



## Propane Refrigeration System: Operations and Maintenance



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## Introduction:

This interactive training unit is designed to introduce trainees to some of the basic principles of refrigeration system operation, details explanation of mechanical refrigeration system cycle components surge drum, expansion valve, chiller, refrigeration compressor, and condenser, and to conduct design, operation, control system, maintenance, improve efficiency and troubleshooting of refrigeration system for natural gas processing. After completing this unit, trainees should be able to have knowledgeable and real experience field of natural gas propane refrigeration system plant.

## Course Objectives:

At the end of this course the participants will be able to:

- Refrigerator propane properties
- Heat transfer factors impact
- Design of Propane refrigeration system
- Operation of the Propane refrigeration system
- Control system of the Propane refrigeration system
- Maintenance Propane refrigeration system
- Improve the efficiency of the Propane refrigeration system
- Troubleshooting of Propane refrigeration system

## Targeted Groups:

- Operation engineers
- Operation supervisors
- Process engineer
- Maintenance engineer
- Maintenance supervisors
- Managers and team leaders
- Design engineer
- Operators and SR. Operators

## Course Outlines:

### Unit 1: Fundamentals:

- Introduction to Refrigeration
- Refrigerator propane properties
- Heat Transfer
- Refrigeration Systems
- Basic Refrigeration Cycle
- Refrigeration Components
- Secondary Cooling Systems

## **Unit 2: Design, Operation, and Control of Propane Refrigeration System Components Cycle:**

- Typical single and multi-stages
- Propane surge drum and pump loading
- Expansion valves
- Propane chillers
- Economizer
- Propane condenser

## **Unit 3: Propane Refrigeration Centrifugal Compressor:**

- Introduction to Centrifugal Compressor Principles
- Typical Centrifugal Compressor
- Centrifugal Compressor Operation
- Multi-Stage Compressors
- Axial Compressors
- The Compressor
- Casings
- Rotors
- Guide Vanes
- Diffuser and Volute
- Diaphragms
- Shaft Seals
- Shaft Bearings
- Lubrication System
- Seal Oil System
- Cooling System
- Drivers, Couplings, and Controls
- Drivers
- Direct Drive
- Gear Drive
- Couplings
- Compressor Performance
- Surge Control
- Safety Devices
- Classification

## **Unit 4: Propane Refrigeration Reciprocating Compressor:**

- Introduction to Reciprocating Compressor Principles
- Gas Compression
- Typical Compressors
- Piston Operation
- Typical Reciprocating Compressor
- Compression Unit Components
- Compressor Operation
- Valves
- The Compression Unit
- Air Cooling



- Water Cooling
- The Cylinder
- Compression Unit Lubrication
- Wiper or Scraper Rings
- Clearance Pocket
- Unloaders
- The Drive Unit
- Crank Assembly
- Crosshead
- Connecting Rod
- Power Source
- Balanced-Opposed Unit
- Integral Unit
- Multi-Stage Unit

#### **Unit 5: Propane Refrigeration Troubleshooting and Improve Efficiency:**

- Indicators and Checks
- Operating Checks
- Operating Problems
- Refrigeration System Controls and Applications
- Factors Affecting Operation
- Solve Fouling problems
- Maintenance types and maintenance plan