



Air Induction Subsystem Maximum Filtered Air Leakage Test

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. To identify and evaluate any leaks in the air induction system, from the dirty air side of the air box to the throttle body/turbo inlet.

1.2 Applicability. All vehicles.

2 References

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

2.1 External Standards/Specifications.

SAE J2044

2.2 GM Standards/Specifications.

GMW15143

2.3 Additional References.

Program Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities. Must be able to maintain an ambient room temperature of $21\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Environmental chamber capable of temperatures from $-40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ to $+110\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ continuous.

Note: Chamber must be large enough to house the entire air induction system in production orientation.

3.2.2 Vacuum source capable of maintaining a 15 kPa vacuum at the mass flow rate at rated power specified in the air flow section of the Program Subsystem Technical Specification (SSTS).

3.2.3 Flow meter capable of measuring air flow rates from 0.01 g/s to 2.0 g/s with 0.01 g/s resolution.

3.2.4 Solid plug/plate with same shape as inside of clean air duct outlet. Plug/plate must have a nipple installed to connect to vacuum source.

3.3 Test Vehicle/Test Piece. Use production intent parts that provide the maximum gap between the mating parts and within the dimensional tolerances. This applies to each joint. The air induction Designing Engineer can provide the dimensions.

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3.4 Test Time.

Calendar time: 1 day
Test hours: 8 hours
Coordination hours: 5 hours

3.5 Test Required Information. Minimum torque specification for any clamps used in the assembly.

3.6 Personnel/Skills. Test stand operator should have knowledge of; general fluid dynamics, Air Induction System (AIS) manufacturing methods, data recording methods, statistical analysis methods and applicable test facility requirements.

4 Procedure**4.1 Preparation.**

4.1.1 Install plug/nipple assembly into clean air duct outlet.

4.1.2 Clamp plug into duct using production clamp, torqued to minimum torque specification.

4.1.3 Remove dirty air snorkel from air box and seal with air tight plate or cut dirty air side of box to allow installation of an air tight plate.

4.1.4 Final assembly should include air filter element installed in the air box in production orientation.

4.1.5 Torque the threaded fasteners used to hold the air cleaner assembly together to the minimum torque specification.

4.1.6 Ensure and document that all parts are manufactured to correct dimensional specifications.

4.1.7 Interfaces between ports and hoses/connectors that are an industry standard, designed and validated by other groups, are not required to be included in this test (e.g., SAE J2044 for Positive Crankcase Ventilation (PCV)). Plug these ports during the test.

4.1.7.1 All non-industry standard interfaces for ports and hose shall be included in the test.

4.1.7.2 For all port interfaces included in test, attach a section of the mating hoses and plug/seal the open ends.

4.1.7.3 Interfaces which are integral to the AIS shall be included in the testing.

4.1.7.4 AIS Design Release Engineer (DRE) will provide direction for test content.

4.2 Conditions.

4.2.1 Environmental Conditions. Record barometer, temperature and relative humidity.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Place assembly into environmental chamber with ends fixed in the in car position with vacuum source attached to the plug vacuum nipple.

4.3.2 Ensure that all fastener/clamps are torqued to minimum torque specification.

4.3.3 Apply the vacuum listed in the program SSTs under the Maximum Allowable Clean Air Leakage section and record leak rate (ambient temperature of $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.)

4.3.4 Ramp up to $110\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and hold for 2 h. (See GMW15143 for temperature ramp rates.)

4.3.5 Apply the vacuum listed in 4.3.3 and record leak rate.

4.3.6 Ramp down to $-40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and hold for 2 h.

4.3.7 Ramp back to $-28\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and repeat 4.3.5.

4.3.8 Ramp back to ambient, $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and hold for 2 h.

4.3.9 Repeat 4.3.5.

4.3.10 Remove and reinstall air filter element.

4.3.11 Repeat 4.3.5.

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