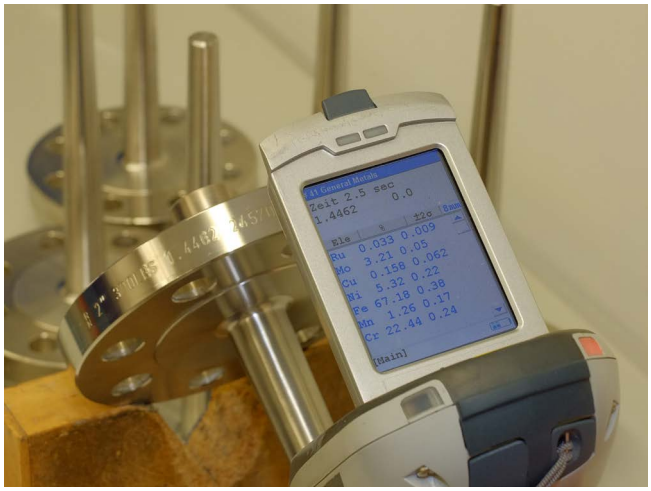
Positive Material Identification test (PMI test)

The Positive Material Identification tests, or also known as PMI test, are of great importance for the traceability of components. This non-destructive testing serves as a proof of the alloying constituents present in the material, confirming the melting analysis of the material contained in the 3.1 certificate. It is important since the confusion of materials can lead to considerable damage and must therefore be avoided at all costs in safety-relevant applications. There are two different test procedures common for thermowells:

X-ray fluorescence analysis (XRF)

X-ray fluorescence analysis uses X-rays to stimulate the atoms of the thermowell material to produce natural radiation, without damaging the surface of the metal.
The wavelength and intensity of the emitted radiation is, in turn, a measure of the alloy's constituent elements and their concentration.

Identifiable elements:
Steels: Nb/Cb, Cu, Cr, Fe, Mn, Mo, Ni, Ti, W
Cu materials: Co, Cu, Fe, Mn, Ni, Pb, Sn, Zn, Zr



PMI test: X-ray fluorescence analysis of the thermowell stem

Optical Emission Spectroscopy (OES)

With spectrographic analysis, an arc is generated between the thermowell surface and a tungsten electrode in the test instrument, and the spectrum of this arc enables the alloy's elements, including carbon, to be identified – both qualitatively and quantitatively.

For the OES, it does leave a characteristic burn mark of approx. 5 mm [0.020"] diameter on the workpiece.

Identifiable elements:
Steels: Al, C, Cu, Cr, Fe, Mn, Mo, Nb/Cb, Ni, P, S, Si, Ti, W
CU materials: Al, Be, Co, Cu, Fe, Mn, Ni, P, Pb, S, Si, Sn, Zn, Zr

PMI test: Spectrographic analysis on a model TW10 flanged thermowell

The various thermowell models, as a result of their different construction and the test possibilities that result from this, require different numbers of test points [1].

Thermowell model	X-ray fluorescence analysis (XRF)	Spectrographic analysis (OES)
TW10, TW55-7	3 test points ■ Thermowell ■ Flange ■ Upper side of the weld seam	2 test points ■ Thermowell ■ Flange
TW15, TW20, TW25, TW30, TW31, TW50, TW55-6	1 test point ■ Thermowell	1 test point ■ Thermowell
TW35, TW45	3 test points ■ Thermowell ■ Adapter (thread) ■ Solid tip	2 test points ■ Thermowell ■ Adapter (thread)
TW40	3 test points ■ Thermowell ■ Flange ■ Solid tip	2 test points ■ Thermowell ■ Flange
TW70-K	2 test points ■ Thermowell ■ Solid tip	1 test point ■ Thermowell
TW70-L, TW70-M	3 test points ■ Thermowell ■ Flange / Adapter (thread) ■ Solid tip	2 test points ■ Thermowell ■ Adapter (thread)

1) Further tests are available on request

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg/Germany
Tel. +49 9372 132-0
Fax +49 9372 132-406
info@wika.de
www.wika.de