AIRBUS

BOLT - COUNTERSUNK HEAD, SHORT THREAD

Issue : **AG**
Date : **Feb 08**
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INACTIVE FOR NEW DESIGN AFTER SEPTEMBER 2002,
INACTIVE FOR PROCUREMENT AFTER 31st JANUARY 2008.
SUPERSEDED BY EN 6114

This standard has been prepared according to manufacturer definitions.
Possible patents which may refer to the product are not mentioned.
AIRBUS denies all responsibility related to any dispute arising from manufacture, use or sale of parts corresponding to this standard.

SUMMARY

1 - SCOPE AND FIELD OF APPLICATION

This standard specifies the dimensions, tolerances, required characteristics and the masses of a countersunk head bolt.

2 - REFERENCES

ANSI B46-1 : Surface texture (surface roughness waviness, and lay).
AMS 4928 : Titanium alloys bars, wire, forgings, and rings 6AL-4V annealed.

AMS 4967	: Titanium alloys bars, wire, forgings, and rings 6.0AL-4.0V annealed, heat treatable.
MIL-C-83488	: Coating, aluminium, ion vapor deposited.
MIL-H-6875	: Heat treatment of steel, process for.
MIL-S-5626	: Steel, chrome-molybdenum (4140) bars, rods, and forging stock (for aircraft application).
MIL-S-5000	: Steel, chrome-nickel-molybdenum (E4340) bars and reforging stock.
MIL-S-6049	: Steel, chrome-nickel-molybdenum (8740) bars and reforging stock (aircraft quality).
MIL-S-8879	: Screw threads, controlled radius root with increased minor diameter, general specification for.
A/DET 0012	: Process specification - Aluminium base protection for fasteners.
A/DET 0013	: Specification for lubrication of bolts with cetyl alcohol.
QQ-P-416	: Plating, cadmium (electrodeposited).
EN 2424	: Aerospace series - Marking of aerospace products.
A/DET 0062	: Bolt - Short thread, recessed on thread end.
I.G.C.04.45.117	: Aerospatiale works acceptance inspection for screws with hexagonal socket on threaded end.

Manufacturer's specification No. 294.

Manufacturer's specification No. 380.

3 - TERMINOLOGY

Not applicable.

4 - REQUIRED CHARACTERISTICS

4.1 - Configuration, dimensions, tolerances, mass

4.1.1 - Configuration shall be in accordance with the figure.

Roll-formed thread as per MIL-S-8879 except TD diameter.

4.1.2 - Dimensions shall be in accordance with the figure and Table 1 and Table 2.

4.1.3 - General tolerances shall be in accordance with the figure and Table 1 and Table 2.

Concentricity tolerances between :

- Tapered surface of head with Ø D : 0,127 mm (TIR).
- Cylindrical part of head and Ø D within the values of F (TIR) (see Table 1).

4.1.4 - 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 1.
Mass of the smooth part :
Multiply the value of the 2nd mass column of Table 1 (value according to the diameter code No.) by the length code No. of the bolt.

Examples :

BOLT ASNA2026-4-8			
Invariable mass	:		2,37
Variable mass	: 0,39 x 8 =		3,12
Head mass to be deducted	:		-0,46
Total mass	:		5,03 g
BOLT ASNA2026V4-8			
Invariable mass	:		1,37
Variable mass	: 0,22 x 8 =		1,76
Head mass to be deducted	:		-0,27
Total mass	:		2,86 g

4.2 - Materials, finishes, lubrications, identifications

Materials, finishes, lubrications and identifications shall be in accordance with table 3.

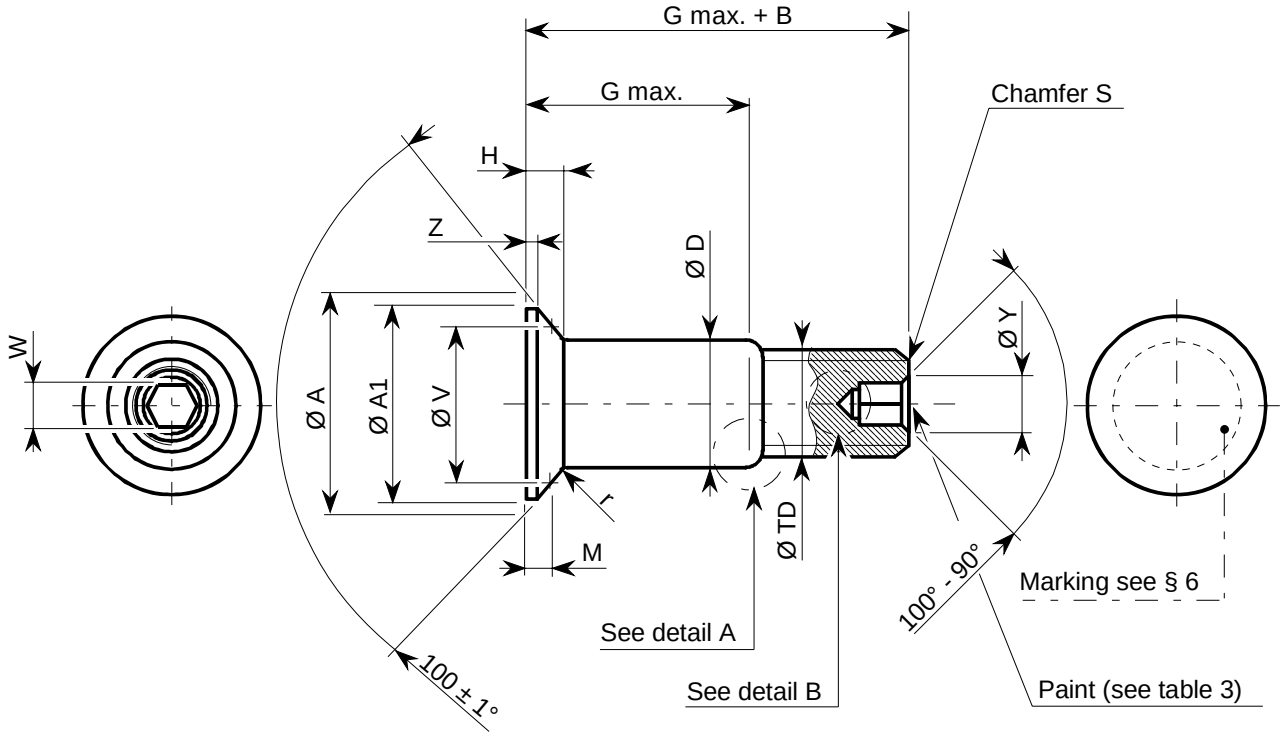
4.3 - Mechanical characteristics

Mechanical characteristics shall be in accordance with table 4.

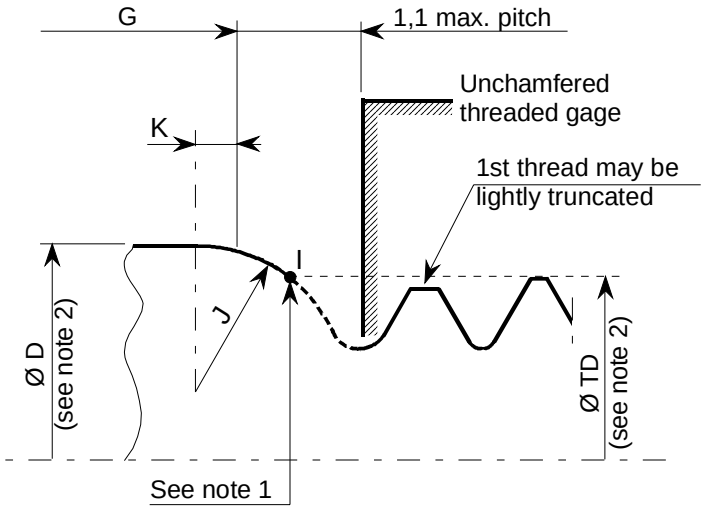
4.4 - General characteristics

4.4.1 - Surface condition as per ANSI B46-1.

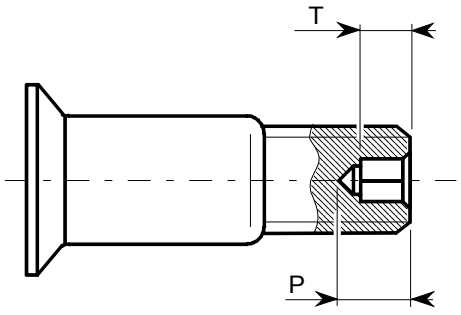
4.4.2 - Thread of steel bolts shall be carried out after thermal shield.



DETAIL A
Definition of the shank - thread transition zone



DETAIL B
Drilling depth (hexagonal recess)



Dimensions in mm.

Note 1 : The diameter measured at point I shall be less than or equal to the max. diameter TD.

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.

Figure - Configuration, dimensions, tolerances

Table 1 - Dimensions, tolerances, mass

(dimensions continued on page 6)

DIA. CODE No.	NOMINAL SHANK DIAMETER	THREAD UNJF-3A modified (in inch)	Ø A max.	Ø A1 min.	B Ref.	Ø D	Ø TD	F max. (1)	H Ref. (2)	r
3	3/16"	0.1900-32	8,32	7,44	7,37	4,813 4,788	4,673 4,597	0,127	1,42	
3A	7/32"	0.2160-28	9,57	8,69	7,75	5,542 5,517	5,334 5,258	0,152	1,65	0,762 0,508
4	1/4"	0.2500-28	10,88	10,01	8,13	6,337 6,312	6,197 6,121	0,152	1,88	
5	5/16"	0.3125-24	13,62	12,73	9,65	7,925 7,899	7,772 7,670	0,177	2,34	1,016
6	3/8"	0.3750-24	16,29	15,42	10,67	9,512 9,487	9,347 9,245	0,203	2,79	0,762
7	7/16"	0.4375-20	18,86	17,55	12,32	11,099 11,074	10,947 10,820	0,228	3,20	
8	1/2"	0.5000-20	21,39	20,09	13,33	12,687 12,662	12,522 12,395	0,254	3,61	
9	9/16"	0.5625-18	23,62	22,38	15,24	14,262 14,237	14,097 13,970		3,88	
10	5/8"	0.6250-18	26,52	25,27	16,26	15,849 15,824	15,697 15,545		4,42	1,270 1,016
12	3/4"	0.7500-16	33,02	31,78	22,73	19,024 18,999	18,872 18,719	0,304	5,82	
14	7/8"	0.8750-14	38,33	37,11	25,40	22,199 22,174	22,047 21,869	0,355	6,68	
16	1"	1.0000-12	43,69	42,44	29,46	25,374 25,349	25,222 25,044		7,57	
18	1"1/8	1.1250-12	49,15	47,93	33,15	28,549 28,524	28,372 28,194	0,381	8,64	1,520 1,270

Dimensions in mm unless otherwise stated.

(1) See chapter 4.1.3.

(2) Height H is dimensioned based on max. diameter D.

Table 1 - (dimensions continued from page 5) (dimensions continued on page 7)

DIA. CODE No.	NOMINAL SHANK DIAMETER	THREAD UNJF-3A modified (in inch)	Z max.	S Ref. (3)	HEXAGONAL RECESS			M	Ø V
					W	T	Ø Y		
3	3/16"	0.1900-32	0,381	0,79	2,047 2,009	2,540 2,032	3,022 2,641	0,749 0,668	6,502 6,497
3A	7/32"	0.2160-28						0,820 0,744	7,574 7,569
4	1/4"	0.2500-28			2,456 2,405	2,794 2,286	3,606 3,099	0,576 0,495	9,479 9,474
5	5/16"	0.3125-24		1,19	3,289 3,225	3,302 2,794	4,572 4,064	0,594 0,503	12,169 12,164
6	3/8"	0.3750-24			4,107 4,018	4,064 3,556	5,512 5,004	0,749 0,657	14,473 14,467
7	7/16"	0.4375-20	0,558		4,902 4,813	4,826 4,318	6,426 5,918	0,881 0,779	16,718 16,713
8	1/2"	0.5000-20			5,694 5,605	5,588 5,080	7,340 6,832	1,280 1,178	18,288 18,283
9	9/16"	0.5625-18		1,59	6,489 6,400	6,604 6,096	8,280 7,772	1,353 1,232	20,350 20,345
10	5/8"	0.6250-18						1,602 1,496	22,611 22,606
12	3/4	0.7500-16			8,089 8,001	8,128 7,620	10,109 9,601	1,971 1,818	28,254 28,249
14	7/8"	0.8750-14		1,98	9,702 9,601	9,906 9,398	11,963 11,455	1,762 1,579	34,137 34,132
16	1"	1.0000-12			12,954 12,801	12,95 12,44	15,697 15,189	1,567 1,361	39,959 39,954
18	1"1/8	1.1250-12			14,541 14,414	14,48 13,97	17,602 17,094	1,422 1,206	45,786 45,781

Dimensions in mm unless otherwise stated.

(3) 37° for titanium bolt and 45° for steel bolt.

Table 1 - (dimensions continued from page 6) (end)

DIA. CODE No.	NOMINAL SHANK DIAMETER	THREAD UNJF-3A modified (in inch)	P max.	DETAIL A			MASS (g)					
				J	K max.	Max. installation interference (mm)	Head and thread		Smooth part		Head mass to be deducted	
							Steel	Titanium	Steel	Titanium	Steel	Titanium
3	3/16"	0.1900-32	3,40	2,540 2,286	0,406	90	1,13	0,65	0,22	0,13	0,20	0,12
3A	7/32"	0.2160-28	3,43	TBD	TBD		-	-	-	-	-	-
4	1/4"	0.2500-28	3,78	3,556 3,202	0,533	110	2,37	1,37	0,39	0,22	0,46	0,27
5	5/16"	0.3125-24	3,91	4,318 4,064	0,660		4,52	2,61	0,61	0,35	0,90	0,52
6	3/8"	0.3750-24	4,78	5,842 5,588	0,762	125	7,49	4,32	0,88	0,51	1,54	0,89
7	7/16"	0.4375-20	5,61	7,620 7,366	0,889	128	11,61	6,70	1,20	0,69	2,41	1,39
8	1/2"	0.5000-20	6,45	9,017 8,763	0,991		16,35	9,43	1,56	0,90	3,55	2,05
9	9/16"	0.5625-18	7,57	9,652 9,398		138	23,35	13,47	1,97	1,14	4,83	2,78
10	5/8"	0.6250-18		9,906 9,652	1,041		32,63	18,83	2,44	1,41	6,79	3,92
12	3/4"	0.7500-16	9,27	10,160 9,652	1,118	-	66,01	-	3,52	-	12,89	-
14	7/8"	0.8750-14	11,23	10,287 9,779	1,143	-	100,53	-	4,79	-	20,14	-
16	1"	1.0000-12	14,63	11,049 10,541		-	145,41	-	6,26	-	29,83	-
18	1"1/8	1.1250-12	TBD	TBD	TBD	-	-	-	-	-	-	-

Dimensions in mm unless otherwise stated.

Table 2 - Dimensions, tolerances

LENGTH CODE No.	G ± 0,127	LENGTH (G max. + B ref.) ± 0,254												
		3	3A	4	5	6	7	8	9	10	12	14	16	18
1	1,59	8,95	9,34	9,72	11,24									
2	3,18	10,54	10,93	11,31	12,83	13,85								
3	4,76	12,12	12,51	12,89	14,41	15,43	17,08							
4	6,35	13,71	14,10	14,48	16,00	17,02	18,67	19,68						
5	7,94	15,30	15,69	16,07	17,59	18,61	20,26	21,27	23,18					
6	9,52	16,88	17,27	17,65	19,17	20,19	21,84	22,85	24,76	25,77				
7	11,11	18,47	18,86	19,24	20,76	21,78	23,43	24,44	26,35	27,36	33,84			
8	12,70	20,06	20,45	20,83	22,35	23,37	25,02	26,03	27,94	28,95	35,43	38,10		
9	14,29	21,65	22,05	22,42	23,94	24,96	26,61	27,62	29,53	30,54	37,02	39,69	43,75	
10	15,88	23,24	23,63	24,01	25,53	26,55	28,20	29,21	31,12	32,13	38,61	41,28	45,34	49,03
11	17,46	24,82	25,21	25,59	27,11	28,13	29,78	30,79	32,70	33,71	40,19	42,86	46,92	50,61
12	19,05	26,41	28,80	27,18	28,70	29,72	31,37	32,38	34,29	35,30	41,78	44,45	48,51	52,20
13	20,64	28,00	28,39	28,77	30,29	31,31	32,96	33,97	35,88	36,89	43,37	46,04	50,10	53,79
14	22,22	29,58	29,97	30,35	31,87	32,89	34,54	35,55	37,46	38,47	44,95	47,62	51,68	55,37
15	23,81	31,17	31,56	31,94	33,46	34,48	36,13	37,14	39,05	40,06	46,54	49,21	53,27	56,96
16	25,40	32,76	33,15	33,53	35,05	36,07	37,72	38,73	40,64	41,65	48,13	50,80	54,86	58,55
17	26,99	34,35	34,74	35,12	36,64	37,66	39,31	40,32	42,23	43,24	49,72	52,39	56,45	60,14
18	28,58	35,94	36,33	36,71	38,23	39,25	40,90	41,91	43,82	44,83	51,31	53,98	58,04	61,73
19	30,16	37,52	37,91	38,29	39,81	40,83	42,48	43,49	45,40	46,41	52,89	55,56	59,62	63,31
20	31,75	39,11	39,50	39,88	41,40	42,42	44,07	45,08	46,99	48,00	54,48	57,15	61,21	64,90
21	33,34	40,70	41,09	41,47	42,99	44,01	45,66	46,67	48,58	49,59	56,07	58,74	62,80	66,49
22	34,92	42,28	42,67	43,05	44,57	45,59	47,24	48,25	50,16	51,17	57,65	60,32	64,38	68,07
23	36,51	43,87	44,26	44,64	46,16	47,18	48,83	49,84	51,75	52,76	59,24	61,91	65,97	69,66
24	38,10	45,46	45,85	46,23	47,75	48,77	50,42	51,43	53,34	54,35	60,83	63,50	67,56	71,25
25	39,69	47,05	47,44	47,82	49,34	50,36	52,01	53,02	54,93	55,94	62,42	65,09	69,15	72,84
26	41,28	48,64	49,03	49,41	50,93	51,95	53,60	54,61	56,52	57,53	64,01	66,68	70,74	74,43
27	42,86	50,22	50,61	50,99	52,51	53,53	55,18	56,19	58,10	59,11	65,59	68,26	72,32	75,01
28	44,45	51,81	52,20	52,58	54,10	55,12	56,77	57,78	59,69	60,70	67,18	69,85	73,91	77,60

(length code Nos continued on page 9)

Dimensions in mm.

Table 2 - (length code Nos continued from page 8)

LENGTH CODE No. *	G ± 0,127	LENGTH (G max. + B ref.) ± 0,254												
		3	3A	4	5	6	7	8	9	10	12	14	16	18
29	46,04	53,40	53,79	54,17	55,69	56,71	58,36	59,37	61,28	62,29	68,77	71,44	75,50	79,19
30	47,62	54,98	55,37	55,75	57,27	58,29	59,94	60,95	62,86	63,87	70,35	73,02	77,08	80,77
31	49,21	56,57	56,96	57,34	58,86	59,88	61,53	62,54	64,45	65,46	71,94	74,61	78,67	82,36
32	50,80	58,16	58,55	58,93	60,45	61,47	63,12	64,13	66,04	67,05	73,53	76,20	80,26	83,95
34	53,98	61,34	61,73	62,11	63,63	64,65	66,30	67,31	69,22	70,23	76,71	79,38	83,44	87,13
36	57,15	64,51	64,90	65,28	66,80	67,82	69,47	70,48	72,39	73,40	79,88	82,55	86,61	90,30
38	60,32	67,68	68,07	68,45	69,97	70,99	72,64	73,65	75,56	76,57	83,05	85,72	89,78	93,47
40	63,50	70,86	71,25	71,63	73,15	74,17	75,82	76,83	78,74	79,75	86,23	88,90	92,96	96,65
42	66,68	74,04	74,43	74,81	76,33	77,35	79,00	80,01	81,92	82,93	89,41	92,08	96,14	99,83
44	69,85	77,21	77,60	77,98	79,50	80,52	82,17	83,18	85,09	86,10	92,58	95,25	99,31	103,00
46	73,02	80,38	80,77	81,15	82,67	83,69	85,34	86,35	88,26	89,27	95,75	98,42	102,48	106,17
48	76,20	83,56	83,95	84,33	85,85	86,87	88,52	89,53	91,44	92,45	98,93	101,60	105,66	109,35
50	79,38	86,74	87,13	87,51	89,03	90,05	91,70	92,71	94,62	95,63	102,11	104,78	108,84	112,53
52	82,55	89,91	90,30	90,68	92,20	93,22	94,87	95,88	97,79	98,80	105,28	107,95	112,01	115,70
54	85,72	93,08	93,47	93,85	95,37	96,39	98,04	99,05	100,96	101,97	108,45	111,12	115,18	118,87
56	88,90	96,26	96,65	97,03	98,55	99,57	101,22	102,23	104,14	105,15	111,63	114,30	118,36	122,05
58	92,08	99,44	99,83	100,21	101,73	102,75	104,40	105,41	107,32	108,33	114,81	117,48	121,54	125,23
60	95,25	102,61	103,00	103,38	104,90	105,92	107,57	108,58	110,49	111,50	117,98	120,65	124,71	128,40

(end)

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

Dimensions in mm.

Table 3 - Materials, finishes, lubrications, identifications

ITEM CODE No.	CODE	MATERIAL	FINISH	LUBRICATION	BOLT IDENTIFICATION
3 to 10	T	Titanium alloy 6AL-4V as per AMS 4928 or AMS 4967 or equivalent. Rc min. = 650 MPa	Sulphuric-acid anodizing	Cetyl alcohol as per A/DET 0013	None
	V		IVD as per A/DET 0012		
	BV *		(Applicable to BAe only) IVD as per MIL-C-83488 Type II, class 3	Without	A black paint layer at thread end
	HK *		(Applicable to BAe only) HI-KOTE 1 as per specification HI-SHEAR 294		None
	K		HI-KOTE 1 as per specification HI-SHEAR 294	Cetyl alcohol as per A/DET 0013	A white paint layer at thread end
	L	Inconel 718 as per AMS 5662, R = 1 510 MPa	HI-KOTE 1 as per specification HI-SHEAR 299		None
All items	Without	Alloy steel 4340 (MIL-S-5000) or 4140 (MIL-S-5626) or 8740 (MIL-S-6049) or equivalent. Rc min. = 740 MPa R = 1 240 to 1 380 MPa (MIL-H-6875)	Cadmium plating as per QQ-P-416, Type II, class 2		A green paint layer at thread end

* The code VBV changed to the code BV and the code VHK changed to the code HK.

Table 4 - Mechanical characteristics

DIA. CODE No.	Min. DOUBLE SHEAR STRENGTH (N)		Min. TENSILE STRENGTH (N)		Max. FATIGUE LOAD (N)	
	Steel alloy	Titanium	Steel alloy	Titanium	Steel alloy	Titanium
3	27 250	23 900	11 500	10 700	4 050	4 000
3A	-	32 000	-	14 450	-	5 050
4	47 150	41 330	22 250	20 000	7 800	7 000
5	73 850	64 880	33 350	30 450	11 700	10 650
6	106 300	93 320	48 950	45 350	17 150	15 900
7	144 550	127 100	63 600	58 250	22 250	20 400
8	188 600	165 760	88 100	80 000	30 850	28 000
9	238 850	209 950	109 450	100 000	38 250	35 050
10	294 900	259 330	137 900	129 900	48 250	45 350
12	424 350	-	213 500	-	74 750	-
14	573 800	-	289 150	-	101 200	-
16	749 500	-	378 100	-	132 350	-
18	951 872	-	487 056	-	169 024	-

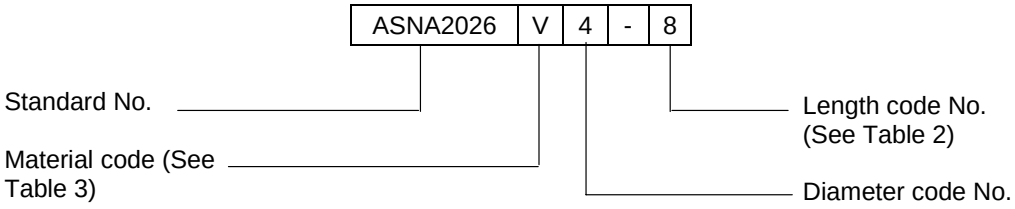
Note : Minimum fatigue loads are equal to 10 % of maximum loads.

5 - DESIGNATION

Example of part number identification to be used on drawing schedules :

ASNA2026V4-8 , Bolt

Example of part number construction :



6 - MARKING

Marking shall be recessed with max. depth of 0,25 mm. :

- as per EN 2424 category A. For item code No. 3 only, manufacturers will have the possibility of marking the bolts as per example A2026V3-8 and the manufacturer's trademark.

or

- the manufacturer's part number and the manufacturer's name or trademark.

7 - TECHNICAL SPECIFICATION

A/DET 0062 - Manufacturer's specification No. 380.
Inspection conditions of bolts as per I.G.C.04.45.117.

8 - MANUFACTURERS

Refer to the list of qualified manufacturers and products.

AMENDMENT RECORD SHEET

Issue	Modified paragraph	Modification summary	Justification
K.05.85	Page 2	Manufacturer reference modified for material code V and manufacturer reference added for material code VBV. Page numbering modified.	
L.09.85	Page 1	In summary, paragraph 4, "IDENTIFICATION" added.	
	Page 4	In MATERIAL table : column "BOLT IDENTIFICATION" added.	
	Page 5	"PROCUREMENT SPECIFICATION" modified.	
M.12.85	Page 4	BOLT IDENTIFICATION : Code T : "A green paint layer at thread end" changed to "None". Without code : "None" changed to "A green paint layer at thread end".	
N.06.86		Paragraph 7 added : OVERSIZES. The number of pages increases from 6 to 7.	ATR 72 wings
P.06.87	Page 1	Note above summary added. Number of pages : 7 changed to 6. In summary, paragraph 7 deleted (oversizes).	Following note JB No. 12 of 23.03.87
	1	Size G max. + B added. Tolerance modified : $\pm$ 0,254 changed to $^{+\ 0,25}_{-\ 0,10}$ (see table 3).	
	Page 2	Table and detail A representation modified.	
	Page 4	"Manufacturer's acronym" added instead of "Manufacturer's marking".	
	Page 5	Paragraph 7 deleted (oversizes). Specification No. modified.	
R.09.87	Page 4	Material code VHK added.	BAe request
S.04.89	4	Material code K added.	Following memo. RCz/JB531/123/89 of 22.03.89

NOTE : Modification to the last standard issue are indicated by a vertical line in the margin.

AMENDMENT RECORD SHEET

Issue	Modified paragraph	Modification summary	Justification
T.09.89	4	BOLT IDENTIFICATION : without code : "white" color changed to "green".	Following French/English color discrepancy
U.12.89	4	Bolt identification modified for material code V.	437.220/89
V.08.90	6	Diameter code Nos 12, 14 and 16 added. Mass modified.	TF3 - WG1
W.02.91		Example of the mass calculation modified.	Mod. 9999
Y.03.91		Diameter code Nos 9 and 10 : Installation interference added : 138.	Mod. 9999
Z.04.92	2	Ø B modified for Ø code No. 10 : 16,762 changed to 16,26.	Note 531.020/92
AA.06.95		Standard fully amended. Dimensions P, J and K modified. Dimension T modified for diameter code Nos 12, 14 and 16. Mass modified in table 1. Manufacturer's specification modified in TECHNICAL SPECIFICATION : No. 294 changed to No. 380.	In accordance with manufacturer's documentation
AB.01.97		Table 3 modified.	Point D01-02 TF3-WG1
AC.12.99		Diameter code Nos 3A and 18 added in tables 1, 2 and 4.	A340-500/600
		Note "Intermediate grip lengths .... if necessary" added.	TF3-WG1 decision
		Material code L (inconel 718) added in table 3.	TF3-WG1 Item 852
AD.02.00	Table 4	Double shear strength modified for diameter code No. 3A in titanium : 31 580 N changed to 32 000 N.	TF3-WG1 Item 852 EIS-1033/00

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AMENDMENT RECORD SHEET

Issue	Modified paragraph	Modification summary	Justification
AE.02.01		Thread, Ø D and Ø TD modified for Ø code No. 18.	Item 852 In accordance with manufacturer's documentation
AF.09.02		"Inactive for new design after Sep. 02, superseded by EN 6114" added.	
AG.02.08		Note added 'Inactive for Procurement after 31st January 2008'	Request by Airbus Procurement

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