

**Aerospace series****Bolt, Titanium Alloy,  
Protruding Head**

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## 1 Scope

This standard specifies the dimensions tolerances and static values of protruding tension head point drive short thread titanium alloy bolts.

## 2 Normative references

This Airbus Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Airbus Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO2768-1	General tolerances
ISO8080	Anodic treatment of titanium and titanium alloys - Sulfuric acid process.
EN2000	Aerospace series – Quality assurance EN aerospace products – Approval of the quality system of manufacturers
EN6115	Aerospace series – Bolt protruding head, short thread inch series <sup>1</sup>
EN2424	Aerospace series - Marking of aerospace products <sup>1</sup>
EN6117	Specification for lubrication of bolts with cetyl alcohol. <sup>1</sup>
EN6118	Aerospace series - Process specification – Aluminium base protection for fasteners. <sup>1</sup>
EN4473	Aerospace series - Aluminium pigmented coatings – Technical specification <sup>1</sup>
AS8879	Screw threads – UNJ profile, inch controlled radius root with increased minor diameter <sup>2</sup>
AMS4928	Titanium alloy bars, wire, forgings and rings <sup>2</sup>
AMS4967	Titanium alloy bars, wire, forgings and rings <sup>2</sup>
BS.TA28	Titanium alloy forging stock and wire
ANSI-B46.1	Surface Texture.
HS294	Product specification – Aluminium pigmented coating. (Manufacturers specification)
HS380	Product specification - Hi-lite fastening system. (Manufacturers specification)
HS380-1	Product specification - Hi-lite fastening system. Annealed (Manufacturers specification)

## 3 Requirements

### 3.1 Configuration, dimensions, tolerances and mass

- 3.1.1 The configuration, dimensions, tolerances and mass shall conform with figure 1 and tables 2, 3, 4, 5 & 6  
Tolerances not specified, shall be in accordance with ISO2768-m.
- 3.1.2 The bolts are produced by a Double Anneal Heat Treatment process.
- 3.1.3 Diameters A and D shall be concentric within .010in (0,254mm) TIR.
- 3.1.4 Surface texture as per ANSI-B46.1

<sup>1</sup> In preparation at the date of publication of this standard

<sup>2</sup> Published by: Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001, USA

### 3.2 Mass

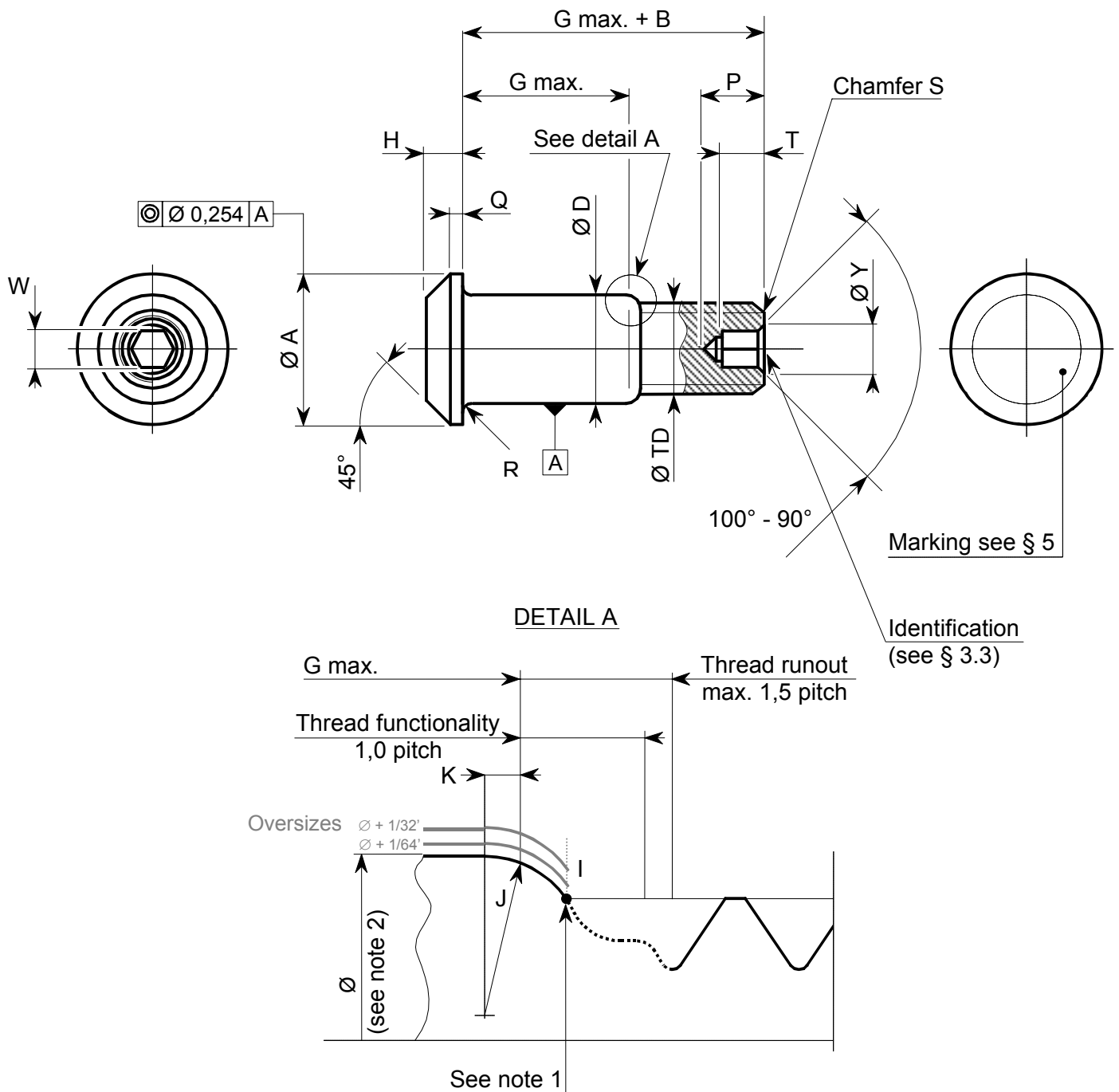
The calculation of the mass of a bolt shall be in accordance with EN6115

### 3.3 Material and surface treatment

**Table 1 : Material and surface treatment**

Material	Code	Finish	Lubrication	Bolt Identification	Code
Titanium alloy 6AL-4V as per AMS 4928 or AMS 4967 or BS TA28 Rc min. = 650 MPa	V	Sulfuric-acid anodizing as per ISO 8080	Cetyl alcohol as per EN 6117	None	T
		IVD as per EN 6118		A Black paint identification at thread end	BV
		Aluminium coating as per specification EN 4473		None	HK

3.3.1 Heat-treated to 85 ksi shear in accordance with Specifications HS380 and HS380-1



**Figure 1 : Configuration**

**Note 1:** The diameter measured at point I shall be less than or equal to the max. diameter TD for nominal diameter. This requirement shall be incremented to 1/64' and 1/32' respectively for 1st and 2nd oversize.

**Note 2:** Check concentricity of diameters D (shank) and TD (thread) to avoid interference between the bolt thread and hole when using tight interference fits.

**Note 3:** The maximum thread runout and functionality for first and second oversizes is incremented by 0,25 mm, 0,5 mm for third oversize.

**Note 4:** When installation is at maximum interference and diameter 'TD' is at maximum diameter, 'TD' must not contact the hole during installation even with maximum eccentricity between diameter 'D' and diameter 'TD'.

**Table 2 : Dimensions and tolerances**

Dimensions in inch (mm)

Dia Dash No	Nominal Ø	ØA		B Ref	ØD ('T' Code)		ØD (Other Code)		H		P Max
		Max	Min		Max	Min	Max	Min	Max	Min	
12	3/4	1.150 (29,21)	1.110 (28,19)	0.895 (22,73)	0.7490 (19,025)	0.7485 (19,011)	0.7490 (19,025)	0.7480 (18,999)	0.335 (8,51)	0.320 (8,13)	0.523 (13,28)
14	7/8	1.330 (33,78)	1.290 (32,77)	1.000 (25,40)	0.8740 (22,200)	0.8735 (22,187)	0.8740 (22,200)	0.8730 (22,174)	0.385 (9,78)	0.370 (9,40)	0.608 (15,44)
16	1	1.510 (38,35)	1.470 (37,34)	1.160 (29,46)	0.9990 (25,375)	0.9985 (25,362)	0.9990 (25,375)	0.9980 (25,349)	0.435 (11,05)	0.420 (10,67)	0.770 (19,56)

**Table 2 : Dimensions and tolerances**

Dimensions in inch (mm) Continued

Dia Dash No	Nominal Ø	Q Ref	R (Rad)		S Ref	T Min	ØTD	
			Max	Min			Max	Min
12	3/4	0.200 (5,08)	0.045 (1,14)	0.030 (0,76)	1/16ins X 37°	0.300 (7,62)	0.7430 (18,872)	0.7370 (18,720)
14	7/8	0.250 (6,35)	0.050 (1,27)	0.035 (0,89)	5/64ins X 37°	0.370 (9,40)	0.8680 (22,047)	0.8610 (21,869)
16	1	0.300 (7,62)	0.060 (1,52)	0.045 (1,14)		0.490 (12,45)	0.9930 (25,222)	0.9860 (25,044)

**Table 2 : Dimensions and tolerances**

Dimensions in inch (mm) Continued

Dia Dash No	Nominal Ø	Thread <sup>a)</sup>	J Min	K Max	W (Hex)		ØY	
					Max	Min	Max	Min
12	3/4	0.7500-16UNJF-3A MODIFIED	0.375 (9,52)	0.044 (1,12)	0.3185 (8,090)	0.3150 (8,001)	0.398 (10,11)	0.378 (9,60)
14	7/8	0.8750-14UNJF-3A MODIFIED	0.390 (9,91)	0.045 (1,14)	0.3820 (9,703)	0.3780 (9,601)	0.471 (11,96)	0.451 (11,46)
16	1	1.0000-12UNJF-3A MODIFIED	0.410 (10,41)	0.045 (1,14)	0.5100 (12,954)	0.5050 (12,827)	0.618 (15,70)	0.598 (15,19)

a) Rolled thread formed as per AS8879 except for ØTD

**Table 3 : Grip Lengths** Dimensions in inch (mm)

Length Code *	G Max $\pm 0.005$ ( $\pm 0,13$ )	Length G Max + B $\pm 0.010$ ( $\pm 0,25$ )		
		12	14	16
7	0.437 (11,11)	1.332 (33,84)	–	–
8	0.500 (12,70)	1.395 (35,43)	1.500 (38,10)	–
9	0.562 (14,29)	1.457 (37,02)	1.563 (39,69)	1.722 (43,75)
10	0.625 (15,88)	1.520 (38,61)	1.625 (41,28)	1.785 (45,34)
11	0.687 (17,46)	1.582 (40,19)	1.687 (42,86)	1.847 (46,92)
12	0.750 (19,05)	1.645 (41,78)	1.750 (44,45)	1.910 (48,51)
13	0.812 (20,64)	1.707 (43,37)	1.812 (46,04)	1.972 (50,10)
14	0.875 (22,22)	1.770 (44,95)	1.875 (47,62)	2.035 (51,68)
15	0.938 (23,810)	1.832 (46,54)	1.937 (49,21)	2.097 (53,27)
16	1.000 (25,40)	1.896 (48,13)	2.000 (50,80)	2.160 (54,86)
17	1.063 (27,00)	1.959 (49,72)	2.063 (52,39)	2.223 (56,45)
18	1.125 (28,58)	2.021 (51,31)	2.125 (53,98)	2.286 (58,04)
19	1.188 (30,17)	2.084 (52,89)	2.188 (55,56)	2.348 (59,62)
20	1.250 (31,75)	2.146 (54,48)	2.250 (57,15)	2.410 (61,21)
21	1.313 (33,35)	2.209 (56,07)	2.313 (58,74)	2.473 (62,80)
22	1.375 (34,93)	2.271 (57,65)	2.375 (60,32)	2.536 (64,38)
23	1.438 (36,53)	2.333 (59,24)	2.438 (61,91)	2.598 (65,97)
24	1.500 (38,10)	2.396 (60,83)	2.500 (63,50)	2.660 (67,56)
25	1.563 (39,69)	2.459 (62,42)	2.563 (65,09)	2.723 (69,15)
26	1.625 (41,28)	2.521 (64,01)	2.625 (66,68)	2.785 (70,74)
27	1.687 (42,86)	2.583 (65,59)	2.687 (68,26)	2.847 (72,32)
28	1.750 (44,45)	2.646 (67,18)	2.750 (69,85)	2.910 (73,91)
29	1.813 (46,04)	2.709 (68,77)	2.813 (71,44)	2.973 (75,50)
30	1.875 (47,62)	2.771 (70,35)	2.875 (73,02)	3.035 (77,08)
31	1.937 (49,21)	2.833 (71,94)	2.937 (74,61)	3.097 (78,66)

(continued)

**Table 3 (concluded)**

Dimensions in inch (mm) Continued				
Length Code *	G Max ± 0.005 (± 0,13)	Length G Max + B ± 0.010 (± 0,25)		
		12	14	16
32	2.000 (50,80)	2.896 (73,53)	3.000 (76,20)	3.160 (80,26)
34	2.125 (53,98)	3.021 (76,71)	3.125 (79,38)	3.285 (83,44)
36	2.250 (57,15)	3.146 (79,88)	3.250 (82,55)	3.410 (86,61)
38	2.375 (60,32)	3.271 (83,05)	3.375 (85,72)	3.535 (89,78)
40	2.500 (63,50)	3.396 (86,23)	3.500 (88,90)	3.660 (92,96)
42	2.625 (66,68)	3.521 (89,41)	3.625 (92,08)	3.785 (96,14)
44	2.750 (69,85)	3.646 (92,58)	3.750 (95,25)	3.910 (99,31)
46	2.875 (73,02)	3.771 (95,75)	3.875 (98,42)	4.035 (102,48)
48	3.000 (76,20)	3.896 (98,93)	4.000 (101,60)	4.160 (105,66)
50	3.125 (79,38)	4.021 (102,11)	4.125 (104,78)	4.285 (108,84)
52	3.250 (82,55)	4.146 (105,28)	4.250 (107,95)	4.410 (112,01)
54	3.375 (85,72)	4.271 (108,45)	4.375 (111,12)	4.535 (115,18)
56	3.500 (88,90)	4.396 (111,63)	4.500 (114,30)	4.660 (118,36)
58	3.625 (92,08)	4.521 (114,81)	4.625 (117,48)	4.785 (121,54)
60	3.750 (95,25)	4.646 (117,98)	4.750 (120,65)	4.910 (124,71)

**\*Note:** Intermediate grip lengths may be purchased in 1/16 inch (1.5875mm) increments if necessary.

**Table 4 : First Oversize Dimensions**

Dimensions in inch (mm)

Thread <sup>a)</sup> UNJF-3A modified (inch)	Diameter Code No	Nominal Ø	B ref	ØD ('T' Code)		ØD (Other Code)	
				Max	Min	Max	Min
.7500-16	12X	49/64	0.905 (22,98)	0.7646 (19,421)	0.7641 (19,409)	0.7646 (19,421)	0.7636 (19,396)
.8750-14	14X	57/64	1.010 (25,65)	0.8896 (22,596)	0.8891 (22,584)	0.8896 (22,596)	0.8886 (22,571)
1.0000-12	16X	1-1/64	1.160 (29,72)	1.0146 (25,771)	1.0141 (25,759)	1.0146 (25,771)	1.0136 (25,746)

a) Rolled thread formed as per AS8879 except for ØTD



**Table 5 : Second Oversize Dimensions**

Dimensions in inch (mm)

Thread <sup>a)</sup> UNJF-3A modified (inch)	Diameter Code No	Nominal Ø	B ref	ØD ('T' Code)		ØD (Other Code)	
				Max	Min	Max	Min
.7500-16	12Y	25/32	0.905 (22,98)	0.7802 (19,817)	0.7797 (19,805)	0.7802 (19,817)	0.7792 (19,792)
.8750-14	14Y	29/32	1.010 (25,65)	0.9052 (22,992)	0.9047 (22,980)	0.9052 (22,992)	0.9042 (22,967)
1.0000-12	16Y	1-1/32	1.170 (29,72)	1.0302 (26,167)	1.0297 (26,155)	1.0302 (26,167)	1.0292 (26,142)

a) Rolled thread formed as per AS8879 except for ØTD

**Table 6 : Mechanical Characteristics**

Values in lbf (N)

Dia Dash No	Double Shear Strength <sup>b)</sup>		Tensile Strength Min	Fatigue Load <sup>c)</sup> Max
	Min	Max		
12	75 000.00 (333 617,0)	82 200.00 (365 644,0)	52 000.00 (231 307,0)	18 200.00 (80 958,0)
14	101 900.00 (453 274,0)	111 900.00 (497 756,0)	72 300.00 (321 606,0)	25 300.00 (112 540,0)
16	133 200.00 (592 503,0)	146 100.00 (649 885,0)	93 300.00 (415 019,0)	28 000.00 (124 550,0)

b) Values apply without lubrication.

c) Minimum fatigue loads are equal to 10% of maximum fatigue loads.

## 4 Designation

EXAMPLE:

	Description block	Identity block
	Bolt Protruding	ABS0559 V HK 12 - 30
Number of this standard		
Material code (see table 1)		
Finish code (see table 1)		
Dia dash number (see table 2)		
Oversize (X or Y if applicable see table 4 / 5)		
Grip length number (see table 3)		

## 5 Marking

Parts to this standard to be marked in accordance with EN2424 Style 'A', in addition the manufacturers part number may be added.

## 6 Technical specification

Product specification HS380 and HS380-1.

RECORD OF REVISIONS

Issue	Clause modified	Description of modification
3 08/06		Additional grip lengths added for the A380 project. Normative references updated to latest specifications. Addition of Anodising for the A400M project and Oversize codes added.