



Performance Requirements for Condenser Radiator Fan Module (CRFM) Air Baffles, Air Seals, and Air Deflectors

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 standard covers the performance requirements for the Condenser Radiator Fan Module (CRFM) air baffles, air seals, and air deflectors used in the "Front End" of the vehicle (space between fascia grille and CRFM).

1.2 Applicability. This standard provides the standard performance material requirements for air baffles, air seals, and air deflectors used in the "Front End" of the vehicle (space between fascia grille and CRFM).

1.3 Remarks. The operating characteristics of parts covered by this standard are operating continuously in temperatures of -30 °C and up to a maximum continuous temperature. Peak temperatures can exceed the maximum continuous temperature by 20 °C. These peaks can make up 60 h in the lifetime of the vehicle. Based on maximum continuous temperature in installation position and CRFM configuration, the parts are identified by Class 1 to Class 4 according to Table 1. For different continuous temperatures consult the Material Engineer for guidance.

2 References

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

2.1 External Standards/Specifications.

IATF 16949	ISO 188	ISO 8510-2
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2.2 GM Standards/Specifications.

GMW3059	GMW14729	GMW16355	GMW16456
GMW3116	GMW15813		

2.3 Additional References.

- Engineering drawing.
- Material Decision Tree.

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. According to test specifications and standards listed in this specification.

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

3.1.1.2 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.

3.1.2 Equipment. According to test specifications and standards listed in this specification.

3.1.3 Test Vehicle/Test Piece. Unless otherwise specified in the test method for the property concern, either the complete component or a section from the complete component shall be used for test pieces. Unless otherwise specified in the test methods at least one test piece shall be tested.

3.1.4 Test Time.

Calendar time:	35 d
Test time:	830 h
Coordination time:	48 h

3.1.5 Test Required Information. Conforming to relevant test procedure.

3.1.6 Personnel/Skills. Personnel trained in accordance with laboratory accreditation and Standard Operating Procedure requirements.

3.2 Preparation. Not applicable.

3.3 Conditions.

3.3.1 Environmental Conditions. Test pieces shall not be tested within 24 h after parts had been processed, part must be stabilized at room temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ (ambient temperature).

3.3.2 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.

3.4 Instructions. Not applicable.

3.5 Data. Not applicable.

3.6 Safety.

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

3.7 Documentation. Samples of components or material released to this standard shall be tested for conformity with the requirements of this standard and approved by the responsible GM Department prior to the start of delivery of production level components or materials.

Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

If not otherwise agreed to, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.7.1 Test Results. The test results shall have the same outline and numbering as this test specification.

4 Requirements and Procedure

4.1 Raw Material Specification Conformance. The components of the assembly must be made from materials which meet the individual material specifications shown on the engineering drawing in addition to meeting the requirements of this performance specification.

Engineering qualification of an approved source is required for the material specification called out on the part drawing/math data. Only sources listed in the GM Approved Source List under the material specification number per drawing callout/math data have been qualified by engineering as meeting the requirements of this material specification.

4.2 Regrind (RE). The percent regrind allowed per part shall not exceed the numeric value following the prefix RE-symbol. Only use Home Scrap (HS) regrind as defined by GMW3116 (scrap that is reused back into the same part), the letters HS shall follow the numeric regrind value. The use of regrind must not preclude the part from meeting the other specified characteristics of part performance. Furthermore, in any case:

- The maximum regrind content shall be limited to the percent that was validated and submitted for the Production Part Approval Process (PPAP).

- The type of regrind must be of the same material that was validated and submitted for PPAP.
- The regrind must be clean, dry, and free of contamination.
- RE10 = 10% maximum regrind.
- RE20HS = 20% maximum Home Scrap regrind.

Note: Only five (5) cycles of HS is allowed. Parts for component and vehicle validation shall contain the maximum RE to be used for production parts.

4.2.1 When this specification and RE prefix does not appear on the part print, no RE is approved for use.

4.2.2 No painted, laminated or plated regrind may be used without the written approval of the GM Materials Engineering Department.

4.3 Moldflow Analysis, per GMW16355.

4.3.1 Run "Mold flow 0" with three-dimensional (3D) math model released for "VSVA Synch Point". Perform Fill, Pack, Cool and Warp Analysis (Mold flow 0 applies to both Pull Ahead Production Tools and NON Pull Ahead Production Tools).

4.3.2 Run "Mold flow 1" with 3D math model at "IVBR/VIVA Synch Point – 3 weeks". Perform Fill, Pack, Cool and Warp Analysis (Mold flow 1 applies to both Pull Ahead Production Tools and NON Pull Ahead Production Tools).

4.3.3 Run "Mold flow 2" with 3d math model at "TKO – 3 weeks". Perform Fill, Pack, Cool and Warp Analysis (Mold flow 2 applies to NON Pull Ahead Production Tools only).

4.3.4 Requirement.

4.3.4.1 Minimum reported outputs per Phase 3 of GMW16355 for the material decision tree Analysis; Mold flow 0, 1, and 2.

4.3.4.2 Maximum Warping shall comply with Geometric Dimensioning and Tolerancing (GD&T) requirement.

4.4 Dimensional Analysis. Perform dimensional analysis on three (3) Air Baffles after Environmental conditions per 3.3.1. Dimensional Analysis shall be performed considering the following two items:

4.4.1 Air Baffle shall be mounted onto the holding fixture as the Air Baffle is mounted onto the vehicle.

4.4.2 Any device cannot be used to force the Air Baffle to keep certain geometry/position.

4.4.3 Requirement.

4.4.3.1 The three (3) Air Baffles shall meet the GD&T requirements, any significant shrinkage or deformation not meeting GD&T requirements shall be addressed.

4.5 Resistance to Temperature – Humidity Cycle. Three (3) Air Baffles shall be assembled to jigs or formers so as to simulate actual vehicle conditions.

The complete test assembly shall then be subjected to the following test cycle (see Table 2). This cycle shall be performed one (1) time using the temperatures from Table 1.

Design Release Engineer (DRE)/Validation Engineer will define the Class number from Table 1 per Thermal vehicle Computer Aided Engineering (CAE) Analysis.

Resistance to temperature ramp 2 °C/minute, according to each test temperature, see Table 2.