Improving chemical reactor safety through custom thermowell design

Custom barstock thermowells for reliable temperature measurement in corrosive chemical reactors

Benefits at a glance

- Improved process safety through reliable, continuous temperature measurement in highly corrosive reactor environments
- Reduced risk of thermowell failure by eliminating welded joints and other common mechanical weak points
- Enhanced corrosion resistance using solid barstock Alloy 601 suited for nitric acid and ammonium nitrate service
- Greater mechanical strength for deep insertion lengths required to reach critical measurement points
- Protection of high-value reactor assets, including platinum catalysts, by minimizing the risk of overheating events
- Lower lifecycle costs through reduced unplanned downtime, fewer replacements and extended service life
- Application-specific customization that delivers a better long-term solution than standard pipestyle thermowells

Summary Temperature measurement in ammonium nitrate and nitric acid processing environments demands equipment capable of withstanding both aggressive corrosion and elevated operating temperatures. In many reactor systems, accurate monitoring requires longer insertion lengths, placing additional mechanical and chemical stress on thermowell designs.

Challenge Chemical reactors often involve highly corrosive processes that necessitate extended thermowell insertion lengths to accurately capture temperature at critical measurement points. In such demanding environments, thermowell assemblies may be subject to mechanical degradation or failure, leading to inaccurate temperature readings. These failures can have severe consequences, as unreliable temperature measurement increases the risk of unsafe operating conditions and poses significant safety hazards to both the reactor and the overall plant.

Our solution Endress+Hauser offers extensive thermowell customization to ensure each design precisely matches application requirements. Insertion length, process connection, tip geometry and overall profile can be

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Endress+Hauser's iTHERM ModuLine TM152 industrial modular thermometer

tailored to accommodate reactor geometry, flow conditions and measurement response needs. This flexibility allows thermowells to be optimized for both mechanical strength and thermal performance, even on long insertion thermowells in high-stress environments. By combining application-specific customization with solid barstock construction and corrosion-resistant alloys, Endress+Hauser delivers thermowell solutions engineered for long-term reliability in demanding chemical processes.

Results Fully customizable temperature measurement options enable enhanced safety and long-term cost savings. Using a customized thermowell specifically for the application rather than relying on a standard pipe-style design significantly reduces failure risk in a highly corrosive chemical reactor environment.

Endress+Hauser's fully configurable iTHERM ModuLine TM152 industrial modular thermometer minimizes welded joints where possible and engineers them appropriately for long insertion lengths, a common primary failure point in a chemical reactor's existing design. This improves mechanical integrity and reduces the likelihood of leaks or catastrophic failure. This improved reliability directly enhances process safety by ensuring accurate, continuous temperature measurement in a critical reactor application, where measurement loss could lead to dangerous overheating events and damage to high-value components such as platinum catalysts. Reductions in unplanned downtime, avoidance of reactor damage and extended service life deliver substantial cost savings over the life of the installation.

Learn more about Endress+Hauser's iTHERM ModuLine TM152

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