



Aluminum Sheet for Heat Shield Applications

1 Scope

This specification covers the requirements for wrought aluminum alloy sheet for heat shields. This specification is applicable only to non-age hardenable aluminum alloys. Non-age hardenable aluminum alloy sheet supplied to the specification shall be formable by conventional cold stamping processes.

Non-age hardenable aluminum alloy sheet supplied to this specification can be utilized to fabricate single monolithic sheet heat shields, multilayer sheet heat shields, or the skins of composite heat shield assemblies consisting of thermal barrier textile. Thermal barrier textiles are covered by separate material specifications.

Additional requirements or agreements shall be specified by each region (e.g., GMNA, GMLAAM, GMAP, etc.)

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 Material Description. The material designation is defined by the GMW base metal specification number, aluminum alloy series number (1000, 3000, or 5000), a letter to differentiate specific aluminum alloy grades, a temper designation, and, if applicable, a designation for surface texture.

1.2 Symbols. Not applicable.

1.3 Applicability. Typical applications include underbody heat shields and exhaust system heat shields.

2 References

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

2.1 External Standards/Specifications.

ASTM E34	ASTM E607	ISO 209-1	ISO 10275
ASTM E101	ASTM E1251	ISO 6892	JIS H4000
ASTM E517	EN 573	ISO 10113	

2.2 GM Standards/Specifications.

GMW3059	GMW14019	GMW16823
GMW3335	GMW15420	

2.3 Additional References.

- Aluminum Association Standards and Data – Metric SI
- ME-Lastenheft

3 Requirements

The following section defines specific requirements for material on delivery, processing, performance and other stages during life cycle. Deviations required for regional GM business units are listed in the Deviations section at the end of this specification. In cases of dispute, the GMW15935 specification shall take precedence.

3.1 Requirements on Delivery.

3.1.1 Chemical Requirements.

3.1.1.1 Base Metal. Base metal chemical compositions shall conform to the requirements of Table A1. Additional demands and restrictions may be imposed by regional Materials Engineering organizations depending upon the application. The base metal chemical composition shall be determined per ASTM E34, ASTM E101, ASTM E607, ASTM E1251 or EN 573. In cases of dispute, referee method shall be ASTM E34. For reference, ISO, AA, EN, and JIS base metal chemical compositions designations are shown in Table A2.

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

3.1.2 Mechanical Requirements.

3.1.2.1 Tensile Mechanical Property Requirements. The aluminum products shall meet the mechanical properties as specified in Table A3. Longitudinal sheet direction mechanical properties shall be determined per GMW3335. Tests shall be performed using samples per ISO 6892 Type 1 (50°mm gage length ASTM type sample).

3.1.3 Physical Requirements.

3.1.3.1 Material Thickness and Tolerance. The sheet thickness tolerance requirements listed in Table A4 shall be guaranteed.

3.1.3.2 Surface Requirements.

3.1.3.2.1 Surface Condition. Specific surface condition requirements for each region are detailed the Deviations section at the end of this document.

3.1.3.2.2 Surface Quality. The aluminum sheet shall be supplied as unexposed (U) surface quality Surface imperfections such as pores, slight indentations, small marks, minor scratches, and slight coloring, which do not affect formability and part performance are allowed.

3.1.3.2.3 Textured Surfaces. Aluminum heat shields supplied with a two dimensional textured, or dimpled surface shall meet nominal dimensional requirements in the longitudinal direction shown in Table A5. Textured or dimpled surface pattern type shall be specified by adding "TEX A", "TEX B" or "TEX C" designation to materials specification. Dimpled or textured surface nominal dimensions are shown in Figure A1 and Figure A2.

3.1.3.2.4 Surface Treatment. Mill-applied products must be approved to GMW14019 and/or approved by the regional business unit.

3.1.3.2.5 Typical Base Metal Density Values. For theoretical calculation of product and part mass, the typical base metal densities shown in Table A6 shall be used. This information is for GM Engineering Information only. The information in Table A6 is not guaranteed by the supplier.

3.1.3.2.6 Typical Base Metal Maximum Service Temperatures Values. For comparison purposes, the typical base metal maximum service temperatures are shown in Table A7. This information is for GM Engineering Information only. The information in Table A7 is not guaranteed by the supplier.

3.1.4 Additional Requirements.

3.1.4.1 Lot Identification. All shipments of production aluminum sheet products shall show the production date on the supplier's material certification warrant.

3.1.4.2 Other Requirements. Requirements such as tolerances on product shape and dimensions, inspections units, number of tests, sampling, test conditions, re-tests, inspection documents, packing, and handling of disputes shall be agreed upon between supplier and the regional business unit.

3.2 Processing Requirements. Not applicable.

3.3 Performance Requirements. Not applicable.

3.4 Requirements on Other Stages During Life Cycle. Not applicable.

3.5 All materials supplied to this standard must comply with GMW3059, Restricted and Reportable Substances, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.

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A new approval must be received for any changes, e.g., properties, manufacturing process, location of manufacture, etc. If not otherwise agreed, all testing and documentation normally required for initial release must be completed.

It is the responsibility of the supplier to inform the customer in a timely manner, without solicitation, and to include documentation of all modifications of materials and/or processes and to apply for a new release.

5.4 Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS). For new product submissions, or when a change in chemical composition of an existing product has occurred, a complete copy of the Material Safety Data Sheet/Safety Data Sheet must be submitted in compliance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) requirements or other country-specific MSDS/SDS requirements.

6 Approved Sources

Materials supplied to this specification must be approved by General Motors (Materials Engineering).

The appropriate GM Materials Engineering department(s) must confirm material as meeting the requirements of this specification. Any test data sheets of material submitted to General Motors for such confirmation (e.g., during Production Part Approval Process (PPAP)) under this material specification must list all properties and must apply corresponding test methods of this material specification.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

AA	Aluminum Association
CTS	Component Technical Specification
EN	European Standard
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
GMAP	General Motors Asia Pacific
GMLAAM	General Motors Latin America, Africa, and Middle East
GMW	General Motors Worldwide
GPSC	Global Purchasing and Supply Chain
GSSLT	Global Subsystem Leadership Team
IMDS	International Material Data System
JIS	Japanese Industrial Standards
MSDS	Material Safety Data Sheet
PPAP	Production Part Approval Process
SDS	Safety Data Sheet
U	Unexposed

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

8.1 The coding system for GMW aluminum heat shields on engineering part drawings/electronic math files, manufacturing engineering documents and other documents (VTS, CTS, etc.) shall use a nomenclature consisting of the GMW base metal specification number, aluminum alloy designation, temper designation, and dimpled or textured surface dimensional designation.

8.2 Example of Manufacturing Engineering Document Coding.