

# TUV/IICS 2.6 CERTIFIED PRESSURE RELIEF VALVES INSPECTOR

(FORMALLY AS SAFETY RELIEF VALVES INSPECTOR)

**COURSE DURATION: 5 DAYS** (4 DAYS TRAINING + 1 DAY EXAM)

## COURSE DESCRIPTION

Within the boiler, piping and pressure vessel industry, safety relief valves are of most essential importance. Pressure relief valves are the last line of defense against catastrophic failure or even loss of life. The course covers safety valve types, codes & standards and designs, materials, specification and selection, sizing, installation & testing, preventive maintenance procedures, operation and troubleshooting.

A number of different instructional methods are used throughout the course to allow interactive learning and to give practical examples from manufacturing and service industry to enable the delegates to operate select, size, install, test and troubleshoot safety valves upon course completion.

Safety Relief Valve Sizing Software "Valvestar" from LESER Germany will be demonstrated for sizing & selection of relief valves. (Sizing of Safety Valves as per codes, two phase flow / fire case as per API, pressure loss, back pressure, reaction forces, noise level). Pentair PRV Size Software will demonstrated for sizing Relief Valves.



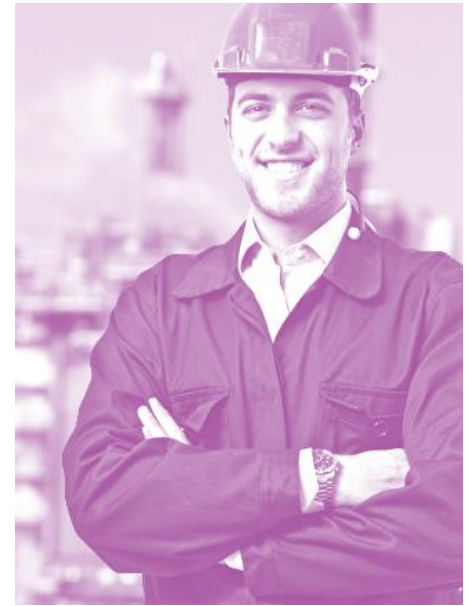
## COURSE OBJECTIVES

- ✓ Familiarize participants with the functions and applications of safety relief valves, their types, designs and components.
- ✓ Enable appropriate safety valve sizing and selection for liquid, gas and vapor applications
- ✓ Train participants to install, inspect, test & troubleshoot a variety of safety valves.
- ✓ To increase the participant's 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 the participants 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 the participants with the knowledge and failure analysis skills they need to conduct damage and failure analysis so as to prevent similar failures from happening.
- ✓ To understand requirements of industry codes / standards and approval authorities.
- ✓ In-situ Testing Techniques – Onsite Testing of Safety Relief Valves.
- ✓ Emerging Technologies in Pressure Relieving Devices
- ✓ Use Valve Star / PRV size software for Safety Relief Valve Sizing & selection from Leser and CROSBY.

## COURSE OUTLINE

### CHAPTER: 1 - INTRODUCTION –SAFETY RELIEF VALVES

- ✓ History
- ✓ Pressure Relief Devices ( ReClosing, Non- ReClosing)
- ✓ Reclosing Pressure Relief Devices
  - Pressure Relief Valves
    - ⇒ Safety Valves
    - ⇒ Relief Valves
    - ⇒ Safety Relief Valve



### WHO SHOULD ATTEND?

Engineers / Supervisors /  
Technicians from Maintenance  
Operations Department,  
Maintenance Service  
Department and Inspection &  
Materials Technology Section.

### COURSE DURATION

- 5 Days  
(4 Days Training + 1 Day Exam)

- ✓ Non Reclosing Pressure Relief Devices
  - Rupture Disk
  - Breaking Pin devices
  - Buckling Pin devices
  - Shear Pin devices
  - Fusible Plug devices

## CHAPTER 2) OVERPRESSURE PROTECTION

- ✓ Safety Relief Valves in a Process
- ✓ Causes of Overpressure (Blocked Discharge, Fire Case, Thermal Expansion)
- ✓ Runaway Reaction, Tube Rupture in Heat Exchangers)
- ✓ Overpressure Protection Requirements

## CHAPTER 3) PRESSURE RELIEF VALVES – WORKING PRINCIPLE & COMPONENTS & SPECIFICATION

- ✓ Conventional Pressure Relief Valves
- ✓ Pilot Operated Pressure Relief Valves
- ✓ Balanced Bellow Pressure Relief Valves
- ✓ Power & Temperature Actuated Pressure Relief Valves
- ✓ Relief Vs Safety Valve
- ✓ Components & Accessories of Relief Valves
- ✓ Specifying Pressure Relief Valves

## CHAPTER 4) SAFETY VALVES – WORKING PRINCIPLE & COMPONENTS, SPECIFICATION

- ✓ Working Principle
- ✓ Classification ( Actuation, Lift, Seat Design, lever, bonnet )
- ✓ Major Components / Accessories
- ✓ Locations
- ✓ Specifying Safety Valves

## CHAPTER 5) CODES & STANDARDS

- ✓ Overview operational requirements
- ✓ ASME & API codes and standards-clarifications
- ✓ National Board approval
- ✓ Main paragraph excerpts from ASME VIII
- ✓ Main excerpts from American Petroleum Institute (API) recommended practices related to safety relief valves
- ✓ NACE
- ✓ PED
  - PED97/23/EC(Pressure Equipment Directive)-CEN



## TRAINING METHODOLOGY

This interactive training course includes the following training methodologies as a percentage of total tuition hours:-

- ✓ 50% Lectures – Workshop Presentations
- ✓ 30% Group Work & Practical Exercises (Question & Answers, Discussion )
- ✓ 20% Videos & Software

## CHAPTER 6) TERMINOLOGY

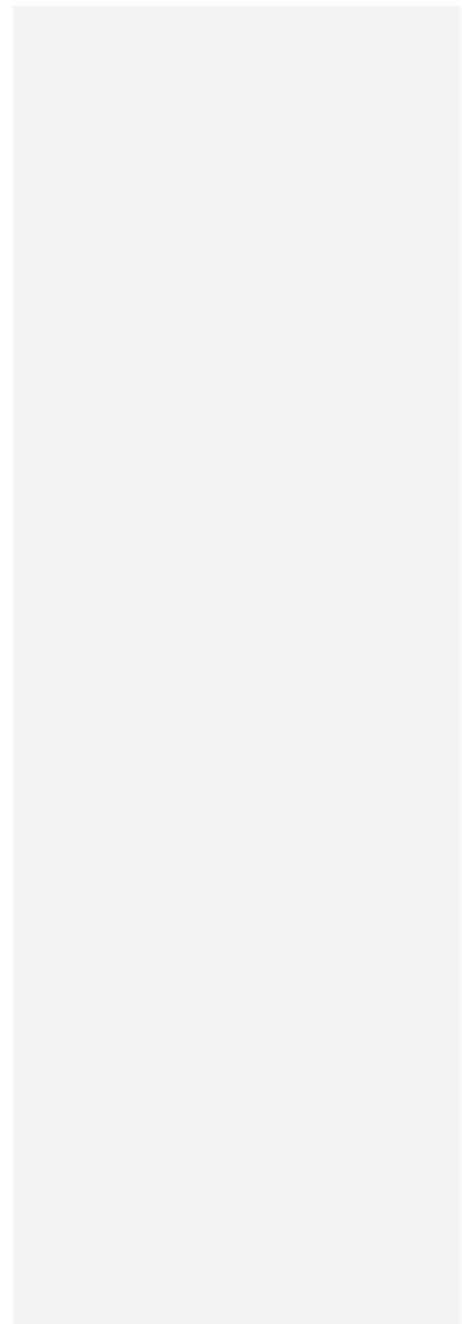
- ✓ Testing
- ✓ Type of devices
  - Reclosing pressure-relieving devices
  - Non-reclosing pressure relief devices
- ✓ Dimensional terms
- ✓ Operational terms
- ✓ Component terms
- ✓ Clarification of the terms: set pressure, overpressure, accumulation, MAWP and design pressure ( PED versus ASME )

## CHAPTER 7) DESIGN FUNDAMENTALS

- ✓ Materials of Construction
- ✓ Direct spring operated Safety Relief Valves
  - Introduction
  - Functionality
  - General design
  - Design of main assemblies
  - Design differences
  - Types of spring-operated SRV's
- ✓ Controlled safety pressure relief system (CSPRS)
- ✓ Pilot Operated Safety Relief Valves
  - Introduction
  - Functionality
  - Types of POSRV
  - Summary
- ✓ DIN designs
- ✓ Non re-closing pressure relief devices

## CHAPTER 8) SIZING & SELECTION

- ✓ Introduction
- ✓ Gas and vapor sizing
- ✓ Steam sizing (sonic flow)
- ✓ Liquid sizing
  - Combination devices
- ✓ Two phase or flashing flow
  - Two phase liquid/ vapor flow
  - Two phase system with flashing or non-condensable gas
  - Sub cooled liquid flashing
  - Two phase system with flashing and non-condensable gas



## CHAPTER 9) SAFETY RELIEF VALVE SELECTION

- ✓ Seat tightness
- ✓ Blowdown
- ✓ Service temperature
- ✓ Weight and/ or height
- ✓ Back pressure
- ✓ Orifice size – sizing
- ✓ Two phase flow
- ✓ Type of fluid
- ✓ Reciprocating compressors
- ✓ Liquid
- ✓ Materials

## CHAPTER 10) INSTALLATION

- ✓ Inlet and outlet piping
  - Calculating piping losses
  - Calculating outlet piping
- ✓ Location of installed SRVs
- ✓ Reaction forces and bracing
- ✓ Temperature transmission on installed SRVs
- ✓ Installation guidelines

## CHAPTER 11) TESTING

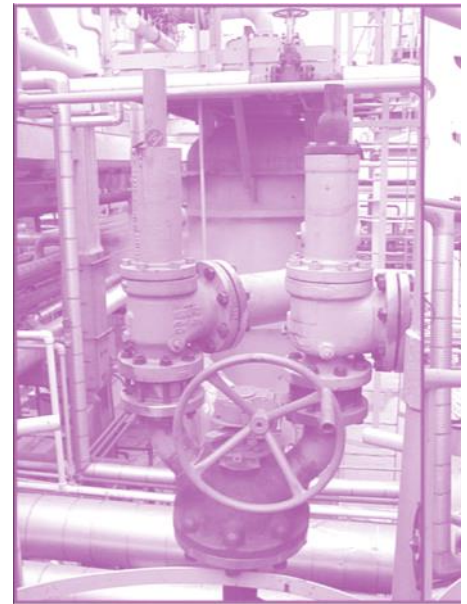
- ✓ In situ testing of spring-operated SRVs
- ✓ In situ testing of pilot-operated SVs

## CHAPTER 12) MAINTENANCE

- ✓ Determining maintenance frequency and cost
- ✓ Transportation and dirt
  - Preinstallation handling and testing of pressure relief valve
- ✓ Maintenance procedure ( Pretest, Disassembly, Repair, Assembly & Testing)

## CHAPTER 13) TROUBLESHOOTING SRV'S

- ✓ Seat leakage
- ✓ Chatter
- ✓ Premature opening
- ✓ Valve will not open
- ✓ Valve open above set pressure
- ✓ Valve does not reclose
- ✓ Bellows failure
- ✓ Springs



## CHAPTER 14) NOISE

- ✓ Noise from SRV, open vent and associated pipe
- ✓ Noise Calculations by SRV Vendor

## CHAPTER 15) SPECIFYING SAFETY RELIEF VALVES

- ✓ Summary of overall requirements
- ✓ Materials, design, identification, inspection, testing, preparation and shipment

## CHAPTER 16) LOW PRESSURE PROTECTION DEVICES

- ✓ Breather valves
- ✓ Emergency vents
- ✓ Pilot valves
- ✓ Tank blanketing

## CASE STUDY: SAFETY RELIEF VALVE INSPECTION & EVALUATION.





## TRAINER'S PROFILE

# MD. KAMAL

**Md. Kamal Uddin Ahmed, B.E.( Mechanical Engineering ) is a Senior Piping & Pipeline Engineer with 15-20 years of progressive & extensive international experience. He is an expert in Process, Power Piping & Liquid & Gas Transmission Pipelines as per ASME & API standards including ASME B1.1, B31.3, B31.4, B31.8, & API 570.**

He is a dynamic speaker & master trainer providing knowledge transfer effectively with interactive style that connects with the audience.

Md. Kamal has designed & presented piping design seminars to piping engineers & designers across India, Qatar & Saudi Arabia. He has trained more than 1500 mechanical, chemical, & petroleum engineers in Piping Engineering, Pipeline Design, HVAC & Plumbing Systems from different countries including India, Qatar, Saudi Arabia, Jordan, Turkey, Sudan, Ghana, Nigeria, Maldives, United Kingdom, & Thailand.

## CLIENTS SERVED

Md. Kamal has offered professional training services to many corporate including:

- ORYX GTL Qatar
- ICB Tecnimont, Qatar Petroleum
- RASGAS
- Intergraph Consulting
- Infotech Enterprises
- Petrodar Oil & Gas Operating Co.

## EXPERTISE IN

- ✓ Piping Systems Detailed Engineering
- ✓ Pipe Stress Analysis
- ✓ Pipe Hydraulics
- ✓ Process Plant Layout
- ✓ Pipeline Design & Construction
- ✓ Pipe Supports
- ✓ Piping Systems Erection & Testing
- ✓ HVAC Plant Design
- ✓ Plumbing & Fire Water Piping Systems

Throughout his career, Md. Kamal has been providing these expertise for both new and operating process / power plants & facility construction industry using codes / standards, software analysis and field experience in arriving at safe, economical piping designs and solutions to piping problems.

Besides, Md. Kamal has also offered his services such as:

- ✓ Project Management
- ✓ Design / Analysis
- ✓ Construction / Testing / Inspection

in **India & Kingdom Of Saudi Arabia** involving many onshore & offshore projects.