California Vehicle Fill Pipe Specifications

Proposed Amendments

May 23, 2018
How does fill pipe design impact overpressure?

- **2015 CARB testing:**
  - >1000 consumer fueling events
  - Certain vehicles frequently had high Vapor to Liquid (V/L)

- **Capless fill pipes:**
  - Drain Holes

- **Capped fill pipes:**
  - Deep locking lip requiring large force to latch nozzle

- **Both capless and capped:**
  - Items in access zone blocking nozzle sealing
Plans for Improvements

CHANGES TO THE SPECIFICATIONS
Collaboration with SAE and industry

- SAE Refueling Interface Task Force
  - Auto, nozzle, and fill pipe manufacturers
  - Assisted with developing many of the planned changes
  - Performed testing to support new standards and dimensions
Goal: Restrict Open Ports to Atmosphere

Proposed change: add performance standard

- Tests quality of nozzle seal to fill pipe (interface)
- Compliance method:
  - Bench test (surrogate to gas station testing)
  - Removed V/L and Zero-leak Attestation options: since no industry interest

Changed since Dec 2017 workshop
Summary: Bench Test Standard Development

1) Orifice testing at gas station: 2.5 mm: Max orifice for V/L <0.5

2) 1.6 mm: Adjusted w/ safety factor to account for recirc, etc

3) Standard is 2.5 slpm MAX @ 500 Pa vacuum, (leak rate for 1.6 mm orifice)
CARB’s Bench Test Method + Equipment

- Adjust vacuum supply: -500 Pascal @ pressure gage
- Output = leak rate in liters per minute @ flow meter
- Compare with standard: 2.5 liters per minute

No changes since December 2017 workshop
DIMENSIONAL CHANGES
Access Zone Update: Why it's needed

Boot overlaps fill pipe
Access Zone Update Plan

• Clarify and improve fill pipe’s access zone
  • To represent today’s nozzles
• Adds to current access zone in ISO 13331
• Purpose of access zone:
  • Leave space on vehicle for nozzle insertion
• The change makes room for concave nozzle boot
  • Allows boot to overlap fill pipe
  • Enable boot to seal with fill pipe
• Working with SAE Refueling Interface Task Force
Additional clearance to ISO 13331 access zone, proposed by CARB

Section V-V
Access Zone Update will affect:
Fill Pipe With Outer Ring

- A current design on some cars

Two different insertion scenarios:

1. Boot butts up against outer ring
2. Boot fits within outer ring

- Operator dependent
Locking Lip Depth

Example: Latched Nozzle
Locking Lip Depth Update

Goal: reduce “loose latching”
- Current: 4-13 mm
- Planned change: 4-10 mm
- Easier to latch nozzle
- Insertion force increases dramatically > 10 mm
  - Source: SAE nozzle insertion study

No changes since December 2017 workshop
SAE nozzle insertion study

Dimensional Changes

Nozzle Insertion Study  Healy 900 vs Locking Lip Depth

Force (Newtons)

Locking lip depth (mm)
Modify J1114’s Alternate Shape

- Current Outer Diam. (OD) is too large (up to 61.6 mm)
- Results in about 1.7 mm of additional boot compression
  - Since contacts higher on conical boot
- Contributes to loose latching
- Proposal: Reduce OD to 57.9 mm (max)
  - Match with standard J1114
  - Very similar to ISO 13331
Proposing to bring back Spitback

• Used to be a CA requirement prior to 2014
• CARB aligned with US EPA in 2014 and removed
  • Basis: Current ORVR testing is sufficient
• This was a mistake, since ORVR is tested with a nozzle w/o vapor recovery
• Using both assist and balance type nozzles
  • For testing Spitback and Pre-Mature Shut-off
**Implementation**

- **Proposed Phase-In**: 

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<th>Model Year</th>
<th>% of Fleet</th>
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*Spitback effective MY 2022 on 100% of fleet*
For More Information:

• Vehicle Fill Pipe:
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    (626) 575-7068

• Draft Proposed Regulation Language:
  https://www.arb.ca.gov/msprog/evap/evap.htm
  In the “What’s New” section

• CARB current CA Fill Pipe Specifications:
  https://www.arb.ca.gov/msprog/onroad/cert/ldctp/ldctp.htm#fillpipe