

Australian Standard[®]

**Tube fittings with dryseal American
standard taper pipe and unified
threads for automotive and
industrial use (imperial units)**

The following scientific, industrial and governmental organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Department of Defence (Defence Standardisation Committee)

Department of Shipping and Transport

National Association of Australian State Road Authorities

Federal Chamber of Automotive Industries

Federation of Automotive Products Manufacturers

Society of Automotive Engineers—Australasia

Institute of Road Transport Engineers

Australian Automobile Association

Tube Fitting Manufacturers

This standard, prepared by Committee AU/6, Fuel Line Fittings, was approved on behalf of the Council of the Standards Association of Australia on 29 May 1972.

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Tube fittings with dryseal American standard taper pipe and unified threads for automotive and industrial use (imperial units)

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PREFACE

This standard was prepared by the Association's Committee on Fuel Line Fittings.

Preparation of the standard arose from a request submitted by the National Association of Australian State Road Authorities. Shortly before the committee commenced work, the Society of Automotive Engineers—Australasia, having noted the diversity of tube fittings and flares in use within the automotive industry, decided that a standard was required, and constituted its own committee to draft recommendations. These recommendations became available to the SAA committee, and were adopted as the basis for this standard.

The standard is similar to SAE J512e, Automotive Tube Fittings, but excludes the thread sleeve compression type fitting, and the convex and 37-degree flares. The threaded sleeve compression type fitting and the convex flare have limited use within the automotive industry in Australia, and the 37-degree flare applies to high-pressure hydraulic installations. Other changes from J512e have been made to suit local requirements.

The drawings and tables are presented in the standard in readily usable form.

This standard makes reference to the following standards:

AS B131	Centre-line-average Height Method (M-System) for the Assessment of Surface Texture
AS B133	Unified Screw Threads
AS G17	Bright Carbon Steel and Carbon-manganese Steel Bars
AS H3	Naval Brass Rods, Sections, Forging Stock and Forgings
AS H4	Naval Brass (Special Mixture) Rods and Sections (other than Forging Stock)
AS H8	Leaded Brass (58 per cent Copper, 3 percent Lead) Rods and Sections (Other than Forging Stock)
AS K132	Electroplated Coatings on Threaded Components: Part 1—Cadmium on Steel Components: Part 2—Zinc on Steel Components
BS 1400	Schedule of Copper Alloy Ingots and Copper and Copper Alloy Castings
ANSI B2.2	Dryseal Pipe Threads

CONTENTS

	<i>Page</i>		<i>Page</i>
SECTION 1. SCOPE AND SIZE DESIGNATION		5.3 Wrenching Test for Inverted Flared Nuts	8
1.1 Scope	4		
1.2 Size Designation	4	SECTION 6. FLARED TYPE FITTINGS	
1.3 Deviation from Standard	4	6.1 Dimensions and Tolerances	8
SECTION 2. DIMENSIONS AND TOLERANCES APPLYING TO ALL FITTINGS		6.2 Concentricity of Seats	8
2.1 General	5	Figures and Tables	13-22
2.2 Bar Sections	5	SECTION 7. INVERTED FLARED TYPE FITTINGS	
2.3 Hole Diameter	5	7.1 Dimensions and Tolerances	8
2.4 Angular Tolerance	5	7.2 Concentricity of Seats	8
2.5 Passages	5	7.3 Thread Relief	8
2.6 Wall Thickness	5	Figures and Tables	23-36
2.7 Contour	5	SECTION 8. BALL SLEEVE (COMPRESSION) TYPE FITTINGS	
SECTION 3. SCREW THREADS		8.1 Dimensions and Tolerances	9
3.1 Straight Screw Threads	6	Figures and Tables	38-47
3.2 Pipe Threads	6	SECTION 9. DIMENSIONS OF SINGLE AND DOUBLE 45-DEGREE FLARES AND TUBING	
SECTION 4. MATERIALS AND MANUFACTURE		9.1 Dimensions and Tolerances	9
4.1 Material	7	9.2 Squareness	9
4.2 Manufacture	7	9.3 Workmanship	9
4.3 Sealing Surfaces	7	Figures and Tables	48
4.4 Workmanship	7	APPENDICES	
4.5 Finish	7	A Gauges and Gauging For Inverted Flared Type Fittings	10
4.6 Marking	7	B SAE Identification Code For Automotive Tube and Pipe Fittings	12
SECTION 5. DESIGN PRESSURES AND TEST REQUIREMENTS			
5.1 Design Pressures	8		
5.2 Type Test of Assembled Joint	8		

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
TUBE FITTINGS WITH DRYSEAL AMERICAN STANDARD TAPER PIPE
AND UNIFIED THREADS FOR AUTOMOTIVE AND INDUSTRIAL USE

SECTION 1. SCOPE AND SIZE DESIGNATION

1.1 SCOPE. This standard relates to tube fittings of the following types:

- 45-degree flared ($\frac{1}{8}$ — 1 in)
- Inverted flared ($\frac{1}{8}$ — $\frac{3}{4}$ in)
- Ball sleeve ($\frac{1}{8}$ — $\frac{3}{4}$ in).

The fittings are intended primarily for automotive use, and are screwed Dryseal American Standard Taper Pipe thread (NPTF) and Unified threads.

NOTE: Other fittings in common use are screwed with British Standard Pipe taper threads and Unified threads. The BSP thread is similar to the NPTF thread, having the same t.p.i. in the $\frac{1}{2}$ in and $\frac{3}{4}$ in sizes, and differing by not more than one t.p.i. in the other sizes. BSP and NPTF threads are, however, not compatible, having different thread forms and methods of sealing, and the fittings are not interchangeable in any sizes.

The standard specifies the dimensions, materials, working pressures, test pressures and general manufacturing requirements of the fittings.

1.2 SIZE DESIGNATION. Fitting sizes shall be designated by the outside diameter of the tube for tube ends, and by the nominal pipe size for pipe thread ends. See Appendix B for identification code.

1.3 DEVIATION FROM STANDARD. Where there is a requirement for deviation from the fittings listed in this standard, e.g. for safe assembly of a dual brake-line assembly, a standard fitting of larger thread and hexagon size should be selected from those listed, and modified to the smaller tube diameter.

SECTION 2. DIMENSIONS AND TOLERANCES APPLYING TO ALL FITTINGS

2.1 GENERAL. Dimensions and tolerances given in Tables 11-14, 21-27, 31-35 shall apply to the fittings in the finished condition, including the electroplating if specified. Tolerances on dimensions not otherwise limited shall be ± 0.010 in.

2.2 BAR SECTIONS. Unless otherwise specified, the maximum and minimum dimensions across flats shall be within the commercial tolerances of the bar or extruded stock. The minimum across the corners dimensions of hexagons shall be 1.092 times the nominal width across flats. The minimum side flat length shall be 0.43 times the nominal width across flats.

Where so illustrated, hexagon corners shall be chamfered 30 ± 5 degrees to a diameter equal to the nominal width across flats with a tolerance of -0.016 in. Where design permits, corners may be chamfered to the diameter of the abutting surface, provided that the length of chamfer does not exceed that produced by the 30-degree chamfer previously described.

The nominal hexagon size shall be as measured across flats.

2.3 HOLE DIAMETERS. Hole diameters designated 'drill' shall conform to Table 1.

TABLE 1
HOLE SIZE

Nominal drill dia.		Allowable deviations in hole dia.	
over	up to	max.	min.
—	0.187	+ 0.003	– 0.002
0.187	0.249	+ 0.004	– 0.002
0.249	0.753	+ 0.006	– 0.003
0.753	—	+ 0.007	– 0.004

2.4 ANGULAR TOLERANCE. Angular tolerance on the axes of ends of elbows and tees shall be ± 1.5 degrees.

2.5 PASSAGES. Where passages in straight fittings are machined from opposite ends, the offset at the meeting point shall not exceed 0.015 in. The cross-sectional area at the junction of passages in angle fittings shall be not less than that of the smallest passage. Where the passage is specified as a maximum diameter or as a tap drill diameter, the minimum diameter shall be not less than the minimum diameter of the smallest passage in the fitting.

2.6 WALL THICKNESS. Unless otherwise designated, the wall thickness at any point on fittings shall be not less than the thickness established by the specified dimensions, tolerances, and eccentricities for inner and outer surfaces.

2.7 CONTOUR. Details of contour shall be optional with the manufacturer, provided that the tabulated dimensions are maintained, and serviceability of the fittings is not impaired. Wrench flats on elbows and tees shall be optional. Where extruded, cast or forged shapes are reduced to conserve material, the wall thickness shall be not less than that shown in Table 2. For extruded shapes the reduction applies to one plane of shape only.

TABLE 2
MINIMUM WALL THICKNESS

Nominal tube OD in	Wall thickness, min. in	
	Extruded shapes	Cast and forged shapes
1/8	0.04	0.060
3/16	0.04	0.070
1/4	0.04	0.075
5/16	0.05	0.075
3/8	0.05	0.090
7/16	0.06	0.090
1/2	0.06	0.090
9/16	0.06	0.090
5/8	0.08	0.100
3/4	0.08	0.100
7/8	0.08	0.120
1	0.08	0.120

SECTION 3. SCREW THREADS

3.1 STRAIGHT SCREW THREADS.

3.1.1 Thread Form. Straight threads shall conform to AS B133, Unified Screw Threads.

3.1.2 Unplated Fittings. Class 2A external threads and class 2B internal threads shall apply, except that class 2B threads may be modified to class 3B limits for inverted flare brass fittings as indicated in Tables 21-23.

3.1.3 Plated Fittings with External Threads. For plated fittings with external threads, the maximum diameters of class 2A may be exceeded by an allowance of 30 per cent of class 2A pitch diameter tolerance, thus increasing the diameter of the plated fittings to the basic diameter.

3.1.4 Plated Fittings with Internal Threads. For plated fittings with internal threads, the class 2B diameters, and modified 3B minor diameters, shall apply after plating. The pitch diameter tolerance shall be the same as the corresponding diameter-pitch combination and class of the Unified coarse and fine thread series, or for special diameter-pitch combinations shall be based on diameter, pitch, and a length of engagement of nine times the pitch.

3.1.5 Roll Threading. Where external threads are produced by roll threading, and the body is not undercut, the unthreaded portion of the body adjacent to the shoulder may be reduced to the minimum pitch diameter.

3.1.6 Chamfer. External threads shall be chamfered to the diameter of the abutting surfaces, or to the diameters specified, to produce a length of chamfered or partial thread equivalent to $\frac{3}{4}$ to $1\frac{1}{4}$ times the pitch (rounded to a three-place decimal).

3.1.7 Counter-sink. Internal threads shall be countersunk 90 degrees included angle to the diameter specified in the dimensional tables.

3.1.8 Thread Eccentricity Tolerances. Any eccentricity of the pitch diameter with respect to the crest diameter shall not result in the maximum material condition of the basic thread form being exceeded.

3.2 PIPE THREADS.

3.2.1 Thread Form. Pipe threads, unless there is a specific authorization to the contrary, shall conform to the Dryseal American Standard Taper Pipe thread (NPTF), in ANSI B2.2. Where required by the purchaser the pipe thread may be shortened by one pitch (thread) in conformity with SAE Short Dryseal Taper Pipe thread (PTF—SAE Short).

3.2.2 Length of Thread. The length of full form external thread shall be not less than that shown in Table 3, except that where the thread is cut through into a relieved body, or undercut on the fitting, the minimum full thread length may be reduced by one pitch (thread).

NOTES:

1. The tube fitting dimensions used in this standard are based on the length of the Dryseal American Standard Taper Pipe thread (NPTF), it being the general opinion of manufacturers and users that trouble-free assembly cannot be assured unless a full length thread is used. However, the tap drill depths and overall lengths specified in the tables for fittings with internal taper type threads are not consistent with the tap drill depths and overall thread lengths of the Dryseal American Taper Pipe threads (NPTF) shown in Table A2, Appendix A, of the SAE Standard J476—Dryseal Pipe Threads. The full length Dryseal American Standard Taper Pipe taps specified in Table B2 of SAE Standard J476 cannot be used, as the tap drill depths and overall lengths of the fittings have been reduced to the minimum required by bottoming taps to produce standard full length thread. The deviations described above are peculiar to these tube fittings, and as special tooling is required, caution should be exercised in specifying such deviations for any other products.
2. Where it is not objectionable from a functional or production standpoint, the use of a compatible lubricant or sealant may be desirable in assembling Dryseal pipe threads on automotive tube fittings to minimize galling and effect a pressure-tight seal.

TABLE 3
LENGTH FULL THREAD

Nominal pipe thread size in	NPTF		PTF—SAE	
	Length in	Threads	Length in	Threads
$\frac{1}{8}$	0.3009	8.12	0.2639	7.12
$\frac{1}{4}$	0.4574	8.23	0.4018	7.23
$\frac{3}{8}$	0.4634	8.34	0.4078	7.34
$\frac{1}{2}$	0.6051	8.47	0.5337	7.47
$\frac{3}{4}$	0.6171	8.64	0.5457	7.64
1	0.7698	8.85	0.6828	7.85

3.2.3 Roll Threading. Where external pipe threads are produced by roll threading, the diameter of the unthreaded portion of the shank adjacent to the shoulder may be reduced to the shank diameters shown in Table 4.

TABLE 4
SHANK DIAMETERS—ROLL THREADS

Nominal pipe thread size in	Shank dia. in	Thread size in	Shank in
$\frac{1}{8}$	0.3800	$\frac{1}{2}$	0.7918
$\frac{1}{4}$	0.5025	$\frac{3}{4}$	1.0018
$\frac{3}{8}$	0.6375	1	1.2563

3.2.4 Chamfer. External pipe threads shall be chamfered from the diameters shown in Table 5 to produce the specified length of chamfered or partial thread. Internal pipe threads shall be countersunk 90 degrees, included angle, to the diameters shown in Table 5.

TABLE 5
CHAMFERS

Nominal pipe thread size in	External thread				Internal thread	
	Chamfer diameter, in		Length of chamfered or partial thread, in		Countersink diameter, in	
	max.	min.	min.	max.	min.	max.
$\frac{1}{8}$	0.32	0.30	0.037	0.035	0.42	0.44
$\frac{1}{4}$	0.42	0.40	0.056	0.084	0.55	0.57
$\frac{3}{8}$	0.55	0.53	0.056	0.084	0.69	0.71
$\frac{1}{2}$	0.68	0.66	0.071	0.107	0.85	0.87
$\frac{3}{4}$	0.89	0.87	0.071	0.107	1.06	1.08
1	1.12	1.09	0.087	0.130	1.34	1.37

SECTION 4. MATERIALS AND MANUFACTURE

4.1 MATERIALS. The materials used for fittings to this standard shall be brass or steel as required by the purchaser. The following specifications shall apply:

- (a) AS H4—Naval Brass (Special Mixture) Rods and Sections (other than Forging Stock), and AS H8—Leaded Brass (58% Copper, 3% Lead) Rods and Sections (other than Forging Stock) for Brass Bar or Extruded Stock.
- (b) AS H3—Naval Brass Rods, Section, Forging Stock and Forgings, and AS H11—Leaded Brass (58% Copper, 2% Lead) Forging Stock and Forgings, for Forged Stock and Forgings.
- (c) BS 1400—Schedule of Copper Alloy Ingots for Copper and Copper Alloy Castings—material LG2 or equivalent for castings.
- (d) AS G17—Bright Carbon Steel and Carbon-Manganese Steel Bars—to a maximum carbon content of 0.20 per cent.

4.2 MANUFACTURE. Fittings shall be milled from bar, forged or cast.

4.3 SEALING SURFACES. Sealing surfaces shall be free from tool marks across the face of the surface. Annular tool marks of 63 or 125 μ -in CLA shall be permissible as alternative surface textures, the required alternative being as specified by the purchaser.

NOTE: Surface texture as measured by AS B131—Centre-line-average Height Method (M-System) for the Assessment of Surface Texture.

4.4 WORKMANSHIP. Fittings shall be cleanly finished, free from burrs, flashes, sharp edges, slivers, and loose scales.

4.5 FINISH. Steel fittings shall be cadmium or zinc plated and passivated in accordance with AS K132—Electroplated Coatings on Threaded Components: Part 1, Cadmium on Steel Components; Part 2, Zinc on Steel Components.

4.6 MARKING. Unless otherwise specified by the purchaser, fittings complying with this standard shall be dyed transparent orange-red. A basic dyestuff giving a waterproof fade-resistant colouring shall be used. The colour film shall be thin and even without undue buildup in the threads.

NOTE: A dyestuff solution of colour intensity 12 on the Gardner scale has been found suitable. Dipping or spraying methods are applicable.

SECTION 5. DESIGN PRESSURES AND TEST REQUIREMENTS

5.1 DESIGN PRESSURES. The design pressures for both brass and steel fittings shall be as shown in Table 6.

TABLE 6
DESIGN PRESSURES

Size fitting in	Design pressure	
	Hydraulic lbf/in ²	Pneumatic lbf/in ²
1/8 – 5/16	3000	1000
3/8 – 7/16	2000	600
1/2 – 3/4	1500	400
7/8 – 1	1000	250

5.2 TYPE TEST OF ASSEMBLED JOINT. Fittings when assembled with short lengths of compatible tube shall be capable of withstanding a hydraulic pressure of twice the design pressure shown in Table 6 for 15 minutes without showing signs of leakage or other defects. The test shall be carried out before electroplating. The fittings shall be fixed at one end only during the test.

5.3 WRENCHING TEST FOR INVERTED FLARED NUTS. Steel inverted flared nuts when assembled without tubing into mating brass fittings

which are held securely by a suitable means such as a vice, shall be capable of being tightened by means of a standard open end wrench, having an opening as shown in Table 7, to the minimum torque values specified, without failure (rounding) of the hexagon corner.

NOTE: The torque values are only for testing the hexagon corners, and are not to be construed as installation torques.

TABLE 7
WRENCHING REQUIREMENTS

Nom. tube OD in	Torque requirements for steel nuts lbf.in	Wrench opening in
	min.	max.
1/8	60	0.322
3/16	120	0.384
1/4	150	0.446
5/16	180	0.510
3/8	210	0.636
7/16	300	0.699
1/2	400	0.763
5/8	500	0.888
3/4	650	1.077

SECTION 6. FLARED TYPE FITTINGS

6.1 DIMENSIONS AND TOLERANCES. The dimensions and tolerances of flared type fittings shall be as shown in Figs 10 to 14 and Tables 11 to 14, as follows:

Fig. 10	General arrangement
Figs 11A to 11C	Unions and connectors
Figs 12A to 12C	Elbows

Figs 13A to 13C	Tees
Fig. 14	Nut

6.2 CONCENTRICITY OF SEATS. Unless otherwise specified, seats of flared type fittings shall be concentric with straight thread pitch diameters within 0.010 in full indicator reading (FIR).

SECTION 7. INVERTED FLARED TYPE FITTINGS

7.1 DIMENSIONS AND TOLERANCES. The dimensions and tolerances of inverted flared type fittings shall be as shown in Figs 20 to 26 and Tables 21 to 26 (see Note), as follows:

Fig. 20	General arrangement
Figs 21A to 21C	Unions and connectors
Figs 22A to 22D	Elbows
Figs 23A to 23D	Tees
Fig. 24	Nut
Fig. 25	Plug
Fig. 26	Seat insert

NOTE: The seat dimensions specified in Tables 20 to 26 are predicated on practical threading limitations in steel fittings, and the use of these fittings with double flared tubing. Therefore, whenever purchasers contemplate using these fittings with single flared tubing, it is recommended that fitting manufacturers be consulted.

7.2 CONCENTRICITY OF SEATS. Integral internal seats in inverted flared tube fittings shall be concentric with straight thread pitch diameters within 0.005 in full indicator reading (FIR).

7.3 THREAD RELIEF. The use of a thread relief undercut beyond a length equal to 'K min' shall be permissible.

SECTION 8. BALL SLEEVE (COMPRESSION) TYPE FITTINGS

8.1 DIMENSIONS AND TOLERANCES. The dimensions and tolerances of ball sleeve (compression) type fittings shall be as shown in Figs 31 to 35 and Tables 30 to 35, as follows:

Fig. 30 General arrangement

Figs 31A to 31C

Figs 32A to 32C

Figs 33A to 33C

Fig. 34

Fig. 35

Unions and connectors

Elbows

Tees

Nut

Ball sleeve

SECTION 9. DIMENSIONS OF SINGLE AND DOUBLE 45-DEGREE FLARES FOR TUBING

9.1 DIMENSIONS AND TOLERANCES. The dimensions and tolerances of single and double 45-degree flares for tubing for use with flared and inverted flared fittings shall be as shown in Fig. 40 and Table 40.

9.2 SQUARENESS. Flares shall be square with the axis of the tube within half a degree.

9.3 WORKMANSHIP. Flares shall be free from loose scale, burrs and cracks. Seating surfaces shall be smooth and free from pit marks. Smoothly breaking the outside and inside corners prior to flaring shall be permissible on any tube material to minimize splitting.

APPENDIX A

GAUGES AND GAUGING FOR INVERTED FLARED TYPE FITTINGS

A1 GENERAL. The information contained herein is intended to provide and promote the use of uniform gauging practices for determining the conformance of inverted flared type fittings with the requirements given in this standard.

A2 GAUGING OF CONE SEATS. Proper location of the face of the cone seat relative to the face of the fittings shall be determined by use of the step limit gauge shown in Fig. A1. One half of the top surface of the body of this gauge shall be machined and/or ground 0.015 inch below the other half of the surface to provide a low limit step. The gauge pin shall have a minimum diameter equal to 'E max' as shown in Table 21A, and shall be of a length equivalent to the sum of the height of the high limit side of the gauge body plus 'K min' as shown in Table 21A.

The opposite faces of the gauge body and the ends of the gauge pin shall be flat, smooth, parallel and square with the axis of the pin. The fit between the gauge pin and the gauge body shall be such that the pin alignment is maintained but is free to move of its own weight within the gauge body. All gauge components should be made from steel suitably hardened to assure adequate service life.

When this gauge is placed on the face of the fitting, in line with the axis of the seat, and with the gauge pin contacting the face of the seat, the top of the gauge pin shall not protrude above the high limit nor be below the low limit top surfaces of the gauge body for the fitting to be acceptable.

A3 GAUGING OF INTERNAL THREADS.

A.3.1 Size and Form. Conformance of internal threads with the dimensions specified shall be determined in accordance with standard thread gauging procedures.

A.3.2 Full Form Thread Depth. Suitability of the relationship between the last full form thread to the face of the cone seat shall be determined by use of the gauge shown in Fig. A2. This gauge shall have external threads conforming in all respects with the corresponding Go thread plug gauge for the respective thread size, of a minimum length equal to 'K min' as shown in Table 21A plus one pitch (thread) and shall have the partial thread at the starting end removed. The use of a thread relief undercut beyond a length equal to 'K min' shall be permissible. The gauge pin hole at the starting end should be suitably counterbored to flare the fitting cone seat to a depth equivalent to $1\frac{1}{2}$ pitches (threads). The length of the gauge pin shall be equivalent to the overall length of the body of the gauge plus the difference between 'J max' as shown in Table 21A, and half pitch (thread). All other features of the gauge body, gauge pin, fit, and material shall be as specified for the gauge in Fig. A1.

When this gauge is assembled by hand into the fitting as far as the thread will permit, with the pin contacting the face of the cone seat, the top of the gauge pin shall be flush with, or protrude above, the top surface of the gauge body for the fitting to be acceptable.

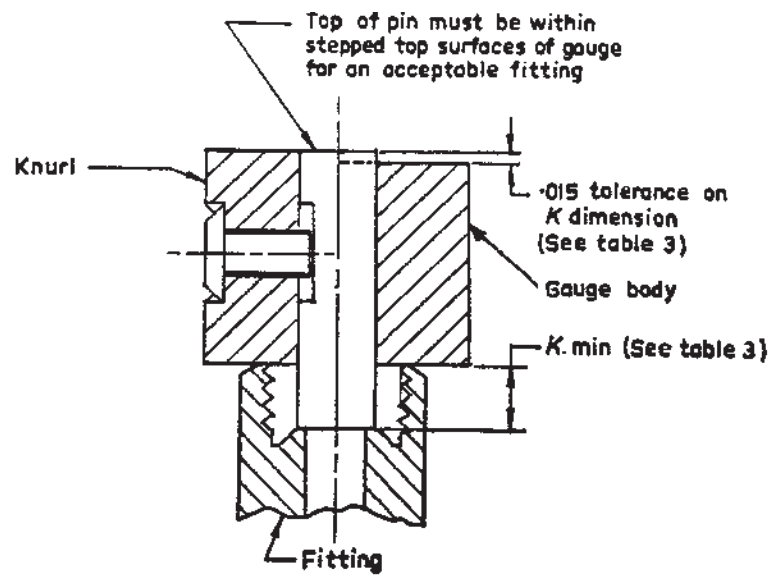


Fig. A1. FLUSH PIN GAUGE FOR CHECKING LOCATION OF FACE OF CONE SEAT

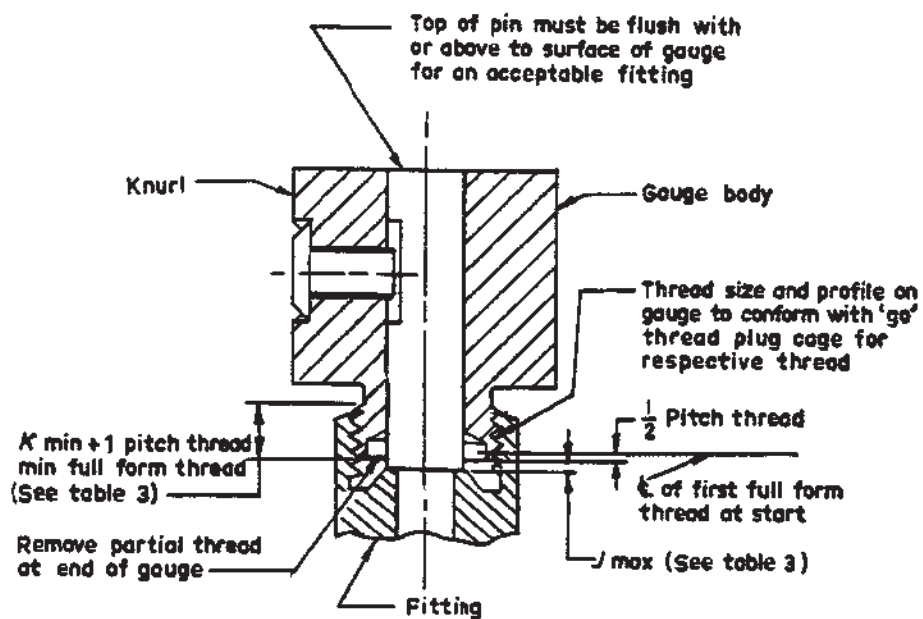


Fig. A2. FLUSH PIN GAUGE FOR CHECKING RELATION OF END OF FULL THREAD WITH FACE OF CONE SEAT

APPENDIX B

SAE IDENTIFICATION CODE FOR AUTOMOTIVE TUBE AND PIPE FITTINGS

(Summary as applicable to AS D26)

B1 CODE. The code shall consist of two groups of numbers, the first group giving the fitting size, and the second group the fitting identification.

B2 SIZE.

B2.1 Tube Size. The tube size shall be given by a series of dash numbers consisting of the number of $\frac{1}{16}$ -inch increments in the nominal tube outside diameter as shown in Table B1.

TABLE B1
TUBE SIZE

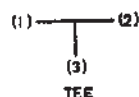
Nom. tube OD in	Dash size symbol	Nom. tube OD in	Dash size symbol	Nom. tube OD in	Dash size symbol
$\frac{1}{8}$	-2	$\frac{7}{16}$	-7	$\frac{7}{8}$	-14
$\frac{3}{16}$	-3	$\frac{1}{2}$	-8	1	-16
$\frac{1}{4}$	-4	$\frac{9}{16}$	-9	$1\frac{1}{4}$	-20
$\frac{5}{16}$	-5	$\frac{5}{8}$	-10	$1\frac{1}{2}$	-24
$\frac{3}{8}$	-6	$\frac{3}{4}$	-12	2	-32

B2.2 Pipe Size. The pipe size shall be given by a series of dash numbers consisting of the number of $\frac{1}{16}$ -inch increments in the nominal pipe thread size as shown in Table B2.

TABLE B2
PIPE SIZE

Nominal pipe thread size in	Dash size symbol	Nominal pipe thread size in	Dash size symbol	Nominal pipe thread size in	Dash size symbol
$\frac{1}{16}$	-1	$\frac{3}{8}$	-6	1	-16
$\frac{1}{8}$	-2	$\frac{1}{2}$	-8	$1\frac{1}{4}$	-20
$\frac{1}{4}$	-4	$\frac{3}{4}$	-12	$1\frac{1}{2}$	-24

B2.3 Sequence. The size of the tube end shall precede the size of pipe, and the dash shall be omitted from the initial size symbol. Sizes of ends on tees shall be given in the sequence defined below.



For tees, run (1—2) shall be described first, then branch (—3).

B3 FITTING IDENTIFICATION. The fitting identification shall consist of a six-digit number made of up to three groups of two digits, each giving in sequence the fitting type, the fitting shape, and the fitting connecting ends as follows:

(a) *Fitting Type.* The two digit numbers applicable to the fitting types shall be as shown in Table B3.

TABLE B3
FITTING IDENTIFICATION

No	Fitting type
01	45-degree flared automotive
04	Inverted flared automotive
06	Ball sleeve automotive

(b) *Fitting Shape.* The two-digit numbers applicable to the fitting shapes shall be as shown in Table B4.

TABLE B4
FITTING SHAPE

No	Fitting shape
01	Straight
02	90-degree elbow
03	45-degree elbow
04	Tee

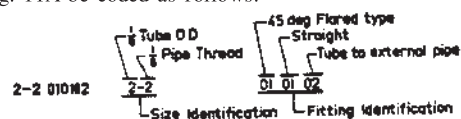
(c) *Fitting Connecting Ends.* The two-digit numbers applicable to the fitting connecting ends shall be as shown in Table B5.

TABLE B5
CONNECTING ENDS

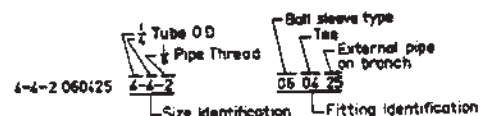
No	Connecting ends
01	Tube, all ends
02	Tube to external pipe
03	Tube to internal pipe
09	Plug
10	Short nut
11	Long nut
15	Tube sleeve
24	External pipe on run
25	External pipe on branch
27	Internal pipe on branch
41	Seat insert

B4 APPLICATION OF CODE. The identification code shall be applied as indicated in the examples given below.

Example (i). The $\frac{1}{8}$ size 45-degree flared tube connector shown in Fig. 11A be coded as follows:



Example (ii). The $\frac{1}{4}$ size ball sleeve tube tee shown in Fig. 33B shall be coded as follows:



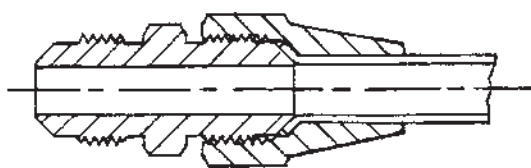


Fig. 10. GENERAL ARRANGEMENT—FLARED TYPE FITTING

TABLE 11A
FLARED STRAIGHT, UNION TO EXTERNAL TAPER (010102)

Nominal Tube OD			1/8	3/16	1/4	5/16	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
A	Dry Seal Taper Thread NPTF		1/8	1/8	1/8	1/8	1/4	1/4	1/4	3/8	1/2	1/2	3/4	1
B	Nominal size		5/16-24	3/8-24	7/16-20	1/2-20	1/2-20	5/8-18	11/16-16	3/4-16	7/8-14	1 1/16-14	1 1/4-12	1 3/8-12
	Pitch dia.	max.	0.2843	0.3468	0.4037	0.4662	0.4662	0.5875	0.6455	0.7079	0.8270	1.0145	1.1941	1.3190
		min.	0.2806	0.3430	0.3995	0.4619	0.4619	0.5828	0.6407	0.7029	0.8216	1.0092	1.1879	1.3127
C	Hexagon	nom.	7/16	7/16	7/16	1/2	9/16	5/8	11/16	3/4	7/8	1 1/16	1 1/4	1 3/8
D	Hole dia.	drill	0.078	0.125	0.188	0.219	0.219	0.281	0.312	0.406	0.500	0.625	0.750	0.875
D ₁	Hole dia.	drill	0.219	0.219	0.219	0.219	0.312	0.312	0.312	0.406	0.562	0.562	0.750	0.938
E	Dia.	±0.005	0.109	0.156	0.219	0.250	0.250	0.312	0.344	0.438	0.531	0.719	0.797	0.938
F	Dia.	±0.005	0.234	0.297	0.344	0.406	0.406	0.531	0.578	0.641	0.750	0.938	1.125	1.250
G	Dia.	+0.000 -0.010	0.250	0.313	0.364	0.427	0.427	0.543	0.596	0.659	0.770	0.958	1.128	1.253
I	Part length		0.38	0.44	0.50	0.56	0.56	0.62	0.69	0.75	0.88	1.00	1.12	1.12
J	Full thread	min.	0.31	0.38	0.41	0.47	0.47	0.54	0.56	0.66	0.76	0.90	0.95	0.97
K	Part length		0.12	0.12	0.16	0.19	0.19	0.22	0.25	0.25	0.28	0.28	0.38	0.38
L	Overall length	±0.03	0.92	1.00	1.06	1.16	1.34	1.44	1.53	1.62	2.00	2.19	2.37	2.62
P	Part length		0.38	0.38	0.38	0.38	0.56	0.56	0.56	0.56	0.75	0.75	0.75	0.94
S	Part length	max.	0.46	0.48	0.48	—	0.67	0.69	—	—	0.94	1.22	—	1.22
T	Hex. thickness	ref.	0.15	0.18	0.18	0.21	0.21	0.24	0.27	0.30	0.37	0.43	0.49	0.55

NOTES:

- Where SAE Short Pipe Thread is authorized by the purchaser, dimensions L, P, S are reduced in accordance with the reduction of pipe thread length. See Table 3.
Where thread relief undercut is used, the last thread shall be chamfered 1/2 to 1 pitch long from G diameter, and dimension J may be reduced by an amount equal to 1/2 pitch.
- At manufacturer's option, through passages may conform with the smaller diameter specified (D), or be counterbored to the larger diameter (D₁) from the appropriate end for a depth of S.
- T is a minimum design dimension, not subject to inspection.
- Dimensions are in inches.

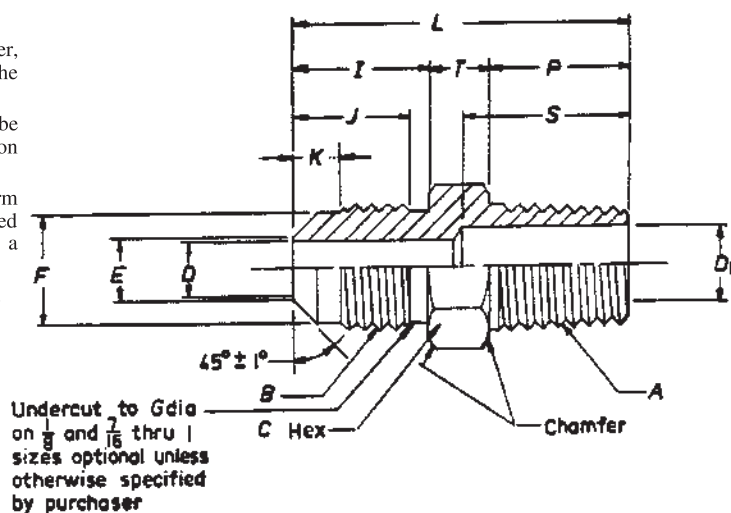


Fig. 11A

TABLE 11B
FLARED STRAIGHT, DOUBLE UNION (010101)

Nominal Tube OD			1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
B Straight Thread	Nominal size		5/16-24	3/8-24	7/16-20	1/2-20	5/8-18	11/16-16	3/4-16	7/8-14	1 1/16-14	1 1/4-12	1 3/8-12
	Pitch diameter	max. min.	0.2843 0.2806	0.3468 0.3430	0.4037 0.3995	0.4662 0.4619	0.5875 0.5828	0.6455 0.6407	0.7079 0.7029	0.8270 0.8216	1.0145 1.0092	1.1941 1.1879	1.3190 1.3127
C ₁	Hexagon	nom.	7/16	7/16	7/16	1/2	5/8	11/16	3/4	7/8	1-1/16	1 1/4	1 3/8
D	Hole diameter	drill	0.078	0.125	0.188	0.219	0.281	0.312	0.406	0.500	0.625	0.750	0.875
E	Diameter	±0.005	0.109	0.156	0.219	0.250	0.312	0.344	0.438	0.531	0.719	0.797	0.938
F	Diameter	±0.005	0.234	0.297	0.344	0.406	0.531	0.578	0.641	0.750	0.938	1.125	1.250
G	Diameter	+0.000 ±0.010	0.250	0.313	0.364	0.427	0.543	0.596	0.659	0.770	0.958	1.128	1.253
I	Part length		0.38	0.44	0.50	0.56	0.62	0.69	0.75	0.88	1.00	1.12	1.12
J	Full thread	min.	0.31	0.38	0.41	0.47	0.54	0.56	0.66	0.76	0.90	0.95	0.97
K	Part length		0.12	0.12	0.16	0.19	0.22	0.25	0.25	0.28	0.28	0.38	0.38
L ₁	Overall length	±0.03	0.92	1.06	1.19	1.34	1.50	1.66	1.81	2.12	2.44	2.74	2.80
T	Hexagon thickness	ref.	0.15	0.18	0.18	0.21	0.24	0.27	0.30	0.37	0.43	0.49	0.55

NOTES:

- Where thread relief undercut is used, the last thread shall be chamfered 1/2 to 1 pitch long from G diameter, and dimension J may be reduced by an amount equal to 1/2 pitch.
- T is a minimum design dimension, not subject to inspection.
- Dimensions are in inches.

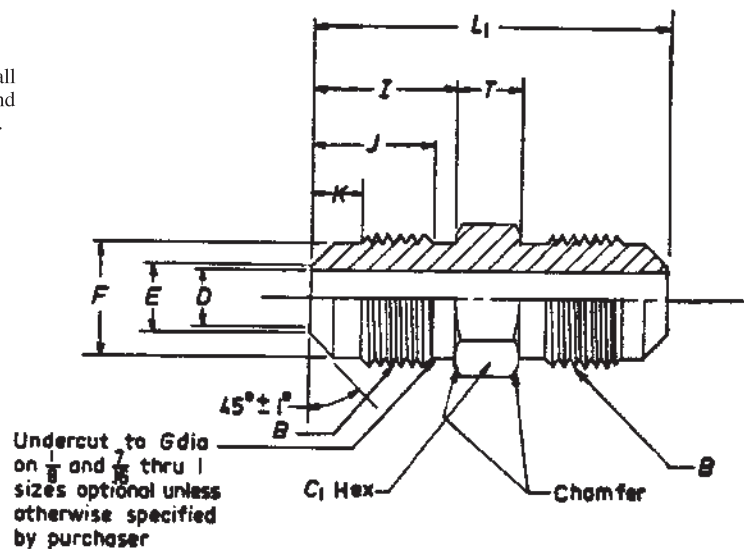


Fig. 11B