Technical Data Sheet
Extrusion Ingot
Hydro 75R® - 696022

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Physical properties – typical values

Density		2,70-2,71	kg/dm³
Modulus		69	kN/mm²
Shear modulus		26	kN/mm²
Linear expansion coefficient	20-100°C	23	µ°C⁻¹
Thermal conductivity	20°C	180	W/(m•K)
Specific heat capacity	0-100°C	880-900	J/(kg•K)
Resistivity	20°C	38	nΩ•m
Conductivity	20°C	46	% IACS
Solidus temperature		600-655	°C

k = kilo (10^3)
µ = micro (10^{-6})
n = nano (10^{-9})

Mechanical properties

The alloy is designed for a tensile strength of minimum 215 MPa using Dual Rate Ageing practise (see specification below). Obtainable mechanical properties are in accordance with the following requirements for EN AW-6060 in EN 755-2:2016. Examples of mechanical properties for extruded profiles are given below.

Temper	Yield strength (MPa)	Tensile strength (MPa)	Uniform elongation Ag(%)*	Total elongation A5 (%)
Open and hollow profiles having wall thickness t ≤ 5 mm				
T4	60	120	11	16
T5	120	160	6	8
T6	150	190	6	8
T66	160	215	7	8

The mechanical properties vary with process conditions and with chemical composition within the minimum and maximum concentration limits of alloying elements.

* Uniform elongation is not specified in EN 755-2:2008

Chemical composition

%	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	OE	OT	Al
Min.	0.45	0.20	0.01	0.04	0.36					-	-	Balance
Max.	0.50	0.25	0.04	0.06	0.41	0.03	0.05	0.03	0.02	0.03	0.15	

Analysis is performed on Hydro Aluminium's spectrographs using Hydro Aluminium's selection of calibration standards. Analysis made on other instruments using other standards may show deviations.

OE = Others Each
OT = Others Total

Special properties

Formability	Good
Machinability	Moderate; best in T6 temper
Weldability	Suitable for all methods
Corrosion resistance	Good. See also section about corrosion resistance below
Surface treatment	Well suitable for all types of surface treatments
Anodizing	Adequate. Similar as other recycle friendly alloys within 6060 compositions

Extrusion

Preheating

The preheating temperature should be high enough to ensure good dissolution of Mg_2Si precipitates and at the same time low enough to obtain a high extrusion speed. An extended stay in the temperature range 350 ±50°C (e.g. gas furnaces in connection with a stop at the press) may destroy the optimised extrusion ingot microstructure and give reduced extrudability, surface quality and mechanical properties. These negative effects of long production stop can be counteracted by prolonged stay at temperatures above 490°C.

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
- Die design
- 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).

Extrudability

Extrudability is mainly determined by the Si and Mg content. This alloy will have a good extrudability that is similar to other 6060 alloys for the 215MPa strength class with comparable Mg+Si content.

Recommended production parameters based on experience and best practise for an open section

Preheating temp. (°C)	Taper (°C)	Container temp. (°C)	Typical exit temp. (°C)	Typical extrusion speed (m/min)	Maximum recommended cooling time from 500-250 °C
460-510	10-50	400-420	560-580	20-50	3-4 minutes

Heat treatment

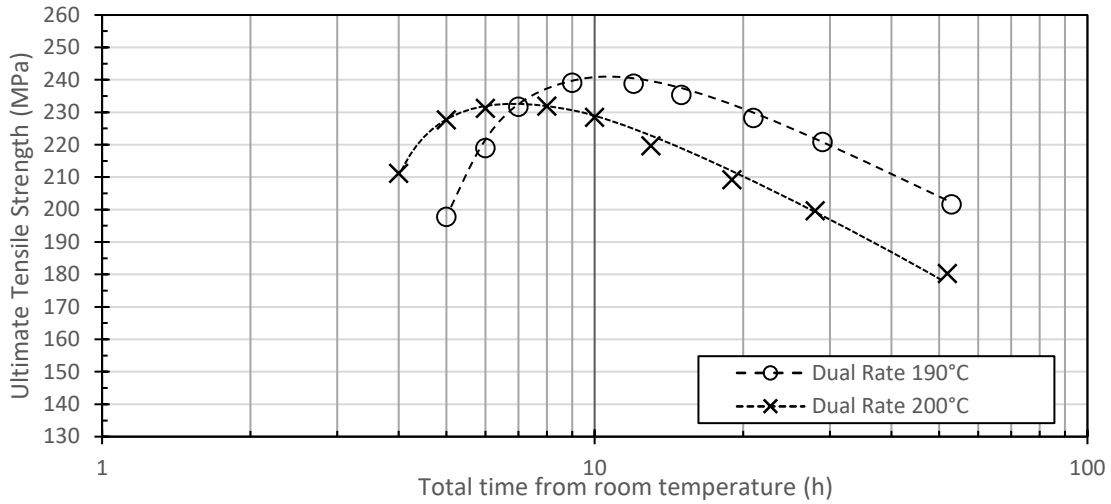
Recommended ageing cycles for material condition T66

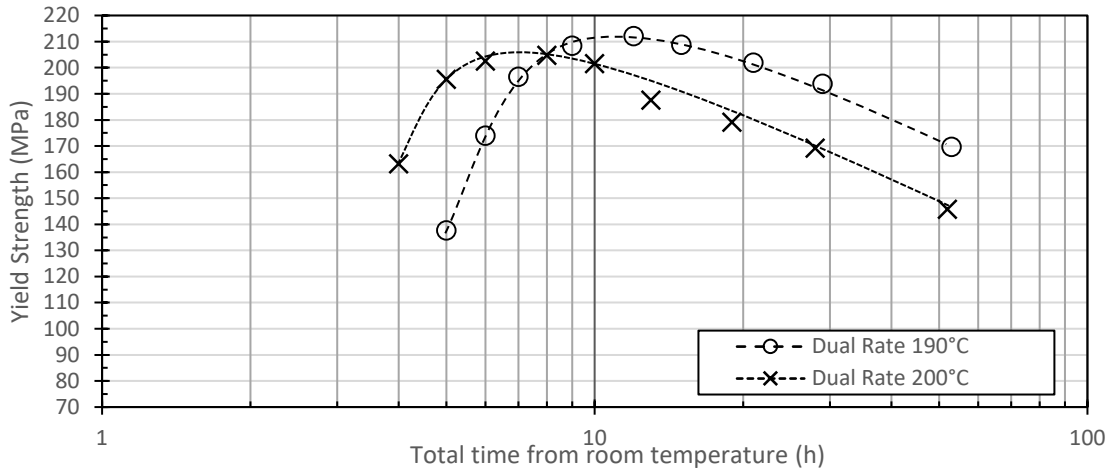
Desirable mechanical properties may be reached using aging procedures as given in table below

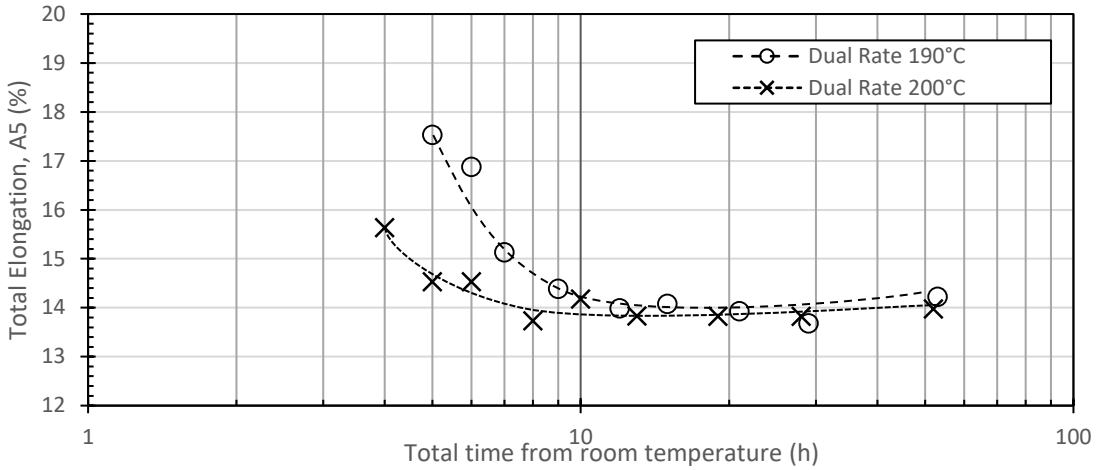
Temper	Standard ageing cycle	Heating from RT to 150°C (minutes)	Holding time at 150°C (minutes)	Heating rate from 150°C to final temp. (°C/h)	Time at final temperature 190°C (minutes)	Total time (hours)
T66	DR190	Rapid (~ 30)	~90	14	90	6,5
T66	DR200	Rapid (~ 30)	~30	17	60	5

Ageing curves

Ageing curves obtained for an alloy at the lower limit of the compositional window (i.e. min Si and min Mg) are shown below. Properties measured in tensile samples after dual-rate ageing with an initial stage of 3h at 150°C.







Corrosion resistance

Filiform corrosion (FFC) resistance is good, provided that the proper pre-treatment is applied. It is comparable to FFC resistance of other alloys with similar chemistry.

75% post-consumer scrap

This alloy is based on a minimum of 75% post-consumer scrap (End of Life scrap), the balance being a combination of process scrap, primary ingots, and alloying elements. Since the ingot is primarily based on post-consumer scrap it will have a very low carbon footprint. Considering all factors including raw materials and energy production, the carbon footprint is estimated to be maximum 2.3 kgCO2e./Kg Aluminium.