

# Automotive Pipe, Filler, and Drain Plugs—SAE J531 JAN81

SAE Standard  
Editorial Change January 1981

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# AUTOMOTIVE PIPE, FILLER, AND DRAIN PLUGS—SAE J531 JAN81

SAE Standard

Report of the Parts and Fittings Committee, approved February 1948, last revised by the Tube, Pipe, Hose, and Lubrication Fittings Committee December 1973, editorial change January 1981.

## GENERAL SPECIFICATIONS

**Scope**—This standard includes complete general and dimensional specifications for those types of pipe, filler, and drain plugs (shown in Figs. 1-6 and Tables 2-4) commonly used in automotive and related industrial applications.

**Dimensions and Tolerances**—Except for nominal sizes and thread specifications, dimensions and tolerances are given in both U. S. customary and SI units as designated. Tabulated dimensions shall apply to the finished plugs, plated, hardened, or otherwise processed, as specified by the purchaser. The minimum across corner dimensions of external hexagons shall be 1.092 times the nominal width across flats, but shall not result in a side flat width less than 0.43 times the nominal width across flats. The minimum across corner dimensions of external squares shall be 1.25 times the nominal width across flats, but shall not result in a side flat width less than 0.75 times the nominal width across flats. At maximum material condition, the radii at corners of hexagon and square sockets in broached and upset plugs shall not exceed 0.005 in. (0.13 mm). Tolerance on dimensions not otherwise limited shall be  $\pm 0.010$  in. (0.25 mm).

**Pipe Threads**—The pipe threads on automotive pipe plugs, unless there is specific authorization to the contrary, shall conform with the Dryseal American Standard Taper Pipe Thread (NPTF) and be gaged accordingly. The automotive pipe plug dimensions are based on the length of the NPTF thread and are intended for assembly with all types of Dryseal taper and straight internal threads. It is the consensus of manufacturers and users that trouble-free assembly and pressure tight joints without lubricant or sealer cannot be assured unless a full length thread is used. The pipe threads on automotive filler and drain plugs, unless there is specific authorization to the contrary, shall conform with the Dryseal SAE Short Taper Pipe Thread (PTF-SAE Short) and be gaged accordingly. The automotive filler and drain plug dimensions are based on the length of the (PTF-SAE Short) thread and are primarily intended for assembly with Dryseal American Standard Taper (NPTF) or Dryseal American Standard Intermediate Straight (NPSI) internal pipe threads in installations where it is desirable to limit the entry of the small end of the plug. Limitations on other application of this thread are explained in SAE J476.

External pipe threads shall be chamfered or rounded from the diameters tabulated in Table 1 to produce a length of chamfered or partial thread as specified. The threads on countersunk headless types of plugs shall be chamfered on both ends to the dimensions shown.

TABLE 1

Nominal Dryseal Pipe Thread Size, in	Chamfer Dia at Small End of Plugs of All Types <sup>a</sup>				Chamfer Dia at Large End of Countersunk Headless Plugs				Length of Chamfered or Partial Threads			
	Max		Min		Max		Min		Max		Min	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/16	0.23	5.8	0.21	5.3	0.25	6.4	0.23	5.8	0.056	1.42	0.037	0.94
1/8	0.32	8.1	0.30	7.6	0.34	8.6	0.32	8.1	0.056	1.42	0.037	0.94
1/4	0.42	10.7	0.40	10.2	0.45	11.4	0.43	10.9	0.083	2.11	0.056	1.42
3/8	0.55	14.0	0.53	13.5	0.58	14.7	0.56	14.2	0.083	2.11	0.056	1.42
1/2	0.68	17.3	0.66	16.8	0.72	18.3	0.70	17.8	0.107	2.72	0.071	1.80
3/4	0.89	22.6	0.87	22.1	0.93	23.6	0.91	23.1	0.107	2.72	0.071	1.80
1	1.12	28.4	1.09	27.7	1.17	29.7	1.14	29.0	0.130	3.30	0.087	2.21

<sup>a</sup>Tabulated diameters conform with Appendix A, SAE J476.

Related specifications covering blank sizes, dies, chasers, and gages are shown in SAE J476.

**Material and Manufacture**—Plugs may be made from low carbon steel, cast iron, malleable iron, brass, bronze, or aluminum alloy as specified by purchaser, by casting, milling from the bar, or upsetting from a grade of material free of defects which will affect their serviceability.

**Finish**—Unless otherwise specified by the purchaser, steel plugs shall be furnished cadmium or zinc plated to a thickness of 0.0002 in. (0.005 mm) *ed.* min. These parts must meet the requirements of a 32 h salt spray test in accordance with ASTM B 117. At the manufacturer's option, plated plugs may be given a subsequent chromate treatment.

**Workmanship**—Workmanship shall conform to the best commercial practice to produce high quality parts. Plugs shall be free from all hanging burrs, loose scale, and slivers which might become dislodged in usage and all other defects which might affect their serviceability.

## SQUARE AND HEXAGON HEAD

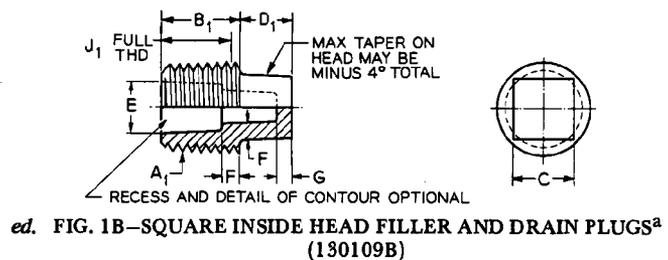
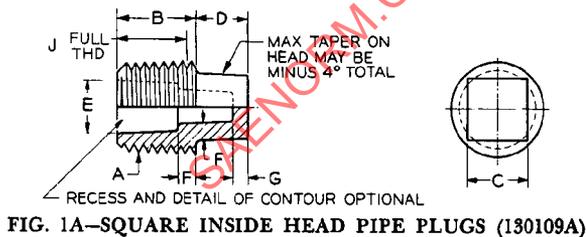


FIG. 1A—SQUARE INSIDE HEAD PIPE PLUGS (130109A)

*ed.* FIG. 1B—SQUARE INSIDE HEAD FILLER AND DRAIN PLUGS<sup>a</sup> (130109B)

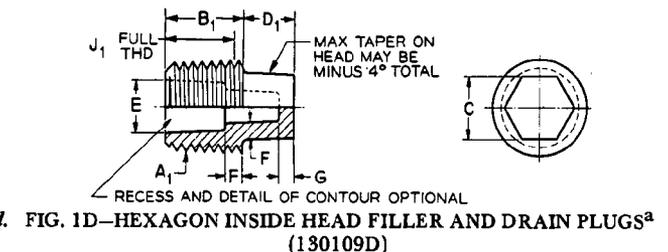
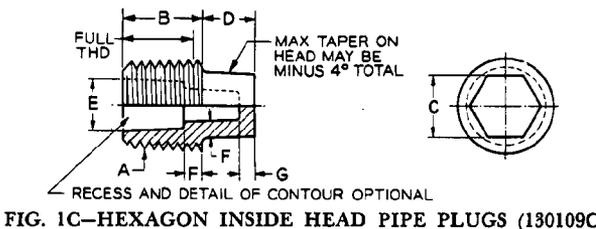


FIG. 1C—HEXAGON INSIDE HEAD PIPE PLUGS (130109C)

*ed.* FIG. 1D—HEXAGON INSIDE HEAD FILLER AND DRAIN PLUGS<sup>a</sup> (130109D)

## FIG. 1—SQUARE AND HEXAGON INSIDE HEAD PLUGS

CODES SHOWN IN BRACKETS ADJACENT TO FIGURE NUMBERS REPRESENT RESPECTIVE FITTING IDENTIFICATION IN ACCORDANCE TO SAE J846.

ed. TABLE 2—DIMENSIONS OF SQUARE AND HEXAGON INSIDE HEAD PIPE, FILLER, AND DRAIN PLUGS (FIGS. 1A-1D)<sup>a</sup>

A Dryseal Thread NPTF, in	A <sub>1</sub> Dryseal Thread PTF-SAE Short, in	B Body Length <sup>b</sup>		B <sub>1</sub> Body Length <sup>b</sup>		C Head Width		D Head Height		D <sub>1</sub> Head Height		E Recess Dia, Max			
		Square Head		Hex Inside Head		Ferrous		Nonferrous							
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/16-27	1/16-27	0.330	8.38	0.290	7.37	0.214	5.44	0.178	4.52	0.163	4.14	—	—	—	—
		0.350	8.89	0.310	7.87	0.221	5.61	1.93	4.90	0.178	4.52	—	—	—	—
1/8-27	1/8-27	0.330	8.38	0.290	7.37	0.276	7.01	0.240	6.10	0.225	5.72	—	—	—	—
		0.350	8.89	0.310	7.87	0.283	7.19	0.255	6.48	0.240	6.10	—	—	—	—
1/4-18	1/4-18	0.495	12.57	0.445	11.30	0.370	9.40	0.280	7.11	0.260	6.60	—	—	—	—
		0.525	13.34	0.475	12.06	0.377	9.58	0.300	7.62	0.280	7.11	—	—	—	—
3/8-18	3/8-18	0.495	12.57	0.445	11.30	0.428	10.87	0.310	7.87	0.285	7.24	0.31	7.9	0.36	9.1
		0.525	13.34	0.475	12.06	0.440	11.18	0.335	8.51	0.310	7.87	—	—	—	—
1/2-14	1/2-14	0.660	16.76	0.590	14.99	0.553	14.05	0.380	9.65	0.350	8.89	0.38	9.7	0.53	13.5
		0.700	17.78	0.630	16.00	0.565	14.35	0.410	10.41	0.380	9.65	—	—	—	—
3/4-14	3/4-14	0.670	17.02	0.600	15.24	0.615	15.62	0.440	11.18	0.410	10.41	0.56	14.2	0.72	18.3
		0.710	18.03	0.640	16.26	0.627	15.93	0.470	11.94	0.440	11.18	—	—	—	—
1-11-1/2	1-11-1/2	0.830	21.08	0.750	19.05	0.803	20.40	0.500	12.70	0.460	11.68	0.75	19.0	0.93	23.6
		0.870	22.10	0.790	20.07	0.815	20.70	0.540	13.72	0.500	12.70	—	—	—	—

A Dryseal Thread NPTF, in	A <sub>1</sub> Dryseal Thread PTF-SAE Short, in	Wall Thickness, Min								J Full Thread Length		J <sub>1</sub> Full Thread Length	
		F				G							
		Ferrous		Nonferrous		Ferrous		Nonferrous					
		in	mm	in	mm	in	mm	in	mm				
1/16-27	1/16-27	—	—	—	—	—	—	—	—	0.30	7.6	0.26	6.6
1/8-27	1/8-27	—	—	—	—	—	—	—	—	0.30	7.6	0.27	6.9
1/4-18	1/4-18	—	—	—	—	—	—	—	—	0.46	11.7	0.41	10.4
3/8-18	3/8-18	0.13	3.3	0.11	2.8	0.13	3.3	0.08	2.0	0.46	11.7	0.41	10.4
1/2-14	1/2-14	0.16	4.1	0.12	3.0	0.16	4.1	0.09	2.3	0.61	15.5	0.53	13.5
3/4-14	3/4-14	0.18	4.6	0.13	3.3	0.18	4.6	0.10	2.5	0.62	15.7	0.55	14.0
1-11-1/2	1-11-1/2	0.20	5.1	0.14	3.6	0.20	5.1	0.11	2.8	0.77	19.6	0.69	17.5

ed. <sup>a</sup>WARNING—AUTOMOTIVE FILLER AND DRAIN PLUGS ARE PRIMARILY INTENDED FOR INSTALLATION WHERE IT IS DESIRABLE TO LIMIT THE ENTRY OF THE SMALL END OF THE PLUG. SEE GENERAL SPECIFICATIONS.

<sup>b</sup>Length B may be reduced one (p) thread if the thread is cut through at head corners.

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ed. HEXAGON OUTSIDE HEAD

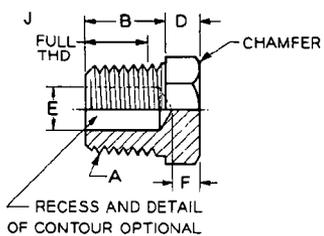
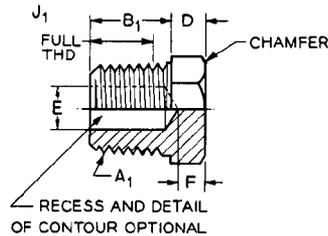
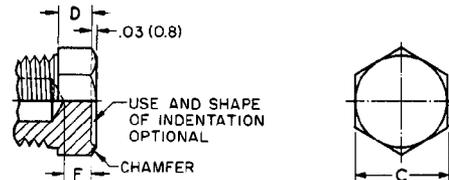


FIG. 2A—HEXAGON OUTSIDE HEAD PIPE PLUGS (130109E)



ed. FIG. 2B—HEXAGON OUTSIDE HEAD FILLER AND DRAIN PIPE PLUGS<sup>a</sup> (130109F)



NOTE: DIMENSIONS ARE IN (mm)

ed. TABLE 3—DIMENSIONS OF HEXAGON OUTSIDE HEAD PIPE, FILLER, AND DRAIN PLUGS<sup>a</sup> (FIGS. 2A AND 2B)

A Dryseal Thread NPTF, in	A <sub>1</sub> Dryseal Thread PTF-SAE Short, in	B Shoulder Length		B <sub>1</sub> Shoulder Length		C Hex (Nom)	D Head Height		E Recess Dia, Max		F Wall Thickness, Min		J Full Thread		J <sub>1</sub> Full Thread	
		in	mm	in	mm	in	in	mm	in	mm	in	mm	in	mm	in	mm
1/16-27	1/16-27	0.37	9.4	0.32	8.1	5/16	0.151 0.162	3.84 4.11	0.10	2.5	0.09	2.3	0.30	7.6	0.26	6.6
1/8-27	1/8-27	0.37	9.4	0.32	8.1	7/16	0.181 0.194	4.60 4.93	0.16	4.1	0.12	3.0	0.30	7.6	0.27	6.9
1/4-18	1/4-18	0.56	14.2	0.49	12.4	9/16	0.181 0.194	4.60 4.93	0.25	6.4	0.12	3.0	0.46	11.7	0.41	10.4
3/8-18	3/8-18	0.56	14.2	0.49	12.4	11/16	0.212 0.227	5.38 5.77	0.38	9.7	0.16	4.1	0.46	11.7	0.41	10.4
1/2-14	1/2-14	0.75	19.0	0.64	16.3	7/8	0.212 0.227	5.38 5.77	0.50	12.7	0.16	4.1	0.61	15.5	0.53	13.5
3/4-14	3/4-14	0.75	19.0	0.65	16.5	1-1/16	0.304 0.323	7.72 8.20	0.69	17.5	0.19	4.8	0.62	15.7	0.55	14.0
1-11-1/2	1-11-1/2	0.94	23.9	0.81	20.6	1-5/16	0.304 0.323	7.72 8.20	0.88	22.4	0.19	4.8	0.77	19.6	0.69	17.5

ed. <sup>a</sup>WARNING—AUTOMOTIVE FILLER AND DRAIN PLUGS ARE PRIMARILY INTENDED FOR INSTALLATION WHERE IT IS DESIRABLE TO LIMIT THE ENTRY OF THE SMALL END OF THE PLUG. SEE GENERAL SPECIFICATIONS.

<sup>b</sup>Length B may be reduced one (p) thread if thread is cut through at head corners.

ed. **SQUARE AND HEXAGON COUNTERSUNK HEADLESS**

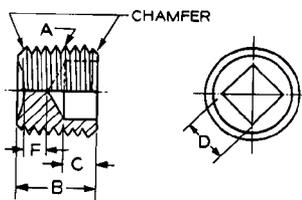


FIG. 3A—UPSET (130109G)

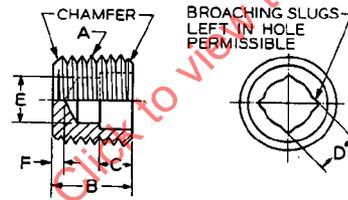


FIG. 3B—BROACHED (130109H)

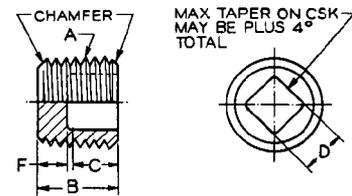


FIG. 3C—CAST (130109J)

FIG. 3—SQUARE COUNTERSUNK HEADLESS PIPE PLUGS (NPTF)

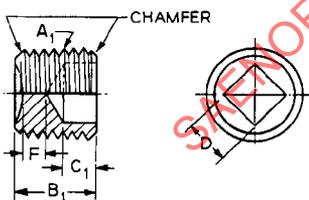


FIG. 4A—UPSET (130109K)

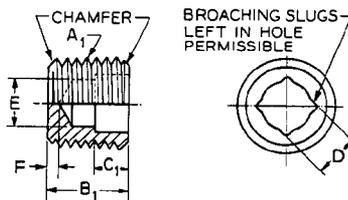


FIG. 4B—BROACHED (130109L)

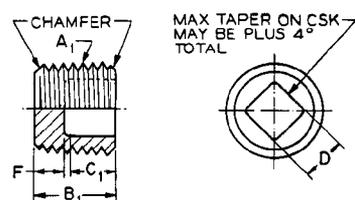


FIG. 4C—CAST (130109M)

ed. FIG. 4—SQUARE COUNTERSUNK HEADLESS FILLER AND DRAIN PLUGS (PTF)<sup>a</sup>

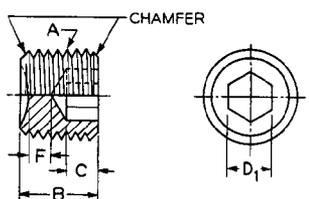


FIG. 5A—UPSET (130109N)

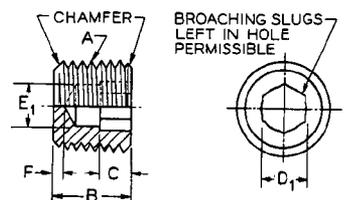


FIG. 5B—BROACHED (130109P)

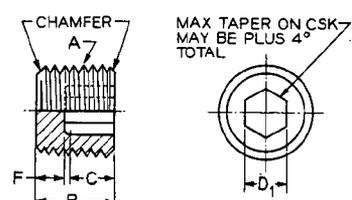


FIG. 5C—CAST (130109R)

FIG. 5—HEXAGON COUNTERSUNK HEADLESS PIPE PLUGS (NPTF)