

PURCHASE DESCRIPTION
FOR
KIT, LIGHTING FOR M1A2 COLLIMATOR

6 January 2004

1. SCOPE

Scope. This specification covers the requirements, examinations and tests for the Lighting Kit used for the M1A2 Collimator.

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 must meet all requirements 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 document to the extent specified herein.

SPECIFICATIONS

DEPARTMENT OF DEFENSE

MIL-C-53072

Chemical Agent Resistant Coating (CARC)
System Application Procedures and Quality
Control Inspection

DEPARTMENT OF DEFENSE

MIL-STD-130

Identification Marking of US Military
Property

FEDERAL

FED-STD-595

Colors Used in Government Procurements

MIL-STD-1916

DoD Preferred Standards for Acceptance of Product

FSC: 1290

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

MIL-STD-810F

Environmental Engineering Considerations And Laboratory Tests

MIL-STD-882

System Safety

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from DODSSP – Customer Service, Standardization Documents Order Desk, 700 Robbins Avenue, Bldg. 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in this solicitation (See 6.3)

DOCUMENTS

Title 49 Code of Federal Regulations (49 CFR)

International Air Transport Association's (IATA) Requirements
2000 Pearl Street
Montreal, Quebec Canada
H3A2R4

2.3 Non-Government publications. There are no Non-Government publications associated with this specification.

2.4 Order of precedence. 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.

2. REQUIREMENTS

3.1 First article. When specified in the contract order (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Interface Requirements.

3.2.1 Weight. The battery enclosure assembly shall not exceed 1.5 lbs.

3.2.2 Lighting Kit Interface. Lighting Kit shall interface in accordance with Figure I. Possible solution is provided in drawings referenced in 6.3.

3.3 Environmental Requirements.

3.3.1 Storage Temperatures. The Collimator Lighting Kit shall not exhibit any degradation of materials or performance after storage at standard ambient temperatures of - 60° F and + 160° F.

3.3.2 Operating Temperatures. The Collimator Lighting Kit shall not exhibit any degradation of materials or performance, while exposed to and thermally stabilized at ambient temperatures of - 40° F and + 150° F.

3.3.3 Watertightness. The Collimator Lighting Kit shall perform as specified herein and show no indication of damage or moisture penetration to interior cavities when exposed to water.

3.3.4 Humidity. The Collimator Lighting Kit shall be capable of withstanding humidity and shall perform as specified herein when exposed to high humidity.

3.3.5 Sand and Dust. The Collimator Lighting Kit shall be capable of withstanding blowing sand and dust and shall perform as specified herein when exposed to blowing sand and dust (See 6.4.3).

3.3.6 Vibration. The Collimator Lighting Kit shall perform as specified herein and show no indication of damage after experiencing vibration levels normally encountered during transport.

3.3.7 Drop. The Collimator Lighting Kit shall perform as specified herein and show no evidence of damage after undergoing shock normally induced by dropping the item four feet.

3.4 Operating Requirements.

3.4.1 Power. The Lighting Kit shall be powered by two “C” size, 3.6 volt commercial battery or an equivalent battery system from the AMC Battery Management office list in 6.2h. System must comply with transportability requirement of 3.5.4.

3.4.2 Power Life. Light devices must be capable of a minimum of 1000 hours illumination without power source replacement or recharge.

3.4.3 Illumination range. Illumination shall cover a minimum area of 2.25 inches diameter at a distance of 1.25 inches.

3.4.4 Illumination color. Lighting Kit illumination color peak wavelength shall be within the range of 500 to 550 nanometers.

3.4.5 Illumination brightness. Lighting Kit illumination brightness shall be 8.412 Cd/cm² plus or minus 10 percent at the point of illumination.

3.4.6 Automatic Cycle Time. Upon activation of the switch, the Lighting Kit shall remain on for a period of 12.5 hours + 2 hours / -0.5 hours.

3.4.7 Visual low voltage strobe. Light shall begin a visually recognizable strobing to indicate 12 hours plus or minus 2 hours of battery life remaining.

3.4.8 Switch. The manually actuated switch shall turn the unit on and off.

3.5 Support and Ownership Requirements.

3.5.1 Finish. Finish color of the kit shall be Camouflage 383 Green, per FED-STD-595. All surfaces normally painted shall be cleaned, treated and coated using a Chemical Resistant Agent Coating (CARC) per MIL-C-53072.

3.5.2 Materials. The contractor shall select the materials, but the materials shall be capable of meeting all of the operational and environmental requirements specified herein. Materials used, including all components, shall not support fungus growth to any extent that would preclude proper functioning. Radioactive materials shall not be used. All surfaces shall be capable of being decontaminated.

3.5.3 Human Factors Engineering. The Collimator Lighting Kit shall permit ease of use and maintenance when the item is operated and maintained by soldiers dressed in arctic clothing and MOPP IV gloves.

3.5.4 Transportability. The battery (ies) used to power the Collimator Lighting Kit shall be unrestricted or shall meet the exemption of the transportation requirements in Title 49 Code of Federal Regulations (49 CFR) and IATA regulation (See 2.2.2).

3.5.5 Identification Marking. Item identification shall be in accordance with MIL-STD-130.

3.5.6 Reliability. The Collimator Lighting Kit's reliability, excluding battery (ies) shall be a minimum of 500-hour Mean-Time-To-Failure (MTF). Reliability of 2,000-hour MTF is desired.

3.5.7 Workmanship. All components and assemblies shall be free of dirt and other extraneous materials. Burrs, slivers, rough die, tool, and grinding marks, dents and cracks shall be unacceptable. Castings, molded parts and stampings shall be free of sand, fins, pits, blowholes and spurs. The surfaces of parts to be welded or brazed shall be clean. All scale and flux shall be removed from the finished welded area. The welds shall be smooth. Threaded fasteners shall not be missing, broken, cracked or stripped of threads. There shall be no defects affecting serviceability, durability, operation or maintenance.

3.5.8 Safety and Health. The Collimator Lighting Kit, complete with battery (ies), shall not present a High or Medium Risk Level to personnel or equipment.

4. VERIFICATION

TABLE I. REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX

METHOD OF VERIFICATION 1 – Analysis 2 – Demonstration 3 – Examination 4 – Test					CLASSES OF VERIFICATION A – Design verification B – First article inspection C – Conformance inspection			
Section 3	Verification Method				Verification Class			Section 4
	1	2	3	4	A	B	C	
3.2.1		x				x		4.4.12
3.2.2	x	x				x	x	4.4.13
3.3.1				x		x	x	4.4.3
3.3.2				x		x	x	4.4.4
3.3.3				x		x	x	4.4.5
3.3.4				x		x		4.4.6
3.3.5				x		x		4.4.7
3.3.6				x		x		4.4.8
3.3.7				x		x	x	4.4.9
3.4.1	x	x				x	x	4.4.14
3.4.2	x	x				x		4.4.15
3.4.3	x	x				x		4.4.16
3.4.4		x		x		x	x	4.4.1
3.4.5		x		x		x	x	4.4.2
3.4.6		x				x		4.4.17
3.4.7		x				x		4.4.18
3.4.8		x				x	x	4.4.19
3.5.1		x				x		4.4.11
3.5.2		x				x		4.4.20
3.5.3		x				x		4.4.21
3.5.4	x	x				x		4.4.22
3.5.5		x				x		4.4.23
3.5.6	x	x				x		4.4.24
3.5.7		x				x	x	4.4.25
3.5.8	x	x				x		4.4.10

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

- a. First article inspection (see 4.2)
- b. Conformance inspection (see 4.3)

4.1.1 Verification conditions. Unless otherwise specified, all verifications shall be performed in accordance with the test conditions specified in this document.

4.2 First article inspection.

4.2.1 Submission. The contractor shall submit a first article sample of 3 units in accordance with provisions of 4.2.2.

4.2.2 Inspections to be performed. The first article verification shall be performed in accordance with Table II below.

TABLE II. First article inspection.

No.	Examination or Test	Conformance Criteria	Requirement Paragraph	Inspection Method Reference
MAJ				
101	Weight	100 percent	3.2.1	4.4.12
102	Interface	100 percent	3.2.2	4.4.13
103	Power	100 percent	3.4.1	4.4.14
104	Power Life	100 percent	3.4.2	4.4.15
105	Illumination Range	100 percent	3.4.3	4.4.16
106	Illumination Color	100 percent	3.4.4	4.4.1
107	Illumination Brightness	100 percent	3.4.5	4.4.2
108	Automatic Cycle Time	100 percent	3.4.6	4.4.17
109	Low Voltage Strobe	100 percent	3.4.7	4.4.18
110	Switch	100 percent	3.4.8	4.4.18
111	Finish	100 percent	3.5.1	4.4.11
112	Materials	100 percent	3.5.2	4.4.20
113	Storage Temperature	100 percent	3.3.1	4.4.3
114	Operating Temperature	100 percent	3.3.2	4.4.4
115	Watertightness	100 percent	3.3.3	4.4.5
116	Humidity	100 percent	3.3.4	4.4.6
117	Sand and Dust	100 percent	3.3.5	4.4.7
118	Vibration	100 percent	3.3.6	4.4.8
119	Drop	100 percent	3.3.7	4.4.9
MIN				
201	Safety and Health	100 percent	3.5.8	4.4.10
202	Human Factors Engineering	100 percent	3.5.3	4.4.21
203	Transportability	100 percent	3.5.4	4.4.22
204	Identification and Marking	100 percent	3.5.5	4.4.23
205	Reliability	100 percent	3.5.6	4.4.24
206	Workmanship	100 percent	3.5.7	4.4.25

4.2.3 Rejection. If any assembly, component or test specimen fails to comply with any of the applicable requirements, the first article sample may be rejected.

4.3 Conformance Inspection.

4.3.1 Inspection Lot Formation. Lot formation shall be in accordance with Section 4 of MIL-STD-1916.

4.3.2 Examinations and Tests.

a. Classification of Characteristics. For examinations and tests cited herein or when required by contract; Critical, Major and Minor Characteristics are defined in Section 3 of MIL-STD-1916.

b. Inspections to be performed. The contractor shall perform all of the tests specified in Table III below.

c. Inspection sample size. The number of samples to be inspected shall vary with lot size and characteristic verification level in accordance with MIL-STD-1916 and Table III above.

d. Alternative Conformance Provisions. Unless otherwise specified herein or provided for in the contract, alternative conformance procedures, methods or equipment, such as statistical process control, tool control, variables sampling or other types of sampling plans may be proposed to the Government by the contractor.

TABLE III. Conformance inspection.

Class	Examination or Test	Requirement Paragraph	Suggested Inspection Method	Verification Level
Major:				
101	Illumination Range	3.4.3	4.4.16	III
102	Illumination Brightness	3.4.5	4.4.2	III
103	Illumination Color	3.4.4	4.4.1	III
104	Interface	3.2.2	4.4.13	III
105	Power	3.4.1	4.4.14	III
106	Switch	3.4.8	4.4.19	III
107	Operating Temperature	3.3.2	4.4.4	I
108	Storage Temperature	3.3.1	4.4.3	I
109	Water Tightness	3.3.3	4.4.5	I
110	Drop	3.3.7	4.4.9	I
Minor:				
201	Workmanship	3.5.7	4.4.25	I

4.4 Methods of Inspection.

4.4.1 Illumination Color. The Collimator Lighting Kit, with fresh battery (ies), shall be subjected to a photometric test by focusing a radiometer onto the light source and measuring the wavelength at the center. This procedure shall be repeated three times and an average value shall be obtained. The illumination color wavelength shall meet specification requirements of 3.4.4. Nonconformance shall constitute failure of this test.

4.4.2 Illumination Brightness. The Collimator Lighting Kit, with fresh battery (ies), shall be subjected to a photometric test. The illumination brightness shall be obtained by averaging three readings

taken at the center of the Light Emitting Diode (LED). The brightness shall meet specification requirements of 3.4.5. Nonconformance shall constitute failure of this test.

4.4.3 Storage Temperature. The Collimator Lighting Kit, complete with battery (ies), shall be placed in a climatic chamber and the temperature reduced gradually to -60° F and allowed to remain at this temperature for 4 hours. The rate of temperature change in the climatic chamber shall not exceed 3 degrees per minute throughout the temperature cycling tests. After thermal stabilization is reached the temperature shall gradually be increased to + 160° F and held constant for 4 hours. After thermal stabilization is reached the temperature shall then be reduced to standard ambient temperature and allowed to remain at this temperature for 4 hours. The Collimator Lighting Kit, complete with battery (ies), shall then be subjected to a visual and tactile examination and shall meet the requirements of 3.3.1. The Lighting Kit shall then be subjected to a photometric test for illumination brightness (4.4.2) and shall meet the requirements of 3.4.5.

4.4.4 Operating Temperature. The Collimator Lighting Kit, complete with battery (ies), shall be placed in a climatic chamber and the temperature reduced gradually to -40° F and allowed to remain at this temperature for 4 hours. The rate of temperature change in the climatic chamber shall not exceed 3 degrees per minute throughout the temperature cycling tests. While the test item(s) is at this temperature extreme it shall be subjected to a visual and tactile examination as well as a photometric test and shall meet the requirements of 3.3.2 and 3.4.5. The temperature shall then be gradually increased to + 150° F and held constant for 4 hours. . While the test item(s) is at this temperature extreme it shall be subjected to a visual and tactile examination as well as a photometric test and shall meet the requirements of 3.3.2 and 3.4.5.

4.4.5 Watertightness. The Collimator Lighting Kit, complete with battery (ies), shall be submerged in water at room temperature (77° F \pm 5° F) for one hour at a depth of 18 inches. Remove the item, wipe the outside dry, remove the batteries and inspect the battery cavities. When inspected the item shall show no evidence of moisture within interior cavities and shall meet the requirements of 3.3.3. Install the batteries and perform the photometric test for illumination brightness (4.4.2). The item shall meet all the requirements of 3.4.5.

4.4.6 Humidity. The Collimator Lighting Kit, complete with battery (ies), shall be preconditioned in a climatic chamber at 73 degrees F with 50 percent relative humidity for 24 hours prior to starting the test. Perform one 48 hour aggravated temperature-humidity cycle in accordance with MIL-STD-810F, Method No. 507.4. Remove the item from the chamber, wipe the outside dry, remove the batteries and inspect the battery cavities. When inspected the item shall show no evidence of moisture within interior cavities and shall meet the requirements of 3.3.4. Install the batteries and perform the photometric test for illumination brightness (4.4.2). The item shall meet all the requirements of 3.4.5.

4.4.7 Sand and Dust. Representative small-particle dust and fine sand shall be placed on and around the switch. The mechanism shall be tested by operating the switch for 25 cycles. Failure of the switch to complete 25 cycles shall constitute failure of this test. . MIL-STD-810 identifies sand and dust compositions used in the Blowing Dust Test. Compositions identified in MIL-STD-810 are appropriate for the Sand and Dust Test in this specification.

4.4.8 Vibration. The Collimator Lighting Kit, with battery (ies) installed, shall withstand vibration for 5 minutes each in 3 orthogonal axes. Vibration in each direction shall be at a constant frequency of thirty Hz with an amplitude of 1/16-inch (1/8-inch total excursion) for a period of five minutes plus or minus 15 seconds. Subsequent to vibration, the Collimator Lighting Kit shall not have been damaged or adversely affected and shall meet the requirements of 3.3.6. The Lighting Kit shall then be subjected to a photometric test for illumination brightness (4.4.2) and shall meet the requirements of 3.4.5.

4.4.9 Drop. The Collimator Lighting Kit, with battery (ies) installed, shall be dropped in free fall onto 1 inch of plywood backed by concrete from a height of 48 inches. The item shall be dropped three times on three orthogonal surfaces: the top, the right side, and the left side of the battery enclosure. Subsequent to shock, the Collimator Lighting Kit shall not have been damaged or adversely affected and

shall meet the requirements of 3.3.7. The Lighting Kit shall then be subjected to a photometric test for illumination brightness (4.4.2) and shall meet the requirements of 3.4.5.

4.4.10 Safety and Health. During handling and functioning of the Collimator Lighting Kit, under any environmental condition, analysis shall be made to ensure that using the Collimator Lighting Kit poses no physical danger to the user as specified in 3.5.8 and per MIL-STD-882 (see 6.2.f).

4.4.11 Finish. Use visual inspection to determine if the color meets the requirements of FED-STD-595. Verify by analysis that the CARC complies with the test and inspection methods of MIL-C-53072.

4.4.12 Weight. The contractor, using suitable standard measuring equipment, calibrated to within 10 percent of the requirement, shall demonstrate that the total weight of the Lighting Kit (batteries included) meets the requirement of 3.2.1.

4.4.13 Lighting Kit Interface. The contractor shall demonstrate that the Lighting Kit interfaces with the M1A2 Collimator in accordance with the drawings provided (See 6.3) or any other suitable means that meets all the requirements of this specification.

4.4.14 Power. The contractor shall ensure by analysis and demonstration that the power source is adequate and meets all the requirements of 3.4.1.

4.4.15 Power Life. The contractor shall ensure by analysis and demonstration that the power source is capable of meeting the requirement of 3.4.2. Continuous running of the kit for at least 1000 hours without a power source replacement is an acceptable verification method.

4.4.16 Illumination Range. The contractor shall perform a test, using standard measuring equipment, calibrated to within 10 percent of the requirement, to ensure that the requirements of 3.4.3 are met.

4.4.17 Automatic Cycle Time. The contractor shall demonstrate that the item meets the requirement of 3.4.6 by running it several times until automatic shut off. Times shall be recorded and the average taken and compared to the requirement.

4.4.18 Visual Low Voltage Strobe. The contractor shall use analysis and demonstration to ensure that the requirement of 3.4.7 is met by placing a low charge power source in the kit and making sure that there is a recognizable strobe. This shall be done several times to ensure compliance.

4.4.19 Switch. The contractor shall demonstrate that the requirement of 3.4.8 is met. Simple operation of the switch several times is an acceptable means of verification.

4.4.20 Materials. The contractor shall show by analysis and demonstration that the materials selected meet all the requirements of 3.5.2. Where appropriate, the contractor shall provide a Certificate of Conformance (COC) from the original manufacturer to ensure compliance with the requirement.

4.4.21 Human Factors Engineering. The contractor shall demonstrate that the item complies with the requirements of 3.5.3. The demonstration shall consist of an actual operation of the item: switching it on and off, attaching it to the collimator, and dismounting it from the collimator.

4.4.22 Transportability. The contractor shall adhere to the requirements of 3.5.4 when selecting a power source for the Lighting Kit. Where appropriate, the contractor shall provide a COC from the battery manufacturer to confirm compliance.

4.4.23 Identification Marking. The contractor shall visually inspect the item to ensure that it adheres to the requirements of 3.5.5. Items that do not meet the requirements of MIL-STD-130 shall be rejected.

4.4.24 Reliability. The contractor shall demonstrate that the item and all of its components meet or exceed the requirement of 3.5.6 (See 6.2g). Verification time needed for this test can be a combination of the environmental and operational tests of this specification.

4.4.25 Workmanship. The contractor shall visually inspect the item to ensure compliance with all the requirements of 3.5.7. Items not meeting the criteria shall be rejected.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (See 6.2). When actual packaging of material is to be performed by DOD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's 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. The lighting kit furnished to this performance specification is for use in the M1A2 Collimator, Infinity Aiming Reference used in artillery and transported in its case.

6.2 Acquisition Requirements. Acquisition documents must specify the following:

- a. Title, number and date of the specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.2).
- c. When first articles are required for inspection, the number of samples and identification of the tests and inspections to be performed from Table I (see 3.1).
- d. Submit Acceptance Inspection Equipment to:
AMSTA-AR-QAT-F
ARDEC
Picatinny Arsenal, NJ 07806-500
- e. Level of preservation and packing required (see 5.1).
- f. When a safety risk assessment is required (see 3.5.8).
- g. When component reliability data and information such as reliability predictions, demonstrated reliability of similar products, item reliability as demonstrated by previously conducted contractor testing, shall be provided.
- h. Preferred Batteries. A list of preferred power sources is available from:
Commander, CECOM
AMC Battery Management Office
ATTN: AMSEL-LC-P-AMC
Fort Monmouth, NJ 07703-5011

6.3 Drawings. Figure I is enclosed with this specification. Government drawings 12984656, 12984660, and 12984663 may be used to provide an interface solution.

(Copies of other Government documents, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from U.S. Army TACOM-ARDEC, AMSTA-AR-QAW, Picatinny Arsenal, NJ 07806-5000.)

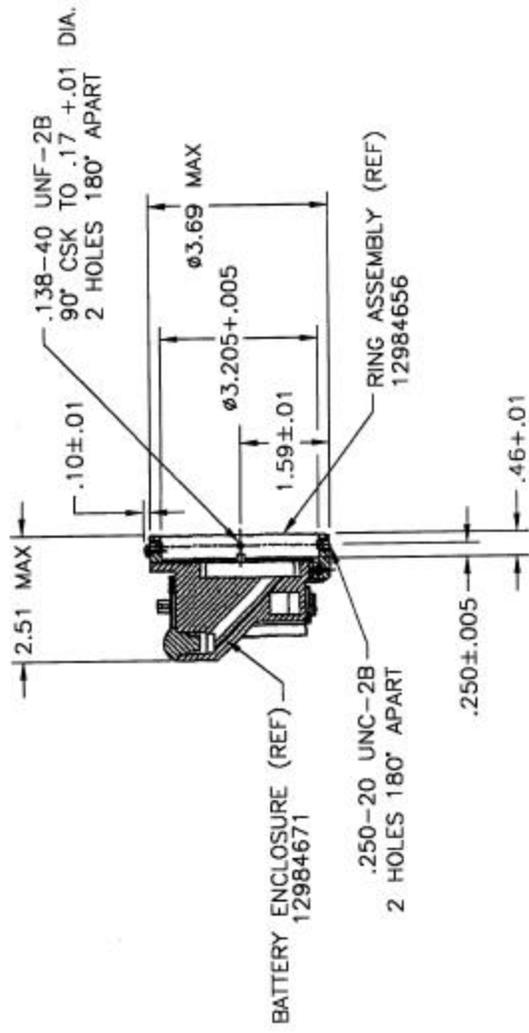
6.4 Definitions.

6.4.1 Recovered Materials. For the purpose of this requirement, recovered materials are those materials that have been collected from solid waste and reprocessed to become a source of raw materials, as distinguished from virgin raw materials. Recovered materials shall be used to the maximum extent possible.

6.5 Subject Term (key word) listing:

- Batteries, preferred
- Battery, life
- Inspection, conformance
- Inspection, first article
- Power, life
- Reliability
- Requirements, operating
- Switch, operation
- Testing, environmental

Preparing Activity:
Army -AR



LIGHTING KIT AND M1A2 COLLIMATOR INTERFACE
 FIGURE I