ABSTRACT

Properly functioning pressure relief devices (PRDs) are essential to protect plant personnel and equipment, as unexpected overpressure events can cause equipment damage and loss of containment, and result in costly plant shutdowns. PRDs are considered to be the ultimate layer of protection of pressurized systems.

The inspection and testing of relief devices is needed to ensure PRD functionality on demand. But when and how often should PRDs be inspected? Many plants apply inspection intervals to PRDs in general agreement with API 510 and NBIC, without considering historical performance or the potential hazards associated with the relief device application.

The latest edition of API RP 581, “Risk-based Inspection technology”, provides a quantitative methodology for establishing inspection intervals for PRDs based on risk. The PRD Risk-Based Inspection (RBI) technology provides a system approach (includes the damage state of the protected equipment) and evaluates the probability (reliability) and the consequence (criticality) of pressure relief valve failure and sets the appropriate inspection frequency based on risk. Results of recent studies have demonstrated the benefits of the new approach. Compared to a typical API510 approach, the risk based plan can significantly reduce the overall risk in the plant while at the same time provide a significant reduction in inspection costs.

A case study of implementation in a refinery process unit illustrates the methodology has been successfully used to establish risk-based inspection intervals for PRDs.