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**Innovative Ceramic  
Materials**

# Mechanical and physical properties of FRIALIT®-DEGUSSIT® Engineering Ceramics in comparison with hard metal and stainless steel.

Material	Aluminium oxide $Al_2O_3$		Zirconium oxide $ZrO_2$			Silicon carbide SiC	Silicon nitride $Si_3N_4$	Tungsten carbide	Stainless steel
FRIALIT®-DEGUSSIT®	F 99,7	FZT	FZM	FZY	FZM/K	SiC 198	HP 79	Wc/Co	
<b>Material structure properties:</b>									
Density (g/cm <sup>3</sup> )	3,9–3,95	4,1–4,15	5,7–5,8	5,5–5,8	6,0–6,1	3,1	3,2	15,0	7,9
<b>Mechanical properties:</b>									
Hardness (Knoop) (N/mm <sup>2</sup> ) (MPa)	23 000	23 000	17 000	17 000	17 000	21 000	17 000	14 000	2 000
Compressive strength (N/mm <sup>2</sup> ) (MPa)	3 500	3 000	2 000	2 000	2 200	1 200	3 000	5 000	200–490(δ)
Bending strength (N/mm <sup>2</sup> ) (MPa)	350	450	500	350	800	350	750	2 500	200–490(δ)
E-modulus E (GPa)	380	360	200	165	200	330	320	600	200
<b>Thermal properties:</b>									
Max operating temperature (°C)	1 950	1 700	900	1500	1 200	1 400	1 400	ca 200	ca 375
Specific heat 20 °C (J/kgK)	900	850	400	400	400	900	800	ca 500	ca 500
Thermal conductivity 100 °C (W/mK)	30	25	2,5	2,5	2,5	90	40	95	15
Coefficient of expansion 20–1000 °C (10 <sup>-6</sup> /K)	8,5	9	10	10,5	11	4,4	3,2	5,0	16,8
<b>Electrical properties:</b>									
Specific resistance 20 °C Ωcm	10 <sup>15</sup>	—	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>-1</sup>	10 <sup>14</sup>	—	—
Specific resistance 500 °C Ωcm	10 <sup>11</sup>	—	10 <sup>4</sup>	5 · 10 <sup>3</sup>	10 <sup>2</sup>	—	—	—	—
Specific resistance 1000 °C Ωcm	10 <sup>7</sup>	—	—	5 · 10 <sup>1</sup>	—	—	—	—	—
<b>Colour:</b>	White	White	Yellow	White	White	Black	Black		

All data refer to a temperature of 20 °C if nothing else is specified