

Application Note # 41

Measurement of ferrite content in (duplex) steel and weld seams

Components found in industrial plants – whether chemical, energy, petrochemical or other – are often subject to heat, aggressive agents and high pressure. These conditions require steel types that are extremely corrosion and acid resistant even at high temperatures. When austenitic steels are used, it is important to make sure the ferrite content of the weld seams is within strict norms. The FERITSCOPE® DMP30 is the suitable solution to measure the ferrite content reliably and precisely.

Only an optimum ferrite content can ensure the best possible corrosion protection. When the joints of boilers and pipelines are welded, modifications of the steel structure occur under the influence of temperature, which lead to the formation of ferrite. A lack of ferrite in the weld area leads to a reduction in resistance. An excessively high ferrite content reduces toughness, ductility and corrosion resistance. In some industries, special standards, regulations or guidelines exist for this purpose.

With duplex steel in particular, the ferrite content in the heat-affected zone can easily deviate from the target values, either due to unsuitable welding filler materials or through incorrect heat input or cooling during the

welding process. In this case, only an on-the-spot measurement can provide assurance that the processing did not change the ferrite content at the expense of crucial mechanical or corrosion-resistance properties.

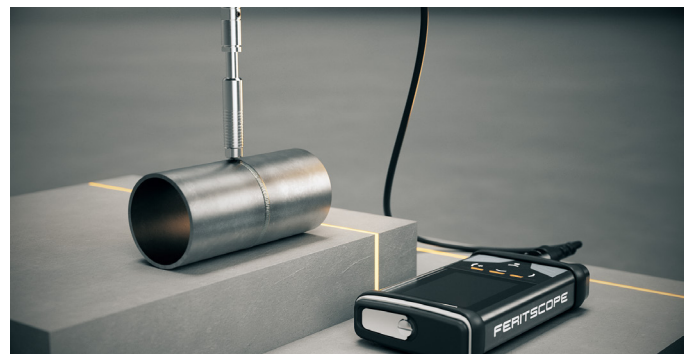


Figure 1: Measuring the ferrite content on weld seams with the FERITSCOPE® DMP30 and the connected probe D-F-Fe

Specialist for ferrite content measurement

To meet these requirements FISCHER has developed the mobile handheld FERITSCOPE® DMP30 device. The FERITSCOPE® DMP30 from the DMP instrument family is ideally suited for onsite measurements of austenitic claddings as well as weld seams in stainless steel pipes, vessels, boilers or other products made of

austenitic or duplex steel.

The ferrite content is measured by the magnetic induction method and displayed as ferrite content in % or as ferrite number FN (Welding Research Council Ferrite Numbers). All magnetizable microstructural components are recorded, i.e. in addition to delta ferrite also, for example, deformation martensite or other ferritic phases which can influence the measurement results. The ferrite content can be determined reliably and precisely from a cladding thickness of 3 mm, regardless of the properties of the base material.



Figure 2: Highest corrosion protection is required, e.g. for hydrogen pipelines

Up to any challenge

The devices offer numerous functionalities: Highest quality and durability thanks to full aluminum housing with IP64 and scratch-resistant and chemical-resistant display with Gorilla Glass, full measurement control thanks to limit monitoring via light, sound and vibration, a replaceable and quickly rechargeable battery or even the simplest data transfer via USB-C and Bluetooth.

Flexible measurement and evaluation

The FERITSCOPE® DMP30 can be equipped with probes in specific designs such as axial, angled or for measuring inside center holes. Even in hard-to-reach places, the digital and analog probes provide maximum flexibility and the most precise results. With the intuitive Fischer DataSuite, transferring, evaluating and exporting measurement data is more convenient than ever before.

Conclusion:

The FERITSCOPE® DMP30 enables reliable and precise determination of ferrite content in % or as ferrite number FN. The robust and modern design, the intuitive operation and its extensive functionalities make the compact handheld device your perfect companion for measuring the ferrite content or even the martensite content in austenitic and duplex steels.

For more information, please contact our Fischer experts: sales@helmut-fischer.com