A note about temperature standards: Which do you choose?

By Frank Johnson

Standards define materials, tolerances, and the conditions within which the agreement to purchase is fulfilled. They keep us from relying on pabulum such as "Quality goes in before the name goes on." ISA was founded in order to clarify and facilitate the use of instrumentation in the U.S.—Standards and Practices were essential. The very first standard was assigned ISA–SP1. The committee was charged with temperature measurement and later organized into several sub committees. SP1.1, SP1.2, etc., were assigned to different aspects including RTDs, thermocouples, thermowells, meters, and transmitters. I was the last of many chairmen of that committee as ISA redirected its focus from fundamental control elements and sensors to becoming an international association encompassing computers and automation.

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The resulting standard out of the ISA1 committee became American National Standards Institute (ANSI) MC96.1 and stood alone as ***the*** standard for years. It is still (unfortunately) cited in requests for quotations and in some proprietary company standards. The standard is mostly irrelevant today, as it incorporates defunct millivolts tables and defines the use of asbestos and other outdated and ancient processes. It was vital in its time, but not today. Subsequently, facets of the standard were expanded and responsibility adopted by other organizations.

ASTM—originally known as the American Society for Testing and Materials—domestically had picked up the baton and was running hard. Today, the ASTM E-20 committee meets twice a year with members from users, academia, manufacturers, and the National Institute of Standards and Technology. All ASTM E-20 industrial temperature standards are quite up to date. The committee has had one hard-to-define task that it just cannot get through—trying to define and quantify the inhomogeneity of thermocouple wire. It has been working on this for as long as I can remember, and the solution remains elusive. A standard for thermowells was lost in the shuffle, and the responsibility for a comprehensive document was not assumed by any committee or organization. ISA actually stepped up at the very end, but the effort was dropped; American Society of Mechanical Engineers (ASME)'s B-40 committee had an incomplete standard that was used mostly for gauges and the military, and ASME's PTC 19.3 3 page standard was pretty much all we had to go by. It was only three pages long, including innumerable references, and if you were not a degreed mathematician, it was easy to get lost in the process.

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ASME develops standards on pressure gauges and temperature gauges under the same main committee. The obvious reason is the same companies that make pressure gauges also make bimetal, gas, and liquid-filled temperature gauges. ASME does not usually work with anything electrical in nature, so TCs/RTDs are outside its domain. But since thermowells are used for these gauges, ASME was the consensus committee to maintain the primary thermowell standard under the auspices of Power Test Codes (PTC). Now, the U.S. finally has a finished standard after going about 30 years without a good, consistent document. Being the primary thermowell group in the U.S., the work of this committee was being watched by foreign and domestic committees all over the world.

As one of the U.S. delegates to the IEC committee, I have perused most of the individual country standards on temperature and found them very inconsistent in definition, description, and language. The experts across the globe representing individual countries (GOST, DIN, BS, JIS, GB, AISI, CSEE, JIC, OST, API, etc.) are extremely competent and anxious to have world standards in this global economy. All of them mention thermowells, but none do anywhere close to the job as completed by the PTC sub-committee.

ASME PTC 19.3 TW 2010 is now a reality. It has all the calculations that allow a user to design a well that will hold up in the user's process. The standard grew from three pages to 43, and it took years to get it right. This was a task started by ISA and blossomed within the domain of ASME. It is the de facto world standard on thermowells.

Now maybe—possibly—could we get them to take up the problem of quantifying inhomogeneity in thermocouple wire?

ABOUT THE AUTHOR

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