

## **AUTOMOTIVE PIPE, FILLER, AND DRAIN PLUGS**

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

### **2. References**

**2.1 Applicable Documents**—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

**2.1.1 SAE PUBLICATIONS**—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J476—Dryseal Pipe Threads

SAE J846—Coding Systems for Identification of Fluid Conductors and Connectors

**2.1.2 ASTM PUBLICATIONS**—Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM B 117—Method of Salt Spray (Fog) Testing

### **3. General Specifications**

**3.1 Dimensions and Tolerances**—Except for nominal sizes and thread specifications, dimensions and tolerances are given in both SI and U.S. customary 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 0.13 mm (0.005 in). Tolerance on dimensions not otherwise limited shall be  $\pm 0.25$  mm ( $\pm 0.010$  in).

**3.2 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

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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.

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

**3.3 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.

**3.4 Finish**—Unless otherwise specified by the purchaser, steel plugs shall be furnished cadmium or zinc plated to a thickness of 0.005 mm (0.0002 in) 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.

**3.5 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.

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PREPARED BY THE SAE FLUID CONDUCTORS AND CONNECTORS TECHNICAL  
COMMITTEE S1—AUTOMOTIVE AND HYDRAULIC TUBE AND FITTINGS

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TABLE 1—CHAMFER DIMENSIONS

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

\* Tabulated diameters conform with Appendix A, SAE J476.

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SQUARE AND HEXAGON HEAD

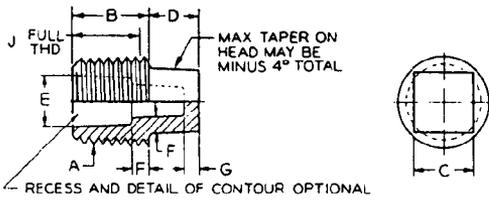


FIGURE 1A—SQUARE INSIDE HEAD  
PIPE PLUGS (130109A)

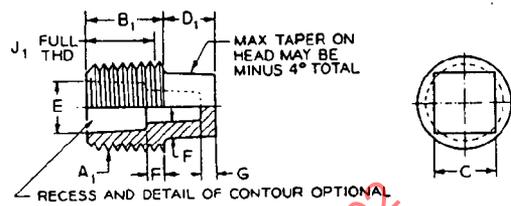


FIGURE 1B—SQUARE INSIDE HEAD  
FILLER AND DRAIN PLUGS<sup>a</sup> (130109B)

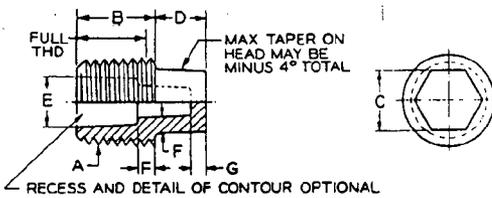


FIGURE 1C—HEXAGON INSIDE HEAD  
PIPE PLUGS (130109C)

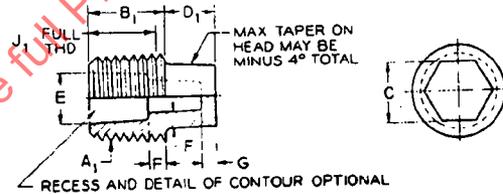


FIGURE 1D—HEXAGON INSIDE HEAD  
FILLER AND DRAIN PLUGS<sup>a</sup> (130109D)

FIGURE 1—SQUARE AND HEXAGON INSIDE HEAD PLUGS

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

TABLE 2—DIMENSIONS OF SQUARE AND HEXAGON INSIDE HEAD PIPE, FILLER, AND DRAIN PLUGS (FIGURES 1A TO 1D)

A Dryseal Thread NPTF, in	A <sub>1</sub> Dryseal Thread PTF-SAE Short, in	B		B <sub>1</sub>		C		D		D <sub>1</sub>		E		E	
		Body Length <sup>b</sup> mm	Body Length <sup>b</sup> in	Body Length <sup>b</sup> mm	Body Length <sup>b</sup> in	Head width mm	Head width in	Head Square Head mm	Head Square Head in	Head Height, Hex Inside Head mm	Head Height, Hex Inside Head in	Recess Dia, Max Ferrous mm	Recess Dia, Max Ferrous in	Recess Dia, Max Nonferrous mm	Recess Dia, Max Nonferrous in
1/16-27	1/16-27	8.38	0.330	7.37	0.290	5.44	0.214	4.52	0.178	4.14	0.163	—	—	—	—
1/16-27	1/16-27	8.89	0.350	7.87	0.310	5.61	0.221	4.90	0.193	4.52	0.178	—	—	—	—
1/8-27	1/8-27	8.38	0.330	7.37	0.290	7.01	0.276	6.10	0.240	5.72	0.225	—	—	—	—
1/8-27	1/8-27	8.89	0.350	7.87	0.310	7.19	0.283	6.48	0.255	6.10	0.240	—	—	—	—
1/4-18	1/4-18	12.57	0.495	11.30	0.445	9.40	0.370	7.11	0.280	6.60	0.260	—	—	—	—
1/4-18	1/4-18	13.34	0.525	12.06	0.475	9.58	0.377	7.62	0.300	7.11	0.280	—	—	—	—
3/8-18	3/8-18	12.57	0.495	11.30	0.445	10.87	0.428	7.87	0.310	7.24	0.285	7.9	0.31	9.1	0.36
3/8-18	3/8-18	13.34	0.525	12.06	0.475	11.18	0.440	8.51	0.335	7.87	0.310	—	—	—	—
1/2-14	1/2-14	16.76	0.650	14.99	0.590	14.05	0.553	9.65	0.380	8.89	0.350	9.7	0.38	13.5	0.53
1/2-14	1/2-14	17.78	0.700	16.00	0.630	14.35	0.565	10.41	0.410	9.65	0.380	—	—	—	—
3/4-14	3/4-14	17.02	0.670	15.24	0.600	15.62	0.615	11.18	0.440	10.41	0.410	14.2	0.56	18.3	0.72
3/4-14	3/4-14	18.03	0.710	16.26	0.640	15.93	0.627	11.94	0.470	11.18	0.440	—	—	—	—
1-11-1/2	1-11-1/2	21.08	0.830	19.05	0.750	20.40	0.803	12.70	0.500	11.68	0.460	19.0	0.75	23.6	0.93
1-11-1/2	1-11-1/2	22.10	0.870	20.07	0.790	20.70	0.815	13.72	0.540	12.70	0.500	—	—	—	—

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HEXAGON OUTSIDE HEAD

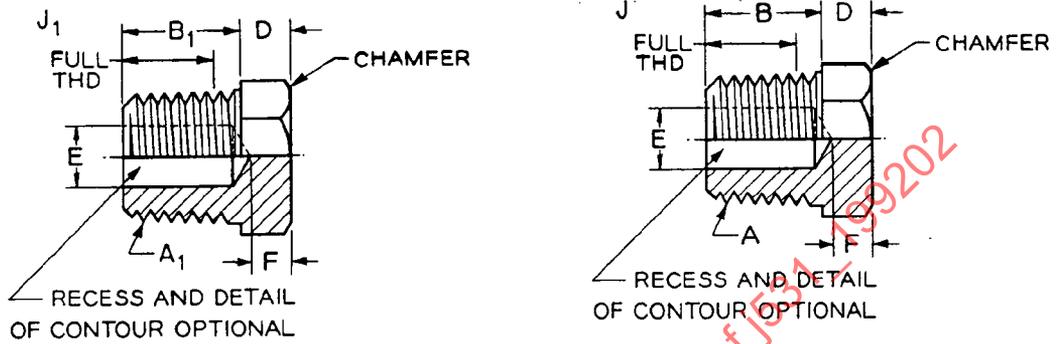
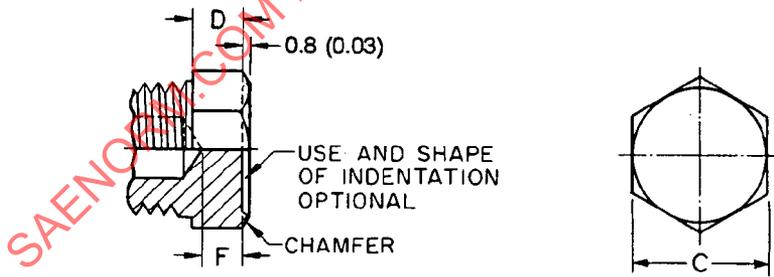


FIGURE 2A—HEXAGON OUTSIDE HEAD PIPE PLUGS (130109E)



NOTE - DIMENSIONS ARE mm (in)

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

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

TABLE 3—DIMENSIONS OF HEXAGON OUTSIDE HEAD PIPE, FILLER, AND DRAIN PLUGS\* (FIGURES 2A AND 2B)

A Dryseal Thread NPTF, in	A, 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	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/16-27	1/16-27	9.4	0.37	8.1	0.32	5/16	3.84	0.151	2.5	0.10	2.3	0.09	7.6	0.30	6.6	0.26	
1/8-27	1/8-27	9.4	0.37	8.1	0.32	7/16	4.60	0.181	4.1	0.16	3.0	0.12	7.6	0.30	6.9	0.27	
1/4-18	1/4-18	14.2	0.56	12.4	0.49	9/16	4.60	0.181	6.4	0.25	3.0	0.12	11.7	0.46	10.4	0.41	
3/8-18	3/8-18	14.2	0.56	12.4	0.49	11/16	5.58	0.212	9.7	0.38	4.1	0.16	11.7	0.46	10.4	0.41	
1/2-14	1/2-14	19.0	0.75	16.3	0.64	7/8	5.38	0.212	12.7	0.50	4.1	0.16	15.5	0.61	13.5	0.53	
3/4-14	3/4-14	19.0	0.75	16.5	0.65	1-1/16	7.72	0.304	17.5	0.69	4.8	0.19	15.7	0.62	14.0	0.55	
1-11-1/2	1-11-1/2	23.9	0.94	20.6	0.81	1-5/16	7.72	0.304	22.4	0.88	4.8	0.19	19.6	0.77	17.5	0.69	

\* 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.

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SQUARE AND HEXAGON COUNTERSUNK HEADLESS

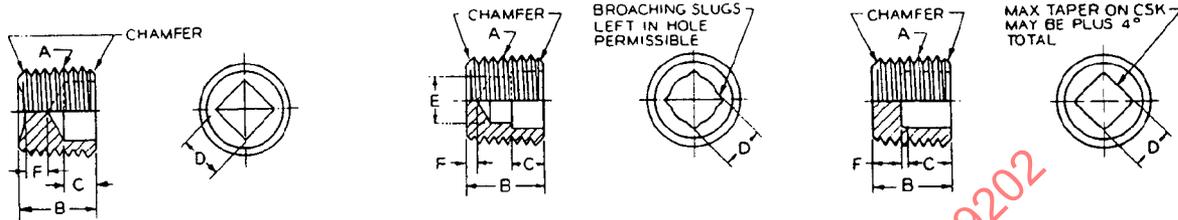


FIGURE 3A—UPSET  
(130109G)

FIGURE 3B—BROACHED  
(130109H)

FIGURE 3C—E CAST  
(130109J)

FIGURE 3—SQUARE COUNTERSUNK HEADLESS PIPE PLUGS (NPTF)

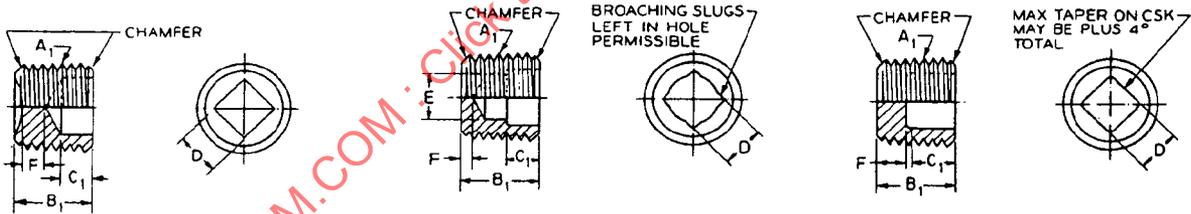


FIGURE 4A—UPSET  
(130109K)

FIGURE 4B—BROACHED  
(130109L)

FIGURE 4C—CAST  
(130109M)

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

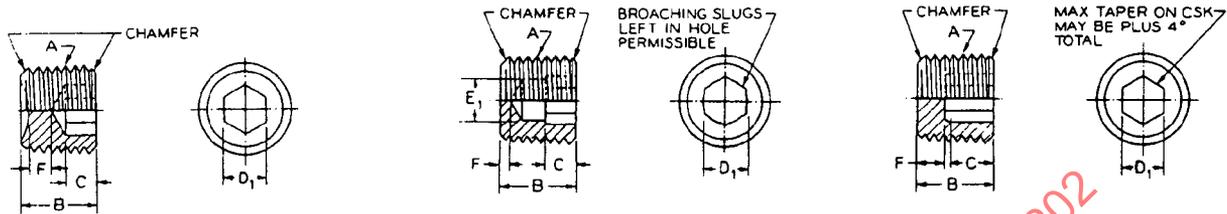


FIGURE 5A—UPSET  
(130109N)

FIGURE 5B—BROACHED  
(130109P)

FIGURE 5C—CAST  
(130109R)

FIGURE 5—HEXAGON COUNTERSUNK HEADLESS PIPE PLUGS (NPTF)

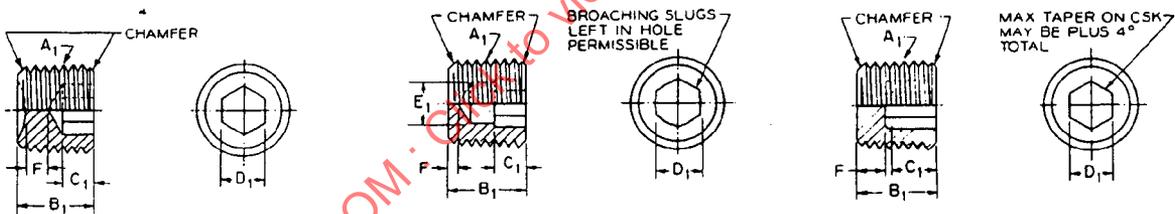


FIGURE 6A—UPSET  
(130109S)

FIGURE 6B—BROACHED  
(130109T)

FIGURE 6C—CAST  
(130109U)

FIGURE 6—HEXAGON COUNTERSUNK HEADLESS FILLER AND DRAIN PLUGS (PTF)<sup>a</sup>

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