METRIC AEROSPACE STANDARD

MA1784™	REV. A

Issued 1987-07
Revised 2018-10
Reaffirmed 2024-10

Superseding MA1784

Spacers and Washers, Procurement Specification for, Metric
FSC 5310 & 5365

RATIONALE

Delete MIL-STD-105 sampling requirements and extensively revise Section 4 (Quality Assurance Provisions) to acceptance based on zero defectives, update FPI and MPI references, revise classification “MAJOR A” to “MAJOR B” based on acceptance quality requirements, revise military packing requirements to MIL-STD-2072-1, general update of references, and general editorial revisions.

MA1784A has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

1.1 Type

This specification covers metric aircraft quality spacers for use as positioners for tubes, flat washers for use as load spreaders, galling protection of adjacent surfaces and or material compatibility, and key or tab washers for use as locks for bolts, nuts, and screws.

1.2 Application

Primarily for use in aerospace propulsion systems.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 AIA/NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NASM1312-12 Thickness of Metallic Coatings

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/MA1784A/

2.2 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

ASME B46.1 Surface Texture (Surface Roughness, Waviness and Lay)

2.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E340 Standard Practice for Macroetching Metals and Alloys

ASTM E1417/E1417M Standard Practice for Liquid Penetrant Testing

ASTM E1444/E1444M Standard Practice for Magnetic Particle Testing

2.4 U.S. Government Publications

Copies of these documents are available online at http://quicksearch.dla.mil.

2.4.1 Military Standard

MIL-STD-2073-1 Standard Practice for Military Packaging

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be as specified on the part drawing.

3.2 Dimensions

The dimensions and geometric tolerances of completed parts, after all processing including plating when required, shall conform to the requirements on the part drawing.

3.2.1 Surface Texture

Surface texture of completed parts, prior to plating or coating, if required, shall conform to the requirements on the drawing, determined in accordance with ASME B46.1.

3.3 Passivation

When specified on the part drawing, parts made from corrosion resistant steel shall, after finishing, be degreased and then immersed in one of the following solutions for the time and the temperature shown, rinsing, and drying:

3.3.1 One volume of nitric acid (sp gr 1.42) and nine volumes of water for not less than 20 minutes at room temperature.

3.3.2 One volume of nitric acid (sp gr 1.42) and four volumes of water for 30 to 40 minutes at room temperature.

3.3.3 One volume of nitric acid (sp gr 1.42) and four volumes of water for 10 to 15 minutes at 60 to 70 °C.

3.4 Product Marking

Each part shall be identification marked as specified on the part drawing.

3.5 Plating or Coating

When required, plating or coating shall be as specified on the part drawing.

3.6 Direction of Grain

When specified on the drawing, direction of grain on parts, macroetched in accordance with ASTM E340, shall be as shown on the part drawing.

3.7 Quality

Parts shall be uniform in quality and condition, clean, sound, smooth, and free from burrs and foreign materials and external imperfections detrimental to their performance.

3.8 Nondestructive Inspection

3.8.1 Fluorescent Penetrant Inspection

Parts shall show no evidence of cracks, seams, laminations, machining tears, or laps when subjected to fluorescent penetrant inspection in accordance with ASTM E1417/E1417M.

3.8.2 Magnetic Particle Inspection

Parts shall show no evidence of cracks, seams, laminations, machining tears, or laps when subjected to magnetic particle inspection in accordance with ASTM E1444/E1444M.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of parts shall supply all samples and shall be responsible for performing all required tests. Purchaser reserves the right to perform such confirmatory testing deemed necessary to ensure that the parts conform to the requirements of this specification.

4.2 Responsibility for Compliance

The manufacturer's system for parts production shall be based on preventing product defects, rather than detecting the defects at final inspection and then requiring corrective action to be invoked. An effective manufacturing in-process control system shall be established, subject to the approval of the purchaser, and used during production of parts.

4.3 Production Acceptance Tests

The purpose of production acceptance tests is to check, as simply as possible, using a method which is inexpensive and representative of the part usage, with the uncertainty inherent in random sampling, that the parts comprising a production inspection lot satisfy the requirements of this specification.

4.3.1 Tests for all technical requirements are acceptance tests and shall be performed on each production inspection lot. A summary of acceptance tests is specified in Table 1.

4.4 Production Inspection Lot

A production inspection lot shall be all finished parts of the same part number, made from a single heat of alloy, heat treated at the same time to the same specified condition, produced as one continuous run, and submitted for vendor's inspection at the same time.

4.5 Acceptance Test Sampling

4.5.1 Non-Destructive Test - Visual and Dimensional

A random sample of parts shall be taken from each production inspection lot; the size of the sample to be as specified in Table 2. The classification of characteristics shall be as specified in Table 3. All dimensional characteristics are considered defective when out of tolerance.

4.5.2 Fluorescent Penetrant and Magnetic Particle Inspection

Parts shall be subjected to fluorescent penetrant inspection or magnetic particle inspection when specified on the part drawing. A random sample shall be selected from each production inspection lot; the size of the sample shall be as specified in Table 2 and classified as in Table 3. The sample units may be selected from those that have been subjected to and passed the visual and dimensional inspection, with additional units selected at random from the production inspection lot as necessary.

4.5.3 Acceptance Quality

Of random samples tested, acceptance quality shall be based on zero defectives.

4.6 Reports

The vendor of parts shall furnish with each shipment a report stating that the chemical composition of the parts conforms to the applicable material specification, showing the results of tests to determine conformance to the acceptance test requirements, and stating that the parts conform to the other technical requirements of this specification. This report shall include the purchase order number, MA1784 and revision letter, contractor or other direct supplier of material, part number, nominal size, and quantity.

4.7 Rejected Lots

If a production inspection lot is rejected, the vendor of parts shall perform corrective action to screen out or rework the defective parts, resubmit for acceptance tests inspection as in Table 1, or srap the entire lot. Resubmitted lots shall be clearly identified as reinspected lots.

5. PREPARATION FOR DELIVERY

5.1 Packaging and Identification

5.1.1 Parts having different part numbers shall be packed in separate containers.

5.1.2 Each container of parts shall be marked to show the following information:

PART NAME _____
MA1784A
PART NUMBER _____
LOT NUMBER _____
PURCHASE ORDER NUMBER _____
QUANTITY _____
MANUFACTURER'S IDENTIFICATION _____

5.1.3 Containers of parts shall be prepared for shipment in accordance with commercial practice to ensure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.1.4 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-2073-1.