SAE International

SURFACE VEHICLE STANDARD

SAE J2494-1 MAY2011

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Superseding J2494 AUG2004

Dimensional Specifications for Metallic Body Push-to-Connect Fittings Used on a Vehicular Air Brake System

RATIONALE

The purpose of the changes noted in this document are to harmonize the dimensioning scheme for the jam nut thickness of bulkhead unions found in Figure 1 with that of Figure 2 in this document and also Figure A5 of SAE J2494-2. In each case, the bulkhead union jam nut thickness dimensions was noted to be a “minimum”, except for that found in Table 1A and 1B for Figure 1 of SAE J2494-1 where the dimensions were noted to be a “maximum”. It is reasonable that the dimensions for the jam nut thickness, define a certain minimum thickness, as to insure an adequate thread engagement will be maintained for the integrity of the fitting. Correcting Table 1A and 1B, harmonizes the design intent for all bulkhead union, jam nut minimum thickness found in the SAE J2494-1 and SAE J2494-2 documents.

1. SCOPE

This SAE Standard covers general and dimensional specifications for brass bodied reusable Push to Connect tube fittings for use in the piping of vehicular air brake systems. This type of fitting is intended for use with nylon tubing per SAE J844. See SAE J2494-3 for the Performance Requirements of Reusable (Push to Connect) Fittings Intended for Use in Automotive Air Brake Systems and U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA) Federal Motor Vehicle Safety Standards (FMVSS) 571.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J476 Dryseal Pipe Threads

SAE J512 Automotive Tube Fittings

SAE J844 Nonmetallic Air Brake System Tubing

SAE J846 Coding Systems for Identification of Fluid Conductors and Connectors

SAE J2494-3 Performance Requirements for SAE J844 Non-Metallic Air Brake Tubing and Push to Connect Fitting Assemblies Used in Vehicular Air Brake Systems

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

2.1.2 ANSI Publication

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI B 1.1 Unified Inch Screw Threads

2.1.3 Federal Publications

Available from the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, http://assist.daps.dla.mil/quicksearch/.

FMVSS 571.106 Standard No. 106; Brake Hoses

2.1.4 ISO Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 7-1 Pipe threads where pressure-tight joints are made on the threads—Part 1: Dimensions, tolerances and designation

ISO 228-1 Pipe threads where pressure-tight joints are not made on the threads

ISO 261 General purpose metric screw threads general plan

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI B 1.20.3 Dryseal Pipe Threads

ANSI B 18.2.2 Square and Hex Nuts Inch Series

2.2.2 ASTM Publication

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B 249 Specification for Wrought Copper and Copper Alloy Rod Bar and Shape

3. GENERAL SPECIFICATIONS

The following general specifications supplement the dimensional data contained in Tables 1A to 4B with respect to all unspecified details.

3.1 Identification

Any one component of the fitting shall be permanently and legibly marked according to the current U.S. Department of Transportation FMVSS 571.106 Regulation (NHTSA). The location of such markings shall be optional with manufacturer.

3.2 Size Designations

Fitting sizes are designated by the corresponding nominal outside diameter of the tubing for the various sizes of tube ends and by the corresponding standard nominal pipe size for pipe thread ends.

3.3 Dimensions and Tolerances

Except for nominal size and thread specifications, dimensions and tolerances are given in both SI units and U.S. customary as designated. Tabulated dimensions shall apply to the finished parts. The maximum and minimum across flat dimensions shall be within the commercial tolerance of bar or extruded stock from which the fittings are produced.

Angular tolerance on axis of ends of elbows and tees shall be ±2.50 degrees for sizes up to and including 3/8 in (8 mm), and ±1.50 degrees for sizes larger than 3/8 in (8 mm).

The minimum across corners dimensions of 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.

Wrenching surfaces shall fit standard wrench openings. Where so illustrated, hexagon corners shall be chamfered 30 degrees ± 5 degrees to a diameter equal to the nominal width across flats, with a tolerance of –0.41 mm (–0.016 in); or, where design permits, corners may be chamfered to the diameter of the abutting surface, provided the length of chamfer does not exceed that produced by the 30 degree chamfer previously described.

Tabulated dimensions apply to measurements taken when the release mechanism is in the “in” position.

3.4 Passages

The minimum flow diameter through any section of the air brake fitting shall not be less than 66% of the nominal inside diameter of the air brake tubing.

Where passages in straight fittings are machined from opposite ends, the offset at the meeting point shall not exceed 0.38 mm (0.015 in). The cross-sectional area at the junction of passages in angle fittings shall not be less than that of the smallest passage. At manufacturer’s option, all passages in a particular fitting may conform with the smallest diameter specified for that fitting. Where the passage is specified as tap drill diameter or less, the minimum shall be no less than the minimum diameter of the smallest passage in the fitting.

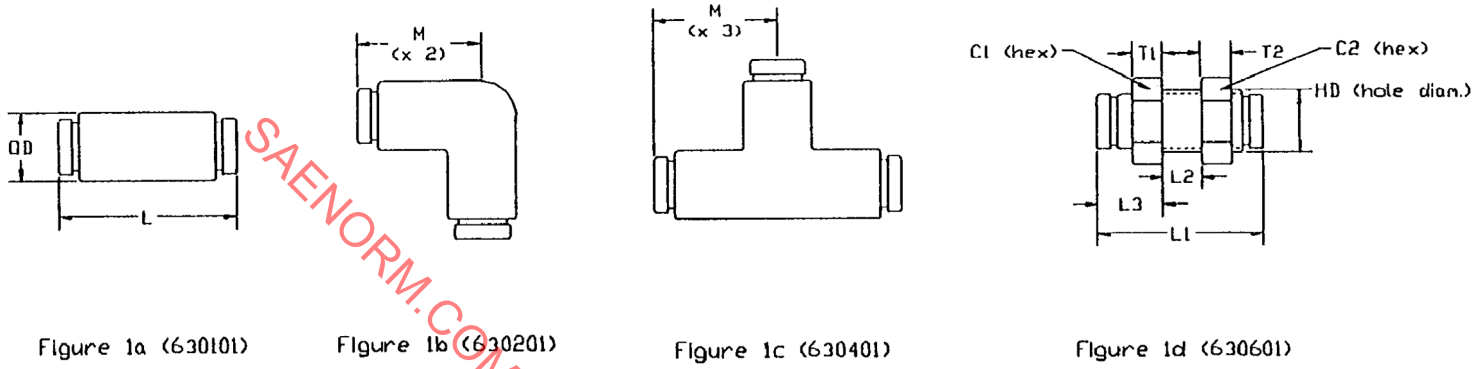

Figure 1a (630101) Figure 1b (630201) Figure 1c (630401) Figure 1d (630601)

FIGURE 1 - UNION CONNECTORS

TABLE 1A - DIMENSIONS OF UNION CONNECTORS[1] (FIGURE 1) - METRIC DIMENSIONS

Tube Size	C1, hex maximum	C2, hex maximum	HD maximum	L maximum	L1 maximum	L2 maximum	L3 maximum	M maximum	OD maximum	T1 minimum	T2 minimum
1/4	27.2	27.2	16.5	54.1	48.0	29.0	19.1	25.9	15.5	3.0	4.1
5/16	—	—	—	44.7	—	—	—	25.4	17.3	—	—
3/8	27.2	27.2	23.9	54.4	54.4	38.4	22.9	33.3	19.8	4.1	5.1
1/2	31.8	31.8	26.9	68.1	68.1	40.4	19.6	39.1	23.6	4.1	5.1
5/8	35.1	35.1	31.8	70.6	63.5	25.4	23.4	—	31.8	6.6	8.9

1. Dashes (—) in the table indicate dimensional data is unavailable for that fitting size and configuration.

TABLE 1B - DIMENSIONS OF UNION CONNECTORS[1] (FIGURE 1) - INCH DIMENSIONS

Tube Size	C1, hex maximum	C2, hex maximum	HD maximum	L maximum	L1 maximum	L2 maximum	L3 maximum	M maximum	OD maximum	T1 minimum	T2 minimum
1/4	1.07	1.07	0.65	2.13	1.89	1.14	0.75	1.02	0.61	0.12	0.16
5/16	–	—	—	1.76	—	—	—	1.00	0.68	—	—
3/8	1.07	1.07	0.94	2.14	2.14	1.51	0.90	1.31	0.78	0.16	0.20
1/2	1.25	1.25	1.06	2.68	2.68	1.59	0.77	1.54	0.93	0.16	0.20
5/8	1.38	1.38	1.25	2.78	2.50	1.00	0.92	—	1.25	0.26	0.35

1. Dashes (—) in the table indicate dimensional data is unavailable for that fitting size and configuration.

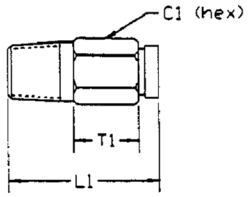

Figure 2a (630102)

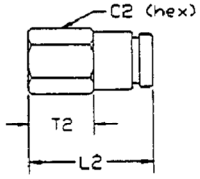

Figure 2b (630103)

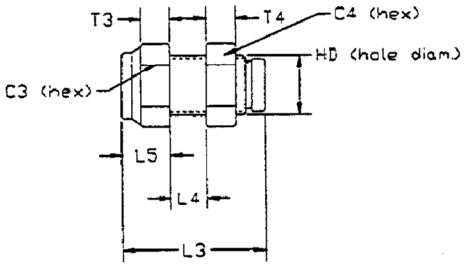

Figure 2c (630603)

FIGURE 2 - STRAIGHT CONNECTORS

TABLE 2A - DIMENSIONS OF STRAIGHT CONNECTORS[1] (FIGURE 2) - METRIC DIMENSIONS

Tube Size	Pipe Thread	C1, hex maximum	C2, hex maximum	C3, hex maximum	C4, hex maximum	HD maximum	L1 maximum	L2 maximum
1/4	1/8	14.5	14.5	—	—	—	28.7	33.8
1/4	1/4	14.5	19.1	27.2	27.2	16.5	32.5	40.4
1/4	3/8	19.1	—	—	—	—	33.0	—
5/16	1/8	16.0	—	—	—	—	34.5	—
5/16	1/4	16.0	—	—	—	—	35.8	—
3/8	1/8	19.1	19.1	—	—	—	37.3	36.8
3/8	1/4	19.1	20.8	—	—	—	40.6	45.2
3/8	3/8	19.1	22.4	27.2	28.7	23.9	40.6	45.5
3/8	1/2	22.4	—	—	—	—	40.4	—
1/2	1/4	22.4	—	—	—	—	47.5	—
1/2	3/8	22.4	22.4	—	—	—	47.5	42.4
1/2	1/2	22.4	27.2	31.8	33.5	26.9	47.0	53.6
5/8	3/8	27.2	—	—	—	—	52.1	—
5/8	1/2	27.2	—	—	—	—	53.6	—
3/4	1/2	30.2	—	—	—	—	54.1	—

1. Dashes (—) in the table indicate dimensional data is unavailable for that fitting size and configuration.

TABLE 2A - DIMENSIONS OF STRAIGHT CONNECTORS - METRIC DIMENSIONS (CONTINUED)

Tube Size	Pipe Thread	L3 maximum	L4 maximum	L5 maximum	T1 minimum	T2 minimum	T3 minimum	T4 minimum
1/4	1/8	—	—	—	3.8	7.4	—	—
1/4	1/4	41.2	16.3	16.3	3.8	10.7	10.9	4.3
1/4	3/8	—	—	—	3.8	—	—	—
5/16	1/8	—	—		6.9	—	—	—
5/16	1/4	—	—	—	6.9	—	—	—
3/8	1/8	—	—	—	6.6	8.1	—	—
3/8	1/4	—	—	—	4.3	11.2	—	—
3/8	3/8	55.9	25.4	15.8	4.3	11.9	8.4	4.3
3/8	1/2	—	—	—	4.6	—	—	—
1/2	1/4	—	—	—	7.9	—	—	—
1/2	3/8	—	—	—	5.1	13.0	—	—
1/2	1/2	67.1	12.7	18.5	4.6	12.4	8.4	6.4
5/8	3/8	—	—	—	8.4	—	—	—
5/8	1/2	—	—	—	5.3	—	—	—
3/4	1/2	—	—	—	5.8	—	—	—

TABLE 2B - DIMENSIONS OF STRAIGHT CONNECTORS[1] (FIGURE 2) - INCH DIMENSIONS

Tube Size	Pipe Thread	C1, hex maximum	C2, hex maximum	C3, hex maximum	C4, hex maximum	HD maximum	L1 maximum	L2 maximum
1/4	1/8	0.57	0.57	—	—	—	1.13	1.33
1/4	1/4	0.57	0.75	1.07	1.07	0.65	1.28	1.59
1/4	3/8	0.75	—	—	—	—	1.30	—
5/16	1/8	0.63	—	—	—	—	1.36	—
5/16	1/4	0.63	—	—	—	—	1.41	—
3/8	1/8	0.75	0.75	—	—	—	1.47	1.45
3/8	1/4	0.75	0.82	—	—	—	1.60	1.78
3/8	3/8	0.75	0.88	1.07	1.13	0.94	1.60	1.79
3/8	1/2	0.88	—	—	—	—	1.59	—
1/2	1/4	0.88	—	—	—	—	1.87	—
1/2	3/8	0.88	0.88	—	—	—	1.87	1.67
1/2	1/2	0.88	1.07	1.25	1.32	1.06	1.85	2.11
5/8	3/8	1.07	—	—	—	—	2.05	—
5/8	1/2	1.07	—	—	—	—	2.11	—
3/4	1/2	1.19	—	—	—	—	2.13	—

1. Dashes (—) in the table indicate dimensional data is unavailable for that fitting size and configuration.

TABLE 2B - DIMENSIONS OF STRAIGHT CONNECTORS - INCH DIMENSIONS (CONTINUED)

Tube Size	Pipe Thread	L3 maximum	L4 maximum	L5 maximum	T1 minimum	T2 minimum	T3 minimum	T4 minimum
1/4	1/8	—	—	—	0.15	0.29	—	—
1/4	1/4	1.62	0.64	0.64	0.15	0.42	0.43	0.17
1/4	3/8	—	—	—	0.15	—	—	—
5/16	1/8	—	—		0.27	—	—	—
5/16	1/4	—	—	—	0.27	—	—	—
3/8	1/8	—	—	—	0.26	0.32	—	—
3/8	1/4	—	—	—	0.17	0.44	—	—
3/8	3/8	2.20	1.00	0.62	0.17	0.47	0.33	0.17
3/8	1/2	—	—	—	0.18	—	—	—
1/2	1/4	—	—	—	0.31	—	—	—
1/2	3/8	—	—	—	0.20	0.51	—	—
1/2	1/2	2.64	0.50	0.73	0.18	0.49	0.33	0.25
5/8	3/8	—	—	—	0.33	—	—	—
5/8	1/2	—	—	—	0.21	—	—	—
3/4	1/2	—	—	—	0.23	—	—	—

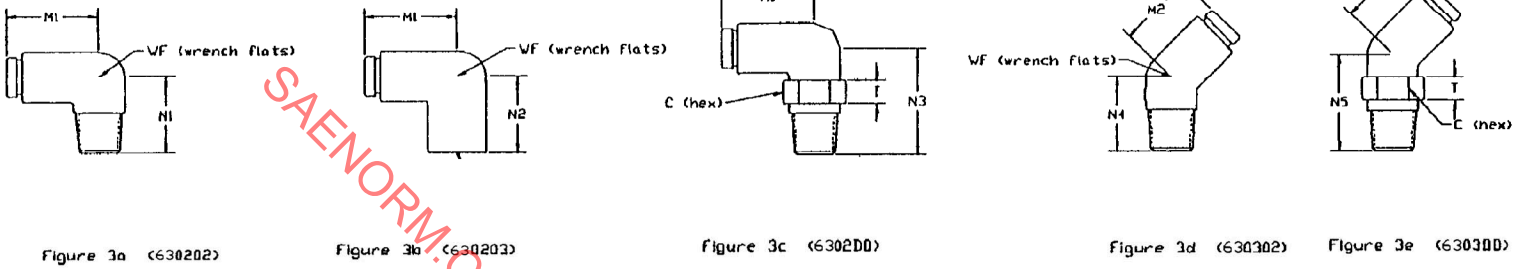

Figure 3a (630202) Figure 3b (630203) Figure 3c (630200) Figure 3d (630302) Figure 3e (630300)

FIGURE 3 - ELBOW CONNECTORS

TABLE 3A - DIMENSIONS OF ELBOW CONNECTORS[1] (FIGURE 3) - METRIC DIMENSIONS

Tube Size	Pipe Thread	C, hex maximum	M1 maximum	M2 maximum	N1 maximum	N2 maximum	N3 maximum	N4 maximum	N5 maximum	T minimum	WF maximum
1/4	1/8	11.2	26.2	25.1	20.1	22.9	32.3	22.1	31.5	2.5	17.5
1/4	1/4	14.5	28.7	25.1	26.2	26.2	39.6	25.1	37.1	4.1	19.1
1/4	3/8	19.1	27.9	—	28.2	—	39.6	—	—	5.8	22.1
3/8	1/8	16.0	33.3	30.5	22.9	—	35.8	28.2	36.6	2.5	19.1
3/8	1/4	19.1	32.5	30.5	26.2	27.7	40.1	28.2	40.9	4.1	20.8
3/8	3/8	19.1	33.3	30.5	28.2	—	40.4	33.0	40.9	4.1	22.1
3/8	1/2	22.4	30.7	33.0	35.1	—	45.5	33.0	—	5.1	24.1
1/2	1/4	22.1	39.1	32.5	29.2	—	43.9	33.0	—	5.1	22.4
1/2	3/8	22.1	33.0	32.5	29.2	—	46.0	28.7	45.2	4.1	24.1
1/2	1/2	22.4	39.1	33.0	35.1	—	49.8	33.0	49.0	4.1	24.1
5/8	3/8	22.4	37.1	—	31.0	—	51.6	—	—	5.8	25.4
5/8	1/2	—	39.1	37.1	36.1	—	—	37.1	—	—	30.2
3/4	1/2	—	46.0	38.6	37.6	—	—	38.6	—	—	33.5

1. Dashes (—) in the table indicate dimensional data is unavailable for that fitting size and configuration.

TABLE 3B - DIMENSIONS OF ELBOW CONNECTORS[1] (FIGURE 3) - METRIC DIMENSIONS

Tube Size	Pipe Thread	C, hex maximum	M1 maximum	M2 maximum	N1 maximum	N2 maximum	N3 maximum	N4 maximum	N5 maximum	T minimum	WF maximum
1/4	1/8	0.44	1.03	0.99	0.79	0.90	1.27	0.87	1.24	0.10	0.69
1/4	1/4	0.57	1.13	0.99	1.03	1.03	1.56	0.99	1.46	0.16	0.75
1/4	3/8	0.75	1.10	—	1.11	—	1.56	—	—	0.23	0.87
3/8	1/8	0.63	1.31	1.20	0.90	—	1.41	1.11	1.44	0.10	0.75
3/8	1/4	0.75	1.28	1.20	1.03	1.09	1.58	1.11	1.1	0.16	0.82
3/8	3/8	0.75	1.31	1.20	1.11	—	1.59	1.30	1.61	0.16	0.87
3/8	1/2	0.88	1.21	1.30	1.38	—	1.79	1.30	—	0.20	0.95
1/2	1/4	0.87	1.54	1.28	1.15	—	1.73	1.30	—	0.20	0.88
1/2	3/8	0.87	1.30	1.28	1.15	—	1.81	1.30	1.93	0.16	0.95
1/2	1/2	0.88	1.54	1.30	1.38	—	1.96	1.30	1.93	0.16	0.95
5/8	3/8	0.88	1.46	—	1.22	—	2.03	—	—	0.23	1.00
5/8	1/2	—	1.54	1.46	1.42	—	—	1.46	—	—	1.19
3/4	1/2	—	1.81	1.52	1.48	—	—	1.52	—	—	1.32

1. Dashes (—) in the table indicate dimensional data is unavailable for that fitting size and configuration.

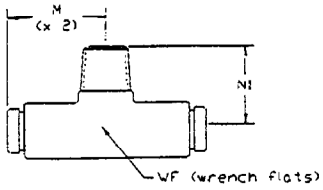

Figure 4a (630425)

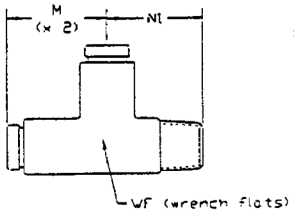

Figure 4b (630424)

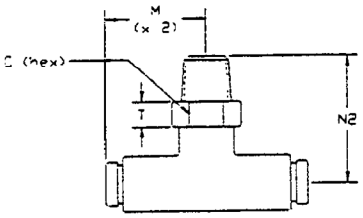

Figure 4c (6304FF)

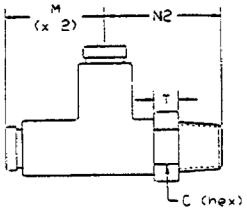

Figure 4d (6304EE)

FIGURE 4 - TEE CONNECTORS

TABLE 4A - DIMENSIONS OF TEE CONNECTORS[1] (FIGURE 4) - METRIC DIMENSIONS

Tube Size	Pipe Thread	C, hex maximum	M maximum	N1 maximum	N2 maximum	T minimum	WF maximum
1/4	1/8	11.2	25.9	20.1	31.8	2.5	14.5
1/4	1/4	14.5	25.9	24.6	37.6	4.1	18.0
3/8	1/8	14.5	31.0	—	42.2	2.5	—
3/8	1/4	19.1	31.0	25.4	46.5	4.1	19.1
3/8	3/8	19.1	33.3	28.2	46.5	4.1	22.1
1/2	1/4	22.1	34.0	—	43.9	4.1	—
1/2	3/8	22.1	34.0	36.1	46.5	4.1	24.1
1/2	1/2	22.4	39.1	36.1	50.5	4.1	24.1

1. Dashes (—) in the table indicate dimensional data is unavailable for that fitting size and configuration.

TABLE 4B - DIMENSIONS OF TEE CONNECTORS[1] (FIGURE 4) - INCH DIMENSIONS

Tube Size	Pipe Thread	C, hex maximum	M maximum	N1 maximum	N2 maximum	T minimum	WF maximum
1/4	1/8	0.44	1.02	0.79	1.25	0.10	0.57
1/4	1/4	0.57	1.20	0.97	1.48	0.16	0.71
3/8	1/8	0.57	1.22	—	1.66	0.10	—
3/8	1/4	0.75	1.22	1.00	1.83	0.16	0.75
3/8	3/8	0.75	1.36	1.11	1.83	0.16	0.87
1/2	1/4	0.87	1.34	—	1.73	0.16	—
1/2	3/8	0.87	1.34	1.42	1.83	0.16	0.95
1/2	1/2	0.88	1.54	1.42	1.99	0.16	0.95

1. Dashes (—) in the table indicate dimensional data is unavailable for that fitting size and configuration.