

91-308 Electrode Tests

Electrode Adhesion Tests & Soldering

Electrode Materials

Silver and Nickel (electroless and sputtered) are the most commonly used electrodes for piezoelectric materials and are both offered by SensorTech. Other less commonly used electrodes are chrome-gold and conductive epoxies. Table-1 provides the characteristics of the silver and nickel electrodes.

•Soldering Procedure

- Soldering iron 20W. Preheat the iron for 20 minutes.
- Clean the area of the ceramic to be soldered with a soft abrasive or pencil eraser.
- Pre-tin both the wire (#22 AWG solid copper) and the ceramic. Use flux if necessary. Avoid excess solder.
- Join the lead to the ceramic using the soldering iron. Soldering duration should be kept to a minimum (typically 3-5 second)

Material	Thickness	Solder	Flux	Cleaner
Silver	0.0005" - 0.0015" (12µm - 38µm)	SN62 62/36/2 (Pb/Sn/Ag)	Kester 1544 or 1571 Superior #30 for Nickel Rosin Type Non-Corrosive	Ethanol Kester 5235
Nickel	0.0002" - 0.0010" (5µm - 25µm)	SN60 60/40 (Pb/Sn)		

Definition of Electrode Quality

The electrode quality is best defined by its conductance, adhesive characteristics and the surface finish.

Adhesion Tests

Tensile Tests

- Tensile tester (Chatillon or Wagner) (0-20 lb. or 0-10 kg range)
- A test wire (#22 AWG Solid copper wire) is soldered to the ceramic using the procedure outlined in Section-2.
- A tensile load is applied slowly to the ceramic. The loading is continued until the lead separates or the required load is registered on the dial.

Pressure-sensitive Tape Adhesion Tests

The pressure-sensitive tape method can be used when it is impractical to use a solder tensile test or when testing is impossible because of the size and shape of the ceramic element. The use of pressure-sensitive tape is also sometimes preferred as it is a non-destructive test method.

To avoid discrepancies in the results, careful choice of materials and procedures is required for each test.

- Clean the electrode surface with a solvent or a degreaser such as trichloroethane.
- Attach the strip of pressure-sensitive adhesive tape with an average adhesion to steel value necessary for your application (typically 25-50 oz/in). Press firmly.
- Lift one end of the tape normal to the electrode surface and pull until the tape is removed. The pull must be even and continuous until the tape is removed.

Relevant Standards

DOD-STD-1 376A (SHIPS)