



Gasoline and Flex Fuel Filter Assembly

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.

Note: Program specific technical specifications may include additional requirements that are not referenced in this document and may supercede any requirements included in this document. In the case of any conflicts between this document and the program specific technical specifications, the program specific technical specifications take precedence.

1.1 Purpose. This document provides standard technical requirements for external gasoline and flex fuel filter assembly. The primary function of the fuel filter is to remove the contaminants from fuel before it reaches engine.

1.2 Applicability. This specification applies only to vehicles that operate on gasoline or any blends of ethanol or methanol with gasoline. The external fuel filter is only required for vehicles sold in Brazil.

1.3 Remarks. This specification establishes the component level requirements for external gasoline and flex fuel filter assembly. This document shall be used in conjunction with and complement other requirements documents included in the program specific Statement of Requirements (SOR).

2 References

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

2.1 External Standards/Specifications.

ASTM D4169	ISO 3167	ISO 16750-5	SAE J2044
ISO 179-1	ISO 4020	ISO 19438	SAE J2886
ISO 527-1/2	ISO 16232-5	SAE J1645	
ISO 1431-1	ISO 16232-6	SAE J1739	
ISO 2942	ISO 16232-7	SAE J1960	

2.2 GM Standards/Specifications.

9985784	GMW14872	GMW15570	GMW16816
GMW3059	GMW15272	GMW15760	GMW15760
GMW14700	GMW15311	GMW16331	

2.3 Additional References.

- CG2308 Process Control and Documentation for Injection Molded Parts.
- CG2768 Gasoline and Flex Fuel Filter Assembly Validation Cross Reference Index (VCRI).
- GM1927 Advanced Product Quality Planning.
- GM1927-03 Supplier Quality Statement of Requirements.
- GM Fuel Systems Peer Review Checklist.
- Statement of Requirements (SOR).
- Vehicle Owner's Manual.

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2.3.1 Global Propulsion Systems (GPS) Test Fuel Specifications.

GMPT-4-002

GMPT-4-015

GMPT-6-022

GMPT-6-037

GMPT-4-019

GMPT-6-019

GMPT-6-032

3 Requirements

3.1 System/Subsystem/Component/Part Definition. The fuel filter assembly shall filter contaminants from fuel and provide leak free connection to the fuel lines.

3.1.1 Content. Paragraphs 3.1.1.1 and 3.1.1.2 describe the physical and functional content of the filter assembly.

3.1.1.1 Physical Content. The fuel filter assembly consists of:

3.1.1.1.1 Fuel filter element.

3.1.1.1.2 Housing which holds the fuel filter element.

3.1.1.1.3 Fuel inlet and out ports.

3.1.1.1.4 Mounting bracket to mount the assembly on chassis, fuel tank or fuel line bundle.

3.1.1.1.5 Ground connection from filter to vehicle ground to meet Electrostatic Discharge (ESD) requirement.

3.1.1.1.6 Dust caps for fuel filter.

3.1.1.1.7 Any optional content as requested by the program specific SOR.

3.1.1.2 Functional Content. The filter assembly shall remove contaminants from the fuel before it reaches engine.

3.1.2 Ambient Environment. Paragraphs 3.1.2.1 through 3.1.2.5 specify the environmental conditions that the fuel filter assembly will be exposed to during its lifetime.

3.1.2.1 Operating Environment. The fuel filter assembly shall be capable of operating in the environments described in Table 1 without adverse effect to functional performance.

Table 1: Operating Environment

Environment	Conditions
Underbody	-40 °C to +90 °C
Relative Humidity	2% to 100%
Fuel Temperature	-40 °C to +70 °C
Fuel Pressure during Operation	0 kPa to +900 kPa
Barometric Pressure	56.9 kPa to 106.3 kPa The system shall survive an atmospheric pressure of 10 kPa, not operated, during air shipment
Precipitation	≤ 4.6 mm/minute
Grade	≤ 30%
Altitude	-150 m to +4600 m

3.1.2.2 Corrosives: Chloride Exposure. Polymers exposed to the underbody and lower underhood atmosphere must be compared against Table 2 to determine the need for further testing. For polymers not listed in the table, GM Materials Engineering shall be consulted to determine the appropriate disposition.

3.1.2.2.1 Resistance to Zinc Chloride. This requirement applies to components with external exposure. The filter assembly shall be immersed in a 50% aqueous solution (by weight) of zinc chloride for 200 h at 23 °C ± 2 °C with the ports sealed. The sample may be rinsed with fresh water to clear salt residue. There shall be no cracking, crazing, or other damage to the plastic parts.

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3.1.2.2.2 Resistance to Calcium Chloride. This requirement applies to components with external exposure. The filter assembly shall be immersed in a 50% aqueous solution (by weight) of calcium chloride for 200 h at 60 °C ± 2 °C with the ports sealed. The sample may be rinsed with fresh water to clear salt residue. There shall be no cracking, crazing, or other damage to the plastic parts.

Table 2: Chloride Exposure

Testing Required	Testing Not Required
Polyamide (PA), i.e., PA6, PA12, PA66 etc. Polyketone (PK)	Polyacetal (POM) Polyethylene (PE) Polybutylene Terephthalate (PBT/PET) i.e., Polyester Polypropylene (PP) Polyphenylene Sulfide (PPS)

3.1.2.3 Robustness to Ozone. This requirement applies to parts made of polymer/elastomer compounds with external exposure. The parts shall not exhibit loss of function or service life following 568 h exposure to ozone (chamber) at 50 ppm at 38 °C per ISO 1431-1. After the test, parts shall not have surface cracks, crazing or discontinuities, when comparing pretest to post-test parts at 30x to 40x magnification.

3.1.2.4 Ultraviolet Radiation. Ultraviolet radiation, accelerated weathering, applies to incomplete vehicles only, e.g., cab chassis, cutaway G-Van, etc. The exposed materials shall retain 75% of the original properties for tensile strength (ISO 527-1/2) and notched Charpy impact (ISO 179-1) after 2500 kJ/m² of accelerated exposure using xenon arc weathering apparatus as described in SAE J1960. Tensile bars shall be prepared using ISO 3167, 4 mm thick, Type A. Charpy impact bars shall be 80 mm × 10 mm × 4 mm, machined V notch, r = 0.25 mm. For complete vehicle applications, this requirement does not apply.

3.1.2.5 Types of Fuels. Table 3 includes fuels for which the fuel filter assembly may be exposed. These fuels shall be considered in component design and analysis. Information regarding Global Propulsion System (GPS) fuels can be obtained by contacting GPS Materials Engineering. Test fuels shall be purchased from an approved supplier.

Table 3: Types of Fuels

Type	Description
GMPT-4-002	General purpose E85
GMPT-4-015	M15 General Purpose Validation Fuel
GMPT-4-019	Brazil E100 Cert Fuel
GMPT-6-019	Oxidized gasoline (with 540 ppm peroxide)
GMPT-6-022	Corrosive E22 (with corrosive salts and water)
GMPT-6-032	Conductive E85
GMPT-6-037	E-100 Conductivity

3.1.3 Interface of Fuel Filter Assembly to Other Subsystems and Vehicle. The following interface and clearance requirements may constrain or drive the design of the fuel filter assembly and, therefore, must be addressed during design and development.

3.1.3.1 Clearance Requirements. The following clearances shall be maintained as outlined in GM Fuel Systems Peer Review Checklist (The Supplier shall work with the GM responsible engineer to comprehend this requirement).

- Clearance to vehicle ground lines.

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- Clearance to tools and fixtures at GM assembly plants.
- Clearance to fuel tank.
- Clearance to other surrounding parts from the vehicle.
- Service accessibility of the filter and clearances during service.

3.1.3.2. Fuel Filter Mounting Position. Figure 1 illustrates recommended fuel filter mounting positions on vehicle. These recommendations must be followed to avoid the contaminants blocking the fuel ports.

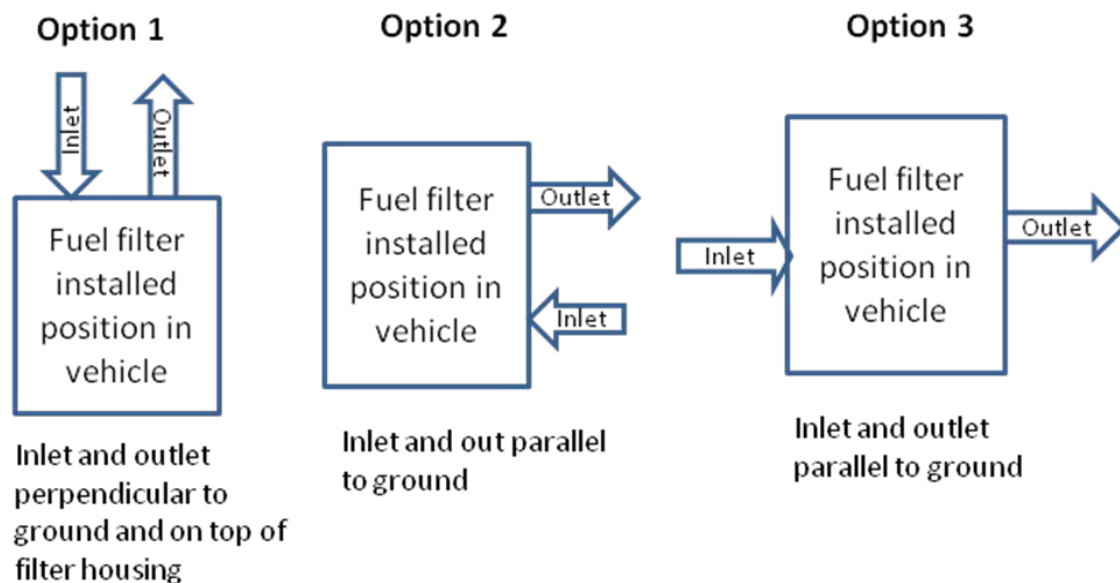


Figure 1: Fuel Filter Mounting Position

3.1.3.3 Component Layout. The layout shown in Figure 2 shall be used for packaging, when both the ethanol sensor and fuel filter are used.

Note: Conductivity of fuel entering the ethanol sensor shall be $\leq 1000 \mu\text{S/m}$. Previous studies show that fuel filter assembly increases conductivity and sets Diagnostic Trouble Code (DTC), if the filter is placed between the fuel tank and the ethanol sensor.

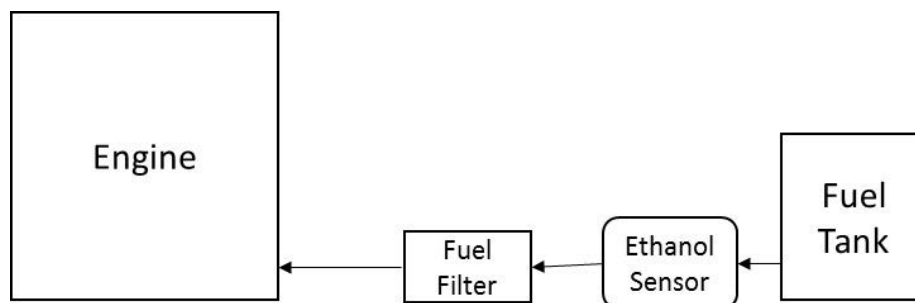


Figure 2: Component Layout in Vehicle

3.1.3.4 Fuel Line Interface. Fuel ports on the filter shall be male end forms as per SAE J2044 dimensions and tolerances with the sizes shown in Figure 3. Any deviation from this line size shall be reviewed to ensure wrong connection cannot be made at GM Assembly Plant or during service.

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