

INCH-POUND

MIL-PRF-32243

12 March 2009

## PERFORMANCE SPECIFICATION

## LIGHT EMITTING DIODE (LED) MILITARY DRIVING HEADLAMP

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 what is commonly termed as the seven (7) inch round Forward Lighting Driving Headlamp, 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, MIL Standards and Military Performance Specifications. The lamps will be designed to conform to the photometry, mechanical, electrical and special performance requirements referenced within this document where applicable. Each production part need not be tested to the specified validation tests as proof of compliance. The headlamp may be supplied as a replacement part or as a component in a finished assembly.

1.2 Classification. The LED Military Driving Headlamp will be the following types and styles.

## Type I – Lamp with Bucket

Style 1- Lamp w/ Green Bucket (Short Mount 3/8" Mounting Stud Length)

Style 2 - Lamp w/ Tan Bucket (Short Mount 3/8" Mounting Stud Length)

Style 3 - Lamp w/ Black Bucket (Short Mount 3/8" Mounting Stud Length)

Style 4- Lamp w/ Green Bucket (Long Mount 3/4" Mounting Stud Length)

Style 5 - Lamp w/ Tan Bucket (Long Mount 3/4" Mounting Stud Length)

Style 6 - Lamp w/ Black Bucket (Long Mount 3/4" Mounting Stud Length)

## Type 2 – Lamp Only

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>

## MIL-PRF-32243

## 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 or 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 will meet all specified requirement documents cited in sections 3 and 4 of this specification, whether or not they are listed.

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 listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

## DEPARTMENT OF DEFENSE STANDARDS

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

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

FMVSS 571.7 - Code of Federal Regulations (CFR), Title 49, Chapter V – National Highway Traffic Safety Administration

MIL-PRF-32243

(NHTSA), Department of Transportation (DOT), Part 571 – Federal Motor Vehicle Safety Standards (FMVSS)

(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)).

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

#### DRAWINGS

- 12480561 - WATERPROOFNESS REQUIREMENT FOR AUTOMOTIVE ELECTRICAL COMPONENTS LED HEADLAMP, 24 V, HIGH & LOW BEAM.

(Application for copies should be addressed to the U.S. Army Tank-automotive and Armaments Command, ATTN: AMSRD-TAR-E/CM/DM/STND, Warren, MI 48397-5000, or at [dami\\_standardization@conus.army.mil](mailto:dami_standardization@conus.army.mil)).

2.3 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issue of the documents cited in the solicitation (see 6.2).

#### SOCIETY OF AUTOMOTIVE ENGINEERS, INC (SAE)

- 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 Materials for use in optical parts such as lenses and reflex reflectors of motor vehicle lighting devices
- SAE J577 - Vibration Test Machine and Operation Procedure
- SAE J578 - Color Specification
- SAE J759 - Lighting Identification Code

## MIL-PRF-32243

- |           |   |  |
|-----------|---|--|
| SAE J1383 | - | Performance Requirements for Motor Vehicle Headlamps   |
| SAE J1455 | - | Recommended Environmental Practices for Electronic Equipment Design in Heavy-Duty Vehicle Applications |
| SAE J1889 | - | L.E.D. Signal and Marking Lighting Devices   |
| SAE J2139 | - | Tests for Signal and Marking Devices Used on Vehicles 2032mm or More in Overall Width                  |

(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.

3.2.1 Recycled, recovered, or environmentally preferable materials. 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 referenced 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

## MIL-PRF-32243

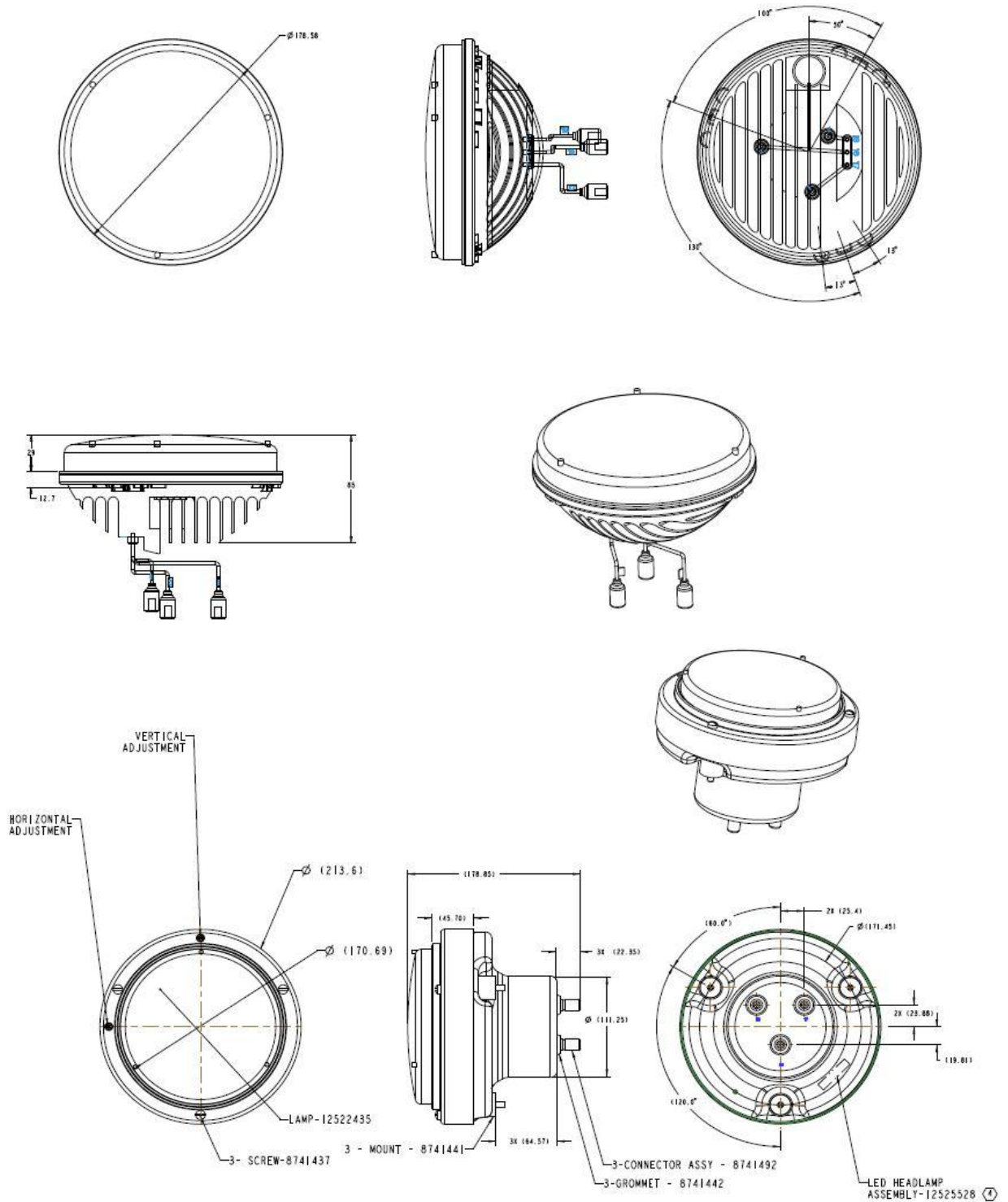
specific activity is greater than .002 microcuries per gram or total activity per item exceeds .01 microcuries.

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 -50 C to 70 C, + or - 5 C without any adverse physical or dimensional properties that would cause lamp to fail or sealing degradation resulting in moisture intrusion.

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 Drawing I.

NOTES:	
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.	LAMPS DESIGNED TO CONFORM WITH TITLE 49 CFR FMVSS 571.108
4.	ITEM IDENTIFICATION: APPLY THE FOLLOWING MARKING IAW MIL-STD-130, METHOD OPTIONAL. 19207- <input type="text"/> ← PART NO. 12512435 MFR- <input type="text"/> ← MANUFACTURER'S CAGE CODE
5.	PERFORMANCE REQUIREMENTS IAW MIL-PRF-32243
6.	LAMP MEETS ALL FORM, FIT, FUNCTION REQUIREMENTS OF EXISTING 24V INCANDESCENT SEALED BEAM/BUCKET LAMP ASSEMBLY

MIL-PRF-32243



Drawing I: LED Headlamp and Assembly, 7' Flush Mounted

## MIL-PRF-32243

3.3.1 Dimensional Requirements. The LED Headlamp and all electronics necessary for operation shall be contained within the dimensions specified in SAE J1383 as referenced in FMVSS 571.108.

3.4 Identification Codes, Markings and Notices. The lamp shall be marked with permanent markings in accordance with SAE J759 for the functions specified by FMVSS 571.108 in the production year of original certification. The lamp shall also be permanently marked with the normal operating voltage on any component of the lamp.

### 3.5 FMVSS 571.108

3.5.1 Photometry. The test lamp shall comply with Title 49 CFR FMVSS 571.108 and 571.7 Section C for Mechanically Aimed Head Lighting Systems in the production year of the original certification. Lamp shall be tested on upper and lower beams IAW section 4.5.1 of this document.

3.5.2 Color. Lamp shall emit light that is White in color according to the requirements in SAE J578 as specified by FMVSS 571.108.

3.5.3 Abrasion. The LED Headlamp exterior lens shall comply with abrasion testing as specified by FMVSS 571.108.

3.5.4 Chemical Resistance. The LED Headlamp exterior lens shall comply with chemical resistance testing as specified by FMVSS 571.108.

3.5.5 Temperature Cycle. The LED Headlamp shall comply with temperature cycle testing section specified by FMVSS 571.108.

3.5.6 Internal Heat Test. The LED Headlamp shall comply with Internal Heat Test testing as specified by FMVSS 571.108.

3.5.7 Humidity. The LED Headlamp shall comply with Humidity Test testing as specified by FMVSS 571.108.

3.5.8 Impact. The LED Headlamp exterior lens shall comply with impact testing per SAE J1383 as referenced in FMVSS 571.108.

3.5.9 Inward Force. The LED Headlamp exterior lens shall comply with inward force testing per SAE J1383 as referenced in FMVSS 571.108.

3.6 Mechanical Testing Requirements. The Light Emitting Diode (LED) Headlamp shall meet all SAE J2139 recommended practices for Mechanical testing listed below. Please note that

## MIL-PRF-32243

the requirements for the tests listed herein eclipse those for FMVSS 571.108 mechanical testing. Lamps that comply with these tests, comply with the requirements for FMVSS 571.108 as well. Any loss of function of the lamp or individual LED is considered a failure. Evidence of deformation, loss of seal, cracking or crazing that would prevent compliance to form, fit or function is considered a failure.

- a) Vibration Extended (5) hours total
- b) Moisture
- c) Dust
- d) Corrosion
- e) Warpage

3.7 Military Performance Requirements. Any loss of function of the lamp or individual LED is considered a failure. Evidence of deformation, loss of seal, cracking or crazing that would prevent compliance to form, fit or function is considered a failure.

3.7.1 Electromagnetic Compatibility. The LED headlamp shall meet requirements for EMC (Electro Magnetic Compatibility) Testing to Mil-STD-461 for Army Ground platform vehicles.

3.7.2 Fording. The integrity of the lamp's seal and functionality shall be maintained against moisture intrusion under pressure of deep water fording.

3.7.3 Voltage Transient Testing. The LED headlamp shall meet the voltage transient testing specified in SAE J2139 for 12V lamps, for 24 volt lamps or both 12V & 24V for variable voltage lamps. Lamps shall meet load dump, mutual coupling, and inductive switching requirements.

3.8 Special Performance Requirements. The LED headlamp shall comply with all of the requirements listed below. Any loss of function of the lamp or individual LED is considered a failure. Evidence of deformation, loss of seal, cracking or crazing that would prevent compliance to form, fit or function is considered a failure.

3.8.1 Thermal Cycle. The LED Headlamp shall comply with SAE J1889 except temperature range from minimum -50°C to maximum 70°C cycled 25 times.

3.8.2 Thermal Shock. Shall be tested according to SAE J1455 temperature range from minimum -40°C to maximum 85°C cycled 5 times.

3.8.3 Humidity. Shall be tested according to SAE J1455.



## MIL-PRF-32243

3.8.4 (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 120 hours minimum.

3.8.5 (5%) Salt Water Injection. The integrity of the lamp's 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 18 hours.

3.8.6 Installation Harness Shock. Shall be tested according to SAE J1455.

3.9 Operating Voltage. The LED Headlamp shall meet the following requirements.

3.9.1 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.

3.9.2 Single Voltage Lamp. Lamp components may be designed for a specific operational vehicle voltage range, such as 10V - 14 VDC for 12 V systems application or 22V - 30 VDC for 24 V systems applications. Lamps may be operational outside the stated design voltage range.

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

3.9.4 Jumper Start. Individual Lamp functions shall meet SAE J2139 jumper start test for 12 volt or 24 volt lamps, or both for variable voltage lamps

3.10 Additional SAE Electrical Tests. The LED Headlamp shall comply with the following SAE Electrical tests, on the high and low beam functions.

3.10.1 Electrostatic Discharge (ESD). The LED Headlamp shall comply with +/- 4 kV level in both the operational mode, with 28.0 volts or 12.8 volts applied for single voltage lamps or both for variable voltage lamps and the non-operational (no voltage applied) handling mode.

3.11 Recommended Field Testing. Lamps to be durability field tested per the table below without failure or deterioration:

## MIL-PRF-32243

TABLE I: Recommended Field Testing

Environment	Location	Duration
Cold	Cold Regions Test Center - Alaska	3 months minimum during extreme cold period of year
Desert	Yuma Proving Grounds - Arizona	3 months minimum during extreme hot period of year
Temperate	Aberdeen Proving Grounds – Maryland	3 months minimum
Tropical	Tropic Regions Test Center - Panama	3 months minimum

\* Recommended vehicle-specific field testing in each extreme environment is very effective in finding weaknesses in the design not otherwise revealed by laboratory or bench testing.

#### 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 Military Driving Headlamp 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”.

4.1.1 First article inspection. First article inspection of the LED Military Driving Headlamp shall be produced prior to the manufacturing of the item in production quantities. A quantity of fifty (50) production representative LED Headlamps shall be used for both destructive and non-destructive testing requirements. Thereafter, random testing if required will be performed in the same manor.

4.2 Design, Materials and Manufacturing processes. The lamps shall 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 referenced in FMVSS 571.108 except for Luminous Transmittance. Evidence of fungus resistance shall be provided with verification documents. If radioactive materials are

## MIL-PRF-32243

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 - 50 C to 70 C, + or - 5 C, without any adverse physical or dimensional properties shall be provided.

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

4.3.1 Dimensional Requirements. Evidence shall be provided demonstrating compliance that the LED Headlamp and all electronics necessary for operation shall be contained within the dimensions specified in SAE J1383 as specified by FMVSS 571.108.

4.4 Identification Codes, Markings and Notices. Evidence shall be provided demonstrating compliance with the marking requirements IAW SAE J759 for the functions specified by FMVSS 571.108 in the production year of original certification. Also evidence shall be provided demonstrating permanent marking of the normal operating voltage on any component of the lamp.

4.5 FMVSS 571.108 Requirements. The Military LED Headlamp shall meet the SAE Recommended practices and other requirements specified by FMVSS 571.108 in the production of the original certification.

4.5.1 Photometry. (10) production level parts shall comply with Figure 27-1 or Figure 17-1 Photometric Test Point Values for Mechanical Aim Headlighting Systems for Upper and Lower Beams as specified by FMVSS 571.108. The test lamp shall be warmed up for 30 minutes or to photometric stability (+/- 3% within any 15 minute period) at room temperature (~75 F). Test voltages shall be 12.8 VDC and 28 VDC +/- 1 VDC for variable voltage lamps and 12.8 VDC or 28 VDC +/- 1 VDC for single voltage lamps. Evidence demonstrating compliance shall be provided.

4.5.1.1 Photometry. (2) production level parts shall comply with section 4.5.1 above. Evidence demonstrating compliance from an A2LA certified independent ( third party) test facility shall be provided.

4.5.2 Color. (10) production level parts shall comply with SAE J578c as specified by FMVSS 571.108.

## MIL-PRF-32243

4.5.3 Abrasion. The LED Headlamp exterior lens shall comply with abrasion testing section as specified by FMVSS 571.108. (1) production level part shall comply with the photometry requirements of FMVSS 571.108 Figure 27-1 or Figure 17-1 for High and Low Beams after abrasion.

4.5.4 Chemical Resistance. The LED Headlamp exterior lens shall comply with chemical resistance testing section 8.3 (and section 8.10.1 for replaceable lens headlamps) as specified by FMVSS 571.108. (1) production level part treated with all 5 chemicals or (5) production level part treated with 1 chemical each shall comply with the photometry requirements of FMVSS 571.108 Figure 27-1 or Figure 17-1 for High and Low Beams after the chemical wipe procedure.

4.5.5 Temperature Cycle. The LED Headlamp shall comply with temperature cycle testing section specified by FMVSS 571.108. The lamp shall be energized at design voltage and at the maximum wattage dissipation for the lamps intended usage. A headlamp, mounted on a headlamp test fixture, shall be subjected to 10 complete consecutive cycles having the thermal cycle profile shown below. During the hot cycle, the lamp, shall be energized commencing at point "A" and de-energized at point "B". Separate or single test chambers may be used to generate the environment of Figure I. All drain holes, breathing devices or other openings or vents of the headlamps shall be in their normal operating positions. After a temperature cycle test is conducted, the headlamp shall show no evidence of delamination, fractures, entry of moisture or deterioration of bonding material, color bleeding, warpage or deformation visible without magnification or lens warpage greater than 0.118 in. (3 mm) when measured parallel to the optical axis at the point of intersection of the axis of each light source with the exterior surface of the lens, and it shall meet the photometric requirements applicable to the headlamp system under test. (1) production level part shall comply with the photometry requirements of FMVSS 571.108 Figure 27-1 or Figure 17-1 for High and Low Beams. (2) production level parts may be tested, one for each beam and shall comply with the photometry requirements of FMVSS 571.108 Figure 27-1 or Figure 17-1 for High or Low Beams as appropriate after the temperature cycle.

## MIL-PRF-32243

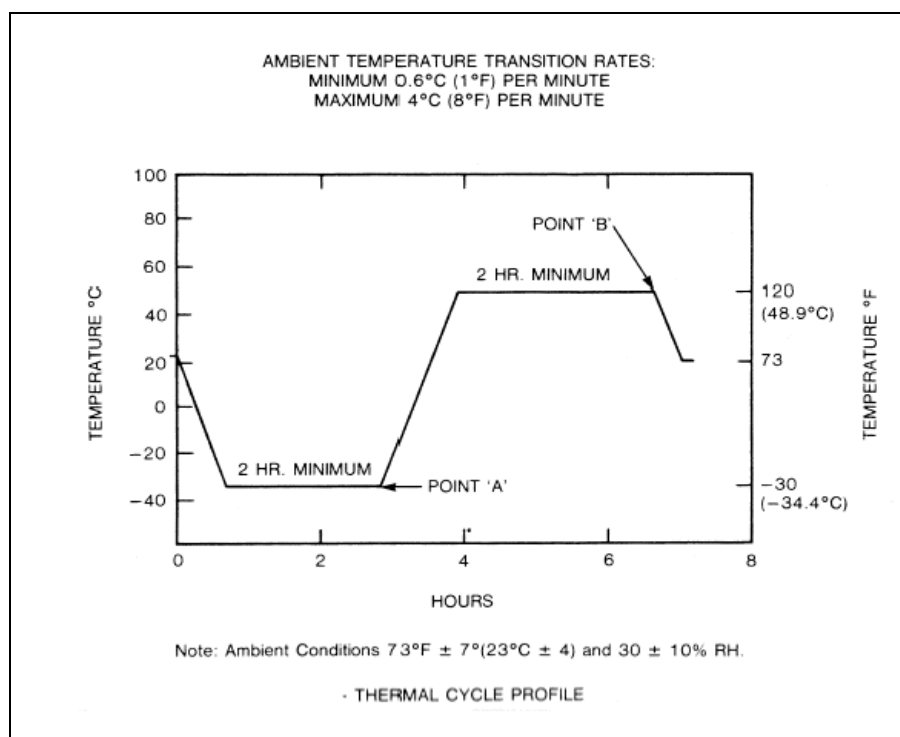


FIGURE I: Thermal Cycle Profile

4.5.6 Internal Heat Test. The LED Headlamp shall comply with Internal Heat Test testing section specified by FMVSS 571.108. The lamp shall be energized at design voltage and at the maximum wattage dissipation for the lamps intended usage. After an internal heat test conducted in accordance with paragraph S8.6.2, there shall be no lens warpage greater than .118 in. After the internal heat test there shall be no lens warpage greater than 0.118 in. (3 mm) when measured parallel to the optical axis at the point of intersection of the axis of each light source with the exterior surface of the lens, and it shall meet the photometric requirements applicable to the headlamp system under test. (1) production level part shall comply with the photometry requirements of FMVSS 571.108 Figure 27-1 for High and Low Beams. (2) production level parts may be tested, one for each beam and shall comply with the photometry requirements of FMVSS 571.108 Figure 27-1 for High or Low Beams as appropriate after the internal heat test.

4.5.7 Humidity. The LED Headlamp shall comply with Humidity Test testing as specified by FMVSS 571.108. (1) production level part shall comply with the requirements of FMVSS 571.108 or (2) production level parts may be tested, one for each beam and shall comply with the requirements of FMVSS 571.108. After a humidity test is conducted the inside of the headlamp shall show no evidence of delamination or moisture, fogging or condensation visible without magnification.

## MIL-PRF-32243

4.5.8 Impact. The LED Headlamp exterior lens shall comply with impact testing per SAE J1383 as specified in FMVSS 571.108. (1) production level parts shall comply.

4.5.9 Inward Force. (1) production level parts shall comply with SAE J1383 as specified in FMVSS 571.108; the headlamp shall meet the following requirements:

- a) The headlamp shall not permanently recede by more than 2.5mm.
- b) The aim of the headlamp shall not permanently deviate by more than 0.3 degrees.

4.6 Mechanical Testing. The LED headlamp shall comply with all of the requirements listed below. Any loss of function of the lamp or individual LED is considered a failure. Evidence of deformation, loss of seal, cracking or crazing that would prevent compliance to form, fit or function is considered a failure. Please note that the tests listed below eclipse those for FMVSS 571.108 mechanical testing and lamps that comply with these tests comply with the requirements for FMVSS 571.108 as well. SAE J2139 Requirements: The Light Emitting Diode (LED) Headlamp shall meet all SAE recommended practices for mechanical test listed below. The lamp shall be energized at design voltage and at the maximum wattage dissipation for the lamps intended usage according to the methods called out in each section, except were specified otherwise.

- a. Vibration - (3) production level parts shall comply with SAE J2139 after 5 hours of operation on the SAE J577 Vibration Machine. The lamp shall be energized continuous at design voltage and at the maximum wattage dissipation for the lamps intended usage
- b. Moisture - (3) production level parts shall comply
- c. Dust - (3) production level parts shall comply
- d. Corrosion - (3) production level parts shall comply
- e. Warpage - (3) production level parts shall comply

4.7 Military testing verification. Any loss of function of the lamp or individual LED is considered a failure. Evidence of deformation, loss of seal, cracking or crazing that would prevent compliance to form, fit or function is considered a failure. The lamp shall be energized at design voltage and at the maximum wattage dissipation for the lamps intended usage unless otherwise specified as worst case

4.7.1 Electro Magnetic Compatibility. (1) production level part shall meet requirements listed below for EMC (Electro Magnetic Compatibility) Testing to MIL-STD-461 for Army Ground platform vehicles when energized with test voltages in section 4.9.1 or 4.9.2 of this document.

## MIL-PRF-32243

- CS101 - Conducted Susceptibility, Power Leads – 30Hz to 150kHz
- CE102 - Conducted Emissions, Power Leads – 10kHz to 10MHz
- RE102 - Radiated Emissions, Electric Field – 2MHz to 18GHz
- CS114 - Conducted Susceptibility, Bulk Cable Injection 10kHz to 200MHz
- CS115 - Conducted Susceptibility, Bulk Cable Injection – Impulse Excitation
- CS116 - Conducted Susceptibility, Damped Sinusoidal Transients, Cables and Power Leads – 10kHz to 100MHz
- RS 103 - Radiated Susceptibility, Electric Field – 2MHz to 40 GHz

4.7.2 Fording. (3) production level parts shall 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. Drawing 12480561 shall be used as a waterproofness requirement.

4.7.3 Voltage Transient Testing. (3) production level parts shall comply with SAE J2139 vehicle transient voltage tests when energized with test voltages in section 4.9.1 or 4.9.2 of this document.

4.8 Special performance testing. The LED Military Driving Headlamp shall be optically functional after each of the following tests below. Any loss of function of the lamp or individual LED is considered a failure. Evidence of deformation, loss of seal, cracking or crazing that would prevent compliance to form, fit or function is considered a failure. The high beam or maximum current load function shall be energized at design voltage for the tests in this section.

4.8.1 Thermal Cycle. (3) production level parts shall comply with SAE J1889 except for the temperature range. The temperature range is from -50°C to 70°C. Test duration is 25 cycles. The lamps are energized, as shown in Figure II, from the end of the cold cycle (point A) to the end of the hot cycle (point B).

## MIL-PRF-32243

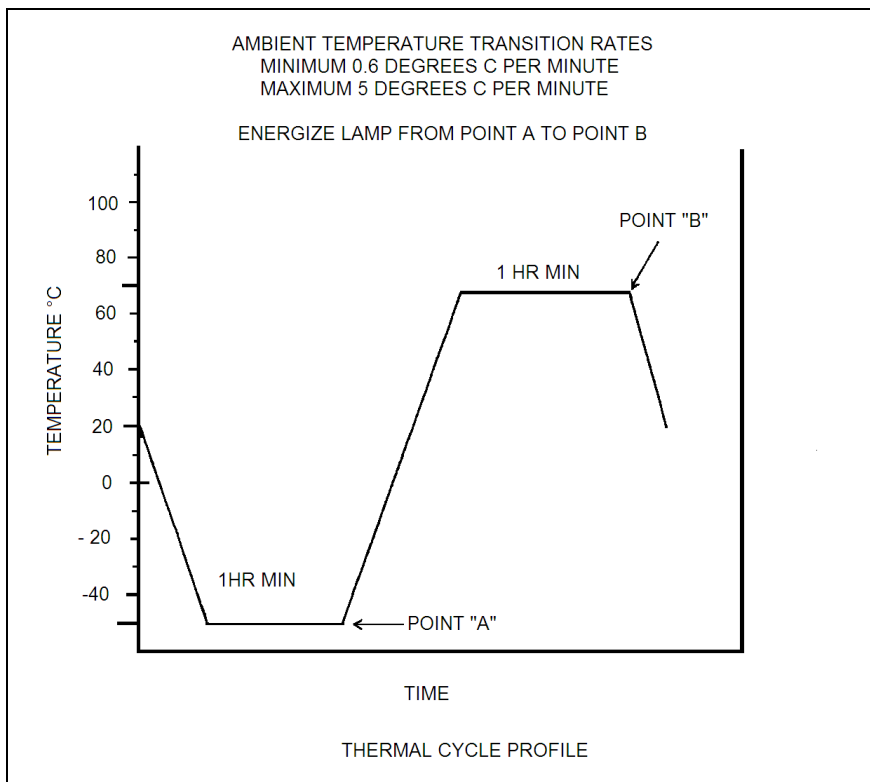


FIGURE II: Thermal Cycle Profile

4.8.2 Thermal Shock. (3) production level parts shall comply with the following. The thermal shock test should begin with a 2 hour presoak (-40 C/-40 F). The test item should be transferred to the hot chamber (85 C/185 F) where it should remain for 2 hours then transferred to the cold chamber (-40 C/-40 F) for 2 hours. This cycle should be repeated at least five times. Each transfer should be accomplished in 1 min or less. Energize the lamp at design voltage 5 minutes on and 5 minutes off for the entire test.

4.8.3 Humidity. (3) production level parts shall comply with SAE J1455 with temperature range of -40C to 85C, 90% RH@ 38C. The test duration shall be 5 cycles of 8 hours each (40 hours total). Energize the lamp at design voltage, 5 minutes on and 5 minutes off for the entire test.



## MIL-PRF-32243

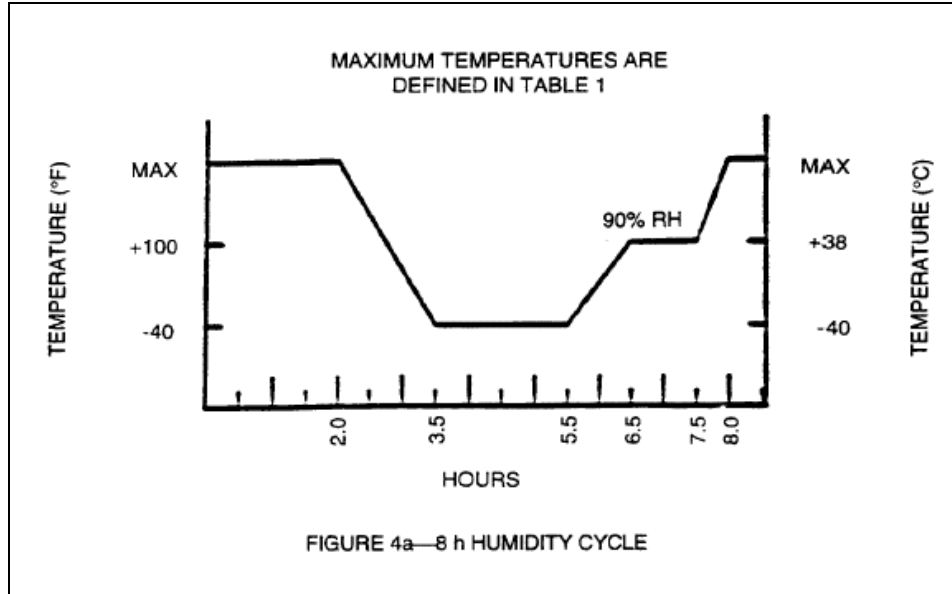


FIGURE III: Humidity Cycle

4.8.4 (5%) Salt Water Immersion. (3) production level parts shall comply with the procedure listed below any loss of function of the lamp or individual LED is considered a failure.

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 desired voltage or amperage.
- g. Test Duration: 120 hours minimum

4.8.5 (5%) Salt Water Injection. (3) production level parts shall comply with the procedure listed below.

Procedure.

- 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 desired voltage or amperage.
- f. Test duration : 18 hours energized at design voltage or amperage

## MIL-PRF-32243

4.8.6 Installation Harness Shock. (1) production level part shall comply with SAE J1455. The lamp shall be dropped 10 times.

4.9 Operating voltage. The light emitting diode (LED) Headlamp shall comply with the following:

4.9.1 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 12.8 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 12.8 VDC and 28.0 VDC +/- 1 VDC. Lamps may be operational outside the stated design voltage range. (3) production level parts shall comply with this test.

4.9.2 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 12.8 VDC or 28.0 VDC +/- 1 VDC, while meeting all requirements in this standard. All required testing will be performed at 12.8 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. (3) production level parts shall comply with this test.

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

4.9.4 Jumper Start. Individual Lamp functions shall meet SAE J2139 jumper start test for 12 volt or 24 volt lamps, or both for variable voltage lamps. The lamps shall function normally when the correct voltage is re-applied. (3) production level parts shall comply with this test.

4.10 Additional SAE Electrical Tests. The LED Headlamp shall comply with the following SAE Electrical tests, tested on both low and high beam functions.

4.10.1 Electrostatic Discharge (ESD). Electro Static Discharge (ESD) Testing

Procedure.

- a. Mount lamps in normal position.
- b. Attach ground of ESD Simulator instrument and lamp to common point.
- c. Attach KeyTek Model MZ-15/EC ESD Simulator instrument or equivalent (150pfd, 150ohm) output module.
- d. Energize the lamp with 12.8 or 28.0 Volts for single voltage lamps.

## MIL-PRF-32243

- e. Apply 5 pulses of air discharge high voltage pulses at approximately 1 to 2 mm from conductors at 1 pulse per second consecutively to rear of housing and into all power inputs connections at +/- 4 kV level.
- f. Repeat sections d and e at alternate voltage for variable voltage lamps.
- g. Verify proper operation of LED Headlamp functions i.e. no mechanical or electrical damage. This concludes test for Operational Mode.
- h. Disconnect power leads from lamp (except ground).
- i. Apply 5 pulses of air discharge high voltage pulses at approximately 1 to 2 mm from conductors at 1 pulse per second consecutively to rear of housing and into all power inputs connections at +/- 4 kV level.
- j. Verify proper operation of LED Headlamp functions with no mechanical or electrical damage. This concludes test for Handling Mode.

(2) production level parts shall comply with this test.

4.11 Recommended Field Testing. (2) Pre-Production or Production level lamps shall comply with the vehicle specific durability requirements for field testing at each location per the table below. Lamp acceptance shall be determined by the government. Revisions that affect form fit or function to previously qualified lamps may require requalification via field testing at the discretion of the government.

TABLE I: Recommended Field Testing

Environment	Location	Duration
Cold	Cold Regions Test Center - Alaska	3 months minimum during extreme cold period of year
Desert	Yuma Proving Grounds - Arizona	3 months minimum during extreme hot period of year
Temperate	Aberdeen Proving Grounds - Maryland	3 months minimum
Tropical	Tropic Regions Test Center - Panama	3 months minimum

\* Recommended vehicle-specific field testing in each extreme environment is very effective in finding weaknesses in the design not otherwise revealed by laboratory or bench testing.

## 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

## MIL-PRF-32243

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 Headlamps. 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 will 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.

7 inch Round  
Photometry  
Water submersion test

6.4 Definitions.

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

MIL-PRF-32243

Custodians:

Army - AT  
Navy - MC  
Air Force - 99

Preparing Activity:

Army - AT

(Project 6220-2008-002)

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>.