



Material Engineering Common Requirements

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. The purpose of this specification is to clearly communicate the GM Materials Engineering requirements to the supplier during the quotation process. Each Statement of Requirement (SOR) for a part, component or subsystem, will reference specifications to ensure that the quotation is based on materials that are suitable for the application. Specifications can include materials specifications and/or material-related part performance specifications. Note that in this document, Material Specification is used interchangeably with Material Standard.

Most SORs include GMW14270 as a Common Corporate Appendix. It is also known as Appendix F9. Additional appendices may be included in the SOR package which contain Materials Engineering Requirements:

1.1.1 For Program Specific Materials Engineering Requirements, there are three (3) main approaches to include materials engineering content with guidelines as follows:

- a. **Appendix B2.** For example, used for Exterior and Interior decorative parts (with color, grain or gloss) and some other vehicle parts. It includes a spreadsheet with an Enhanced Bill of Materials (EBOM) tab, a visible Bill of Materials (visBOM), and additional material information tabs (F10, Preferred Materials Catalog (PMC)) which are used as needed. Appearance (Appendix F5) and Dimensional (Appendix F7) tabs are also included. The document is started by the Electronic Statement of Requirements (eSOR) author and includes Key Stakeholders in Materials, Appearance and Dimensional engineering.
- b. **Appendix F10.** For example, used for Chassis and Battery Parts (not decorated). It is a stand-alone Word or PDF document that is completed by the Materials Engineering Key Stakeholder.
- c. **Appendix C/C1 or C2.** For example, used for Transmission, Motor, Engine, Tire & Wheel Systems (T&WS) Parts. The Technical Specialists have standard materials content in Appendix C/C1 and the eSOR Author may input additional requirements into Appendix C2.

1.1.2 For Program Specific Materials Engineering Requirements, several teams have unique appendices either stand-alone or embedded within the B2 or F10 Appendices:

- a. **Appendix M14.** Used by the Power Electronics team. It is a stand-alone Word or PDF document that is completed by the Materials Engineering Key Stakeholder.
- b. **Appendix B.** Used by the Exterior Lighting team. It is a document created by the eSOR author.
- c. **Appendices S, T, V:** Used by the Closures team as Appendix S (body seals), Appendix T (glass seals), or Appendix V (garnish moldings).

1.1.3 Validation Appendices may contain materials engineering content:

- a. **Appendix G2.** Material-related part performance specifications and materials test methods are often incorporated into the program specific validation test plan.
- b. **Appendix G4.** Material property data required to develop material cards for use by the GM Virtual Design, Development, & Validation (VDDV) organization are detailed in Appendix G4. All material testing shall be performed by a supplier meeting the laboratory requirements of AIAG-IATF 16949 with laboratory certification (scope) paperwork supplied upon request, or by a laboratory approved by GM Materials Engineering.

Note: In the case of specification conflicts within the SOR Appendices, Appendix B2 shall be regarded as the authoritative source for materials selection and part performance, when it is included in the SOR package. If questions arise regarding discrepancies between appendices, contact the GM Materials Engineer for the relevant part.

1.2 Applicability. This specification is applicable to all purchased parts.

1.3 Remarks. The intent of this specification is to provide high level material guidance on any vehicle parts. The exact material specification shall be communicated in other SOR appendices and on math/drawings.

2 References

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

2.1 External Standards/Specifications.

IATF 16949

2.2 GM Standards/Specifications.

GMW3013

GMW3116

GMW3600

GMW14797

GMW3059

2.3 Additional References.

- GM1927 Global Supplier Quality Manual.
- GM Engineering Standards: Available to GM suppliers through Information Handling Service (IHS) (global.ihs.com).
- GM SupplyPower (<https://gmsupplypower.covisint.com/web/portal/home>).
- International Material Data System (IMDS) (mdsystem.com).

2.3.1 The following Appendices of the SOR:

- B General Program Description (Commodity specific).
- B2 Enhanced Bill of Materials (EBOM) (Commodity specific).
- C/C1 Component or Subsystem Technical Specifications (SSTS/CTS).
- C2 Exceptions/Additions to the SSTS/CTS.
- F9 Use this document, Material Engineering Common Requirements (General) – GMW14270.
- F10 Program Specific Materials Engineering Requirements (Commodity specific).
- G1 Analysis, Development, and Validation (A/D/V) SOR – (General) – GMW3600.
- G2 Supplier A/D/V Process Tasks and Deliverables (Commodity specific).
- G4 VDDV Computer Aided Engineering (CAE) Tasks & Deliverables (Commodity specific).
- M14 Power Electronics Materials Engineering Requirements.
- S Glass Seals and Greenhouse Moldings for Frame Under Glass Doors.
- T Glass Seals and Greenhouse Moldings for Inlay Doors.
- V Garnish Moldings.

3 Requirements

The material requirements are separated into the following portions:

3.1 General Common Notes. General Common Notes are requirements to which all delivered parts must conform and must be placed on all drawings and/or in the math data. The General Common Notes are:

3.1.1 Restricted and Reportable Substances for Parts per GMW3059. See 7.1 for details.

3.1.2 Recyclability/Recoverability per GMW3116.

3.2 Specific Common Notes. Conformance to the Specific Common Notes are required for the relevant part(s). The Specific Common Notes shall be placed on the relevant drawing or math data. The Specific Common Notes are organized by material-related characteristics and/or part location, e.g., plastic parts shall comply with specific

plastic common notes; metallic parts shall comply with specific metallic common notes; interior parts shall comply with specific interior common notes. If a part fits into more than one (1) of the listed categories, all Specific Common Notes of all relevant categories apply. Specific Common notes shall be communicated through SOR Appendices.

3.3 Material Callout Requirements.

3.3.1 Material Callout Documentation Requirement. All materials shall be called out on the part drawing and in the math data by a standard. To obtain a copy of a standard, go to global.ihs.com. Accepted standards are:

- GM Worldwide (GMW) Standards.
- International Industry Standards.

Only material specifications or standards which are available as official English versions can be used. Standards that are not controlled and cannot be purchased globally online or from the standard's governing body are not permitted. For exceptions, contact GM Materials Engineering.

In the Production Part Approval Process (PPAP) documentation, the material used shall be documented to its original manufacturer's name, trade name, product code, and manufacturing location as well as the GM material callout.

Note: Any material change (even within a material callout) requires notification to the Supplier Quality Engineer and may require a new PPAP.

3.3.1.1 Material Callout by External Standards. Use of internationally recognized standards, such as International Organization for Standardization (ISO) is generally accepted. For several material categories, callouts by other international standards organizations, such as Society of Automotive Engineers (SAE), American Society for Testing and Materials (ASTM) International, European Norm (EN), Japanese Industrial Standards (JIS), Deutsches Institut für Normung (DIN), etc., are accepted. In these cases, always check with GM Materials Engineering for compliance. The callout in the drawing or in the math data must conform to the coding described in the referenced standard. If the standard describes more than one (1) material grade, the code for the grade must be noted on the drawing or in the math data.

3.3.1.2 Material Callout by GM Standards. GMW standards have been developed for many materials. Material callouts by GMW Standards, are preferred when one is available and applicable. The material callout on the drawing or in the math data must conform to the coding as described in the referenced GM standard. If the standard describes more than one (1) material grade, the code for the required grade must be noted on the drawing or in the math data.

All GM Suppliers, including Integrated Suppliers and Joint Ventures are required to obtain GM Engineering Standards from GM's 3rd party distributor, IHS. This requirement is contained in the SOR template and becomes part of the supplier contract.

3.3.1.3 Teamcenter Integrated Materials Management (TcIMM) Callouts. In the math data, at least the base material for each external surface and surfaces that interface with another component or sub-component object, must have an associated TcIMM material callout which can provide material callout traceability and properties. In the case where material notes are required in addition to the TcIMM base material callout, notes will be on the drawing or in the Data Creation Standards (DCS) File Log in math. Material properties for CAE analysis are required in many cases as referenced in Appendix G4.

3.3.1.3.1 GM engineers may request internal component definition and corresponding material callouts, often depending on requirements for how parts are modelled or analyzed. In any case, GM engineers may request a complete Bill of Materials (BOM) with all material callouts for all components as referenced in the contract (reference GM's Terms & Conditions, Ingredients section).

3.3.1.3.2 A material library of TcIMM material callouts exists in GM's Materials Database system and is replicated in Teamcenter and the NX system and available via SupplyPower. See Appendix A, A1 for information on how to find SupplyPower documents.

3.3.1.3.3 In Teamcenter, a set of approved best practice TcIMM material callouts are classified to each of the Vehicle Partitioning and Product Structure (VPPS) levels (4th level and below) from where callouts can be assigned to the math objects. When a new TcIMM material callout is needed, work with the Materials Engineering team to have it added to TcIMM. A new material callout requires a density and a properly formatted callout. GM is working to obtain a full set of material properties for each material callout as required to support analysis.