Specification for Tank Vent Valve

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 Tank Vent Valve (TVV), also referred to as the Grade Vent Valve (GVV) or the Rollover Valve (ROV) Assembly.

1.2 Applicability. This specification applies to the valves that are welded to fuel tank or attached to Fuel Pump Module (FPM).

1.3 Remarks. This document must only be used when invoked by a program-specific Statement of Requirements (SOR). References to the program-specific SOR 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 1431-1	SAE J1739	SAE J2044
ISO 179-1	ISO 3167	SAE J1960	SAE J2886
ISO 527-1/2			

2.2 GM Standards/Specifications.

GMW3013	GMW14106	GMW15570	GMW16600
GMW3059	GMW14264	GMW15571	GMW17081
GMW14081	GMW15311	GMW15760	

2.3 Additional References.

10093203 GM End Form Chart

CG2011 Tank Vent Valve Validation 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/Fluids.

GMPT-6-001

GMPT-6-005

GMPT-6-006

GMPT-6-018

GMPT-6-023

GMPT-5-020

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3 Requirements

3.1 System/Subsystem/Component/Part Definition. GVV shall vent vapor to the canister and prevent fuel leak in case of roll-over.

3.1.1 Appearance. Not applicable.

3.1.2 Content.

3.1.2.1 Physical Content. The GVV typically includes the following:

- Outer housing.
- Head valve.
- Float.
- Spring.
- O-ring.
- Any other hardware, based on the supplier design, to make the component work as per this specification.

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

- Venting vapor from the fuel tank and sending it to the canister, during static and dynamic conditions to prevent excessive system pressure.
- Keep fuel in the tank during vehicle maneuvering, grade soak and rollover.

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

3.1.3.1 Operating Environment. The GVV shall withstand all operating environment extremes, as stated in Table 1, and suffer no permanent damage. The GVV 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 ($CaCl_2$) 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.

3.1.4 Interfaces.

3.1.4.1 Valve Interface to Fuel Tank. The fuel tank vent valve may be mounted to the fuel tank by the hot-plate welding method (polymer fuel tanks), mounted in a well with a weld cover, or internally snapped. A snap-ring or cam lock fastening method, with an O-ring, may be used on steel fuel tanks. Additional details for these valves may be defined in program specific SOR documents.

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3.1.4.2 Valve Interface to Fuel Pump Module. For valves mounted in the FPM, refer to GMW14081 for interface design features. Additional details for these valves may be defined in program specific SOR documents.

3.1.5 Usage Definition. Grade vent valves provide a venting and/or check valve function. The venting function is performed during normal vehicle usage or non-aggressive vehicle maneuvers. The check valve function is engaged during aggressive maneuvers or under conditions where the vehicle may come to rest on a surface other than its wheels. GVV is typically used on most gasoline/ethanol vehicles and some diesel vehicles.

3.2 Product Characteristics.

3.2.1 Performance Requirements. GMPT-6-005 shall be used as test fuel for gasoline GVV, unless an alternative fuel is specifically defined. Diesel GVV shall be tested with GMPT-5-020. GMPT-6-001 may be used for 65 °C and -40 °C testing only.

3.2.1.1 Air Leak. When air pressure at 6 kPa and 11.2 kPa is applied to Region "B" (refer to Figure 1) at 23 °C, the valve leak shall not exceed 75 cc/minute.

Note: Leak correlation data between fuel and air shall be used to set leak acceptance criteria for process control activities.

3.2.1.2 Liquid Leak. When pressure is applied to Region "B", the valve leak shall not exceed 0.5 cc/minute of test fuel (in case of valves that are connected to hoses). Refer to Table 2 for test matrix. In case of valves that are vented to atmosphere (like in diesel application), no leak is allowed.

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

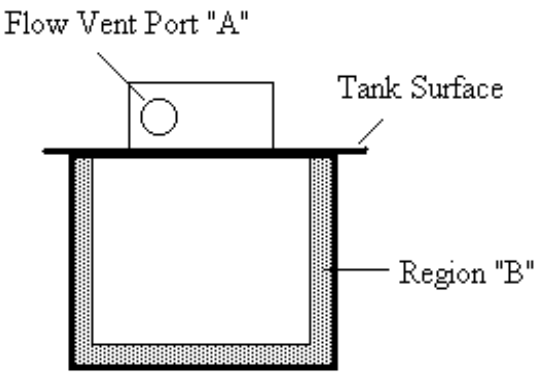

Figure 1: Region "B" Seal Area

Table 2: Liquid Leak Test Matrix

Valve Position	Test Temperature	Pressure
Upright	-40 °C, 23 °C and 65 °C	0.5 kPa, 6 kPa and 11.2 kPa
90° from Upright	-40 °C, 23 °C and 65 °C	0.5 kPa, 6 kPa and 11.2 kPa
180° from Upright	-40 °C, 23 °C and 65 °C	0.5 kPa, 6 kPa and 11.2 kPa

3.2.1.3 Reopening (For Normally Open Valves). With the valve closed due to exposure/submersion to an increasing fuel level and a minimum of 10 kPa maintained in Region "B" of the closed valve, the valve shall open fully when the fuel level is gradually lowered. Reference the program-specific SOR documents.

Note: Grade vent valves shall be normally open for North American applications, to prevent the fuel tank from accumulating pressure.

3.2.1.4 Liquid Discrimination. Liquid flow out of Port "A" (Figure 1) shall not exceed 10 ml with the tank pressurized to generate a 7.55 L/minute flow out of the valve. GMPT-6-001 may be used. Test shall include:

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