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# SAFETY RELIEF VALVES

## INSPECTION, OPERATION AND TROUBLESHOOTING



### WHAT YOU WILL LEARN:

- Essential and integrated knowledge about pressure equipment and piping systems design and the significance of appropriate design, operation and maintenance on their mechanical integrity.
- A sound and practical understanding of the major degradation mechanisms affecting relief valves in oil and gas plants and refinery process units, how to predict them, how to assess their impact on relief valves over their operating life, and how to prevent and control these degradation and damage mechanisms using best industry practices including API and ASME codes.
- Enhance knowledge about inspection and testing strategies and methods and their effective application to achieve the highest probability of detection of damage and defects
- You will achieve a better understanding of the regulations and industry practices pertaining to repairs and alterations to safeguard against related failure and to avoid excessive repair costs
- Enhance competence and productivity thereby enhancing your competence and performance level and making additional value added contributions to your organizations

### WHO SHOULD ATTEND:

Maintenance, production and other plant engineers and technicians responsible for pressure relieving devices.

## The Workshop

This three day course is structured so that the inspection and maintenance personnel will benefit most from the first two days and the third day will also benefit pressure vessel engineers and system designers.

A safety or safety relief valve can be considered the most important single safety device on a boiler, piping, pipeline or pressure vessel. If it fails to function in the manner for which it was intended and an overpressure condition develops, the result could be catastrophic.

Like all mechanical devices, pressure relief valves require periodic maintenance and repair. To properly carry out repairs, it is essential that the work be done by trained personnel under controlled conditions, using proper parts and procedures.

### Objectives

- To increase your awareness and understanding that the mechanical integrity of relief valves depends jointly on the proper design, operation, condition assessment, and maintenance of the equipment.
- To provide you with a clear understanding of the degradation mechanisms that relief valves could be subjected to over their operating life, how to identify them, predict and determine their impact, and what appropriate measures can be taken to prevent and control the resultant damage.
- To provide you with the knowledge and failure analysis skills they need to conduct damage and failure analysis so as to prevent similar failures from happening.

### Competencies Emphasised

You will enhance your competencies in the following areas:

- Working knowledge in design, operation and maintenance of pressure relieving devices
- Understanding, prediction and identification of degradation and damage mechanisms that affect relief valves fitness for continued service and could result in significant potential failures
- NDT methods and their effective application
- Your company will be able to enhance its ability to use applicable inspection and maintenance resulting in lower life cycle costs while complying with codes and standards, and other regulatory requirements.

### Organisational Impact

Your company will be able to achieve measurable improvement in mechanical integrity through effective interaction between engineering, operation and maintenance functions. Your company will be able to enhance its loss prevention and safety performance.

## Practical Sessions

This is a practical, hands on workshop enabling you to work through practical exercises which reinforce the concepts discussed.

***To gain full value from this workshop, please bring your laptop/notebook computer.***

## The Program

### PRINCIPLE OF PRESSURE RELIEF VALVES

- Operation
- Development and application
- Dimensional characteristics of pressure relief valves

### SAFETY & RELIEF VALVE TYPES

- Conventional safety relief valve.
- Balanced safety relief valve
- Pilot-operated pressure relief valve
- Pressure and/or vacuum vent valve
- Rupture disk device

### RELIEF VALVE STRATEGY

- Selection
- Materials
- Sizing overview

### OPERATIONAL CHARACTERISTICS

- System pressures
- Device pressures

### CAUSES OF IMPROPER PERFORMANCE

- Mechanical/design (springs, materials etc)
- Process (corrosion, fouling, damaged seating surfaces)
- Maintenance

### INSPECTION & TESTING

- Reasons for inspection
- Shop inspection/overhaul
- Visual on-stream inspection
- Inspection frequency
- Time of inspection

### TESTING FACILITIES

- Pressure relief device certifications
- Pressure relief valve repair
- Nameplate data interpretation and stamping

### OVERHAUL

- Pressure relief valve disassembly
- Lapping and grinding
- Assembly
- Setting, testing and sealing

### SIZING RELIEF VALVES

- Gas & vapour sizing
- Liquid sizing
- Multiple valve sizing

### CODES & STANDARDS

- API RP 576 and API RP 520
- ASME Code Sections I and VIII
- National Board Inspection Code

### QUALITY CONTROL SYSTEMS

- Records & reports
- The need to keep records
- Responsibilities

### SUMMARY, OPEN FORUM AND CLOSING