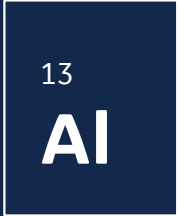




# AlSi7Mg

Aluminum alloy AlSi7Mg can be used for the production of lightweight components in the field of aerospace and industrial applications

Data in this document represents material built with 60 µm layer thickness and in an Argon atmosphere on an M2 / M2 Multilaser machine. Values listed are typical.

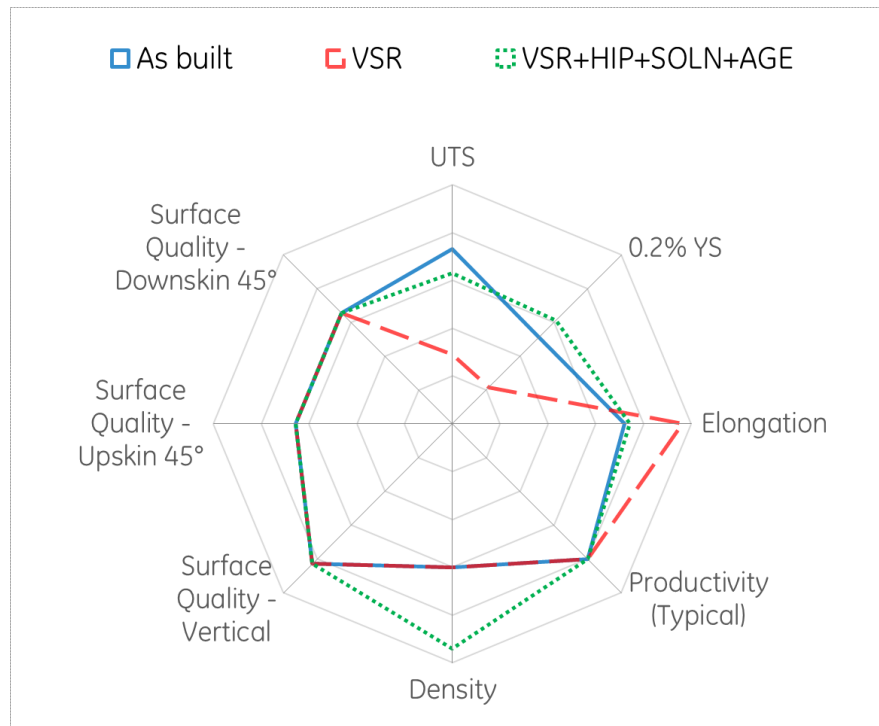


## POWDER CHEMISTRY

Element	Indicative value (wt%)
Si	6.5-7.5
Mg	0.40-0.70
Cu	0-0.20
Ti	0.04-0.20
Fe	0-0.10
Mn	0-0.10
Zn	0-0.10
Al	Balance

AlSi7Mg (powder) chemical composition et al. according to **AMS 4289**

## SPIDER PLOT



## BUILD DETAILS

- M2 / M2 Multilaser
- Argon Gas
- Steel blade/Rubber blade
- Layer thickness 60µm
- Build rate dual laser w/ coating \* [cm<sup>3</sup>/h]: 23.6
- Max. Build rate per Laser\*\* [cm<sup>3</sup>/h]: 39.3.

\*Measured by using Factory Acceptance Test layout  
\*\*Calculated (layer thickness x scan velocity x hatch distance)

## THERMAL STATES

1. AS BUILT
2. VACUUM STRESS RELIEF (VSR): 440°C, 1 hour in vacuum
3. VACUUM STRESS RELIEF+HOT ISOSTATIC PRESS.+SOLUTION.+AGE. (VSR+HIP+SOLN+AGE)  
VSR: 440°C, 1 hour in vacuum, HIP: 538°C, 8 hours at 100MPa, SOLN: 543°C, 8 hours, rapid quench, AGE: 160°C, 8 hours

## PHYSICAL DATA AT ROOM TEMPERATURE

	Surface Roughness - Overhang ( $\mu\text{m}$ )			Surface Roughness ( $\mu\text{m}$ )	
	45°	60°	75°	H	V
	Upskin	17	14	11	18
Downskin	17	11	9	11	

Thermal State	Porosity (% Density)		Hardness (HV10)		Poisson's Ratio	
	H	V	H	V	H	V
	As-Built	99.6	99.6	110	--	--
VSR	99.6	99.6	--	--	--	--
VSR+HIP+SOLN+AGE	99.94	99.94	--	--	0.352	--

### HORIZONTAL Thermal State

	Thermal Conductivity (W/m·K)	Coeff. Of Thermal Expansion (mm/mm/K)	Thermal Diffusivity (m <sup>2</sup> /s)	Specific Heat (J/K·kg)
As-Built	--	--	--	--
VSR	--	--	--	--
VSR+HIP+SOLN+AGE	154.0	$13.7 \times 10^{-6}$	$6.3 \times 10^{-5}$	917

### VERTICAL Thermal State

	Thermal Conductivity (W/m·K)	Coeff. Of Thermal Expansion (mm/mm/K)	Thermal Diffusivity (m <sup>2</sup> /s)	Specific Heat (J/K·kg)
As-Built	--	--	--	--
VSR	--	--	--	--
VSR+HIP+SOLN+AGE	154.0	$13.7 \times 10^{-6}$	$6.3 \times 10^{-5}$	917

## TENSILE DATA

Tensile testing done in accordance with ASTM E8 and ASTM E21

### Temperature: RT

Thermal State	Modulus of Elasticity (GPa)		0.2% YS (MPa)		UTS (MPa)		Elongation (%)		Reduction of Area (%)	
	H	V	H	V	H	V	H	V	H	V
As-Built	70	69	240	220	405	400	13.5	9.6	--	--
VSR	54	59	100	95	160	160	26.4	26.4	60	58
VSR+HIP+SOLN+AGE	75	75	270	280	345	350	11.7	13.2	20	25

### Temperature: 150°C

Thermal State	Modulus of Elasticity (GPa)		0.2% YS (MPa)		UTS (MPa)		Elongation (%)		Reduction of Area (%)	
	H	V	H	V	H	V	H	V	H	V
As-Built	--	--	--	--	--	--	--	--	--	--
VSR	49	34	105	100	125	115	34.5	32.3	73	71
VSR+HIP+SOLN+AGE	54	67	230	235	270	270	15.5	16.8	32	33

H: HORIZONTAL (XY) orientation  
V: VERTICAL (Z) orientation

\* All of the figures contained herein are approximate only. The figures provided are dependent on a number of factors, including but not limited to, process and machine parameters, and the approval is brand specific and/or application specific. The information provided on this material data sheet is illustrative only and cannot be relied on as binding.

## LOW CYCLE FATIGUE DATA (STRAIN-CONTROLLED)

LCF testing done in accordance with ASTM E606

R-Ratio: 0

Test Frequency: 0.5 Hz for 24 hrs; 9 Hz in load-control >24 hrs per ASTM E606

Temperature: 150°C

### AS-PRINTED SURFACE

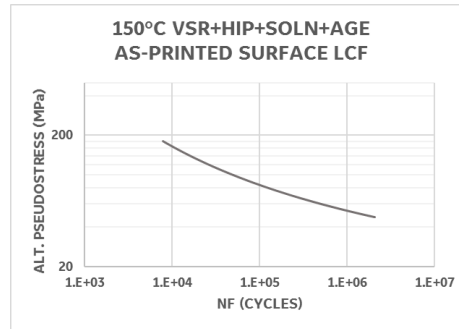
### MACHINED SURFACE

	Alt Stress at 1E5 cycles (MPa)		Alt Stress at 1E6 cycles (MPa)		Alt Stress at 1E5 cycles (MPa)		Alt Stress at 1E6 cycles (MPa)	
	H	V	H	V	H	V	H	V
VSR	--	--	--	--	--	--	--	--
VSR+HIP+SOLN+AGE	84	84	54	54	--	--	--	--

### Thermal State

VSR

VSR+HIP+SOLN+AGE



## HIGH CYCLE FATIGUE DATA (LOAD-CONTROLLED)

HCF testing done in accordance with ASTM E466

R-Ratio: 0

Test Frequency: 60 Hz

Temperature: 150°C

### AS-PRINTED SURFACE

### MACHINED SURFACE

Alt Stress at 1E7 cycles (MPa)

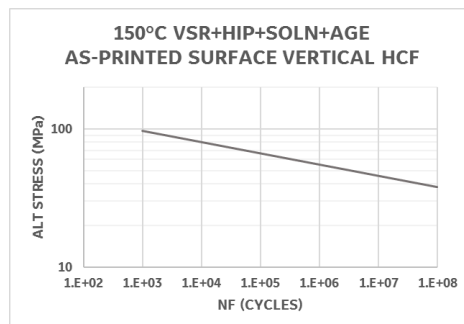
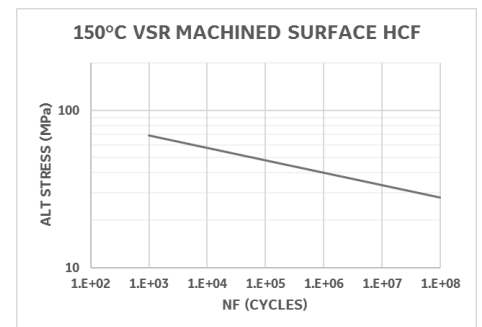
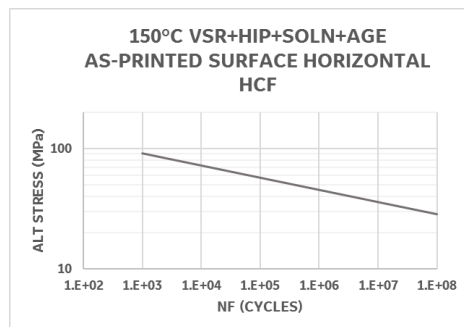
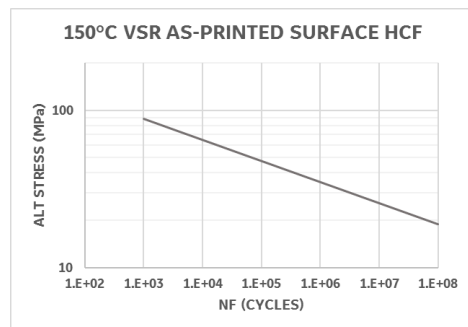
Alt Stress at 1E7 cycles (MPa)

### Thermal State

VSR

VSR+HIP+SOLN+AGE

	H	V	H	V
VSR	26	26	34	34
VSR+HIP+SOLN+AGE	36	46	--	--



H: HORIZONTAL (XY) orientation  
V: VERTICAL (Z) orientation

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