– Appendix B –

State of California
AIR RESOURCES BOARD

PROPOSED

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 proposed amendments to this document are shown in underline to indicate additions and strikeout to indicate deletions compared to the test procedures as adopted March 22, 2012. [No change] indicates proposed federal provisions that are also proposed for incorporation herein without change. Existing intervening text that is not amended in this rulemaking is indicated by “* * * *”.  

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SPECIFICATIONS FOR FILL PIPES AND OPENINGS OF MOTOR VEHICLE FUEL TANKS

I. General

A. No new 2015 or later model year gasoline or alcohol fueled passenger car, light-duty truck, medium-duty vehicle, or heavy-duty vehicle may be sold, offered for sale, or registered in California unless such vehicle complies with the following specifications for fill pipes and openings of motor vehicles fuel tanks. The Executive Officer may exempt vehicles for which compliance with the specifications is found to be technologically infeasible, in accordance with Paragraph 9.

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” “Certification of Vapor Recovery Systems of Dispensing Facilities” established in Section 94001 94011 of Title 17, California Code of Regulations, at any time between January 1, 1981 and September 1, 2018.
An alternative vapor recovery nozzle means any nozzle certified subsequent to September 14, 1982.

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5. “Fill pipe head” means upper portion of the fill pipe which would interface with the vapor recovery nozzle during refueling. The following fill pipe characteristics shall be the same among fill pipe heads sharing the same design:

- The exterior of the fill pipe from the sealing surface to a plane perpendicular to the fill pipe centerline that is located 12 mm beyond the sealing surface. Fill pipe sealing surface is defined in III.A.a.
- The internal locking lip depth from the sealing surface.
- The fill pipe outer diameter.
- The occurrence of and size of any orifices opening the fill pipe head to atmosphere.

Any changes to portions of the fill pipe not in the areas defined above do not constitute a changed fill pipe head design.

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 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.

A. Fill pipe sealing surface, adding to ISO 13331-1995(E)), as adopted June 1, 1995 Section 3.1:

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, and the convex portion shall have a maximum radius of 6 mm.

c. Fill Pipe surfaces outside of the 57.5 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.

d. These added provisions apply only when a manufacturer is changing the design of their vehicle’s fill pipe head for model year 2024 and subsequent vehicle fleets.

B. Update internal locking lip depth, modifying ISO 13331-1995(E) Section 3.2:

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 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. Supplement to access zone, adding to ISO-13331-1995(E) section 3.3:

a. The fill pipe and any other vehicle parts shall not occupy space defined by the supplemental access zone shown in Figure A below. The supplemental access zone is centered on the axis of the fill pipe sealing surface’s outer diameter.

b. This 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.
D. 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.

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V. Spillage and Spitback Specifications

A. There shall be no more than 1 millimeter milliliter of liquid gasoline loss per test in 90 percent of the tests using the test procedures described in Section 6 Section 7.
B. There shall be no unlatching of the vapor recovery nozzle during dispensing or upon nozzle shut-off using the test procedure described in Section 6. The nozzle shall remain in the normal resting position during dispensing and after nozzle shut-off using the test procedure described in Section 7.

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.

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

The following test procedures and test conditions shall be used for determining compliance with the Fill Rate, Spillage, and Spitback specifications in Section 4 and 5.

* * * *

F. Each test shall be conducted as follows:

At the start of the test the fuel tank shall be approximately 10 percent of the nominal tank capacity. The nozzle to be used for dispensing gasoline shall be in the normal hands-off-latched position. The fill rate shall be the minimum rate necessary to demonstrate compliance with the applicable fill rate specification set forth in Section 4. The nozzle shall be allowed to dispense gasoline until automatic nozzle shut-off.

* * * *

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 milliliter during the first five test 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

A. Secure the test fill pipe into the fill pipe mounting fixture.
   a. Fill pipe should be oriented such that:
      i. Fill pipe opening, at center, is at a height of 38 +/- 1 inches above the ground.
      ii. Pipe axis angle with respect to horizontal shall be 30 +/- 2 degrees.
      iii. Internal locking lip degrees on each side of the vertical reference plane meet the vehicle manufacturer’s specification, within +/- 5 degrees.

B. Interconnect the fill pipe, flow meter, pressure gage, and vacuum source, as shown in Figure B.
   a. Vacuum and pressure/flow measurement can occur at different locations in this apparatus, so long as it is representative of what is occurring inside the nozzle’s boot.

![Figure B: Set-up of Testing Equipment](image)

C. The outlet of the fill pipe shall be plugged.

D. If the fill pipe has a recirculation line, the recirculation line shall be plugged.

E. The two pre-existing holes in the boot of the nozzle shall either be plugged or the holes can be used for routing the vacuum source into the nozzle.

F. 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.

G. Hose should form a “U” shape, and be within 6-12 inches from the ground at its lowest point.
H. Adjust the vacuum source until a vacuum level is stabilized to vary no more than 500 +/- 50 Pascal over a two minute period during which no adjustments are made.
   a. Record the flow rate at a vacuum of 500 +/- 25 Pascal.
I. The above measurement shall be repeated with five more fill pipes 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.

VII.IX. Specifications to Reduce Damage to Vapor Recovery Nozzles

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VIII.X. Fill Pipe Assembly and Restriction Device Durability and Other Specifications

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IX.XI. Exemption of Vehicles

A. A manufacturer may apply for an exemption from the fill pipe and fuel tank opening specifications in paragraphs 3 through 810 for any of its vehicles by applying in writing to the Executive Officer. Application should be submitted at least 60 days prior to the manufacturer’s date for final design commitment. The application shall set forth:

1. the specific models for which the exemption is sought;

2. for each such model all facts which demonstrate that compliance with the specifications is technologically infeasible; and

3. evidence showing what efforts have been and will be made by the manufacturer to overcome technological infeasibility, and what the state-of-art technology and problems consist of.

B. Upon receipt of an exemption application, together with sufficient supporting evidence, the Executive Officer may make a finding of technological infeasibility and grant an exemption. The exemption may be limited to specific models, specified body styles of any vehicle model, and/or specified model years. In determining whether to grant an exemption, the Executive Officer shall consider technologies available to the motor vehicle industry as a whole. The Executive Officer may condition an exemption upon a commitment by the manufacturer to develop new technologies in accordance with a responsible compliance schedule approved by the Executive Officer. No exemption shall be granted unless the manufacturer has demonstrated a good faith effort to overcome technological infeasibility.
C. The manufacturer shall bear the responsibility for submitting evidence to the Executive Officer sufficient to justify the granting of an exemption.

XII. Phase-in schedule

A. This phase-in schedule only applies to the Bench Leak Rate Specification as indicated in Section VI. Otherwise, all requirements in this document are considered effective for the 2015 and subsequent model years or as otherwise indicated.

B. For each model year, a manufacturer shall certify, at a minimum, the specified percentage of its vehicle fleet to these standards according to the implementation schedule set forth below. For the purpose of this section XII, 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>Model Years</th>
<th>Minimum Percentage of Vehicle Fleet(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>25</td>
</tr>
<tr>
<td>2023</td>
<td>50</td>
</tr>
<tr>
<td>2024 and subsequent</td>
<td>100</td>
</tr>
</tbody>
</table>

(1) Small volume manufacturers are not required to comply with the phase-in schedule set forth in this table. Instead, they shall certify 100 percent of their 2024 and subsequent model year vehicle fleet to the specific requirements for which this document indicates to use a phase-in schedule.