GM WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW17044

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.

ASTM D3012	ISO 4577	ISO 8510-2	SAE J1545
ISO 188	ISO 7724-1	ISO/TS 16949	

2.2 GM Standards/Specifications.

GMW3059	GMW14093	GMW16955
GMW3116	GMW14729	
GMW3221	GMW16456	

2.3 Additional References.

- Engineering drawing.
- Material Decision Tree.
- Test report.

3 Test Preparation and Evaluation

3.1 Resources. Requirement of test specimens: All test specimens shall be conditioned to GMW3221, Code A, unless the test procedure, or GM Engineering, indicates that standard conditioning is not required.

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.

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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.

3.1.3.1 Test pieces shall not be tested within 72 h after parts had been processed, part must be stabilized at room temperature.

3.1.4 Test Time.

Calendar time:	35 days
Test hours:	830 h
Coordination hours:	48 h

3.1.5 Test Required Information. Conforming to relevant test procedure.

3.1.6 Personnel/Skills. Not applicable.

3.2 Preparation. Conform to relevant test procedure.

3.3 Conditions.

3.3.1 Environmental Conditions. Conform to relevant test procedure. For tests which do not specify environmental conditions, run these at 23 °C ± 2 °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 standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

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.

3.7.1.1 Test Report. The test report 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 suffix 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).

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- 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.

Examples:

- RE10 = 10% maximum regrind.
- RE20HS = 20% maximum Home Scrap regrind.

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

4.2.1 When this specification and RE suffix does not appear on the part print, no regrind 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 Resistance to Temperature – Humidity Cycle. Test pieces 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 time using the temperatures from Table 1.

Resistance to temperature ramp 2 degree/minute, according to each test temperature, Table 2.

Table 1: Operating Temperatures

Class	Excursion Temperature °C	Maximum Continuous Temperature °C	Minimum Temperature °C
	A	B	C
Class 1	90 ≤ Peak Temp ≤ 100	60 ≤ Continuous Temp ≤ 80	-30
Class 2	100 ≤ Peak Temp ≤ 110	80 ≤ Continuous Temp ≤ 90	-30
Class 3	110 ≤ Peak Temp ≤ 130	90 ≤ Continuous Temp ≤ 110	-30
Class 4	130 ≤ Peak Temp ≤ 160	110 ≤ Continuous Temp ≤ 130	-30

Table 2: Resistance to Temperature – Humidity Cycle Test

Number of Hours	Test Temperature
24 h ± 1.0 h	Temperature A
12 h ± 0.5 h	Temperature C
72 h ± 1.0 h	Temperature B
24 h ± 1.0 h	40 °C ± 3 °C and 95% ± 3% Relative Humidity (RH)
12 h ± 0.5 h	Temperature C
24 h ± 1.0 h	22 °C ± 3 °C

4.3.1 Requirement. Test pieces shall show no cracking, crazing, appreciable color changes, discoloration, cloudiness, blistering, objectionable shrinkage, deformation, nor loss of adhesion to the substrate between layers of the composite or other changes detrimental to serviceability. Test pieces shall comply with the dimensions specified on the drawing before and after completion of test.

After the Resistance to Temperature - Humidity Cycle Test (see Table 2), dimensional assessment shall be performed on tested pieces, significant shrinkage or deformation not meeting Geometric Dimensioning and Tolerancing (GD&T) requirements shall be discussed with the Designing Engineer (DE) and Design Release Engineer (DRE) to assure it will not cause issues with surrounding components.

4.4 Resistance of Material to Heat Ageing/Oxidation Stability.

Note: Only for parts made of Polypropylene (PP).

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