AIRBUS

BOLT - PROTRUDING HEAD, SHORT THREAD

INACTIVE FOR NEW DESIGN AFTER SEPTEMBER 2002,
INACTIVE FOR PROCUREMENT AFTER 31st JANUARY 2008.
SUPERSEDED BY EN 6115

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 protruding 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 Ø A and Ø D within the values of 0,254 mm (TIR).

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 ASNA2027-4-8

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

BOLT ASNA2027V4-8

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

4.2 - Materials, finishes, lubrications, identifications

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

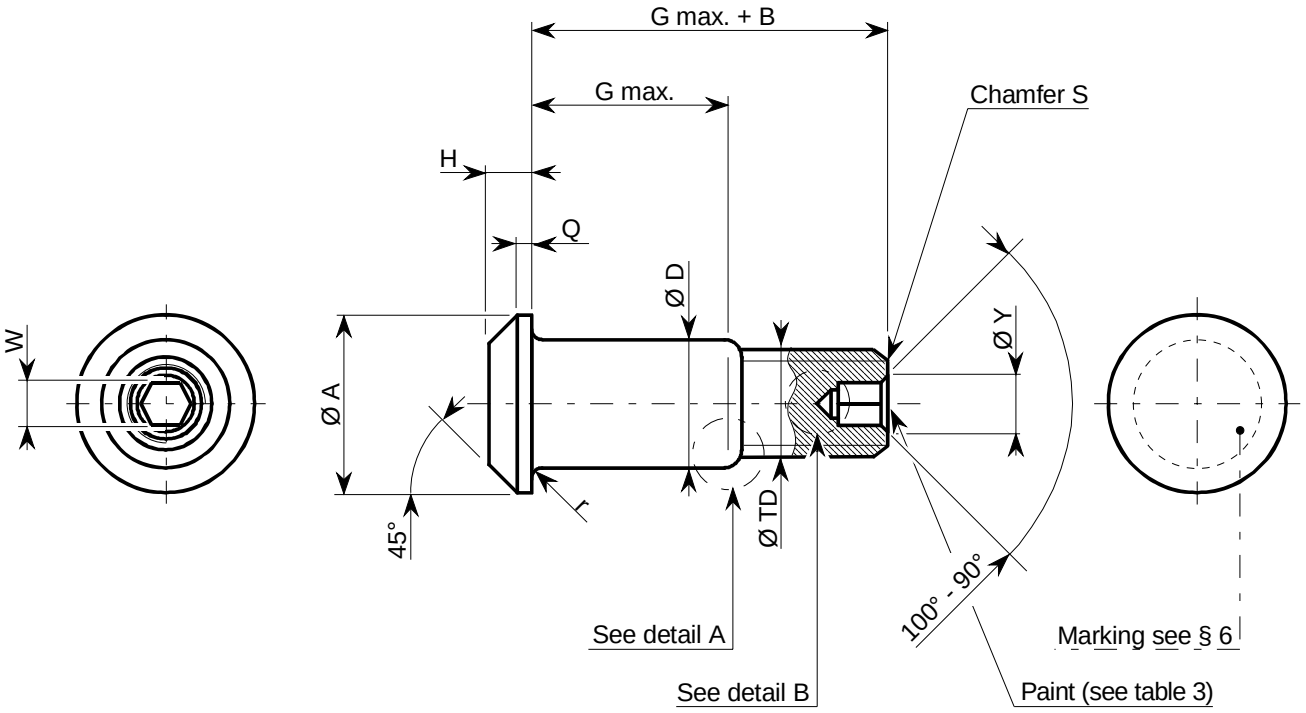
4.3 - Mechanical characteristics

Mechanical characteristics shall be in accordance with table 4.

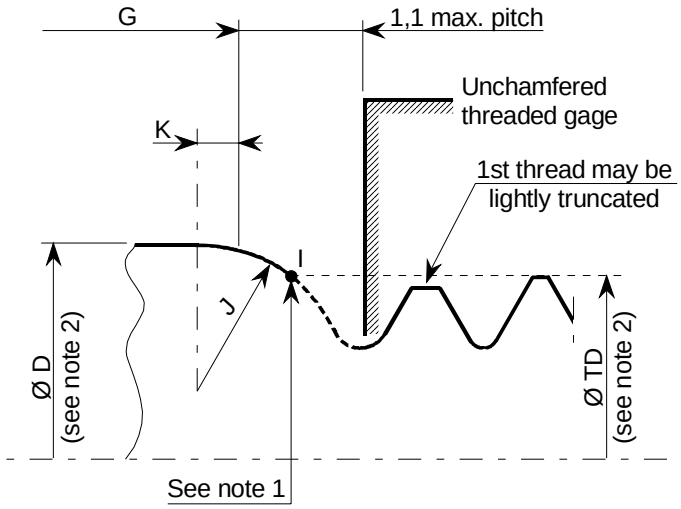
4.4 - General characteristics

4.4.1 - Surface condition as per ANSI B46-1.

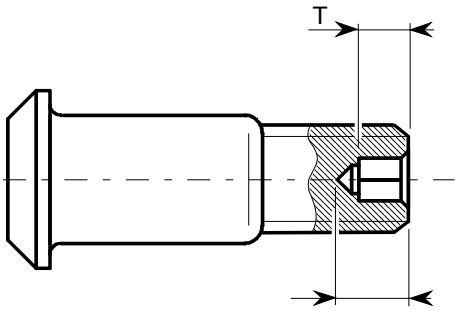
4.4.2 - Thread of steel bolts shall be carried out after thermal shield.



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	B Ref.	Ø D	Ø TD	H	r
3	3/16"	0.1900-32	9,57 9,07	7,37	4,813 4,788	4,673 4,597	1,88 1,63	
3A	7/32"	0.2160-28	10,41 9,91	7,75	5,542 5,517	5,334 5,258	2,06 1,80	0,635 0,381
4	1/4"	0.2500-28	11,17 10,54	8,13	6,337 6,312	6,197 6,121	2,28 2,03	
5	5/16"	0.3125-24	12,82 12,07	9,65	7,925 7,899	7,772 7,670	2,84 2,59	
6	3/8"	0.3750-24	15,24 14,35	10,67	9,512 9,487	9,347 9,245	3,55 3,30	0,762 0,508
7	7/16"	0.4375-20	17,17 16,28	12,32	11,100 11,074	10,947 10,820	4,06 3,81	
8	1/2"	0.5000-20	19,56 18,67	13,33	12,687 12,662	12,522 12,395	4,77 4,52	
9	9/16"	0.5625-18	22,27 21,39	15,24	14,262 14,237	14,097 13,970	5,33 5,08	1,01 0,64
10	5/8"	0.6250-18	24,20 23,32	16,26	15,850 15,824	15,697 15,545	6,04 5,79	
12	3/4"	0.7500-16	29,21 28,19	22,73	19,024 18,999	18,872 18,720	8,51 8,13	1,14 0,76
14	7/8"	0.8750-14	33,78 32,76	25,40	22,199 22,174	22,047 21,869	9,78 9,40	1,27 0,89
16	1"	1.0000-12	38,35 37,34	29,46	25,374 25,349	25,222 25,044	11,05 10,67	1,52 1,14
18	1" 1/8	1.1250-12	43,05 42,04	33,15	28,549 28,524	28,372 28,194	12,44 12,06	1,78 1,40

Dimensions in mm unless otherwise stated.

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

DIA. CODE No.	NOMINAL SHANK DIAMETER	THREAD UNJF-3A modified (in inch)	S Ref. (1)	Q Ref.	HEXAGONAL RECESS		
					W	T	Ø Y
3	3/16"	0.1900-32	0,79	0,89	2,047 2,009	2,540 2,032	3,022 2,641
3A	7/32"	0.2160-28		1,02			
4	1/4"	0.2500-28		1,14	2,456 2,405	2,794 2,286	3,606 3,099
5	5/16"	0.3125-24	1,19	1,40	3,289 3,225	3,302 2,794	4,572 4,064
6	3/8"	0.3750-24		1,90	4,107 4,018	4,064 3,556	5,512 5,004
7	7/16"	0.4375-20		2,41	4,902 4,813	4,826 4,318	6,426 5,918
8	1/2"	0.5000-20			5,694 5,605	5,588 5,080	7,340 6,832
9	9/16"	0.5625-18	1,59	3,17	6,489 6,400	6,604 6,096	8,280 7,772
10	5/8"	0.6250-18		3,55			
12	3/4"	0.7500-16		5,08	8,090 8,001	8,128 7,620	10,109 9,601
14	7/8	0.8750-14	1,98	6,35	9,703 9,601	9,906 9,398	11,963 11,455
16	1"	1.0000-12		7,62	12,954 12,827	12,954 12,446	15,697 15,189
18	1" 1/8	1.1250-12		8,89	14,541 14,414	14,478 13,970	17,602 17,094

Dimensions in mm unless otherwise stated.

(1) 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	
							Steel	Titanium	Steel	Titanium
3	3/16"	0.1900-32	3,40	2,540 2,286	0,406	90	1,60	0,87	0,22	0,13
3A	7/32"	0.2160-28	3,68	TBD	TBD	-	TBD	TBD	TBD	TBD
4	1/4"	0.2500-28	3,78	3,556 3,202	0,533	110	2,98	1,53	0,39	0,22
5	5/16"	0.3125-24	3,91	4,318 4,064	0,660		5,10	2,81	0,61	0,35
6	3/8"	0.3750-24	4,78	5,842 5,588	0,762	125	8,77	4,80	0,88	0,51
7	7/16"	0.4375-20	5,61	7,620 7,366	0,889	128	13,63	7,19	1,20	0,69
8	1/2"	0.5000-20	6,45	9,017 8,763	0,991		19,81	10,33	1,56	0,90
9	9/16"	0.5625-18	7,57	9,652 9,398		138	29,22	16,12	1,97	1,14
10	5/8"	0.6250-18		9,906 9,652	1,041		40,31	21,82	2,44	1,41
12	3/4"	0.7500-16	9,27	10,160 9,652	1,118	-	97,08	-	3,52	-
14	7/8"	0.8750-14	11,23	10,287 9,779	1,143	-	152,00	-	4,79	-
16	1"	1.0000-12	14,63	11,049 10,541		-	225,00	-	6,26	-
18	1" 1/8	1.1250-12	16,33	12,827 12,319	1,194	-	326,00	-	7,91	-

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

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

(end)

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
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	Cetyl alcohol as per A/DET0013	A green paint layer at thread end
	Z		Zinc plating to Defense Standard 03-20		-

* 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	17 100	14 150	5 330	4 670
3A	-	31 590	-	17 800	-	6 680
4	47 150	41 330	29 150	25 900	9 780	8 670
5	73 850	64 880	46 050	40 900	15 560	13 960
6	106 300	93 320	70 050	62 250	24 000	21 570
7	144 550	127 100	94 300	78 600	32 900	27 200
8	188 600	165 760	128 100	106 500	44 480	37 100
9	238 850	209 950	161 900	126 100	55 150	44 000
10	294 400	259 330	205 050	170 600	69 830	59 900
12	424 350	-	297 600	-	-	-
14	573 800	-	413 700	-	-	-
16	749 500	-	536 000	-	-	-
18	951 900	-	684 150	-	-	-

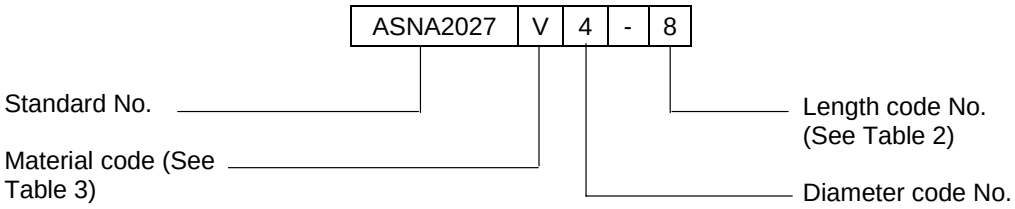
Note : Minimum fatigue loads are equal to 10 % of maximum loads.

5 - DESIGNATION

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

ASNA2027V4-8 , 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 A2027V3-8 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.06.85	Page 2	Manufacturer reference modified for material code V and manufacturer reference added for material code VBV. Page numbering modified.	
L.09.85		Page numbering modified.	
	Page 4	Note modified in MARKING.	
	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.07.87	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).	
	7	Specification No. modified.	
R.09.87	Page 4	Material code VHK added.	BAe request
S.08.88	2	Nominal Ø modified for Ø code No. 10 : 3/4 changed to 5/8.	Mod. 9999
T.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
U.09.89	4	Color modified in english version : "black" changed to "white".	Colors harmony
V.12.89	4	Bolt identification modified for material code V.	437.220/89
W.08.90	6	Diameter code Nos 12, 14, 16 and 18 added. Mass modified.	TF3 - WG1
Y.03.91		Diameter code Nos 9 and 10 : Installation interference added : 138.	Mod. 9999
Z.06.95		Standard fully amended. Dimensions P, J and K modified. Dimension T modified for diameter code Nos 12, 14, 16 and 18. Mass modified in table 1. Manufacturer's specification modified in TECHNICAL SPECIFICATION : No. 294 changed to No. 380. Tensile strength and max. fatigue load modified for diameter code Nos 7, 8, 9 and 10 in titanium. Marking modified.	In accordance with manufacturer's documentation
AA.01.97		Table 3 modified.	Item D01-02 TF3-WG1
AB.03.98		Finish " Zinc plating to Defense Standard 03-20" added in table 3.	Item 05-09 TF3 -WG1
AC.12.99		Material code Z added in table 3. Note "Intermediate ... if necessary" added.	Item 852 TF3-WG1
AD.02.01		Diameter code No. 3A added.	Item 852 TF3-WG1
AE.09.02		“Inactive for new design after Sep. 02, superseded by EN 6115” added.	
AF.02.08		Note added ‘Inactive for Procurement after 31st January 2008’	Request by Airbus Procurement

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