

INCH-POUND

MIL-H-10056F  
28 June 1995  
SUPERSEDING  
MIL-H-10056E  
6 January 1975

## MILITARY SPECIFICATION

HOLDERS (ENCLOSURES), CRYSTAL,

## GENERAL SPECIFICATION FOR

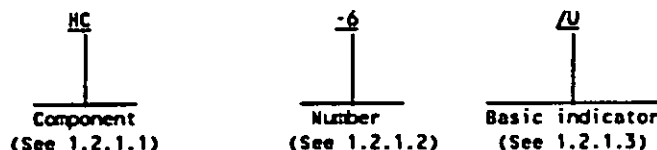
This specification is approved for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers the general requirements for quartz crystal holders (enclosures).  
Note: This specification is subject to NATO standardization agreements.

1.2 Classification.

1.2.1 Type designation. The type designation will be in the following form, and as specified (see 3.1, 3.3, and 6.1):



1.2.1.1 Component. Crystal holders are identified by the two-letter symbol "HC".

1.2.1.2 Number. The number indicates the numerical identification of a crystal holder which has been designed with certain physical characteristics. The number comprises one or more digits and is preceded by a hyphen, which may be followed by a letter. The letter indicates a modification of the basic number, and one-way interchangeability. Detail specification sheets define Part or Identifying Numbers (PIN's) where applicable.

1.2.1.3 Basic indicator. The basic application for which a crystal holder has been designed is indicated by the symbol "/U" denoting "general utility".

## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document 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).

BENEFICIAL COMMENTS, RECOMMENDATIONS, ADDITIONS, DELETIONS, CLARIFICATIONS, ETC., AND DATA WHICH MAY IMPROVE THIS DOCUMENT SHOULD BE SENT TO: US ARMY RESEARCH LABORATORY, PHYSICAL SCIENCES DIRECTORATE, ATTN: AMSRL-PS-DC, FORT MONMOUTH, NJ 07703-5601.

## MIL-X-10056F

## SPECIFICATIONS

## MILITARY

- MIL-P-116 - Preservation Based Electronic, Methods of.
- MIL-F-14072 - Finishes for Ground Equipment.
- MIL-F-14256 - Flux, Soldering, Liquid, Paste Flux, Solder Paste and Solder-paste Flux, General Specification for.

(See supplement 1 for list of applicable detailed specifications.)

## STANDARDS

## MILITARY

- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
- MIL-STD-1285 - Marking of Electrical and Electronic Parts.
- MIL-STD-2073-1 - DOD Material Procedures for Development and Application of Packaging Requirements (Part 1 of 2 parts).

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Defense Printing Service Detachment Office, Building 4D (Customer Service), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

**2.2 Non-Government publications.** The following documents 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 issues of the documents cited in the solicitation (see 6.2).

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI/NCSL Z540-1 - Calibration Laboratories and Measuring and Test Equipment - General Requirements.
- ISO 10012-1 - Quality Assurance Requirements for Measuring Equipment - Part 1: Metrological Confirmation System for Measuring Equipment.

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D1974 - Fiberboard Shipping Containers, Methods of Closing, Sealing, and Reinforcing, Standard Practice for.
- D3953 - Steel and Seals, Flat, Strapping, Standard Specification for.

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

**2.2 Order of precedence.** In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), 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 Detailed specification sheets.** The individual requirements shall be as specified herein and in accordance with the applicable detailed specification sheets. In the event of any conflict between requirements of this specification and the specification sheets, the latter shall govern.

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**3.2 Material.** Material shall be as specified herein (see 3.1). However, when a definite material is not specified, a material shall be used which will enable the holders to meet the performance requirements. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product (see 4.4.1.1).

**3.2.1 Solder and soldering flux.** Where solder is used on any parts of crystal holders, the solder shall be composition Sn10 or higher melting point solder, in accordance with QQ-S-571, and flux shall conform to MIL-F-14256.

**3.2.2 Insulating, impregnating, and sealing compounds.** Insulating, impregnating, and sealing compounds shall not be used.

**3.3 Design and construction.** Holders shall be of the design, construction, and physical dimensions specified (see 3.1). Holders, or parts thereof, shall not deviate in any design detail from the construction required (see 3.1), unless such deviations have been explained in detail, approved by the procuring agency, and permit assemblies which do not exceed the dimensional tolerances for the base and cover combinations (see 4.4.1.2 and 6.1). The undercut on pin terminals, when specified (see 3.1) is optional.

**3.3.1 Covers.** Covers shall be designed to fit the applicable bases in a manner that will permit easy assembly and interchangeability of covers and bases of the same type supplied on any one contract or order (see 4.4.1.2).

**3.3.2 Glass parts.** All glass parts shall contain no visible cracks (see 4.4.1.2.1). However, minute cracking around the feather edge of a meniscus, which is generally inevitable, shall not be considered a crack within the meaning of this specification.

**3.3.3 Pin alignment and length.** The pins in the base of holders having pin-type terminals shall freely and completely enter the applicable pin-alignment test gauge, or the pin alignment shall conform to the maximum dimensional tolerances of pin-alignment test gauge as viewed on a shadowgraph. The length of the pins shall be such that their ends shall come within the steps of the gauge (see 4.4.1.2.2).

**3.4 Solderability (applicable to wire-lead holders).** When tested as specified in 4.4.2, the dipped surface of the lead shall be at least 95 percent covered with continuous new solder coating. The remaining 5 percent of the lead surface may show only small pinholes or voids. These shall not be concentrated in one area. Bare base metal, and areas where the solder dip failed to cover the original coating, are indications of poor solderability and shall be cause for failure.

### **3.5 Terminal strength.**

**3.5.1 Pull.** When tested as specified to 4.4.3.1, crystal holders shall withstand the applied force without evidence of damage or relative movement at the point of sealing between terminals and base.

**3.5.2 Pin-lead bend.** When tested as specified in 4.4.3.2, terminals shall not break and glass seals shall not crack.

**3.5.3 Wire-lead bend.** When tested as specified in 4.4.3.3, leads shall not break and glass seals shall not crack.

**3.6 Seal.** When tested as specified in 4.4.4, crystal holder bases shall show no leakage in excess of rate equivalent to  $10^{-8}$  atmosphere cubic centimeters per second (atm cm<sup>3</sup>/s).

**3.7 Salt spray (corrosion).** When bases for holders are tested as specified in 4.4.5, there shall be no evidence of excessive corrosion. Excessive corrosion shall be construed as any corrosion which impairs the satisfactory operation of the holder, or has attacked the base metal.

### **3.8 Thermal shock.**

**3.8.1 Base assembly (applicable to bases for metal holders).** When the assembly is tested as specified in 4.4.6.1, there shall be no evidence of cracking or chipping in the glass or glass seal, and the insulation resistance shall be not less than 5,000 megohms.

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3.8.2 Glass envelope. When tested as specified in 4.4.6.2, the glass envelope shall not crack, break, or chip.

3.9 Marking. Holders shall be marked only when required in the contract or order (see 6.2), with the marking specified (see 6.2). Marking shall be in accordance with MIL-STD-1285.

3.10 Workmanship. Holders shall be manufactured and processed in a careful and workmanlike manner, in accordance with good design and sound practice. All parts shall be free from dirt, grease, and any other loose or attached foreign material. Glass parts shall also be free of chipped or jagged edges and surfaces. All burrs shall be removed.

#### 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 (examinations or tests) 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

4.1.3 Test equipment and inspection facilities. The supplier shall establish and maintain a calibration system in accordance with ANSI/NCSL Z540-1, ISO-10012-1, or equivalent system.

4.2 Classification of inspection. The examination and testing of crystal holders shall be classified as follows:

Quality conformance inspection (see 4.3).

4.3 Quality conformance inspection. Quality conformance inspection shall consist of groups A, B, and C.

4.3.1 Inspection lot. An inspection lot shall consist of crystal holders or parts of the same type, produced under essentially the same conditions and offered for inspection at one time or within a period designated by the Government.

4.3.1.1 Sample unit. A sample unit shall be defined as one cover and one base assembly, not paired.

4.3.2 Group A inspection. Group A inspection shall consist of the examinations and test specified in table I, in the order shown.

4.3.2.1 Sampling plan. Sample units shall be randomly selected from each inspection lot in accordance with table II, if one or more defects are found, the lot shall be rescreened and defects removed. After screening and removal of defects, new sample units shall be randomly selected in accordance with table II, if one or more defects are found in this second sample, the lot shall be rejected and shall not be supplied to the specification.

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TABLE I. Group A inspection.

Examination or tests	Requirement paragraph	Method paragraph
Visual and mechanical examination	3.2, 3.2.1, 3.2.2, 3.3, 3.3.1, 3.3.2, 3.3.3, 3.9, and 3.10	4.4.1
Terminal pull	3.5.1	4.4.3.1

TABLE II. Group A, zero defect sampling plan.

Lot size	Sampling size
1 to 12	100 percent
13 to 150	13
151 to 280	20
281 to 500	29
501 to 1200	34
1201 to 3200	42
3201 to 10,000	50
10,001 to 35,000	60

4.3.3 Group B inspection. Group B inspection shall consist of the tests specified in table III, in the order shown.

TABLE III. Group B inspection.

Test	Requirement paragraph	Method paragraph
Solderability	3.4	4.4.2
Pin-lead bend	3.5.2	4.4.3.2
Wire-lead bend	3.5.3	4.4.3.3
Thermal shock	3.8	4.4.6.1 or 4.4.6.2
Seal	3.6	4.4.4

4.3.3.1 Sampling plan. Sample units shall be randomly selected from inspection lots that have currently passed group A inspection in accordance with table IV. If one or more defects are found, the lot shall be rescreened and defects removed. After screening and removal of defects, new sample units shall be randomly selected in accordance with table IV, if one or more defects are found in this second sample, the lot shall be rejected and shall not be supplied to the specification.

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TABLE IV. Group B, zero defect sampling plan.

Lot size	Sample size
1-4	100%
5 to 50	5
51 to 90	7
91 to 150	11
151 to 280	13
281 to 500	16
501 to 1200	19
1201 to 3200	23
3201 to 10,000	29
10,001 to 35,000	35

4.3.3.3 Disposition of sample units. Sample units subjected to group B inspection shall not be delivered on the contract or order.

4.3.4 Group C inspection. Ten bases for holders from the first inspection lot and ten bases once a month thereafter shall be subjected to the salt-spray (corrosion) test specified in 4.4.5 (see 3.7).

4.3.4.1 Noncompliance. If a sample fails to pass group C inspection, the supplier shall take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials, processes, etc, and which are considered subject to the same failure. Quality conformance inspection shall be discontinued until corrective action acceptable to the Government has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspection, or the inspection which the original sample failed, at the option of the Government). Groups A and B inspections may be reinstituted; however, final acceptance shall be withheld until the group C reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.3.5 Inspection of preparation for delivery. Except for commercial packaging, the sampling and inspection of the preservation-packaging and interior package marking shall be in accordance with the groups A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification and the marking requirements of MIL-STD-129. The inspection of commercial packaging shall be as specified in the contract or purchase order (see 6.1).

#### 4.4 Methods of examination and test.

4.4.1 Visual and mechanical. Crystal holders shall be examined as specified in 4.4.1.1 and 4.4.1.2 to verify that the materials and design and construction are in accordance with 3.2 and 3.3. Marking and workmanship shall be examined to verify compliance with the requirements of 3.9 and 3.10.

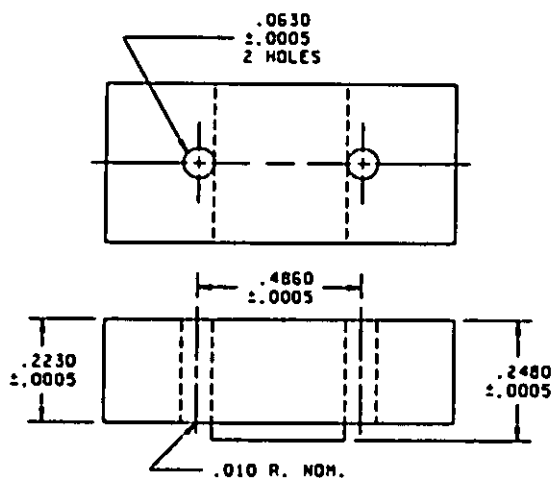
4.4.1.1 Materials. All parts of the holder shall be examined to verify that the materials are in accordance with the applicable requirements (see 3.1).

4.4.1.2 Design and construction. All parts of the holder shall be examined to verify that the applicable design requirements have been met (see 3.1). All required dimensions shall be checked. Covers and bases for metal holders shall be fitted together in random pairings without solder, to check overall height, seating, and interchangeability.

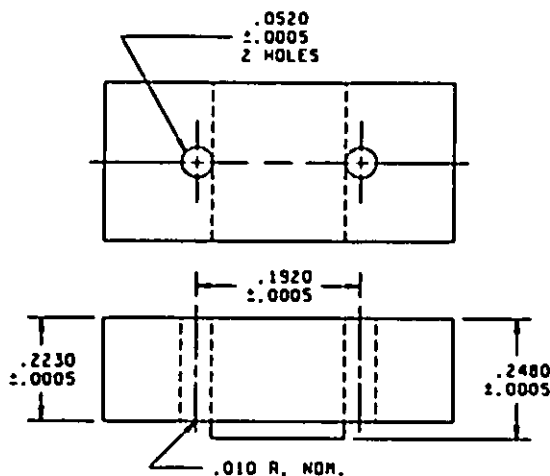
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4.4.1.2.1 Glass parts (see 3.3.2). All glass parts shall be examined under 10-power stereo-magnification and a strong light, for evidence of cracks.

4.4.1.2.2 Pin alignment and length (see 3.3.3). A pin-alignment test gauge (see figure 1 A or B, as applicable) or a shadowgraph shall be used to determine pin alignment and length. The same gauge may be used as "go-no-go" on pin length. When bosses appear on the holder, the gauge must be relieved to admit them.



A. LARGER PIN SIZE AND SPACING



B. SMALLER PIN SIZE AND SPACING

Inches	mm
.010	0.25
.0005	0.013
.0520	1.321
.0630	1.600
.1920	4.877
.2230	5.664
.2480	6.299
.4860	12.344

## NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified tolerance is  $\pm.005$  (0.13 mm).
4. Material: Brass.

FIGURE 1. Test gauges for pin alignment and length.

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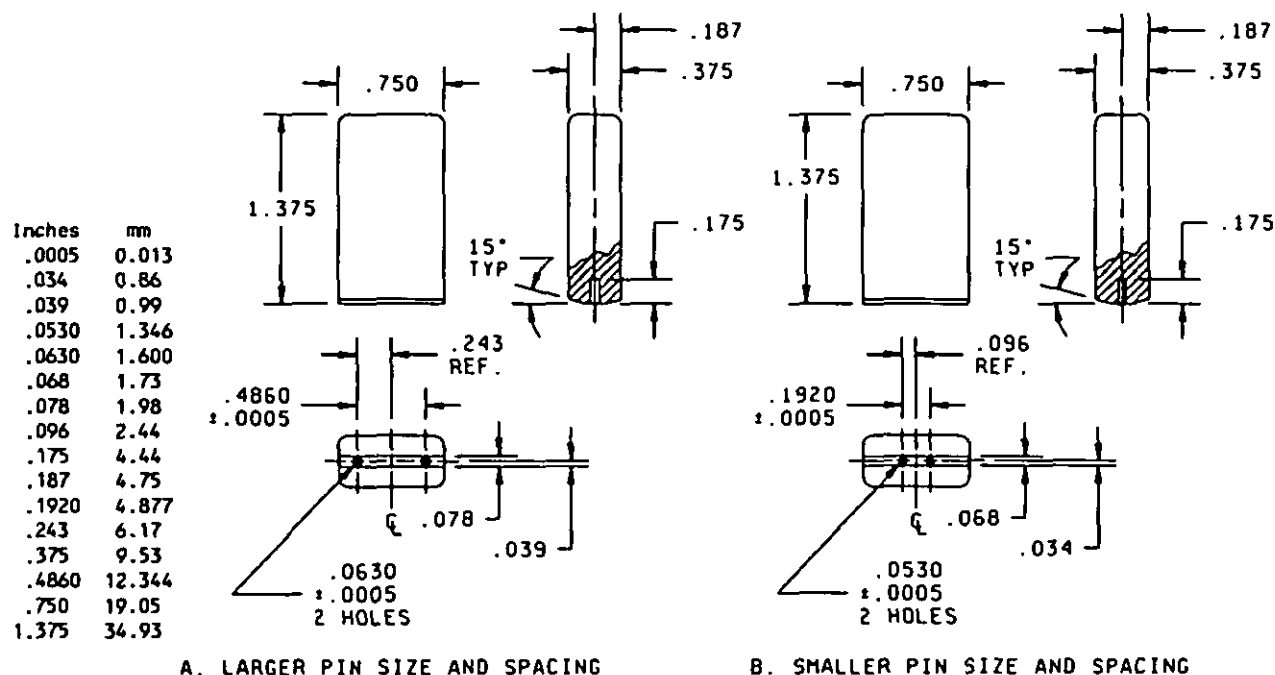
4.4.2 Solderability (see 3.4). Each wire-lead terminal shall be subjected to method 208 of MIL-STD-202.

4.4.3 Terminal strength (see 3.5). Each terminal, mounted on the base assembly, shall be tested as specified in 4.4.3.1 and 4.4.3.2 or 4.4.3.3 as applicable. Subsequently, glass seals shall be examined under strong light and 10-power stereo-magnification for evidence of cracks.

4.4.3.1 Pull (see 3.5.1). Base assemblies shall be subjected to method 211 of MIL-STD-202, test condition A, except applied force shall be 4 pounds for pin-type units, or 2 pounds for wire-lead terminals. In making this test, the base shall be supported near its periphery.

4.4.3.2 Pin-lead bend (see 3.5.2). Bases shall be tested in accordance with method 211 of MIL-STD-202. The following details and exceptions shall apply:

- a. Test-condition letter: 8.
- b. Bending tool to be in accordance with figure 2, A or B, as applicable. Any convenient means may be used for holding base of the crystal holder. The tool shall engage the terminal pins exclusive of the portion between the undercut and the base. To insure that bending will occur primarily at the undercut portion, a plate with two clearance holes for the pins may be placed over the pins. This plate may be of such thickness as to include a portion of the undercut section of the pins.
- c. Number of bending operations: 2.
- d. The bending cycle shall start with a  $15^\circ \pm 2^\circ$  bend to one side of the normal position. The terminal shall then be bent  $30^\circ \pm 2^\circ$  in the opposite direction to a point  $15^\circ$  on the opposite side of the normal position, and then back  $15^\circ$  to normal.



## NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified tolerance is  $\pm 0.005$  (0.13 mm).
4. Material: Brass.

FIGURE 2. Tools for terminal bend test.



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4.4.3.3 Wire-lead bend (see 3.5.3). Each terminal shall be tested in accordance with method 211 of MIL-STD-202. The following details and exceptions shall apply:

- a. Test-condition letter: C.
- b. Load: 1 pound.

4.4.4 Seal (see 3.6). Base assemblies shall be tested in accordance with method 112 of MIL-STD-202. The following details and exceptions shall apply:

- a. Test-condition letter C, procedure number 1, except that the test specimens shall not be subjected to final filling, pinching off, and sealing; verification of final seal is not required.
- b. Leakage rate sensitivity:  $10^{-8}$  atm/cm<sup>3</sup>/s.
- c. Method of mounting: Base assemblies shall be clamped to a suitable test jig.
- d. Test for gross leaks: Not applicable.

4.4.5 Salt spray (corrosion) (see 3.7). Base for holders shall be tested with method 101, test condition B, of MIL-STD-202. After this test, the base shall be examined for evidence of excessive corrosion.

4.4.6 Thermal shock (see 3.8).

4.4.6.1 Base assembly (applicable to metal holders) (see 3.8.1). The assembly shall be immersed for at least 30 seconds in liquid soldering flux at a temperature maintained at  $100^{\circ}\text{C} + 10^{\circ}\text{C}, -0^{\circ}\text{C}$  and then dipped for at least 10 seconds in molten solder at a temperature of  $215^{\circ}\text{C} + 10^{\circ}\text{C}, -0^{\circ}\text{C}$ . The solder shall be shaken off immediately, and the assembly shall then be cooled at room temperature. The thermal capacity of the flux and solder baths shall be such that, for the quantity of assemblies being tested at any one time, the bath temperature specified above will be maintained. Subsequently, the part shall be thoroughly washed and dried. Insulation resistance shall be measured in accordance with test condition A, method 302 of MIL-STD-202 between the pins and base. The glass seal shall then be examined under 10-power stereo-magnification and a strong light, for evidence of radial or other detrimental cracks.

4.4.6.2 Glass envelope (applicable to glass holders) (see 3.8.2). The glass cover and base shall be immersed in boiling water for  $15 \pm 1$  seconds and immediately thereafter shall be immersed in ice water for  $5 \pm 1$  seconds. The volume of water shall be large enough so that the temperature of the water will not be appreciably affected by this test.

## 5. PACKAGING

5.1 Packaging requirements. Unless otherwise specified (see 6.2), the requirements for packaging shall be in accordance with MIL-STD-2073-1.

5.2 Marking. In addition to any special marking required by the contract or order (see 6.2), marking shall be in accordance with MIL-STD-129.

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Holders, crystal are intended to be used in conjunction with MIL-C-3098, as the holder for the crystal, which completes the crystal unit.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Title, number, and date of the applicable specification sheet, the complete type designation (see 1.2.1, 3.1, and 3.3), and PIN where applicable.

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- c. Whether springs or other crystal-plate mounting systems are required; if so, their dimensions, shape factors, materials, and how they are to be mounted.
- d. Marking of holder, if required (see 3.9).
- e. Length of pin above base, if different from the minimum specified (see 3.1).
- f. Any deviation from the construction and design features specified herein (see 3.1) must be subject to the provisions of 3.3; and in such a case, if this specification is referenced, the exceptions are approved shall be clearly stated.
- g. Levels or preservation-packaging required (see 5.1, 5.2, and 5.4.2.3).
- h. Special marking, if required (see 5.3).

6.3 International standardization agreements. Certain provisions of this specification are the subject of international standardization agreement, NATO STANAG 4032. When amendment, revision, or cancellation of this specification is proposed which affects or violates the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required. The United States by international agreement (STANAG) has agreed to the use of type of crystal holders designated by NATO nomenclature, i.e., NATO style no. 15 on new equipment design. The NATO types are shown in supplement 1 to this specification and should be used whenever possible.

6.4 Subject term (key word) listing.

Base assembly  
Pins  
Seal

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

## CONCLUDING MATERIAL

## Custodians:

Army - ER  
Navy - EC  
Air Force - 85

## Review activities:

Army - AR, MI  
Navy - AS, MC, OS, SH  
Air Force - 17, 19, 80  
DLA - ES

## Preparing activity:

Army - ER

## Agent:

DLA - ES

(Project 5955-0635)

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

**I RECOMMEND A CHANGE:**

1. DOCUMENT NUMBER MIL-H-10056F

2. DOCUMENT DATE (YYMMDD)

28 June 1995

## 3. DOCUMENT TITLE

HOLDERS (ENCLOSURES), CRYSTAL, GENERAL SPECIFICATION FOR

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

## 5. REASON FOR RECOMMENDATION

## 6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)

(1) Commercial

(2) AUTOVON  
(If applicable)7. DATE SUBMITTED  
(YYMMDD)

## 8. PREPARING ACTIVITY

a. NAME

US Army Research Laboratory  
Physical Sciences Directorate

b. TELEPHONE (Include Area Code)

(1) Commercial

(908) 427-3441

(2) AUTOVON

987-3441

c. ADDRESS (Include Zip Code)

ATTN: AMSRL-PS-DC  
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5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466  
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