Alloy EN AW-6063 [Al Mg0,7Si]

Technical datasheet - Extruded products

Alloy 6063, historically one of the most popular alloys in the 6000 series, provides good strength, very good corrosion resistance and is suitable for decorative anodising. Increasingly replaced by alloy 6060 with equal strength but improved surface finish.

Used primarily for structures requiring good strength, good surface finish and good anodising response, such as profiles for windows, doors, entrance lots, ceilings and furniture. This is also a commonly used alloy for thermal applications such as heat sinks.

Typical Applications

- Architectural and building products
- Door and window frames
- Electrical components and conduit
- Heat sinks
- Railings and furniture
- Pipe and tube for irrigation systems
- Truck and trailer flooring
- Ladders

Chemical Composition[1]

Si		Fe		Cu		Mn		Mg		Cr		Zn		Ti		Pb		Bi	Sn	Others	
Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Max	Max	Each	Tot
0.20	0.60		0.35		0.10		0.10	0.45	0.90		0.10		0.10		0.10					0.05	0.15

[1] Chemical composition in weight-% according to EN-573-3:2013

Mechanical Properties[2,3]

Temper	Wall thickness t [mm]	$R_{p0,2}$ [MPa]	R_m [MPa]	A [%]	A_{50mm} [%]	HBW[c] TYPICAL VALUE	Vickers[c] TYPICAL VALUE	Webster[c] TYPICAL VALUE
T4[a]	t ≤ 25	65	130	14	12	50	56	9
T5	t ≤ 10	130	175	8	6	65	74	13
	10 < t ≤ 25	110	160	7	5	65	74	13
T6[a]	t ≤ 10	170	215	8	6	75	86	14
	10 < t ≤ 25	160	195	8	6	75	86	14
T64[a b]	t ≤ 15	120	180	12	10	65	74	13
T66[a]	t ≤ 10	200	245	8	6	80	92	15
	10 < t ≤ 25	180	225	8	6	80	92	15

[2] Properties according to EN 755-2:2016 for extruded profile, minimum values unless else specified

[3] If a profile cross section comprises different thickness which fall in more than one set of specified mechanical property values, the lowest specified value shall be considered as valid for the whole profile section

[a] Properties may be obtained by press quenching

[b] Bending quality

[c] Brinell hardness values for information only. Vickers and Webster converted from Brinell value and should be considered approximate

Temper Designations[4]

T4	Solution heat treated and naturally aged
T5	Cooled from an elevated temperature shaping process and then artificially aged
T6	Solution heat treated and then artificially aged
T64	Solution heat treated and then artificially aged in underageing conditions (between T6 and T61) to improve formability
T66	Solution heat treated and then artificially aged – mechanical property level higher than T6 achieved through special control of the process

[4] Temper designations according to EN 515:1993

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Physical Properties[5]

Temper	Modulus of Elasticity [GPa]	Modulus of Rigidity [GPa]	Melting Range [°C]	Density [g/cm^3]	Thermal Conductivity [W/m·K]	Specific Heat Capacity [J/kg·K]	Electrical Resistivity [nΩm]	Coefficient of linear expansion [$10^{-6}K^{-1}$]
	69	26	615 - 655	2.70		901		23.5
T6					201		35	

[5] *Reference: MNC Handbok nr 12, version 2, SIS, 1989. Typical properties at room temperature 20°C*

Comparative Characteristics of Related Alloys[6]

Property	6060	6063	6005	6005A	6082
Tensile strength	1	2	3	3	4
Impact strength	2	2	1	3	4
Surface finish	5	4	3	3	2
Suitability for decorative anodizing	5	5	4	3	2
Corrosion resistance	5	5	4	4	4
Machinability	2	3	4	4	5
Coldforming	5	5	4	4	3
Weldability	5	5	5	5	4

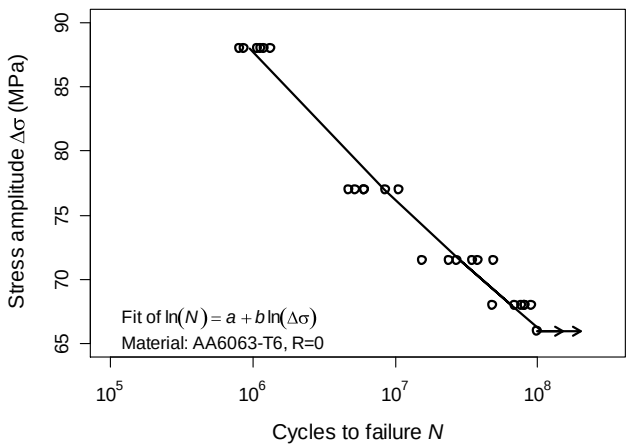
[6] *Relative grading, 5 = top grade*

Fatigue Properties

Example of fatigue properties for 6063 in temper T6. Provided for informational purposes only, not to be considered as guaranteed properties. Results are valid for the investigated specimens taken from a specific sample.

Tests performed at 20 ± 2 °C on 7 mm diameter cylindrical specimens parallel to the extrusion direction by Sapa Technology, Finspång, Sweden.

Axial testing, constant amplitude, sine wave loading at around 100 Hz test frequency. Load ratio (min. stress / max. stress) R = 0. Runouts after 10^8 cycles are indicated by the arrows.



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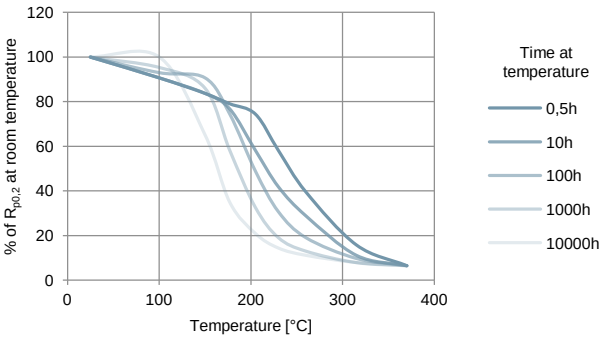
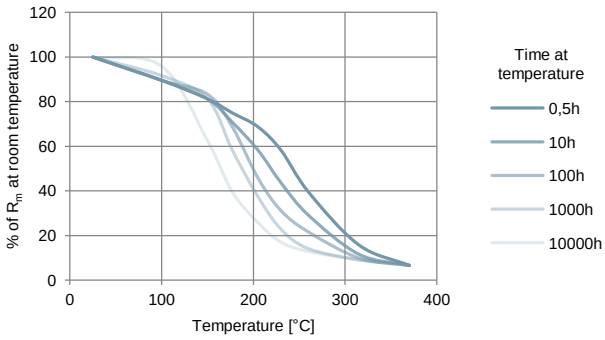
Tensile Data at Elevated Temperature[7]

Provided for informational purposes only, not to be considered as guaranteed properties.

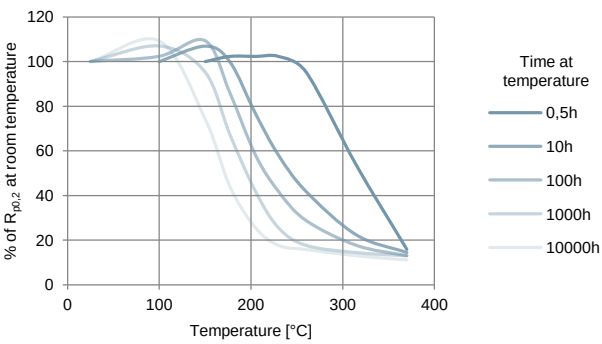
$R_{p0,2}$ at elevated temperature



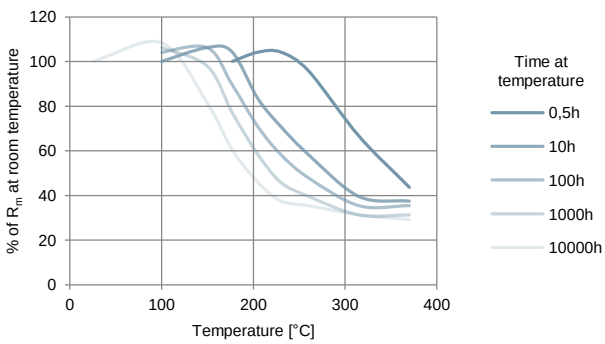
R_m at elevated temperature



$R_{p0,2}$ at room temperature after heating



R_m at room temperature after heating



[7] Reference: J. Kaufman, Properties of Aluminium alloys -tensile, creep, and fatigue data at high and low temperatures, pp 176, ASM 1999

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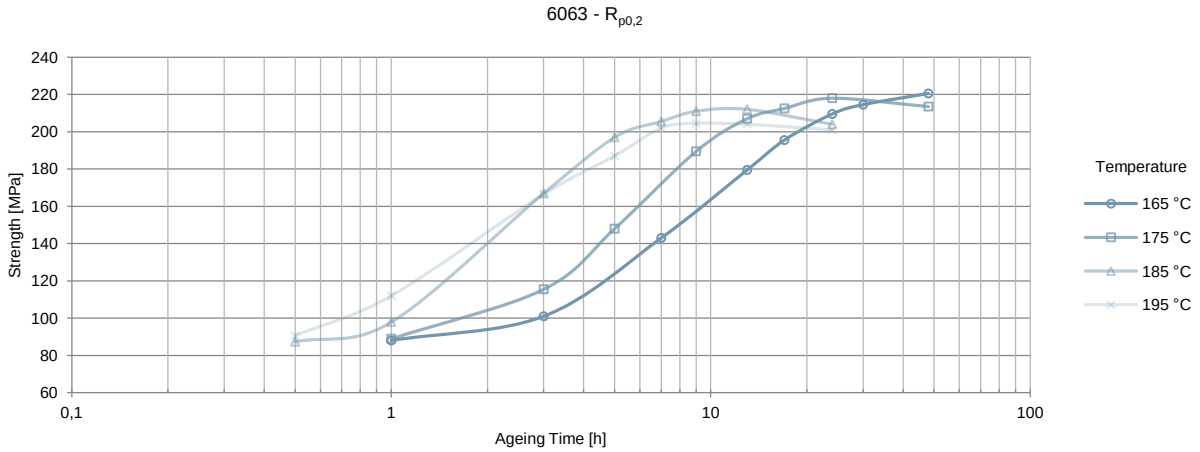
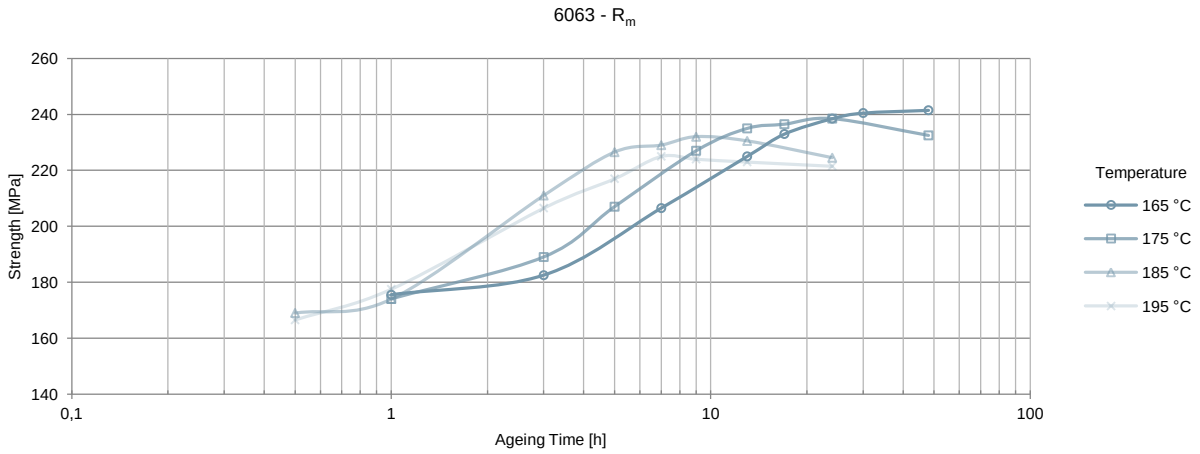
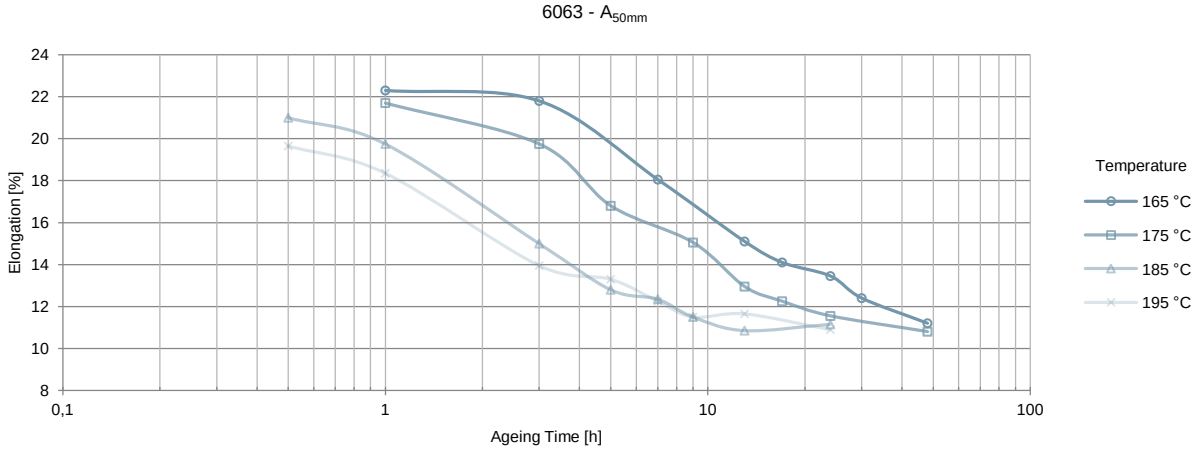
Heat Treatment Response[8]

Example of heat treatment response for alloy 6063.







[8] *Solid profile, 200 x 3mm, air quenched after extrusion, 24h natural ageing prior to artificial ageing, properties in extrusion direction*