

FED. SUPPLY CLASS

5320

1. SCOPE

1.1 Scope. This specification covers the requirements for 95 KSI Fsu bimetal titanium rivets.

1.2 Classification. Rivets furnished under this specification shall be of the followings types:

Type I – Rivet, titanium, bimetal, 95 KSI Fsu protruding head.

Type II – Rivet, titanium, bimetal, 95 KSI Fsu full flush crown head.

Type III – Rivet, titanium, bimetal, 95 KSI Fsu reduced flush crown head.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents, of the issue in effect on date of invitation for bid or request for proposal, form a part of this specification to the extent specified herein.

STANDARDS

MILITARY

- ② MIL-STD-129 Marking for Shipment and Storage
- ② MIL-STD-2073/1 Standard Practice for Military Packaging

- ② Copies can be obtained from DLA Document Services. <http://quicksearch.dla.mil/>

2.2 Other publications. The following documents form 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.

SAE International

- AMS2801 Heat Treatment of Titanium Alloy Parts
- AMS4967 Titanium Alloy Bars, Forgings and Rings, 6Al-4V, Annealed, Heat Treatable
- AMS4982 Titanium Alloy Bars, 45Cb, Annealed, Heat Treatable
- AMS-H-81200 Heat Treatment of Titanium and Titanium Alloys
- AS87132 Lubricant, Cetyl Alcohol, 1-Hexadecanol, Application to Fasteners

Copies can be obtained from SAE International, Inc, 400 Commonwealth Drive, Warrendale, PA 15096, www.sae.org

ASME International

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

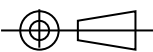
Copies can be obtained from ASME, Three Park Ave., New York, NY 10016-5990. www.asme.org

ASTM International

- ASTM D3951 Standard Practice for Commercial Packaging
- ASTM E120 Chemical Analysis of Titanium and Titanium Base Alloys

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REVISION

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PROCUREMENT
SPECIFICATION

TITLE

CLASSIFICATION
SPECIFICATION

NONE

**RIVET, TITANIUM, BIMETAL, 95 KSI Fsu,
GENERAL SPECIFICATION FOR**

NASM83459
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- ② ASTM E407 Standard Practice for Microetching Metals and Alloys
 ② ASTM E1447 Standard test method for Determination of Hydrogen in Titanium and Titanium Alloys by Inert Gas Fusion Thermal Conductivity/Infrared Detection Method

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

Aerospace Industries Association of America (AIA/NAS)

- ② NASM1312-8 Fastener Test Methods, Method 8, Tensile Strength
 ② NASM1312-11 Fastener Test Methods, Method 11, Tension Fatigue
 ② NASM1312-20 Fastener Test Methods, Method 20, Single Shear

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

American Society for Quality (ASQ)

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

- ② Battelle Memorial Institute

MMPDS Metallic Materials and Elements for Aerospace Vehicle Structures

Copies can be obtained from Battelle Memorial Institute, 505 King Avenue, Columbus, OH 43201. www.battelle.org

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

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

3.2 Materials

3.2.1 The materials used in the manufacture of high strength, bimetal rivets shall be as follows:

Body – 6Al-4V Titanium alloy in accordance with AMS4967 heat treated to 95 KSI minimum shear.
 Tail – 45Cb Titanium alloy in accordance with AMS4982 heat treated to 50 KSI minimum shear.

②

3.2.2 Heat treatment. Heat treatment shall be in accordance with AMS-H-81200 or AMS2801.

3.3 Design and construction

3.3.1 Dimensions. The rivets shall conform dimensionally to the applicable specification sheet.

3.3.2 Construction. The rivet shall be of one piece construction consisting of a manufactured head and shank of 6Al-4V titanium alloy joined to the tail by welding as shown on Figure 1. The tail shall be of 45Cb titanium alloy and shall be sufficiently ductile to facilitate upsetting by tools presently available at government facilities and in use by airframe manufacturers.

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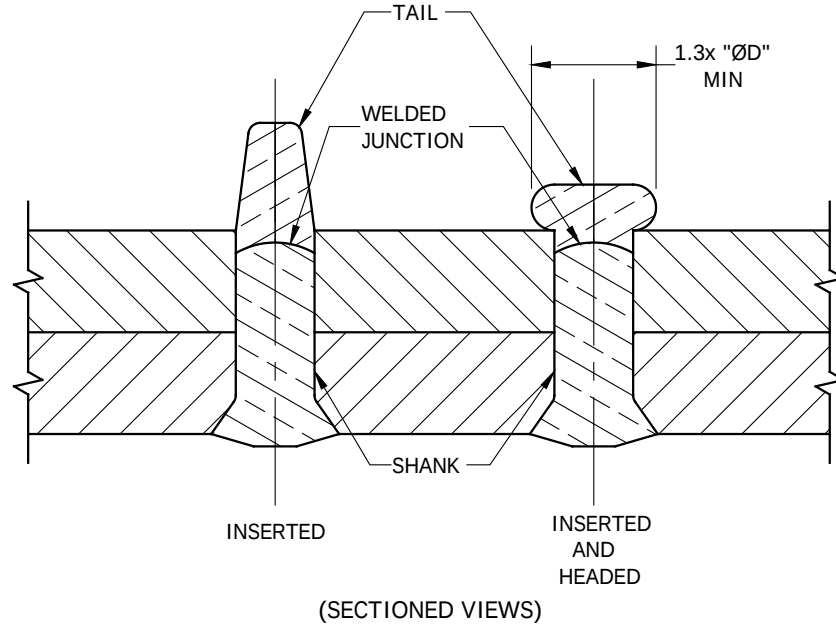
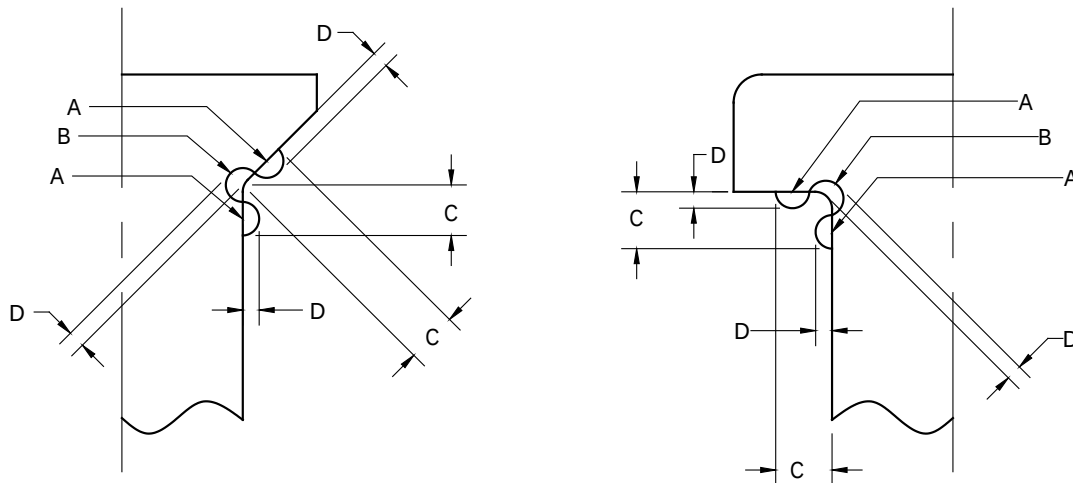


FIGURE 1 – TYPICAL CONSTRUCTION

- 3.3.3 **Head-to-shank fillet.** Unless otherwise specified, head-to-shank fillet shall be cold worked subsequent to all thermal treatment. Fillet radius, after cold working, shall conform to the applicable specification sheet. Cold working of head to shank fillet may cause distortion of fillet area. Distortion from the smooth contour, which results from cold working, shall not exceed .002 in Area A or Area B as shown in Figure 2. Distortion shall not extend beyond the limits indicated. The fillet shall show no evidence of seams or inclusions.



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1st Dash No. (Dia)	Nominal Diameter	Shank Diameter	C Max	D Max
5	.156	.1635	.060	.002
6	.188	.1895	.062	.002
8	.250	.2495	.062	.002
10	.313	.3120	.094	.002
12	.375	.3745	.094	.002

FIGURE 2 – HEAD-TO-SHANK FILLET DISTORTION ALLOWANCE

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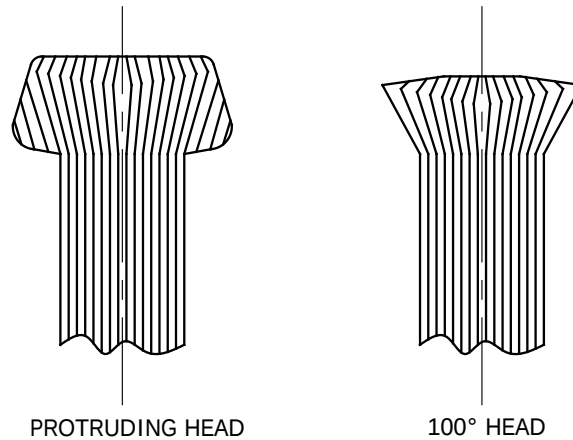


FIGURE 3 – HEAD STRUCTURE AND GRAIN FLOW

- 3.3.4 Head structure and grain flow. A section of the head shall show no detrimental defects. Flow lines in the fillet area immediately below the surface shall closely conform to the pattern shown in Figure 3. The flow lines may be slightly broken by the finish machining or grinding operation.
- 3.3.5 Weld. The weld shall be homogeneous. Weld interface shall be free of detrimental inclusions and undesirable precipitates. There shall be no evidence of lack of fusion in any area. The integrity of the weld shall be evidenced by capability of meeting tension-tension fatigue requirements of 3.6.3.

TABLE I – FATIGUE LOADING

Nominal Diameter	Tension Type		Upset Diameter
	High Load	Low Load	
.156	715	72	.230
.188	1,050	105	.266
.250	1,950	195	.350
.313	3,140	314	.437
.375	4,850	485	.525

- (2) /a/ Average fatigue life shall be over 30,000 cycles and minimum individual shall be over 15,000 cycles. Tests running over 60,000 cycles shall use 60,000 cycles for averaging.
- (b) Rivets shall be tested in maximum grip condition.

- 3.3.6 Weld location. The weld location shall be as specified on Figure 5.
- 3.3.7 Finish. Unless otherwise specified, the rivets shall be supplied without any supplementary surface treatment.
- 3.3.8 Lubrication. Unless otherwise specified, the rivets shall be supplied with a lubricant coating of chlorine-free cetyl alcohol in accordance with AS87132.
- (2) 3.3.9 Surface roughness. The surface roughness of the rivets shall conform to the values shown in the applicable specification sheet. The surface roughness shall be measured in accordance with ASME B46.1.
- 3.4 Installation. The rivets shall install satisfactorily with no cracks in any plane. The minimum upset head diameter shall be 1.3 times the shank diameter and have a minimum head height of .5 times the shank diameter.
- 3.4.1 Squeeze load. The load to deform the tail to 1.3x “ØD” shall not exceed the values of Table II.

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