MIL-B-27497C
27 April 1978
SUPERSEDING
MIL-B-27497B
20 May 1970

MILITARY SPECIFICATION

BEARINGS, JEWEL, SAPPHIRE OR RUBY, SYNTHETIC

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

1. SCOPE

1.1 Scope. This specification covers jewel bearings furnished both in synthetic sapphire and ruby material produced by the Verneuil process.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. 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.

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-1188	Commercial Packaging of Supplies and Equipment
MS27041	Bearing, Jewel - Bar Hole
MS27042	Bearing, Jewel - Olive Hole, Double Cup
MS27043	Bearing, Jewel - Olive Hole, Bombe'
MS27044	Bearing, Jewel - Olive Hole, Ringstone
MS27045	Bearing, Jewel - Vee
MS27046	Bearing, Jewel - Cup
MS27047	Bearing, Jewel - Endstone
MS27048	Bearing, Jewel - Olive Hole, Single Cup
MS27049	Bearing, Jewel - Bar Hole, Bombe'

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: ASD/ENESS, Wright-Patterson AFB, OH 45433, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

2.2 Other publication. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

Consolidated Freight Classification Rules

(Application for copies should be addressed to the Classification Committee, 202 Chicago Union Station, Chicago, IL 60606.)

3. REQUIREMENTS

3.1 Material. The material shall be synthetic sapphire and ruby produced by the Verneuil flame fusion process so as to produce components that will meet all the requirements of this specification (see 6.2).

3.2 Design. The configuration of the bearings shall be in accordance with MS27041 through MS27049, as applicable (see 6.2).

3.3 Surface finish. Unless otherwise specified, all polished surfaces shall be free of defects when viewed with 18X magnification. On ground surfaces minor defects that have been brushed clean will be acceptable.

3.4 Workmanship. Workmanship shall be of a quality consistent with the highest existing instrument production standards and practices. All finished surfaces shall be protected against corrosion or damage during manufacture and prior to delivery. All excess material shall be removed. All surfaces shall be free from burrs and sharp edges. All material shall be sound, of uniform quality and condition, and free from cracks and other defects which may adversely affect the strength, endurance or wear resistance of the part. Any material which has been treated in any manner to conceal defects therein shall not be offered for Government acceptance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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) Individual inspections (see 4.2.1).

(b) Sampling inspections (see 4.2.2).

4.2.1 Individual inspections. Each bearing shall be subjected to the examination of product specified in 4.3.1.

4.2.2 Sampling inspections.

4.2.2.1 Lot. A lot shall consist of finished bearings of the same material, size, and part number produced consecutively by the same machines and submitted for inspection at the same time. Lots shall be segregated and marked to identify them with their respective samples.

4.2.2.2 Sampling plan. Bearings selected in accordance with inspection level II of MIL-STD-105 shall be subjected to the inspection of dimensions and tolerances specified in 4.3.2. The acceptable quality level for this inspection shall be 1.0 percent defective for major defects.

4.2.2.3 Resubmitted lots. The resubmission of lots found unacceptable shall be in accordance with MIL-STD-105, except that items in the resubmitted lots shall be reinspected using 100 percent inspection. Before resubmitting the lot, the contractor shall fully explain to the procuring activity the corrections made and the cause of previous rejections.

4.3 Inspection methods.

4.3.1 Examination of product. The bearing shall be examined to determine compliance with the surface finish and workmanship requirements specified herein and in the applicable MS standard. Nonconformance of bearing to the specified surface finish and workmanship requirements shall be cause for rejection of the bearing.

4.3.2 Dimensions and tolerances. Each sample bearing selected as specified in 4.2.2.2 shall be checked to determine compliance with the applicable MS standard with respect to dimensions, tolerances, configuration, and eccentricity as specified in table I.

4.4 Inspection of preservation, packaging, packing, and marking. Sample items or packs shall be inspected to determine that preservation, packaging, packing, and marking conforms to Section 5 or the documents specified therein.

TABLE I. Sampling inspection for defects.

Category	Requirement to be Inspected for Defect 1/	Method of Inspection
Major		
101	Outside diameter	Cary gage
102	Bore diameter	"Go" and "no go" plug gages
103	Thickness	Dial indicator
104	Cup width	Diascopic projection and template 2/
105	Chamfer dimensions (includes rounded edges)	Diascopic projection and template
106	Depth of countersink	Diascopic projection and template
107	Profile of countersink	Diascopic projection and template
108	Contours of "olive"	Diascopic projection and template
109	"Ribbon" dimensions (ribbon is the cylindrical outside surface)	Diascopic projection and template
110	Angle of "vee"	Diascopic projection and template
111	Curvature at bottom of "vee"	Diascopic projection and template
112	Curvature of cup (in cup bearings)	Diascopic projection and template
113	Eccentricity	Diascopic projection and template
114	Surface Finish	18X Magnification

1/ During the sample inspection, each failure of the sample bearing to conform to the specified requirement shall be classified as a major defect.
2/ For proper measurement of jewel outlines during diascopic projection, the jewel shall be submerged in methylene-iodide. Care shall be taken so that the jewel is vertical and that the outside diameter of the jewel is perpendicular to the ray of light.

5. PACKAGING

5.1 Preservation and packing. Bearings shall be preserved and packed in accordance with MIL-STD-1188.

5.2 Marking. In addition to any special marking required by the contract or order (see 6.2), marking and packaged bearings shall be in accordance with MIL-STD-1188. The item description for shipment marking shall be as follows:

Bearing, Jewel (Applicable Configuration), Sapphire, Synthetic 1/

1/ The applicable configuration on the MS standard and ruby in lieu of sapphire, if applicable, shall be included.

6. NOTES

6.1 Intended use. The bearings covered by this specification are intended for use in precision instruments, meters, timing devices, clocks, and similar equipment. For related items see MIL-S-83464.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification

(b) Applicable part number (see 3.2)

(c) Special marking of shipments, if required (see 5.2)

(d) Selection of material (see 3.1)

(e) Jewel bearings in accordance with ASPR 1-2207.2

6.3 Annotation of changes. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Army - AR
Navy - SH
Air Force - 11

Reviewers:
Army - EL
Navy - AS
Air Force - 99
DLA - GS

User:
Navy - MC

Preparing activity:
Air Force - 11

Project 6695-0047

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS: This form is provided to solicit beneficial comments which may improve this document and enhance its use. DoD contractors, government activities, manufacturers, vendors, or other prospective users of the document are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity. A response will be provided to the submitter, when name and address is provided, within 30 days indicating that the 1426 was received and when any appropriate action on it will be completed.

NOTE: This form shall not be used to submit requests for 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.

DOCUMENT IDENTIFIER (Number) AND TITLE

NAME OF ORGANIZATION AND ADDRESS OF SUBMITTER

☐ VENDOR ☐ USER ☐ MANUFACTURER

1. ☐ HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? ☐ IS ANY PART OF IT TOO RIGID, RESTRICTIVE, LOOSE OR AMBIGUOUS? PLEASE EXPLAIN BELOW.

A GIVE PARAGRAPH NUMBER AND WORDING

B RECOMMENDED WORDING CHANGE

C REASON FOR RECOMMENDED CHANGE(S)

REMARKS

SUBMITTED BY (Printed or typed name and address — Optional)

TELEPHONE NO.

DATE

DD FORM 1 OCT 76 1426 PREVIOUS EDITION WILL BE USED.

FOLD

ASD/ENESS
Wright-Patterson AFB, O 45433

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF AIR FORCE
DOD-319

ASD/ENESS
Wright-Patterson AFB, O 45433

FOLD