

FED. SUPPLY CLASS

53GP

1. PURPOSE

- 1.1 To establish dimensional and configurational requirements for metric male threaded fasteners of aerospace quality, used primarily for aerospace airframe applications.
- 1.2 For clarification, the term bolts shall be used for all male threaded fasteners for the purpose of this document.
- 1.3 Derivation and origin of all design parameters are included in Section 3.6 of this document. If values for sizes not listed in the tables of this document are necessary, these values shall be computed using the information in Section 3.6.

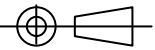
2. SCOPE

- 2.1 To fully define the following requirements for bolts with spline wrenching configuration, hexagonal head, 100° countersunk (flush) head and pan head with all the specific parameters, the following paragraphs are applicable.
- 2.1.1 Head Configuration and Dimensions (See 3.1)
- 2.1.2 Shank Dimensions (See 3.2)
- 2.1.3 Threads (See 3.3)
- 2.1.4 Geometric Control (See 3.4)
- 2.1.5 Surface Texture (See 3.5)
- 2.1.6 Derivation of Parameters (See 3.6)

3. GENERAL REQUIREMENTS

- 3.1 Head Configurations. The following head configurations are defined in this design standard.

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THIRD ANGLE PROJECTION 	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 1
PROCUREMENT SPECIFICATION NONE	TITLE MALE THREADED FASTENERS, METRIC DESIGN, PARAMETERS FOR	CLASSIFICATION DESIGN STANDARD DA0156 SHEET 1 OF 20

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.
1000 WILSON BLVD.
ARLINGTON, VA 22209

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FORM 09-01

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3.1.1 Spline Drive. Splined wrenched bolts shall have a head configuration in accordance with Figure 1 and Table I.

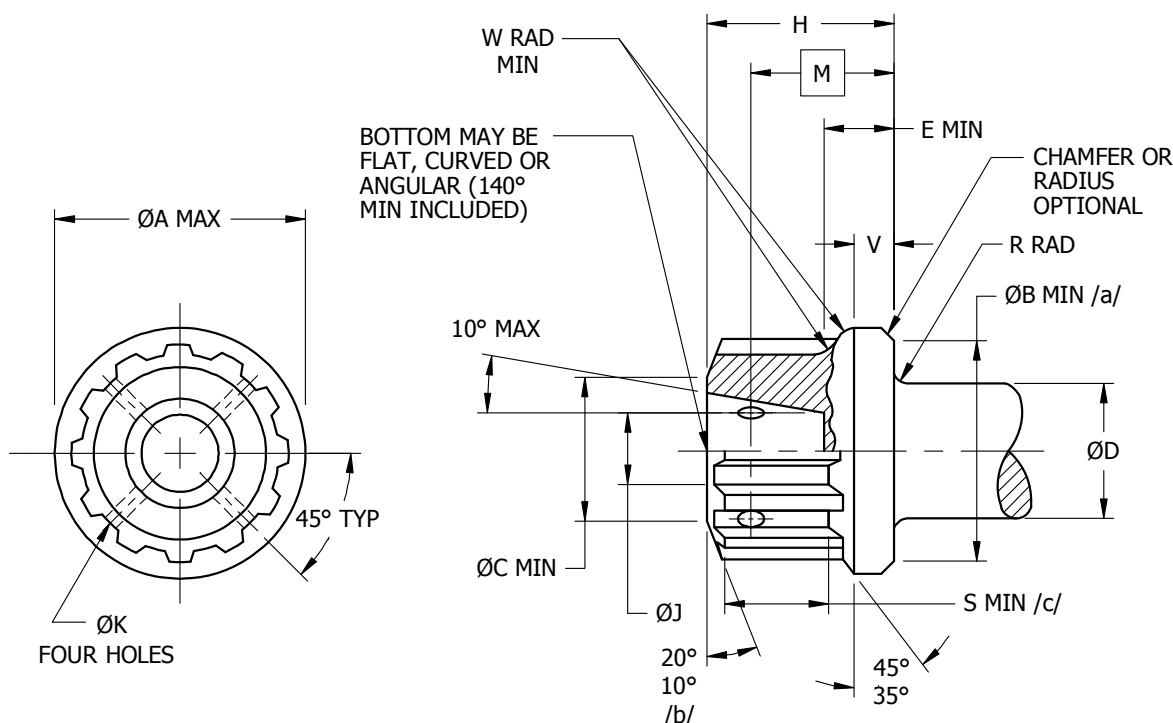


FIGURE 1 – SPLINE DRIVE

TABLE I – SPLINE DRIVE CONFIGURATION

DIA CODE	ØD NOM	WRENCH SIZE NO.	ØA MAX	ØB MIN /a/	ØC MIN	E MIN	H	ØJ	ØK	M BASIC	R RAD	S MIN /c/	V MIN	W RAD MIN
050	5	07	10,2	9,5	5,4	3,5	7,0 6,5	4,2 3,2	1,14 1,00	4,9	0,8 0,6	1,7	1,5	0,5
060	6	08	11,7	11,0	6,4	3,9	7,9 7,4	5,0 4,0	1,54 1,40	5,6	1,0 0,8	2,0	1,7	0,6
080	8	10	14,8	14,0	8,2	4,7	9,0 8,5	6,4 5,4	1,54 1,40	6,7	1,0 0,8	2,5	2,1	0,8
100	10	12	18,4	17,4	10,1	5,9	10,7 10,2	7,8 6,8	1,74 1,60	8,3	1,2 1,0	3,0	2,5	1,0
120	12	14	21,4	20,4	12,9	7,1	11,9 11,4	10,0 9,0	1,74 1,60	9,5	1,4 1,2	3,5	2,9	1,2
140	14	16	24,9	23,9	14,8	7,8	13,3 12,8	11,5 10,5	1,74 1,60	10,9	1,4 1,2	4,0	3,3	1,4
160	16	19	28,4	27,4	17,8	9,0	14,8 14,3	13,7 12,7	1,74 1,60	12,4	1,8 1,6	4,5	3,7	1,6
180	18	21	31,4	30,4	19,5	9,3	15,8 15,3	15,0 14,0	1,74 1,60	13,4	1,8 1,6	5,0	4,1	1,8
200	20	24	34,5	33,4	22,3	10,6	17,8 17,3	17,3 16,3	1,74 1,60	15,4	1,8 1,6	5,5	4,5	2,0

/a/ "ØB" defines minimum bearing face diameter.

/b/ Radius or natural flow of material optional.

/c/ Wrenching configuration per MA1549.

(d) Dimensions in millimeters unless otherwise specified.

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3.1.2 Hexagon Head. Bolts with hexagon heads shall have a head configuration in accordance with Figure 2 and Table II.

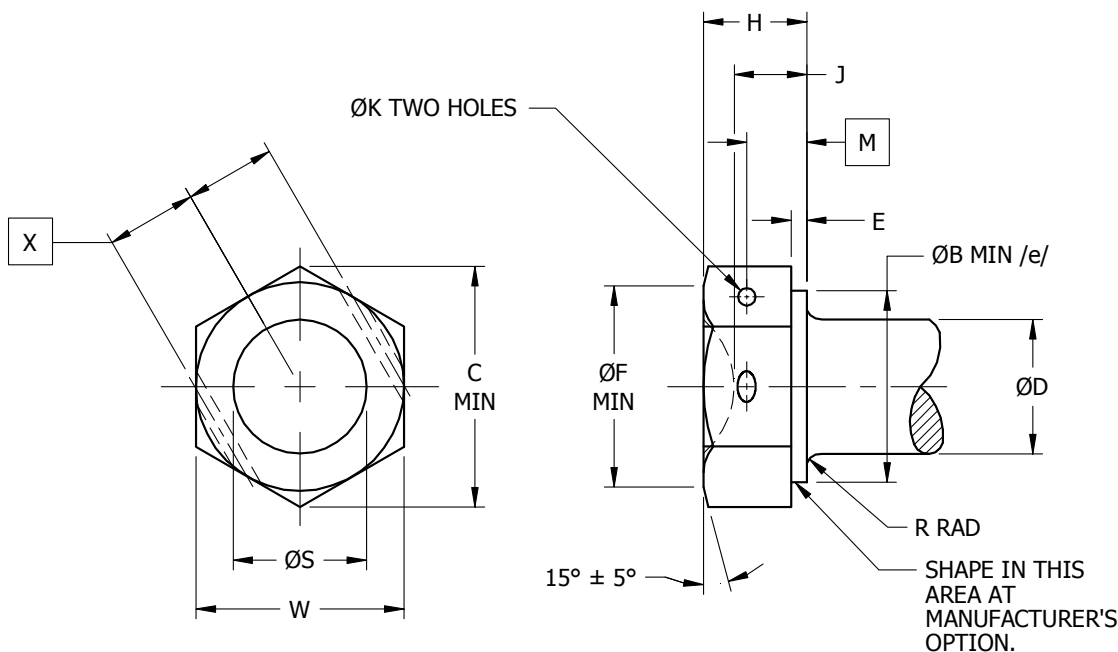


FIGURE 2 – HEXAGON HEAD

TABLE II – HEXAGON HEAD CONFIGURATION

DIA CODE	ØD NOM	ØB MIN /e/	C MIN	E	ØF MIN	H	J	ØK	M BASIC	R RAD	ØS	W	X BASIC
050	5	7,4	8,7	0,5 0,2	7,4	3,0 2,7	2,0 1,7	1,14 1,00	1,35	0,5 0,3	5,25 4,75	8,00 7,85	3,25
060	6	9,3	10,9	0,5 0,2	9,4	3,5 3,2	2,3 2,0	1,54 1,40	1,60	0,7 0,5	6,25 5,75	10,00 9,78	4,10
080	8	12,2	14,3	0,5 0,2	12,3	4,5 4,2	3,0 2,7	1,54 1,40	2,10	0,7 0,5	8,25 7,75	13,00 12,73	5,35
100	10	16,0	18,9	0,6 0,3	16,3	5,0 4,7	3,4 3,1	1,74 1,60	2,35	0,8 0,6	10,25 9,75	17,00 16,73	7,10
120	12	18,0	21,1	0,6 0,3	18,3	6,0 5,7	4,0 3,7	1,74 1,60	2,85	0,9 0,6	12,25 11,75	19,00 18,67	7,90
140	14	21,0	24,5	0,6 0,3	21,3	7,0 6,7	4,7 4,4	1,74 1,60	3,35	1,1 0,8	14,25 13,75	22,00 21,67	9,20
160	16	23,0	26,8	0,6 0,3	23,3	8,0 7,7	5,4 5,1	1,74 1,60	3,85	1,1 0,8	16,25 15,75	24,00 23,67	10,05
180	18	26,0	30,2	0,6 0,3	26,3	9,0 8,7	6,0 5,7	1,74 1,60	4,35	1,3 1,0	18,25 17,75	27,00 26,67	11,30
200	20	29,0	33,6	0,6 0,3	29,3	10,0 9,7	6,7 6,4	1,74 1,60	4,85	1,3 1,0	20,25 19,75	30,00 29,67	12,60

/e/ Washer face diameter shall not exceed actual width across flats, minimum as tabulated.

(f) Dimensions in millimeters unless otherwise specified.

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3.1.3 Countersunk Bolts. Full size countersunk bolts shall have a head configuration in accordance with Figure 3 and Table III.

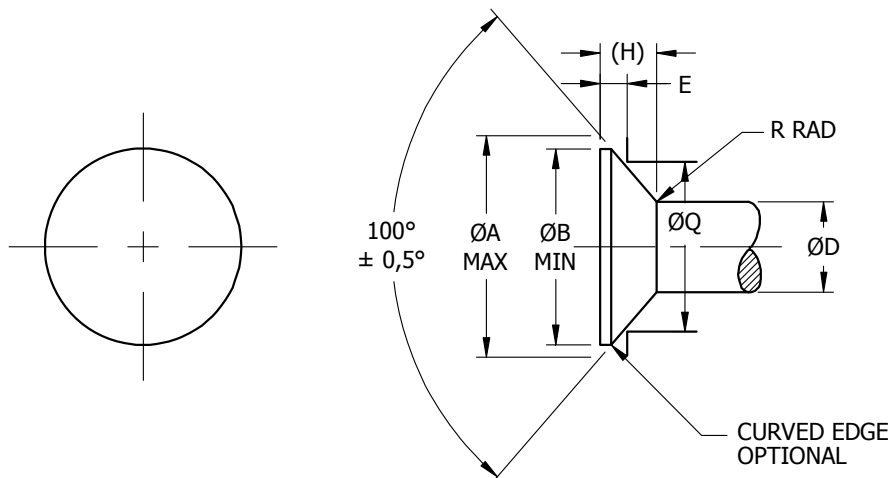


FIGURE 3 – COUNTERSUNK HEAD

TABLE III – COUNTERSUNK HEAD CONFIGURATION

DIA CODE	ØD NOM	ØA MAX	ØB MIN	E GAGE PROT	(H)	ØQ GAGE	R RAD
016	1,6	3,2	2,9	0,30 0,22	0,67	2,505 2,500	0,3 0,1
020	2	4,0	3,6	0,34 0,26	0,84	3,205 3,200	0,3 0,1
025	2,5	5,0	4,5	0,41 0,34	1,05	4,005 4,000	0,3 0,1
030	3	6,0	5,4	0,51 0,43	1,3	4,805 4,800	0,4 0,2
040	4	8,0	7,2	0,63 0,55	1,7	6,505 6,500	0,4 0,2
050	5	10,0	9,0	0,72 0,64	2,1	8,305 8,300	0,5 0,3
060	6	12,0	10,8	0,80 0,72	2,5	10,105 10,100	0,7 0,5
080	8	16,0	14,8	0,93 0,85	3,4	13,805 13,800	0,7 0,5
100	10	20,0	18,8	1,06 0,98	4,2	17,505 17,500	0,8 0,6
120	12	24,0	22,8	1,27 1,19	5,0	21,005 21,000	0,9 0,6
140	14	28,0	26,8	1,48 1,40	5,9	24,505 24,500	1,1 0,8
160	16	32,0	30,8	1,70 1,62	6,7	28,005 28,000	1,1 0,8
180	18	36,0	34,8	1,91 1,83	7,6	31,505 31,500	1,3 1,0
200	20	40,0	38,8	2,12 2,04	8,4	35,005 35,000	1,3 1,0

(g) Dimensions in millimeters unless otherwise specified.

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3.1.4 Pan Head Bolts. Pan Head bolts shall have a head configuration in accordance with Figure 4 and Table IV.

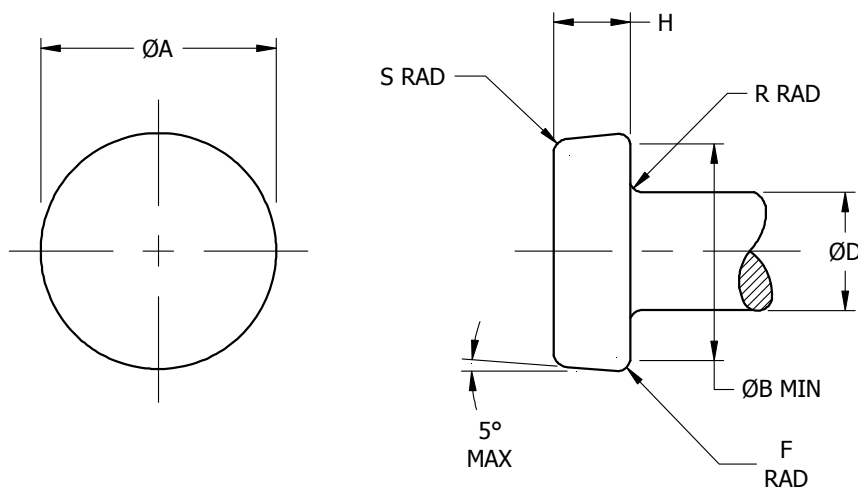


FIGURE 4 – PAN HEAD BOLT

TABLE IV – PAN HEAD CONFIGURATION

DIA CODE	ØD NOM	ØA	ØB BEARING MIN	F RAD	H	R RAD	S RAD
016	1,6	3,2 2,9	2,3	0,3 0,1	1,0 0,8	0,3 0,1	0,6 0,2
020	2	4,0 3,7	3,1	0,3 0,1	1,2 1,0	0,3 0,1	0,8 0,2
025	2,5	5,0 4,7	4,1	0,3 0,1	1,5 1,3	0,3 0,1	1,0 0,3
030	3	6,0 5,7	5,1	0,3 0,1	1,8 1,6	0,4 0,2	1,2 0,3
040	4	8,0 7,7	7,1	0,3 0,1	2,4 2,2	0,4 0,2	1,6 0,4
050	5	10,0 9,7	9,1	0,3 0,1	3,0 2,8	0,5 0,3	2,0 0,5
060	6	12,0 11,7	11,1	0,3 0,1	3,6 3,3	0,7 0,5	2,4 0,6
080	8	16,0 15,7	14,7	0,5 0,2	4,8 4,5	0,7 0,5	3,2 0,8
100	10	20,0 19,7	18,7	0,5 0,2	6,0 5,7	0,8 0,6	4,0 1,0

(h) Dimensions in millimeters unless otherwise specified.

3.2 **Shank Dimensions.** For the purpose of this document the shank dimensions shall apply to tension or shear bolts.

3.2.1 The applicable shank diameter tolerances listed below shall apply to coated or non-coated bolts, ready for use.

3.2.1.1 Shank diameter tolerance of non-coated bolts shall be of tolerance Grade f7 in accordance with ASME B4.2, ISO/R286-1 or ISO/R286-2. See Table V for actual values.

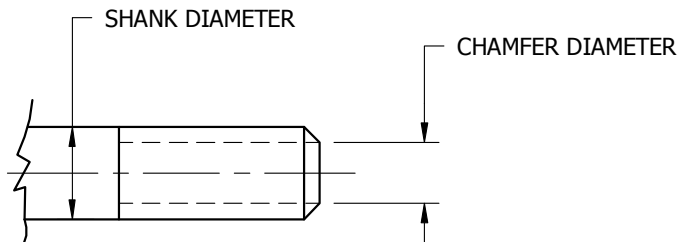


FIGURE 5 – SHANK

TABLE V – SHANK DIMENSIONS

THREAD SIZE	SHANK DIAMETER OF NON-COATED BOLTS WITH f7 TOLERANCE (mm)	CHAMFER DIAMETER (mm)
1,6 x 0,35	1,594 – 1,584	1,1 – 0,6
2 x 0,4	1,994 – 1,984	1,4 – 0,9
2,5 x 0,45	2,494 – 2,484	1,9 – 1,4
3 x 0,5	2,994 – 2,984	2,3 – 1,8
4 x 0,7	3,990 – 3,978	3,0 – 2,5
5 x 0,8	4,990 – 4,978	4,0 – 3,5
6 x 1	5,990 – 5,978	4,7 – 4,2
8 x 1	7,987 – 7,972	6,7 – 6,2
10 x 1,25	9,987 – 9,972	8,4 – 7,9
12 x 1,25	11,984 – 11,966	10,4 – 9,9
14 x 1,5	13,984 – 13,966	12,0 – 11,5
16 x 1,5	15,984 – 15,966	14,0 – 13,5
18,5 x 1,5	17,984 – 17,966	16,0 – 15,5
20 x 1,5	19,980 – 19,959	18,0 – 17,5

3.2.1.2 Shank diameter of coated bolts shall have tolerances of those listed in Table VI.

TABLE VI – SHANK DIAMETER TOLERANCES

NOMINAL DIAMETER (mm)	≥3	>6	>10	>18	>30
	≤6	≤10	≤18	≤30	
TOLERANCE (mm)	-0,010	-0,013	-0,016	-0,020	f7
	-0,035	-0,038	-0,041	-0,045	

3.2.2 Thread ends shall be chamfered 45° approximately from chamfer diameter. Chamfer diameters shall be in accordance with those listed in Table V.

3.2.3 Grip length increments for grip type bolts shall be those listed in Table VII.

TABLE VII – GRIP LENGTH INCREMENT

GRIP LENGTH	INCREMENT (mm)
< 100	2
≥ 100	4

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