

<p><b>KLM Technology Group</b></p> <p>Practical Engineering Guidelines for Processing Plant Solutions</p>	<table border="1"><tr><td><b>KLM</b></td><td><b>Technology Group</b></td></tr></table> <p><b>Engineering Solutions</b></p> <p><a href="http://www.klmtechgroup.com">www.klmtechgroup.com</a></p>	<b>KLM</b>	<b>Technology Group</b>	<p>Page 1 of 7</p> <p>Rev 1.0</p>
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## **Process Plant Pressure Relieving, Flaring Systems, and Flare Mitigation / Reduction Advanced Training Course**

The success of every company depends on each employee's understanding of the key business components. Employee training and development will unlock the companies' profitability and reliability. When people, processes, and technology work together as a team developing practical solutions, companies can maximize profitability and assets in a sustainable manner. Training and development are an investment in future success - give yourself and your employees the keys to success.

It is strategically important that your team understands the fundamentals of process unit operations concepts. This is the difference between being in the best quartile of operational ability and being in the last quartile. There is vast difference in the operational ability of operating companies and most benchmarking studies have confirmed this gap in operational abilities.

Whether you have a team of new or seasoned employees, an introduction or review of these concepts are very beneficial in closing the gap if you are not in the best quartile, or maintaining a leadership position. Most studies show that a continuous reinforcement of best practices in operational principles is the most effective way to obtain the desired results. Training and learning should be an ongoing continuous lifelong goal.

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## Course Objective

This course will guide the participants to develop key concepts and techniques for optimizing and designing pressure relieving systems, flaring systems and flare mitigation and reduction. These key concepts can be utilized to make operating decisions that can improve your unit's performance. To mitigate flaring effectively one needs to understand the flaring systems design and operation basis.

Many aspects of pressure relieving, flaring systems and reduction can be improved including, product recoveries, energy utilization, environmental impacts, and safety. This cannot be achieved without first an understanding of basic fundamental principles of design and operation. These principles need to be understood in advance of operating and trouble shooting a process unit operation for the manager or problem solving to be effective.

Each company needs to have people trained in key areas of safety. These include;

1. Hazard Analysis
2. Relief Valve Design
3. Relieving Cases Design
4. Flare System Design

This seminar focuses on the core building blocks of the relieving and flaring process systems equipment, flare reduction and economics. This program will emphasize the process unit operation fundamentals, safe utilization of these fundamentals by operations, engineering, maintenance and support personnel.

This course is an advanced course for these topics – for an introductory course consider attending our Introduction to Flaring Systems courses.

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## Outline

### Introduction

- Overview of the Chemical Processing Industry

### Review of Process Incidents

- Safety for the Chemical Processing Industry

### Introduction to Flaring System Equipment

- Flare Headers
- Relief Valves
- Knock Out Drums
- Flares
- Heat Exchangers
- Pumps
- Compressors
- Overview of Application Codes

### Overview of a Flare Header

- Comparison of Flare Header Designs
- Line Sizing Fundamentals
- Flare Line Routing
- Materials of Construction
- Flare Line Safety Case Study
- Piping Safety Guidelines

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### Overview of a Pressure Relieve Valve

- Design of a Pressure Relieve Valve
- Sizing a Pressure Relieve Valve
- Sizing Reliving Cases
  1. Fire Case
  2. Power Failure
  3. Cooling Water Failure
- Design Case Studies

### Overview of a Flare Knock Out Drum

- Comparison of KO Drum Designs
- KO Drum Design Guidelines
- Liquid Seal Design
- Heat Exchangers
- Pumps
- Compressors

### Overview of a Flare

- Comparison of Flare Designs
  1. Elevated Flare
  2. Ground Flare
  3. Enclosed Flare
  4. Thermal Oxidizer
- Types of Flare Tips
- Sizing a Flare Tip
- Types of Flare Tip Seals
- Sizing a Flare Height (Simple Approach)
- Sizing a Flare Tip (Brzustowski's and Sommer's Approach)
- Design Case Studies

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### Environmental Aspects

- Flare Combustion Efficiency
- Flare Smoking
- Reducing Flare Noise
- Thermal Radiation

### Flare Reduction by Layers of Protection Guidelines

- Layers of Protection Guidelines / Code Overview
- High Integrity Protection Systems (HIPS)

### Flare Reduction by P&ID Review

- P&ID Review to reduce flaring.
- Example - Installation of recycle lines.

### Flare Reduction by Vapor Recovery Systems

- Overview of Vapor Recovery Systems

### Process Equipment Troubleshooting

- Troubleshooting concepts and techniques
- Typical Problems
- Interaction of Process and Equipment

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### **Who Should Attend:**

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
  1. 1<sup>st</sup> Line Operations personnel,
  2. Operation Supervisors,
  3. 1<sup>st</sup> Line Maintenance personnel,
  4. Maintenance Supervisors,
  5. Senior Plant Supervisors,
  6. Operations Engineers
  7. Process Support Engineers,
  8. Design Engineers,
  9. Cost Engineers
  10. Environmental Support Personnel
- Ideal for veterans and those with only a few years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject matter

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### **What you can expect to gain:**

- A detailed overview of Flaring Systems operations, design processes and environmental concerns
- Gain an understanding of the equipment of a Flaring System
- To mitigate flaring effectively one needs to understand the flaring systems design and operation basis.
- Understand how LOPA and HIPPs may be applied to reduce flaring per the codes and standards.
- Understand Vapor Recovery Systems
- Gain an understanding of the design of these critical pieces of equipment.
- Review safety guidelines of Flaring Systems
- Troubleshooting Techniques