

Heat Treatment of Steels and Other Metals

All Moisture Analyzers

Application

Moisture is measured in the blanketing gases that are used in the treatment of steel.

Problem

Inert blanketing gases are required during the heat treatment of steels to prevent oxidation of the metal product. At heat-treating temperatures, moisture and oxygen will readily react with the metal to form an undesirable metal-oxide coating on the steel. The blanketing gas purges the oven of ambient air thereby removing the moisture and oxygen that are always found in it.

Occasionally, the blanketing gas itself will contain an unacceptable concentration of moisture. When this problem occurs, the blanketing gas will fail to perform its needed function resulting in a loss of product quality.

Monitoring the moisture concentration of the blanketing gas entering the furnace provides a very useful quality control parameter and a safeguard against poor quality blanketing gas.

Equipment

The common blanketing gases are nitrogen, argon, or hydrogen. They are fed to the ovens at only moderate pressures. Therefore, any quartz-crystal based moisture analyzer can be used. However, the common ranges of interest are well covered by the models 3050-OLV and 2850.

Procedure

The sample gas for the analyzer is taken from the blanketing gas line just before it enters the heat-treatment ovens. A sample pressure of at least 1 bar (15 psi) gauge is needed.

How Previously Handled

In the past, gas samples were analyzed in a laboratory for spot-checking or aluminum oxide hygrometers were used for continuous analysis. However, aluminum oxide's calibration drift and fail-to-zero nature combined with the inability to verify if the sensor was still responsive has led to many customers seeking a more reliable instrument.

Results

The moisture content is monitored accurately, directly, and continuously. Quality control parameters based upon concentration are more reliable than the prior dew point parameters which were pressure-dependent.

The extremely high accuracy of the analyzer has enabled a tightening of the moisture allowance specification in the blanketing gas resulting in greater operator confidence in both the gas supply and the analyzer.

When the moisture content does exceed the alarm concentration, corrective action can be quickly taken to save the product steel.

Typical Operating Specifications

Range of interest:
1.0 to 16 ppmv

Operating Pressure:
3.1 barg (45 psig)

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