



Air Induction Subsystem Leak Test with Aging

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 heat age the air cleaner assembly and identify any warpage issues that could cause a clean air leak.

1.2 Applicability. This test is for the air cleaner assembly only.

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.

None

2.3 Additional References.

Air Induction 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 maintaining a temperature of $110\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ continuous.

Note: Chamber must large enough to house the entire air cleaner assembly.

3.2.2 Vacuum source capable of maintaining a 15 kPa vacuum at 0.55 g/s flow rate.

3.2.3 Flow meter capable of measuring airflow rates from 0.01 g/s to 1.0 g/s with 0.01 g/s resolution.

3.2.4 Barometer to measure room conditions.

3.2.5 Thermometer to measure room conditions.

3.2.6 Relative Humidity indicator to measure room conditions.

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: 5 days
Test hours: 101 hours
Coordination hours: 5 hours

3.5 Test Required Information. Minimum and maximum torque specifications for fasteners clamping the air cleaner together.

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 Remove inlet air snorkel as required.
- 4.1.2 Remove clean air duct as required.
- 4.1.3 Remove Mass Air Flow Sensor (MAFS) as required.
- 4.1.4 Install plug/nipple assembly into outlet of air cleaner. This plug should have a vacuum tap in it.
- 4.1.5 Install plug/nipple assembly into inlet of air cleaner.
- 4.1.6 Torque the threaded fasteners used to hold the air cleaner assembly together to the minimum torque specification.
- 4.1.7 Ensure and document that all parts are manufactured to correct dimensional specifications.
- 4.1.8 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.
 - 4.1.8.1 All non-industry standard interfaces for ports and hose shall be included in the test.
 - 4.1.8.2 For all port interfaces included in test, attach a section of the mating hoses and plug/seal the open ends.
 - 4.1.8.3 Interfaces which are integral to the AIS shall be included in the testing.
 - 4.1.8.4 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 Inspect air cleaner assembly to ensure 4.1 has been completed.
- 4.3.2 Apply a Vacuum (VAC), VAC kPa $\pm$ 0.1 kPa and leak rate (at ambient).

Where:

VAC = Air induction system pressure loss at maximum air flow rate +5.0 kPa.

Reference the Air Induction program-specific Subsystem Technical Specification (SSTS) for the AIS pressure loss at maximum air flow rate.

4.3.3. Install air cleaner assembly into environmental chamber and raise temperature to 110 °C $\pm$ 2 °C and maintain for 100 h.

4.3.4 While assembly is still in the chamber and heated to 110 °C $\pm$ 2 °C, apply vacuum, VAC kPa $\pm$ 0.06 kPa and measure leak rate.

Where:

VAC = Air induction system pressure loss at maximum air flow rate + 5.0 kPa.

Reference the Air Induction program-specific SSTS for the AIS pressure loss at maximum air flow rate.

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