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SAE J548 AUG87

Spark Plugs

**SAE Standard
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**Submitted for Recognition as
an American National Standard**

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SPARK PLUGS

1. **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.

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TABLE 1 - FLAT SEAT SPARK PLUGS (Fig. 1) mm (in)

Dimension	M14 x 1.25 (Preferred)				
	Short Reach	Normal Reach	Long Reach	Special Long Reach	Bantam
A, plug reach, nom. ^a	9.53 (0.375)	12.70 (0.500)	19.00 (0.748)	19.00 (0.748)	9.53 (0.375)
B, plug depth, max. ^{a,b} (retracted insulator)	13.60 (0.535)	17.80 (0.701)	24.40 (0.960)		13.60 (0.535)
B, plug depth, max. ^{a,b} (projected insulator)	17.20 (0.677)	21.00 (0.827)	27.00 (1.063)	27.00 (1.063)	16.00 (0.630)
Y, threaded length, ^a max.	9.02 (0.355)	11.70 (0.461)	18.00 (0.709)	18.00 (0.709)	9.02 (0.355)
Hex size:					
D, across flats	20.40-20.80 (0.803-0.819)	20.40-20.80 (0.803-0.819)	20.40-20.80 (0.803-0.819)	15.73-15.95 (0.619-0.628)	18.80-19.00 (0.740-0.748)
G, across corners, min.	23.00 (0.906)	23.00 (0.906)	23.00 (0.906)	17.50 (0.689)	21.00 (0.827)
L, Hex Length, min.	4.00 (0.157)	4.00 (0.157)	4.00 (0.157)	4.00 (0.157)	3.00 (0.118)
Barrel length under hex, min.	11.40 ^c (0.449)	10.00 (0.394)	10.00 (0.394)	8.75 (0.344)	3.00 (0.118)
Seat dia., max.	20.80 (0.819)	20.80 (0.819)	20.80 (0.819)	19.00 (0.748)	19.00 (0.748)
Insulator E, dia. ^d	11.90-12.50 (0.469-0.492)	11.90-12.50 (0.469-0.492)	11.90-12.50 (0.469-0.492)	10.20-10.80 (0.402-0.425)	11.90-12.50 (0.469-0.492)
E', length ^d	33.00 (1.299)	33.00 (1.299)	33.00 (1.299)	33.00 (1.299)	24.00 (0.945)
E'', length ^d	29.00 (1.142)	29.00 (1.142)	29.00 (1.142)	29.00 (1.142)	20.00 (0.787)
H, installed height, max.	68.00 (2.677)	68.00 (2.677)	68.00 (2.677)	50.50-53.50 ^e (1.988-2.106)	46.00 (1.811)

TABLE 1 - continued

Dimension	M12 x 1.25		M10 x 1.0	
	Normal Reach	Long Reach	Normal Reach	Long Reach
A, plug reach, nom. ^a	12.70 (0.500)	19.00 (0.748)	12.70 (0.500)	19.00 (0.748)
B, plug depth, max. ^{a,b} (retracted insulator)	15.80 (0.622)	22.35 (0.880)	15.80 (0.622)	22.35 (0.880)
B, plug depth, max. ^{a,b} (projected insulator)	19.00 (0.748)	27.00 (1.063)	19.00 (0.748)	25.00 (0.984)
Y, threaded length, ^a max.	11.70 (0.461)	18.00 (0.709)	11.70 (0.461)	18.00 (0.709)
Hex size:				
D, across flats	15.73-15.95 (0.619-0.628)	15.73-15.95 (0.619-0.628)	15.73-15.95 (0.619-0.628)	15.73-15.95 (0.619-0.628)
G, across corners, min.	17.50 (0.689)	17.50 (0.689)	17.50 (0.689)	17.50 (0.689)
L, Hex Length, min.	4.00 (0.157)	4.00 (0.157)	4.00 (0.157)	4.00 (0.157)
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 E, dia. ^d	10.20-10.80 (0.402-0.425)	10.20-10.80 (0.402-0.425)	10.20-10.80 (0.402-0.425)	10.20-10.80 (0.402-0.425)
E', length ^d	33.00 (1.299)	33.00 (1.299)	33.00 (1.299)	33.00 (1.299)
E'', length ^d	29.00 (1.142)	29.00 (1.142)	29.00 (1.142)	29.00 (1.142)
H, installed height, max.	61.00 (2.402)	61.00 (2.402)	61.00 (2.402)	61.00 (2.402)

Notes:

- a - Dimensions A, B and Y include a compressed outside gasket 1.25 mm (0.049 in) thick after torquing at the maximum value recommended in Table 5. If gasket thickness is different than 1.25 mm (0.049 in), 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 (0.449 in), check with engine manufacturer.
- d - Between the reference lines E' and E'', the maximum insulator diameter shall be defined by E. If threaded terminals are used without knurl nuts, subtract 3 mm (0.118 in) from the values shown for E' and E''.
- e - Installed height includes compressed outside gasket of 1.25 mm (0.049 in) thickness.

* * *



TABLE 2 - HEAD COUNTERBORE - FLAT SEAT (Fig. 2) mm (in)

M Thread Size and Reach	A Tolerance	B Max.	C Min.	D Max.	E Min.	Fb Min.
M14 x 1.25 Standard:						
Short reach	14.25-14.50 (0.561-0.571)	1.70 (0.067)	22.00 (0.866)	10.20 (0.402)	31.00 (1.220)	8.46 (0.333)
Normal reach	14.25-14.50 (0.561-0.571)	1.70 (0.067)	22.00 (0.866)	9.00 (0.354)	31.00 (1.220)	11.63 (0.458)
Long reach	14.25-14.50 (0.561-0.571)	1.70 (0.067)	22.00 (0.866)	9.00 (0.354)	31.00 (1.220)	18.00 (0.709)
Special Long Reach	14.25-14.50 (0.561-0.571)	1.70 (0.067)	21.20 (0.835)	3.00 (0.118)	24.00 (0.945)	18.00 (0.709)
M14 x 1.25 Bantam	14.25-14.50 (0.561-0.571)	a	a	a	a	8.46 (0.333)
M12 x 1.25:						
Normal reach	12.24-12.50 (0.482-0.492)	1.70 (0.067)	19.00 (0.748)	5.00 (0.197)	29.00 (1.142)	11.63 (0.458)
Long reach	12.24-12.50 (0.482-0.492)	1.70 (0.067)	19.00 (0.748)	5.00 (0.197)	29.00 (1.142)	18.00 (0.709)
M10 x 1.00:						
Normal reach	10.37-10.50 (0.408-0.413)	1.00 (0.039)	17.02 (0.670)	5.00 (0.197)	25.00 (0.984)	11.63 (0.458)
Long reach	10.37-10.50 (0.408-0.413)	1.00 (0.039)	17.02 (0.670)	5.00 (0.197)	25.00 (0.984)	18.00 (0.709)

a - Dimension does not apply.

b - This F dimension shall be of sufficient length to ensure that the end of the spark plug thread does not project into the combustion chamber at any point when the gasket is tightened to maximum compression.

TABLE 3 - CONICAL SEAT SPARK PLUG DIMENSIONS (Fig. 3) mm (in)

Dimension	M14x1.25			M18x1.5	
	Bantam	Standard		Standard	
	Short Reach	Normal Reach	Long Reach	Normal Reach	Special Long Reach
F, reference dia.	14.80 (0.583)	14.80 (0.583)	14.80 (0.583)	19.00 (0.748)	19.00 (0.748)
A, plug reach, nom. ^a	7.80 (0.307)	11.20 (0.441)	17.50 (0.689)	10.90 (0.429)	23.83 (0.938)
B, plug depth, max. ^a (retracted ins.)	11.90 (0.469)	16.30 (0.642)	22.90 (0.902)	18.00 (0.709)	30.23 (1.190)
B, plug depth, max. ^a (projected ins.)	14.00 (0.551)	19.00 (0.748)	25.00 (0.984)	20.00 (0.787)	32.00 (1.260)
Y, threaded length, max.	7.29 (0.287)	10.20 (0.402)	16.48 (0.649)	9.90 (0.390)	22.80 (0.898)
Hex size:					
D, across flats	15.73-15.95 (0.619-0.628)	15.73-15.95 (0.619-0.628)	15.73-15.95 (0.619-0.628)	20.40-20.80 (0.803-0.819)	20.40-20.80 (0.803-0.819)
G, across corners, min.	17.50 (0.689)	17.50 (0.689)	17.50 (0.689)	23.00 (0.906)	23.00 (0.906)
L, Hex length, min.	3.00 (0.118)	4.00 (0.157)	4.00 (0.157)	4.00 (0.157)	4.00 (0.157)
Barrel length under hex, min.	3.00 (0.118)	8.40 (0.330)	8.40 (0.330)	12.00 (0.472)	14.48 (0.570)
Seat dia.	15.49-15.95 (0.610-0.628)	15.49-15.95 (0.610-0.628)	15.49-15.95 (0.610-0.628)	19.90-20.80 (0.783-0.819)	19.90-20.80 (0.783-0.819)

continued

TABLE 3 - continued

Dimension	M14x1.25			M18x1.5	
	Bantam	Standard		Standard	
	Short Reach	Normal Reach	Long Reach	Normal Reach	Special Long Reach
J, unthreaded length below conical seat, max	b	b	b	b	13.84 (0.545)
K, unthreaded dia. below conical seat, max.	b	b	b	b	17.93 (0.706)
Insulator:					
E, dia. ^c	10.20-10.80 (0.402-0.425)	10.20-10.80 (0.402-0.425)	10.20-10.80 (0.402-0.425)	11.90-12.50 (0.469-0.492)	11.90-12.50 (0.469-0.492)
E', length ^c	24.00 (0.945)	33.00 (1.299)	33.00 (1.299)	33.00 (1.299)	33.00 (1.299)
E'', length ^c	20.00 (0.787)	29.00 (1.142)	29.00 (1.142)	29.00 (1.142)	29.00 (1.142)
H, Installed height, max.	38.00 (1.496)	63.00 (2.480)	50.50-53.50 (1.988-2.106)	68.00 (2.677)	63.00 (2.677)

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

b - Dimension does not apply.

c - Between the reference lines E' and E'', the maximum insulator diameter shall be defined by E. If threaded terminals are used without knurl nuts, subtract 3 mm (0.118 in) from the values shown for E' and E''.