State of California
AIR RESOURCES BOARD

PROPOSED 15-DAY MODIFICATIONS

SPECIFICATIONS FOR FILL PIPES AND OPENINGS OF 2015 AND SUBSEQUENT MODEL MOTOR VEHICLE FUEL TANKS

Adopted: March 22, 2012
Amended: [INSERT DATE OF AMENDMENT]

Note: The following text contains staff’s suggested modifications to these test procedures as set forth in Appendix B of the Staff Report: Initial Statement of Reasons, released September 4, 2018. The originally proposed amendments are shown in underline to indicate additions and strikeout to indicate deletions. The additional 15-day proposed modifications made available with the 15-day notice are shown in dashed underline to indicate additions and double strikeout to indicate deletions. Staff is proposing modifications to limited portions of the original proposal; for some portions of the original proposal for which no modifications are proposed, the text has been omitted and the omission indicated by “* * * *.”
II. Definitions

2. “Vapor recovery nozzle”, for the purpose of these specifications, means a nozzle, unleaded or leaded as appropriate for fueling vehicles, certified by the state board, pursuant to the latest version of the board’s “Certification procedures for Gasoline Vapor Recovery Systems at Service Stations” “CP-201 Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities” established in Section 94001 of Title 17, California Code of Regulations, at any time between January 1, 1981 and September 14, 1982, together with an appropriate vapor hose. An alternative vapor recovery nozzle means any nozzle certified subsequent to September 14, 1982.

III. General Design Specifications

The fill pipe and opening of the vehicle fuel tank shall conform to all specifications in the ISO standard “Road vehicles – Filler pipes and openings of motor vehicle fuel tanks – Vapour recovery system” (ISO-13331-1995(E)), as adopted June 1, 1995 and incorporated by reference herein, along with the modifications and additions below. For filler pipes with threaded-type caps, manufacturers may elect to use the alternate filler pipe sealing surface shape specified in the Society for Automotive Engineers (SAE) standard “Fuel Tank Filler Cap and Cap Retainer Threaded” (J1114), as amended (see Table 1) August 4, 2005 and incorporated by reference herein. The alternate shape allowance would be used in lieu of Section 3.1 of ISO-13331-1995(E); all other provisions of ISO-13331-1995(E) would need to be met by a manufacturer utilizing the SAE J1114 provision, along with the modification below. For the purpose of this section III, the manufacturer’s vehicle fleet consists of the vehicles produced and delivered for sale by the manufacturer in California that are subject to this specification.

<table>
<thead>
<tr>
<th>Vehicle Model Year</th>
<th>Applicable Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up through 2023</td>
<td>SAE J1114 as amended August 4, 2005</td>
</tr>
<tr>
<td>2024 and subsequent: when a manufacturer is not changing the design of their vehicle’s fill pipe head</td>
<td>SAE J1114 as amended August 4, 2005</td>
</tr>
<tr>
<td>2024 and subsequent: when a manufacturer is changing the design of their vehicle’s fill pipe head</td>
<td>SAE J1114 as amended TBD. 2019; must use Alternate Shape 1 only</td>
</tr>
</tbody>
</table>
A. Fill pipe sealing surface, modifying or adding to ISO 13331-1995(E), as adopted June 1, 1995 Section 3.1 as adopted June 1, 1995:

a. “Fill pipe sealing surface” means portion of the fill pipe face which would contact the vapor recovery nozzle boot face. For purposes of this specification, this is the portion of the fill pipe face which would contact the 40-degree tapered zone in Figure A.

b. Diameter of the sealing surface of the fill pipe shall have a maximum diameter of 57.5 mm to 57.9 mm, and the convex portion shall have a maximum radius of 6 mm.

c. Fill Pipe pipe surfaces outside of the 57.5 mm to 57.9 mm diameter of the sealing surface are allowable so long as it does not infringe into the 40 degree tapered access zone, which extends to a maximum depth of 12 mm back from the sealing surface of the fill pipe as described in Figure A access zone below.

*   *   *   *

Figure A: Additional access zone, dimensions are in millimeters
B. Modify Update internal locking lip depth, modifying to ISO 13331-1995(E) Section 3.2 as adopted June 1, 1995:
   a. The depth of the lip shall not be less than 4 mm nor more than 11 mm into the filler pipe as measured in the reference plane, from the filler pipe sealing surface.
   b. The depth of the locking lip shall be measured down to its deepest edge (edge facing the fuel tank).
   c. This allowable depth range of the locking lip shall be maintained throughout at least 100 degrees of the inside circumference of the filler pipe, and extending to at least 35 degrees to either side of the reference plane.
   d. This modification update applies only when a manufacturer is changing the design of their vehicle’s fill pipe head for model year 2024 and subsequent vehicle fleets.
C. Clarification to access zone, in ISO-13331-1995(E) Section 3.3 as adopted June 1, 1995:
   a. The 2.5 mm dimension of the portion of the access zone described in Figure 5, view X of ISO-13331-1995(E) shall be as shown in Figure B.
   b. This clarification applies to a manufacturer’s fill pipe certifications, except for cases described in Section III.D.c.

   ![Figure B: Clarification to Access Zone (dimensions are in millimeters)]

D. Modification Supplement to access zone, modifying to ISO-13331-1995(E) section Section 3.3:
   a. The fill pipe and any other vehicle parts shall not occupy space defined by the additional supplemental access zone shown in Figure A below. The additional supplemental access zone is centered on the axis of the fill pipe sealing surface’s outer diameter, and applies around the entire perimeter of the fill pipe. The clearance zone shall line up flush with the seal surface as shown in Figure A. Additionally, in the event there is space between the fill pipe sealing surface and the additional access zone, that space shall be kept clear of objects.
b. This modification replaces the 2.5 mm dimension of the portion of the access zone described in Figure 5, view X of ISO-13331-1995(E), as clarified in section Section III.C of this document.

c. This modification supplement applies only when a manufacturer is changing the design of their vehicle’s fill pipe head for model year 2024 and subsequent vehicle fleets.

E. Fill pipe outer diameter modification, modifying (SAE) standard “Fuel Tank Filler Cap and Cap Retainer Threaded” (J1114), as amended August 4, 2005.

a. For the “Alternate Shape”, the outermost diameter of the fuel tank cap retainer (the fill pipe) shall be a maximum of 57.9 mm and a minimum of 56.9 mm.

b. This modification applies only when a manufacturer is changing the design of their vehicle’s fill pipe head for model year 2024 and subsequent vehicle fleets.

*   *   *   *

VI. Bench Leak Rate Specification

A. Nozzle to Fill Pipe Interface Bench Leak Rate:
   a. Bench Leak Rate: At 500 +/- 25 Pascal vacuum, the maximum allowable leak rate is 2.5 Standard Liters per Minute (SLPM), using the procedure described in Section 8.
   b. The Bench Leak Rate shall be implemented based on the phase-in schedule in Section XII.
   c. A separate test shall be performed on each individual fill pipe head configuration.
   d. Manufacturers shall either provide an attestation that vehicle fill pipe meets the proposed requirement Bench Leak Rate when certifying or provide actual test data.
   e. In lieu of demonstrating compliance to the Bench Leak Rate, manufacturers may, with advance Executive Officer approval, use an alternative set of test procedures to demonstrate that the vapor to liquid ratio (V/L) will be less than 0.5 when refueling a vehicle equipped with On-Board Refueling Vapor Recovery (ORVR). It must be demonstrated that the alternate set of procedures use assist type refueling equipment which is equivalent to what is used at the time of certification at California gas stations, and that refueling and measuring equipment operation has been verified to meet the parameters indicated in Table 2.
### TABLE 2: Operational Parameters for V/L Measurement with ORVR Vehicles

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Operational Range</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline dispensing flow rate</td>
<td>6.0 – 10.0 gallons per minute</td>
<td><a href="https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex05.pdf">https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex05.pdf</a></td>
</tr>
<tr>
<td>Vapor to Liquid Volume ratio setting</td>
<td>0.95-1.15</td>
<td><a href="https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex05.pdf">https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex05.pdf</a></td>
</tr>
<tr>
<td>Volume of fuel to dispense for each event</td>
<td>7.5 gallons</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapor to Liquid Volume Ratio for ORVR equipped vehicles</td>
<td>0.35 +/- 0.15 if ISD is installed</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Dispenser vapor return path leak rate</td>
<td>Less than 4 inches water column drop over sixty seconds</td>
<td><a href="https://www.arb.ca.gov/vapor/eos/evr202/vr202w">Exhibit 14 of</a></td>
</tr>
<tr>
<td>Nozzle vapor valve leak rate</td>
<td>33 ccm at 2.0 inches water column</td>
<td><a href="https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex07.pdf">https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex07.pdf</a></td>
</tr>
<tr>
<td>Resolution of ISD vapor flow meter</td>
<td>0.000 V/L ratio</td>
<td><a href="https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex09.pdf">https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex09.pdf</a></td>
</tr>
<tr>
<td>Accuracy of ISD vapor flow meter</td>
<td>+/- 15% of reference meter</td>
<td><a href="https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex09.pdf">https://www.arb.ca.gov/vapor/eos/evr202/vr202w_ex09.pdf</a></td>
</tr>
<tr>
<td>Resolution and Accuracy of gasoline flow metering system</td>
<td>Resolution: 0.000 gallons Accuracy: +/- 0.01 gallons</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

f. Manufacturers may use an alternative set of test procedures to demonstrate that the V/L will be less than 0.5, with advance Executive Officer approval if the alternative procedure is demonstrated to yield test results equivalent to, or more stringent than, those resulting from the use of the test procedures set forth this section.

* * * *

VI.VII. Test Procedures: Fill Rate, Spillage, and Spitback

* * * *

G. A minimum of five tests with each chosen nozzle shall be completed to demonstrate compliance with the fill rate and spillage/spitback specifications. If there is any premature nozzle shut-off or instance of liquid gasoline
loss greater than 1 millimeter milliliter during the first five test tests with any chosen nozzle, a minimum of ten tests with that nozzle shall be completed to demonstrate compliance with the fill rate and spillage/spitback specifications.

VIII. Test Procedure: Bench Leak Rate

B. Interconnect the fill pipe, flow meter, pressure gage, and vacuum source, as shown in Figure B Figure C.
   a. Vacuum and Pressure/Flow measurement can occur at different locations in this apparatus, so long as it is representative of what is occurring; hose shall be routed inside the assist vapor recovery nozzle’s (assist nozzle’s) boot.

Two Stock Boot Holes: Plug one hole, tap vacuum/measurement hose into the other hole

Figure B: Figure C: Set-up of Testing Equipment
E. The two pre-existing holes in the boot of the assist nozzle shall either be plugged or the hole(s) can be used for routing the vacuum source into the nozzle. One of the two pre-existing holes in the boot of the assist nozzle shall be used for routing the vacuum source/pressure/flow measurement hose into the nozzle, and the other hole shall be plugged.

F. The hose dimensions shall be as indicated in Table 3.

Table 3: Hose dimensions for bench leak test

<table>
<thead>
<tr>
<th>Location (between points in Figure C)</th>
<th>Hose Length (inches)</th>
<th>Hose Inner Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-B</td>
<td>128 +/-2</td>
<td>3/16 to 1/4</td>
</tr>
<tr>
<td>B-C</td>
<td>40 +/-2</td>
<td>3/16 to 1/4</td>
</tr>
<tr>
<td>B-D</td>
<td>16 +/-2</td>
<td>3/16 to 1/4</td>
</tr>
</tbody>
</table>

G. Latch an assist type vapor recovery nozzle into the fill pipe using a natural motion as you would when filling up your own car at a gas station.

H. Hose should form a “U” shape, and be within 6-12 inches from the ground at its lowest point. Attach a 3 kg weight to the nozzle, at the end where a hose would normally connect to.

I. The above measurement procedure shall be repeated with five more fill pipes iterations with the same fill pipe head design.

J. The average of the six flow rate measurements shall meet the specification as indicated in Section 6.

1. See the most recent version of CARB Executive Orders VR-201 and VR-202 for specifications for assist vapor recovery nozzles.