IRmadillo™

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Enhancing Plant Safety with Real-Time Ethanol Monitoring in Distillation

KEY WORDS

- Distillation
- Whole Stillage
- Ethanol
- Explosion
- Safety
- Beer Bottoms

Abstract

Accurate measurement of ethanol in beer bottoms is vital for plant safety. Ethanol vapor is highly flammable, and its presence in significant quantities can pose seri- ous fire and explosion risks. By continuously measuring the ethanol content of beer bottoms in real time, plant operators can monitor and react accordingly, reducing the likelihood of dangerous levels of ethanol vapor. This application note highlights the safety risks associ- ated with inadequate monitoring. It addresses the po- tential hazards of ethanol vapor migrating downstream of beer bottoms, off-gassing, and venting into various plant areas. The IRmadillo offers a solution to these challenges by providing continuous and real-time monitoring of ethanol in the liquid phase upstream, enhancing safety and efficiency in ethanol production facilities.

Introduction

Ethanol is highly flammable, making its production in- herently hazardous. The presence of residual ethanol in beer bottoms can pose significant safety risks if not properly monitored. Current safety measures include interlock systems and flame scanners on Dryers and Thermal Oxidizers (TOs), which are intended to identify and avert dangerous situations. However, while flame scanners operate in real time, they do not provide re- al-time measurements of ethanol levels at the source, in the beer bottoms. This lack of continuous data at the source is vital for early hazard detection and timely intervention. Recent incidents at ethanol plants have underscored the importance of vigilant monitoring practices. These events illustrate the dangers of inadequate ethanol measurement and control, emphasizing the importance of accurate and continuous monitoring to reduce such hazards.

Safety Risks

There are two primary safety hazards associated with el- evated ethanol levels in beer bottoms: 1. Ethanol Vapor Traveling Downstream: Ethanol in beer bottoms can travel downstream to various process equipment, such as centrifuges, evaporators, dryers, and TO's, where high temperatures and conditions condu- cive to ignition pose a risk of explosion. 2. Off-Gassing from Whole Stillage: