Alcoa Specialty Alloys:
C611 EZCast™

Optimized properties and savings through heat treatment avoidance

Aluminium megacastings is an emerging trend, reducing complexity and becoming widely accepted in the Automotive industry. C611 EZCast™ is a heat-treatment free alloy, which can be used in large die casting machines and complex automotive applications. C611 EZCast™ is suitable and proven for megacasting, enhancing manufacturing of single body pieces with gross weight up to 100 kg.

C611 EZCast™ has been long used in the Automotive industry. It achieves optimal mechanical properties and excellent die stick resistance without a dedicated heat treatment which saves cost, energy and time. Optimization and sustainability are the cornerstones behind this alloy. It is the result of several decades of development in the area of high-pressure die castings (HPDC), which initially yielded the alloys used for the all-aluminum space frame in the Audi A8 and the Ferrari 360 Modena.

Megacasting | Battery boxes | Shock towers and tunnels
Frame Nodes | Sub-frames | Engine cradles
Cross-members | Side doors | Radiator mounting | Engine mounts

Optimization and sustainability to reduce complexity

C611 is part of EZCast™ alloy family. It is a high-pressure die castings (HPDC) alloy that eliminates the need for a dedicated heat treatment, achieving optimal mechanical properties after the paint-bake of the car body.

- Eliminates dedicated heat treatment. Saves energy, cost, time and space and avoids part distortion.
- Very good fluidity, suitable for megacastings. Simplifies production process and improves operation efficiency.
- Excellent hot cracking resistance and lower solidification shrinkage tendency.
- Good fracture toughness, ideal for crash-resistant applications.

C611 EZCast™ Technical Data

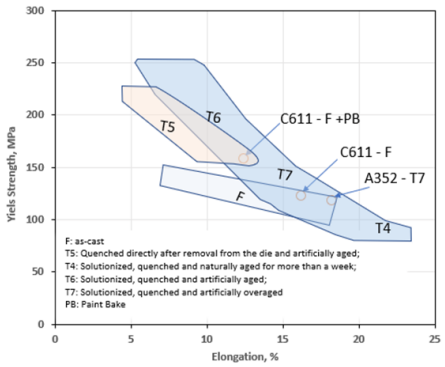
CHEMICAL COMPOSITION *(all in wt%. Single values indicate maximum content)

Si	Fe	Mn	Mg	Ti	Sr	Others Each	Others Total
6.0-9.0	<0.15	0.4-0.8	0.15-0.30	<0.10	0.01-0.03	<0.05	0.15

MECHANICAL PROPERTIES*

Alloy-Temper	Yield Strength (MPa)	UTS (MPa)	Elongation (%)	VDA Bending Angle, Degree
C611 - F	123	268	16.2	45
C611 - F+PB	159	276	12.4	36
A352 - T7	119	188	18.2	60

*The achievable mechanical properties are strongly dependent on the casting process used. The table and plot refer to typical properties obtained in thin-walled high-pressure vacuum die cast (HPDC) components.

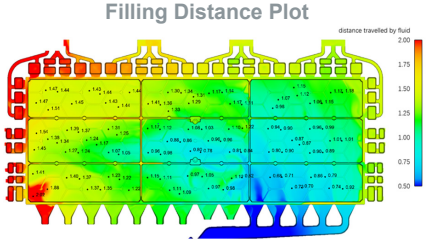


MECHANICAL PROPERTIES (as function of filling distance and actual components)

Filling distance (m)	Yield Strength (MPa)	UTS (MPa)	Elongation (%)
0.5-0.7	108	234	16.9
0.75-1.0	116	237	16.9
1.0-1.25	118	253	11.8
1.25-1.5	127	260	14.6

Component	Yield Strength (MPa)	UTS (MPa)	Elongation (%)
Shock Tower	117	268	14.1
Rear Floor #1	118	228	10
Rear Floor #2	132	241	11.8
Rear Floor #3	122	252	13.2

Filling Distance Plot



Rear Floor Megacasting

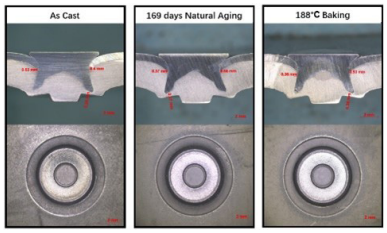
PHYSICAL PROPERTIES (TYPICAL VALUES)

Density (g/cm3)	Young's Modulus (GPa)	Coeff. Of Thermal Expansion (CTE) 20-300ºC (µm/m/K)	Thermal Conductivity [W/(mK)]	Solidification Range (ºC)
2.68	70-74	21.5	135-170	620-554

OTHER PROPERTIES

- Very good castability, excellent die sticking resistance, designed for HPDC.
- High elongation and bending angle.
- Outstanding rivetability and weldability.
- Very good corrosion resistance and machinability.

High quality joints between 3.0 mm C611 EZCast™ cast plate and 0.8 mm steel sheet



To know more about the full range of Alcoa special alloys applications, scan the QR Code.

You can also use the link in your Internet browser:
https://www.alcoa.com/global/en/what-we-do/aluminum/cast-products/foundry-aluminum-alloys.asp