Trace Moisture Measurement in Welding - GTAW and TIG

Application Note

SHAW MOISTURE METERS

Gas Tungsten Arc Welding (GTAW), commonly referred to as TIG welding, uses a non consumable tungsten electrode to generate a stable welding arc. Filler material is added manually to the weld pool, allowing precise control over heat input and weld composition. This level of control enables the production of high integrity welds, making TIG the preferred method for thin sections and critical materials such as stainless steel, aluminium, titanium and other specialist alloys. It is widely used in aerospace and other high specification industries.

Certain metals, including titanium, vanadium, zirconium, tantalum and niobium are highly susceptible to hydrogen embrittlement. At elevated temperatures, these materials readily react with atmospheric gases such as oxygen, nitrogen, hydrogen and carbon. The absorption of these into the weld structure can significantly reduce mechanical strength and may lead to premature failure.

To maintain weld integrity, the weld zone must be effectively shielded from atmospheric contamination. Inert gases such as argon, helium or their mixtures are typically used for this purpose, sometimes with controlled additions of other gases to optimise weld characteristics. Critically, these shielding gases must have a very low moisture content to prevent the introduction of hydrogen into the weld.

In aerospace applications, strict quality standards apply, often under NADCAP accreditation. These standards define acceptable moisture levels at the torch, typically within the range of -60 °C to -40 °C dewpoint. Routine verification is required to ensure compliance and maintain process reliability.

TIG welding is used in low volume, high value applications, with each station supplied by a dedicated gas cylinder.



Although cylinder gas is typically supplied at very low moisture levels, often below -70 °C dewpoint, contamination can occur through regulators, pipework or connections between the cylinder and the torch.

To verify moisture levels at the point of use, a portable dewpoint hygrometer such as the Shaw SDHmini can be deployed directly at the torch. Measurement is typically achieved by fitting a shroud or nozzle to the torch and inserting the 6 mm outer diameter sampling tube supplied with the instrument. A No. 5 nozzle provides a close fit; for larger nozzles, a temporary seal can be achieved using insulating tape. Some users may prefer a dedicated adaptor to connect directly to the torch head.

For ideal response time, a short length (10 – 20 mm) of PTFE tubing is recommended between the sampling point and the instrument. The gas flow should be set to normal operating conditions, typically 10 to 12 litres per minute, using the regulator's integrated flow control.

Suitable Products



Dewpoint Sensor



Handheld Hygrometers



Portable Sample System

We design and manufacture dewpoint instruments for many different applications.

For advice, choosing the right product for your application, please contact us:

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