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(R) Automotive Hydraulic Brake System—Metric Tube Connections

1. **Scope**—This SAE Standard documents dimensional metric specifications for hydraulic brake system tubing with flared ends, threaded ports, and male tube nuts for the interconnection of major components in automotive hydraulic brake systems.

The purpose of this document is to recommend preferred metrically dimensioned components (including alternative choices), that are intended to be functionally compatible with International Organization for Standardization Specification, ISO 4038. Some applications may require sizes of forms other than those shown herein, and this document does not preclude such other details when they are required.

2. **References**

- 2.1 **Applicable Publications**—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

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

SAE J512—Automotive Tube Fittings

SAE J527—Brazed Double Wall Low Carbon Steel Tubing

SAE J533—Flares for Tubing

SAE J1047—Tubing—Motor Vehicle Brake System Hydraulic

SAE J1291—Automotive Hydraulic Brake System—Metric Banjo Bolt Connections

- 2.1.2 ANSI PUBLICATION—Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002.

ISO4038—Road vehicles—Hydraulic braking systems—Pipes, tapped holes, males fittings and hose end fittings

- 2.1.3 DIN PUBLICATION—Available from Global Engineering, 15 Inverness Way East, Englewood, CO 80112.

EN 10278 (DIN)—Dimensions & Tolerances of Bright Steel Products

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3. **Tubing And Flares**—Tubing and tubing end flares should be dimensioned as shown in Figure 1 and Table 1.

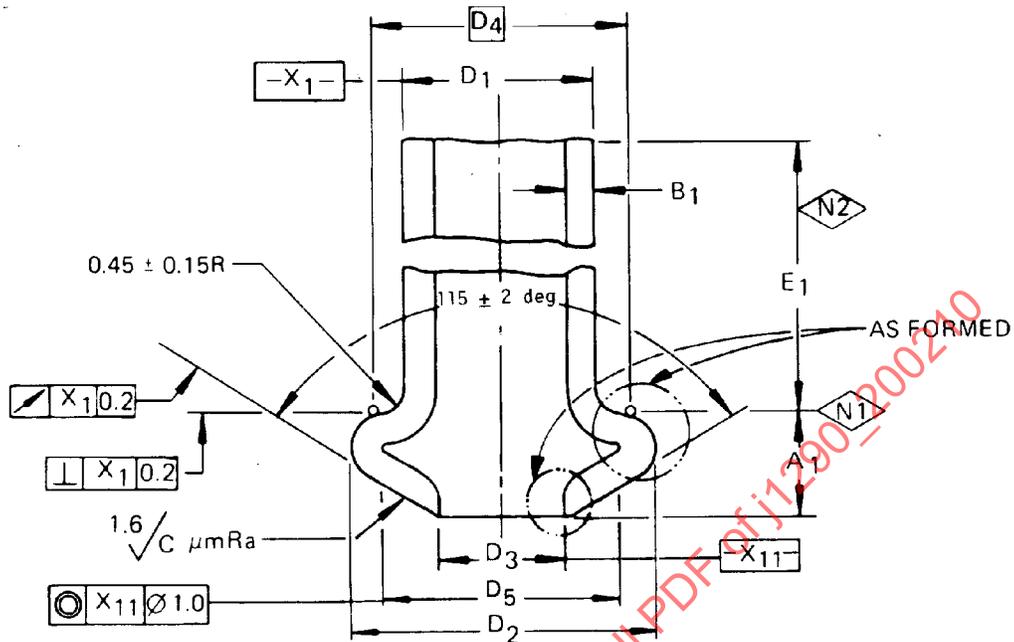


FIGURE 1—END FLARE (mm)

TABLE 1—DIMENSIONS AND TOLERANCES—
FOR TUBING AND END FLARE (mm)

D ₁ Bare Tube ±0.07	D ₁ Coated Tube φ max	D ₂ ±0.18	D ₃ +0.3 -0.2	D ₄	D ₅ min	A ₁ ±0.3	B ₁ ±0.07	E ₁ min
4.75	4.87	7.1	3.2	6.0	5.5	2.5	0.70	16
6.00	6.12	8.4	4.5	7.3	6.8	2.5	0.70	18
8.00	8.12	10.7	6.5	9.3	8.8	2.7	0.70	24
10.00	10.12	12.7	8.5	11.3	10.8	3.0	0.70	28

N1 Datum line

N2 Squareness and runout applies about diameter D₁ over length E₁

For information relative to brazed double-wall low-carbon steel tubing, refer to SAE J527 and SAE J1047. For additional information on flares, refer to SAE J533 and ISO 4038.

4. **Threaded Ports (Tube Nuts)**—Threaded ports for disc brake calipers, drum brake wheel cylinders, combination valves, pressure switches, metering valves, proportioning valves, master cylinders, brake hose end fittings, tubing fittings, and other brake circuit components should be dimensioned as shown in Figure 2 and Table 2.

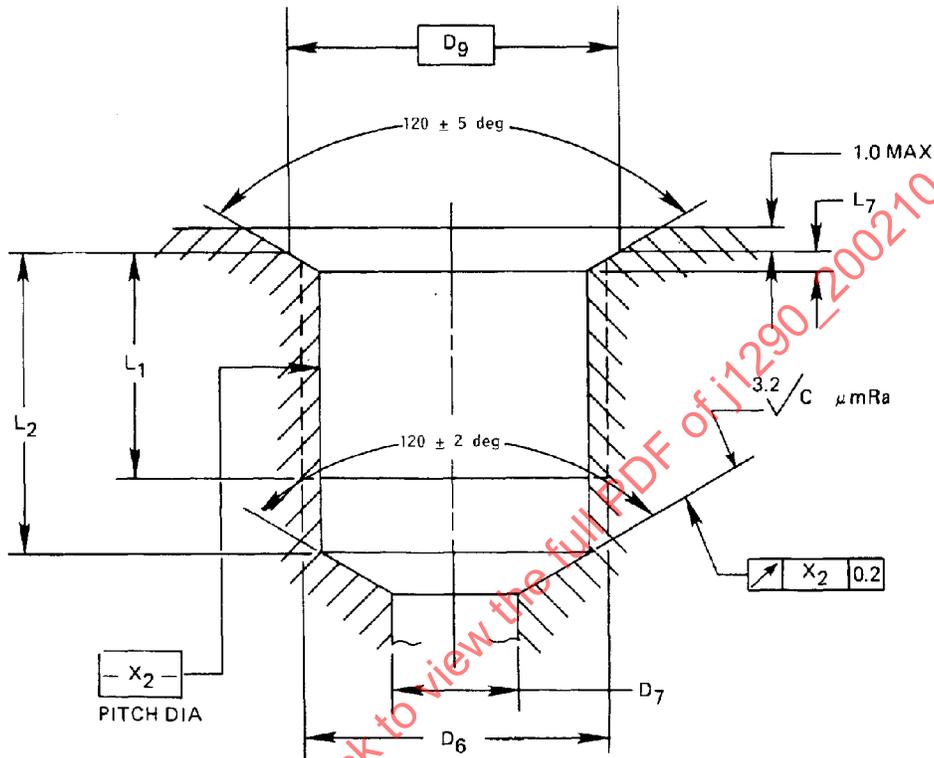


FIGURE 2—THREADED PORTS FOR TUBE NUTS (mm)

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TABLE 2—DIMENSIONS AND TOLERANCES FOR THREADED PORTS FOR TUBE NUTS (mm)

D ₁ Nom Tube OD	D ₂ Straight Thread Nom Size	D ₂ Straight Thread Pitch	D ₂ Straight Thread Pitch 6H max	D ₂ Straight Thread Pitch 6H min ⁽¹⁾	D ₂ Straight Thread Minor 6H max	D ₂ Straight Thread Minor 6H min	Selection Preference ⁽²⁾	D ₇ +0.0 -0.4	D ₉	L ₁ Full Thread min	L ₂ +0.0 -0.5	L ₇ min	L ₇ max
4.75	M10	1	9.500	9.350	9.153	8.917	1	3.3	10.5	7.0	10.0	0.35	0.50
4.75	M12	1	11.510	11.350	11.153	10.917	2	3.3	12.5	7.0	10.0	0.35	0.50
4.75	M12	1.5	11.216	11.026	10.676	10.376	2	3.3	12.5	6.0	10.0	0.47	0.63
4.75	M14	1.5	13.216	13.026	12.676	12.376	2	3.3	14.5	6.0	10.0	0.47	0.63
4.75	M11	1	10.500	10.350	10.153	9.917	3	3.3	11.5	7.0	10.0	0.35	0.50
4.75	M11	1.5	10.206	10.026	9.676	9.376	3	3.3	11.5	6.0	10.0	0.47	0.63
4.75	M13	1	12.510	12.350	12.153	11.917	3	3.3	13.5	7.0	10.0	0.35	0.50
4.75	M13	1.5	12.216	12.026	11.676	11.376	3	3.3	13.5	6.0	10.0	0.47	0.63
4.75	M15	1.5	14.216	14.026	13.676	13.376	3	3.3	15.5	6.0	10.0	0.47	0.63
6.00	M12	1	11.510	11.350	11.153	10.917	1	4.6	12.5	9.0	12.0	0.35	0.50
6.00	M12	1.5	11.216	11.026	10.676	10.376	2	4.6	12.5	8.0	12.0	0.47	0.63
6.00	M14	1.5	13.216	13.026	12.676	12.376	2	4.6	14.5	8.0	12.0	0.47	0.63
6.00	M16	1.5	15.216	15.026	14.676	14.376	2	4.6	16.5	8.0	12.0	0.47	0.63
6.00	M13	1	12.510	12.350	12.153	11.917	3	4.6	13.5	9.0	12.0	0.35	0.50
6.00	M13	1.5	12.216	12.026	11.676	11.376	3	4.6	13.5	8.0	12.0	0.47	0.63
6.00	M15	1.5	14.216	14.026	13.676	13.376	3	4.6	15.5	8.0	12.0	0.47	0.63
8.00	M14	1.5	13.216	13.026	12.676	12.376	1	6.6	14.5	12.5	16.5	0.47	0.63
8.00	M16	1.5	15.216	15.026	14.676	14.376	2	6.6	16.5	12.5	16.5	0.47	0.63
8.00	M15	1.5	14.216	14.026	13.676	13.376	3	6.6	15.5	12.5	16.5	0.47	0.63
8.00	M17	1.5	16.216	16.026	15.676	15.376	3	6.6	17.5	12.5	16.5	0.47	0.63
10.00	M16	1.5	15.216	15.026	14.676	14.376	1	8.6	16.5	13.5	17.5	0.47	0.63
10.00	M18	1.5	17.216	17.026	16.676	16.376	2	8.6	18.5	13.5	17.5	0.47	0.63
10.00	M17	1.5	16.216	16.026	15.676	15.376	3	8.6	17.5	13.5	17.5	0.47	0.63

1. These values are also the basic pitch diameter.

2. Ports recognized as standard for respective tube diameters are listed as preference 1. To avoid proliferation where ports having other thread diameter pitch combination must be used to satisfy design or installation requirements, it is recommended they be selected from sizes listed under preferences 2 and 3, respectively.

For information relative to tube nut ports, refer to SAE Standard J512 and International Standard, Road Vehicles - Hydraulic Braking Systems - Pipes, Tapped Holes and Male Fittings - ISO 4038.

