trimal®-38

High pressure die cast alloy for maximum ductility

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The **trimal®-38** (AlSi8ZnMn) alloy was specially developed for high pressure die casting. It exhibits optimum ductility properties in the as-cast state when compared to conventional high pressure die cast alloys. This is evident in its extremely high strain rate and excellent formability. The **trimal®-38** material is particularly suitable for components that must withstand crash load conditions and self-piercing rivet properties. These include battery housings or structural components (e.g. for electric vehicles).

The **trimal®-38** alloy was developed for large die cast structural components with optimum formability and, simultaneously, excellent castability and demoldability. Despite a comparatively low silicon content of 7.5 to 8.5 percent, the alloy can be cast using the process parameters of the widespread **trimal®-37** (AlSi9Mn) alloy, thus facilitating a change of alloy. The targeted addition of further alloy elements optimizes its flowability, strength and die filling capacity. The adhesion tendency is minimized. Critical elements were not employed to ensure unrestricted international use. Targeted limitation of the magnesium content ensures that the material does not age and achieves its mechanical properties without additional heat treatment.

Chemical composition

The following table shows a reference analysis for the described material. Customer specifications may vary.

%	Si	Fe	Cu	Mn	Mg	Cr	Zn
Min.	7.5			0.3		0.1	0.2
Max.	8.5	0.15	0.05	0.6	0.01	0.2	0.8

%	Ti	Sr*	Zr	o.e.	o.t.	other
Min.	0.04	0.015	0.1			
Max.	0.15	0.025	0.3	0.05	0.2	Al

**A permanent refinement with strontium is common practice.*

Mechanical properties

The mechanical properties illustrated below were determined on structural components with a wall thickness of 2.5 to 3.0 mm in the flow paths. The parts are from serial high pressure die casting production, constitute reference values for the use of this alloy and may vary in individual application cases. Serial parameters of the smelting process, melt treatment and high pressure die casting of **trimal®-37** were used for production.

Mechanical properties of high pressure die cast structural components

Temper	Rp0.2 MPa	Rm MPa	A %	Hardness HB
F	110-125	250-270	9-13	36-42
T5	105-120	240-260	12-16	> 40

Elongation and the bending angle increase further relative to the wall thickness, so that bending angles exceeding 60° were achieved in test bars cast separately.

Self-piercing rivetability

Self-piercing rivetability is achieved in the as-cast state and was confirmed for conventional flat and annular dies with close to series joining parameters.

Summary

The high pressure die cast alloy **trimal®-38**:

> Has very high formability
> Does not require heat treatment
> Is intended for structural components involved in crashes
> Can be joined by welding and with self-piercing rivets
> Exhibits excellent resistance to corrosion

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