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SURFACE VEHICLE STANDARD

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Submitted for recognition as an American National Standard

Flares for Tubing

1. Scope—This SAE Standard covers specifications for 37-degree and 45-degree single and double flares for tube ends intended for use with 37-degree flared tube fittings and 45-degree flared or inverted flared tube fittings, respectively.

2. References

2.1 Applicable Publications—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, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J514—Hydraulic Tube Fittings
SAE TSB 003—Rules for Use of SI (Metric) Units

3. General Specifications

3.1 Dimensions—Dimensions in this document are based on and, unless designated otherwise, are specified in metric units.

3.1.1 Single and double 45-degree flares shall conform to the dimensions specified in Figure 1 and Table 1.

3.1.2 Single and double 37-degree flares shall conform to the dimensions specified in Figure 2 and Table 2.

3.1.3 Optional configurations for single 37-degree flares are specified in Figure 3 and Table 2. These configurations provide extended length of seal contact surface and are recommended for tube wall thickness exceeding "E-Table 2."

3.1.4 The following general specifications supplement the dimensional data with respect to unspecified detail and apply to both 37-degree and 45-degree flares for tubing.

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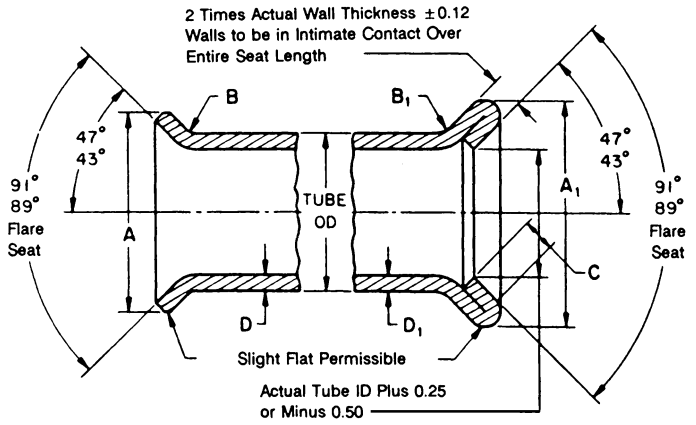

FIGURE 1—SINGLE AND DOUBLE 45-DEGREE FLARES FOR TUBING

TABLE 1—DIMENSIONS OF SINGLE AND DOUBLE 45-DEGREE FLARES FOR TUBING(1) (FIGURE 1)

Nominal Tube OD mm	Nominal Tube OD in	A Single Flare Diameter mm Max	A Single Flare Diameter mm Min	A_1 Double Flare Diameter mm Max	A_1 Double Flare Diameter mm Min	B Single Flare Radius mm ±0.25	B_1 Double Flare Radius mm ±0.25	C Double Flare Coined Seat Length mm Min	D(2) Single Flare Wall Thickness mm Max	D_1(2) Double Flare Wall Thickness mm Max
3.18	0.13	4.59	4.35	5.41	5.03	0.51	1.02	1.02	0.88	0.63
4.76	0.19	6.32	6.08	7.11	6.74	0.51	1.02	1.02	0.88	0.71
6.35	0.25	8.25	8.01	9.14	8.77	0.51	1.02	1.02	1.24	0.83
7.94	0.31	10.26	9.86	10.79	10.42	0.51	1.02	1.57	1.24	0.88
9.52	0.38	12.36	11.97	12.70	12.32	0.51	1.02	1.57	1.65	1.24
11.11	0.44	14.24	13.85	14.47	14.10	0.51	1.02	1.57	1.65	1.24
12.70	0.50	15.82	15.42	16.25	15.88	0.51	1.02	1.57	2.10	1.24
14.29	0.56	17.17	16.77	18.08	17.71	0.51	1.02	1.57	2.10	1.24
15.88	0.63	18.99	18.60	19.60	19.23	0.51	1.02	1.57	2.41	1.24
19.05	0.75	23.26	22.86	23.16	22.79	0.51	1.02	1.57	2.76	1.24
22.22	0.88	26.44	26.04	—	—	0.51	—	—	2.76	—
25.40	1.00	29.38	28.99	—	—	0.51	—	—	3.04	—

1. It is not the intent of this document to define the appropriateness of fittings to be used in conjunction with the flares specified. Considerations such as the effects of wall thickness on working pressures, length of thread engagements, etc., shall be the responsibility of the user. See SAE J514.
2. Recommended maximum nominal wall thickness of tubing normally considered suitable for flaring to the above specifications.

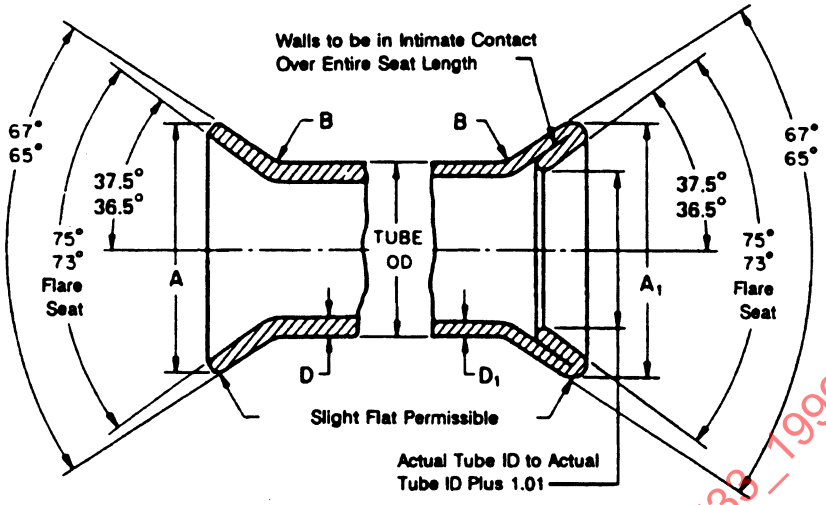

FIGURE 2—SINGLE AND DOUBLE 37-DEGREE FLARES FOR TUBING

TABLE 2—DIMENSIONS OF SINGLE AND DOUBLE 37-DEGREE FLARES FOR TUBING(1)
(FIGURES 2 AND 3)

Nominal Tube OD mm	Nominal Tube OD in	A Single Flare Diameter mm Max	A Single Flare Diameter mm Min	A_1 Double Flare Diameter mm Max	A_1 Double Flare Diameter mm Min	B Radius mm ±0.5	D(2) Single Flare Wall Thickness mm Max	D_1(2) Double Flare Wall Thickness mm Max	E Optional Tube Chamfer Face Width mm	F_1 Dia mm ±0.25
3.18	0.13	5.08	4.58	5.08	4.58	0.80	0.88	0.63	0.5 ± 0.12	4.85
4.76	0.19	7.11	6.61	7.11	6.61	0.80	0.88	0.71	0.5 ± 0.12	6.20
6.35	0.25	9.14	8.64	9.14	8.64	0.80	1.65	0.88	0.75 ± 0.12	7.35
7.94	0.31	10.92	10.16	10.92	10.16	0.80	1.65	0.88	0.75 ± 0.12	8.90
9.52	0.38	12.44	11.69	12.44	11.69	1.00	1.65	1.24	0.75 ± 0.12	10.90
12.70	0.50	16.76	16.01	16.76	16.01	1.50	2.10	1.24	1.25 ± 0.25	14.35
15.88	0.63	20.06	19.31	20.06	19.31	1.50	2.41	1.24	1.25 ± 0.25	17.15
19.05	0.75	24.13	23.37	24.13	23.37	2.00	2.76	1.24	1.25 ± 0.25	21.45
22.22	0.88	27.17	26.42	27.17	26.42	2.00	2.76	1.65	1.25 ± 0.25	24.65
25.40	1.00	30.48	29.72	30.48	29.72	2.30	3.04	1.65	1.25 ± 0.25	27.80
28.58	1.13	35.05	34.29	35.05	34.29	2.30	3.04	1.65	1.25 ± 0.25	—
31.75	1.25	38.35	37.60	38.35	37.60	2.30	3.04	1.65	1.25 ± 0.25	35.70
38.10	1.50	43.94	43.18	43.94	43.18	2.80	3.04	1.65	1.25 ± 0.25	41.15
44.45	1.75	53.59	52.84	53.59	52.84	2.80	3.04	1.65	1.50 ± 0.25	—
50.80	2.00	59.94	59.19	59.94	59.19	2.80	3.40	1.65	1.50 ± 0.25	56.75

1. It is not the intent of this document to define the appropriateness of fittings to be used in conjunction with the flares specified. Considerations such as the effects of wall thickness on working pressures, length of thread engagements, etc., shall be the responsibility of the user. See SAE J514.
2. Recommended maximum nominal wall thickness of tubing normally considered suitable for flaring to the above specifications.

3.2 Deburring Prior to Flaring—To assure producing satisfactory flares, it may be necessary to perform deburring operations on the tube end prior to flaring. Smoothly breaking the inside corner before single flaring ferrous, and some nonferrous tubing is normally required to eliminate the cutoff burr which might otherwise create leakage paths across a substantial portion of the flare. Smoothly breaking the outside corner prior to single flaring, or both outside and inside corners prior to double flaring, shall be permissible on any tube material to minimize splitting.

3.2.1 Recommended OD chamfers for optional 37-degree single flares are specified in Figure 3 and Table 2.

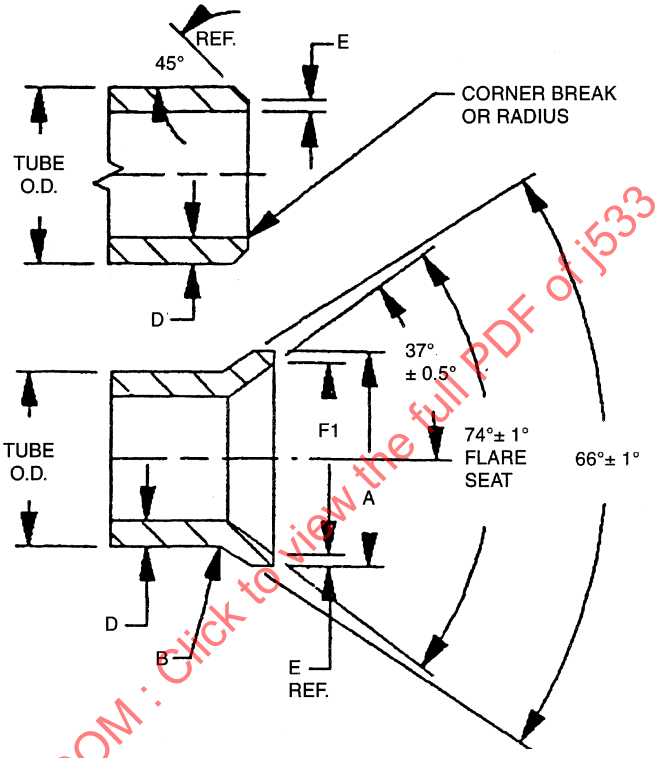

FIGURE 3—OPTIONAL TUBE PREPARATION AND SINGLE 37-DEGREE FLARE FOR TUBING

3.2.2 Inasmuch as the specified dimensions shall prevail, whether or not the corners are broken, the quality of the finished flare shall be the only criterion applied to the burring operation.

3.3 Concentricity—Flare seat shall be concentric with tube outside diameter within 0.38 mm full indicator reading (FIR). To promote uniformity in checking concentricity of flare seat to the tube outside diameter, it is recommended the gaging method depicted in Figure 4 and the following procedure, or equivalent means, be used.

3.3.1 Mount tube in precision collet, dividing head, or equivalent rotational centering and clamping device with the rear of flare not more than 3 mm ahead of the collet. A minimum straight length of tube behind the flare of 25.4 mm, or twice the tube outside diameter, whichever is greater, must be available for mounting purposes.

3.3.2 Place stylus of indicator gage on the coined portion of flare seat.

3.3.3 Rotate the mounted tube through full 360 degree revolution.