TAI Quality Control Procedures – Electrochemical O2 Sensor Mfg'g

Outside Process Inspection:

1. **Electrolyte Solution** – Electrolyte is removed from the mixing tanks and analyzed by a third party lab for impurities (i.e. Total Organic Carbon (TOC), Potassium Carbonate K2CO3, Lead, KOH) prior to being used in sensor production runs. Report submitted for verification.
2. **Cathode Plating Bath** – Bath is analyzed prior to plating of O2 Sensor Cathodes to ensure that various unwanted impurities (i.e. Copper, Aluminum, Iron, Nickel, Lead, Tin, Chrome & Zinc) are below threshold levels. Report submitted for verification.

Internal Process Inspection – Dry Process

3. **Weld Junction Test** - Conduct pull-test to ensure wire is properly welded to the cathode assembly.
4. **Receiving Inspection on Cathode Plating Processes** to ensure that an even plating coat has been placed on the cathodes (i.e. no exposed areas, no cathode holes plugged, no discolorization, etc) under nickel, silver and/or rhodium plating conditions.
5. **Heat Seal Pressure Testing** – Subject heat sealed expansion membrane to pressure burst testing (3 samples) prior to conducting production run to ensure heat sealing settings are accurate.

Internal Process Inspection – Wet Process

6. **Lead Sintering Validation** – Visual inspection to ensure that the loose lead granules have been properly compacted, under high-pressure conditions, into a solid cake-form with high surface area exposure. Ensure no loose lead fragments are present.
7. **Sensor Leak Test** – After filling the sensor with electrolyte solution and heat sealing the Teflon membrane in place over the sensor cathode, (100% of production run) are placed in a bath with phenolthaline indicator added. Sensors which leak the KOH electrolyte will react with the phenolthaline indicator and turn the solution a pinkish color at the point where the leak is occurring. Leaking sensors are rejected and discarded in an appropriate manner.

Final Qualification Testing

8. Sensors are properly labeled and then placed in our Automatic Testing System (ATS) where 48 x O2 Sensors can be tested at one time. Computer graphic readout indicates if the sensor fails or passes the test criteria. Depending on the sensor type (i.e. automotive, medical or diving), we look at sensor response time, linearity and output in air (i.e. 8.5 to 12.5 mV in Air). Data is recorded and maintained.

9. Sensors which fail to meet their accepted criteria are rejected for their intended use.
10. Passing sensors are then bagged, placed in stock and shipped against incoming orders.