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28 March 1969
SUPERSEDING
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11 April 1963

MILITARY SPECIFICATION

THERMOMETER, SELF-INDICATING, BIMETALLIC

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

1. SCOPE

1.1 This specification covers two bimetallic, self-indicating thermometers, graduated in fahrenheit or centigrade units for use in determining the temperature of propellant in semifixed and separate loading ammunition and are also assembled in propellant temperature indicators to determine the temperature in fixed ammunition. (See 6.1).

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

QQ-S-763	Steel Bars, Shapes, and Forgings: Corrosion Resisting
UU-C-282	Chipboard
UU-T-106	Tape, Pressure-Sensitive Adhesive, Masking, Paper
PPP-B-585	Boxes, Wood, Wirebound
PPP-B-601	Boxes, Wood, Cleated Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Box, Fiberboard
PPP-B-676	Boxes, Setup
PPP-P-291	Paperboard, Wrapping, Cushioning
PPP-T-45	Tape, Gummed, Paper, Reinforced and Plain, for Sealing and Securing
PPP-T-76	Tape, Pressure-Sensitive Adhesive, Paper, Water Resistant

Military

MIL-P-116	Preservation, Methods of
MIL-B-117	Bags, Sleeves and Tubing, Interior Packaging
MIL-F-13926	Fire Control Materiel: General Specification Governing the Manufacture and Inspection of
MIL-P-13988	Paper, Lens, Tissue, Antitarnish, Wrapping

STANDARDS

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-109	Quality Assurance Terms and Definitions
MIL-STD-129	Marking for Shipment and Storage

DRAWINGS

US Army Munitions Command

A8268609	Thermometer, Self-Indicating, Bimetallic: M1A1 W/E
A10552697	Thermometer, Self-Indicating, Bimetallic (Centigrade) W/E
B7687275	Thermometer, Self-Indicating, Bimetallic: M1A1
B8566038	Thermometer, Self-Indicating, Bimetallic (Centigrade)
F7651925	Case, Carrying

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

3. REQUIREMENTS

3.1 First article sample.- Unless otherwise directed by the contracting officer, a first article production sample shall be required. The sample shall be manufactured in the same manner, using the same materials, equipment, processes and procedures as will be used in regular production.

3.2 Materials.- Materials shall be in accordance with drawings, material specifications and general specifications forming a part of the specification.

3.2.1 Stem and body shall be of corrosion resistant steel in accordance with QQ-S-763.

3.3 Construction.- The thermometers shall be manufactured in accordance with Drawing B7687275, "Thermometer, Self-Indicating, Bimetallic: M1A1" and Drawing B8566038, "Thermometer, Self-Indicating, Bimetallic (Centigrade)" and drawings pertaining thereto.

3.3.1 Dial.- The graduations on the dial shall be clearly defined and shall extend around the full circumference and contain a division for every four degrees with figures every 20 degrees (10 degrees for centigrade).

3.3.2 Dial window.- The plastic dial window shall be transparent, permanently clear, and shall not be adversely affected when subjected to the accuracy requirements of 3.5. Assembly of the dial shall insure waterproofing in compliance with 3.6.

3.4 General specification.- The contractor shall be responsible for adherence to, and compliance with, the following requirements of MIL-F-13926:

(a) Order of precedence.
(b) Dimensions and tolerances.
(c) Inorganic protective surface finishes.
(d) Part identification and marking.
(e) Workmanship.

3.5 Accuracy.- The thermometer shall be capable of registering accurately to within 1° at ranges of $+40^{\circ}$ to $100^{\circ}F$ ($4.4^{\circ}C$ to $37.8^{\circ}C$), and within 2° at ranges of -80° to $+40^{\circ}F$ ($-62.2^{\circ}C$ to $+4.40^{\circ}C$) and $+100^{\circ}$ to $160^{\circ}F$ ($+37.8^{\circ}C$ to $71.1^{\circ}C$).

3.6 Waterproofing.- The operating element shall be protected from rust and shall be waterproofed to withstand submersion in water at a temperature of $75^{\circ}F \pm 3^{\circ}F$ ($23.9^{\circ}C \pm 1.7^{\circ}C$) for a period of 2 hours.

3.7 Equipment.- When a carrying case is required, it shall be in accordance with Drawing F7651925.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities 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.

4.1.1 General provisions.- The component and subassembly inspection requirements of MIL-F-13926 form a part of the Quality Assurance Provisions of this specification. Definitions of inspection terms shall be as listed in MIL-STD-109.

4.2 First article (initial production) approval.- The requirement for first article approval and the responsibility (Government or contractor) for first article testing shall be as specified in the contract. The sample for first article approval tests shall consist of 3 thermometers. The sample shall be manufactured in the same manner, using the same materials, equipment, processes, and procedures as used in regular production. All parts and materials, including packaging and packing, shall be obtained from the same source of supply as used in regular production.

4.2.1 Government testing.- When the Government is responsible for conducting first article approval tests, the contractor, prior to submitting the sample to the Government, shall inspect the sample to insure that it conforms to all the requirements of the contract and submit a record of this inspection with the sample, including certificates of conformance for materials.

4.2.2 Contractor testing.- When the contractor is responsible for conducting first article approval tests, the sample shall be inspected by the contractor for all the requirements of the contract. The sample and a record of this inspection, including certificates of conformance for materials, shall be submitted to the Government for approval. The Government reserves the right to witness the contractor's inspection.

4.3 Inspection provisions.

4.3.1 Submission of product.- Unless otherwise specified by the contracting officer, inspection lot size, lot formation and presentation of lots shall be in accordance with "Submission of Product" provisions of MIL-STD-105.

4.4 Defective units and lots.- Defective units and lots shall be processed as specified in MIL-STD-105.

4.5 Accuracy requirements.- Inspection equipment which incorporates features for measuring values or sizes established by product requirements shall be capable of measuring those values within an accuracy of ten percent of the specified tolerance except as specified in 4.5.1.1. In cases where the ten percent accuracy imposes impractical or very difficult design and fabrication problems, or results in a test equipment cost factor which is exorbitant in relation to the cost and application of the product to be inspected, the Government shall be expeditiously advised in order that necessary appropriate action can be taken.

4.5.1 Accuracy requirements for special testing devices.

4.5.1.1 Device to test thermometer accuracy.- The device shall register thermometer readings to within 1° at ranges of 40° to $+100^{\circ}F$ (4.4° to $+37.8^{\circ}C$) and within 2° at ranges of -80° to $+40^{\circ}F$ ($-62.2^{\circ}C$ to $+4.4^{\circ}C$) and $+100^{\circ}$ to $+160^{\circ}F$ ($+37.8^{\circ}C$ to $+71.1^{\circ}C$).

4.5.1.2 Device to test waterproofing.- The device shall permit submersion of the thermometer in 2 feet of water at standard ambient temperature of 75°F ± 3°F (23.9°C ± 1.7°C).

4.6 Acceptance inspection.- The classification of defects in Table I shall constitute the minimum inspection requirements to be performed prior to acceptance or rejection by lots. The AQL specified pertains to each individual characteristic.

4.6.1 Disposition of rejected lots.- Rejected lots shall be screened for all defective characteristics. After corrections have been made and the Government inspector informed of the corrective action taken, the lots shall be resubmitted for acceptance as outlined in MIL-STD-105.

TABLE I - CLASSIFICATION OF DEFECTS

CRITICAL: None Defined

MAJOR: AQL 6.5%	Req't Par.	QA Par.
101. Dial	3.3.1	4.6.2.1
102. Dial window	3.3.2	4.6.2.2
103. Accuracy	3.5	4.6.2.3
104. Waterproofing	3.6	4.6.2.4

MINOR: None Defined

The above tests shall be conducted at the ambient temperatures specified in Section 3 in accordance with the quality assurance paragraph (QA Par.) listed.

4.6.2 Test methods and procedures.

4.6.2.1 Dial.- The dial shall be visually examined to determine compliance with 3.3.1.

4.6.2.2 Dial window.- The dial window shall be visually examined for any evidence of discoloration, such as yellowing. Adverse affect is identified as shrinkage, breakage or warpage that will cause poor legibility of the dial readings, or causes the thermometer to leak when determining compliance with 3.5 and 3.6.

4.6.2.3 Thermometer accuracy.- To determine compliance with 3.5, the thermometer shall be tested at temperatures of +160°F, +70°F, and -80°F. At +160°F the bath mixture shall be water and glycerin; at +70°F the bath shall be of water; and at -80°F the bath shall be of alcohol. The temperature of the bath shall be determined by means of a standard certified precision thermometer.

4.6.2.4 Waterproofing.- This test shall be performed by submerging the thermometer to a depth of 2 feet at a temperature of 75°F ± 3°F for a period of 2 hours in compliance with 3.6. There shall be no evidence of moisture or water on interior surfaces. If fog forms on the inside of the dial window, this shall be considered as leakage.

4.7 Packaging, packing and marking.- Quality assurance provisions for packaging, packing and marking shall be in accordance with MIL-P-116.

4.8 Final acceptance.- Final acceptance of a lot of thermometers shall be withheld by the Government inspector until the sample units, representative of that production lot, have satisfactorily passed the applicable requirements of this specification.

5. PREPARATION FOR DELIVERY

5.1 Materials and methods.- The materials, methods, and procedures used in the packaging of items shall be in accordance with this specification. Materials and methods not covered by a specification shall be suited to the intended use and subject to the approval of the contracting officer.

5.1.1 Materials.- The following shall apply wherever packaging materials are referred to in this specification by name only:

Reference	Full Identification
Gummed tape	Type III, Grade B of PPP-T-45
Water-vaporproof bag	Type II, Class E, Style 1 of MIL-B-117

5.2 Size of containers.- Bags, interior containers and exteriors shall be of a minimum size that shall adequately contain the items.

5.3 Packaging.

5.3.1 Level A.

5.3.1.1 Cleaning.- Cleaning process C-1 of MIL-P-116 shall be followed to clean the thermometer and carrying case.

5.3.1.2 Drying.- Immediately after cleaning, items shall be thoroughly dried in accordance with any applicable procedure, specified in MIL-P-116 that shall not damage the items.

5.3.1.3 Unit packaging.- Packaging shall be as specified herein, which is in conformance with Method IA-15 of MIL-P-116 for the thermometer without a carrying case and Method IA-8 of MIL-P-116 for the thermometer with a carrying case.

5.3.1.3.1 Packaging the thermometer (Drawing B7687275 or B8566038) without a carrying case.

5.3.1.3.1.1 Covering glass surface.- The glass surface of the thermometer dial shall be covered with at least three thicknesses of lens tissue conforming to MIL-P-13988. The tissue shall be secured in place with pressure-sensitive tape conforming to UU-T-106.

5.3.1.3.1.2 Immobilizing the thermometer in a setup box.- The thermometer shall be immobilized in a setup paperboard box by utilizing three pieces of chipboard as shown in Figure 1. The chipboard shall be at least .061 inch thick and conform to the chipboard specified in UU-C-282. The box shall conform to type I or IV, Variety 1 any class and style of PPP-B-676. The inside dimensions of the box shall not be more than 7-1/2 inches by 2 inches by 2 inches. The box shall be closed by covering the seams with gummed tape.

5.3.1.3.1.3 Water-vaporproof bag.- The corners of the box shall be blunted. The boxed thermometer shall then be placed in a water-vaporproof bag. The bag shall be heat-sealed in such a manner as to pass the heat-seal and leak tests of MIL-P-116. Air shall be exhausted from the bag prior to final closure.

5.3.1.3.2 Packaging the thermometer with a carrying case (Drawing A8268609 or A10552697).- The thermometer shall be placed in its carrying case and the cover positioned and secured in place. The carrying case shall then be wrapped with paperboard cushioning conforming to type I, style 1 of PPP-P-291. The wrap shall be secured in place with gummed tape. The wrapped carrying case shall then be placed in a water-vaporproof bag. The bag shall be heat-sealed, air exhausted and pass the tests as specified in 5.3.1.3.1.3.

5.3.1.4 Intermediate packaging.- Unless otherwise specified, only items with the same stock number shall be placed in an intermediate container. Twenty unit packaged thermometers, with or without carrying cases shall be immobilized in a fiberboard box conforming to grade W6c and any style, except FTC, OPF, TS and FPF, of PPP-B-636. The bottom of the box shall be closed with staples, adhesive or 2 inch width pressure-sensitive tape conforming to PPP-T-76. Stapling and adhesive shall be applied as specified in PPP-B-636. If tape is used, a single strip shall be applied over the bottom seam and extend 3 inches onto each end panel. The top of the box shall be closed with the aforementioned tape in the same manner as specified for closure of the bottom of the box with tape.

5.3.2 Level C.

5.3.2.1 Cleaning and drying.- Cleaning and drying shall be as specified in 5.3.1.1 and 5.3.1.2.

5.3.2.2 Unit packaging.- The packaging procedures for thermometers, with or without carrying cases, shall be such as to afford adequate protection against corrosion and physical damage during shipment and interim storage prior to use at the first receiving installation.

5.4 Packing.- Unless otherwise specified, all the items packed in a shipping container shall contain the same stock number.

5.4.1 Level A.- Twenty-four fiberboard boxes containing thermometers without carrying cases or six fiberboard boxes containing thermometers with carrying cases shall be immobilized in a shipping container conforming to either one of the following specifications:

PPP-B-601	Style A or B (overseas type)
PPP-B-621	Class 2, style 4

5.4.2 Level B.- Twenty-four fiberboard boxes containing thermometers without carrying cases or six fiberboard boxes containing thermometers with carrying cases shall be immobilized in a shipping container conforming to one of the following specifications:

PPP-B-585	Class 1, style 1, 2 or 3
PPP-B-601	Any style under domestic type
PPP-B-621	Class 1, style 4

5.4.3 Level C.- A number of packaged thermometers, with or without carrying cases, shall be immobilized in a shipping container conforming to grade V3c, any style, except FTC, TS, OPF, and FPF of PPP-B-636. The gross weight for a fiberboard shipping container shall not exceed the limits of the fiberboard box specification.

5.5 Marking.- Marking interior packages and shipping containers shall be in accordance with MIL-STD-129. Fragile labels shall be applied as specified in MIL-STD-129.

5.6 Pilot pack.- Prior to quantity packaging production, a pilot pack, consisting of a complete and packed shipping container, shall be inspected to determine conformance with the applicable requirements of this specification for level A. A rough-handling test is required.

5.7 Workmanship.- All operations involved in accomplishing corrosion prevention, preservation, packaging, and packing by the procedures specified herein shall be in accordance with the highest grades of practice associated with this type of work.

5.8 Inspection of packaging.

6. NOTES

6.1 Intended use.- The thermometer is intended to be used in determining the temperature of propellant in semifixed and separate loading ammunition. The thermometer is also assembled in powder temperature indicators to determine the temperature of powder in fixed ammunition.

6.2 Ordering data.- Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Thermometer graduated in fahrenheit or centigrade units. (See 3.3).
(c) Applicable part number and stock number.

Custodian:

Army - MU

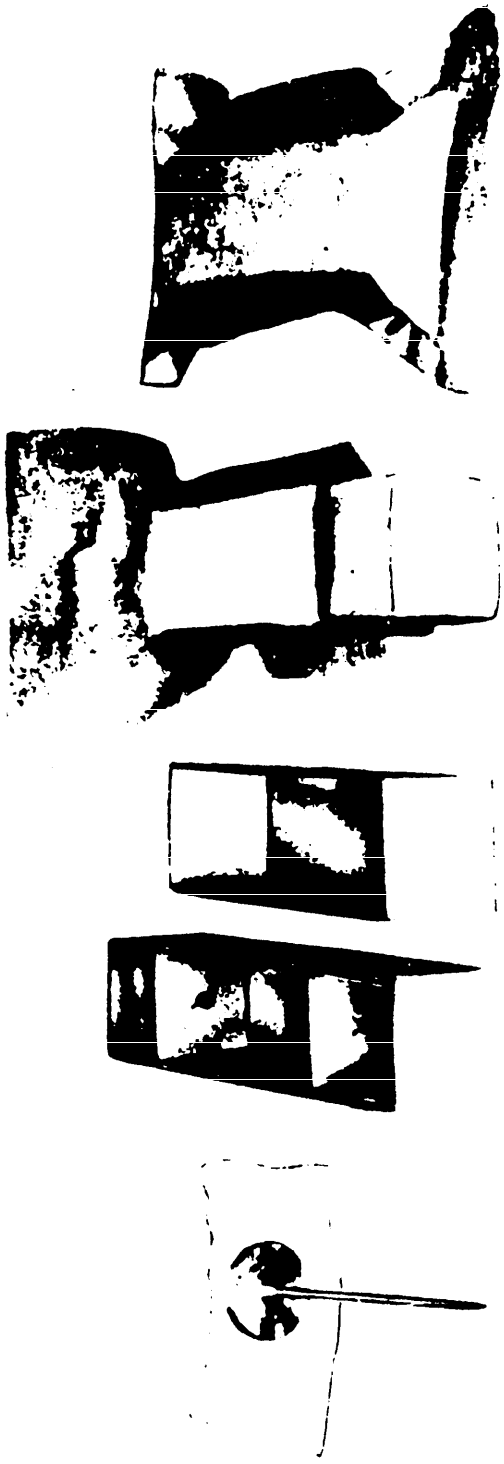
User:

Navy - MC

Preparing activity:

Army - MU

Project No. 6685-0289



UNIT PACKAGING THE THERMOMETER WITHOUT A CARRYING CASE

FIGURE 1

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 22-R255

INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.

SPECIFICATION

ORGANIZATION

CITY AND STATE

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

[ ] DIRECT GOVERNMENT CONTRACT [ ] SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

[ ] YES [ ] NO *(If "yes", in what way?)*

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity - Optional)*

DATE

DD FORM 1 JAN 66 1426

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.

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