GM WORLDWIDE ENGINEERING STANDARDS	**Material Specification**	**GMW16853**

Comprehensive Standard for Overall Emission Testing of Interior Materials and Parts (Fogging, Odor, Emissions, Carbonyls, Amines)

1 Scope

This standard covers all interior emission related performance requirements for all interior parts and/or materials that are defined as Code E parts per GMW14444. Code E parts are all parts that are in contact with refreshable air in the occupant compartment, the trunk and all parts having air flow into the interior including HVAC ducts, trunk trim, insulations etc. For clarification refer to the responsible material engineer. This standard shall be used to evaluate the emission behavior of vehicle interior materials and parts. This standard is applicable for all regional and global supplied materials and parts.

1.1 Material Description. Not applicable, performance requirements only.

1.1.1 Based on size and weight the following parts shall be tested per this standard:

- All parts having air flow into the interior with an area of ≥ 50 cm^2 or a weight of ≥ 10 g shall be tested.
- All parts ≤ 50 cm^2 or with a weight ≤ 10 g, that are used multiple times in the vehicle shall be tested in the following case: The area or the weight of the part shall be multiplied by the number of parts used in the vehicle, if the resulting weight is ≥ 10 g or the area is ≥ 50 cm^2 the part shall be tested.
- All parts containing polyoxymethylene (POM, acetal) shall be tested independent of area or weight.
- If more than one (1) color of any material or part is used, then the lightest and the darkest material colors only need be tested.

This standard defines minimal material related emission requirements for regional and global parts. In addition, specific requirements are called out in other documentation, e.g., Specification of Requirements (SOR), drawings, material specifications, math files etc., and apply to this engineering standard also.

The results of the tests per this standard will deliver comprehensive information for the vehicle interior air analysis.

1.2 Symbols. Not applicable.

1.3 Applicability. The intention of this specification is to continually improve GM's Vehicle Interior Air Quality, (VIAQ). All interior materials that can contribute emissions to the vehicle interior air are required to be individually tested and compliant prior to being put on General Motors Approved Source List (GMMASL). Those interior materials must be tested for Volatile Organic Compounds (VOC) and Semi-Volatile Organic Compounds (SVOC) per GMW15634. Additionally, interior materials that can contain carbonyls compounds must be tested per GMW15635.

1.3.1 Refer to CG5025, a form associated with this specification which has six (6) tabs. CG5025 includes instructions on how to apply the various standards referenced in Appendix B, Table B1.

1.3.1.1 The VIAQ List tab has three (3) tables and shows a comprehensive list of volatile substances that may be found in vehicle interiors that can create a negative human physiological response, e.g., lachrymation, mucosa irritant or sensitization.

Those three (3) tables are;

- **Table 1** lists those chemicals which are regulated by the governments of China, (GB 27630), South Korea, (MOLIT 2013-549, which will begin utilizing a new United Nations Economic Commission for Europe (UNECE) specification), and Japan, (JSAE JASO Z 125).
- **Table 2** lists those chemicals which are substances of concern and are regulated in Europe through TRGS 905/906.

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- **Table 3** lists fragrances that can be used for air freshening of vehicle interior air and require reporting in some countries.

1.3.1.2 The VIAQ Waiver Form tab is the form which must be filled out when necessary for materials or parts which exceed limitations.

1.3.1.3 The Waiver Form Instructions tab is an aid to help filling out waiver form.

1.3.1.4 The Emission Requirements tab was previously GMW16853, Table 4. The table was modified, removed from GMW16853 and placed into CG5025 in order to make changes to it without having to republish GMW16853.

1.3.1.5 The Contact List tab shows Lead GM VIAQ materials engineer located in each of the GM regions and their contact information.

1.3.1.6 The Revision Log Update tab shows each revision to CG5025.

1.4 Remarks. If, in the tests per GMW15634 and/or GMW15635, substance values are determined to exceed the limits in the VIAQ List tab of CG5025, contact the regionally responsible VIAQ materials engineer to initiate acquiring a waiver form. The completed waiver form with assigned number and necessary signatures must be submitted with the Production Part Approval Process (PPAP) documents.

2 References

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

2.1 External Standards/Specifications.

DIN 55531	ISO 9001	JSAE JASO Z 125	TRGS 905/906
GB 27630	ISO/EC 17025	MOLIT 2013-549	

2.2 GM Standards/Specifications.

GMW3205	GMW14131	GMW15634	GMW17914
GMW3235	GMW14444	GMW15635	

2.3 Additional References.

- CG5025 VIAQ Regulated Volatile External Supplement (Form)
- Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02
- VACUPAC available at www.branopac.com/en/branoguard/branovac/vacupac/

3 Requirements

3.1 Resources. All tests per this standard shall be performed by a laboratory that conforms to ISO/IEC 17025 or ISO 9001 or other 3rd party accreditation that is acceptable to the GM VIAQ Materials Engineer. Supplier shall submit documentation showing proof of accreditation. A list of laboratories certified to this standard can be obtained by the VIAQ materials engineer.

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

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.

3.1.3 Facilities. As specified by the relevant test procedure.

3.1.4 Equipment. As specified by the relevant test procedure.

3.1.5 Test Piece. Test pieces should be obtained from suppliers as soon as possible after production. Unless otherwise specified in this standard, no pre- or post-treatment of the test samples besides the production process and the test sample preparation (e.g., drying if necessary) is allowed. Care should be taken to prevent material out-gassing before analysis (package, refrigerate).

The sample shall not be touched with bare fingers. The cutting shall be done with an oil-free tool. A photograph of the sampling region of the part shall be taken to identify the part sampling location. This photograph shall be later added to the sample package. All samples intended for testing shall be packed as described in 3.1.5.2.

Note: Sample size and quantity shall be such that all tests can be performed.

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A part or material can be tested when no further heat treatment or adhesive bonding is needed for finishing the assembly. For example, a roll good for seat covers can be tested directly as a roll good or it can be tested as a seat cover material. The GM validation engineer shall decide on which pieces, roll goods or seat covers, to test.

3.1.5.1 The following requirements apply for all new, carryover materials and components supplied, unless otherwise specified on the drawing. These requirements also apply to newly sourced or redesigned materials and components.

3.1.5.1.1 Parts (Non-Composite)/Semi-Finished Products. If agreed upon for large parts, the sample shall be taken from the part as follows:

A representative sample of the material shall be taken. The sample size shall be minimum 25 cm × 20cm.

3.1.5.1.2 Composite Parts. A composite material is a material composed of more than one (1) layer intimately held together at every point of contact by cementing, bonding, cladding, welding, etc. When layers are intermittently held together (e.g., by sewing, high frequency welding, riveting), the result is not considered to be a composite material and shall be tested individually per 3.1.5.

Composite parts shall be tested as composite, or upon agreement, layers of the composite can be tested individually. All individual materials and composite materials must fulfill the requirements of this standard. If tested individually, test piece shall be defined per 3.1.5.

3.1.5.1.3 Paint. Paint suppliers shall prepare samples as follows:

Paints are sprayed on aluminum foil of 30 µm maximum foil thickness, the paint process guidelines of the paint supplier including coating, thickness and drying requirements shall be followed. For multilayer paints, the thickness of the individual layers of the film shall be the same as the thickness on the painted part. If necessary, each layer will be analyzed separately.

3.1.5.1.4 All Materials Cured within the Vehicle (Fillers, Adhesives, Sealants, Deadener Pads, etc.) Supplier shall prepare samples as follows:

Material shall be applied to emission neutral foil or paper (e.g., aluminum foil). The material shall be treated as if it is used for the vehicle production process at the minimum cure time and temperature.

Optional, and if agreed upon with testing laboratory, material can be delivered to the laboratory and cured at the laboratory with the same production conditions.

3.1.5.1.5 All Adhesives/Glues Cured Prior to Installation. All adhesives/glues that will be cured on a part/component before installation to a vehicle (e.g., on Instrument Panel (IP), door trim, etc.) Supplier shall prepare samples as follows:

Material shall be applied to emission neutral foil or paper (e.g., aluminum foil). The material shall be treated as if it is used for the part production process at the minimum cure time and temperature. Adhesives shall be tested in that manner as it will be used within the vehicle. Glass bubbles used to ensure uniform thickness.

3.1.5.1.6 Peel and Stick Adhesives. Adhesives that are used between two (2) layers (e.g., between trim and carrier) shall also be tested within two (2) layers of aluminum foil to be as realistic as possible.

Optional, and if agreed upon with testing laboratory, material can be delivered to the laboratory and cured at the laboratory with the same production conditions.

3.1.5.1.6.1 Tapes. Sample rolls shall be placed and stored in an aluminum plastic laminate film within 8 h after manufacture. After the sample rolls of tapes are received, remove the first five (5) windings of sample roll and discard. Remove a length of tape and store openly for 7 d. Cut a piece from the center of the tape sample 40 mm × 3 mm.

3.1.5.1.6.1.1 Single sided tapes are measured with the adhesive side showing downwards. Weigh the sample, record the weight and then deactivate adhesive by using hollow glass spheres (see Note). Insert the sample into testing tube.

Note: Hollow glass spheres:

- Q-Cel 5028-k, Potters Ballotini Ltd., UK
- SiLiBeads S5211-7, SiLi, Warmensteinach, Germany

3.1.5.1 6.1.2. Double sided tapes are measured with the adhesive side showing upwards. First remove the cover liner and replace with aluminum foil, then weigh the sample and record weight. Cover adhesive with a piece of aluminum foil and insert into testing tube.

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3.1.5.1.7 Self Adhesive Materials. Self-adhesive materials (e.g., foils, fleeces, Expanded Polypropylene (EPP) parts, foams) shall be bonded to aluminum foil before testing the emissions.

3.1.5.1.8 Plastic Pellet Raw Materials. Pellet materials intended for test shall be molded in a test plaque, so that at a minimum a circle of 80 mm in diameter can be cut out for fog testing to GMW3235. Samples intended for tests shall be packed as described in 3.1.5.2.

3.1.5.1.9 Other Materials. Samples intended for tests shall be packed as described in 3.1.5.2.

3.1.5.2 Packaging of Test Pieces. The test piece shall be packed into aluminum composite films (e.g., VACUPAC, or any other material per DIN 55531). Examples of procurement addresses for aluminum composite foils (export foils as defined in DIN 55531):

- Supplier: Flöter, D-71701 Schwieberdingen
- Supplier: Nawrot, D-51688 Wipperführt

Note: In the exceptional case, the test piece can be packed into two (2) layers of thick silicone-free aluminum foil (pre-cleaned with n-pentane), the edges shall be folded multiple times to prevent contamination and to ensure a gastight packing. The aluminum foil packed test piece shall then be packed additionally into a polyethylene bag. The packed test piece shall be labeled with vendor name, part number, final sample name, manufacturing date and date of sampling.

3.1.6 Test Time. See individual test procedure.

3.1.7 Test Required Information. The following information shall be submitted with the samples:

Material or component information such as vendor name, raw material, production date, sampling date and GM part number shall be reported in the test report to the responsible GM test engineer. For template see Appendix A, Data Sheet A1.

Manufacturing date and sampling date shall be documented:

- Vendor Name
- Manufacturer Name (if different from Vendor Name)
- Part Number
- Final Part Name
- Manufacturing Date
- Date of Sampling
- Date of Packing/Wrapping
- Material Specification of used raw material or composite or individual material of each layer in a composite
- Explicit Trade Name and Supplier of used raw material or composite or individual material of each layer in a composite

Note: Samples without identification labels will not be analyzed until clarification is received.

3.1.8 Personnel/Skills. Proper training is required to operate the instrumentation in this procedure. A professional degree in chemistry, chemical engineering, health science or equivalent, and familiarity with the operation of the instrumentation is required. Personnel without this background shall be trained carefully on the instrumentation before using it.

3.2 Preparation. The delivered parts/samples shall be unpacked and then stored for (168 ± 4) h at (+23 ± 2) °C and (50 ± 10) % relative humidity (RH) in a room with a controlled atmosphere (free of dust and air draft).

After storage, the test samples for the individual test shall be prepared as defined in the individual test procedures. A photograph of the samples shall be taken to identify the samples.

3.3 Conditions.

3.3.1 Environmental Conditions. See individual test procedures.

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. Table 1 identifies applicable test procedures per sample types:

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