Aerospace
Defence
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Industrial
Medical

Ferroperm™ Piezoelectric ceramics

Pz50 series

Dedicated materials for the HIFU industry

The new Ferroperm Pz50 material series have very high permittivities, high mechanical Q_m values, and low dielectric losses. They are therefore the optimum choice for applications, where the highest power levels are required in combination with the smallest possible volume. The materials were developed to meet the challenges dictated by the rapid development in ultrasonic assisted surgery and therapeutics.

Repeatable performance

The main focus through our entire production process is to provide materials and components with the highest possible reproducibility of properties and parameters and to obtain the lowest aging rates in the industry.

Our materials have a variation of ±5% for all parameters. This reduces the requirements for impedance matching, frequency tuning and dimensioning of the housing meaning fewer rejects and lower costs.

Customised solutions

We have more than 60 years of experience in the production of advanced piezoelectric ceramics. Our team has extensive expertise in customising designs to match the customer's needs.

Please contact us to discuss your requirements in further detail.

Key benefits

- Lowest batch to batch variation in the industry
- Stable material with consistent performance
- Customised or standard designs

Key features

- High operating temperature
- High permittivities
- High mechanical Q_m values
- Low dielectric losses

Applications

- Highly specialised HIFU transducers
- Ultrasonic assisted surgery and therapeutics

Contact

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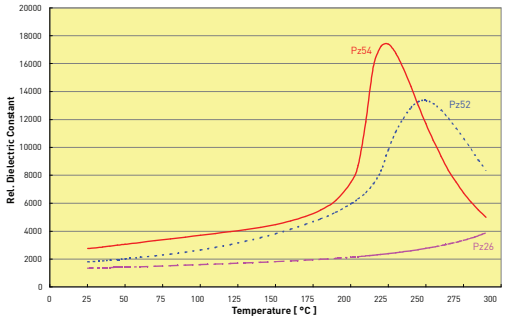
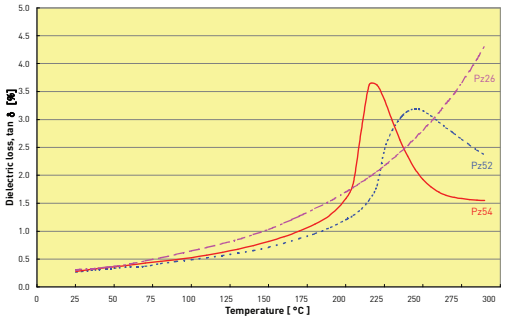
Material properties

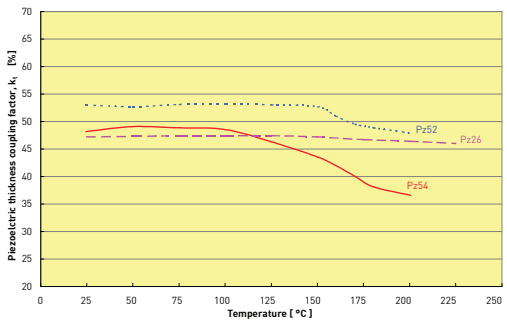
Electrical	Symbol	Pz52	Pz54
Relative dielectric permittivity at 1 kHz	K_{33}^{T}	1900	2800
Dielectric dissipation factor at 1 kHz	tan δ	3 x 10^{-3}	3 x 10^{-3}
Curie temperature	T_C >	250 °C	225 °C
Recommended working range		200 °C	180 °C
Electromechanical			
Coupling factors	k_p	0.61	0.59
	k_t	0.53	0.48
Piezoelectric charge coefficient	d_{33}	420 pC/N	500 pC/N
Frequency constant, thickness	N_t	1960 Hz m	1980 Hz m
Mechanical			
Mechanical Quality Factor	$Q_{m,t}^{E}$	550	1500
Density	ρ	7.3 g/cm³	7.8 g/cm³

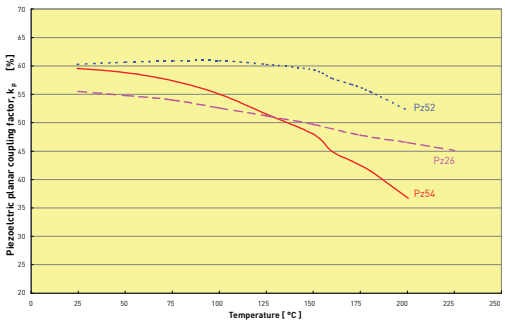
Note: Due to continuous process improvement, specifications are subject to change without notice.
Please be aware that extreme dimensions and geometries can lead to exaggeration in tolerances in all materials.





Temperature dependence of the free dielectric constant, ε_{33} (left) and dielectric loss tangent, tanδ, (right) of Pz52 and Pz54 in comparison with a traditional Type 100 high-power material (Pz26).
A very moderate and linear increase in both parameters can be observed in the recommended working range from room temperature to 180-200°C.
It is worth noting, that tanδ for both Pz52 and Pz54 is lower than in Pz26 at temperatures as high as 200°C





Temperature dependence of the thickness coupling constant k_t (left) and planar coupling constant k_p (right) in Pz52 and Pz54 in comparison with a traditional Type 100 high-power material (Pz26).
The coupling coefficients are very stable, and at high level within the entire recommended temperature range from room temperature to 180-200°C.