STANDARD

SAE J548d

APPROVED AS ANSI/SAE J548d-1978
BY AMERICAN NATIONAL
STANDARDS INSTITUTE

Spark Plugs —SAE J548d

SPONSORED BY:
SOCIETY OF AUTOMOTIVE ENGINEERS, INC.

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Reports of Miscellaneous Division approved January 1915, Aircraft Division approved March 1918, Motorcycle Division approved August 1919, Electrical Equipment Division approved May 1930, and completely revised by Electrical Equipment Committee July 1977.

Scope and Purpose—This SAE Standard applies only to spark plugs used for ground vehicles and stationary engines.

This standard is intended to serve as a guide to dimensions common to the majority of current production spark plugs and future applications. It is not the intent of this standard to prohibit the manufacture of spark plugs having dimensions differing from those presented. Many applications exist which require specialized or nonstandard spark plugs. It is recommended that this standard be used in spark plug design and engine applications wherever possible. Whenever design situations arise that prevent the use of one of these standard spark plugs, a spark plug manufacturer should be contacted for guidance.

The figures and tables show typical configurations of unshielded and shielded spark plug designs, their dimensional characteristics, installation, threaded hole and spark plug thread sizes.

Thread Gages—In order to keep the wear on threading tools within permissible limits, the threads on the spark plug GO (ring) gage shall be truncated to the maximum minor diameter of the spark plug, and the tapped hole GO (plug) gage to the minimum major diameter of the tapped hole. The plain plug gage for checking the minor diameter of the tapped hole shall be the minimum specified.

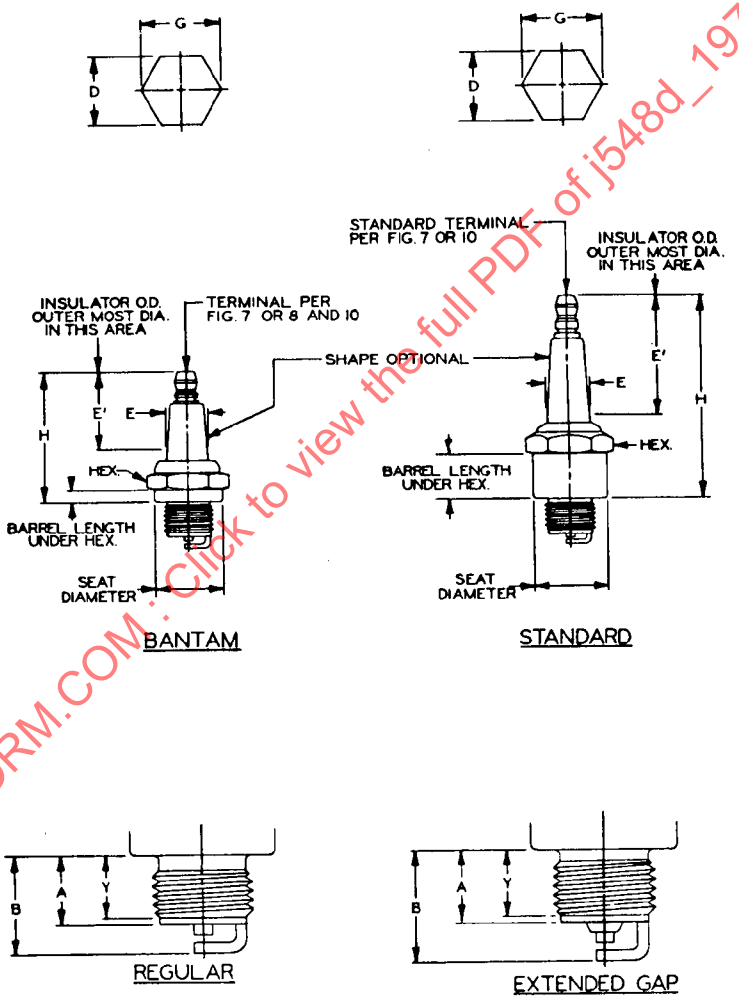

FIG. 1—FLAT SEAT SPARK PLUGS (SEE TABLE 1)

The φ symbol is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

TABLE 1—FLAT SEAT SPARK PLUGS (FIG. 1), mm (in)

Dimension	M14 x 1.25 Standard Installed Height				M14 x 1.25 Bantam Installed Height
	Short Reach	Intermediate Reach	Normal Reach	Long Reach	
A, plug reach, nom[a,b]	9.53 (0.375)	11.13 (0.438)	12.70 (0.500)	19.00 (0.748)	9.53 (0.375)
B, plug depth regular, max[a,b]	13.60 (0.535)	14.27 (0.562)	17.80 (0.700)	24.40 (0.960)	13.60 (0.535)
B, plug depth, extended gap, max[a,b]	17.20 (0.677)	17.45 (0.687)	21.00 (0.830)	27.00 (1.060)	16.00 (0.630)
Y, threaded length, nom[a]	9.02 (0.355)	10.13 (0.399)	11.71 (0.461)	18.00 (0.709)	9.02 (0.355)
Hex size:					
D, across flats	20.80–20.40 (0.819–0.803)	20.80–20.40 (0.819–0.803)	20.80–20.40 (0.819–0.803)	20.80–20.40 (0.819–0.803)	19.00–18.80 (0.748–0.740)
G, across corners, min	23.00 (0.905)	23.00 (0.905)	23.00 (0.905)	23.00 (0.905)	21.01 (0.827)
Barrel length under hex, min	11.40[c] (0.450)[c]	11.20 (0.440)	10.00 (0.394)	10.00 (0.394)	2.92 (0.115)
Seat dia max	20.80 (0.820)	20.80 (0.820)	20.80 (0.820)	20.80 (0.820)	19.00 (0.748)
Insulator, max E, dia	12.70 (0.500)	12.70 (0.500)	12.70 (0.500)	12.70 (0.500)	12.70 (0.500)
E[1], length	33.00 (1.300)	33.00 (1.300)	33.00 (1.300)	33.00 (1.300)	24.10 (0.950
H, installed height, max	68.00 (2.677)	68.00 (2.677)	68.00 (2.677)	68.00 (2.677)	46.00 (1.810)

Dimension	M12 x 1.25 Standard Installed Height		M10 x 1.0 Standard Installed Height	
	Normal Reach	Long Reach	Normal Reach	Long Reach
A, plug reach, nom[d]	12.70 (0.500)	19.00 (0.748)	12.70 (0.500)	19.00 (0.748)
B, plug depth regular, max[d]	15.80 (0.622)	22.35 (0.880)	15.80 (0.622)	22.35 (0.880)
B, plug depth (extended gap) max[d]	19.00 (0.748)	25.00 (0.984)	19.00 (0.748)	25.00 (0.984)
Y, threaded length, nom[d]	11.71 (0.461)	18.00 (0.709)	11.71 (0.461)	18.00 (0.709)
Hex size:				
D, across flats	17.50–17.20 (0.689–0.677)	17.50–17.20 (0.689–0.677)	15.95–15.62 (0.628–0.615)	15.95–15.62 (0.628–0.615)
G, across corner, min	19.51 (0.768)	19.51 (0.768)	17.65 (0.695)	17.65 (0.695)
Barrel length under hex, min	6.00 (0.236)	6.00 (0.236)	6.00 (0.236)	6.00 (0.236)
Seat dia, max	17.50 (0.689)	17.50 (0.689)	15.95 (0.628)	15.95 (0.628)
Insulator dia, max:				
E, dia	11.00 (0.433)	11.00 (0.433)	11.00 (0.433)	11.00 (0.433)
E[1], length	33.00 (1.300)	33.00 (1.300)	33.00 (1.300)	33.00 (1.300)
H, installed height, max	61.00 (2.400)	61.00 (2.400)	61.00 (2.400)	61.00 (2.400)

Note: See Table 5 for installation torque and gasket thickness.

[a] After tightening the spark plugs with a torque of 38 N·m (28 lb-ft) (threads clean and dry), the gasket must be 1.02–1.52 mm (0.045–0.057 in) thickness. If the thickness of the gasket is outside these dimensions, a corresponding adjustment to dimensions A, B, and Y must be made.

[b] Dimensions A and B may be adjusted for some types of plugs.

[c] Where barrel length under hex requires 11.40 mm (0.450 in), check with engine manufacturer.

[d] After tightening the spark plugs with a torque of 15 N·m (11 lb-ft) (threads clean and dry), the gasket must be 0.97–1.22 mm (0.038–0.048 in) thickness. If the thickness of the gasket is outside these dimensions, a corresponding adjustment to dimensions A, B, and Y must be made.

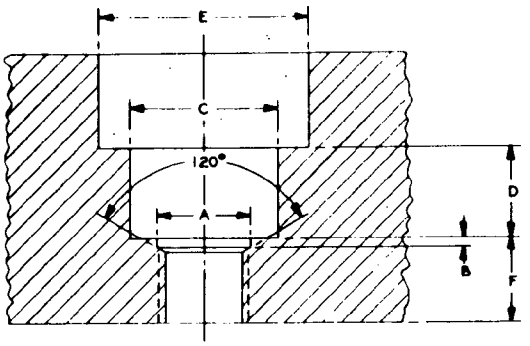

FIG. 2–HEAD COUNTERBORE–FLAT SEAT (SEE TABLE 2)

TABLE 2–HEAD COUNTERBORE–FLAT SEAT (FIG. 2) mm (in)

M Thread Size and Reach	A Min	B Nom	C Min	D Max	E Min	F Min
M14 x 1.25 Bantam installed height	14.25 (0.561)	1.24 (0.049)	20.00 (0.787)	2.03 (0.080)	29.00 (1.142)	8.46 (0.333)
M14 x 1.25 Standard installed height						
Short reach	14.25 (0.561)	1.24 (0.049)	22.00 (0.866)	10.21 (0.402)	31.00 (1.220)	8.46 (0.333)
Intermediate reach	14.25 (0.561)	1.24 (0.049)	22.00 (0.866)	10.21 (0.402)	31.00 (1.220)	10.03 (0.395)
Normal reach	14.25 (0.561)	1.24 (0.049)	22.00 (0.866)	9.00 (0.354)	31.00 (1.220)	11.63 (0.458)
Long reach	14.25 (0.561)	1.24 (0.049)	22.00 (0.866)	9.00 (0.354)	31.00 (1.220)	18.00 (0.709)
M12 x 1.25 installed height						
Normal reach	12.24 (0.482)	1.24 (0.049)	18.49 (0.728)	5.00 (0.197)	29.00 (1.142)	11.63 (0.458)
Long reach	12.24 (0.482)	1.24 (0.049)	18.49 (0.728)	5.00 (0.197)	29.00 (1.142)	18.00 (0.709)
M10 x 1.00 installed height						
Normal reach	10.37 (0.408)	1.00 (0.039)	17.02 (0.670)	5.00 (0.197)	25.00 (0.984)	11.63 (0.458)
Long reach	10.37 (0.408)	1.00 (0.039)	17.02 (0.670)	5.00 (0.197)	25.00 (0.984)	18.00 (0.709)

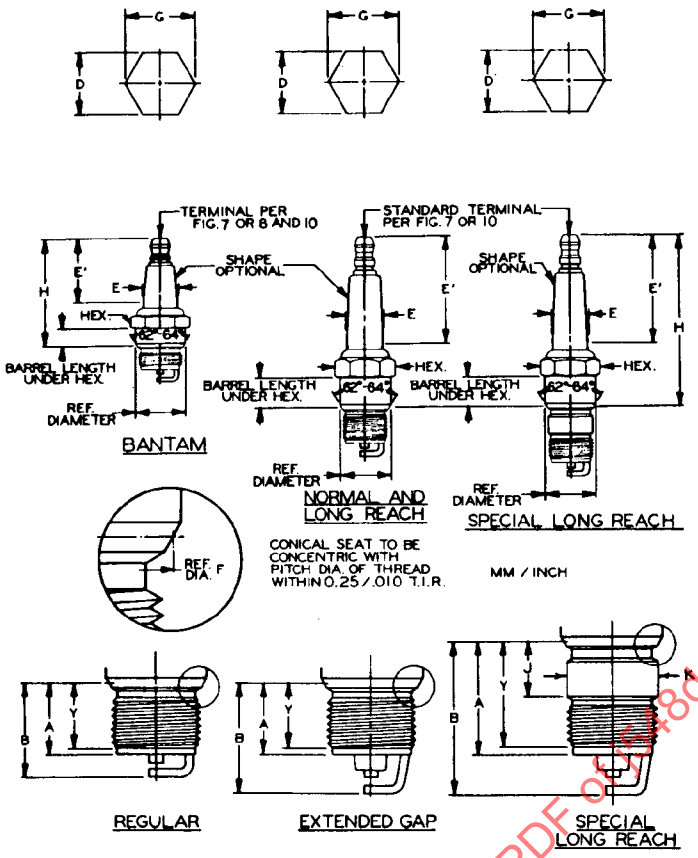

FIG. 3–CONICAL SEAT SPARK PLUGS (SEE TABLE 3)

TABLE 3–CONICAL SEAT SPARK PLUG DIMENSIONS (FIG. 3), mm (in)

Dimension	M14 x 1.25 Bantam Installed Height	M14 x 1.25 Standard Installed Height	
	Short Reach	Normal Reach	Long Reach
F, reference dia	14.81 (0.583)	14.81 (0.583)	14.81 (0.583)
A, plug reach, nom[a]	7.80 (0.307)	11.00 (0.433)	17.50 (0.689)
B, plug depth regular, max[a]	11.90 (0.470)	16.30 (0.640)	22.90 (1.020)
B, plug depth extended gap, max[a]	14.00 (0.550)	19.30 (0.760)	25.80 (1.020)
Y, threaded length, nom	7.29 (0.287)	10.21 (0.402)	16.48 (0.649)
Hex size:			
D, across flats	15.95–15.62 (0.628–0.615)	15.95–15.62 (0.628–0.615)	15.95–15.62 (0.628–0.615)
G, across corners, min	17.65 (0.695)	17.65 (0.695)	17.65 (0.695)
Barrel length under hex, min[a]	3.00 (0.120)	8.40 (0.330)	8.40 (0.330)
Seat dia	15.95–15.49 (0.628–0.610)	15.95–15.49 (0.628–0.610)	15.95–15.49 (0.628–0.610)
Insulator max:			
E, dia	11.00 (0.433)	11.00 (0.433)	11.00 (0.433)
E^1, length	24.00 (0.940)	33.00 (1.300)	33.00 (1.300)
H, Installed height, max	38.00 (1.500)	63.00 (2.480)	63.00 (2.480)

[a]Dimensions A and B may be adjusted for some types of plugs.

Dimension	M14 x 1.25 Bantam Installed Height	M18 x 1.5 Standard Installed Height	
	Special Long Reach	Normal Reach	Special Long Reach
F, reference dia	14.81 (0.583)	19.00 (0.748)	19.00 (0.748)
A, plug reach, nom[a,b]	17.3 (0.681)	10.90 (0.429)	23.83 (0.938)
B, plug depth, regular, max[a,b]	22.90 (0.900)	18.00 (0.709)	30.23 (1.190)
B, plug depth, extended gap, max[a,b]	25.80 (1.020)	20.00 (0.790)	32.00 (1.260)
Y, seat to end of thread, nom	16.49 (0.649)	10.21 (0.402)	22.80 (0.898)
J, plug reach, unthreaded barrel, nom	8.36 (0.329)		12.97 (0.511)
Hex Size:			
D, across flats	15.95–15.62 (0.628–0.615)	20.80–20.40 (0.819–0.803)	20.80–20.40 (0.819–0.803)
G, across corners, min	17.65 (0.695)	23.00 (0.906)	23.00 (0.906)
Barrel length under hex	9.10 (0.358)	13.49 (0.531)	14.48 (0.570)
Seat dia	15.95–15.49 (0.628–0.610)	20.19–19.89 (0.795–0.783)	20.19–19.89 (0.795–0.783)
Insulator, max			
E, dia	11.00 (0.433)	12.70 (0.500)	12.70 (0.500)
E^1, length	33.00 (1.300)	33.00 (1.300)	33.00 (1.300)
H, installed height	63.00 (2.480)	68.00 (2.680)	63.00 (2.680)

[a]Lengths are to the reference diameter. See Fig. 3.
[b]Dimension A may be increased for some types of plugs.

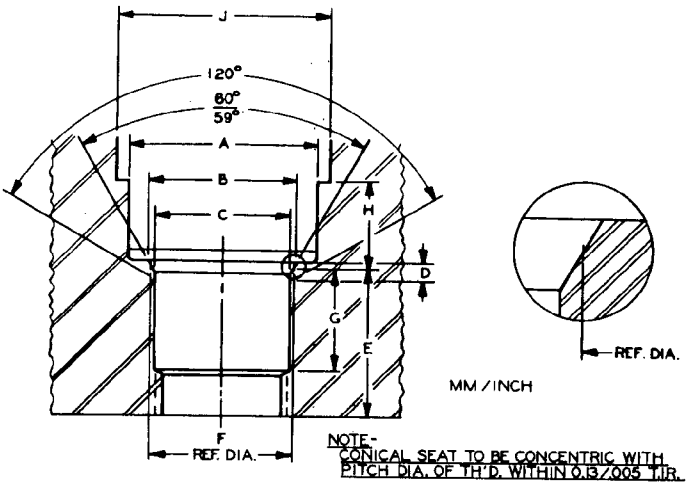

FIG. 4–HEAD COUNTERBORE–CONICAL SEAT (SEE TABLE 4)

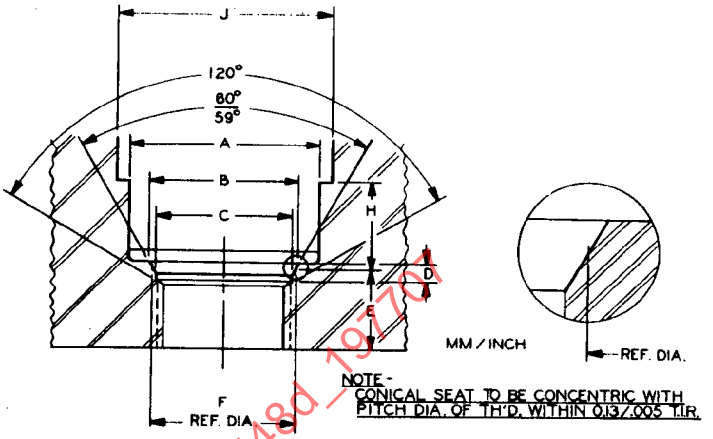

FIG. 5–HEAD COUNTERBORE–CONICAL SEAT (SPECIAL LONG REACH) (SEE TABLE 4)

TABLE 4–HEAD COUNTERBORE–CONICAL SEAT (FIGS. 4 and 5) mm (in)

Thread Size and Reach	A Min	B Tolerance	C Tolerance	D Tolerance	E Min	F Nom	Ga Max	Ha Max	J Min
M14, short	17.50 (0.689)	15.39–15.09 (0.606–0.594)	14.40–14.25 (0.567–0.561)	2.29–2.03 (0.090–0.080)	7.82 (0.308)	14.81 (0.583)	b	2.03 (0.080)	25.00 (0.984)
M14, normal	17.50 (0.689)	15.39–15.09 (0.606–0.594)	14.40–14.25 (0.567–0.561)	2.29–2.03 (0.090–0.080)	11.25 (0.443)	14.81 (0.583)	b	7.10 (0.280)	25.00 (0.984)
M14, long	17.50 (0.689)	15.39–15.09 (0.606–0.594)	14.40–14.25 (0.567–0.561)	2.29–2.03 (0.090–0.080)	17.55 (0.691)	14.81 (0.583)	b	7.10 (0.280)	25.00 (0.984)
M18, normal	22.00 (0.866)	19.81–19.56 (0.780–0.770)	18.39–18.24 (0.724–0.718)	2.29–2.03 (0.090–0.080)	11.20 (0.441)	19.00 (0.748)	b	9.00 (0.354)	31.00 (1.220)
M14, special long	17.50 (0.690)	15.50–15.00 (0.610–0.591)	14.35–14.22 (0.565–0.560)	2.29–2.03 0.090–0.080)	b	14.81 (0.583)	18.05 (0.710)		28.00 (1.100)
M18, special long	22.35 (0.880)	19.81–19.56 (0.780–0.770)	18.42–18.29 (0.725–0.720)	2.29–2.03 (0.090–0.080)		19.13 (0.753)	24.16 (0.951)	11.18 (0.440)	28.45 (1.120)

[a] Lengths are to the reference diameter. See Figs. 4 and 5 as applicable.
[b] Dimension not applicable.

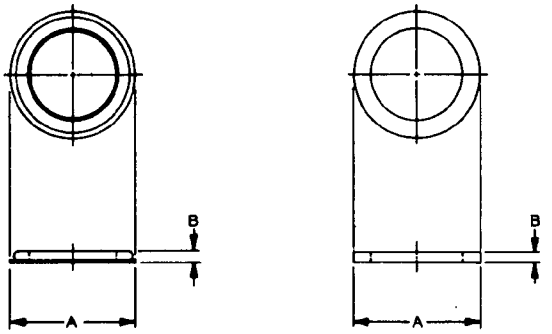

FIG. 6–GASKETS (SEE TABLE 5)

TABLE 5–INSTALLATION TORQUE AND COMPRESSED GASKET DIMENSIONS (SEE FIG. 6) mm (in)

Plug Size	CAST IRON HEADS			ALUMINUM HEADS		
	Installation Torque N·m (lb-ft)	Compressed Gasket Thickness mm (in) B dim	Gasket OD Maximum mm (in) A dim	Installation Torque N·m (lb-ft)	Compressed Gasket Thickness mm (in) B dim	Gasket OD Maximum mm (in) A dim
M14, folded steel	35–40 (26–30)	1.14–1.45 (0.045–0.057)	20.83 (0.820)	20–30 (15–22)	1.14–1.50 (0.045–0.059)	20.83 (0.820)
solid copper	35–40 (26–30)	1.37 (0.054)	20.83 (0.820)	20–30 (15–22)	1.37 (0.054)	20.83 (0.820)
M18 folded steel	43–52 (32–38)	1.22–1.45 (0.048–0.057)	25.15 (0.990)	38–46 (28–34)	1.09–1.40 (0.043–0.055)	25.15 (0.990)
solid copper	43–52 (32–38)	1.96 (0.077)	24.59 (0.968)	38–46 (28–34)	2.01 (0.079)	24.51 (0.965)
M12 folded steel	15–25 (11–18)	1.00–1.45 (0.040–0.057)	16.51 (0.650)	15–25 (11–18)	1.00–1.45 (0.040–0.057)	16.51 (0.650)
M10 folded steel	10–15 (7–11)	1.00–1.45 (0.040–0.057)	14.73 (0.580)	10–15 (7–11)	1.00–1.37 (0.040–0.054)	14.73 (0.580)
M14 conical seat (gasketless)	9–20 (7–15) service[a]			9–20 (7–15) service[a]		
M18 conical seat (gasketless)	20–27 (15–20) service[a]			20–27 (15–20) service[a]		

[a]Consult with engine manufacturer for original installation in engines. Without torque wrench, 1/16 turn after finger tight.

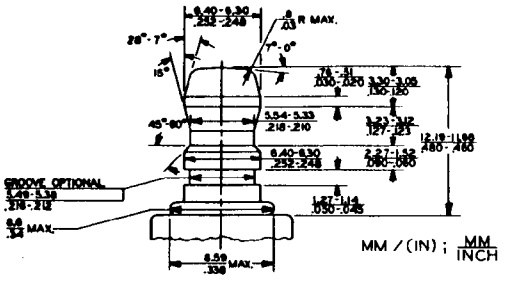

FIG. 7–SOLID POST TYPE

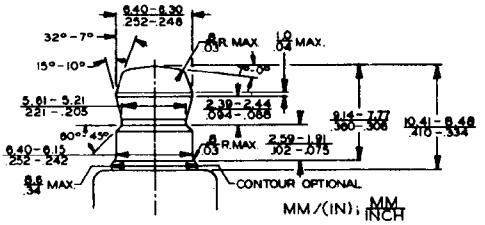

FIG. 8–ALTERNATE BANTAM SPARK PLUG SOLID POST TYPE

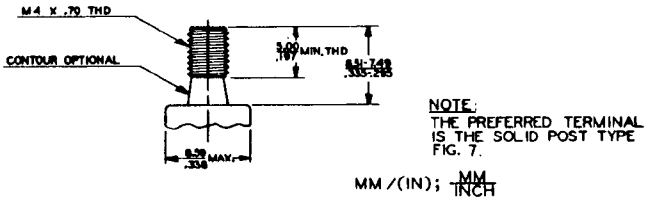

FIG. 9–THREADED POST (SEE TABLE 6)

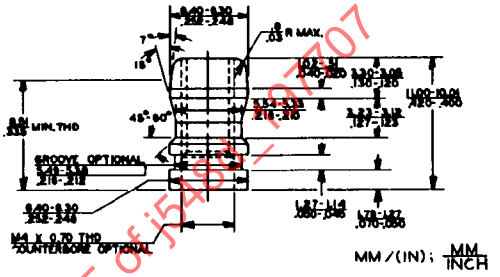

FIG. 10–NUT TYPE FOR THREADED POST (SEE TABLE 6)

TABLE 6–SPARK PLUG AND TAPPED HOLE THREAD SIZES, mm (in)
Installation and Terminals

Size		Major Dia		Pitch Dia		Minor Dia		Go Thread Ring Gage Minor Dia	Go Thread Plug Gage Major Dia	Plain Plug Gage Minor Dia Min
		Max	Min	Max	Min	Max	Min			
M18 x 1.5	Plug	17.955 (0.7069)	17.803 (0.7009)	16.980 (0.6685)	16.853 (0.6635)	16.053 (0.6320)		16.053 (0.6320)		
	Hole		18.039 (0.7102)	17.153 (0.6753)	17.026 (0.6703)	16.426 (0.6467)	16.266 (0.6404)		18.039 (0.7102)	16.266 (0.6404)
M14 x 1.25	Plug	13.868 (0.5460)	13.741 (0.5410)	13.104 (0.5159)	12.997 (0.5117)	12.339 (0.4858)		12.339 (0.4858)		
	Hole		14.034 (0.5525)	13.297 (0.5235)	13.188 (0.5192)	12.692 (0.4997)	12.499 (0.4921)		14.034 (0.5525)	12.499 (0.4921)
M12 x 1.25	Plug	11.862 (0.4670)	11.735 (0.4620)	11.100 (0.4370)	10.998 (0.4330)	10.211 (0.4020)		10.211 (0.4020)		
	Hole		11.935 (0.4699)	11.242 (0.4426)	11.138 (0.4385)	10.559 (0.4157)	10.366 (0.4081)		11.935 (0.4699)	10.366 (0.4081)
M10 x 1.0	Plug	9.974 (0.3927)	9.794 (0.3856)	9.324 (0.3671)	9.212 (0.3627)	8.747 (0.3444)		8.747 (0.3444)		
	Hole		10.000 (0.3937)	9.500 (0.3740)	9.350 (0.3681)	9.153 (0.3604)	8.917 (0.3511)		10.000 (0.3937)	8.917 (0.3511)
M4 x 0.7	Term.	3.944 (0.1553)	3.804 (0.1498)	3.489 (0.1374)	3.399 (0.1338)	3.085 (0.1215)		3.085 (0.1215)		
	Nut		4.000 (0.1575)	3.663 (0.1442)	3.545 (0.1396)	3.422 (0.1347)	3.242 (0.1276)		4.000 (0.1575)	