New IEC standard for thermocouples

The IEC 60584 standard for thermocouples has been altered in the latest edition from 2013.

"The changes aren't major but it's good to know about them," says Pentronic's laboratory manager Lars Grönlund.

"The biggest difference compared with the 1995 edition is the inclusion of two thermocouples constructed from tungsten (W) and rhenium (Re) in various proportions," Lars continues. "They are types A and C, which have the respective compositions of W-5% Re/W-20% Re and W-5% Re/W-26% Re, where the first wire has a plus polarity. Types A and C are only standardised with a tolerance in accordance with class 2."

Thermocouples made of tungsten and rhenium are used in such contexts as extremely high temperatures and vacuum environments. The Swedish chemist Scheele was the first person to publish the discovery of tungsten (also known as wolfram) and in English it came to be called after the Swedish term "tung sten" (literally "heavy stone") due to its very high density of 19,250 kg/m^3.

"In the 1995 edition and earlier, the tolerance of the base metal thermocouples was defined with two temperature ranges," Lars explains. "The new 2013 standard defines the tolerance limits without giving the temperature of the change-over point between the constant and the sloping demarcation lines as shown in the figure. Instead, you must calculate for yourself which tolerance is the greater of the two."

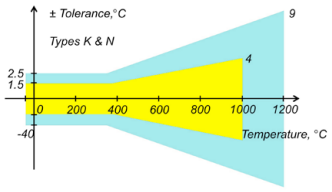

Figure 1. A graph showing the tolerances in accordance with IEC 60584 for types K and N thermocouples in class 1 (yellow) and class 2 (blue). Note that class 1 is limited to 1000 °C. Above 1000 °C a thermocouple in accordance with class 1 does not need to conform to class 2