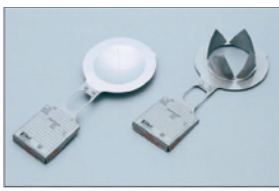


Effective ERS Design

Practical ERS Design



October 19 - 21, 2009 | Houston, TX
Instructor: Kenneth McLeod, P.E.



GDO Rupture Discs

ERS rupture discs before and after rupture

Overview

The Practical ERS Design module serves as an ERS primer and focuses on industry codes/standards, regulatory requirements, ERS contingencies, calculation methodologies, and long-term ERS data management.

This module will help process/safety engineers and managers better understand, plan, and execute future ERS design work for plant projects such as PHAs, unit expansions, debottlenecking studies, etc.

Topics

- ◆ Codes and Practices
- ◆ Application of Pressure Relief Devices
- ◆ ERS Design Heuristic
- ◆ ERS Contingencies
- ◆ Steady State Design Calculations
- ◆ Relief Device Sizing
- ◆ Effluent Handling
- ◆ Operational Considerations and ERS Data Management

Participants

This module is ideally suited to process industry professionals involved in the design and review of emergency relief requirements for non-reactive systems.

Course Materials and Fee

Attendees will receive presentation summaries, exercises, and data for techniques currently employed in ERS design for non-reactive systems.

Fee: \$1,000

Fees for course include lunch and refreshments. They do not include hotel accommodations or travel, which are each participant's responsibility.

COURSE OUTLINE

Day 1

Codes and Practices — 8:00AM to 9:45AM

An introduction to the importance of overpressure protection and the governing / relevant codes, standards, and best practices regarding ERS design. Topics include regulatory requirements such as OSHA's process safety management (PSM) standard (1910.119), design standards such as the American Society of Mechanical Engineers (ASME) Section VIII Pressure Vessel Code, and recommended practices such as the American Petroleum Institute (API) RP 520 and 521.

Application of Pressure Relief Devices — 10:00AM to 12:00PM

A discussion on the critical operation of pressure relief devices as the *last line of defense* in process plants. Topics include mechanical details of various types of relief devices (e.g., pressure safety valves, rupture disks, buckling pins, low pressure vents, etc.), the optimal application of each type, and installation considerations.

ERS Design Heuristic — 1:00PM to 2:45PM

A discussion on a practical approach to ERS design that encompasses the full life-cycle starting from an assessment of needs, selection of appropriate protective devices and effluent handling systems, and ongoing operational and maintenance requirements.

Overpressure Contingencies — 3:00PM to 5:00PM

A discussion on the most commonly occurring overpressure contingencies in process plants. Topics include source identification, pressure development, and situations that lead to equipment overpressure (e.g., fire exposure, overfilling, utility failures, and runaway chemical reactions).

Day 2

Steady-State ERS Rate Calculations-Part I — 8:00AM to 9:45AM

A discussion on the various calculation methodologies employed to generate steady-state relief rates for overpressure contingencies associated with fluid input from high pressure reservoirs. Topics include control valve failures, flow limitations by piping system capacities, and flow limitations by fluid driving equipment such pumps and compressors.

Steady-State ERS Rate Calculations-Part II — 10:00AM to 12:00PM

A discussion on the various calculation methodologies employed to generate steady-state relief rates for overpressure contingencies associated with abnormal heat input. Topics include the API-RP521, API-STD2000, NFPA-30, and ASHRAE-15 fire exposure calculations.

Steady-State ERS Rate Calculations-Part III — 1:00PM to 2:45PM

A discussion on the various calculation methodologies employed to generate steady-state relief rates for overpressure contingencies associated with other process abnormalities. Topics include split heat exchanger tubes, API-STD2000 in-breathing and out-breathing calculations, and overpressure contingencies associated with columns such as reflux failure.

Relief Device Sizing — 3:00PM to 5:00PM

A discussion on the most commonly employed methodologies for relief device sizing, selection, and installation. Topics include theoretical flow constraints (e.g., isentropic nozzle flow), modifications to these for use in practical applications, and inlet and outlet piping pressure drop calculations and implications.

Day 3

Effluent Handling — 8:00AM to 9:45AM

A discussion on design, safety, and regulatory / environmental considerations for effluent systems. Topics include atmospheric dispersion, piping collection systems, separation equipment, and flaring.

Operational Considerations — 10:00AM to 11:30AM

A discussion on the operation and maintenance of the emergency relief systems. Topics include relief valve inspection programs, management of change (MOC) requirements for ERS systems, and the benefits of maintaining ERS documentation in the long-term.

Wrap-up Discussion — 11:30AM to 12:00PM

Effective ERS Design — Elective Module I

Auditing Emergency Relief Systems



October 21, 2009 | Houston, TX

Instructor: Kenneth McLeod, P.E.



GD Rupture Discs



ERS rupture discs before and after rupture



Overview

The Auditing Emergency Relief Systems module provides guidance on how to conduct efficient and effective ERS design audits to ensure compliance, safety, and reliability. Special emphasis is placed on how operating companies can leverage past efforts to bring their existing ERS documentation into compliance.

This module will help process / safety engineers and managers achieve compliance and address potential discrepancies in their ERS documentation.

Topics

- Benefits and Organization of ERS Audits
- Elements of ERS Design Documentation
- Accuracy of Plant Data
- Verification of Contingencies & Calculation Methodologies
- Addressing Discrepancies

Participants

This module is ideally suited to Process Safety Management Professionals responsible for ensuring their ERS design documentation complies with OSHA 1910.119.

Course Materials and Fee

Attendees will receive presentation summaries and guidelines regarding how to conduct ERS design audits to address potential discrepancies.

Auditing Emergency Relief Systems Fee: \$300

Fees for course include refreshments. They do not include hotel accommodations or travel, which are each participant's responsibility.

COURSE OUTLINE

1/2 Day

Benefits and Organization of ERS Audits — 1:00PM to 1:30PM

A discussion on the importance of ERS audits to ensure ongoing compliance and accurate/reliable ERS documentation. Topics include OSHA 1910.119, OSHA 1910.106, and the importance of maintaining accurate ERS design basis information for process hazard analyses (PHAs), capital projects, plant debottlenecking, etc. Emphasis will be placed on how to organize efficient ERS audits through team selection, sampling techniques for different processes, information management, and audit / reporting protocols.

Elements of ERS Design Documentation — 1:30PM to 2:15PM

A discussion on the basic elements of ERS design documentation and the role of each in ensuring a safe and accurate design basis. Topics include reactivity screening, overpressure contingencies evaluation, relief device analysis, piping analysis, effluent system analysis, and application of local/state laws.

Accuracy of Plant Data — 2:15PM to 2:45PM

A discussion on the importance of accurate and reliable plant data for ERS design and verification projects. Topics include piping and instrumentation diagrams (P&IDs), process flow diagrams (PFDs), equipment and instrumentation data, piping isometrics, plot plans, reactivity data, Management of Change (MOC), etc.

Break

Verification of Contingencies and Calculation Methodologies — 3:00PM to 4:30PM

A discussion on contingency consideration and selection as well as best practices and methodologies for ERS design calculations. Topics include API-RP 520 checklist for causes of overpressure, availability of contingency documentation and rationale for selection/rejection, and incorporation of root causes from previous incidents. Topics also include applications of standards and practices (e.g., API-RP 520/521, NFPA-30, DIERS) and the selection of appropriate sizing correlation.

Addressing Discrepancies — 4:30PM to 4:45PM

A discussion on developing a practical and cost effective approach to addressing ERS design basis discrepancies. Topics include reporting of audit results, prioritization/risk ranking of issues, aligning ERS documentation efforts with PHAs, implementation of industry standard tools and best practices, and training of personnel to address ongoing needs.

Wrap-up Discussion — 4:45PM to 5:00PM

Instructor

Mr. Kenneth McLeod, P.E.

Mr. McLeod is a senior consultant with ioMosaic Corporation presently working in our Houston branch office. He obtained his P.E. license in Alberta, Canada; and holds a BASc in Chemical Engineering from the University of Waterloo, Waterloo, Ontario, Canada. Additionally, Mr. McLeod is a member of the AIChE DIERS Users Group.

Mr. McLeod has worked in a variety of industries including agricultural chemicals, petrochemicals, pharmaceuticals and beverage alcohol. His present focus is on Emergency Relief System design and analysis.

Enrollment Information

Enrollment for each course is limited. We suggest you register as early as possible. Please fill out the registration form online at: www.iomosaic.com. We accept payment by check, credit card, or company purchase order.

Telephone or fax reservations will also be accepted.

These training courses are designed to enhance the skills of professionals with new responsibilities and include proprietary ioMosaic material.

Times

Course registration and check-in begin one half hour before start time.

Cancellations

Please notify us of cancellations in writing as soon as possible. Cancellations within two weeks of the course date are subject to a charge of 50% of the registration fee. If you fail to notify us of your cancellation before the course begins, you will be responsible for the full fee. There is no charge for substitutions.

Location and Lodging

The half-day course will be held from 1pm—5pm on the afternoon of October 21, 2009 at ioMosaic's Houston Office, 2401 Fountain View Drive, Suite 850, Houston, TX 77057, Tel: 713.490.5220. Please contact our Educational Services at 603.893.7009 to learn which hotel will be available for each course. Participants are responsible for making their own hotel reservations.

About ioMosaic

ioMosaic Corporation is a leading provider of process safety and risk management technology consulting services and software solutions. Our areas of expertise include runaway reactions and pressure relief design, consequence and risk analysis, fire and explosion dynamics, incident investigation, litigation support, training, mitigation design, hazard evaluation, and model development.

Contact Us

Contact us by email: support@iomosaic.com, by fax: 603.251.8384 or by phone at: 603.893.7009.

