

Temperature Measurement of Acid

APPLICATION



Acids are used in many manufacturing processes and monitoring their temperature is an important variable in maintaining product quality and safety. As you can imagine, they are very corrosive to most metals whether in liquid or vapor form which usually precludes using an off-the-shelf temperature probe. There are however some options that can be added to standard probes that make them usable in all but the harshest conditions.

CHALLENGE



As with all temperature measurements, accuracy, time response, and longevity are the primary factors to consider when choosing a probe. The various stainless steels will last for a while in most acids however replacing them periodically may not be desirable. Concentration and temperature determine how corrosive the solution is and govern the choice of materials to use for the temperature probe. Plastics work well but cannot handle high temperatures. Very few metals are suitable for acid contact but they are necessary to provide strength for high temperature applications.

A04, 200G, and I5673



▶ Teflon® and Tantalum coated RTDs

SOLUTION



Standard 316 SS RTD probes and thermowells can be protected from acid solutions with coatings made from various types of plastic the most common being Teflon®. It can be in the form of shrink tube placed over the sensor or it can be applied using the same process used for non-stick frying pans. Another plastic frequently used for acid applications is ultra high molecular weight polyethylene (UHMWV). It can be machined into a variety of thermowell styles or incorporated into a direct immersion style RTD. Applications that require added strength, a Tantalum over-sheath applied over a straight stem thermowell is an excellent solution. Tantalum coatings can also be applied over other thermowell or probe styles using a vapor deposition process.

Another solution is to use a thermowell made from ceramic, of which my favorite is sintered alpha silicon carbide known by the trade name Hexoloy®. It is nearly universally corrosion resistant up to 3000°F and has good strength.