MIL-I-8835A
20 November 1984
SUPERSEDING
MIL-I-8835
10 March 1959

MILITARY SPECIFICATION

INDICATOR, HUMIDITY, CARD, CHEMICALLY IMPREGNATED

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

1. SCOPE

1.1 Scope. This specification establishes the requirements for one type of chemically impregnated, humidity sensitive, indicator card designed for use in the preservation and packaging of items in accordance with Method II of MIL-P-116 (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

PPP-C-96	-	Can, Metal, 28 Gage and Lighter

MILITARY

MIL-P-116	-	Preservation, Methods of
MIL-D-3464	-	Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Systems Engineering and Standardization Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

STANDARDS

MILITARY

MIL-STD-105	-	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	-	Marking for Shipment and Storage
MS20003	-	Indicator, Humidity, Card, Three Spot, Impregnated Areas (Cobaltous Chloride)

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

2.2 Other publications. The following documents 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 2177	-	Ink Absorption of Blotting Paper
ASTM D 3951	-	Commercial Packaging

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

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. When specified, a sample shall be subjected to first article inspection (see 4.4 and 6.2.1).

3.2 Material. Humidity indicator cards shall consist of smooth blotting paper impregnated with a chemical solution which shall change color to indicate humidity due to the presence of water-vapor.

3.2.1 Component materials.

3.2.1.1 Blotting paper. The blotting paper shall be made from fibrous, cellulosic material which may include reclaimed fiber. The blotting paper shall also meet the requirements in Table I.

3.2.1.2 Chemical impregnant. The impregnant shall be a solution of chemically pure cobaltous chloride in distilled water. No additive shall be used except for spots manufactured to change color over 50 and under 20 percent relative humidity (R.H.) (see 6.2). The amount and concentration of the impregnating solution shall remain the choice of the manufacturer.

TABLE I. Blotting Paper Requirements.

Property	Requirements	Test paragraph
Color	White	4.6.1
Basis Weight (1000 sheets, each measuring 19in x 24in)	200 ± 10 pounds	4.6.2
Ink absorbency	Absorption of 1 milliliter (ml) of ink in 50 seconds or less	4.6.3

3.2.1.3 Printing ink. The ink for printing instructions on the card shall be a black commercial grade of ink with a high degree of permanency.

3.3 Design. Unless otherwise specified, the humidity indicator cards shall be designed in accordance with MS20003 (see 6.2).

3.4 Color and sensitivity of indicating spots. The indicating spots shall be color sensitive to humidity change as specified below. The colors shall be uniform throughout the impregnated area.

Condition	Color
Temperature of 73.5 ± 2°F and R.H. of 5% above R.H. of spot	Pink
Temperature of 73.5 ± 2°F and R.H. of 5% below R.H. of spot	Blue

3.5 Workmanship. The finished product shall be uniform, have color confined within the circle and be free of imperfections which would impair its usefulness.

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 inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.4).
b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the applicable test methods of this specification.

4.4 First article inspection. First article inspection shall include all examinations and tests of this specification. Approval of the first article samples shall not relieve the supplier of his obligation to meet the quality conformance inspection (4.5).

4.4.1 First article test samples. Samples for first article inspection shall consist of one can containing 125 cards which have been produced by the contractor using the same production processes, procedures and equipment as will be used in fulfilling the contract.

4.5 Quality conformance inspection. Quality conformance inspection shall consist of all the tests and examinations of this specification except the high and low temperature cycling test (see 4.8.2) and the stability test (see 4.8.3).

4.5.1 Lot formation. A lot shall consist of all cards that have been manufactured at approximately the same time from the same materials or batch and submitted for acceptance at the same time.

4.5.2 Sampling.

4.5.2.1 Sampling for visual inspection. The sample unit shall be one card. A sufficient number of cans shall be selected at random from the inspection lot so that by inspecting 25 cards from each can, the total number of inspected cards shall equal that of Inspection Level II of MIL-STD-105.

4.5.2.2 Sampling for testing. The sample unit shall be one card. Random samples shall be selected in accordance with inspection level S-1 of MIL-STD-105.

4.6 Blotting paper (without chemical impregnant).

4.6.1 Color. The color of the blotting paper shall be white.

4.6.2 Weight. The weight of 1000 blotting papers (area - 19 in. x 24 in. each) shall be 200 $\pm$ 10 pounds.

4.6.3 Ink absorbency. The test for ink absorbency shall be conducted according to ASTM D 2177.

4.7 Finished cards.

4.7.1 Visual and dimensional inspection. Cards selected in accordance with 4.5.2.1 shall be visually and dimensionally inspected at an AQL of 2.5 percent defective. The cards shall be inspected for the following defects:

Spreading of color from spot
Spots improperly located
Foreign material on spots
Missing spots
Tears
Improper dimensions
Indicating color overruns black circles.

4.7.1.1 Inspection of preservation, packing and marking. The preservation, packing and marking requirements of Section 5 shall be examined for the following defects:

Number of cards in can not as specified (125).
The highest indicating spot or 50% R.H. spot (whichever is lower) is not blue when can is initially opened.
Cans do not conform to Type V, Class 2 of PPP-C-96.
No desiccant conforming to MIL-D-3464 in can (Level A packaging only).

4.8 Test methods.

4.8.1 Color and sensitivity of spots.

4.8.1.1 Apparatus. The apparatus shall consist of a mixing chamber and test chamber having a volume of one cubic foot. In the mixing chamber two streams of air, one saturated and one dry, shall be admitted in proportions necessary to develop the desired relative humidity in the chamber. One stream of air shall be saturated by bubbling the air through distilled water before admission to the mixing chamber. The other stream of air shall be dried by passing the air through a bed of activated silica gel before admission to the mixing chamber. Adjustable valves on each of the air lines shall control the proportions of dry and saturated air admitted to the chamber. The relative humidity of the air leaving the mixing chamber shall be determined by means of a calibrated humidity-sensing element and an electric hygrometer or an equivalent. After passing over the humidity-sensing element, air of the desired relative humidity shall be passec through the test chamber. The test chamber shall be so constructed as to afford a clear view of the inside, and of the indicating cards undergoing the test within it. If opaque or translucent, the test chamber shall have a sufficiently large windoow to permit observation of the cards inside.

4.8.1.2 Procedure. The samples under test shall be suspended in the test chamber in such a manner as to be visible from the outside. Air at a relative humidity of 5 $\pm$ 1 percent below the relative humidity critical for the indicating spot being tested, and at a temperature of 73.5 $\pm$ 2°F, shall be admitted to the test chamber and allowed to pass over the suspended samples for one hour at a rate of 8 $\pm$ 0.2 liters per minute. At the end of this period the spot under test shall be visually examined for conformance to the requirements as specified in 3.4. Evidence of mottling or divergence from the specified blue color shall be cause for rejection. Air at a relative humidity of 5 $\pm$ 1 percent above the relative humidity critical for the indicating spot

under test, and at a temperature of 73.5 ± 2°F, shall then be admitted to the test chamber and allowed to flow over the samples at the same rate as before for one hour. The samples shall then be re-examined for conformance to the requirements as specified in 3.4, and any mottling or divergence from the specified pink color shall be cause for rejection.

4.8.1.3 Alternate static test method. The following test method may be substituted for the dynamic test specified in 4.8.1.2. The samples under test shall be placed in a static relative humidity atmosphere of 5 ± 1 percent below the critical relative humidity for the indicating spot (at 73.5 ± 2°F). The samples shall remain in the static atmosphere for 48 hours. This test shall be repeated at a relative humidity of 5 ± 1 percent above the critical relative humidity. Evidence of any mottling or color defects shall be cause for rejection.

4.8.2 High and low temperature cycling. Place 3 unit containers of humidity indicating cards in a test chamber maintained at a temperature of 160 ± 5°F. The containers shall remain at this temperature for 24 hours. The containers shall then be removed and placed in a test chamber maintained at -65 ± 5°F. After 24 hours exposure at this temperature the containers shall be removed and again exposed at 160 ± 5°F temperature for 24 hours. This cycling exposure is continued for a total period of 168 hours (4 cycles of high temperature exposure and 3 cycles of low temperature exposure). After final removal from the test chamber the containers shall be allowed to remain at room temperature for 2 hours. Four humidity cards shall then be removed from each container and tested in accordance with 4.8.1.

4.8.3 Stability. Place 10 humidity cards in a desiccator containing a glycerine water solution having a specific gravity of 1.184 at 77 ± 2°F to effect an atmosphere of 60 ± 2 percent relative humidity. The desiccator shall be sealed and maintained at a temperature of 160 ± 5°F for 7 days (168 hours). After the conditioning period, the cards shall be removed and tested in accordance with 4.8.1.

5. PACKAGING

5.1 Preservation. Cards shall be preserved Level A or Commercial, as specified (see 6.2).

5.1.1 Color of spots before packaging. The highest indicating spot or the 50 percent relative humidity spot (whichever is lower) must be blue when packaged.

5.1.2 Level A. Cards shall be preserved without folding in cans conforming to Type V, Class 2 of PPP-C-96. Unless otherwise specified each can shall contain 125 cards. Desiccant conforming to MIL-D-3464 shall be placed inside the can prior to packaging of the cards. The size and shape of the can shall be selected so that the void of the cans, when filled with the specified number of cards, shall be a minimum and not exceed 5% of the capacity of the can.

5.1.3 Commercial. Cards shall be preserved in accordance with ASTM D 3951.

5.2 Packing. Cards shall be packed Level A, Level B or Commercial, as specified (see 6.2).

5.2.1 Level A. Cards preserved as specified in 5.1.2 shall be packed in accordance with the Appendix of PPP-C-96 as specified for overseas shipment.

5.2.2 Level B. Cards packaged as specified in 5.1.2 shall be packed in accordance with the Appendix of Specification PPP-C-96 as specified for domestic shipment.

5.2.3 Commercial. The indicators shall be packed in accordance with ASTM D 3951.

5.3 Marking.

5.3.1 Unit container. Each unit container shall be durably and legibly marked in accordance with MIL-STD-129 and with the following information, in such a manner that the marking will not become damaged when the containers are opened:

Specification MIL-I-8835A
MS Part Number
Quantity
Name of Manufacturer
Lot No.
Contract No.
Date of Manufacture.

5.3.2 Exterior shipping container. Each exterior container shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The humidity-indicating cards conforming to this specification are intended for use with Method II packages of MIL-P-116, in which it is necessary to determine that the desiccant within a package is sufficiently active to maintain a relative humidity below that at which corrosion might occur. The cards may also be used in any application in which a knowledge of the approximate relative humidity within a closed space is desired.

6.2 Ordering data. Requisitions, contracts and orders should specify the following:

(a) Title, number and date of this specification.
(b) MS Part Number (see 3.3).
(c) Quantity (see 5.1.2).
(d) Levels of preservation and packing (see section 5).
(e) If first article inspection is required (see 3.1).
(f) If indicating spots are to be keyed to relative humidities other than those in MS20003 (see 3.3).

6.2.1 First article. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations.

6.3 Precautions. Do not keep can open for a long period of time. Immediately after each withdrawal the containers should be tightly resealed. Cards should be used immediately. The highest indicating spot or the 50 percent relative humidity spot, whichever is lower, should be blue when the can is initially opened. Discard cards if indicating color overruns black circles.

6.4 Changes from previous issues. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Navy - AS
Air Force - 99

Review Activities:
Army - MI, AT
Navy - YD
Air Force - 82
DLA - GS

User Activities:
Navy - OS, MC

Preparing Activity:
Navy - AS
(Project No. 6685-0742)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-I-8835A	INDICATOR, HUMIDITY, CARD, CHEMICALLY IMPREGNATED

3a. NAME OF SUBMITTING ORGANIZATION

b. ADDRESS *(Street, City, State, ZIP Code)*

4. TYPE OF ORGANIZATION *(Mark one)*

- ☐ VENDOR
- ☐ USER
- ☐ MANUFACTURER
- ☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording

b. Recommended Wording

c. Reason/Rationale for Recommendation

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional

b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional

c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional

8. DATE OF SUBMISSION *(YYNNDD)*

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NOTE This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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