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STUDY:	STAGE :

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ENGLISH VERSION

Aerospace series
Bolt – Protruding head, Short thread
Inch series

Série Aérospatiale
Vis, tête cylindrique, filetage court
Série en inch

Luft-und Raumfahrt
Zylinderkopfschraube, Kurzgewinde
Zöllige Reihe

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Contents

1 Scope

This product standard specifies the dimensions, tolerances and the requirements of a protruding head bolt for aerospace application.

2 Normative references

This European 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 European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO8080	Aerospace – Anodic treatment of titanium and titanium alloys - Sulfuric acid process. [1)]
EN2424	Aerospace series – Marking of aerospace products.[2)]
EN4473	Aerospace series – Aluminium pigmented coatings – Technical specification.[3)]
EN6116	Aerospace series - Threaded bolts, light weight - Inch series - Technical specification. 3[)]
EN6117	Aerospace series - Specification for lubrication of fasteners with cetyl alcohol. 3[)]
EN6118	Process specification – Aluminium base protection for fasteners. 3[)]
AMS2700	Passivation treatments of Corrosion resistant steels [4)]
AMS4928	Titanium alloys bars, wire, forgings, and rings 6AL-4V annealed
AMS4967	Titanium alloys bars, wire, forgings, and rings 6.0AL-4.0V annealed, heat treatable.
AMS5662	Nickel alloy, corrosion and heat-resistant, bars, forgings and rings
AMS5962	Alloy bars, forgings and rings, corrosion and heat resistant.[)]
AMS6322	Steel bars, forgings, and rings.
AMS6325	Steel bars and forgings.
AMS6327	Steel bars and forgings.
AMS6349	Steel bars 0.95Cr – 0.20Mo (0.38 – 0.43C) (SAE 4140). Normalized.
AMS6382	Steel bars, forgings, and rings, 0.95Cr – 0.20Mo (0.38 – 0.43C) (SAE 4140) (annealed).
AMS6415	Steel bars, forgings, and tubing 0.80Cr – 1.8Ni - 0.25Mo (0.38 – 0.43C) (SAE 4340).
AMS6484	Steel bars, forgings, and tubing 0.80Cr – 1.8Ni - 0.25Mo (0.38 – 0.43C) (SAE 4340). Normalized and tempered.
AMS-H-6875	Heat treatment of steel, raw materials.
AMS-QQ-P-416	Plating, cadmium (electrodeposited).
ANSI/ASME-B46-1	Surface texture (surface roughness waviness, and lay).
AS8879	Aerospace – UNJ threads - General requirements and limit dimensions.

[1)] Published by the ISO Central Secretariat ISO copyright office Case postale 56 CH-1211 Geneva 20.
[2)] Published as AECMA Standard as the date of publication of this standard.
[3)] Published as AECMA Prestandard as the date of publication of this standard.
[4)] Published by: Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001, USA

3 Requirements

3.1 Configuration, dimensions and tolerances

Configuration, dimensions and tolerances shall be in accordance with Figure 1, tables 3 and 4.

Dimensions and tolerances for oversizes shall be in accordance with Table 5.

Limitation of application: large diameter (-12 to -16) titanium fasteners are not recommended for single shear applications, use ABS0559 instead; diameter -18 titanium fasteners are not recommended for single shear applications at all.

3.2 Mass

The calculation of the mass of a bolt shall be provided as per indications hereafter:

CALCULATION OF THE MASS OF A BOLT

Add the mass of the head and threaded part (invariable mass) to the mass of the smooth part (variable mass).

Total mass of the head and threaded part:

1st mass column of Table 3.

Mass of the smooth part :

Multiply the value of the 2nd mass column of Table 3 (value according to the diameter code No.) by the length code No. of the bolt.

EXAMPLES :

BOLT EN6115-4-8

Invariable mass		2,98
Variable mass	0,39 x 8 =	3,12
Total mass		6,10 g

BOLTS EN6115V4-8, EN6115T4-8, EN6115K4-8 or EN6115B4-8

Invariable mass		1,53
Variable mass	0,22 x 8 =	1,76
Total mass		3,29 g

BOLTS EN6115L4-8 or EN6115M4-8

Invariable mass		3,21
Variable mass	0,42 x 8 =	3,36
Total mass		6,57 g

BOLT EN6115L4X8

Invariable mass		3,21
Variable mass	0,45 x 8 =	3,60
Total mass		6,81 g

3.3 Materials, finishes, lubrication and identifications

Table 1: Materials, finishes, lubrication and identifications

Code	Material	Finish	Lubrication	Recess Form	Recess code	Dia. Range	Bolt identification
T	Titanium alloy 6AL-4V as per AMS4928 or AMS4967 or equivalent Rc min. = 650 MPa	Sulfuric-acid anodizing as per ISO8080	Cetyl alcohol as per EN6117	Hexagonal	–	2 to 18	None
V		IVD as per EN6118					
K		Aluminium coating as per specification EN4473					A white paint identification at thread end
F		Resin based Aluminium as per EN4473 Type II					A white paint identification at thread end
B		Sulfuric-acid anodizing as per ISO8080 + Aluminium coating as per specification EN4473 on threads		5 Lobe high torque recess	E	2 to 4	None
				Hexagonal	-	2 to 4[1)]	
						5 to 18	
C		Sulfuric-acid anodizing as per ISO8080 + Resin based Aluminium as per EN4473 Type II on threads.		5 Lobe high torque recess	E	2 to 4	
				Hexagonal	-	5 to 18	
-	Alloy steel 4340 (AMS6415 or AMS6484) or 4140 (AMS6382 or AMS6349) or 8740 (AMS6322 or AMS6325 or AMS6327) or equivalent Rc min. = 740 MPa R = 1 240 to 1 380 MPa (AMS-H-6875) Hardness HRC 40-44	Cadmium plating as per AMS-QQ-P-416, Type II, class 2		Hexagonal	–	3 to 20	A green paint identification at thread end
L	Inconel 718 as per AMS5962 or AMS5662 + cold working R = 1 510 MPa	Aluminium coating as per specification EN4473					A blue paint identification at thread end
G		Resin based Aluminium as per EN4473 Type II					A blue paint identification at thread end

(Continued)

Table 1: Materials, finishes, lubrication and identifications (Concluded)

Code	Material	Finish	Lubrication	Recess		Dia. range	Bolt identification
				Form	Code		
M	Inconel 718 as per AMS5962 or AMS5662 + cold working R = 1 510 MPa	IVD as per EN6118	Cetyl alcohol as per EN6117	Hexagonal	–	3 to 18	A black paint identification at thread end
P		Passivation as per AMS2700					A yellow paint identification at thread end

Note:
1) Inactive for new design after June 2010 use 5 Lobe high torque recess code E.

3.4 Mechanical characteristics

Table 2: Mechanical characteristics

Dia. code No.	Min. double shear strength (N)			Min. tensile strength (N)			Max. fatigue load (N)		
	Steel alloy	Titanium	Inconel	Steel alloy	Titanium	Inconel	Steel alloy	Titanium	Inconel
2	-	17 760	-	-	9 660	-	-	3 170	-
3	27 250	23 900	31 500	17 100	14 150	20 820	5 330	4 670	6 490
3A	-	32 000	41 600	-	17 800	25 060	-	6 050	8 770
4	47 150	41 330	54 800	29 150	25 900	35 490	9 780	8 670	11 900
5	73 850	64 880	85 100	46 050	40 900	56 070	15 560	13 960	18 940
6	106 300	93 320	123 000	70 050	62 250	85 300	24 000	21 570	29 220
7	144 550	127 100	167 300	94 300	78 600	114 830	32 900	27 200	40 060
8	188 600	165 760	218 300	128 100	106 500	155 990**	44 480	37 100	54 160
9	238 850	209 950	276 230	161 900	126 100	186 000	55 150	44 000	65 100
10	294 400	259 330	341 300	205 050	170 600	220 000**	69 830	59 900	74 800**
12	424 350	373 200*	491 130	297 600	247 320	362 390	101 420	86 290	123 500
14	573 800	493 990*	664 100	413 700	302 000	498 740	140 560	112 020	169 967
16	749 500	625 970*	867 450	536 000	394 000	587 500	182 380	141 950	217 400
18	951 900	769 170*	1 098 000	684 150	509 730	-	218 640	174 420	-
20	1 178 800	-	-	898 500	-	-	305 600	-	-
22	-	-	-	-	-	-	-	-	-

Note: - minimum fatigue loads are equal to 10 % of maximum loads
- this table incorporate preliminary design values
* ref. paragraph 3.1 for limitation of application
** to be confirmed

3.5 General characteristics

Surface condition per ANSI-B46-1.

Thread rolling of steel bolts shall be carried out after heat treatment.

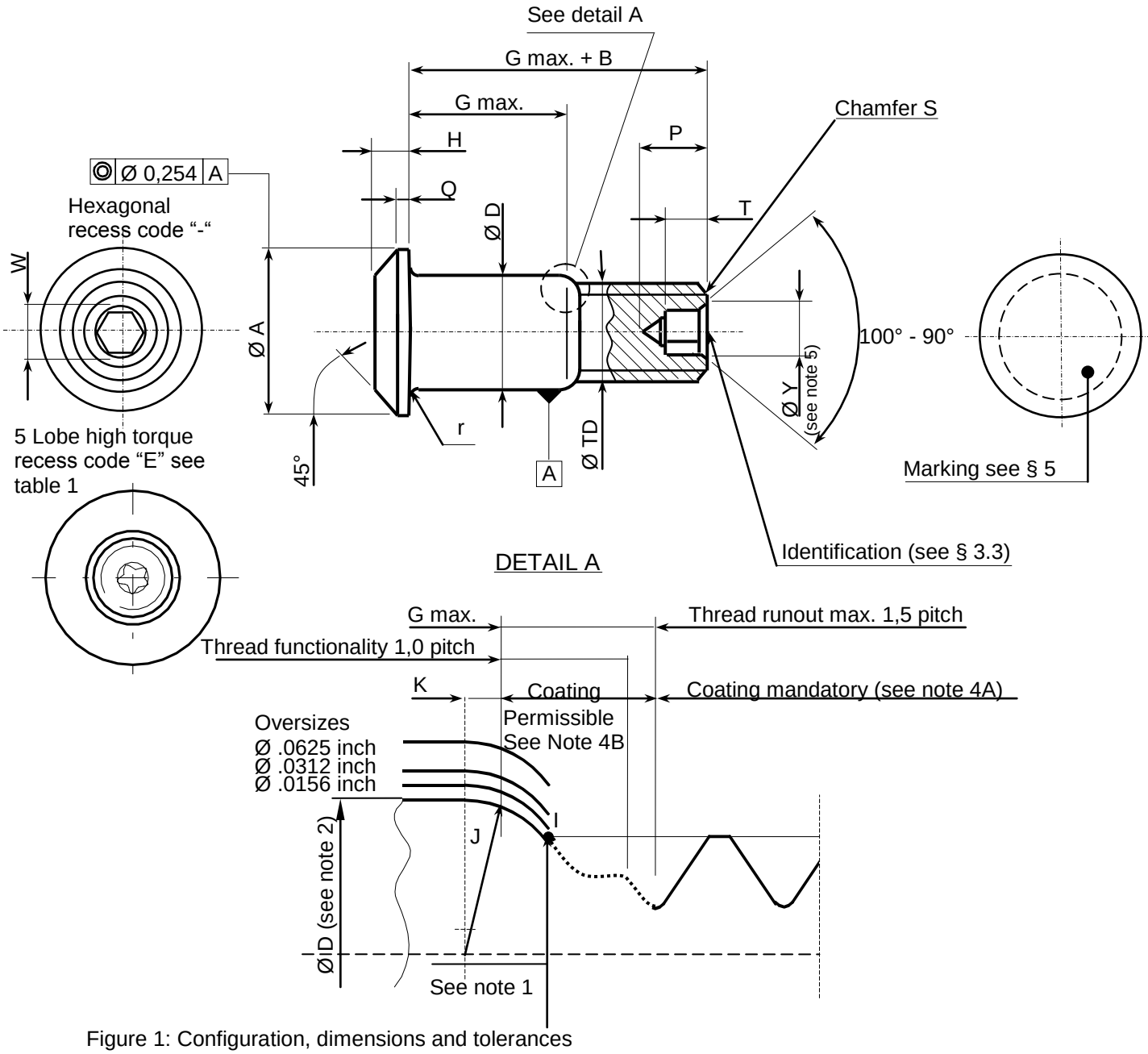


Figure 1: Configuration, dimensions and tolerances

Note 1: For nominal diameter: The diameter measured at point I shall be less than or equal to the maxi.diameter TD for nominal diameter.
For oversizes diameters: Maximum diameter at point I shall be incremented by .0156, .0312 and .0625 inch for respectively 1st, 2nd and 3rd oversize. The TD diameter stays the same as for nominal diameter.

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, and 0,5 mm for third oversize.

Note 4: A. Only for B and C coded fasteners, threads shall be coated with aluminium coating as per EN4473.
B. Only for B and C coded fasteners, overspray of aluminium coating as per EN4473 is permissible in this area.

Note 5: Valid for hexagonal recess

Dimensions in millimeter.

Table 3: Dimensions, tolerances and mass (continued)

Dimensions in millimeter

Diameter code No.	Nominal shank diameter	Thread [a] UNJF-3A modified (inch)	Ø A	B Ref.	Ø D		Ø TD	H	r
					T, B or P code	Other code			
2	3,97	.1640-32 [b]	8,17 7,77	7,11	4,153 4,140	4,153 4,128	4,051 3,988	1,65 1,40	0,64 0,38
3	4,76	.1900-32	9,57 9,07	7,37	4,813 4,800	4,813 4,788	4,673 4,597	1,88 1,63	
3A	5,56	.2160-28	10,41 9,91	7,75	5,542 5,529	5,542 5,517	5,334 5,258	2,06 1,80	
4	6,35	.2500-28	11,17 10,54	8,13	6,337 6,324	6,337 6,312	6,197 6,121	2,28 2,03	
5	7,94	.3125-24	12,82 12,07	9,65	7,925 7,911	7,925 7,899	7,772 7,670	2,84 2,59	0,76 0,51
6	9,52	.3750-24	15,24 14,35	10,67	9,512 9,500	9,512 9,487	9,347 9,245	3,55 3,30	
7	11,11	.4375-20	17,17 16,28	12,32	11,099 11,087	11,099 11,074	10,947 10,820	4,06 3,81	
8	12,70	.5000-20	19,56 18,67	13,33	12,687 12,674	12,687 12,662	12,522 12,395	4,77 4,52	
9	14,29	.5625-18	22,27 21,39	15,24	14,262 14,249	14,262 14,237	14,097 13,970	5,33 5,08	1,01 0,64
10	15,88	.6250-18	24,20 23,32	16,26	15,849 15,836	15,849 15,824	15,697 15,545	6,04 5,79	
12	19,05	.7500-16	29,21 28,19	22,73	19,024 19,011	19,024 18,999	18,872 18,720	8,51 8,13	1,14 0,76
14	22,22	.8750-14	33,78 32,76	25,40	22,200 22,187	22,200 22,174	22,047 21,869	9,78 9,40	1,27 0,89
16	25,40	1.0000-12	38,35 37,34	29,46	25,375 25,362	25,375 25,349	25,222 25,044	11,05 10,67	1,52 1,14
18	28,58	1.1250-12	43,05 42,04	33,15	28,550 28,537	28,550 28,524	28,372 28,194	12,44 12,06	1,78 1,40
20	31,75	1.2500-12	48,50 47,50	36,54	31,725 31,712	31,725 31,700	31,532 31,232	14,46 14,06	1,95 1,85
22	34,92	1.3750-12	53,50 52,50	39,64	34,900 34,887	34,900 34,875	34,706 34,382	16,25 15,85	2,25 2,15

Note:
[a] Thread as per AS-8879 except diameter TD.
[b] Thread UNJC-3A.

Table 3: Dimensions, tolerances and mass (continued)

Dimensions in millimeter

Dia. code No.	Nominal shank dia.	Thread [a] UNJF-3A modified (inch)	Q	S [c] Ref.	Hexagonal recess				5 Lobe high torque recess	
					P max.	W	T	Ø Y	T min.	P max.
2	3,97	.1640-32 [b]	1,01 0,51	0,79	3,43	2,05 2,01	2,54 2,04	3,02 2,64	1,73	3,03
3	4,76	.1900-32	1,27 0,64						1,77	3,10
3A	5,56	.2160-28	1,65 0,77						1,80	3,30
4	6,35	.2500-28	1,65 0,89		3,78	2,46 2,41	2,79 2,29	3,61 3,10	1,97	3,50
5	7,94	.3125-24	2,03 1,01	1,19	4,14	3,29 3,23	2,99 2,49	4,57 4,06	-	-
6	9,52	.3750-24	2,79 1,39		5,26	4,11 4,02	3,68 3,18	5,51 5,00		
7	11,11	.4375-20	3,30 1,90		5,97	4,90 4,81	4,36 3,86	6,43 5,92		
8	12,70	.5000-20			6,88	5,69 5,61	5,05 4,55	7,34 6,83		
9	14,29	.5625-18	4,06 2,66	1,59	8,08	6,49 6,40	5,97 5,47	8,28 7,77		
10	15,88	.6250-18	4,44 3,04							
12	19,05	.7500-16	5,97 4,57		9,86	8,09 8,00	7,34 6,84	10,11 9,60		
14	22,22	.8750-14	7,24 5,84	1,98	12,09	9,70 9,60	8,94 8,44	11,96 11,46		
16	25,40	1.0000-12	8,51 7,11		15,80	12,95 12,83	11,68 11,18	15,70 15,19		
18	28,58	1.1250-12	9,78 8,38		18,14	14,54 14,41	13,05 12,55	17,60 17,09		
20	31,75	1.2500-12	11,56 10,16	2,10	19,75	16,70 16,13	14,434 13,926	19,275 19,075		
22	34,92	1.3750-12	13,69 12,29	3,21	21,95	17,73 17,60	15,664 15,156	21,135 20,935		

Notes:

[a] Thread as per AS-8879 except diameter TD.

[b] Thread UNJC-3A.

[c] 37° to 45°

Table 3: Dimensions, tolerances and mass (concluded)

Dimensions in millimeter

Dia. code No.	Nominal shank dia.	Thread [a] UNJF-3A modified (inch)	DETAIL A		MASS Ref. (g)					
			J	K max.	Head and thread			Smooth part		
					Steel	Titanium	Inconel	Steel	Titanium	Inconel
2	3,97	.1640-32 [b]	2,16 1,65	0,33	-	0,62	-	-	0,10	-
3	4,76	.1900-32	2,67 1,78	0,41	1,60	0,87	1,72	0,22	0,13	0,24
3A	5,56	.2160-28	2,92 2,41	0,48	-	1,25	2,32	-	0,17	0,31
4	6,35	.2500-28	3,68 3,18	0,53	2,98	1,53	3,21	0,39	0,22	0,42
5	7,94	.3125-24	4,45 3,94	0,66	5,10	2,81	5,49	0,61	0,35	0,66
6	9,52	.3750-24	5,97 4,06	0,76	8,77	4,80	9,44	0,88	0,51	0,95
7	11,11	.4375-20	7,75 7,24	0,89	13,63	7,19	14,67	1,20	0,69	1,29
8	12,70	.5000-20	9,14 7,37	0,99	19,81	10,33	21,31	1,56	0,90	1,68
9	14,29	.5625-18	9,78 9,27		29,22	16,12	31,44	1,97	1,14	2,12
10	15,88	.6250-18	10,03 9,40	1,04	40,31	21,82	43,37	2,44	1,41	2,63
12	19,05	.7500-16	10,29 9,53	1,12	97,08	55,30	104,45	3,52	2,01	3,79
14	22,22	.8750-14	10,41 9,65	1,14	152,00	86,58	163,54	4,79	2,73	5,15
16	25,40	1.0000-12	11,18 10,41		225,00	128,16	242,09	6,26	3,57	6,74
18	28,58	1.1250-12	12,95 10,67	1,19	326,00	149,94	278,21	7,91	4,50	8,35
20	31,75	1.2500-12	11,43 11,18		379,14	214,51	398,02	9,83	5,56	10,32
22	34,92	1.3750-12		1,22	514,61	291,16	540,25	11,89	6,73	12,48

Notes:
[a] Thread as per AS-8879 except diameter TD.
[b] Thread UNJC-3A

Table 4: Dimensions and tolerances

Dimensions in millimeter

Length code No. e)	G ± 0,127	LENGTH (G max. + B ref.) ± 0,254							
		2	3	3A	4	5	6	7	8
1	1,59	8,70	8,95	9,34	9,72	11,24	-	-	-
2	3,18	10,29	10,54	10,93	11,31	12,83	13,85	-	-
3	4,76	11,87	12,12	12,51	12,89	14,41	15,43	17,08	-
4	6,35	13,46	13,71	14,10	14,48	16,00	17,02	18,67	19,68
5	7,94	15,05	15,30	15,69	16,07	17,59	18,61	20,26	21,27
6	9,52	16,63	16,88	17,27	17,65	19,17	20,19	21,84	22,85
7	11,11	18,22	18,47	18,86	19,24	20,76	21,78	23,43	24,44
8	12,70	19,81	20,06	20,45	20,83	22,35	23,37	25,02	26,03
9	14,29	21,4	21,65	22,04	22,42	23,94	24,96	26,61	27,62
10	15,88	22,99	23,24	23,63	24,01	25,53	26,55	28,20	29,21
11	17,46	24,57	24,82	25,21	25,59	27,11	28,13	29,78	30,79
12	19,05	26,16	26,41	26,80	27,18	28,70	29,72	31,37	32,38
13	20,64	27,75	28,00	28,39	28,77	30,29	31,31	32,96	33,97
14	22,22	29,33	29,58	29,97	30,35	31,87	32,89	34,54	35,55
15	23,81	30,92	31,17	31,56	31,94	33,46	34,48	36,13	37,14
16	25,40	32,51	32,76	33,15	33,53	35,05	36,07	37,72	38,73
17	26,99	34,10	34,35	34,74	35,12	36,64	37,66	39,31	40,32
18	28,58	35,69	35,94	36,33	36,71	38,23	39,25	40,90	41,91
19	30,16	37,27	37,52	37,91	38,29	39,81	40,83	42,48	43,49
20	31,75	38,86	39,11	39,50	39,88	41,40	42,42	44,07	45,08
21	33,34	40,45	40,70	41,09	41,47	42,99	44,01	45,66	46,67
22	34,92	42,03	42,28	42,67	43,05	44,57	45,59	47,24	48,25
23	36,51	43,62	43,87	44,26	44,64	46,16	47,18	48,83	49,84
24	38,10	45,21	45,46	45,85	46,23	47,75	48,77	50,42	51,43
25	39,69	46,80	47,05	47,44	47,82	49,34	50,36	52,01	53,02
26	41,28	48,39	48,64	49,03	49,41	50,93	51,95	53,60	54,61
27	42,86	49,97	50,22	50,61	50,99	52,51	53,53	55,18	56,19
28	44,45	51,56	51,81	52,20	52,58	54,10	55,12	56,77	57,78
29	46,04	53,15	53,40	53,79	54,17	55,69	56,71	58,36	59,37

(continued)

Table 4: Dimensions and tolerances

Dimensions in millimeter

Length code No. e)	G ± 0,127	LENGTH (G max. + B ref.) ± 0,254							
		9	10	12	14	16	18	20	22
1	1,59	-	-	-	-	-	-	-	-
2	3,18	-	-	-	-	-	-	-	-
3	4,76	-	-	-	-	-	-	-	-
4	6,35	-	-	-	-	-	-	-	-
5	7,94	23,18	-	-	-	-	-	-	-
6	9,52	24,76	25,77	-	-	-	-	-	-
7	11,11	26,35	27,36	33,84	-	-	-	-	-
8	12,70	27,94	28,95	35,43	38,10	-	-	-	-
9	14,29	29,53	30,54	37,02	39,69	43,75	-	-	-
10	15,88	31,12	32,13	38,61	41,28	45,34	49,03	-	-
11	17,46	32,70	33,71	40,19	42,86	46,92	50,61	54,00	-
12	19,05	34,29	35,30	41,78	44,45	48,51	52,20	55,59	58,69
13	20,64	35,88	36,89	43,37	46,04	50,10	53,79	57,18	60,28
14	22,22	37,46	38,47	44,95	47,62	51,68	55,37	58,76	61,86
15	23,81	39,05	40,06	46,54	49,21	53,27	56,96	60,35	63,45
16	25,40	40,64	41,65	48,13	50,80	54,86	58,55	61,94	65,04
17	26,99	42,23	43,24	49,72	52,39	56,45	60,14	63,53	66,63
18	28,58	43,82	44,83	51,31	53,98	58,04	61,73	65,12	68,22
19	30,16	45,40	46,41	52,89	55,56	59,62	63,31	66,70	69,80
20	31,75	46,99	48,00	54,48	57,15	61,21	64,90	68,29	71,39
21	33,34	48,58	49,59	56,07	58,74	62,80	66,49	69,88	72,98
22	34,92	50,16	51,17	57,65	60,32	64,38	68,07	71,46	74,56
23	36,51	51,75	52,76	59,24	61,91	65,97	69,66	73,05	76,15
24	38,10	53,34	54,35	60,83	63,50	67,56	71,25	74,64	77,74
25	39,69	54,93	55,94	62,42	65,09	69,15	72,84	76,23	79,33
26	41,28	56,52	57,53	64,01	66,68	70,74	74,43	77,82	80,92
27	42,86	58,10	59,11	65,59	68,26	72,32	76,01	79,40	82,50
28	44,45	59,69	60,70	67,18	69,85	73,91	77,60	80,99	84,09
29	46,04	61,28	62,29	68,77	71,44	75,50	79,19	82,58	85,68

(continued)

Table 4: Dimensions and tolerances

Dimensions in millimeter

Length code No. [e)]	G ± 0,127	LENGTH (G max. + B ref.) ± 0,254							
		2	3	3A	4	5	6	7	8
30	47,62	54,73	54,98	55,37	55,75	57,27	58,29	59,94	60,95
31	49,21	56,32	56,57	56,96	57,34	58,86	59,88	61,53	62,54
32	50,80	57,91	58,16	58,55	58,93	60,45	61,47	63,12	64,13
34	53,98	61,09	61,34	61,73	62,11	63,63	64,65	66,30	67,31
36	57,15	64,26	64,51	64,90	65,28	66,80	67,82	69,47	70,48
38	60,32	67,43	67,68	68,07	68,45	69,97	70,99	72,64	73,65
40	63,50	70,61	70,86	71,25	71,63	73,15	74,17	75,82	76,83
42	66,68	73,79	74,04	74,43	74,81	76,33	77,35	79,00	80,01
44	69,85	76,96	77,21	77,60	77,98	79,50	80,52	82,17	83,18
46	73,02	80,13	80,38	80,77	81,15	82,67	83,69	85,34	86,35
48	76,20	83,31	83,56	83,95	84,33	85,85	86,87	88,52	89,53
50	79,38	86,49	86,74	87,13	87,51	89,03	90,05	91,70	92,71
52	82,55	89,66	89,91	90,30	90,68	92,20	93,22	94,87	95,88
54	85,72	92,83	93,08	93,47	93,85	95,37	96,39	98,04	99,05
56	88,90	96,01	96,26	96,65	97,03	98,55	99,57	101,22	102,23
58	92,08	99,19	99,44	99,83	100,21	101,73	102,75	104,40	105,41
60	95,25	102,36	102,61	103,00	103,38	104,90	105,92	107,57	108,58
62	98,43	105,54	105,80	106,18	106,56	108,08	109,10	110,75	111,76
64	101,60	108,71	108,97	109,35	109,73	111,25	112,27	113,92	114,93
66	104,78	111,89	112,15	112,53	112,91	114,43	115,45	117,10	118,11
68	107,95	115,06	115,32	115,70	116,08	117,60	118,62	120,27	121,28
70	111,13	118,24	118,50	118,88	119,26	120,78	121,80	123,45	124,46
72	114,30	121,41	121,67	122,05	122,43	123,95	124,97	126,62	127,63
74	117,48	124,59	124,85	125,23	125,61	127,13	128,15	129,80	130,81
76	120,65	127,76	128,02	128,40	128,78	130,30	131,32	132,97	133,98

(continued)

Table 4: Dimensions and tolerances

Dimensions in millimeter

Length code No. [e)]	G ± 0,127	LENGTH (G max. + B ref.) ± 0,254							
		9	10	12	14	16	18	20	22
30	47,62	62,86	63,87	70,35	73,02	77,08	80,77	84,16	87,26
31	49,21	64,45	65,46	71,94	74,61	78,67	82,36	85,75	88,85
32	50,80	66,04	67,05	73,53	76,20	80,26	83,95	87,34	90,44
34	53,98	69,22	70,23	76,71	79,38	83,44	87,13	90,52	93,62
36	57,15	72,39	73,40	79,88	82,55	86,61	90,30	93,69	96,79
38	60,32	75,56	76,57	83,05	85,72	89,78	93,47	96,86	99,96
40	63,50	78,74	79,75	86,23	88,90	92,96	96,65	100,04	103,14
42	66,68	81,92	82,93	89,41	92,08	96,14	99,83	103,22	106,32
44	69,85	85,09	86,10	92,58	95,25	99,31	103,00	106,39	109,49
46	73,02	88,26	89,27	95,75	98,42	102,48	106,17	109,56	112,66
48	76,20	91,44	92,45	98,93	101,60	105,66	109,35	112,75	115,84
50	79,38	94,62	95,63	102,11	104,78	108,84	112,53	115,92	119,02
52	82,55	97,79	98,80	105,28	107,95	112,01	115,70	119,09	122,19
54	85,72	100,96	101,97	108,45	111,12	115,18	118,87	122,26	125,36
56	88,90	104,14	105,15	111,63	114,30	118,36	122,05	125,44	128,54
58	92,08	107,32	108,33	114,81	117,48	121,54	125,23	128,62	129,72
60	95,25	110,49	111,50	117,98	120,65	124,71	128,40	131,79	134,89
62	98,43	113,67	114,69	121,16	123,83	127,89	131,58	134,97	138,07
64	101,60	116,84	117,86	124,33	127,00	131,06	134,75	138,14	141,24
66	104,78	120,02	121,04	127,51	130,18	134,24	137,93	141,32	144,42
68	107,95	123,19	124,21	130,68	133,35	137,41	141,10	144,49	147,59
70	111,13	126,37	127,39	133,86	136,53	140,59	144,28	147,67	150,77
72	114,30	129,54	130,56	137,03	139,70	143,76	147,45	150,84	153,94
74	117,48	132,72	133,74	140,21	142,88	146,94	150,63	154,02	157,12
76	120,65	135,89	136,91	143,38	146,05	150,11	153,80	157,19	160,29

(continued)

Table 4: Dimensions and tolerances (continued)

Dimensions in millimeter

Length code No. [e)]	G ± 0,127	LENGTH (G max. + B ref.) ± 0,254							
		2	3	3A	4	5	6	7	8
78	123,83	130,94	131,20	131,58	131,96	133,48	134,50	136,15	137,16
80	127,00	134,11	134,37	134,75	135,13	136,65	137,67	139,32	140,33
82	130,18	-	-	-	-	-	-	-	-
84	133,35	-	-	-	-	-	-	-	-
86	136,53	-	-	-	-	-	-	-	-
88	139,70	-	-	-	-	-	-	-	-
90	142,88	-	-	-	-	-	-	-	-

Note:

[e)] Intermediate grip lengths may be purchased in 1,5875 mm (.0625 inch) increment if necessary.

Table 4: Dimensions and tolerances (concluded)

Dimensions in millimeter

Length code No. [e)]	G ± 0,127	LENGTH (G max. + B ref.) ± 0,254							
		9	10	12	14	16	18	20	22
78	123,83	139,07	140,09	146,56	149,23	153,29	156,98	160,37	163,47
80	127,00	142,24	143,26	149,73	152,40	156,46	160,15	163,54	166,64
82	130,18	-	-	152,91	155,58	159,64	-	-	-
84	133,35	-	-	156,08	158,75	162,81	-	-	-
86	136,53	-	-	159,26	161,93	165,99	-	-	-
88	139,70	-	-	162,43	165,10	169,16	-	-	-
90	142,88	-	-	165,61	168,28	172,34	-	-	-

Note:

[e)] Intermediate grip lengths may be purchased in 1,5875 mm (.0625 inch) increment if necessary.

Table 5: Oversizes (continued)

Dimensions in millimeter

Thread [a] UNJF-3A modified (inch)	015625 inch oversize shank 0,396 mm [b]					MASS Ref. (g)					
	Dia. code No.	Nom. dia.	B ref.	Ø D		Head and thread			Smooth part		
				T, B or P code	Other code	Steel	Titanium	Inconel	Steel	Titanium	Inconel
.1900-32	3X	5,16	7,62	5,146 5,134	5,146 5,121	1,60	0,87	1,72	0,24	0,14	0,26
.2160-28	3AX	5,95	8,00	5,939 5,927	5,939 5,914	-	1,25	2,32	-	0,18	0,33
.2500-28	4X	6,75	8,38	6,734 6,722	6,734 6,708	2,98	1,53	3,21	0,41	0,23	0,45
.3125-24	5X	8,33	9,91	8,321 8,309	8,321 8,296	5,10	2,81	5,49	0,64	0,37	0,69
.3750-24	6X	9,92	10,92	9,909 9,897	9,909 9,883	8,77	4,80	9,44	0,92	0,53	0,99
.4375-20	7X	11,51	12,57	11,496 11,484	11,496 11,471	13,63	7,19	14,67	1,24	0,71	1,34
.5000-20	8X	13,10	13,58	13,084 13,072	13,084 13,058	19,81	10,33	21,31	1,61	0,93	1,73
.5625-18	9X	14,68	15,49	14,658 14,646	14,658 14,633	29,22	16,12	31,44	2,02	1,17	2,18
.6250-18	10X	16,27	16,51	16,246 16,234	16,246 16,220	40,31	21,82	43,37	2,50	1,45	2,70
.7500-16	12X	19,45	22,98	19,421 19,409	19,421 19,396	97,08	55,30	104,45	3,59	2,05	3,87
.8750-14	14X	22,62	25,65	22,596 22,584	22,596 22,571	152,00	86,58	163,54	4,88	2,78	5,24
1.0000-12	16X	25,80	29,72	25,771 25,759	25,771 25,746	225,00	128,16	242,09	6,36	3,63	6,85
1.1250-12	18X	28,97	33,40	28,945 28,933	28,945 28,920	326,00	149,94	278,21	8,02	4,56	8,47
1.2500-12	20X	32,15	36,79	32,121 32,109	32,121 32,097	379,14	214,51	398,02	9,95	5,63	10,45
1.3750-12	22X	35,32	39,89	35,296 35,284	35,296 35,272	514,61	291,16	540,25	12,03	6,81	12,62

[a] Thread as per AS-8879 except diameter TD.
[b] For dia. code 3X, shank diameter is incremented by .01311 inch (0.333 mm)

Table 5: Oversizes (continued)

Dimensions in millimeter

Thread [a] UNJF-3A modified (inch)	.03125 inch oversize shank 0,792 mm						MASS Ref. (g)					
	Dia. code No.	Nom. dia.	Ø A	B ref.	Ø D		Head and thread			Smooth part		
					T, B or P code	Other code	Steel	Titanium	Inconel	Steel	Titanium	Inconel
.1900-32	-	-	-	-	-	-	-	-	-	-	-	-
.2160-28	-	-	-	-	-	-	-	-	-	-	-	-
.2500-28	4Y	7,14	11,68 11,05	8,38	7,130 7,118	7,130 7,104	2,98	1,53	3,21	0,44	0,25	0,47
.3125-24	5Y	8,73	13,21 12,45	9,91	8,717 8,705	8,717 8,692	5,10	2,81	5,49	0,67	0,39	0,73
.3750-24	6Y	10,32	15,75 14,86	10,92	10,305 10,293	10,305 10,279	8,77	4,80	9,44	0,95	0,55	1,03
.4375-20	7Y	11,91	17,65 16,76	12,57	11,892 11,880	11,892 11,867	13,63	7,19	14,67	1,29	0,74	1,38
.5000-20	8Y	13,49	20,07 19,18	13,58	13,480 13,468	13,480 13,454	19,81	10,33	21,31	1,66	0,96	1,79
.5625-18	9Y	15,08	22,86 21,97	15,49	15,055 15,043	15,055 15,029	29,22	16,12	31,44	2,08	1,20	2,24
.6250-18	10Y	16,67	24,64 23,75	16,51	16,642 16,630	16,642 16,617	40,31	21,82	43,37	2,56	1,48	2,76
.7500-16	12Y	19,84	30,10 29,08	22,98	19,817 19,805	19,817 19,792	97,08	55,30	104,45	3,67	2,09	3,95
.8750-14	14Y	23,02	34,29 33,27	25,65	22,992 22,980	22,992 22,967	152,00	86,58	163,54	4,96	2,83	5,33
1.0000-12	16Y	26,19	38,86 37,85	29,72	26,167 26,155	26,167 26,142	225,00	128,16	242,09	6,46	3,68	6,95
1.1250-12	18Y	29,37	43,56 42,55	33,40	29,342 29,330	29,342 29,317	326,00	149,94	278,21	8,13	4,63	8,58
1.2500-12	20Y	32,54	49,77 48,77	36,79	32,517 32,505	32,517 32,493	379,14	214,51	398,02	10,08	5,70	10,58
1.3750-12	22Y	35,72	54,77 53,77	39,89	35,692 35,680	35,692 35,668	514,61	291,16	540,25	12,16	6,88	12,76

[a] Thread as per AS-8879 except diameter TD.

Table 5: Oversizes (concluded)

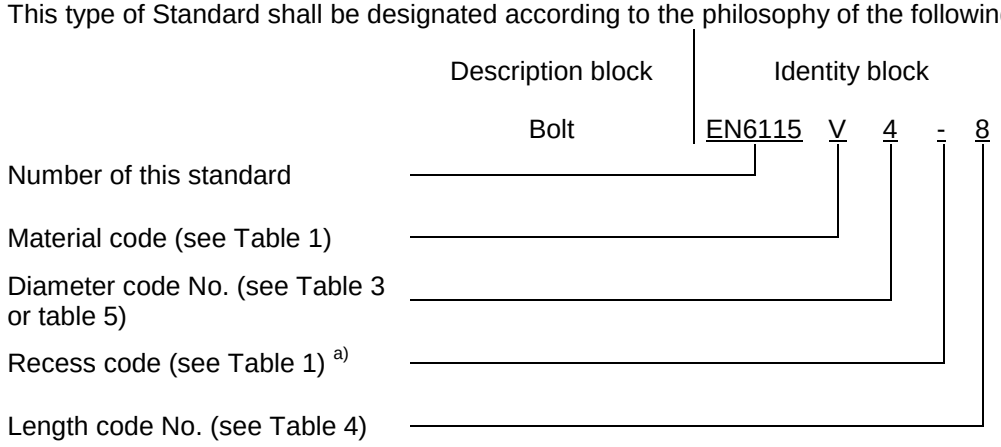
Dimensions in millimeter

Thread [a] UNJF-3A modified (inch)	.0625 inch oversize shank 1,5875 mm						MASS Ref. (g)					
	Dia. code No.	Nom. dia.	Ø A	B ref.	Ø D		Head and thread			Smooth part		
					T, B or P code	Other code	Steel	Titanium	Inconel	Steel	Titanium	Inconel
.6250-18	10Z	17,46	25,27 24,38	16,76	17,437 17,424	17,437 17,412	40,31	21,82	43,37	2,68	1,55	2,89
.7500-16	12Z	20,64	30,63 29,61	23,23	20,612 20,599	20,612 20,587	97,08	55,30	104,45	3,81	2,18	4,11
.8750-14	14Z	23,81	34,84 33,82	25,90	23,787 23,775	23,787 23,762	152,00	86,58	163,54	5,13	2,93	5,52
1.0000-12	16Z	26,99	39,42 38,41	29,96	26,962 26,950	26,962 26,937	225,00	128,16	242,09	6,65	3,79	7,16

[a] Thread as per AS-8879 except diameter TD.

4 Designation

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



Note:
a) If the diameter code ends with an letter (e.g.3A, 3X, 3AX, 4X, 4Y or 10Z) don't use the "-" (e.g. EN6115K3A5, EN6115-3A5, EN6115B3E5, EN6115B3AXE5)

5 Marking

Parts shall be marked as per EN2424, style B.
Marking shall be recessed with max. depth of 0,25 mm.

6 Technical specification

EN6116.

RECORD OF REVISIONS

Edition	Clause modified	Description of modification
1 06/02		New standard.
2 07/02	§ 2 Tables 3, 4 and 5	Normative references updated. Introduction of diameter code Nos 20 and 22. Data for P max.
3 08/03	§ 3.1 Table 2	Limitation of application: Large diameters (-12 to –18) titanium fasteners. Addition of mechanical characteristics for –12 Inconel fasteners, update of tensile strength for –4 inconel fastener.
4 07/04	Table 2 Table 4 Table 5	Mechanical requirements added for –20. Limitation of grip length Oversize code Z added.
5 12/07	§ 3.2 Table 1 Table 2 Figure 1 Table 2 Table 3 Table 5	New references added. Code B added. References updated. Inconel mechanical properties updated for dia. code No. 9. Drawing with oversizes details updated. Note 4 added for code B. Note 1 modified. Mechanical properties of dash 3A for inconel added Min. tensile strength of dash 8 updated. Headings and masses updated. Q modified. Mass added for oversizes dimensions. Dimensions of Ø A modified for dia. code No. 7Y: 17,65/17,27 mm changed to 17,65/16,76 mm.
6 11/09	2 Table 1 and table 3	Normative references updated. Reference AMS QQ-P-35 replaced by AMS2700. Addition of P code
7 08/10	Fig. 1 Table 1, Fig.1 Table 1 Table 3 Table 5 Designation	5 Lobe high torque recess version added Table 1 and fig. 1 updated, footnote 5 added and footnote 4B updated Footnote updated. 5 Lobe high torque recess with recess code E added for code B pins Dimension P max. moved to column Hexagonal recess Dimensions for 5 Lobe high torque recess added Dimension T min. and P max. updated Column D amended with "T, B or P code" EN6115B3AX5 modified to EN6115B3AXE5 Recess code added without influence of existing designation. Footnote a) added.
8 06/14	Table 1 Table 2	Finish codes F, G, CE, and C, added according to the ACF requirements. Dia ranges corrected in line with Table 2. Addition of Minimum double shear, Minimum tensile strength and Maximum Fatigue load for Inconel material dash number 16.