

Material Data Sheet

Aluminium alloy

 Materials Services
 Technology, Innovation
 & Sustainability

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Material designation:

EN-Material No.

DIN-Material No.

EN AW-6061
[EN AW-Al Mg1SiCu]
3.3211

Scope

This data sheet applies to hot and cold-rolled sheets, strips and plates, cold drawn and extruded rod/bar, tubes and profiles made of aluminium-silicon alloy EN AW-6061.

Application

Under the heat treatable aluminium alloys the material EN AW-6061 shows medium mechanical properties and a good atmospheric and seawater corrosion resistance. The material is good weldable and is used for example in architecture and in automotive and railway industry.

The alloy EN AW-6061 is heat treatable and not suitable for decorative anodizing.

Chemical composition in %

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al
0.40–0.8	≤ 0.70	0.10–0.40	≤ 0.15	0.8–1.2	0.04–0.35	≤ 0.25	≤ 0.15	Rest

 Others^{a)}: Each: max. 0.05 %

 Total^{b)}: max. 0.15 %

^{a)} „Others“ includes listed elements for which no specific limit is shown as well as unlisted metallic elements. The producer may analyze samples for trace elements not specified in the registration or specification. However, such analysis is not required and may not cover all metallic „Other“ elements. Should any analysis by the producer or the purchaser establish that an „Others“ element exceeds the limit of „Each“ or that the aggregate of several „Others“ elements exceeds the limit of „Total“, the material shall be considered non-conforming.

^{b)} The sum of those „Others“ metallic elements 0.010 % or more each, expressed to the second decimal place before determining the sum.

Mechanical properties at room temperature (cold drawn rod/bar and tube)

Temper	Dimensions			Yield strength R _{p0,2} [N/mm ²]	Tensile strength R _m [N/mm ²]	Elongation		Hardness ¹⁾ HBW
	D ^{a)} [mm]	S ^{b)} [mm]	t ^{c)} [mm]			A [%]	A ₅₀ [%]	
O, H111	≤ 80	≤ 80	≤ 20	≤ 110	≤ 150	≥ 16	≥ 14	30
T4	≤ 80	≤ 80	≤ 20	≥ 110	≥ 205	≥ 16	≥ 14	65
T6	≤ 80	≤ 80	≤ 20	≥ 240	≥ 290	≥ 10	≥ 8	95

Mechanical properties at room temperature (sheet, strip and plate)

Temper	Nominal thickness [mm]	Yield strength $R_{p0,2}$ [N/mm ²]	Tensile strength R_m [N/mm ²]	Elongation		Hardness ¹⁾ HBW
				A_{50} [%]	A [%]	
O	≥ 0.4–1.5	≤ 85	≤ 150	≥ 14	-	40
	> 1.5–3.0	≤ 85	≤ 150	≥ 16	-	
	> 3.0–6.0	≤ 85	≤ 150	≥ 19	-	
	> 6.0–12.5	≤ 85	≤ 150	≥ 16	-	
	> 12.5–25.0	-	≤ 155	-	≥ 16	
T4	≥ 0.4–1.5	≥ 110	≥ 205	≥ 12	-	58
	> 1.5–3.0	≥ 110	≥ 205	≥ 14	-	
	> 3.0–6.0	≥ 110	≥ 205	≥ 16	-	
	> 6.0–12.5	≥ 110	≥ 205	≥ 18	-	
T451	≥ 0.4–1.5	≥ 110	≥ 205	≥ 12	-	58
	> 1.5–3.0	≥ 110	≥ 205	≥ 14	-	
	> 3.0–6.0	≥ 110	≥ 205	≥ 16	-	
	> 6.0–12.5	≥ 110	≥ 205	≥ 18	-	
	> 12.5–40.0	≥ 110	≥ 205	-	≥ 15	
	> 40.0–80.0	≥ 110	≥ 205	-	≥ 14	
T42	≥ 0.4–1.5	≥ 95	≥ 205	≥ 12	-	57
	> 1.5–3.0	≥ 95	≥ 205	≥ 14	-	
	> 3.0–6.0	≥ 95	≥ 205	≥ 16	-	
	> 6.0–12.5	≥ 95	≥ 205	≥ 18	-	
	> 12.5–40.0	≥ 95	≥ 205	-	≥ 15	
	> 40.0–80.0	≥ 95	≥ 205	-	≥ 14	
T6/T62/T651	≥ 0.4–1.5	≥ 240	≥ 290	≥ 6	-	88
	> 1.5–3.0	≥ 240	≥ 290	≥ 7	-	
	> 3.0–6.0	≥ 240	≥ 290	≥ 10	-	
	> 6.0–12.5	≥ 240	≥ 290	≥ 9	-	
	> 12.5–40.0	≥ 240	≥ 290	-	≥ 8	
	> 40.0–80.0	≥ 240	≥ 290	-	≥ 6	
	> 80.0–100.0	≥ 240	≥ 290	-	≥ 5	
	> 100.0–150.0	≥ 240	≥ 275	-	≥ 5	84
	> 150.0–250.0	≥ 230	≥ 265	-	≥ 4	81
	> 250.0–350.0	≥ 220	≥ 260	-	≥ 4	80
	> 350.0–400.0	≥ 220	≥ 260	-	≥ 2	80

Mechanical properties at room temperature (extruded rod/bar and tube)

Temper	Dimensions			Yield strength $R_{p0,2}$ [N/mm ²]	Tensile strength R_m [N/mm ²]	Elongation		Hardness ¹⁾ HBW
	D ^{a)} [mm]	S ^{b)} [mm]	t ^{c)} [mm]			A [%]	A ₅₀ [%]	
O/H111	≤ 200	≤ 200	≤ 25	≤ 110	≤ 150	≥ 16	≥ 14	30
T4	≤ 200	≤ 200	≤ 25	≥ 110	≥ 180	≥ 15	≥ 13	65
T6	≤ 200 -	≤ 200 -	≤ 5 5 < t ≤ 25	≥ 240 ≥ 240	≥ 260 ≥ 260	≥ 8 ≥ 10	≥ 6 ≥ 8	95

Mechanical properties at room temperature (extruded profiles)

Temper	Wall thickness t [mm]	Yield strength $R_{p0,2}$ [N/mm ²]	Tensile strength R_m [N/mm ²]	Elongation		Hardness ¹⁾ HBW
				A [%]	A ₅₀ [%]	
T4	≤ 25	≥ 110	≥ 180	≥ 15	≥ 13	65
T6	≤ 5 5 < t ≤ 25	≥ 240 ≥ 240	≥ 260 ≥ 260	≥ 9 ≥ 10	≥ 7 ≥ 8	95

¹⁾ For information only

^{a)} D = Diameter for round bar

^{b)} S = Width across flats for square and hexagonal bar, thickness for rectangular bar

^{c)} t = Wall thickness for tubes

Reference data for some physical properties (for guidance only)

Density at 20 °C [kg/dm ³]	Electrical conductivity [MS/m]	Thermal conductivity [W/m·K]	Specific heat capacity [J/kg·K]	Young's modulus [MPa]	Shear modulus [MPa]
2.70	22–30	170–220	-	70000	26300

Mean linear thermal expansion coefficient [10⁻⁶ K⁻¹]

-50–20 °C	20–100 °C	20–200 °C	20–300 °C
-	23.0	-	-

Guidelines on the temperatures for hot forming and heat treatment

Annealing		
Temperature	Time to heat up	Cooling conditions
380–420 °C	1.0–2.0 h	≤ 30 °C/h to 250 °C, below 250 °C on air

Precipitation heat treatment			
Solution heat treatment	Quenching	Natural ageing	Artificial ageing
525–540 °C	Water, air	5–8 days	Temperature: 155–190 °C Time: 4–16 h

Processing/Welding

The material is good weldable with the conventional processes (MIG and TIG). As welding filler metal is AlMg5Mn [Al 5556A / Al 5556B], AlMg4.5Mn0.7 (A) [Al 5183 / Al 5183A] and AlSi5 [Al 4043] recommended. In annealed temper there may arise some difficulties during machining (for example ribbon or thread chips). The machinability improves with the grade of ageing.

Remark

According to EN 602 the use of the material is allowed for the contact with food.

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Important Note

Information given in this data sheet about the condition or usability of materials respectively products are no warranty for their properties, but act as a description.

The information, we give on for advice, comply to the experiences of the manufacturer as well as our own. We cannot give warranty for the results of processing and application of the products.



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