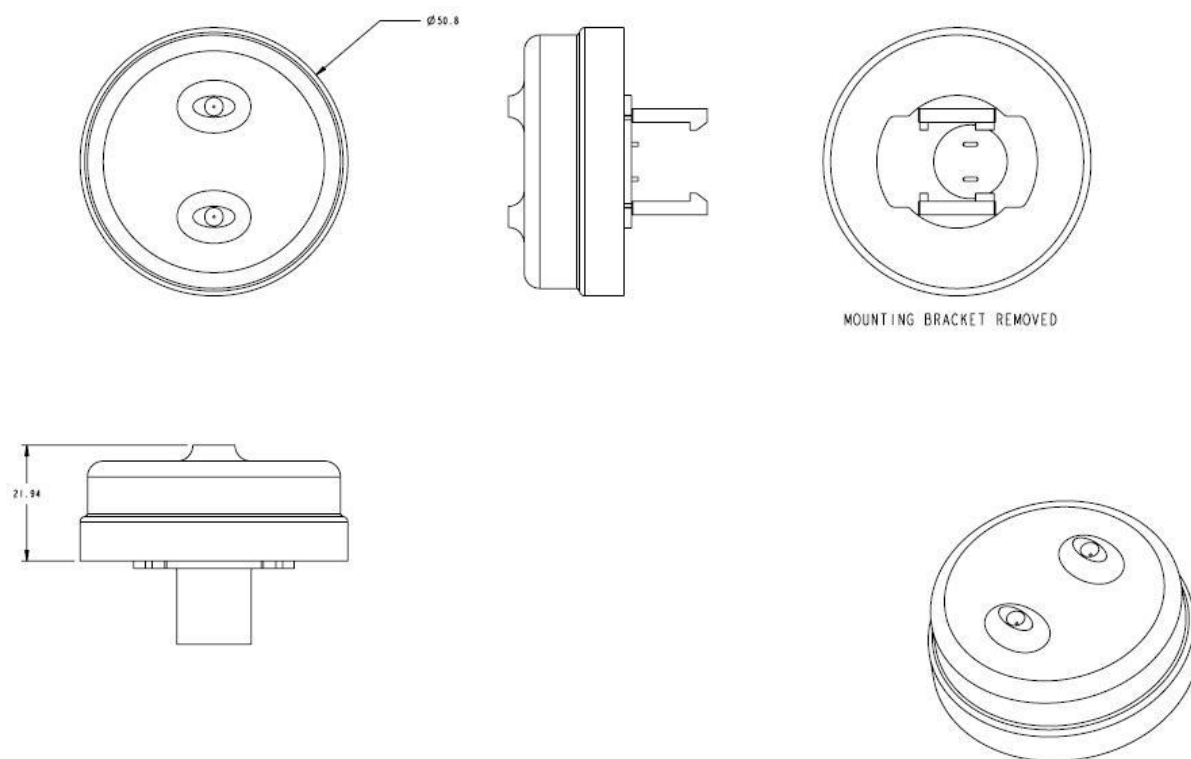
Drawing I: LED MARKER LIGHT ASSEMBLY

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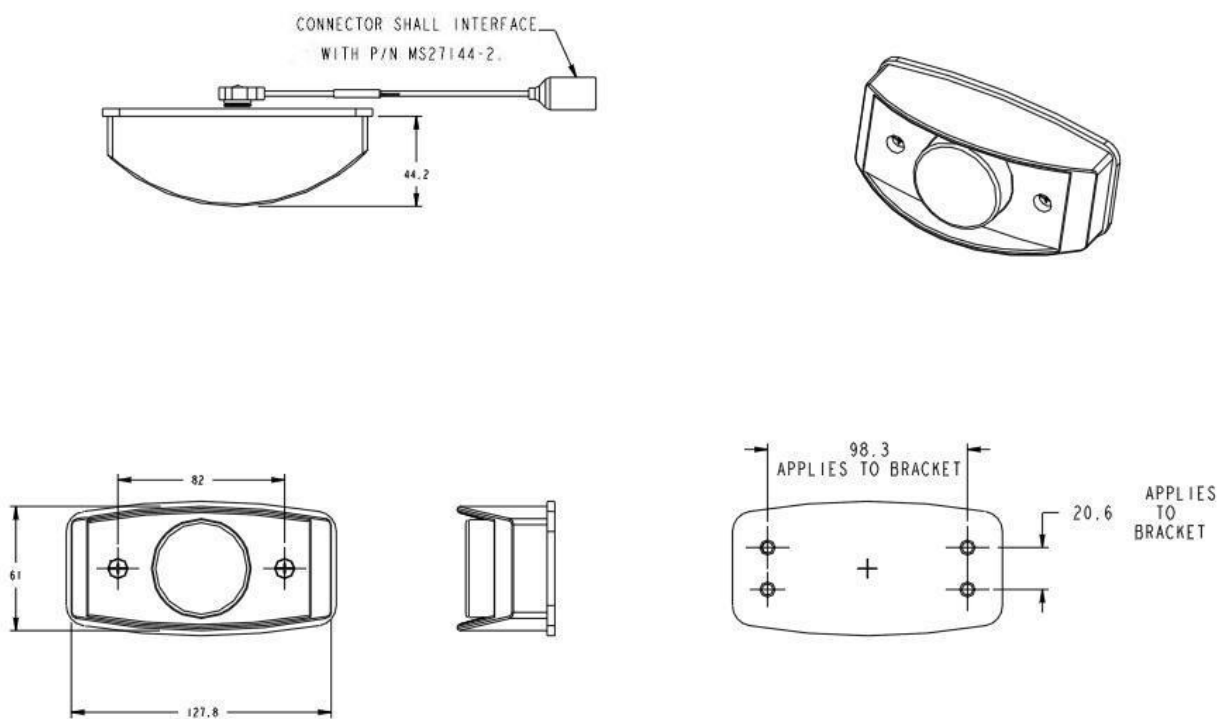


Drawing II: LED LIGHT, MARKER, CLEARANCE, ISOLATED GROUND LAMP WITH BRACKET

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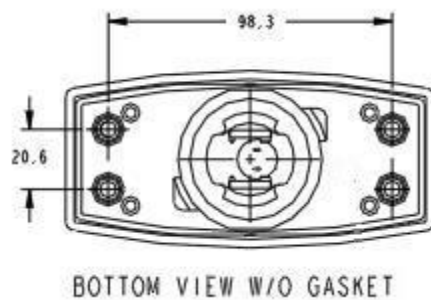


Drawing III: LED LIGHT, MARKER, CLEARANCE, ISOLATED GROUND LAMP

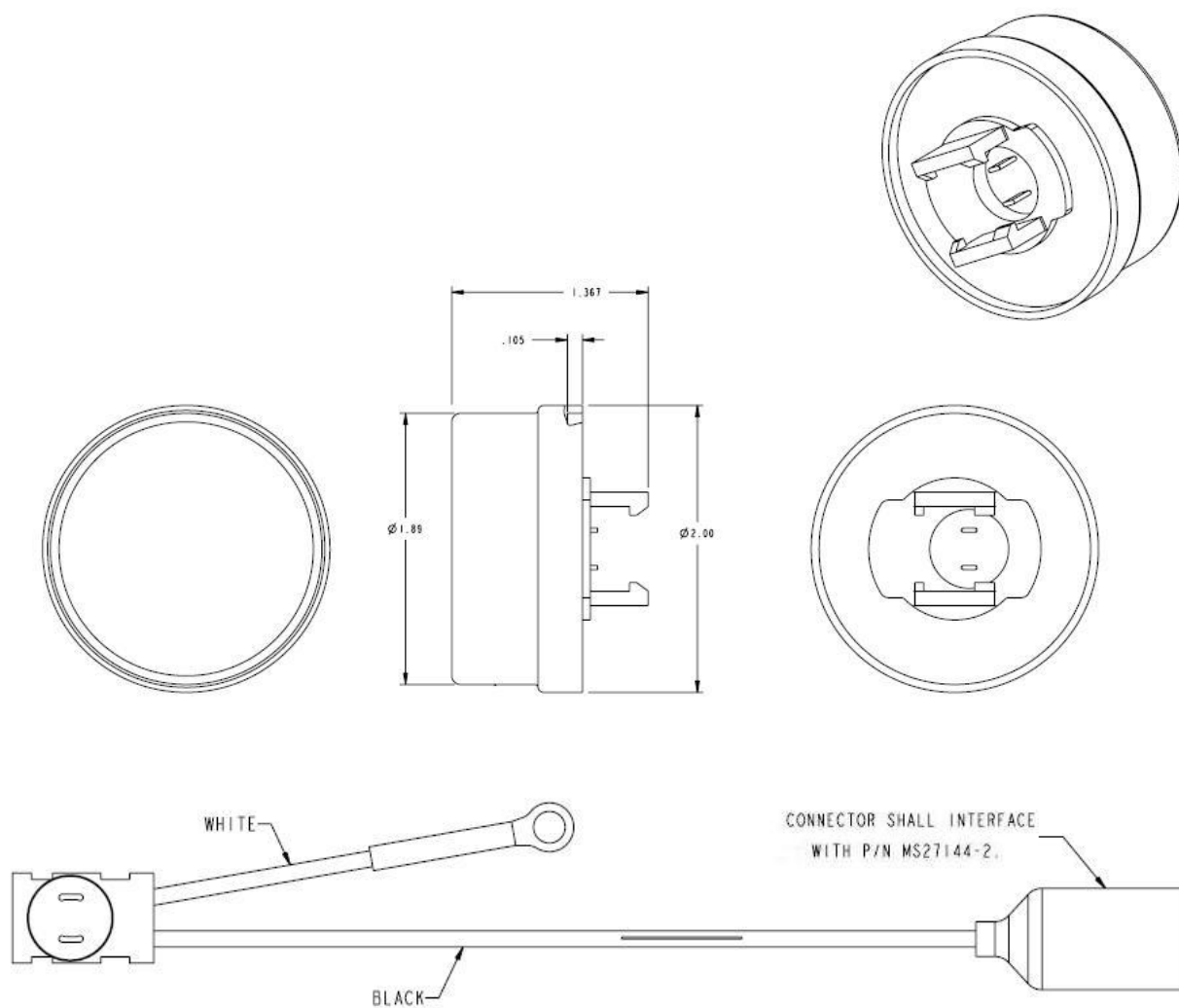




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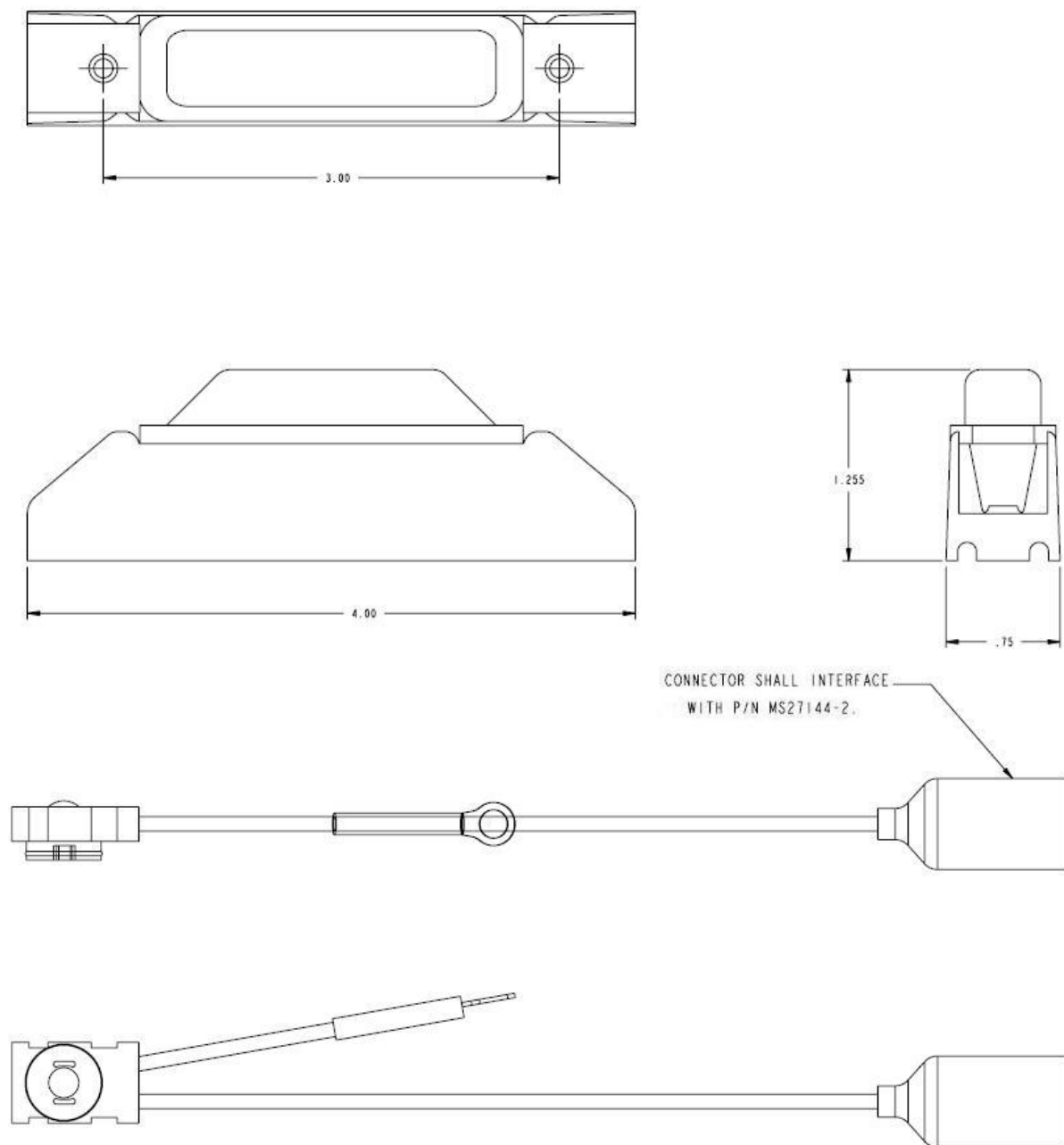
Drawing IV: LED LIGHT, MARKER, CLEARANCE-SERVICE LAMP WITH BRACKET



Drawing V: LED LIGHT, MARKER, CLEARANCE-SERVICE LAMP

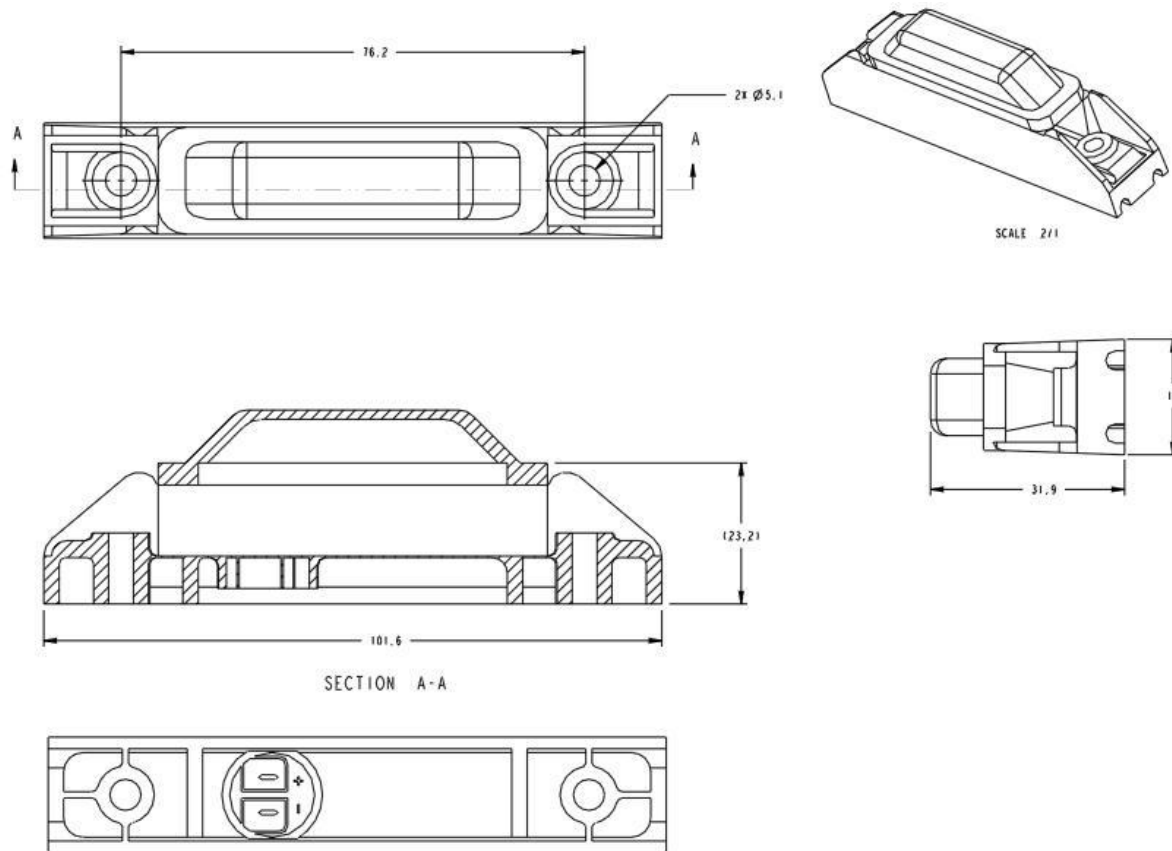


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Drawing VI: LED LIGHT, MARKER, CLEARANCE LAMP ASSEMBLY

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Drawing VII: LED LIGHT, MARKER, CLEARANCE LAMP

3.4 FMVSS-571.108 Photometry: The test lamp shall be warmed up in accordance with SAE J1889 and tested as described in FMVSS-571.108 in the production year of the original certification.

3.4.1 PHOTOMETRY: SAE J592e P2 Clearance or Sidemarkers or Identification Lamps for Vehicles less than, equal to or more than 2032 mm in overall width:

**Optional: This test may be used in lieu of SAE 592e:**

SAE J2042: P3: Clearance or Sidemarkers or Identification Lamps for Vehicles more than 2032 mm in overall width:

3.4.2 COLOR: FMVSS-571.108: Lamp must emit light that is Red or Yellow in color according to the requirements in SAE J578.

3.5 SAE J2139 and SAE J575 Requirements. The LED Clearance/ Sidemarkers and Identification Lamps shall meet all SAE recommended practices for mechanical testing listed below as required. SAE J575 as specified in FMVSS571.108 is to cover vehicles less than 2032mm and SAE J2139 is to cover vehicles greater than 2032mm wide.

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- a. Vibration
- b. Moisture
- c. Dust
- d. Corrosion
- e. Warpage

3.6 Special performance requirements: The LED Clearance/Sidemarkers and Identification Lamps must comply with all of the requirements listed below.

3.6.1 Water submersion moisture test. Refer to SAE J2139 water submersion moisture test section.

3.6.2 Thermal Cycle. The lamp must comply with SAE J1889 temperature range from minimum -40°C to maximum 70°C cycled 25 times.

3.6.3 5% Salt Water Immersion. The integrity of the lamp's seal and functionality shall be maintained against both moisture intrusion and corrosion at all interfaces of the lamp; including the electrical plug connection, when immersed in a 5% salt water solution for 5 days.

3.6.4 5% Salt Water Injection. The integrity of the lamp functionality shall be maintained against severe corrosion and moisture due to cracked or broken casings (lenses, housings, etc.) when a 5% salt water solution is injected inside an energized lamp for 3 days.

3.6.5 Fording. The integrity of the lamp seal and functionality shall be maintained when energized and submerged in 4 feet of water for a minimum of 6 minutes.

3.7 Operating Voltage: The LED Marker/Clearance lamp shall meet the following requirements

3.7.1 Variable Voltage Lamp: Operational DC Voltage: The LED external lamps shall have an operational design voltage range of 10.0 VDC to 30.0 VDC. Lamps may be operational outside the stated design voltage range.

3.7.2 Single Voltage Lamp: Lamp components may be designed for a specific operational vehicle voltage range, such as 12 VDC or 24 VDC applications. Lamps may be operational outside the stated design voltage range.

3.7.3 Reverse Polarity: Individual Lamp functions shall meet SAE J2139 voltage regulation test section for 12 volt lamps or for 24 volt lamps, or both for variable voltage lamps.

#### 4. VERIFICATION

4.1 Classification of inspection: Verification of meeting the requirements shall be in a documented form and the format may be of the choosing of the LED Marker/Clearance lamp manufacturer IAW lighting industries practices. All lamps used to perform testing qualifications and verification shall be kept by the respective lamp manufacturer for a minimum period of six months after completing all required testing parameters. Any and all failures that may arise from any required testing shall be recorded in the documentation and summarized in a separate test failure document called "Failed Test Item Parameter".

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4.1.1 First article inspection: First article inspection of the LED Clearance/Sidemarkers and Identification Lamps shall be produced prior to the manufacturing of the item in production quantities. A quantity of (50) LED Clearance/Sidemarkers and Identification Lamps that represent production level parts shall be used for both destructive and non-destructive testing requirements. Thereafter, random testing, if required, will be performed in the same manner.

4.2 Design, Materials and Manufacturing processes. The lamps must meet the operating, interface, support and ownership and environmental requirements specified in solicitation.

4.2.1 Recycled, recovered or environmentally preferable materials. A bill of materials that meet or exceed the operational and maintenance requirements shall be provided with the verification documents.

4.2.2 Materials. A bill of materials that meet or exceed the operational and maintenance requirements shall be provided with the verification documents. Lens materials shall comply with SAE J576 as specified in FMVSS 571.108 except for Luminous Transmittance. Evidence of fungus resistance shall be provided with verification documents. If radioactive materials are used, evidence shall be provided that no item, part or assembly contains radioactive materials in which the specific activity is greater than 0.002 microcuries per gram or total activity per item exceeds 0.01 microcuries.

4.2.3 Materials and Military LED Lamp Operational Temperatures. Evidence that materials used in the LED lamp finished assemblies for operational temperature range, in degrees, of - 40 C (- 40 F) to 70 C (158°F), + or - 5°C (+ or - 9°F), without any adverse physical or dimensional properties shall be provided.

4.2.4 Finished Product Color. Unless otherwise specified by the procuring activity; the external finished lamp color (not lens) shall be matched to Federal Standard 595 Color Chip #34083 for Green, #33446 for Tan, and #37030 for Black.

4.2.5 Lens Marking(s). When lamp function(s) must meet the requirements of FMVSS 571.108, the external optical lens shall be marked with the Lighting Identification Code (LIC) IAW SAE J759. The device or multifunction device shall be designed to conform to the requirements of FMVSS-571.108, in the production year of the original certification (indicated on the lens). The LIC indicates the SAE specification(s) to which the device is "designed to conform". Please note that lens markings denote the functions of the lamp which apply to the color of the light emitted by the lamp.

4.3 Design and Construction. Evidence shall be provided demonstrating form, fit, function and backward compatibility with previously produced vehicle lamps.

4.4 FMVSS-571.108 Verification. The LED Clearance/ Sidemarkers and Identification Lamps functions shall meet the SAE recommended practices for photometry listed below as required by FMVSS-571.108 in the production year of the original certification. The test lamp shall be warmed up IAW SAE J1889 with test voltages listed in section 4.8.1 or 4.8.2 of this document.

4.4.1 Photometry. (5) production level parts must comply with the requirements listed below:

SAE J592e JUL 72: P2 :Clearance or Sidemarkers or Identification Lamps for Vehicles less than, equal to or more than 2032 mm in overall width:

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**Optional: This test may be used in lieu of SAE 592e:**

SAE J2042 : P3: Clearance or Sidemarker or Identification Lamps for Vehicles more than 2032 mm in overall width:

4.4.2 Color. (5) production level parts must emit light that is Red or Yellow in color IAW SAE J578 as specified by FMVSS571.108.

4.5 Mechanical Testing Practices SAE J2139 Verification. The light emitting diode (LED) Clearance/ Sidemarker and Identification Lamps shall meet all SAE recommended practices for mechanical test listed below as required. Please note that these requirements eclipse the SAE J575e requirements specified in FMVSS 571.108 and compliance with SAE J2139 constitutes compliance with SAE J575e as well.

- a. Vibration - (3) production level parts must comply
- b. Moisture - (3) production level parts must comply
- c. Dust - (3) production level parts must comply
- d. Corrosion - (3) production level parts must comply
- e. Warpage - (3) production level parts must comply

4.6 Special performance testing. The LED Clearance/ Sidemarker and Identification Lamps must be optically functional after each of the following tests. A lamp that does not illuminate is considered to be a failure for the “special test requirements” The lamp shall pass the following tests listed below:

4.6.1 Thermal Cycle. (3) production level parts shall comply with SAE J1889. The temperature range is from -40°C to 70°C. Test duration is 25 cycles. The lamps are energized from the end of the cold cycle (point A) to the end of the hot cycle (point B) as shown in Figure I below.

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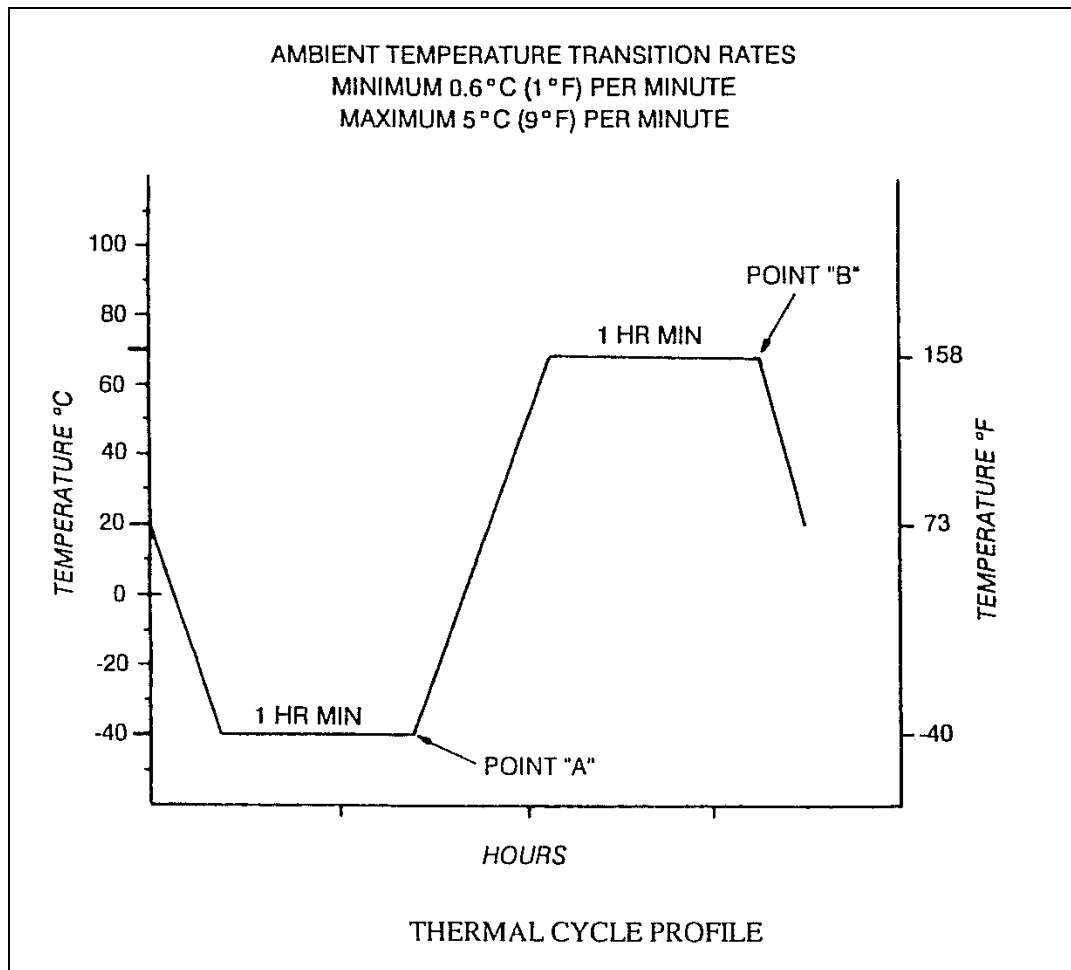


Figure I: Ambient Temperature Transition Rates

4.6.2 5% Salt water immersion. (3) production level parts must comply with the procedure listed below any loss of function of the lamp or individual LED's is considered a failure.

4.6.2.1 Procedure.

- a. Select the samples and check them for proper functionality.
- b. Prepare the 5% Salt/H<sub>2</sub>O Solution.
- c. Place the test samples in the test tank so that they are totally submersed.
- d. Place a ground strap in the test tank creating a negative potential in the solution by connecting the strap to the negative side of the power supply.
- e. Set the cycle timer to operate the samples at the desired cycle time (constant).
- f. Operate the test samples at the voltage or amperage as described in section 3.9 of this document.

4.6.2.2 Test duration. The length of the test is 5 days or 120 hours - minimum.

4.6.3 5% Salt Water Injection. (3) production level parts must comply with the procedure listed below any loss of function of the lamp or individual LED's is considered a failure.

4.6.3.1 Procedure.

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- a. Select the samples and check them for proper functionality.
- b. Prepare the 5% Salt/H<sub>2</sub>O Solution.
- c. Drill a small 1/8" hole into the top of the lens area for injecting the solution. Fill the lamp to just under drilled hole, leaving room for expansion.
- d. Set the cycle timer to operate the samples at the desired cycle time constant).
- e. Operate the test samples at the voltage or amperage as described in section 3.7.1 or 3.7.2 of this document.

4.6.3.2 Test Duration. The length of the test is 3 days or 72 hours - minimum.

4.6.4 Fording. (3) production level parts must comply with the procedure listed below. Any loss of function of the lamp or individual LED's or the presence of water in the interior of the lamp is considered a failure. The lamp shall be submerged to a depth of 4 feet of fresh or salt water for 6 minutes while energized with test voltage in section 4.7.1 or 4.7.2. of this document.

4.7 Operating voltage. The light emitting diode (LED) Clearance/ Sidemarker or Identification lamp shall comply with the following:

4.7.1 Variable voltage lamp. Operational DC Voltage: The LED external lamps shall have an operational design voltage range of 10.0 VDC to 30.0 VDC. The lamps shall operate at 14.0 VDC and 28.0 VDC +/- 1 VDC, while meeting all requirements in this standard. Testing and verification where applied voltage is required shall be performed at 14.0VDC and 28.0 VDC +/- 1 VDC. Lamps may be operational outside the stated design voltage range.

4.7.2 Single voltage lamp. Lamp components may be designed for a specific operational vehicle voltage range. Lamps designed specifically for 12 VDC or 24 VDC operational electrical vehicle systems shall be tested by using 14.0 VDC or 28.0 VDC +/- 1 VDC, while meeting all requirements in this standard. All required testing will be performed at 14.0 VDC or 28.0 VDC +/- 1 VDC or other design voltage as determined by the manufacturer. Lamps may be operational outside the stated design voltage range.

4.7.3 Reverse polarity. Individual lamp functions shall meet SAE J2139 for -12 volt lamps or -24 volt lamps, or both for variable voltage lamps. The lamps must function normally when the correct polarity is re-applied. (3) production level parts shall comply with this test.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.



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## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. LED lamps covered by this performance specification are intended primarily for the purpose of replacing current incandescent Clearance/ Sidemarker or Identification lamps. LED technology that is properly designed, is not vulnerable to shock and vibration and therefore performs much better in severe end-use environments. By converting incandescent lamp products to LED, the lamps often last the life of the vehicle thus eliminating maintenance and field service issues.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).

6.3 Subject term (key word) listing.

Infra-red  
Photometry  
Water submersion test

6.4 Definitions.

6.4.1 Defective. Defective is a unit of product which contains one or more defects.

6.5 International standardization agreement implementation: This specification implements STANAG 4381 Ed-1 "Blackout Lighting Systems For Tactical Land Vehicles". When amendment, revision, or cancellation of this specification is proposed, the preparing activity must coordinate the action with the U.S. National Point of Contact for the international standardization agreement, as identified in the ASSIST database at <http://assist.daps.dla.mil>.

## Custodians:

Army - AT  
Navy - MC  
Air Force - 99

## Preparing Activity:

Army - AT

(Project 6220-2008-001)

## Review Activities:

Army – AV, CR  
Navy – AS, CG, YD  
Air Force – 03, 11, 71  
DLA – GS2

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.