Aerospace series

Bolt - Protruding tension head
Pull type – For fatigue applications

Published and distributed by :
AIRBUS S.A.S.
ENGINEERING DIRECTORATE
31707 BLAGNAC Cedex
FRANCE

Contents

1 Scope

This standard specifies the dimensions, tolerances, required characteristics and the mass of a protruding head bolt pull type intended to be installed with interference for fatigue applications only.

2 Normative references

This Airbus Standard incorporates by dated or undated reference provisions from other publications. All normative references cited at the appropriate places in the text are listed hereafter. For dated references, subsequent amendments to or revisions of any these publications apply to this Airbus Standard only when incorporated in it by amendment of revision. For undated references, the latest issue of the publication referred to shall be applied.

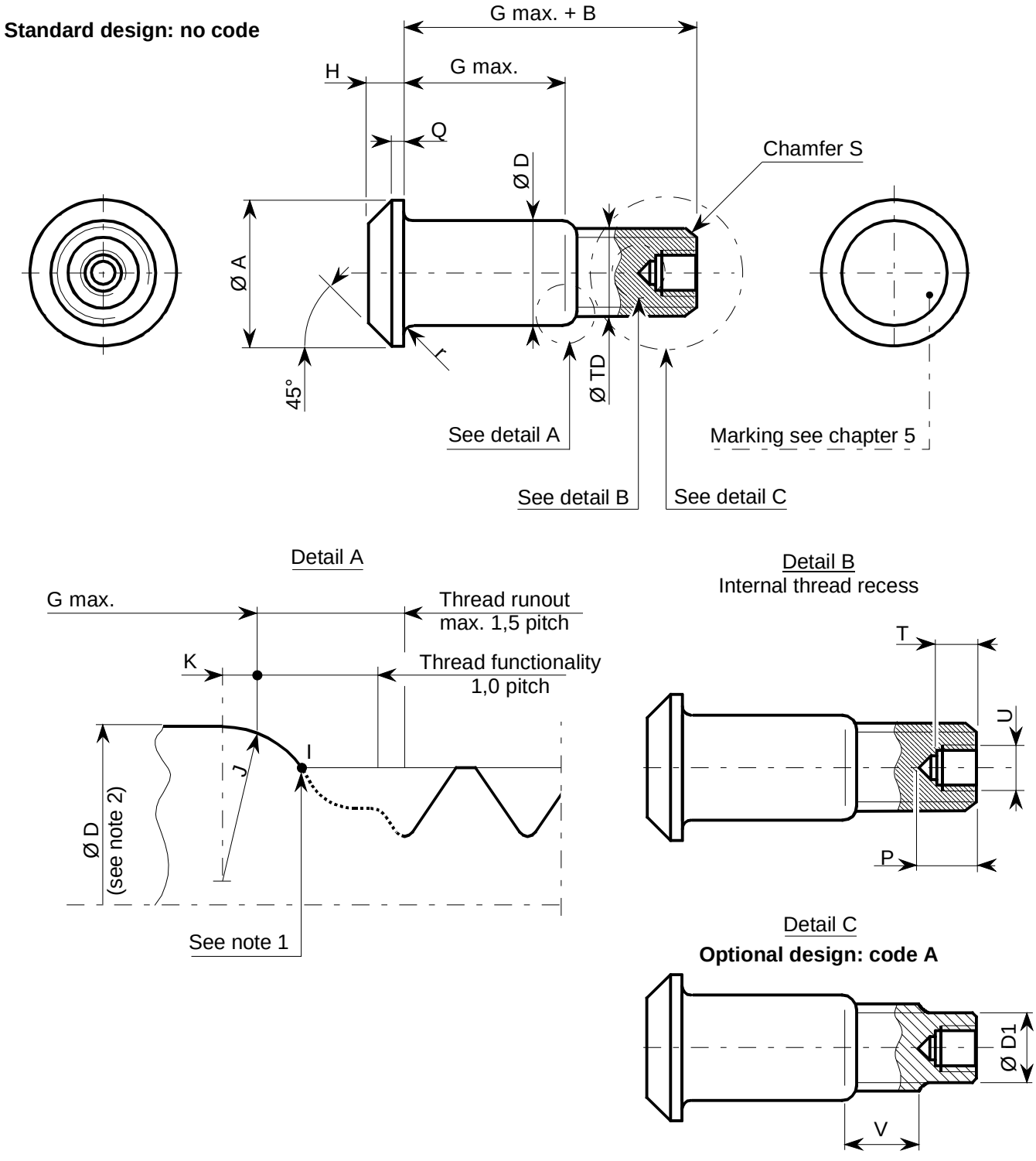
ISO3161	Aerospace – UNJ threads - General requirements and limit dimensions.
EN2424	Aerospace series - Marking of aerospace products. [1]
EN4473	Aerospace series - Aluminium pigmented coatings - Technical specification. [1]
EN6116	Aerospace series - Threaded bolts, light weight - Inch series - Technical specification. [1]
EN6117	Aerospace series - Specification for lubrication of bolts with cethyl alcohol. [1]
AMS4928	Titanium alloy bars, wire, forgings, and rings 6Al-4V annealed. [2]
AMS4967	Titanium alloys bars, wire, forgings, and rings 6AL-4V annealed, heat treatable. [2]
ANSI/ASME-B46-1	Surface texture (Surface roughness, waviness and lay).
SAE AS8879	Screw threads, controlled radius root with increased minor diameter. [3]

3 Requirements

3.1 Configuration, dimensions, tolerances and mass

The configuration, dimensions, tolerances and mass shall in accordance with figure 1, table 1 and table 2.
Dimensions to be met after finish.
Roll-formed thread as per AS8879 except TD diameter.
Lead radius must be tangent to Ø D within K distance and be continuous within this area.
Concentricity tolerances between Ø A and Ø D within the values of .01 inch (0,254 mm) (TIR).

[1] Published as ASD Standard at the date of publication of this standard
[2] Superintendent of documents, US Government Printing House, Washington, D.C. 20402, USA
[3] Published by: Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001, USA



Notes:
1) The diameter measured at point I shall be less than or equal to maximum diameter TD.
2) 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.
3) The maximum thread run-out and functionality for first and second oversizes is incremented by 0,25 mm.

Figure 1 : Configuration and dimensions

Table 1 : Dimensions, tolerances and mass (continued)

Dimensions in inch (millimeters)

Dia. code No.	Nominal shank diameter	Thread UNJF-3A modified	Ø A		B	Ø D		Ø D1	
			Max.	Min.	Ref.	Max.	Min.	Max.	Min.
9	9/16"	.5625-18	.877 (22,28)	.842 (21,39)	.770 (19,56)	.5615 (14,262)	.5605 (14,237)	.4862 (12,350)	.4842 (12,300)
10	5/8"	.6250-18	.953 (24,21)	.918 (23,32)	.825 (20,96)	.6240 (15,850)	.6230 (15,824)	.5472 (13,900)	.5452 (13,850)
12	3/4"	.7500-16	1.150 (29,21)	1.110 (28,19)	1.050 (26,67)	.7490 (19,025)	.7480 (18,999)	.6634 (16,850)	.6614 (16,800)

Table 1 : Dimensions, tolerances and mass (continued)

Dimensions in inch (millimeters)

Dia. code No.	Nominal shank diameter	Thread UNJF-3A modified	Ø TD		H		Q Ref.	r		S Ref.
			Max.	Min.	Max.	Min.		Max.	Min.	
9	9/16"	.5625-18	.5550 (14,097)	.5500 (13,970)	.210 (5,33)	.200 (5,08)	.125 (3,18)	.040 (1,02)	.025 (0,64)	.0625 x 37° (1,59 x 37°)
10	5/8"	.6250-18	.6180 (15,697)	.6120 (15,545)	.238 (6,05)	.228 (5,79)	.140 (3,56)			
12	3/4"	.7500-16	.7430 (18,872)	.7370 (18,720)	.335 (8,51)	.320 (8,13)	.200 (5,08)	.045 (1,14)	.030 (0,76)	

Table 1 : Dimensions, tolerances and mass (concluded)

Dimensions in inch (millimeters)

Dia. code No.	Nominal shank diameter	Thread UNJF-3A modified	Internal thread left hand			V ±.010 (±0,254)	Detail A			Mass (g) ref.	
			T min.	P max.	U thread UNJF-2B		J		K max.	Head and thread	Smooth part
							Max.	Min.			
9	9/16"	.5625-18	.280 (7,11)	.456 (11,582)	.3125-24	.679 (17,26)	.380 (9,65)	.370 (9,40)	.039 (0,991)	18,83	1,12
10	5/8"	.6250-18				.712 (18,08)	.390 (9,91)	.380 (9,65)	.044 (1,118)	26,01	1,39
12	3/4"	.7500-16	.305 (7,75)	.480 (12,192)	.3750-24	.916 (23,28)	.400 (10,16)			50,29	2,00

Table 2 : Dimensions and tolerances

Dimensions in inch (millimeters)

Grip code No.	G ± .005 (± 0,127)	Length (G max. + B ref.) ± .010 (± 0,254)		
		9	10	12
18	1.125 (28,58)	1.895 (48,13)	-	-
19	1.188 (30,18)	1.958 (49,73)	-	-
20	1.250 (31,75)	2.020 (51,31)	2.075 (52,71)	-
21	1.313 (33,35)	2.083 (52,91)	2.138 (54,31)	-
22	1.375 (34,93)	2.145 (54,48)	2.200 (55,88)	-
23	1.438 (36,53)	2.208 (56,08)	2.263 (57,48)	-
24	1.500 (38,10)	2.270 (57,66)	2.325 (59,06)	2.550 (64,77)
25	1.563 (39,70)	2.333 (59,26)	2.388 (60,66)	2.613 (66,37)
26	1.625 (41,28)	2.395 (60,83)	2.450 (62,23)	2.675 (67,95)
27	1.687 (42,85)	2.457 (62,41)	2.512 (63,80)	2.737 (69,52)
28	1.750 (44,45)	2.520 (64,01)	2.575 (65,41)	2.800 (71,12)
29	1.813 (46,05)	2.583 (65,61)	2.638 (67,01)	2.863 (72,72)
30	1.875 (47,63)	2.645 (67,18)	2.700 (68,58)	2.925 (74,30)
31	1.937 (49,20)	2.707 (68,76)	2.762 (70,15)	2.987 (75,87)
32	2.000 (50,80)	2.770 (70,36)	2.825 (71,76)	3.050 (77,47)
34	2.125 (53,98)	2.895 (73,53)	2.950 (74,93)	3.175 (80,65)
36	2.250 (57,15)	3.020 (76,71)	3.075 (78,11)	3.300 (83,82)
38	2.375 (60,33)	3.145 (79,88)	3.200 (81,28)	3.425 (87,00)
40	2.500 (63,50)	3.270 (83,06)	3.325 (84,46)	3.550 (90,17)
42	2.625 (66,68)	3.395 (86,23)	3.450 (87,63)	3.675 (93,35)

(continued)

Table 2 : Dimensions and tolerances (concluded)

Dimensions in inch (millimeters)

Grip code No.	G ± .005 (± 0,127)	Length (G max. + B ref.) ± .010 (± 0,254)		
		9	10	12
44	2.750 (69,85)	3.520 (89,41)	3.575 (90,81)	3.800 (96,52)
46	2.875 (73,03)	-	3.700 (93,98)	3.925 (99,70)
48	3.000 (76,20)	-	3.825 (97,16)	4.050 (102,87)
50	3.125 (79,38)	-	3.950 (100,33)	4.175 (106,05)
52	3.250 (82,55)	-	4.075 (103,51)	4.300 (109,22)
54	3.375 (85,73)	-	4.200 (106,68)	4.425 (112,40)
56	3.500 (88,90)	-	4.325 (109,86)	4.550 (115,57)
58	3.625 (92,08)	-	4.450 (113,03)	4.675 (118,75)
60	3.750 (95,25)	-	4.575 (116,21)	4.800 (121,92)

Note: Intermediate grip lengths may be purchased in 1/16 inch (1,5875 mm) increment if necessary.

3.2 Material and surface treatment

Material and surface treatment shall be in accordance with table 3.

Table 3 : Materials, finishes and lubrications

Material and finish code	Material	Finish	Lubrication
K	Titanium alloy 6Al-4V as per AMS4928 or AMS4967 Rc min. = 650 MPa	Aluminium coating as per specification EN4473	Cetyl alcohol as per EN6117

3.3 Surface condition

Surface condition as per ANSI-B46-1.

3.4 Mechanical characteristics

Mechanical characteristics shall be in accordance with table 4.

Table 4 : Mechanical characteristics

Dia. code No.	Min. double shear strength lbf (N)	Min. tensile strength lbf (N)	Tension - Tension fatigue lbf (N)	Min. pull-in capability lbf (N)
9	47 200 (209 955)	27 780 (126 100)	9 700 (44 000)	11 240 (51 000)
10	58 300 (259 330)	37 610 (170 600)	13 200 (59 900)	
12	83 900 (373 200)	54 520 (247 320)	19 020 (86 290)	17 630 (80 000)

3.5 Oversizes

Oversizes shall be in accordance with table 5 and table 6.

Table 5 : First oversize

Dimensions in inch (millimeters)

Dia. code No.	Oversize code	D diameter .0156 oversize shank		J	
	First oversize	Max.	Min.	Max.	Min.
9	X	.5771 (14,658)	.5761 (14,633)	.380 (9,652)	.370 (9,398)
10	X	.6396 (16,246)	.6386 (16,220)	.390 (9,906)	.380 (9,652)
12	X	.7646 (19,421)	.7636 (19,395)	.400 (10,160)	

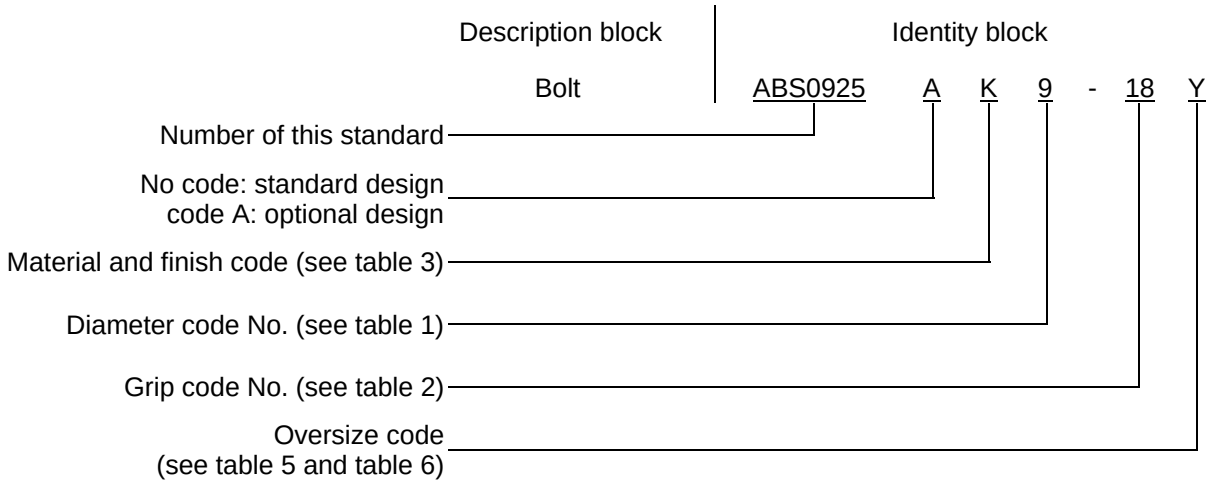
Table 6 : Second oversize

Dimensions in inch (millimeters)

Dia. code No.	Oversize code	A diameter		D diameter .0312 oversize shank		J	
	Second oversize	Max.	Min.	Max.	Min.	Max.	Min.
9	Y	.905 (22,99)	.870 (22,10)	.5927 (15,055)	.5917 (15,029)	.380 (9,652)	.370 (9,398)
10	Y	.975 (24,76)	.940 (23,88)	.6552 (16,642)	.6542 (16,617)	.390 (9,906)	.380 (9,652)
12	Y	1.185 (30,10)	1.145 (29,08)	.7802 (19,817)	.7792 (18,782)	.400 (10,160)	

4 Designation

This type of Standard shall be designated according to the philosophy of the following example:



5 Marking

Marking shall be recessed to a maximum depth of .01 inch (0,25 mm) as per EN2424, category P.

6 Technical specification

EN6116.

RECORD OF REVISIONS

Issue	Clause modified	Description of modification
1 12/98		New Standard.
2 09/99		
3 08/05		Title modified. Table 1 modified : "manufacturer's specification No. 294" changed to "specification EN 4473" for finish and "Cethyl alcohol as per A/DET/0013" changed to "EN 6117" for lubrication. Grip code Nos 5 to 17 deleted. Note 3 added under Figure 1. Table 4 Mechanical Characteristics modified.
4 06/10		Optional design added. Ø D1 and V dimensions created in table 1.