

Material Data Sheet for Sintered Alumina Toughened Zirconia

1. Material

FCT Denotation	ZO-AT
Material Description	Sintered Alumina Toughened Zirconia

2. General Properties

Chemical Composition	ZrO ₂ (wt.-%)	> 74
	Al ₂ O ₃ (wt.-%)	20
	Y ₂ O ₃ (wt.-%)	< 6

Bulk Density	ρ	[1]	(g/cm ³)	$\geq 5,5$
Residual Porosity			(%)	< 1
Open Porosity			(%)	0
Grain Size (Longitudinal Direction)			(μm)	< 4

3. Mechanical Properties

Hardness (HV10)		[3]	(GPa)	15.0
Compressive Strength			(MPa)	> 2800
Bending Strength	σ (20 °C)	[2]	(MPa)	> 1200
	(1000 °C)		(MPa)	400
Weibull-Modulus	m			10
Fracture Toughness	K_{Ic}	[4]	(MPa ^{1/2})	8
Youngs Modulus	E		(GPa)	240
Poisson Ratio	ν			0.28

4. Thermal Properties

Max. Working Temperature				
- Inert Atmosphere			(°C)	800
- Air			(°C)	800
Thermal Conductivity	λ (20°C)		(W/mK)	5
Coeff. of Thermal Expansion	α RT-1000°C		(10 ⁻⁶ K ⁻¹)	9.0
Coeff. of Thermal Expansion	α RT $\pm$ 20°C		(10 ⁻⁶ K ⁻¹)	7
Thermal Shock Parameter	R_1	[5]	(K)	320
Thermal Shock Parameter	R_2	[6]	(W/m)	1600

[1] Determination of density and porosity according to DIN 623-2

[2] Average value of 4-point bending strength at room temperature according to DIN EN 843-1

[3] Hardness according to DIN EN 843-4

[4] Calculated from crack length derived from Vickers hardness indentation, according to Niihara $R_1 = \frac{\sigma(1-\nu)}{E\alpha}$

[5] Critical temperature difference for an infinite high heat transfer (quenching)

[6] Thermal shock coefficient at finite constant heat transfer (slowly heating) $R_2 = \frac{\sigma(1-\nu)}{E\alpha} \lambda$

The material characteristics listed above are measured at testing samples. They cannot be transferred to components with different size, shape or surface properties. We reserve the right to alter properties within the scope of technical progress or new developments.