



Extruded Magnesium Profiles for Structural, Body and Closure Panel Applications

1 Scope

This standard covers the requirements for wrought magnesium alloy extruded profiles for unexposed structural, body and closure panel applications. Additional requirements or agreements shall be specified by each region (e.g., General Motors North America (GMNA), General Motors Europe (GME), General Motors Latin America, Africa and Middle East (GMLAAM), General Motors Asia Pacific (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 material specification number, material designation, material product type, magnesium alloy designation, minimum as-received yield strength and surface quality. The corrosion behavior of this magnesium alloy offers the usability for interior applications except the floor area in uncoated condition. Additionally, the material has a good creep resistance behavior.

1.1.1 Extruded profiles may be supplied in straight as-extruded lengths.

1.1.2 Sheets may be supplied made out from an extruded round tube which is laser cut, opened and flatted.

1.2 Symbols. Not applicable.

1.3 Applicability. Structural, body and closure panel applications such as extruded profiles, tubes, brackets, panels and shells.

2 References

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

2.1 External Standards/Specifications.

ASTM E35	ASTM E954	ISO TS16949
ASTM E112	ISO 6892	

2.2 GM Standards/Specifications.

GMW3011	GMW3335	GMW16546	GMW17679
GMW3059	GMW15420	GMW16549	

2.3 Additional References.

Manufacturing Engineering (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 individual GM business units are listed in Deviations at the end of this document.

Parts supplied according to this specification shall undergo successful trials that fully meet end product requirements. In the event of any changes to the manufacturing process to which the part was successfully validated, the appropriate engineering group must be notified and the part must be revalidated with the new process.

3.1 Requirements on Delivery. The following section defines specific requirements for material on delivery, processing, performance and other stages during life cycle.

3.1.1 Chemical Requirements.

3.1.1.1 Base Metal. Base metal composition shall conform to the requirements of Table 1. 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 E35, ASTM E954. In cases of dispute, the determining method shall be ASTM E35.

Table 1: Chemical Composition (% by Mass)

	Ce	Mn	Cu	Si	Fe	Ni	others	Mg
ME100	0.50 to 1.00	1.60 to 2.00	≤ 0.006	≤ 0.05	≤ 0.005	≤ 0.001	≤ 0.50	balance

3.1.1.2 Surface Treatment. Products coated with a designated lubricant (e.g., pre-lube) shall comply with GMW16546. If necessary a suitable transportation protection has to be applied. Lubricants, transportation protections etc., applied to the material by the magnesium supplier and/or magnesium parts manufacturer must be removable in the purchaser's phosphate cleaner system. Lubricants and/or other transportation protections must be approved by the regional business unit.

3.1.2 Mechanical Requirements.

3.1.2.1 Tensile Mechanical Property Requirements. The magnesium products applied to this specification shall meet the mechanical properties as specified in Table 2. The 0.2% Offset Yield Strength, Ultimate Tensile Strength and Percent Total Elongation shall be determined in the longitudinal direction per GMW3335.

Table 2: Mechanical Properties

		E modulus [GPa]	R _{p0,2} [N/mm ²]	R _m [N/mm ²]	A ₅₀ [%]
ME100	0°	≥ 40	90 to 130	200 to 240	≥ 12
	90°		150 to 180	220 to 250	≥ 5

Tests shall be performed using samples per ISO 6892 Type I (50 mm gage length ASTM type sample).

For production material, required mechanical properties shall be guaranteed for a minimum of 3 months after delivery to a GM Manufacturing Plant. For material qualification, required mechanical properties shall be guaranteed for a minimum of 6 months.

3.1.3 Physical Requirements.

3.1.3.1 Material Thickness and Tolerance. The sheet thickness tolerance requirements listed in Table 3 shall be guaranteed.

Table 3: Guaranteed Metric Nominal Magnesium Alloy Sheet Thickness and Tolerances

Specified Nominal Thickness [mm]	Tolerances [mm]
1.00 to 3.00	± 0.10

Thickness is measured at any point across the width not less than 40 mm from an edge. Tolerances are for sheets up to 3800 mm in width. Thickness and thickness tolerances shall be rounded to the nearest 0.01 mm (two decimal places). Electronic math file of engineering part drawing information supersedes any information in Table 3.

For extruded parts unless otherwise specified the dimensions and dimension tolerances shall conform to the specification on drawing.