

FED. SUPPLY CLASS

5306

1. SCOPE

- 1.1 Scope. This specification establishes the requirements for an impedance-type self-retaining bolt that is intended for critical applications.

2. APPLICABLE DOCUMENTS

2.1 Government documents

- 2.1.1 Specification, standards and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

QQ-W-423 Wire, CRES
QQ-S-763 Steel Bars, Wires, Shapes and Forgings, CRES
PPP-B-566 Boxes, Folding, Paperboard
PPP-B-676 Box, Setup

MILITARY

MIL-PRF-121 Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-S-5000 Steel, Chrome Nickel Molybdenum (E4340) Bars and Reforging Stock
MIL-S-5626 Steel, Chrome Molybdenum (4140) Bars, Rods, and Forging Stock (For Aircraft Applications)
MIL-S-6049 Steel, Chrome Nickel Molybdenum (8740) Bars and Forging Stock (Aircraft Quality)
MIL-S-6758 Steel, Chrome Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)
MIL-S-8503 Steel Bars, Chrome Vanadium (6150) Aircraft Quality

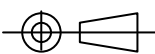
STANDARDS

MILITARY

MIL-STD-129 Marking For Shipment and Storage
MIL-STD-810 Environmental Test Methods and Engineering Guidelines
MS27576 Bolt, Self-Retaining, Impedance Type, 95 KSI Fsu, Hex Head, 450 °F
MS27577 Bolt, Self-Retaining, Impedance Type, 95 KSI Fsu, Flush Head, 450 °F

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

THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-B-83050 REVISION D, AMENDMENT 2.

THIRD ANGLE PROJECTION 	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 2
PROCUREMENT SPECIFICATION NONE	TITLE BOLT, SELF-RETAINING, IMPEDANCE TYPE	CLASSIFICATION SPECIFICATION MSM83050



Documents
SHEET 1 OF 17
Document Sharing Hub

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the document which are indicated as DoD adopted shall be the same issue listed in the current DoDISS and the supplement thereto, if applicable.

SAE International

AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)
AMS-QQ-S-763	CRES, Bars, Wire, Shapes, and Forgings
AMS2700	Passivation Treatments for CRES
AMS2759	Heat Treatment of Steel Parts General Requirements
AMS5643	Steel Bars, Forgings, Tubing, and Rings, Corrosion Resistant 16Cr-4.0Ni-.30(Cb+Ta)-4.0Cu
AMS5644	Steel Bars and Forgings, Corrosion Resistant 17Cr-7Ni-1A1 Resistant (A286)
AMS5678 – AMS5681	Steel Wire, Corrosion Resistant 17Cr-7.1Ni-1.1A1 Precipitation Hardenable, Spring Temper
AMS5731	Steel Bars, Forgings, Tubing and Rings, Corrosion and Heat Resistant, 15Cr-25.5Ni-2.1Ti-.006B-.30V Consumable Electrode Melted, 1800 °F (980 °C) Solution Heat Treated
AMS6322	Steel Bars, Forgings, and Rings, .50Cr - .55Ni - .25Mo (.38 - .43C) (SAE 8740)
AMS6325	Steel, Bars and Forgings, .50Cr - .55Ni - .25Mo (.38 - .43C) (SAE 8740), Heat Treated, 105 ksi (724 MPa) Tensile Strength
AMS6327	Steel Bars and Forgings, .50Cr - .55Ni - .25Mo (.38 - .43C) (SAE 8740), Heat Treated, 125 ksi (862 MPa) Tensile Strength
AMS6349	Steel Bars, .95Cr - .20Mo (.38 to .43C) (SAE 4140), Normalized
AMS6382	Steel, Bars, Forgings, and Rings, .95Cr - .20Mo (.38 - .43C) (SAE 4140), Annealed
AMS6415	Steel, Bars, Forgings, and Tubing .80Cr - 1.8Ni - .25Mo (.38 - .43C) (SAE 4340) – UNS G43406
AMS6484	Steel, Bars, Forgings, and Tubing .80Cr - 1.8Ni - .25Mo (.38 - .43C) (SAE 4340) – UNS G43406 Normalized and Tempered
AMS6448	Steel, Bars, Forgings, and Tubing
AS8879	Screw Threads, Controlled Radius Root With Increased Minor Diameter, General Specification for
AMS-S-6758	Steel, Chrome-Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)

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

ASTM International

ASTM A313/A313M	Spring Wire, Stainless Steel
ASTM D6251/D6251M	Boxes, Wood, Cleated-Plywood
ASTM D1974/D1974M	Closing, Sealing, and Reinforcing Fiberboard Boxes
ASTM D5118/D5118M	Fabrication of Fiberboard Shipping Boxes
ASTM E1417	Inspection, Penetrant Method of
ASTM E1444	Inspection Process, Magnetic Particle

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

NASM1312	Fastener Test Methods
NASM27576	Bolt, Self-Retaining, Impedance Type, 95 KSI Fsu, Hex Head, 450 °F
NASM27577	Bolt, Self-Retaining, Impedance Type, 95 KSI Fsu, Flush Head 450 °F

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

REVISION

2

NASM83050

SHEET 2



Document Sharing Hub

USE OF OR RELIANCE UPON THIS DOCUMENT OR ANY NATIONAL AEROSPACE STANDARD IS ENTIRELY VOLUNTARY. AIA DOES NOT QUALIFY SUPPLIERS OR CERTIFY

Copyright Aerospace Industries Association of America, Inc. ALL RIGHTS RESERVED. AIA MAKES NO REPRESENTATION OR CLAIM RESPECTING (1) THE SUITABILITY OF
Provided by IHS under license with AIA/NAS. ANY PARTIAL OR FULL APPLICATION OR (2) THE EXISTENCE OF OR APPLICABLE LICENSES. Licensee= www.sepana.ir/5991803002, User=sam, albert
No reproduction or networking permitted without license from IHS. Not for Resale, 01/04/2016 03:58:58 MST. TRADEMARK RIGHTS.

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.
1000 WILSON BLVD.
ARLINGTON, VA 22209

THIS DRAWING SUPERSEDES ALL ANTECEDENT STANDARD DRAWINGS FOR THE SAME
PRODUCT AND SHALL BECOME EFFECTIVE NO LATER THAN SIX MONTHS FROM THE LAST
REVISION DATE.

FORM 09-01

Full document details: AIA NASM83050 2013

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

Manufacturers Material Specification

Cobalt Alloy (Elgiloy Wire)

- 2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

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

- 3.2 Qualification. The self-retaining 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 Materials

- 3.3.1 Identification. The manufacturer shall make material identification test of the metal stock used to fabricate the bolts. The test reports shall be made available upon the request of the contracting activity or as directed by the contracting officer (see 4.3.2).

3.3.2 Composition of components

- 3.3.2.1 Body. Alloy steel bolts shall be made of material in accordance with ~~MIL-S-5000~~ AMS6415 or AMS6484, ~~MIL-S-5626~~ AMS6349 or AMS6382 (UNS G41400), ~~MIL-S-6049~~ AMS6322, AMS6325 or AMS6327, ~~MIL-S-6758~~ AMS-S-6758, or ~~MIL-S-8503~~ AMS6448. CRES bolts shall be made of material in accordance with AMS5643 (UNS S17400) or AMS5731 (UNS K66286).

- 3.3.2.2 Retaining element. The retaining element shall be made of material in accordance with AMS5643 (17-4PH), AMS5644 (17-7PH), or ~~QQ-S-763~~ AMS-QQ-S-763 Class 440C.

- 3.3.2.3 Springs. Springs shall be made of material in accordance with AMS5678 (UNS S17700), ~~QQ-W-423 Condition B~~ ASTM A313/A313M, Composition 302, Cobalt Alloy (Elgiloy) wire, or equal.

- 3.4 Protective finish. When specified in the contract or purchase order, bolts shall be plated, coated, or treated as specified in 3.4.1 or 3.4.2 as applicable.

- 3.4.1 Cadmium plating. Cadmium plating shall be in accordance with AMS-QQ-P-416, Type II, Class 2. All cadmium-plated components shall be heated to a temperature of 190 °C ± 14 °C (375 °F ± 25 °F) within one hour after plating and before magnetic particle inspection and shall be held at this temperature for a minimum of 23 hours, after which the bolts shall be allowed to cool normally at room temperature.

- 3.4.2 Passivation. CRES parts shall be passivated in accordance with AMS2700, Method 1, Class 4.

- 3.5 Design and construction. The design and construction of the bolt shall be as specified herein and on the applicable military standard.

REVISION

2

NAS Documents

SHEET 3

- 3.5.1 Shank straightness. The shank straightness shall be within the values specified in Table I when measured as specified in 4.5.3.

TABLE I – SHANK STRAIGHTNESS

Shank Diameter (Inch)	Maximum Deviation of Bolt Shank From Surface Plate (Inch Per Inch Grip Length)
.1900 – .3125	.0030
.3750 – .4375	.0025
.5000 and up	.0020

- 3.5.2 Impedance device. All bolts shall be of such design as to be retained in position by the impedance element. Retaining element shall cause no damage to linkage joints upon insertion or removal.
- 3.5.3 Insertion force. The bolts, with the retaining element incorporated therein, shall not exceed the insertion forces specified in Table II (see 4.5.6).
- 3.5.4 Removal force. The bolt, with the retaining element incorporated therein, shall withstand the removal force specified in Table III (See 4.5.6.1).
- 3.5.4.1 Wear test. The bolt, with the retaining element incorporated therein, shall not exceed the values specified in Table IV (see 4.5.6.2).
- 3.5.5 Dimensions. The retaining or impedance element shall be within the dimensional limitations of NASM27576 and NASM27577 (see 4.5.1.4).
- 3.5.6 Bolt shank shear strength. The bolt shall conform to the minimum double shear strength as specified in Table II (see 4.5.8).
- 3.5.7 Bolt ultimate tensile strength. The bolt ultimate tensile strength shall be as specified in Table II (see 4.5.9).

TABLE II – PERFORMANCE CHARACTERISTICS

Nominal Size	Body Double Shear Strength Min (LBF)	Bolt Ultimate Tensile Strength Min (LBF)	Bolt Insertion Force Max (LBF)
.1900-32	5,380	2,530	14
.2500-28	9,300	4,680	17
.3125-24	14,600	7,510	20
.3750-24	21,000	11,540	22
.4375-20	28,600	15,560	22
.5000-20	37,300	21,160	28
.5625-18	47,200	26,870	28
.6250-18	58,300	34,100	35
.7500-16	83,900	50,000	35
.8750-14	114,200	68,350	40
1.0000-12	149,200	88,900	40

REVISION

2

NASM83050

SHEET 4



Document Sharing Hub

USE OF OR RELIANCE UPON THIS DOCUMENT OR ANY NATIONAL AEROSPACE STANDARD IS ENTIRELY VOLUNTARY. AIA DOES NOT QUALIFY SUPPLIERS OR CERTIFY

Copyright Aerospace Industries Association of America Inc. THIS DOCUMENT IS PRODUCED UNDER NATIONAL AEROSPACE STANDARD: AIA MAKES NO REPRESENTATION OR CLAIM RESPECTING (1) THE SUITABILITY OF PROVIDED BY IHS UNDER LICENSE WITH AIA/NAS. ANY PARTICULAR APPLICATION OR (2) THE EXISTENCE OF OR APPLICABLE LICENSEE: www.sepana.ir/5991803002, User=sam, albert

No reproduction or networking permitted without license from IHS. Not for Resale, 01/04/2016 03:58:58 MST TRADEMARKS RIGHTS.

Full document details: AIA NASM83050 2013

TABLE III – REMOVAL FORCES

Nominal Bolt Size	ØA Hole (in)	Bolt Removal Force For Hole A (Max) (LBF)	ØB Hole (in)	Bolt Removal Force For Hole ØB (Min) (LBF)
.1900-32	.1897	14	.1920	3
.2500-28	.2495	17	.2520	5
.3125-24	.3120	20	.3145	8
.3750-24	.3745	22	.3770	10
.4375-20	.4370	22	.4395	10
.5000-20	.4995	28	.5020	15
.5625-18	.5620	28	.5645	15
.6250-18	.6245	35	.6270	20
.7500-16	.7495	35	.7530	20
.8750-14	.8745	40	.8780	25
1.0000-12	.9995	40	1.0030	25

2

- 3.5.8 **Hardness.** Metal hardness shall be as specified on the applicable military standard (see 4.5.7).
- 3.5.9 **Surface roughness.** The surface roughness of the bolts shall not exceed the values shown in Table V (see 4.5.4).
- 3.5.10 **Threads**
- 3.5.10.1 **Form and dimensions.** Unless otherwise specified, the threads shall be right hand and the dimensions and form shall conform to AS8879 and the applicable NAS standard.
- 3.5.10.2 **Rolling.** Threads shall be fully formed by a single rolling process after heat treatment.
- 3.5.10.3 **Runout.** Thread runout, consisting of a maximum of 1.5 incomplete thread pitches, shall fair onto the shank, thereby eliminating any abrupt changes in cross-sectional area. There shall be a minimum thread runout of 1/2 pitch. Bottom and sides of runout thread pitches may deviate from true thread form but shall be smooth.

TABLE IV – WEAR TEST LIMITS

Bolt Size (In.)	ØB Hole Size		Removal Force (Min) After 100 th Cycle (LBF)	ØB Max Hole Size Enlargement Allowable After 100 Cycles (In.)	Max Chamfer Allowable After 100 Cycles (In.)
	Max	Min			
.1900-32	.1907	.1897	2	.1925	.020 X 45°
.2500-28	.2505	.2495	4	.2525	.020 X 45°
.3125-24	.3130	.3120	6	.3150	.020 X 45°
.3750-24	.3755	.3745	8	.3775	.020 X 45°
.4375-20	.4380	.4370	8	.4400	.025 X 45°
.5000-20	.5005	.4995	12	.5025	.025 X 45°
.5625-18	.5630	.5620	12	.5650	.025 X 45°
.6250-18	.6255	.6245	15	.6275	.030 X 45°
.7500-16	.7505	.7495	15	.7535	.030 X 45°
.8750-14	.8755	.8745	20	.8780	.032 X 45°
1.0000-12	1.0005	.9995	20	1.0030	.032 X 45°

2

REVISION

2

NAS Documents

SHEET 5

Document Sharing Hub

USE OF OR RELIANCE UPON THIS DOCUMENT OR ANY NATIONAL AEROSPACE STANDARD IS ENTIRELY VOLUNTARY. AIA DOES NOT QUALIFY SUPPLIERS OR CERTIFY

Copyright Aerospace Industries Association of America Inc. ALL RIGHTS RESERVED. AIA MAKES NO REPRESENTATION OR CLAIM RESPECTING (1) THE SUITABILITY OF
 Provided by IHS under license with AIA/NAS. Licensee: www.sepana.ir/5991803002, User=sam, albert
 No reproduction or networking permitted without license from IHS. Not for Resale, 01/04/2016 03:58:58 MST. TRADEMARKS RIGHTS.

Full document details: AIA NASM83050 2013

TABLE V – ROUGHNESS HEIGHT RATING

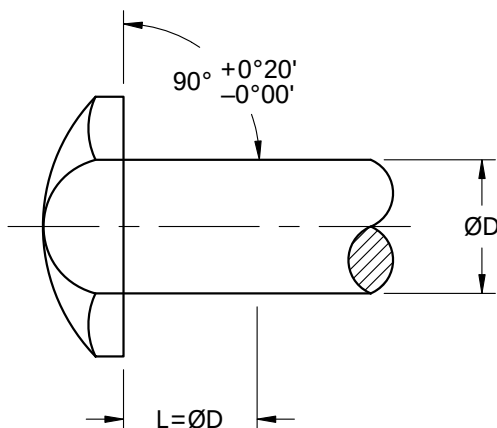
Area	Max Surface Roughness Ra (ASME B46.1)
Shank and underside	63
Other surfaces	125

3.5.11 Heads. Heads shall be upset or forged.

3.5.11.1 Bearing surface. The bearing surface of bolt protruding heads shall be at right angles to the shank within the limits shown on Figure 1. The angular variations of the underside of the head shall be uniform around the shank within a tolerance of +20/–00 minutes, as measured between the bearing surface of the head and shank, at a length along the shank from the head equal to the diameter of the bolts (see 4.5.1).

3.5.11.2 Concentricity. For flush-head bolts, the conical surface of the head and shank “ØD” shall be within .005 full indicator movement (FIM). Head driving recess to shank shall be within .016 FIM. Concentricity of the head and shank of the protruding-head bolts shall be with “C” values FIM (see Figure 1).

3.5.11.3 Fillet (head-to-shank). The head-to-shank fillet radius shall be produced in such a manner as to insure meeting the strength requirements specified herein. The fillet shall be finished to the radius specified on the applicable standard. The working of the fillet radius shall be accomplished subsequent to the heat treatment of the bolt. The fillet shall show no evidence of seams or inclusions (see 4.5.12).



CONCENTRICITY See 3.5.11.2	
Nom Size	C
.1900-32	.005
.2500-28	.006
.3125-24	.008
.3750-24	.009
.4375-20	.010
.5000-20	.011
.5625-18	.012
.7500-16	.013
.8750-14	.014
1.0000-12	.015

FIGURE 1 – HEAD ANGULARITY

3.5.12 Metallurgical properties

3.5.12.1 Carburization. Only the nonload bearing surfaces of the head, the recess surfaces and the chamfered end of the bolt, including the chamfered surface, may show indications of carburization, within the limitations specified in **AMS-H-6875** AMS2759 and decarburization or recarburization as specified in **AMS-H-6875** AMS2759, except depth shall be .003 max. All other external or internal surfaces, such as grooves and holes, shall show no indication of these heat treatment effects.

3.5.12.2 Discontinuities. Bolts shall be examined for discontinuities by magnetic particle or fluorescent penetrant inspections specified in 4.5.12 and 4.5.13. Any bolts having discontinuities equal to or exceeding the limitations specified in 3.5.12.2.1, 3.5.12.2.2, and 3.5.12.2.3 shall be rejected.

3.5.12.2.1 Cracks. Bolts shall be free of cracks in any direction or location. A crack is defined as a clean crystalline break passing through the grain or grain boundary.

REVISION

2

NASM83050

SHEET 6



Document Sharing Hub

USE OF OR RELIANCE UPON THIS DOCUMENT OR ANY NATIONAL AEROSPACE STANDARD IS ENTIRELY VOLUNTARY. AIA DOES NOT QUALIFY SUPPLIERS OR CERTIFY

Copyright Aerospace Industries Association of America Inc. NASM83050 PRODUCED UNDER NATIONAL AEROSPACE STANDARD: AIA MAKES NO REPRESENTATION OR CLAIM RESPECTING (1) THE SUITABILITY OF Provided by IHS under license with AIA/NAS. ANY PARTIAL OR APPLICATION OR (2) THE EXISTENCE OF OR APPLIC Licensee: www.sepana.ir/5991803002, User: sam, albert No reproduction or networking permitted without license from IHS. Not for Resale, 01/04/2016 03:58:58 MST. TRADEMARKS RIGHTS.