



Air Quality Sensor Technical Specification

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 specifies the Air Quality Sensor requirements. The functions, performance, design constraints, and validation required for the sensor are defined in this document.

1.2 Applicability. The sensor will only be available in one version common for all vehicle markets.

1.3 Remarks. The sensor is designed and engineered in order to rapidly provide the Climate Control Application (CCA) within the Heating Ventilation Air Conditioning (HVAC) controller with information about detected high concentrations of harmful gases outside the car for controlling the fresh air/recirculation flap within the HVAC module.

2 References

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

2.1 External Standards/Specifications.

ISO 1043-2	ISO 1629	ISO 11469	ISO/DIS 18064
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2.2 GM Standards/Specifications.

GMW3059	GMW3103	GMW14082
GMW3097	GMW3172	

2.3 Additional References.

- Component Technical Specification (CTS)
- GM Abbreviation Code: ZFW3-36
- GM Drawing (sensor) A3231067
- GM Part Number (sensor) 13231067
- GM Part Number (connector) 09133087
- GM Vehicle Assembly Structure (VAS)
- SAA61766-CI-Air Quality Sensor
- Statement of Requirements (SOR)

3 Requirements

3.1 System/Subsystem/Component/Part Definition.

3.1.1 Appearance. The mechanical appearance shall be as per package model.

- 13231067 Pos Asm Air Quality-Sensor Left Hand Drive (LHD) filed in GM Vehicle Assembly Structure (VAS).
Note: The supplier must work with the responsible GM Engineer to comprehend this requirement.

3.1.2 Content.

3.1.2.1 Physical Content.

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3.1.2.1.1 The sensor assembly shall consist of a water tight plastic housing with integrated sensing unit and electronics/micro controller in order to detect/compute content of detectable reducible and oxidizable gases like:

- Carbon Monoxide.
- Nitrogen Oxide.
- Sulphur Dioxide.
- Aromatics (e.g., Benzene).
- Methyl Alcohol.
- Hydrocarbon and Derivations.
- Hydrogen Sulphide.
- Ammoniac.
- 3-Methyl-1-Buthanethiol (skunk odor).
- Volatile Organic Compounds (VOC) like Benzene, Hydrocarbons and Acetone (Ketone).

3.1.2.1.2 The sensor housing is to be equipped with a defined molded integrated detail connector/terminal pins to interface with the HVAC control module via the vehicle wire harness and integrated clip for rigid attachment to the water case or filter housing within the vehicles plenum area or vehicle front end assembly.

3.1.2.2 Functional Content. The Air Quality Sensor shall detect reducible and oxidizable gases in minimum concentrations.

The information is Pulse Width Modulation (PWM) signal generated on the output pin.

3.1.3 Ambient Environment. All environmental and electrical general requirements are referred to in GMW3172.

The Air Quality Sensor will be located in the vehicle plenum/water case/condenser front end area and will, therefore, be exposed to high humidity load.

The sensor shall pass environmental and durability validation when subjected to loads according to GMW3172. The environmental load coding in Table 1 or Table 2 (per GMW3172) applies for the plenum area location.

Table 1: Environmental Load Coding

Electrical Load Code Letter	Mechanical Load Code Letter	Operating Temperature Code Letter	Climatic Code Letter	Chemical Load Code Letter	Dust and Water Protection Code Letter
C	C	F	I	E	IP6K6K + seal evaluation test according to 5.3.7 (GMW3172)

Table 2: Optional Quote for Alternative Location at Vehicle Front End Location

Electrical Load Code Letter	Mechanical Load Code Letter	Operating Temperature Code Letter	Climatic Code Letter	Chemical Load Code Letter	Dust and Water Protection Code Letter
C	C	F	B	E	IP6K9K

3.1.4 Interfaces.

3.1.4.1 Mechanical/Mounting.

3.1.4.1.1 The Air Quality Sensor is to be mounted on the exterior at the base of the windscreen inside the vehicles plenum compartment or front end location (condenser area). The exact location will vary depending on car model, but design guidelines according to GM Inherent Criteria's (reference SAA61766-CI-Air Quality Sensor) must be followed. The sensor shall be attached to its intended vehicle location using the pre-assembled plastic clip or integrated "bayonet" clip.

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3.1.4.1.2 The sensor element shall be covered by a gas-porous membrane (e.g., Gore-Tex) and a plastic grid in front to protect it from mechanical damages.

3.1.4.2 Electrical Connector.

3.1.4.2.1 The Air Quality Sensor shall be molded with an integrated three (3) position detail connector (GM abbreviation code: ZFW3-36).

3.1.4.2.2 The mating vehicle harness connector shall be GM Part Number 09133087.

3.1.4.2.3 The following terminal pin numbers and functions apply:

- 1 +12 V (Run)
- 2 Ground
- 3 Signal Output

3.1.4.3 Component to Subsystem. The sensor is mechanically connected to the water tray or filter housing in the vehicles plenum area and electrically connected according to Figure 1.

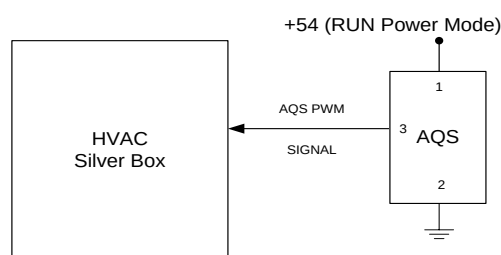


Figure 1: Electrical Connection

3.1.4.4 Signal Output. The output shall follow the following hardware guidelines according to GMW14082.

- PWM Interface Type: A
- Interface Supply: 12 V (Vs)
- Frequency: 100 Hz $\pm$ 5 Hz
- PWM Valid Signal Range: 5% to 95% $\pm$ 2%

3.1.4.5 Power Supply. The power supply shall follow hardware guidelines in Table 3 per GMW14082.

Table 3: Power Supply Hardware Guidelines

Name	V _{RUN}
Type	Power or Signal. Ignition Key State Controlled
Voltage Range, Maximum rating (1 s < t < 1 minute)	-13.5 V to +26.5 V
Voltage Range, Normal	0 to V _{max}
Voltage Range, Normal operating	V _{minimum} to V _{max}
Maximum Load Current	<300 mA
Maximum Inrush Current	Maximum load x 10, duration <1 s
Reverse Polarity Protection Mechanization	Diode/Schottky
Power Switch Off, Voltage Discharge Time Constant	Approximately 1 s (resistive path shall exist to Power ground)

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