APPLICATION NOTE

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Measurement and Monitoring of O_2 Concentrations in Steel Mill Reheating Furnaces

Industry: Iron and Steel
Product: Zirconia Oxygen Analyzer

Introduction

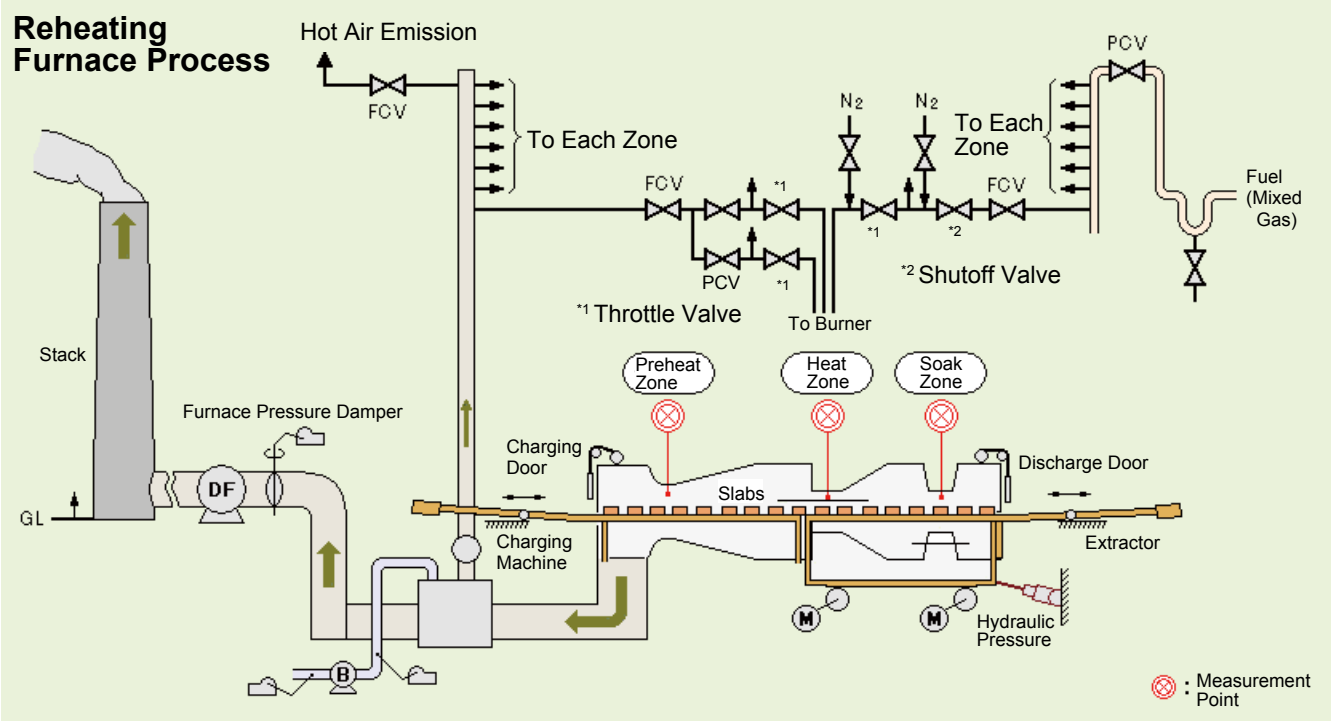
A furnace for heating slabs needs to be operated under low-oxygen conditions at high temperatures of 1000 °C and above to prevent oxidation of the steel. The measurement of oxygen concentrations in the furnace is essential in this process. The ZR22/ZR402 Direct In-Situ Zirconia Oxygen Analyzer requires no sampling system and utilizes a long-life sensor, and is therefore ideally suited for measurement of oxygen concentrations in a high-temperature environment. The ZR22G detector with the ZO21P high temperature probe adapter can be used in gas furnaces at temperatures up to 1400 °C.

Expected Benefits

- Maintains high product quality by monitoring oxygen concentrations in steel mill reheating furnaces
- Ensures stable, continuous measurement of oxygen concentrations
- Reduces operating costs

Process Overview

Slabs are loaded on a conveyor and fed to a reheating furnace, which is heated to between 900 and 1400 °C by burners that use fuels such as by-product gas. In order to keep the oxygen concentration between 1 and 2%, it is monitored in the preheat, heat , and soak zones The slabs are heated uniformly without being oxidized, and then sent to the next processing stage.



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Solution Details

Field Data

Process conditions

Measurement point:	furnace reheat, heat, and soak zones
Temperature:	900 to 1400 °C
Pressure:	30 to 50 kPa
Dust:	Trace
Fuel:	Gas

Measurement system

Detector:

ZR22G-015-S-Q-❑-❑-❑-E-A/CV

High temperature probe adapter

ZO21P-H-❑-❑❑❑-❑*A

Auxiliary ejector for high temperature use

P/N E7046E❑

Converter:

ZR402G-❑-❑-E-A

Flow setting unit: ZA8F-❑*B

Calibration gas unit

Pressure regulator for gas cylinder:

P/N G7013XF (inlet W22, outlet Rc1/4) or P/N G7014XF (inlet W22, outlet 1/4NPT)

Case assembly for calibration gas cylinder: P/N E7044KF

Note: the calibration gas cylinder must be purchased locally

Utilities

Power supply: 85 to 264 V AC, 50/60 Hz

Instrument air (reference gas): pressure, 300 to 700 kPa

Notes

- The material selected for the high temperature probe adapter depends on the temperature of the sample gas. Follow instructions carefully when installing the probe.
- SUS: Sample gas temperature ≤750 °C

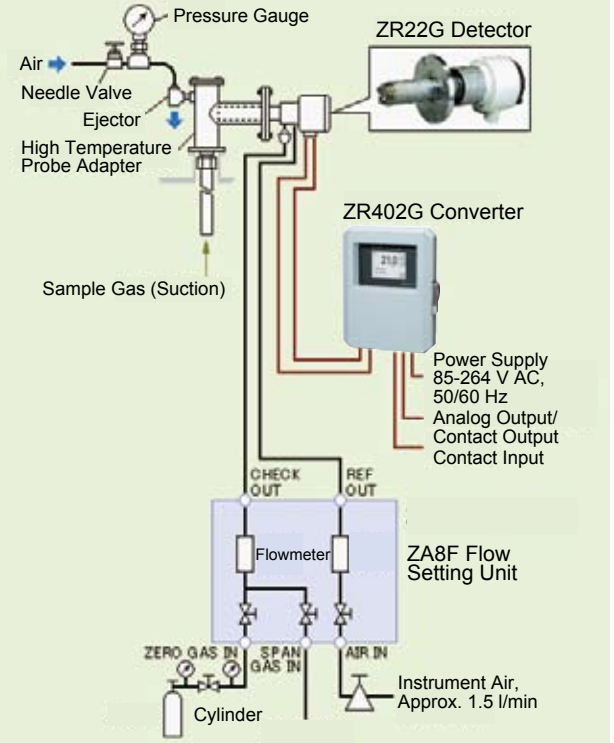
  Probe orientation: vertical or horizontal
- Inconel: 750 °C< sample gas temperature ≤900 °C

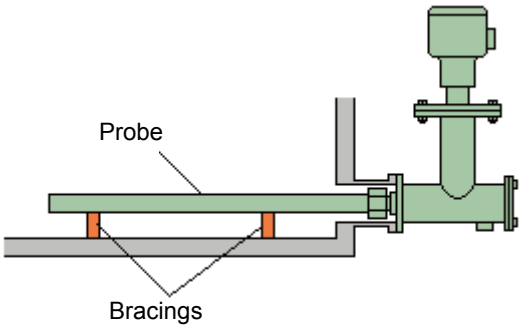
  Probe orientation: vertical or horizontal
- SiC: 900°C< sample gas temperature ≤1400 °C

  Probe orientation: vertical

Note: When the probe is installed horizontally, bracings must be provided for mechanical support.

Auxiliary Ejector for High Temperature Use





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