

FAQ's TO FERROPERM PIEZOCERAMICS

QUESTION

What should I be aware of when I assemble a transducer by use of glue?

ANSWER:

Ferroperm is generally concentrated completely on the manufacturing of piezoceramic materials and have no expertise in the assembly of ultrasonic devices. By maintaining this strategy, we keep a status as a completely independent supplier and avoid any indirect competition with our own customers. We therefore only have very limited information on this subject:

First of all, the output from the piezoelectric material is very dependent on the electronic driving system. The electronics and ceramics should match each other very closely in terms of resonance frequency and input impedance.

Secondly, the assembly process is very critical for the vibration loss in the transducer. The gluing conditions should therefore be controlled very strictly. It is important that the glue layer is very thin and very uniform if loss is to be minimised. In some cases, the glue is deposited by screen-printing or a spray process, to secure the thin and uniform thickness. It is also common to vacuum-treat the assembled part to remove trapped air in the glue joint.

Finally, the curing conditions for the glue are important for the performance of the part. If you cure the glue at a too high temperature you will get two problems, which in combination will amplify. An elevated temperature will give increased tendency of depoling the part. At the same time increased temperature can cause mechanical stresses due to mismatched thermal expansion coefficients in the ceramic and housing materials.

The depolarisation problems in piezoceramics are however most often caused by a combination of electrical and mechanical stresses under operation. Since the gluing operation does not include the electrical stress, the curing temperature can therefore often be up to 25 - 50° C higher than that recommended maximum operation temperature.

A method to check if there is a problem with depolarisation during curing is to measure if the capacitance has decreased (5-10%) in cured parts compared to fresh and unmounted parts.

From other customers we hear that a good product for gluing is Epotek (www.epotek.com). They have a full program of conductive and insulating glues. Other brands we hear about are Ciba-Geigy and Loctite. The brand is not the most important factor as long as you choose a "professional", reliable and reproducible product, and fine-tune your process to work with this.