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MILITARY SPECIFICATION

LIGHT, ULTRAVIOLET, METAL EXAMINING

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

1. SCOPE

1.1 Scope. This specification covers a portable black light suitable to detect surfaced flaws when using fluorescent non-destructive testing methods.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids, forms a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

PPP-B-601	Boxes, Wood, Cleated Plywood.
PPP-B-636	Box, Shipping, Fiberboard.

MILITARY

MIL-P-116	Preservation, Method of.
MIL-T-9107	Test Reports, Preparation of.

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	Marking for Shipment and Storage.
MIL-STD-130	Identification Marking of US Military Property.
MIL-STD-147	Palletized Unit Loads.
MIL-STD-794	Parts and Equipment, Procedures for Packaging and Packing of.
MIL-STD-1186	Cushioning, Anchoring, Bracing, Blocking and Vaporproofing with Appropriate Test Methods.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: the Engineering Division, San Antonio ALC/MMEDO, Kelly AFB, Texas 78241 by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 6635

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

(Copies of specifications, standards, drawings, and publications required by manufacturers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM D 3951 Standard Practice for Commercial Packaging.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

NATIONAL BOARD OF FIRE UNDERWRITERS' LABORATORIES, INC.

"Underwriter Laboratories Standards for Safety"

(Copies of publications of the National Board of Fire Underwriters' Laboratories, Inc., standards may be obtained upon application to the Underwriters' Laboratories Inc., 207 East Ohio Street, Chicago, IL 60611.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 First article. This specification makes provisions for first article testing.

3.2 Component parts. The portable black light shall consist of the following component parts.

a. Mercury-vapor lamp (see 3.6).

b. Filter (see 3.7).

c. Lamp housing (see 3.9).

d. Transformer (see 3.10).

e. Line cords (see 3.11).

f. Container (see 3.14).

3.3 Design and construction. The light emitted shall be suitable for causing fluorescence of the inspection medium when using fluorescent testing methods.

3.4 Materials. Materials used in the construction of the black light shall be as specified herein. Materials not definitely specified shall be of uniform quality and condition and free of seams, cracks, and other defects which may adversely affect the appearance, strength, endurance or wear resistance of the black lights. Materials shall not be hammered, filed, nor otherwise treated to conceal defects therein.

3.4.1 Protective treatment. Materials used in the construction of the black lights shall be protected against deterioration arising from environmental conditions of use, storage, and exposure. The protective media shall be stable and durable, shall not crack, chip, flake, powder, or scale, and shall not interfere with the performance characteristics required by this specification.

3.5 Electrical. All components, devices, wiring and insulation shall be suitable for voltages, current, and duty characteristics of the circuits in which they are used and shall conform to appropriate National Board of Fire Underwriters Laboratories Inc. Standards for Safety.

3.6 Lamp. The lamp shall be a 100 watt high-pressure, mercury-vapor bulb of the spot or flood type as specified (see 6.1).

3.7 Filter. The filter shall be a 5 inch roundel filter of heat resistant glass with a peak transmission 3650 angstrom units ± 1.0%.

3.7.1 Range. The transmission of the filter shall not exceed 1.0 per cent above 4000 angstrom units or below 3200 angstrom units for ultraviolet light.

3.8 Intensity. The black light, at a distance of 15 inches from the face, shall have an intensity of at least 125 foot-candles with a spot bulb and at least 100 foot-candles with a flood bulb (see 3.6).

3.9 Lamp housing. The lamp shall be enclosed in a metal housing fabricated with a pistol-grip handle. The lamp and filter shall be changed without the use of tools. The housing shall be sufficiently light-tight so that the visible light emitted by the mercury arc does not interfere with the fluorescence of the inspection material.

3.10 Transformer. Each black light shall be furnished with a transformer which is operated from 110V-125V, ac, 60 cycle, single phase. The transformer shall have provisions to compensate for voltage variations within the specified limits of line voltage and shall be rated for continuous duty (see 3.5).

3.11 Line cords. A cord at least 20 feet long shall be provided for connecting the black light to the transformer. A cord at least 20 feet long shall be provided for connecting the transformer to the power source. The cords shall be 3 conductor number 16 flexible cord (300V), type (SJO) with neoprene oil resistant jacket.

3.12 Plug. A parallel-blade, three-wire grounding-type attachment-plug shall be provided.

3.13 Ground. The lamp housing and transformer shall be grounded.

3.14 Container. When not in use, the black light shall be supported on a container which houses the black light transformer. A handle shall be provided for convenience in carrying the container, and brackets on the container shall be provided for storing the cords when not in use.

3.15 Weight. The weight of the assembled black light, including lamp, filter and housing but excluding transformer, container and cords shall not exceed 4 pounds.

3.16 Identification of product. The instrument and components shall be marked for identification in accordance with MIL-STD-130.

3.17 Workmanship. The instrument shall be fabricated and finished in a workmanlike manner.

4. QUALITY ASSURANCE PROVISIONS

* 4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of tests. The inspection and testing of portable black lights shall be classified as follows:

a. First article tests (see 4.4).

b. Acceptance test (see 4.5).

4.3 Test conditions. The test conditions are described under the individual tests to which they apply.

4.4 First article testing.

4.4.1 Test sample. The test sample shall consist of one portable black light representative of the production equipment. The samples shall be identified with the manufacturers part number and such other information as required by the procuring activity. The sample shall be prepared as follows:

4.4.1.1 Data to accompany test sample. The test sample shall be accompanied by the following data:

a. Brief operating data to enable test personnel to correctly operate the equipment.

b. Certification that all wiring conforms to the Underwriters Laboratories Inc requirements.

4.4.2 Test report, test sample and data for the procuring activity. When test are conducted at a location other than the laboratory of the procuring activity, the following shall be furnished to that activity:

a. Test report. Three copies of the test report in accordance with MIL-T-9107.

b. Test sample. A new untested sample.

4.4.3 First article tests. The first article tests shall consist of all test described under "Test methods" (see 4.6).

4.5 Acceptance tests. Test samples shall be selected in accordance with MIL-STD-105. Acceptance test shall consist of the examination of the product as described under 4.6.1 and intensity tests described under 4.6.3.

4.6 Test methods.

4.6.1 Examination of product. The portable black light shall be inspected to determine compliance with the requirements specified herein with respect to components, workmanship, and marking.

4.6.2 Filter. The filter shall be tested by spectrophotometer and shall meet requirements specified in 3.7 and 3.7.1. A Koop #41 filter is considered capable of meeting these test requirements.

4.6.3 Intensity. The test for light intensity shall be made with a Weston Sight Light Meter Nr 703, type 3 (unfiltered), equipped with 10X multiplier disc or equal. The test shall be performed while the portable black light is operating on 110 to 115 volts and shall meet the requirements specified in 3.8.

4.6.4 Transformer. The transformer shall be subjected to a temperature rise test utilizing the resistance method. A wheatstone bridge shall be used for taking resistance readings of the copper wound coil.

a. Connect the bridge across the coil by means of two external leads soldered to the 125V connection and ground connection of the coil.

b. With the transformer at ambient room temperature, record the resistance of the coil and the ambient room temperature. CAUTION: Do not connect the wheatstone bridge while power is being supplied to the transformer.

c. Connect the transformer to a 125V power source and operate under the load of the specified lamp (see 3.6) until the transformer temperature becomes stable, approximately 5 to 6 hours. The transformer container shall be closed during this test.

d. Disconnect power by pulling plug from socket and immediately take several resistance readings from the coil recording both the resistance and the time lapse from power cut off at each reading.

e. Plot time versus resistance on a graph to obtain the maximum resistance reached.

f. Calculate the temperature rise in the transformer by means of the following formula:

$$T = \frac{R}{r}(234.5 + t) - 234.5$$

Where t = known temperature in degrees C

r = the resistance at the known temperature, in ohms

R = the resistance at the temperature to be determined, in ohms

T = the temperature to be determined, in degrees C

T-t = Temperature rise

g. Table I shows the allowable maximum temperature rise of the transformer for the corresponding insulation at ambient temperature of 25°C.

TABLE I

Class of insulation	Maximum temp. rise
A	70°C
B	95°C
F	120°C
H	144°C

4.7 Inspection of packaging. Sample items or packs and the inspection of the preservation, packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5.

5. PACKAGING

5.1 Preservation and packaging. Preservation and packaging shall be level A, C or commercial/industrial as specified (see 6.2).

5.1.1 Level A. Portable black light, fluorescent inspection shall be preserved and packaged in accordance with method 1A of MIL-P-116.

5.1.2 Level C. The level C preservation for portable black light, fluorescent inspection shall conform to the MIL-STD-794 requirements of the level.

5.1.3 Commercial/Industrial. Preservation of light shall be in accordance with the requirements of ASTM D 3951.

5.2 Packing. Packing shall be level A, B, C or Commercial/Industrial as specified (see 6.2).

5.2.1 Level A. Portable Black Light, Fluorescent. Inspection preserved and packaged as specified in 5.1.1 shall be packed in a container conforming to PPP-B-601, overseas type. The closure shall be in accordance with the appendix of the container specification.

5.2.2 Level B. Portable Black Light, Fluorescent. Inspection preserved and packaged as specified in 5.1.1 shall be packed in a container conforming to PPP-B-636, weather resistant. The closure shall be in accordance with the appendix of the container specification.

5.2.3 Level C. The level C packing for Portable Black Light, Fluorescent, shall conform to the MIL-STD-794 requirements for this level.

OR

5.2.4 Commercial/Industrial. Packing of lights shall be in accordance with the requirements of ASTM D 3951.

5.3 Physical protection. Cushioning, blocking, bracing and waterproofing shall be in accordance with MIL-STD-1186. Waterproofing requirements for cushioning material and container shall be waived for domestic shipments. The drop test of MIL-STD-1186 shall be waived when the item is preserved, packaged and packed for immediate use or when the drop tests of MIL-P-116 are applicable.

5.4 Marking

5.4.1 Level A, B & C. In addition to any special or other identification marking required by the contract or order (see 6.2), each unit pack intermediate and exterior container shall be marked in accordance with MIL-STD-129.

5.4.2 Commercial/Industrial. Marking shall be in accordance with the requirements of ASTM D 3951.

5.5 Palletization. When specified (see 6.2), unitized loads, commensurate with the level of packing specified in the contract or order, shall be palletized in accordance with MIL-STD-147. Palletized loads shall be uniform in size and quantities to the greatest extent possible. If the container is of a size which does not conform to any of the pallet patterns specified in MIL-STD-147, the pallet pattern used shall first be approved by the contracting officer.

6. NOTES

6.1 Intended use. The fluorescent inspection portable black light covered by this specification is intended for use by maintenance and inspection crews to detect cracks and other surface flaws indicated by fluorescent materials.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification.

b. Type of lamp (see 3.6).

c. Selection of applicable levels of preservation, packaging, packing, marking and commercial/industrial (see 5.1 and 5.2).

d. When palletization is required (see 5.5).

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6.3 Reclaimed materiels. The use of reclaimed materiels shall be encouraged to the maximum extent possible.

6.4 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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5 PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

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