

INCH-POUND

MIL-PRF-32214

12 March 2009

PERFORMANCE SPECIFICATION

LIGHT EMITTING DIODE (LED) COMPOSITE FRONT PARK AND TURN SIGNAL
LAMP, WITH INFRA-RED SECURE FRONT BLACKOUT MARKER LAMP

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

1. SCOPE

1.1 Scope. This specification 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 (LED) 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 zone total photometry requirements of this standard and the associated standards referenced within this document where applicable. Please note the term “designed to conform” used throughout this document means, representative production level samples will be used for verification of compliance as specified below in this document.

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.

1.2 Classification. The LED Composite Front Park and Turn Signal Lamp with Infra-Red Secure Blackout Marker Lamp will be the following types and styles.

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. 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 I – Lamp with Bucket
Style 1- Green in color
Style 2 - Tan in color
Style 3 - Black in Color

Type 2 – Lamp Only
Style 1- Green in color
Style 2 - Tan in color
Style 3 - Black in Color

2.2 Government documents.

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

INTERNATIONAL STANDARDIZATION AGREEMENTS

STANAG 4381 ED. 1 - Blackout Lighting Systems for Tactical
Land Vehicles

(Copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094 or from their website at <http://assist.daps.dla.mil/online/start/>)

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.)

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-461 - Requirements for the Control of
Electromagnetic Interference Characteristics
of Subsystems and Equipment

(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.)

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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 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)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

SAE INTERNATIONAL

SAE J222	-	Parking Lamps (Front Position Lamps)
SAE J575	-	Test Methods and Equipment for Lighting Devices and Components for Use on Vehicles Less than 2032 mm in Overall Width
SAE J576	-	Plastic Material or Materials for Use in Optical Parts Such as Lenses and Reflex Reflectors of Motor Vehicle Lighting Devices
SAE J578	-	Color Specification
SAE J588	-	Turn Signal Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width
SAE J759	-	Lighting Identification Code
SAE J2261	-	Front and Rear Turn Signal Lamps for Use on Motor Vehicles 2032 Mm Or More in Overall Width
SAE J1889	-	L.E.D. Signal and Marking Lighting Devices

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SAE J2139 - Tests for Signal and Marking Devices Used on Vehicles
2032 mm or More in Overall Width

(Copies of the above documents can be found by sending a letter to the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001 or by visiting their website 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 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.

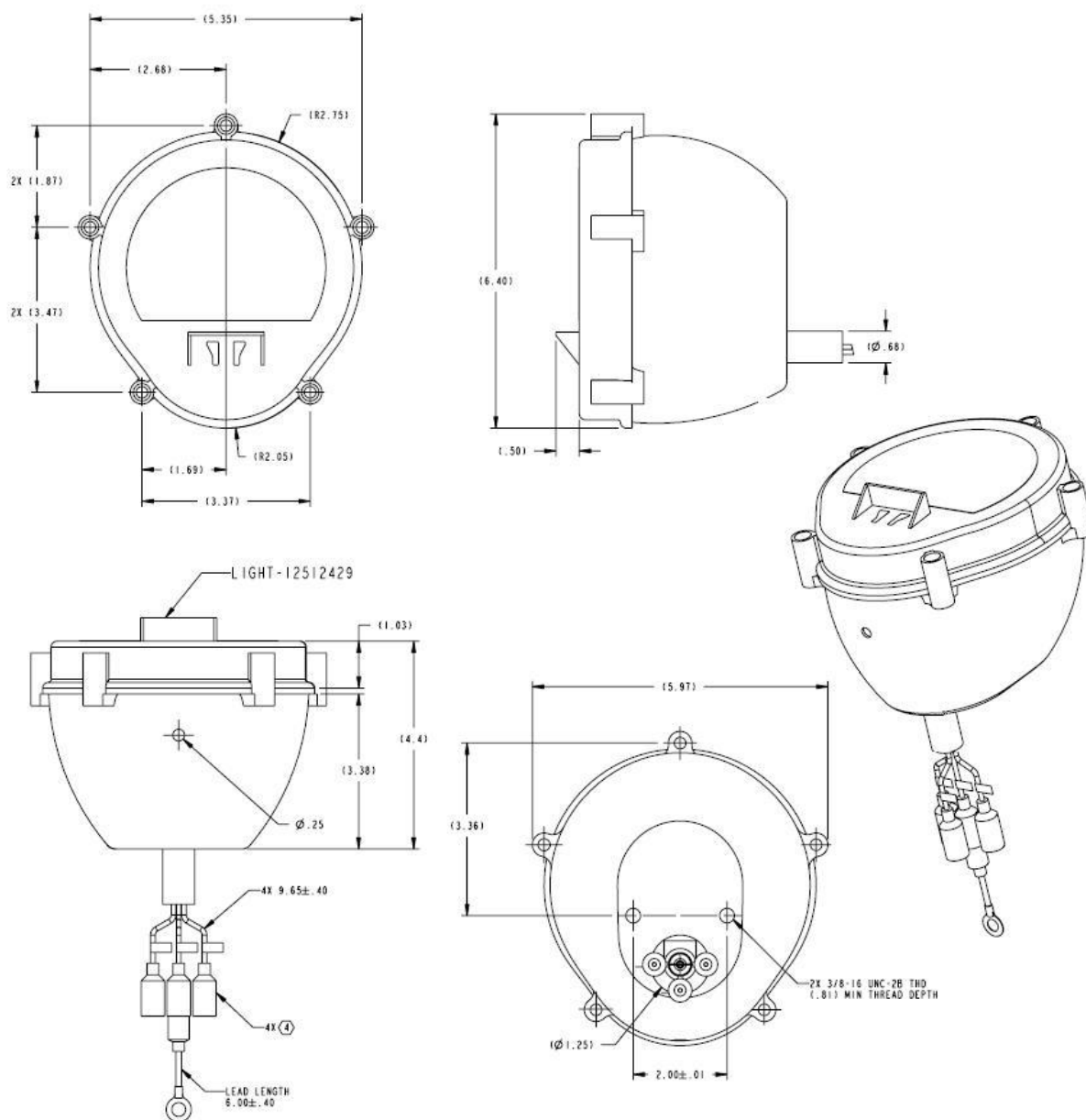
3.2 Design, materials, and manufacturing processes. Unless otherwise specified, the design, materials and manufacturing process selection is the prerogative of the contractor as long as all articles submitted to the Government fully meet the operating, interface, support and ownership, and environmental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

3.2.1 Recycled, recovered, or environmentally preferable materials. Materials shall 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, cadmium, and hexavalent chromium 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 total activity is greater than .002 microcuries per gram or activity per item exceeds .01 microcuries.

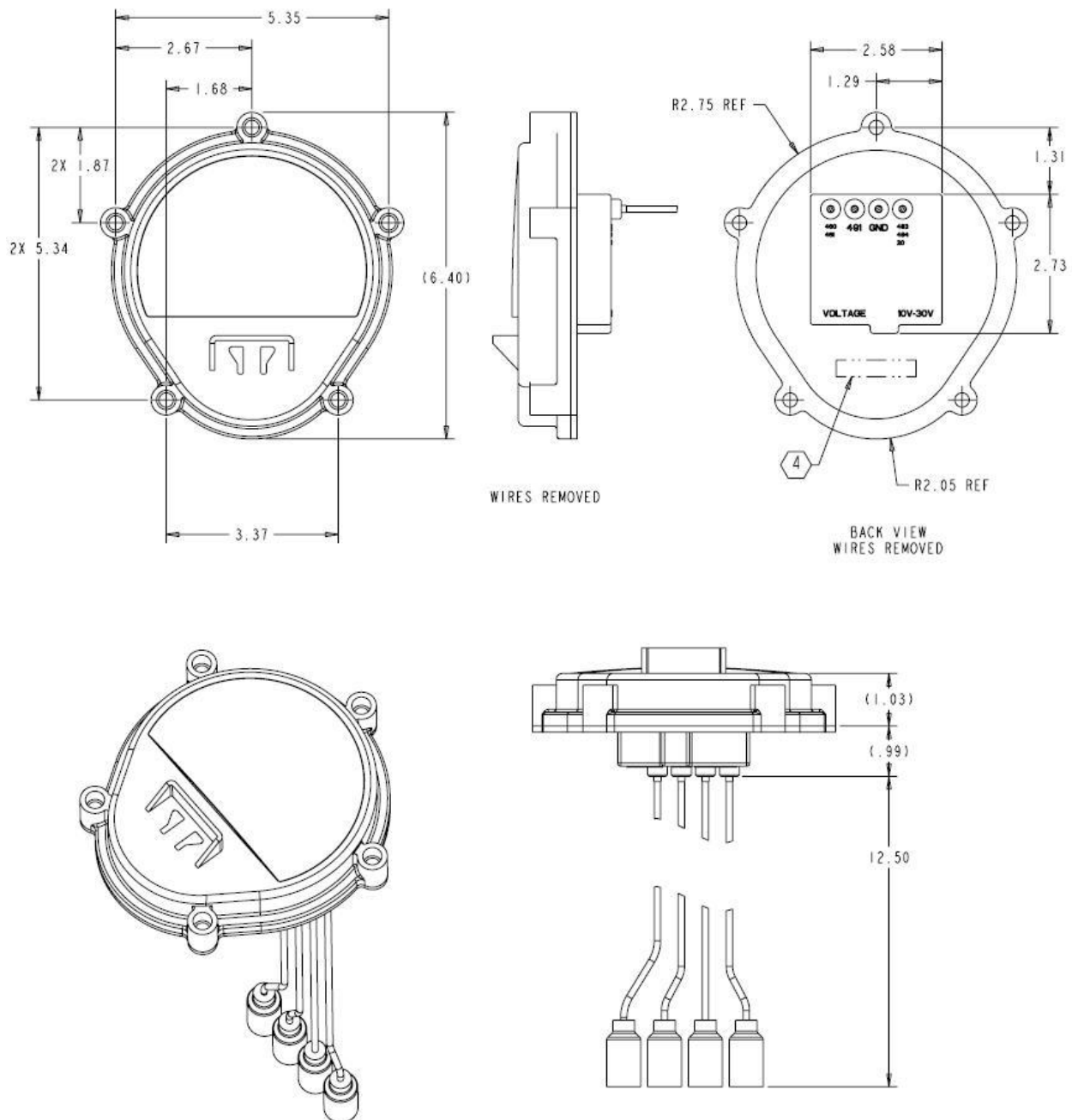
3.2.3 Materials and military LED lamp operational temperatures. Materials shall be as specified herein, applicable specifications, and on applicable drawings. Materials not specifically designated shall be suitable for use in the LED lamp finished assemblies for operational temperature range, in degrees, 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 sealing degradation resulting in moisture intrusion.

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Drawing I: LED Composite Light, Front Amber Lamp Assembly

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Drawing II: LED Composite Light, Front Amber 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.

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3.4.1 Photometry. The Light Emitting Diode (LED) composite front park and turn signal lamp, with infra-red secure front blackout marker lamp shall meet all SAE specifications listed below:

SAE J222	-	Parking Lamps (Front Position Lamps)
SAE J588	-	Turn Signal Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width
SAE J2261	-	Front and Rear Turn Signal Lamps for Use on Motor Vehicles 2032 Mm Or More in Overall Width

3.4.2 Color. Lamp must emit light that is yellow in color according to the requirements in SAE J578, as specified by FMVSS571.108.

3.5 SAE J2139 and SAE J575 requirements. The LED composite front park and turn signal lamp, with infra-red secure front blackout marker lamp 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.

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

3.6 Military performance requirements. The light emitting diode (LED) composite front park and turn signal lamp, with infra-red secure front blackout marker lamp shall meet electromagnetic interference (EMI) methods CE102 and RE102 of MIL-STD-461 to established Army ground platform requirements.

3.7 Special performance requirements. The light emitting diode (LED) composite front park and turn signal lamp, with infra-red secure front blackout marker lamp shall meet all of the requirements listed below.

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

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

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3.7.3 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.

3.7.4 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.

3.7.5 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.

3.8 Operating voltage. The light emitting diode (LED) composite front park and turn signal lamp, with infra-red secure front blackout marker lamp shall meet the following requirements.

3.8.1 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.

3.8.2 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.

3.8.3 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.

3.8.4 Electrical transient voltage(s). The lamp functions shall meet all requirements of SAE J2139, Vehicle Transient Voltage Tests test section for 12 volt lamps or 24 volt lamps or both for variable voltage lamps.

3.8.5 Infra-red secure blackout photometry, color and spectral emission. The Light Emitting Diode (LED) Composite Front Park and Turn Signal Lamps with infra-red secure front blackout marker lamps shall meet the following requirements.

3.8.5.1 Infra-red secure blackout lenses. The front blackout marker lamp lens shall have the form of two Y-shaped opening which shall emit Yellow (amber) light. The openings of each lamp portion shall be individually visible up to 60 feet. From 60 to 120 feet, the openings shall appear as a single point of light. The horizontal angles of cutoff shall be the maximum practicable but shall be not less than 45 degrees right or left of the optical centerline at 100 feet. The color of emitted light the lamp assembly's blackout lamp portions shall comply with color specification called out in SAE J578.

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3.8.5.2 Photometry. Each Y shaped Infra-red Secure Blackout lamp section shall emit light primarily in the visible range 400 -700 nanometers (nm) and comply with the requirements of the Table I for Infra-red Secure Blackout Front Marker Lamps below.

TABLE I: Luminance Lighting Requirements for the Infrared Secure Black Out Front Marker Lamp

	Y-Luminance cd/m		
	Mean Value	Maximum Value	Minimum Value
Brightest Zone	34.26	51.39	17.13
Least Bright Area	8.56	13.71	3.43

Note: luminance is measured in an area of approximately 1 square mm with a spot photometer

3.8.5.3 Color. The color of emitted light of LED infra-red secure blackout front marker lamps shall comply with the yellow color specifications called out in SAE J578.

3.8.5.4 Spectral testing - infra-red range. LED infra-red secure blackout front marker lamps shall be designed such that the emission of any vehicle exterior light source which may be illuminated in the blackout mode, shall be limited to the visible spectrum (400 -700 nm). Emission peaks in the 700 to 920 nm portion of the electromagnetic (EM) spectrum shall not exceed 15% relative to peak emission in the visible spectrum.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein are classified as follows:

4.1.1 First article inspection. First article inspection of the lamps shall be produced prior to the manufacturing of the item in production quantities. A quantity of (50) light emitting diode (LED) composite front park and turn signal lamp, with infra-red secure front blackout marker lamp 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. 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".

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 meets or exceeds the operational and maintenance requirements shall be provided with the verification documents.

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4.2.2 Materials. A bill of materials that meets or exceeds 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 front parking lamp and front turn signal lamp 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 J2261	-	Front and Rear Turn Signal Lamps for Use on Motor Vehicles 2032 Mm Or More in Overall Width
SAE J588	-	Turn Signal Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width

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SAE J222 - Parking Lamps (Front Position Lamps)

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

4.5 Mechanical testing practices SAE J2139 verification. The light emitting diode (LED) composite front park and turn signal lamp, with infra-red secure front blackout marker lamp 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 Military testing. (1) one production level part shall meet electromagnetic interference (EMI) requirements of CE102 and RE102 for Army ground platform vehicles of MIL-STD-461 when energized with test voltages in section 4.8.1 or 4.8.2 of this document.

4.7 Special performance testing. The light emitting diode (LED) composite front park and turn signal lamp, with infra-red secure front blackout marker lamp 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:

4.7.1 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).

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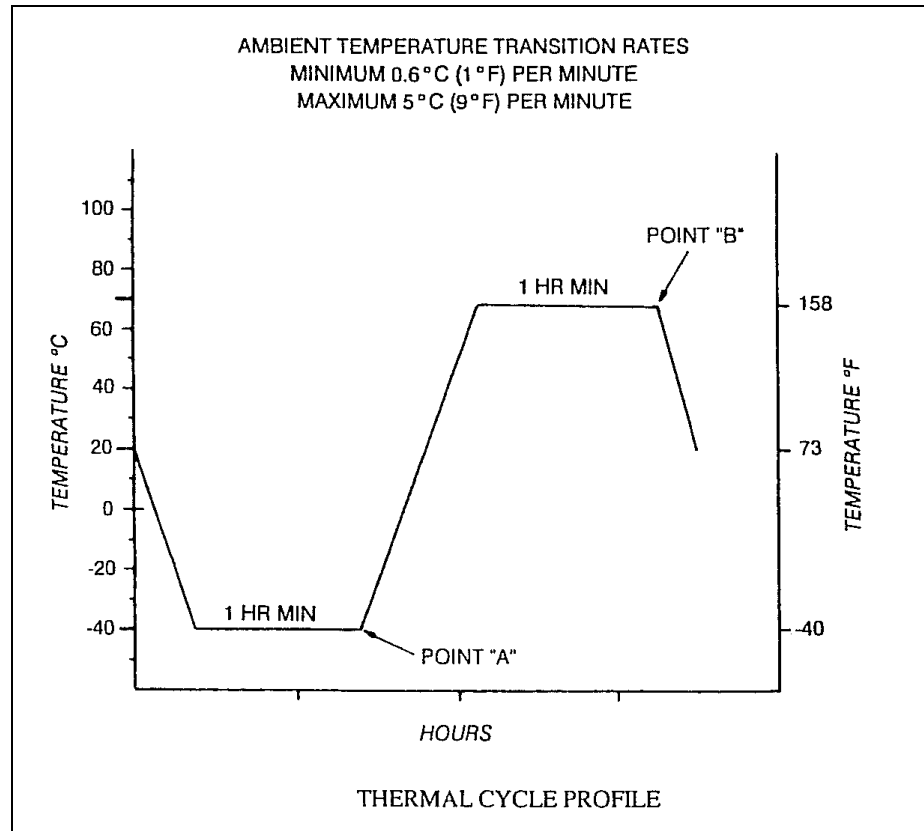


FIGURE I: Ambient Temperature Transition Rates

4.7.2 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.

4.7.2.1 Procedure.

- Select the samples and check them for proper functionality.
- Prepare the 5% Salt/H₂O Solution.
- Place the test samples in the test tank so that they are totally submersed.
- 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.
- Set the cycle timer to operate the samples at the desired cycle time (constant).
- Operate the test samples at the voltage or amperage as described in section 3.8.1 or 3.8.2 of this document.

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

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4.7.3 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.

4.7.3.1 Procedure.

- a. Select the samples and check them for proper functionality.
- b. Prepare the 5% Salt/H₂O 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 3.9 of this document.

4.7.3.2 Test duration. The length of the test is 3 days or 72 hours - minimum.

4.7.4 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 4.8.1 or 4.8.2. of this document.

4.8 Operating voltage. The light emitting diode (LED) composite front park and turn signal lamp, with infra-red secure front blackout marker lamp shall comply with the following:

4.8.1 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.

4.8.2 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.

4.8.3 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.

4.8.4 Electrical transient voltage(s). The lamp functions shall meet all requirements of SAE J2139, Vehicle Transient Voltage Tests requirements section for 12Volt lamps or 24Volt lamps or both for variable voltage lamps.

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4.8.5 Infra-red secure blackout photometry, color and spectral emission. (5) Production Level Samples shall be tested for compliance.

4.8.5.1 Infra-red secure blackout lenses. The blackout marker lamp lens shall have the form of two Y-shaped opening which shall emit Yellow (amber) light. The openings of each lamp portion shall be individually visible up to 60 feet. From 60 to 120 feet, the openings shall appear as a single point of light. The horizontal angles of cutoff shall be the maximum practicable but shall be not less than 45 degrees right or left of the optical centerline at 100 feet. The color of emitted light the lamp assembly's blackout lamp portions shall comply with color specification called out in SAE J578.

4.8.5.2 Photometry. Each Y shaped Infra-red Secure Blackout lamp section shall emit light primarily in the visible range 400 -700 nanometers (nm) and comply with the requirements of the Table II for Infrared Secure Black Out Front Marker Lamps below.

Table II: Luminance Lighting Requirements for the Infrared Secure Black Out Front Marker Lamp

	Y-Luminance cd/m		
	Mean Value	Maximum Value	Minimum Value
Brightest Zone	34.26	51.39	17.13
Least Bright Area	8.56	13.71	3.43

Note: luminance is measured in an area of approximately 1 square mm with a spot photometer

4.8.5.3 Color. The color of light emitted from the LED Infra-Red Secure Blackout Lamps shall comply with the color specifications called out in SAE J578, Yellow (Amber) for IR Secure Blackout Stop Lamps. Color is measured in an area of approximately 1 square mm with a spot color photometer in the brightest zone.

4.8.5.4 Spectral testing - infra-red range. LED Infra-Red Secure Blackout Tail Lamps and Blackout Stop Lamps shall be designed such that the emission of any vehicle exterior light source which may be illuminated in the blackout mode, shall be limited to the visible spectrum(400 -700 nm). Emission peaks in the infrared spectrum (700 to 920 nm) portion of the electromagnetic (EM) spectrum shall not exceed 15% relative to peak emission in the visible spectrum. The test lamp shall be energized to photometric stability IAW SAE J1889 and test voltages IAW section 4.8.1 or 4.8.2. of this document. Spectral energy is measured in an area of approximately 1 square mm with a spot spectrometer in the brightest zone. (5) production level parts must 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

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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.

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 Front Park and Turn Signal Lamp with IR Secure Blackout Front Marker 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.

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>.

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Custodians:

Army - AT
Navy - MC
Air Force - 99

Preparing Activity:

Army - AT

(Project 6220-2008-003)

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>.