

① COMPLETELY REVISED

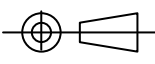
FED. SUPPLY CLASS

5306

TABLE OF CONTENTS

1.	SCOPE	2
2.	APPLICABLE DOCUMENTS	3
2.1	Government documents	3
2.2	Other publications	3
2.3	Order of precedence	4
3.	REQUIREMENTS	4
3.1	Specification sheets	4
3.2	Qualification	4
3.3	Material	4
3.4	Design and construction	5
3.5	Surface texture	7
3.6	Metallurgical properties	7
3.7	Straightness	9
3.8	Heat treatment	9
3.9	Cleaning	9
3.10	Mechanical Properties	10
3.11	Identification of product	12
3.12	Workmanship	12
4.	QUALITY ASSURANCE PROVISIONS	12
4.1	Responsibility for inspection	12
4.2	Classification of inspections	12
4.3	Qualification inspection	12
4.4	Quality conformance inspections	13
4.5	Test methods	14
4.6	Inspection of packaging	17
5.	PACKAGING	17
5.1	Preservation and packaging	17
5.2	Packing	17
5.3	Marking of shipments	17
6.	NOTES	17
6.1	Intended use	17
6.2	Ordering data	18
6.3	Qualification	18
6.4	Definitions	18

THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-B-85604, REVISION A, AMENDMENT 1.

THIRD ANGLE PROJECTION 	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 1
PROCUREMENT SPECIFICATION NONE	TITLE BOLT, NICKEL ALLOY 718, TENSION, HIGH STRENGTH, 125 KSI Fsu AND 220 KSI Ftu, HIGH TEMPERATURE, SPLINE DRIVE	CLASSIFICATION SPECIFICATION ① NAS 85604 SHEET 1 OF 18

TABLES

Table I – Surface Texture.....	7
Table II – Discontinuity Depths	9
Table III – Straightness of Shank	9
Table IV – Mechanical Properties	11
TABLE V – Fatigue loading	11
Table VI – Qualification Inspections	13
Table VII – Quality conformance inspections	14
Table VIII – Classification of defects	15

FIGURES

Figure 1 – Incomplete Threads and Roots Radius	6
Figure 1A – Determination of Incomplete Threads	6
Figure 2 – Grain Flow.....	7
Figure 3 – Head Angularity	7
Figure 4 – Head Structure and Grain Flow	8
Figure 5 – Fillet Rolling Permissible Distortion.....	8
Figure 6 – Nonpermissible Laps, Seams and Surface Irregularities	9
Figure 7 – Permissible Laps, Seams and Surface Irregularities	10
Figure 8 – Metallurgical specimens	15

① COMPLETELY REVISED

REVISION
1
NASM85604
SHEET 2



1. SCOPE

This specification covers the manufacture and acceptance requirements for corrosion resistant, high temperature, external wrenching, tension bolts.

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 specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Military

MIL-STD-2073/1	Standard Practice for Military Packaging
MIL-STD-129	Marking for Shipment and Storage
MS33787	Wrenching Element, External Spline, Dimensions For
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series: General Specification For

Copies can be obtained from the Department of Defense Single Stock Point (DODSSP). <http://dodssp.daps.dla.mil>

2.2 Other publications

The following documents form a part of this specification to the extent specified in herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the non-government documents which is current on the date of the solicitation.

ASTM International

ASTM D3951	Standard Practice for Commercial Packaging
ASTM E1417/E1417M	Inspection, Liquid Penetrant
ASTM A380	Cleaning and Descaling Stainless Steel Parts, Equipment and Systems
ASTM E8/E8M	Practice for Standard Methods of Tension Testing of Metallic Materials
ASTM E112	Standard Methods for Determining the Average Grain Size

Copies can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. www.astm.org

Aerospace Industries Association

NAS1348	Fasteners, Recommended Tensile Stress Areas for External Threaded
NASM1312	Fastener Test Methods

Copies can be obtained from the Aerospace Industries Association, 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209. www.aia-aerospace.org

ASME

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

Copies can be obtained from ASME, Three Park Ave., New York, NY 10016-5990. www.asme.org

① COMPLETELY REVISED

REVISION
1
NAS85604
SHEET 3



American Society for Quality

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes

Copies can be obtained from the American Society for Quality, 600 North Plankinton Ave., Milwaukee, WI 53203.
www.asq.org

SAE International

AMS2759 Heat Treatment of Steel (Aircraft Practice), Process for
AS8879 Screw Threads – UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter
AMS2750 Pyrometry
AMS5662 Alloy Bars, Forgings, and Rings, Corrosion and Heat Resistant – Nickel Alloy 718 (UNS N07718)

Copies can be obtained from SAE International, 400 Commonwealth Dr., Warrendale, PA 15096-0001. www.sae.org

Uniform Classification Committee

Uniform Freight Classification

Copies can be obtained from the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606.

2.3 Order of precedence

In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets

The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification

The bolt manufacturer shall be responsible for conducting qualification tests and furnishing part drawings, certified qualification test reports (if required by the purchaser) and test samples. The bolts furnished under this specification shall be produced using the same manufacturing methods as those used to produce bolts that have passed qualification tests. The purchaser may apply any or all tests specified herein to any product represented as meeting this specification, at any time, to verify conformance.

3.3 Material

Material shall be per AMS5662 (Nickel Alloy 718, UNS N07718), and of 220-250 KSI ultimate tensile strength.

3.3.1 Ductility

After aging, material ductility shall be not less than 8 percent elongation and 15 percent reduction in area when tested as specified in ASTM E8/E8M, see 4.5.4.8.

① COMPLETELY REVISED

REVISION
1
NASM85604
SHEET 4



3.4 Design and construction

3.4.1 Dimensions

The dimensions shall be as specified in the applicable specification sheet or drawing.

3.4.2 Threads

3.4.2.1 Form and dimensions

Dimensions, form, and contour shall be as specified in AS8879.

3.4.2.2 Rolling

Threads shall be fully formed after final heat treatment by a process, which incorporates a single rolling operation for forming the thread. Thread rolling temperature shall be not greater than 800 °F.

3.4.2.3 Incomplete threads

The threads shall be faired onto the shank as shown on Figure 1 & 1A. The root and flanks of runout thread may deviate from true thread form but shall be smooth and free of tool marks.

3.4.2.4 Grain flow

The grain flow in the threads shall be continuous and shall follow the thread contour with the maximum density at the bottom of the root radius as shown on Figure 2.

3.4.3 Bolt heads

The bolt heads shall be forged. Machined or forged holes for reduction of weight are acceptable. Forging temperature shall not be greater than 1850 °F.

3.4.3.1 Wrenching element

Unless otherwise specified in the applicable specification sheet, the wrenching element shall be in accordance with MS33787.

3.4.3.2 Bearing surface

The bearing surface of bolt heads shall be at right angles to the shank within the limits shown on Figure 3. The angular variation of the underside of the head shall be uniform around the shank within a tolerance of ± 10 minutes, as measured between the bearing surface of the head and the shank at a length along the shank from head equal to the diameter of the bolt.

3.4.3.3 Head structure and grain flow

A section of the head shall show no detrimental defects, see 4.5.4.2. Flow lines in the fillet area immediately below the surface shall conform to the fillet contour as shown on Figure 4. The intersection of the longitudinal axis of the bolt and the approximate transverse axis of the flow lines shall be not less than $D/7$ inches from the bearing surface of the bolt where "D" is the nominal diameter of the bolt. The metal removed from the bearing surface shall be as small as practicable to obtain a clean, smooth surface.

① COMPLETELY REVISED

REVISION
1
NASM85604
SHEET 5



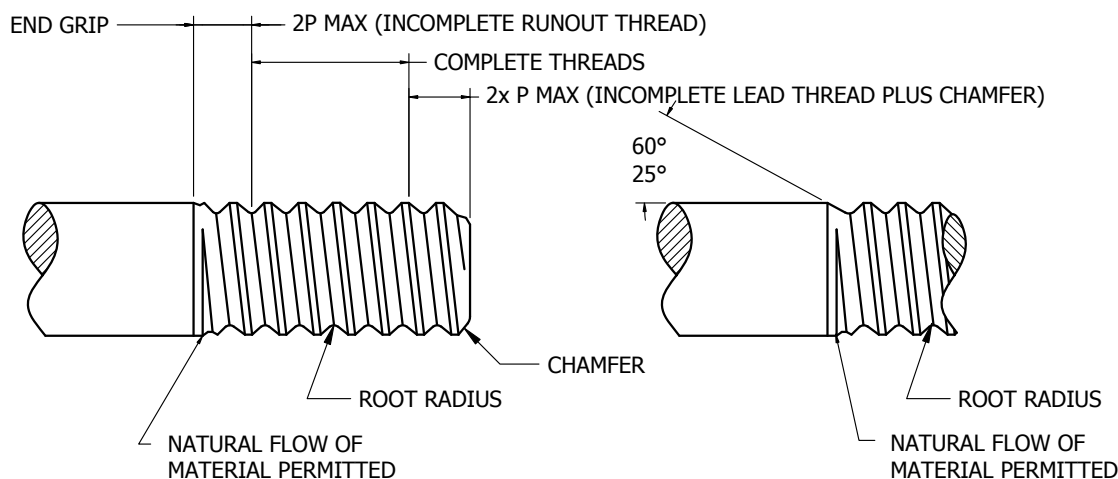


FIGURE 1 – INCOMPLETE THREADS AND ROOTS RADIUS

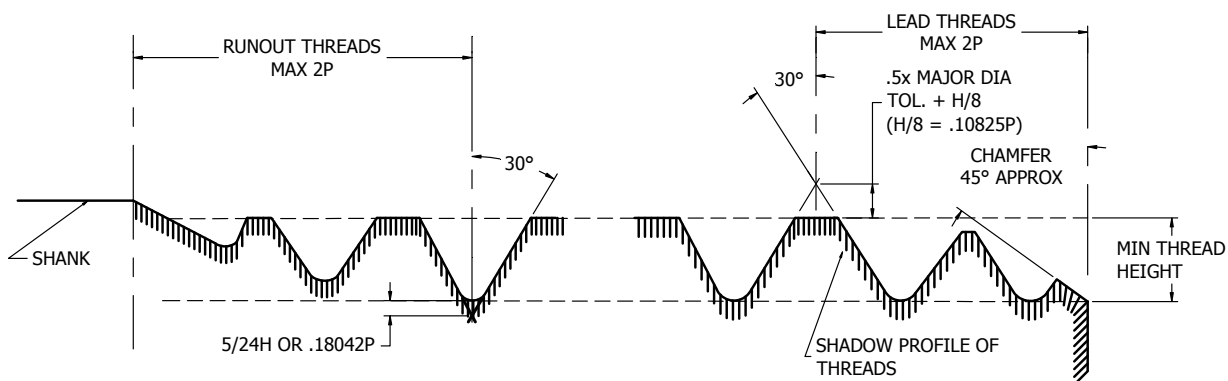


FIGURE 1A – DETERMINATION OF INCOMPLETE THREADS

3.4.4 Fillet (head-to-shank)

The head-to-shank fillet radius shall be cold worked after final heat treat to meet the strength requirements specified herein. The fillet shall be furnished to the radius specified on the applicable specification sheet. The fillet shall show no evidence of seams or inclusions, see 4.5.3.2.

3.4.4.1 Distortion of radius

Distortion of the radius (due to cold work) shall be not greater than height "A" and depth "B", and the distorted area shall not extend beyond "C", see Figure 5.