DISPAL® The Combination of Properties

Erbslöh Aluminium GmbH

DISPAL = low weight of Aluminum plus

+ ...high strength (R_m bis 750 MPa)
+ ...improved fracture toughness (K_{IC} up to max. 115 MPa •√m)
+ ...high temperature strength (Rm=280 MPa) at working temperature up to 300°C
+ ...high fatigue strength of 220 MPa by R=-1 and RT (180 MPa/ at T=150°C)
+ ...improved stiffnes (youngs modulus up to 115 GPa)
+ ...brilliant wear behaviour (Hard Coat not necessary)
+ ...adjustable coefficient of thermal expansion α =14 •10^{-6}/K (~Steel) till α = 23 •10^{-6}/K (~Aluminum/Magnesia)
+ ...good thermal conductivity 90 - 160 W/m/K
+ ...good forging and machinable

DISPAL® Alloy Overview

Erbslöh Aluminium GmbH

DISPAL®	Conventional Alloys	Applications	Specific Characteristics
S220 F	Aluminium, Copper	Crankcase Linear Technology, Housings for Electrotechnologies	Low Thermal Expansion (Comparable with Steel)
S225 F	Aluminium, Titanium, Steel	Housings for Optical Industry, Measurement Technology	Low Thermal Expansion (Comparable with Steel)
S232 T6X	Bronze/ Sinterstahl/ Stahl	Oil Pump Gears, Spool, Connecting Rods	Wear Resistant High Strength (T<170°C)
S236 T6	Grey Cast Iron, Steel	Bearing Caps	Low Thermal Expansion, High Strength
S250 F	Aluminium, Titanium, Steel	Supporting Plates, Construction Elements, Stiffeners	Highly Heat Resisting up to 350°C
S256 F	Grey Cast Iron, Steel	Bearing Caps	Low Thermal Expansion, High Strength
S260 F	Alusil, Grey Cast Iron, Steel	Liners, Pumphousings, Bushings	Wear Resistant, Heat Conductive
S270 F	Steel, Titanium	Pistons, Inlet Valves, Brake Caliper	Wear Resistant, Heat Conductive

DISPAL®- Mechanical Properties (Ø30 mm)

Erbslöh Aluminium GmbH

DISPAL®	UTS (MPa)	Yield Strength (MPa)	Elongation A5 (%)	Hardness HV30	$\alpha_{20\text{-}100°C}$ (10-6 /K)	Young's Modulus (GPa)	Density (g/cm³)	Fatique Strength (RT; MPa)
S220 F	165	95	2,5	65	15,1	85	2,54	
S225 F	218	128	1,0	85	15,1	86	2,58	
S250 F	334	205	2,7	105	16,9	95	2,78	

Physical properties depend on geometry and production process. All mechanical properties are minuinmal values taken from specimen Ø 30 mm and for all other geomtries only for reference. Fatigue (bending) RT , R=-1 for P=50% at 5x10^7 cycles.

DISPAL®- Mechanical Properties (Ø30 mm)

Erbslöh Aluminium GmbH

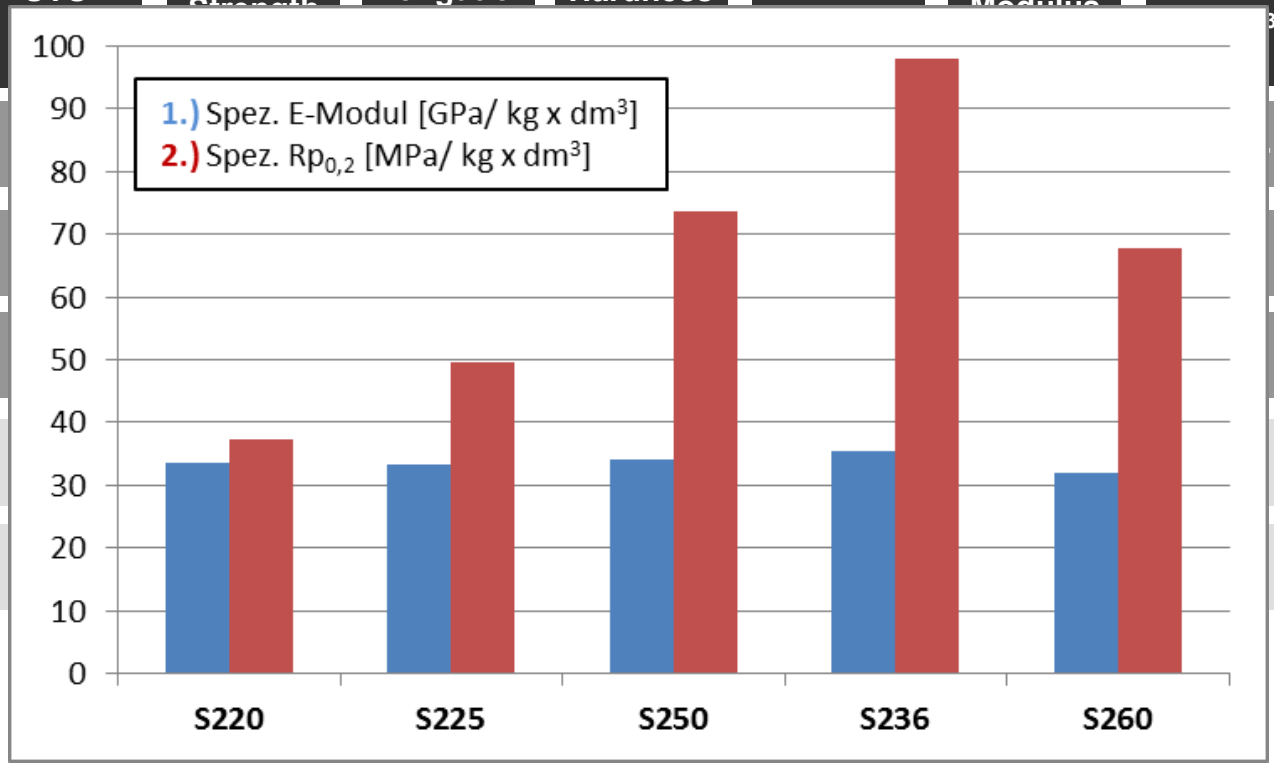
DISPAL®	UTS (MPa)	Yield Strength (MPa)	Elongation A5 (%)	Hardness HV30	$\alpha_{20\text{-}100°C}$ (10-6 /K)	Young's Modulus (GPa)	Density (g/cm³)	Fatique Strength (RT; MPa)
S220 F	165	95	2,5	65	15,1	85	2,54	
S225 F	218	128	1,0	85	15,1	86	2,58	
S250 F	334	205	2,7	105	16,9	95	2,78	
S236 F	424	277	1,2	153	16	100	2,83	
S260 F	265	180	1,0	110	17,2	85	2,66	

Physical properties depend on geometry and production process. All mechanical properties are minuinmal values taken from specimen Ø 30 mm and for all other geomtries only for reference. Fatigue (bending) RT , R=-1 for P=50% at 5x10^7 cycles.

DISPAL®- Mechanical Properties (Ø30 mm)

Erbslöh Aluminium GmbH

DISPAL®	UTS	Yield Strength	Elongation	Hardness	$\alpha_{20\text{-}100°C}$	Young's Modulus	Density (^{3})	Fatique Strength (RT; MPa)
S220 F								
S225 F								
S250 F								
S236 F								
S260 F								

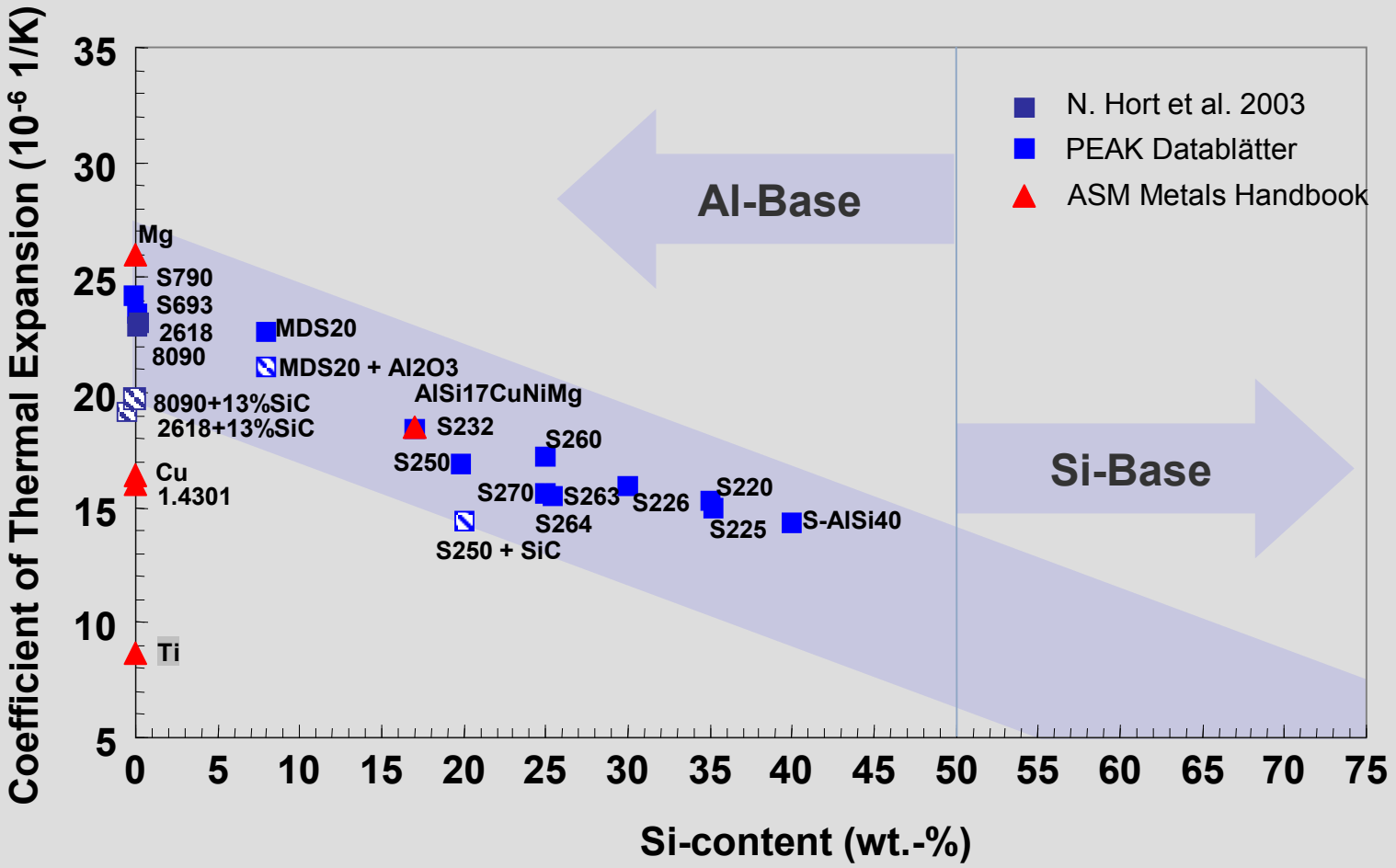


Physical properties depend on geometry and production process. All mechanical properties are minuinmal values taken from specimen Ø 30 mm and for all other geomtries only for reference. Fatigue (bending) RT , R=-1 for P=50% at 5x10^7 cycles.

Low Expansion

Properties – Thermal Expansion

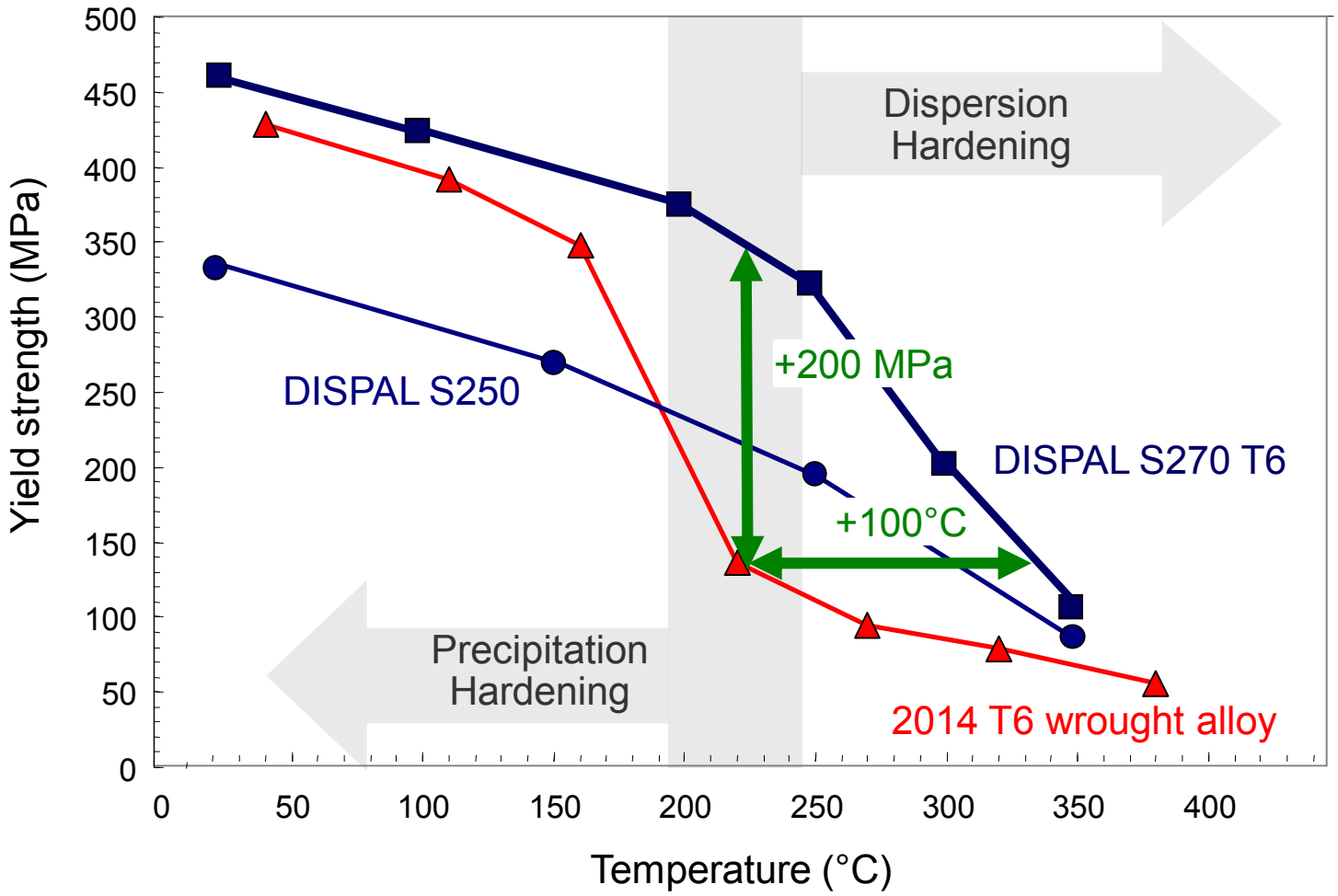
Reduced CTE due to Silicon and Dispersoides



Hot strength

Hot strength

Properties improvement at elevated temperatures by dispersoids

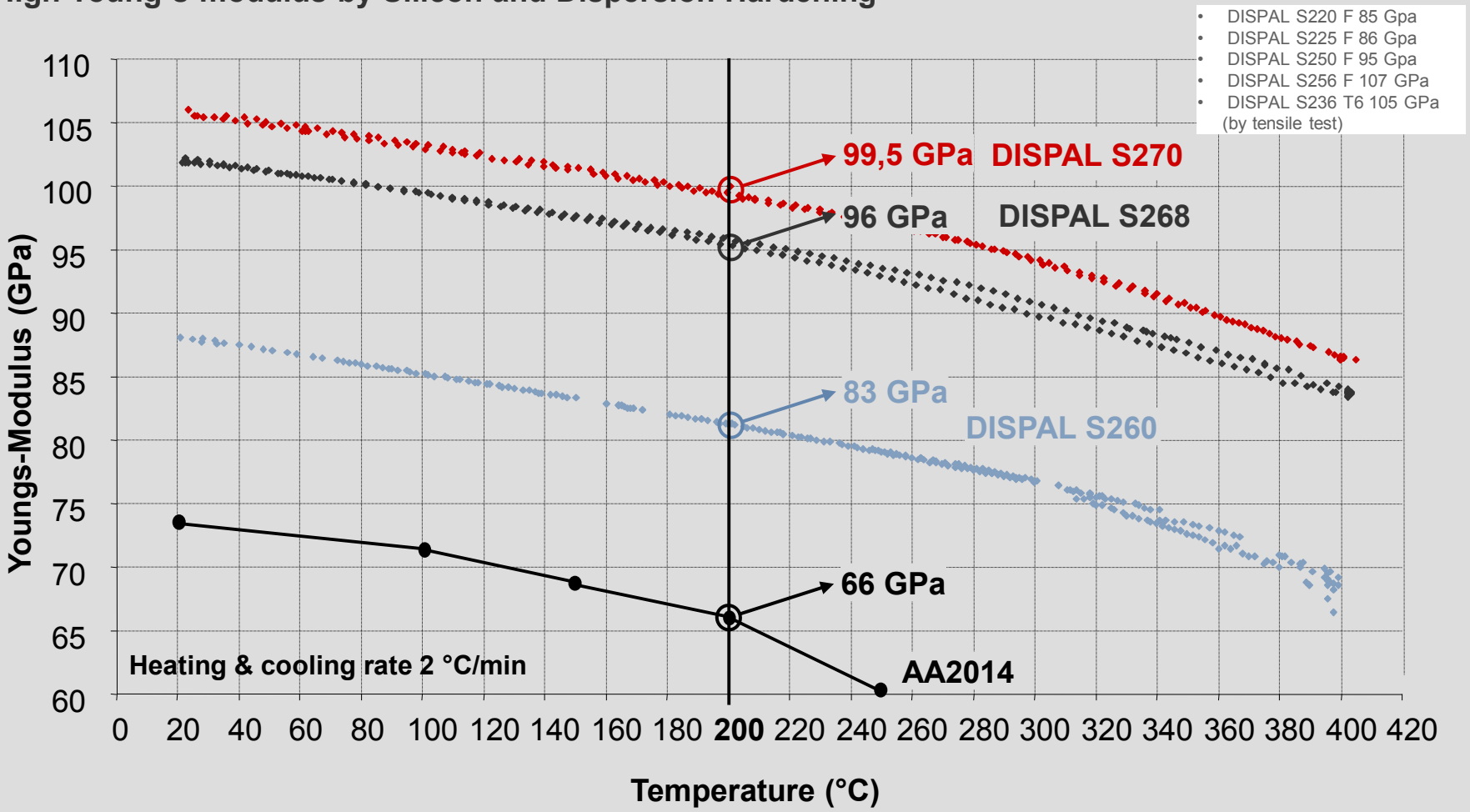


High Stiffness

DISPAL®

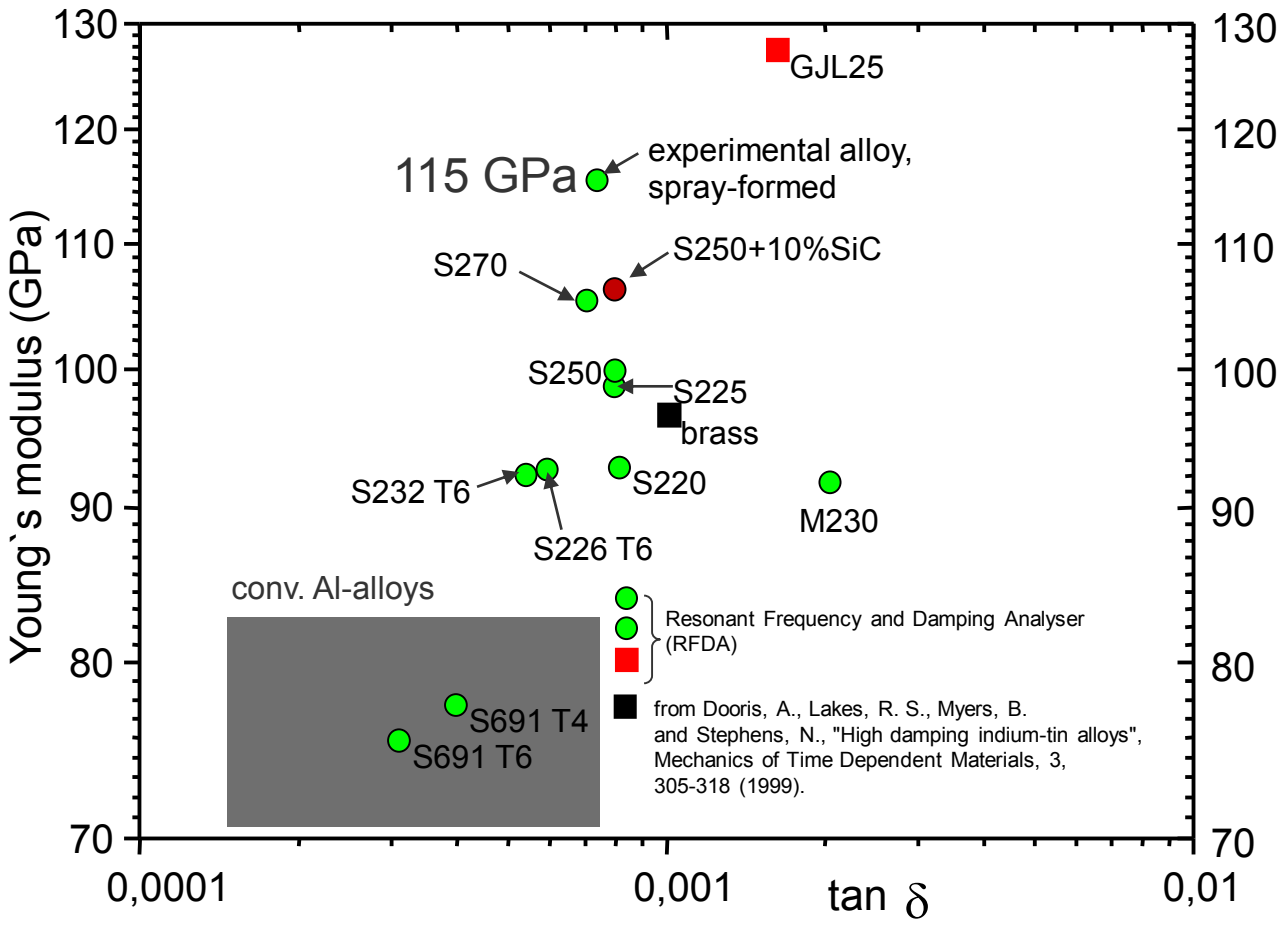
High Stiffness

High Young´s modulus by Silicon and Dispersion Hardening

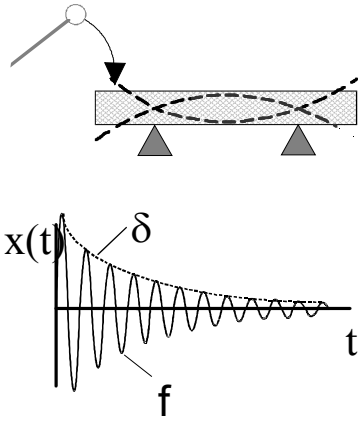


High Stiffness

Young's modulus and damping behaviour



= DISPAL



ASTM E-1876
ASTM C-1259

Krug et al. 2004

DISPAL® - materials

Erbslöh Aluminium GmbH

	Rm (MPa)	Rp0,2 (MPa)	A5 (%)	HV30	α (10-6 /K)	Young's modulus (GPa)	density (g/cm³)
S220 F	165	95	2,5	65	15-16	85	2,6
S225 F	218	128	1,0	85	14-15	86	2,6
S232 T6X	470	405	1,0	170	18-19	88	2,8
S250 F	334	205	2,7	105	16-17	95	2,8
S693 T6	491	429	9,2	144	23	71	2,8

The physical and mechanical properties depend on geometry and the production process.
All mechanical properties are minimal values (average minus 3 Sigma) taken from specimen Ø30mm and for all other geometries only for reference.

30mm

DISPAL® Alloy Range Optimized for Performance

Erbslöh Aluminium GmbH

S220	AlSi35	**Lowest Density**
S225	AlSi35Fe2Ni	**Lowest Thermal Expansion**
S232	AlSi17Fe4Cu3Mg	**Strength , Fatigue and Wear Resistance**
S250	AlSi20Fe5Ni2	**High Temperature Strength**
S260	AlSi25Cu4Mg	**Wear Resistance**
S270	AlSi25Fe4Ni3CuMgMnCrTi	**Highest Strength and Stiffness - High Temp.**