METOXIT
high tech ceramics

High-pressure pistons
made of technical ceramics

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Application: Economic conveyance of liquid, abrasive and highly viscous substances, **exposure up to 6.000 bar possible!**

Pistons made from our oxide ceramic materials Al998, Al999-HIP, ZTA, ATZ-HIP, TZP-A and PSZ are used for pumping highly viscous to liquid media. Long service life, even under extreme pressures, are achieved by the optimal wear resistance and good sliding properties.

When exposed to aggressive chemical attack in combination with high dynamic loads, we recommend our HIPed materials (HIP = hot isostatic postcompacted). Especially the extremely increased fatigue resistance prolongs the service life even in difficult applications.
For each application we offer suitable materials in the required dimensions.

Materials:
Alumina:
Al998, Al999-HIP and ZTA
Zirconia:
TZP-A, ATZ-HIP, PSZ

Fields of applications:
- **High-pressure cleaning of buildings, tanks, ships, etc.**
- **Flushing and cooling**
- **Waterjet cutting systems**
- **Oil and gas conveyance**
- **Fresh water generation (reverse osmosis)**

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The Swiss Spirit of Innovation

SWISS MADE

Proven millions of times!
If only the best is good enough

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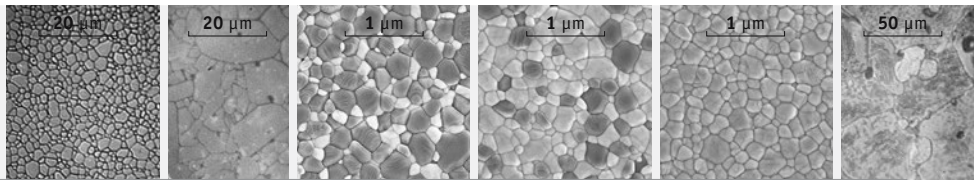
Oxide ceramics



Designation		Al999-HIP	Al998	ZTA	ATZ-HIP	TZP-A	PSZ
Components		Al_2O_3	Al_2O_3	$Al_2O_3/ZrO_2/Y_2O_3$	$ZrO_2/Al_2O_3/Y_2O_3$	$ZrO_2/Y_2O_3/Al_2O_3$	ZrO_2/MgO
Purity	%	99.9	99.8	75/23/2	76/20/4	95/5/0.25	96.5/3.5
Density	g/cm³	3.98	3.86	4.40	5.50	6.05	5.70
Open porosity	%	0	0	0	0	0	0
Grain size	µm	1.8	5	0.7	0.4	0.35	20
Hardness Vickers	Hv	2100	1900	1700	1400	1200	1500
Hardness Mohs		9	9	8.5	8	8	>8
Compressive strength	MPa	3800	2500	2300	2000	2000	2000
Flexural strength	MPa	500	350	900	2000	1200	500
Young's modulus	GPa	380	350	270	220	210	200
Fracture toughness K_{1c}	$MN/m^{3/2}$	4	3.5	5.3	8	8	10
Poisson ratio	-	0.24	0.24	0.26	0.30	0.31	0.23
Max. operating temperature	°C	1900	1900	1000	1000	1000	1000
Thermal expansion (20-1000°C)	10^{-6}/K	8.0	8.0	8.5	9	10	10
Thermal conductivity	W/mK	30	29	22	6	2.5	2
Specific heat	J/kg K	900	900	800	600	500	550
Dielectric strength	kV/mm	35	30	-	-	-	-
Electrical resistivity (20°C/1000°C)	Ω cm	$>10^{14}/10^{9}$	$>10^{14}/10^{9}$	-	-	-	-
Dielectric constant (100 MHz)	ε	9.6	9.6	-	-	-	-
Dielectric loss factor	tan	10^{-4}	10^{-4}	-	-	-	-
Shaping procedures:							
Isostatic pressing		✓	✓	✓	✓	✓	✓
Die pressing		✓	✓	✓	✓	✓	✓
HIP		✓		✓	✓	✓	
Suggested applications		Bioceramics, precision parts, spheres DIN ISO 6872:2009 Class 5	Pistons, plates precision parts, insulators	Bioceramics, precision parts, spheres, pistons DIN ISO 6872:2009 Class 5	Bioceramics, heavy-dutywear-resistant parts DIN ISO 6872:2009 Class 5	Bioceramics, precision parts DIN ISO 6872:2009 Class 5 DIN ISO 13356	Tubes, plates, precision parts

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