



Quick Plastic Forming Aluminum Sheet

1 Scope

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/Material Description. The specification covers the requirements for wrought aluminum alloy sheet for use as automotive closure panels produced by the quick plastic forming (QPF) process. This specification is applicable to AA5083-H175 wrought aluminum alloy sheet (with 74% or greater cold reduction) produced by the direct-chill (DC) casting process, which can be used for exposed and unexposed applications.

1.2 Symbols. Not applicable.

1.3 Applicability. Aluminum sheet closure panels.

1.4 Remarks. Exposing work hardened 5000 series aluminum alloys containing more than 3.5% magnesium to temperatures > 65 °C (150 °F) will result in susceptibility to stress corrosion cracking. Therefore, non-age-hardenable 5000 series aluminum alloy grades in this specification may not be suitable for panels that are exposed to above ambient temperatures.

2 References

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

2.1 External Standards/Specifications.

ASTM B557M	ASTM E101	ASTM E607	IATF 16949
ASTM E34	ASTM E227	ASTM E1251	SAE J911

2.2 GM Standards/Specifications.

GMW3059	GMW15420	GMW16823
GMW14019	GMW16549	GMW16967

3 Requirements

3.1 Chemical Composition. The base metal composition shall conform to the requirements in Appendix A, Table A1. The base metal chemical composition shall be determined per ASTM E34, ASTM E101, ASTM E227, ASTM E607 or ASTM E1251. In cases of dispute, the referee method shall be ASTM E34.

3.2 Lubrication Approval. All aluminum sheet should have a mill applied corrosion preventative lubricant. All lubricants or fluids (mill oils, prelubes, hot melts, etc.) applied to the material by the aluminum producer or processor must be removable in the purchaser's paint line cleaning system. Mill-applied products must be approved to GMW14019, and/or approved by the region receiving the material. Approved lubricants are specified by the region receiving the material and must be documented in the qualification package.

3.3 Mechanical Requirements. Quick plastic forming aluminum AA5083-H175 DC alloy sheet furnished to this specification shall conform to the mechanical property values shown in Appendix A, Table A2 after heating to 500 °C, holding for 15 minutes and testing at room temperature. The 0.2% offset yield strength, tensile strength, and total elongation in 50 mm in the annealed temper shall be determined per ASTM B557M. QPF bulge test requirements for incoming material are shown in Appendix A, Table A3. Refer to Appendix B for the QPF Bulge Test Procedure.

3.4 Surface Texture. Surface texture for all exposed (E) surfaces shall not exceed the maximum roughness limit in GMW16823 as tested per SAE J911.

3.5 Adhesive Compatibility (Qualification Testing). The aluminum alloy sheet approved to this specification shall be tested according to GMW16549. For bonded applications, the surface of the flat products furnished to this specification shall be capable of adhering to surfaces bonded with GM qualified adhesives.

3.6 Marking. If required, marking shall be carried out on the unexposed surface of full finish coils for outer panels and on the outer side of the coils for inner panels. The marking must be agreed upon between the supplier and purchaser. The purchaser must release the marking ink.

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

3.8 All materials supplied to this standard must comply with GMW3059, Restricted and Reportable Substances. For raw materials, non-dimensional materials (e.g., fluids, greases) and/or bulk materials that require approval into the GM Materials Approved Source List (GMMASL), an International Material Data System (IMDS) submission must be made by the material supplier as a material Material Data Sheet (mMDS). After the mMDS is approved by the GM IMDS team, the materials supplier is to provide a "Header only report" to the responsible GM Materials Engineer. Further guidance can be found in the GM-specific instructions on the IMDS website.

3.8.1 Initial Source Approval. No shipments shall be made by any supplier until preliminary technical approval (inclusive material tests at supplier and/or GM) has been obtained. Requirements for aluminum qualification may be found in GMW15420.

3.9 Quality Requirements. The supplier shall have quality process control procedures compliant with IATF 16949 or as required by GM Global Purchasing and Supply Chain (GPSC) demonstrating that the product will conform to all specification requirements. The data required to be submitted for this specification for each shipment will be determined by the regional manufacturing location.

4 Manufacturing Process

4.1 Processing Requirements.

4.1.1 Welding. Sheet aluminum supplied to this standard shall be weldable to the GM Manufacturing Engineering requirements (the supplier shall work with the GM Design Responsible Engineer to comprehend this requirement) and meet spot weld requirements in GMW16967. Contact the GM Weld Council for specific information regarding weldability at weld-council@gm.com.

4.1.2 Stretcher Strains. All aluminum used for exposed (E) surfaces and secondary exposed surfaces shall be free from stretcher strains.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations.

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.

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 Safety Data Sheets. Safety Data Sheets (SDS) for chemicals supplied to GM for internal production processes, must be submitted to GM Manufacturing in compliance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) requirements or other country-specific SDS requirements.

6 Approved Sources

Suppliers must prove conformance to these performance requirements per the Validation Test Plan and/or for the materials approval portion of the Production Part Approval Process (PPAP).