

Improved Sensor Life in Gasification Reactor Applications Utilizing Sapphire Inner Tube

RESULTS

- Improve availability with fewer unplanned shutdowns
- Longer life thermocouples decrease Operating Expenses (OPEX)
- Enhanced safety features prevents release of emissions from the reactor
- Dual seal system improves process integrity

APPLICATION

- High temperature and high pressure processes
- Measuring temperature in various stages of the entrained flow gasification process for fluids and gases

APPLICATION CHARACTERISTIC

- Temperatures up to 1800 °C (3272 °F)
- Pressures up to 65 bar (943 PSIG)
- Contaminating gases such as Hydrogen and Carbon

CHALLENGE

The gasification process in the oil and gas, refining, and power industries impose difficult conditions to the measurement devices including temperatures up to 1800 °C (3272 °F), pressures up to 65 bar (943 PSIG), and contamination that poisons thermocouples. These conditions lead to high costs from unplanned shutdowns, reduction in availability from thermocouple failure, and frequent replacement of thermocouples. Additionally, failure of conventional thermocouples may have safety implications by venting reactor contents to the surrounding atmosphere, which increases the risk of fire or injury to personnel.

SOLUTION

To meet these challenges, Emerson Process Management developed a high temperature thermocouple enclosed by a gas-tight sapphire protection tube. This procedure helps reduce thermocouple poisoning in the gasification reactor, and resulted in a thermocouple with triple the life of a conventional thermocouple.

By hermetically sealing the sapphire protection tube to the supporting bushing, Emerson Process Management created a process protected by United States Patent 6,059,453. In the event that the outer protective or inner sapphire tube breaks, the dual seal system prevents release of toxic emissions from the reactor. The process flanges and the connection housings are optionally available as forged versions to address leakage concerns of hydrogen containing gases.



Emerson Process Management continues to work closely with end users to improve process availability and safety in gasification applications.



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The design and technical improvements provide exact, reliable temperature measurements and provides a life span ranging from 6,000 to 18,000 hours, dependant on the application process. Emerson Process Management continues to work closely with end users to improve sensor life in gasification reactor applications.

RESOURCES (OPTIONAL)

For more information, go to www.Rosemount.com or contact your local Emerson Process Management Representative.



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