



Specification for Fuel Tank Inlet

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This document provides the standard technical requirements for the fuel tank inlet. There are two (2) types of fuel tank inlets: Onboard Refueling Vapor Recovery (ORVR) Inlet Check Valve (ICV) or non-ORVR/diesel fuel tank inlet.

1.2 Applicability. This specification applies to the fuel tank inlet that is welded to plastic fuel tank or attached inside of metallic fuel tank. Requirements for metallic fuel tank inlet that is attached to fuel hose are similar to fuel fill pipe and are covered in GMW15667.

1.3 Remarks. This document must only be used when invoked by a program specific technical specification. References to the program specific technical specification are included in this document where program-specific requirements are expected to exist. The program-specific technical specification may include additional program-specific requirements that are not referenced in this document and may supercede any requirements included in this document. In the case of any conflict between this document and the program-specific technical specification, the program-specific technical specification takes precedence.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

DIN 45631/A1	ISO 3167	SAE J1645	SAE J1960
ISO 527-1/2	ISO 179-1	SAE J1739	SAE J2886
ISO 1431-1			

2.2 GM Standards/Specifications.

GMW3013	GMW14264	GMW15571	GMW16600
GMW3059	GMW15311	GMW15667	GMW16776
GMW14106	GMW15570	GMW15760	GMW17081

2.3 Additional References.

CG1128 Fuel System Statement of Requirements (SOR)
CG1752 Hydrocarbon Permeation Measurement Process
CG2016 Fuel Tank Inlet Cross Reference Index (VCRI)
CG2308 Process Control and Documentation for Injection Molded Parts
GM1927 Advanced Product Quality Planning
GM1927-03 Supplier Quality Statement of Requirements

2.3.1 Fuels.

GMPT-5-020
GMPT-6-001
GMPT-6-005

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GMPT-6-006

GMPT-6-018

GMPT-6-023

3 Requirements

3.1 System/Subsystem/Component/Part Definition. The tank inlet prevents fuel from being expelled out of the fill neck during refueling immediately after nozzle shutoff (while the tank pressure is slowly venting through the FLVV). In ORVR systems, the ICV is normally closed, opens with refueling flow, and closes immediately upon nozzle shutoff to keep the fuel in the fuel tank.

3.1.1 Appearance. Generally, appearance is not applicable for tank inlet, but some programs may request white color inlet for visual identification of the black color fill hose to ensure that the connection is made properly. Refer to program specific requirements in CG1128 for additional details.

3.1.2 Content.

3.1.2.1 Physical Content. The tank inlet typically includes the following:

- Housing with weld pad and spud.
- Flapper door.
- Spring.
- Any other hardware, based on the supplier design, to make the component work as per this specification.

3.1.2.2 Functional Content. The tank inlet shall be designed to perform the following functions:

- Prevent fuel from being expelled out of the fill neck during refueling immediately after nozzle shutoff.
- Flow fuel at the flow rate specified in program specific SOR documents and able to fill the tank.
- Able to drain fuel from the tank using a siphon hose.

3.1.3 Ambient Environment. The ambient environmental conditions that the tank inlet may encounter during its life are defined in this section.

3.1.3.1 Operating Environment. The tank inlet shall withstand all operating environment extremes, as stated in Table 1, and suffer no permanent damage. The tank inlet shall exhibit acceptable performance (per this document), once the operating conditions return to normal.

Table 1: Operating Environment

Normal Operating Ambient Temperature	-40 °C to 90 °C
Fuel Temperature	-40 °C to 70 °C
Relative Humidity	1% to 100%
Barometric Pressure	55 kPa to 105 kPa
Grade	≤ 30%
Altitude	-150 m to 4600 m
Wind	≤ 100 km/h (vehicle at rest)
Precipitation	≤ 4.6 cm/minute

3.1.3.2 Corrosives - Chloride Exposure. The typical corrosive agents and concentrations relevant to lower-body/underbody exposure are outlined in this section.

3.1.3.2.1 Calcium chloride (CaCl₂) exposure with concentration 50% aqueous solution (by weight) shall be considered. Refer applicability of materials to test, test procedure and requirements in GMW16600.

3.1.3.2.2 Zinc chloride exposure with 50% aqueous solution (by weight) shall be considered. Refer applicability of materials to test, test procedure and requirements in GMW16600.

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3.1.4 Interfaces.

3.1.4.1 Interface to Fuel Tank. Refer GMW14106 and the program specific SOR documents for details and requirements on the tank inlet interface to fuel tank.

3.1.4.2 Interface to Fuel Fill Hose. Refer to Figure 1 for dimensional details of the tank inlet at fuel fill hose.

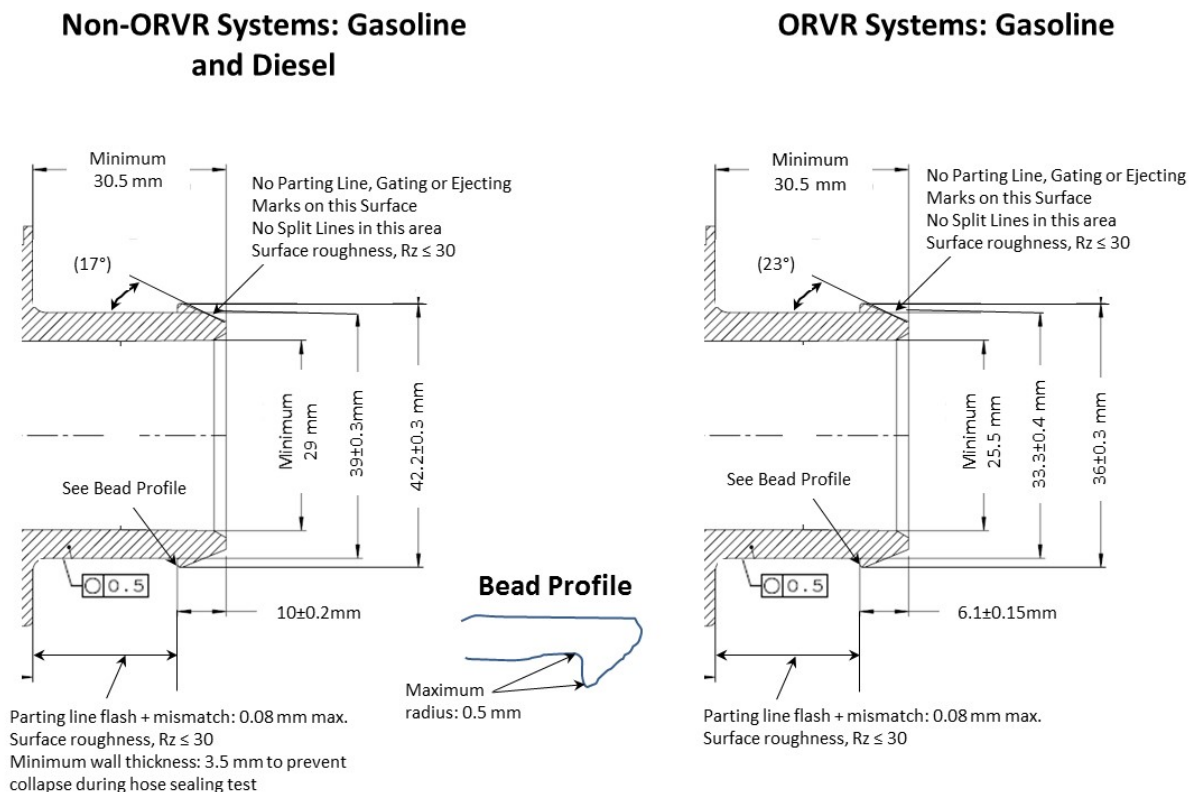


Figure 1: Tank Inlet Dimensions at the Fill Hose

3.1.5 Usage Definition. Fuel tank inlet is required for all tanks, to enable proper filling of fuel from the nozzle into fuel tank.

3.2 Product Characteristics.

3.2.1 Performance Requirements. Performance requirements assume that the tank inlet is evaluated in its application specific mounting, i.e., welded to fuel tank on one end and the other end is attached to fill hose with a clamp. Refer program specific SOR documents for additional details on tank supplier (for weld strength tests), type and supplier of hose (for hose sealing and pull-off tests), etc. GMPT-6-005 shall be used as test fuel for gasoline tank inlet, unless an alternative fuel is specifically defined. Diesel tank inlet shall be tested with GMPT-5 020. GMPT-6-001 (Stoddard Solvent) may be used for 65 °C and -40 °C testing only.

3.2.1.1 Flow Out of Inlet. Paragraphs 3.2.1.1.1 through 3.2.1.1.3 describe the requirements for flow out of the inlet (out of the tank).

3.2.1.1.1 Air Leak. When air pressure at 6 kPa and 11.2 kPa is applied to the tank at 23 °C, the tank inlet leak shall not exceed 75 cc/minute. This requirement applies to tank valves with leak potential inside the tank (i.e., snap on features, flapper door, etc.)

3.2.1.1.2 Liquid Leak. Leaks past the tank inlet seal, shall not exceed 0.5 cc/minute of test fuel. Refer Table 2 for test matrix.

Note: For leaks to the atmosphere, the tank inlet shall satisfy the leak requirements found in GMW15311 and GMW14106.

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Table 2: Liquid Leak Test Matrix

Tank Inlet Position	Test Temperature	Pressure
In vehicle position	-40 °C, 23 °C and 65 °C	0.5 kPa, 6 kPa and 11.2 kPa
90° from vehicle position	-40 °C, 23 °C and 65 °C	0.5 kPa, 6 kPa and 11.2 kPa
180° from vehicle position	-40 °C, 23 °C and 65 °C	0.5 kPa, 6 kPa and 11.2 kPa

3.2.1.1.3 Pressure Relief Flow. Inlets equipped with overpressure relief must meet the requirements of Figure 2 from -10 °C to 85 °C.

Note: Complete opening pressure (A) is to be defined by program-specific requirements.

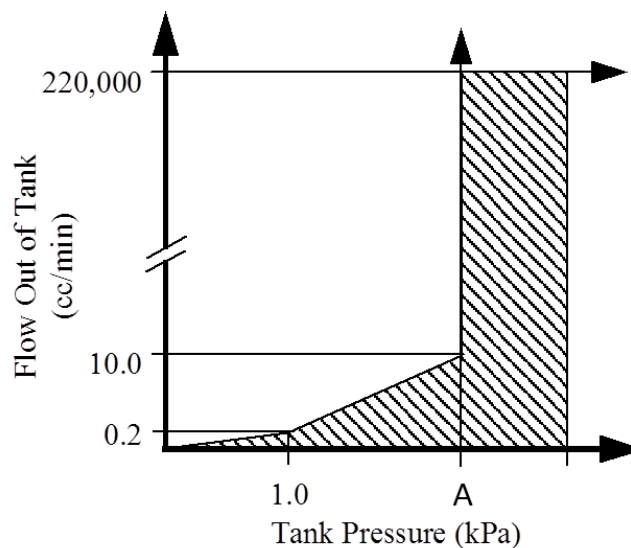


Figure 2: Pressure Relief Flow

3.2.1.2 Pressure Drop. Table 3 describes the pressure drop requirements for flow into the tank.

Table 3: Pressure Drop across Tank Inlet

Position	Horizontal to vertical (down-flow), and at 0 degrees and ± 15 degrees of design rotation, and exposed to liquid
Liquid	Unleaded fuel
Flow	11.0 L/minute to 57.0 L/minute (3.0 gal/minute to 15.0 gal/minute). Test at 11.0 L/minute, 38.0 L/minute and 57.0 L/minute (3 gal/minute, 10 gal/minute and 15 gal/minute) at a minimum
Pressure Drop	≤ 0.25 kPa (1.0 in H ₂ O)
Temperature Range	1 °C to 41 °C

3.2.1.3 Actuation Pressure. After fuel soak at the test temperature shown in Table 4, the tank inlet actuation pressure shall not be more than 0.25 kPa. The test shall be performed with the tank inlet in vehicle position (or if unknown, in horizontal, vertical, and worst case positions) within 2 h of removal from fuel soak.

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