Assembly & Test Considerations for Platinum RTD Elements

1. Handling

Care should be taken to avoid lead strain and peel.
To handle thin film resistors it is not allowed to use metal tweezers or metal gipping device. The edges on the upper side must not be loaded. Plastic tweezers are recommended.

2. Testing

Thin film elements are manufactured and tested via an automated production line, and further testing of the element is typically not required. If testing is desired, a 4-wire test fixture with low contact resistance should be used, along with a precision multimeter, 5 ½ digit resolution minimum. RTD assemblies are typically tested only for continuity.

3. Adding extension leads

Extension leads may be added to element leads via soldering, brazing, or welding.
Typical extension lead materials are:
- Teflon-insulated silver-plated copper
- Teflon-insulated nickel-plated copper
- Fiberglass-insulated nickel-plated or nickel-clad copper

Soldering:
- Standard soldering alloys may be used
- All flux residue must be removed to prevent corrosion at high temperature.
- The “L” series of elements have AgPd leads, and offer the best solderability.

Brazing:
Care must be taken to avoid exposing the element to temperatures exceeding the maximum temperature rating of the part. All flux residue must be removed to avoid corrosion.

Welding:
Ultrasonic, resistance, or laser welding techniques may be used. Proper setup is required to avoid flattening the element lead. Care must be taken to avoid exposing the element to temperatures exceeding the maximum temperature rating of the part.

3 or 4 wire lead extensions:
A 3 or 4 wire configuration is most requested with Pt100 elements, and less common with Pt1000 elements. For Pt200 and Pt1000 RTD elements, a 2 wire connection is usually sufficient.

Note:
For maximum accuracy, the extension lead should be attached at the calibration point indicated on the element data sheet. Attaching the extension lead to a different distance from the element body, or cutting the element lead wire will result in reduced accuracy.

4. Encapsulation or potting

The element must be sufficiently fixed to prevent damage from lead strain or vibration. In addition, to avoid a strain gage effect due to element bending, a potting material must be used that allows free expansion and contraction, and does not introduce stress during curing.

Choice of potting materials

Silicones:
For operating temperatures below 260 Deg C, silicone materials are often used. Silicones introduce little strain during cure, and allow for relatively free thermal expansion and contraction. The disadvantage of silicone is that it offers lower mechanical strength than some other materials. If greater strain relief is required, after encapsulating in silicone, the housing may be backfilled with epoxy or ceramic potting, or crimped, depending upon the required temperature rating. Note that some types of silicones and epoxies can mutually inhibit curing.

Ceramic Potting:
For temperatures in excess of 260 Deg C, ceramic potting materials may be used. The thermal expansion of the material should roughly match the expansion of alumina, the element substrate material. To avoid poisoning the element, potting materials containing fluorine should be avoided.

Ceramic Powders:
For operating temperatures exceeding the capabilities of silicones, powdered high purity magnesia or alumina may be vibrated into the housing. The ceramic powder allows for strain-free thermal expansion. The housing is typically sealed with a ceramic plug.

5. Storage

Pt-thin film sensors should not be stored in etching or corroding atmosphere. Sensors with silver- or silver plated wires should be stored in original packing (VCI bag) or in nitrogen atmosphere. This is also valid for SMD sensors