SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1140

CAN-CELLED APR2000

Issued 1976-12
Cancelled 2000-04

Superseding J1140 FEB1988

Submitted for recognition as an American National Standard

Filler Pipes and Openings of Motor Vehicle Fuel Tanks

1. ***Scope***—This SAE Recommended Practice was developed primarily for gasoline-powered passenger car and truck applications but may be used in marine, industrial, and similar applications where refueling vapor recovery is required.

1.1 **Purpose**—The purpose of this document is to ensure compatibility between new vehicle designs and refueling vapor recovery nozzles by their dimensions and specifications.

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 J829 MAR78—Fuel Tank Filler Cap and Cap Retainer
SAE J1114 MAR78—Fuel Tank Filler Cap and Cap Retainer—Threaded Pressure-Vacuum Type

3. ***Definitions***

3.1 **Filler Pipe Face**—The gasket sealing surface as defined in SAE J829 MAR78, Figure 2 and SAE J1114 MAR78, Figure 2.

3.2 **Test Nozzle Spout**—The rod with dimensions as shown in Figure 4, used to establish the reference lines around which the filler pipe access zone is defined.

3.3 **Reference Plane**—The plane which contains the axial centerline of the filler pipe face, and is turned in the direction which the manufacturer of the automobile has determined to be the orientation in which the nozzle is to be inserted.

3.4 **Normal Resting Position of Test Nozzle Spout**—The position the test nozzle spout is in when the following conditions are met:

3.4.1 The test nozzle spout is inserted into the filler pipe, such that the axial centerline of the test nozzle spout lies in the reference plane.

3.4.2 The locking ring of the test nozzle spout is located immediately on the inside (that is, the vehicle tank side) of the locking lip.

3.4.3 Either the test nozzle locking ring rests upon the filler pipe wall, or the test nozzle spout shaft rests upon the locking lip as shown in Figures 1A and 2A, respectively.

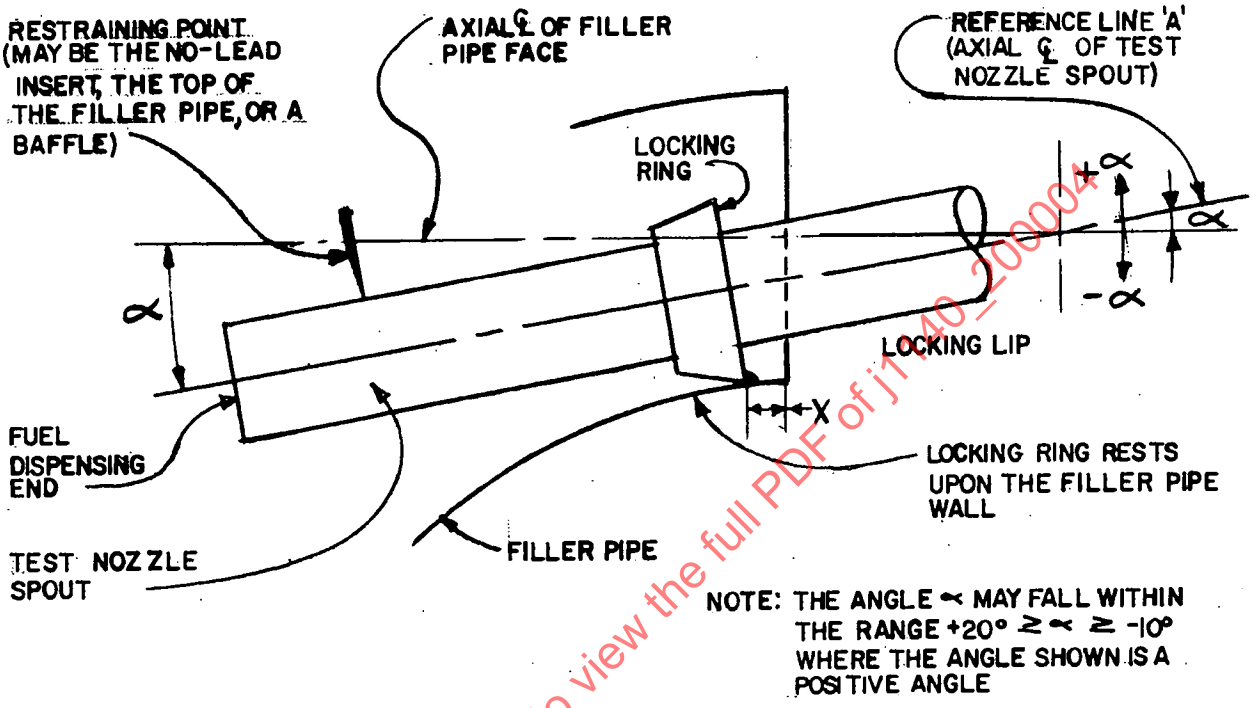

FIGURE 1A—SAE J1114, TYPE FILLER PIPE (NORMAL RESTING POSITION)

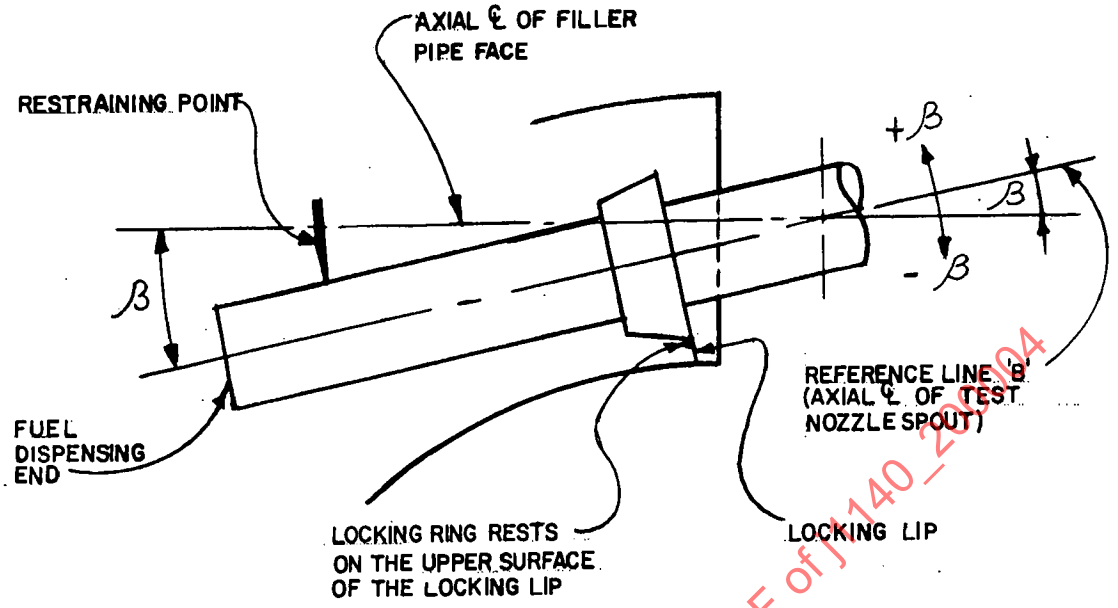

FIGURE 1B—SAE J1114, TYPE FILLER PIPE (INSERTION POSITION)

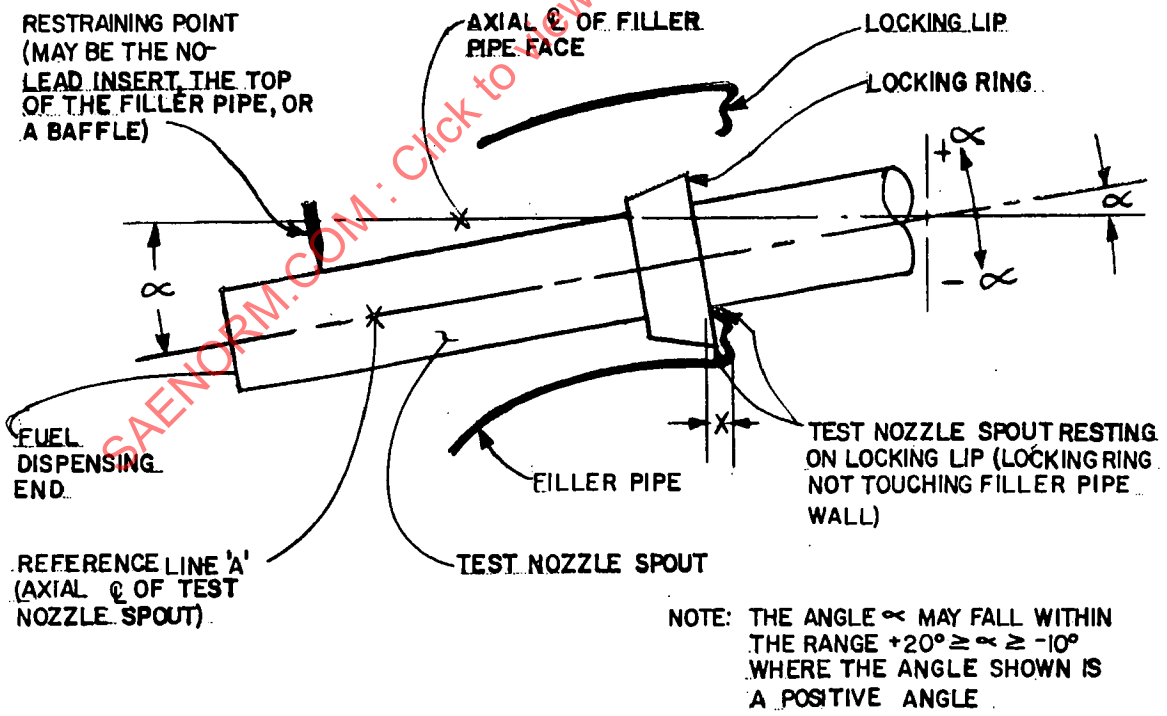

FIGURE 2A—SAE J829, TYPE FILLER PIPE (NORMAL RESTING POSITION)

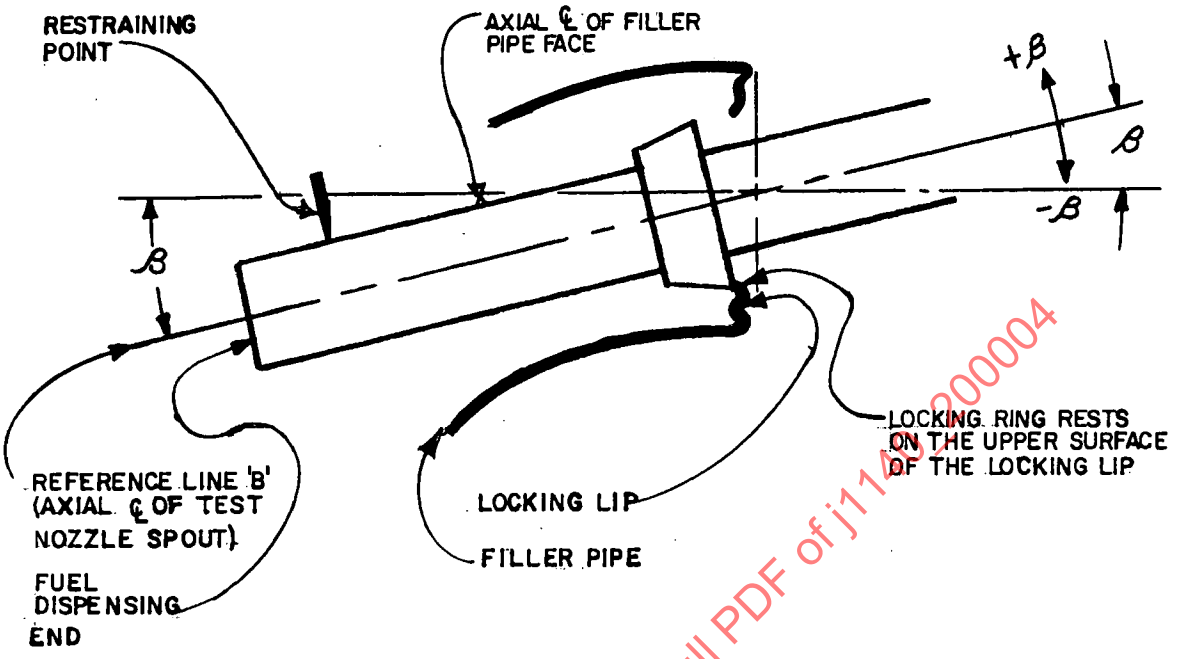

FIGURE 2B—SAE J829, TYPE FILLER PIPE (INSERTION POSITION)

3.4.4 The fuel dispensing end of the test nozzle spout (as indicated in Figures 1A and 2A) is in contact with a restraining point.

3.5 Insertion Position of the Test Nozzle Spout—The position the test nozzle spout is in when the following conditions are met:

3.5.1 The test nozzle is inserted into the filler pipe with the axial centerline of the test nozzle spout contained in the reference plane.

3.5.2 The locking ring of the test nozzle spout is resting on the upper surface of the locking lip so as to raise the nozzle handle through the minimum angle (from the normal resting position) required to effect the test nozzle spout insertion into the filler pipe as shown in Figure 3 - Construction of Zone Top Line.

3.5.3 The fuel dispensing end of the test nozzle spout (as indicated in Figures 1A and 2A) is in contact with a restraining point.

3.6 Angle Alpha—The angle between the axial centerline of the test nozzle spout when in its normal resting position and the axial centerline of the filler pipe face, expressed in degrees. Alpha is considered a positive angle when the dispensing end of the test nozzle spout is pointing down relative to the centerline of the filler pipe face as illustrated in Figures 1A and 2A.

3.7 Angle Beta—The angle between the axial centerline of the test nozzle spout when in its insertion position, and the axial centerline of the filler pipe face, expressed in degrees. Beta is considered a positive angle when the fuel dispensing end of the test nozzle spout is pointing down relative to the axial centerline of the filler pipe face, as illustrated in Figures 1B and 2B.

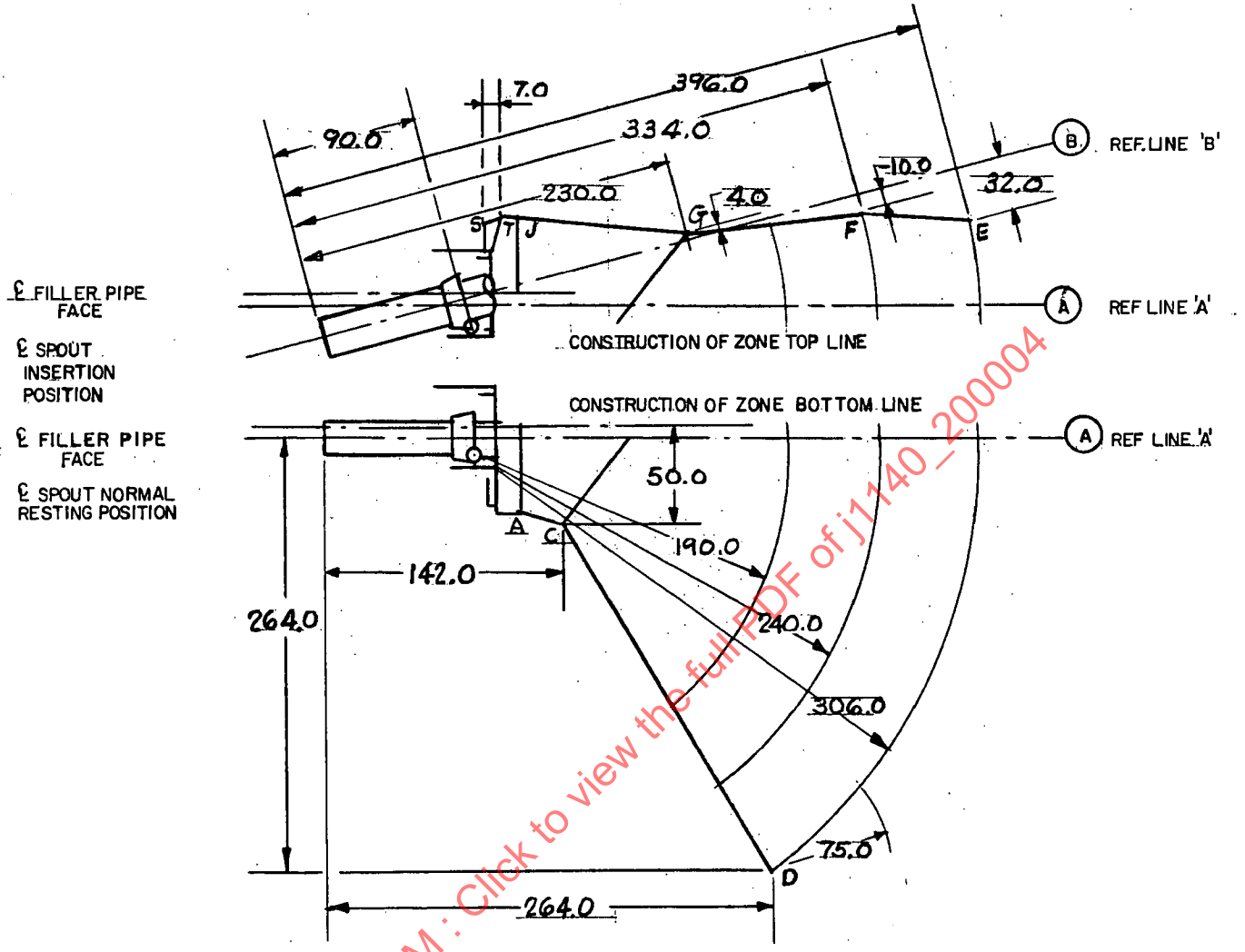

FIGURE 3—CONSTRUCTION OF FILLER PIPE ACCESS ZONE

4. *Specifications*

4.1 The filler pipe face shall be flat within 0.25 mm TIR and have a smooth surface against which a vapor recovery nozzle can effect a vapor-tight seal.

4.2 An internal locking lip shall be provided around at least 100 degrees of the inside circumference of the filler pipe. The locking lip shall be oriented such that it extends at least 35 degrees to either side of the reference plane. The height of the lip shall not be less than 2.5 mm as measured from the inside wall of the filler pipe or shall not be less than 8.5 mm as measured from the outside wall of the filler pipe if the outside diameter of the filler pipe is between 52.0 and 57.5 mm. The depth of the lip shall be not less than 4.0 nor more than 13.0 mm into the filler pipe as measured in the reference plane, from the filler pipe face.

4.3 The filler pipe sealing surface shall be round in cross section, and shall have a diameter not greater than 50.0 mm except as provided in SAE J829 MAR78.

4.4 The filler pipe and all surrounding bumpers, body parts, and factory installed accessories shall be designed and fabricated so that the filler pipe access zone shall allow for insertion of a vapor recovery nozzle in at least one orientation within ±90 degrees of the upright or vertical position. Allowance must be made for production tolerances as these are not included in the access zone. The access zone consists of three parts as follows:

4.4.1 A zone with an oval shaped cross section that is fixed relative to the face of the filler pipe and designed to accommodate the sealing portion of a vapor recovery nozzle. The offset A shown on Figure 4, Section A is equal to $(0.004)\ \alpha^2 - (0.3)\ \alpha + 2.0$ expressed in millimeters if the test nozzle spout locking ring rests on the filler pipe wall in its normal resting position as illustrated in Figure 1A. If the test nozzle spout shaft rests on the locking lip in its normal resting position as is illustrated in Figure 2A, then offset $A = (0.004)\alpha^2 - (0.3)\alpha + (0.11)X$ expressed in millimeters. Where X = depth of the locking lip as measured from the plane of the filler pipe face in the reference plane and is expressed in millimeters. Offset B is equal to the number of degrees of Angle β times 0.4 expressed in millimeters. Offset B fails to exist for $\beta \leq 0$.

4.4.2 A zone with a rectangular cross-section tapered at the bottom, that is designed to accommodate the handle portion of a vapor recovery nozzle. This zone is the portion shown on Figure 4, within the lines defined by points C, D, E, F, and G. The bottom line of this zone (line CD) is positioned relative to Reference Line A as shown in Figure 3 - Construction of Zone Bottom Line. Reference Line A is the test nozzle spout centerline in the normal resting position as shown in Figure 3.

The top of this zone (line G, F, E) is positioned relative to Reference Line B as shown in Figure 3—Construction of Zone Top Line.

Reference Line B is the test nozzle spout centerline in the insertion position as shown in Figure 3.

The center for the 190.0, 240.0, and 306.0 mm radii, shown in Figure 4, is located by finding the intersection point of 306.0 mm radius arcs struck from points D and E, respectively.

4.4.3 A transition zone consisting of a smooth blend from the rectangular zone to the oval zone. The top of this transition zone is the line G-J in Figure 4 and the bottom of this zone is Line A-C.

4.5 The internal portions of the filler pipe shall be configured such that the test nozzle spout can be inserted far enough into the filler pipe to allow entrance of its locking ring beyond the filler pipe locking lip, and to allow movement of the spout to the normal resting position and back to the released position. If a no-lead insert is used, it must be positioned so that the test spout in the normal resting position penetrates the insert by at least 22.5 mm.

The internal portions of the filler pipe shall also be configured to hold the test spout in a normal resting position such that the angle formed between the axial centerline of the test spout and the axial centerline of the filler pipe face falls within the range of alpha from +20 to –10 degrees as shown in Figures 1A and 2A.

4.6 As a minimum assurance against spillage, the filler pipe shall be oriented such that the axial centerline of the test nozzle spout in the normal resting position forms an angle of not less than 30 degrees with the horizontal plane, with the fuel dispensing end pointing down.