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AEROSPACE MATERIAL SPECIFICATION

SAE

AMS 7452M

Issued 1 SEP 1948

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Superseding AMS 7452L

Submitted for recognition as an American National Standard

BOLTS AND SCREWS, LOW-ALLOY STEEL
Heat Treated, Roll Threaded

UNS G87400

This specification has been designated as "SUPERSEDED" by the Aerospace Materials Division, SAE, as of February 1991. The requirements of this specification are embodied in the latest issue of AMS 7452, Bolts and Screws, Low-Alloy Steel, Heat Treated, Roll Threaded. The requirements of the latest issue of AS7452 shall be fulfilled whenever reference is made to AMS 7452.

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AEROSPACE MATERIAL SPECIFICATION

SAE

AMS-7452

REV

L

Issued 1948-09-01

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Superseding AMS-7452K

Submitted for recognition as an American National Standard

BOLTS AND SCREWS, LOW-ALLOY STEEL
Heat Treated, Roll Threaded

UNS G87400

This specification has been designated as "SUPERSEDED" by the Aerospace Materials Division, SAE, as of May 1990. The requirements of this specification are embodied in the latest issue of AS7452, Bolts and Screws, Low-Alloy Steel, Heat Treated, Roll Threaded. The requirements of the latest issue of AS7452 shall be fulfilled whenever reference is made to AMS-7452.

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AEROSPACE MATERIAL

Society of Automotive Engineers, Inc.

TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

SPECIFICATION

AMS 7452K

Superseding AMS 7452J

Issued 9-1-48

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BOLTS AND SCREWS, STEEL, LOW-ALLOY Heat Treated, Roll Threaded

1. SCOPE:

1.1 Type: This specification covers high quality bolts and screws made of a low-alloy steel.

1.2 Application: Primarily for joining parts where minimum strengths of 125,000 psi (862 MPa) and higher are required.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) and Aerospace Standards (AS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

AMS 2373 - Quality Assurance Sampling of Bolts and Screws

AMS 6322 - Steel Bars and Forgings, 0.50Cr - 0.55Ni - 0.25Mo (0.38 - 0.43C) (SAE 8740)

AMS 6327 - Steel Bars and Forgings, 0.50Cr - 0.55Ni - 0.25Mo (0.38 - 0.43C) (SAE 8740)
Heat Treated, 125,000 psi (862 MPa) Tensile Strength

2.1.2 Aerospace Standards:

AS 1132 - Design Parameters for Bolts and Screws, External Wrenching,
Unified Threaded Inch Series

AS 1177 - Nondestructive Inspection Standards for Bolts and Screws

AS 3062 - Bolts, Screws, and Studs, Screw Thread Requirements

AS 3063 - Bolts, Screws, and Studs, Straightness, Concentricity, and
Squareness Requirements

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM A370 - Mechanical Testing of Steel Products

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

2.3.1 Military Standards:

MIL-STD-1312 - Fasteners, Test Methods

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be AMS 6322 or AMS 6327 steel, unless otherwise specified.

Fabrication:



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- 3.2.1 **Blanks:** Heads shall be formed by hot forging, cold forging, or machining.
- 3.2.2 **Heat Treatment:** Headed and machined blanks, unless machined from heat treated stock, shall, before finishing the shank and the bearing surface of the head, cold working the head-to-shank fillet radius when specified, and rolling the threads, be heat treated as follows:
- 3.2.2.1 **Heating Equipment:** Furnaces may be any type ensuring uniform temperature throughout the parts being heated and shall be equipped with, and operated by, automatic temperature controllers. The heating medium or atmosphere shall cause neither surface hardening nor decarburization other than that permitted by 3.4.3.2 and 3.4.3.3.
- 3.2.2.2 **Hardening:** Blanks of AMS 6322 shall be uniformly heated to 1500 - 1550° F (815.6 - 843.3° C), held at heat for not less than 15 min., and quenched in oil. For other steels, the temperature shall be as agreed upon by purchaser and vendor.
- 3.2.2.3 **Tempering:** Hardened blanks shall be tempered by heating uniformly to the temperature necessary to produce the specified hardness and microstructure, holding at heat for not less than 1 hr, and cooling.
- 3.2.3 **Oxide and Decarburization Removal:** The heat treated blanks, before cold working the fillet radius when specified and rolling the threads, shall have all surfaces free from surface oxide, oxide penetration, and decarburization except as permitted in 3.4.3.3. The removal process shall produce no intergranular attack or corrosion of the blanks. The metal removed from the bearing surface of the head and the full body diameter of the shank shall be as little as practicable to obtain a clean, smooth surface and in no case shall be so great as to produce more cutting of flow lines in the head-to-shank junction of upset headed parts than shown in Fig. 1B.
- 3.2.4 **Cold Working of Fillet Radius:** After removal of oxide and decarburization as in 3.2.3, the head-to-shank fillet radius of parts having the radius complete throughout the circumference of the part shall, when specified, be cold worked sufficiently to remove all visual evidence of grinding or tool marks. Distortion due to cold working shall not raise metal more than 0.002 in. (0.05 mm) above the contour at "A" or depress metal more than 0.002 in. (0.05 mm) below the contour at "B" as shown in Fig. 2; distorted areas shall not extend beyond "C" as shown in Fig. 2. In configurations having an undercut associated with the fillet radius, the cold working will be required only for 90 deg (1.57 rad) of fillet arc, starting at the point of tangency of the fillet radius and the bearing surface of the head.
- 3.2.5 **Thread Rolling:** Threads shall be formed on the heat treated and finished blanks by a single rolling process.
- 3.3 **Properties:** Parts shall conform to the requirements of 3.3.1.1 or 3.3.1.2, as applicable, and to the requirements of 3.3.2. Threaded members of gripping fixtures for tensile tests shall be of sufficient size and strength to develop the full strength of the part without stripping the thread. For tensile tests on finished parts, the parts shall be tested in accordance with MIL-STD-1312, Test 8.
- 3.3.1 **Tensile Properties:**
- 3.3.1.1 **Finished Parts:** Parts having hardness not lower than 26 HRC shall have breaking load not lower than that specified in Table II. If the size or shape of the part is such that failure would occur outside the threaded section but the part can be tested satisfactorily, such as parts having a shank diameter equal to or less than the thread minor diameter or having an undercut, parts shall conform to only the tensile strength requirement of 3.3.1.2; for such parts, the diameter on which stress is based shall be the actual measured minimum diameter of the part. Tension fasteners with either standard double hexagon or hexagon type heads having a minimum metal condition in the head equal to the design parameters specified in AS 1132 shall not fracture in the head-to-shank fillet radius except when this radius is associated with an undercut.