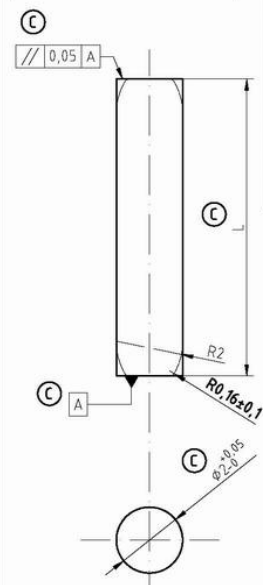


Ceramic Pins Alumina Al_2O_3 (80%)

Alumina (especially Al_2O_3 80%) is the most important oxide ceramic material and very important in our sales program.

Ceramic pins will be used at our applications for adjustment and fixation in thermostat production process.

ATTENTION:
Mind in particular
The integrity of the limbs

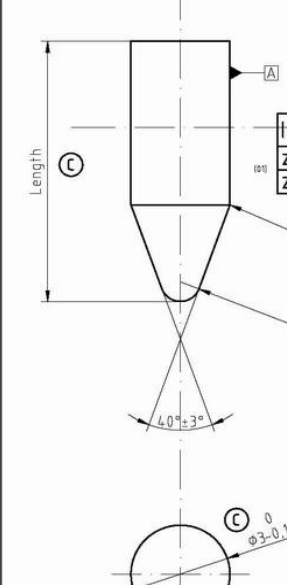


| Item | Length | Item | Length |
|------------------|-----------|------------------|-----------|
| ZZ-PIN D20 L0800 | 8,00±0,01 | ZZ-PIN D20 L0856 | 8,56±0,01 |
| ZZ-PIN D20 L0802 | 8,02±0,01 | ZZ-PIN D20 L0858 | 8,58±0,01 |
| ZZ-PIN D20 L0804 | 8,04±0,01 | ZZ-PIN D20 L0860 | 8,60±0,01 |
| ZZ-PIN D20 L0806 | 8,06±0,01 | ZZ-PIN D20 L0862 | 8,62±0,01 |
| ZZ-PIN D20 L0808 | 8,08±0,01 | ZZ-PIN D20 L0864 | 8,64±0,01 |
| ZZ-PIN D20 L0810 | 8,10±0,01 | ZZ-PIN D20 L0866 | 8,66±0,01 |
| ZZ-PIN D20 L0812 | 8,12±0,01 | ZZ-PIN D20 L0868 | 8,68±0,01 |
| ZZ-PIN D20 L0814 | 8,14±0,01 | ZZ-PIN D20 L0870 | 8,70±0,01 |
| ZZ-PIN D20 L0816 | 8,16±0,01 | ZZ-PIN D20 L0872 | 8,72±0,01 |
| ZZ-PIN D20 L0818 | 8,18±0,01 | ZZ-PIN D20 L0874 | 8,74±0,01 |
| ZZ-PIN D20 L0820 | 8,20±0,01 | ZZ-PIN D20 L0876 | 8,76±0,01 |
| ZZ-PIN D20 L0822 | 8,22±0,01 | ZZ-PIN D20 L0878 | 8,78±0,01 |
| ZZ-PIN D20 L0824 | 8,24±0,01 | ZZ-PIN D20 L0880 | 8,80±0,01 |
| ZZ-PIN D20 L0826 | 8,26±0,01 | ZZ-PIN D20 L0886 | 8,86±0,01 |
| ZZ-PIN D20 L0828 | 8,28±0,01 | ZZ-PIN D20 L0888 | 8,88±0,01 |
| ZZ-PIN D20 L0830 | 8,30±0,01 | ZZ-PIN D20 L0890 | 8,90±0,01 |
| | | ZZ-PIN D20 L0892 | 8,92±0,01 |
| | | ZZ-PIN D20 L0894 | 8,94±0,01 |
| | | ZZ-PIN D20 L0896 | 8,96±0,01 |
| | | ZZ-PIN D20 L0898 | 8,98±0,01 |
| | | ZZ-PIN D20 L0900 | 9,00±0,01 |
| | | ZZ-PIN D20 L0902 | 9,02±0,01 |
| | | ZZ-PIN D20 L0904 | 9,04±0,01 |
| | | ZZ-PIN D20 L0906 | 9,06±0,01 |
| | | ZZ-PIN D20 L0908 | 9,08±0,01 |
| | | ZZ-PIN D20 L0910 | 9,10±0,01 |
| | | ZZ-PIN D20 L0912 | 9,12±0,01 |

REMARK: Piece free from flashes and breakages

| | | | | | |
|----------------|--|----------------|--|---|--|
| Date: 14.02.03 | | Name: M. Seitz | | Bezeichnung/ Zeichnungs-Nr: ZZ-PIN D2 L9 - Code 60040 | |
| MK Mueller | | Maststab: 10:1 | | Position: Menge: Blatt: 1 | |

ATTENTION:
Please take care in particular
of the completeness of the end R0,6



| Item | Length | Quantity |
|---------------------|---------|----------|
| ZZ-C1-PIN D30 L0800 | 8,0±0,3 | |
| ZZ-C1-PIN D30 L0850 | 8,5±0,3 | |

REMARK: Piece free from flashes and breakages

| | | | | | |
|----------------|--|----------------|--|--|--|
| Date: 01.09.06 | | Name: M. Seitz | | Bezeichnung/ Zeichnungs-Nr: ZZ-C1-Pin-D30-L08xx-P93044 | |
| MK Mueller | | Maststab: 10:1 | | Position: Menge: Blatt: 1 | |

Standard:
Material: Al_2O_3 (80%)

Length: 4,0 to 25 mm
Diameter: 1,5 to 4,0 mm

Other length, material and diameter
on request

Mechanical. Chemical. Thermic. Electric.
Alumina is simply in any relation top.



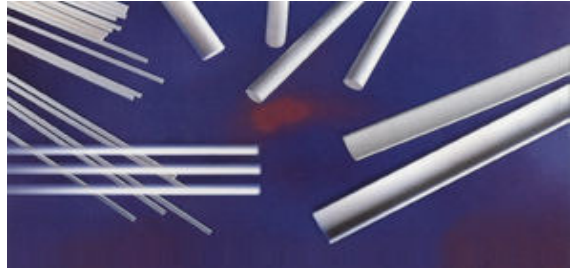
Manfred K. Mueller Eng.
Temperature Control
Mannheimer Strasse 12-14
75179 Pforzheim
Germany
www.thermostat-muller.biz

Phone: + 49 - 7231 1583- 0
Sales office: + 49 - 7231 1583-11
Machinery: + 49 - 7231 1583-12
PC-Fax: + 49 - 7231 1583-27
Fax: + 49 - 7231 1583-20
e-mail: info@thermostat-muller.biz

Bank: Deutsche Bank 24 Pforzheim
BLZ: 666 700 24 Kto-Nr: 12 8561
IBAN: DE52 6667 0024 0012 8561 00
BIC (SWIFT-CODE) DEUTDE33 666
HRA Mannheim 503251
VAT-ID-Nr.: DE 144 137 729

Properties acc. GERMAN INDUSTRIAL STANDARDS **VDE 0035/GERMAN INDUSTRIAL STANDARDS EN 60 672:**

excellent hardness
 high by the time highest firmness
 high by the time very high thermal conductivity
 very good electric insulation properties
 very high resistance
 very high chemical resistance
 high by the time highest fireproofness



This strength predestine the material for example to the enjoyment in insulators, pressure proof regulator divide, axes as well as aerials shafts.

| Material | -Classification | -Type |
|--|--------------------------------|--------------------------------|
| Alumina 80% 80 to 92% Al ₂ O ₃ | Oxidceramic | Al ₂ O ₃ |
| Material quality | Range/Value | |
| Open porosity [Vol%] | 0 | |
| Density [g/cm ³] | 3,2 - 3,5 | |
| Flectional strength [MPa] | 200 - 280 | |
| Modulus of elasticity [GPa] | 200 - 280 | |
| Hardness (HV10) [GPa] | 12 - 15 | |
| Tension intensity factor [MPa sq(m)] | 3,5 - 4,5 | |
| Weibull-Module (m) [---] | 10 - 15 | |
| Wear and tear steadiness [rated] | gut | |
| Resistance to corrosion [rated] | gut | |
| Average thermal expansion coefficient at 30-1.1000°C [10 ⁻⁶ K ⁻¹] | 6 - 8 | |
| Specific heat capacity at 30 - 1.000°C [J kg ⁻¹ K ⁻¹] | 850 - 1050 | |
| Thermal conductivity at 30-100°C [W/m K] | 10 - 16 | |
| Max. Temperature [°C] | 1200 - 1400 | |
| Resistance to thermal shock [rated] | gut | |
| Electric strength [kv/mm] | 10 | |
| Permittivity 48-62Hz [---] | 9 | |
| Dielectric loss factor at 20°C; 48-62Hz [10 ⁻³] | 0,5 - 1 | |
| Dielectric loss factor at 20°C; 1MHz [10 ⁻³] | 1 | |
| Electrical resistivity at 20°C [Ohm * m] | 1000000000000 - 10000000000000 | |
| Electrical resistivity at 600°C [Ohm * m] | 1000000 | |
| Temperature for volume resistance for 1MOhm cm | 700 | |



Manfred K. Mueller Eng.
Temperature Control
Mannheimer Strasse 12-14
75179 Pforzheim
Germany
www.thermostat-muller.biz

Phone: + 49 - 7231 1583- 0
 Sales office: + 49 - 7231 1583-11
 Machinery: + 49 - 7231 1583-12
 PC-Fax: + 49 - 7231 1583-27
 Fax: + 49 - 7231 1583-20
 e-mail: info@thermostat-muller.biz

Bank: Deutsche Bank 24 Pforzheim
 BLZ: 666 700 24 Kto-Nr: 12 8561
 IBAN: DE52 6667 0024 0012 8561 00
 BIC (SWIFT-CODE) DEUTDEDB 666
 HRA Mannheim 503251
 VAT-ID-Nr.: DE 144 137 729