

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)

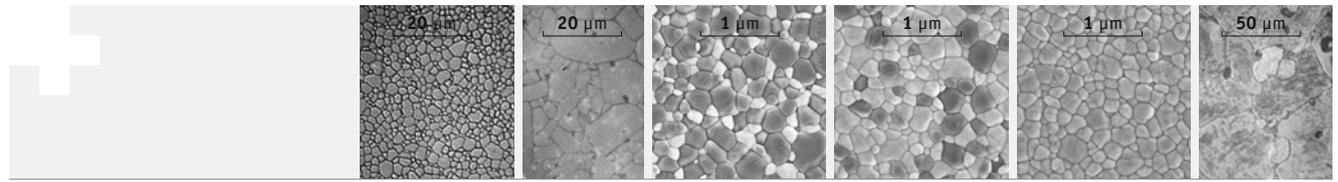
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The Swiss Pioneer of Dental Zirconia

SWISS MADE

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

Oxide ceramics



Designation		Al999-HIP	Al998	ZTA	ATZ-HIP	TZP-A	PSZ
Components		Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃ /ZrO ₂ /Y ₂ O ₃	ZrO ₂ /Al ₂ O ₃ /Y ₂ O ₃	ZrO ₂ /Y ₂ O ₃ /Al ₂ O 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/cm ³	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	-	-	-	-
dielektr. Verlustfaktor	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

All information and data correspond to the present state of our knowledge concerning properties and applications. They do not guarantee certain properties for products designed for specific applications utilizing material(s) described herein. We guarantee, however, first rate quality described in our terms of delivery.

Metoxit AG

Emdwiesenstrasse 6
CH-8240 Thayngen, Switzerland
phone +41 52 645 01 01
fax +41 52 645 01 00
www.metoxit.com
info@metoxit.com