
EXTRUSION INGOT

Technical Datasheet

AlMgSi alloy 606035

APPLICATION

Typical examples for use of this alloy are:

- Architectural members, i.e. glazing bars and window frames
- Windscreen sections
- Road transport

STRENGTH

Obtainable mechanical properties may vary with the production equipment, process parameters used in extrusion and consistency of the process parameters. We recommend that this is checked out for each production line.

However, the alloy is developed to satisfy the following mechanical properties:

Temper (AA)	Yield strength (MPa)	Tensile strength (MPa)	Elongation (%)	Hardness Brinell
T4	70	150	23	43
T6 *	190	215	10	67

* Aged for 5 hours at 185°C.

ALLOY

Chemical composition **

%	Si	Fe	Cu	Mn	Mg	Zn	Ti	Cr	Other elements		Al
									Each	Total	
Min.	0,40	0.18	-	-	0.45	-	-	-	-	-	Balance
Max.	0.45	0.22	0.02	0.03	0.50	0.02	0.02	0.02	0.02	0.10	

** Analysis is performed on manufacturer's spectographs using manufacturer's selection of calibration standards. Analysis made on other instruments using other standards may show deviations.

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PROPERTIES

Strength

Strength depends upon the intermediate storing time before artificial ageing and ageing practice. For this alloy the strength will increase with increased intermediate storing time. Storing for 24 hours prior to artificial ageing will increase the strength with approx. 5%.

Ageing at low temperatures (for longer time) generally gives higher strength than ageing at high temperatures (for shorter time). For details, see enclosed curves.

Special properties

Formability.....	Good
Machinability.....	Moderate; best in T6 temper
Weldability.....	Suitable for all methods
Corrosion resistance.....	Good
Surface treatment.....	Well suitable for all types of mechanical surface treatment
Anodizing.....	Very good for anodizing

Physical properties - typical values

Density		2.70-2.71	kg/dm ³
Modulus of elasticity		69	kN/mm ²
Shear modulus		26	kN/mm ²
Linear expansion coefficient	20-100 °C	23	μ°C ⁻¹
Thermal conductivity	20 °C	200	W/(m•K)
Specific heat capacity	0-100 °C	880-900	J/(kg•k)
Resistivity	20 °C	33	nΩ•m
Conductivity	20 °C	52	% IACS
Melting range		600-655	°C

k = kilo

μ = micro (10⁻⁶)

n = nano (10⁻⁹)

Corresponding or closely approximating norms and designations

Norway NS	Sweden SIS	France NF	Germany DIN	UK BS	USA AA	ISO	Italy UNI
17310	4103	6060	AlMgSi0.5 F22	6063	6060	Al-MgSi	9006-1

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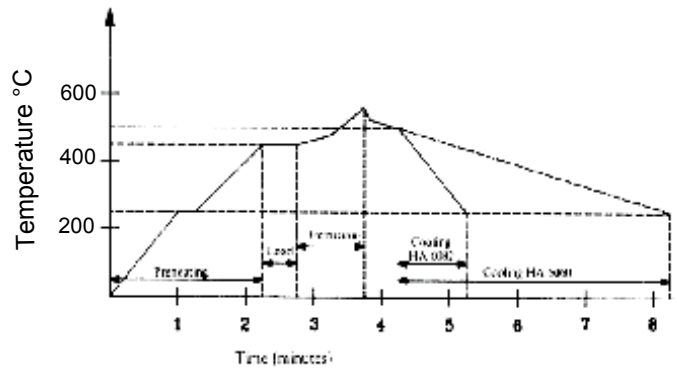
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EXTRUSION

Preheating

The preheating temperature should preferably be as low as possible to obtain the best possible speed in extrusion, but high enough to secure a good material flow and the necessary solution temperature. A too long stay at elevated temperature (e.g. in connection with a stop on the press) may destroy the optimized microstructure of the ingot and give reduced extrudability and mechanical properties.

Sketch of temperature elapse during extrusion



Flow

The material flow will depend upon:

- Friction against the container (container temperature)
- Deformation resistance (Mg and Si in solid solution)
- Surface of the container liner
- Lubrication of the dummy block
- Temperature difference between front and back end of the ingot (taper)

Cooling

To obtain maximum strength the exit temperature must be above the solution temperature for Mg_2Si , and the cooling fast enough to depress precipitation. For this alloy this means that cooling with forced air is usually satisfactory on open profiles with a thickness up to 10 mm. Normally the rear end of the run out length obtains the slowest cooling (=lowest strength).

Recommended production parameters for an open section:

Preheating temp. (°C)	Taper (°C)	Container temp. (°C)	Minimum exit temp. (°C)	Typical extrusion speed (m/min)	Maximum recommended cooling time from 500 to 250 °C
430-470	50-90	400	480	40	4 min.

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HEAT TREATMENT

The mechanical properties of the alloy after artificial ageing at different temperatures are given in the curves below. The data are recorded on extruded sections, which have been solution treated at 540 °C (20 minutes), water quenched and stored 4 hours before

