



PCE182

Improved Natural Gas Conditioning and Processing Technology

Course Introduction:

Natural gas, as it is used by consumers, is much different from the natural gas that is brought from underground up to the wellhead. Gas conditioning and processing separates contaminants to make it suitable for use. The process and equipment varies widely depending on the desired specification and applications of gas. Since its discovery, natural gas has become an indispensable fuel source throughout the world. The knowledge on handling issues in gas conditioning and processing will identify productivity, safety and profitability of the company.

This course will improve knowledge of professionals involved in the design, installation, evaluation and operations of gas processing plants and related facilities. The trainer will discuss processes used to dehydrate natural gas and remove acid gas components and mercury, meet hydrocarbon dew point specification, equipment sizing, specification and selection as well as principles of gas liquefaction and storage. The participants will learn how to apply physical/thermodynamic property correlations and principle to design and evaluate gas processing facilities. At the end of the course, the participants will recognize and develop solutions to operating problems and control issues in gas processing facilities.

The trainer's vast experience on process and project engineering from various roles in upstream and downstream both onshore and offshore in the oil and gas industries will provide practical knowledge and best practices to the participants. As an integral part of this course Case Studies will be presented where designs have been implemented to improve plant operability.

Course Objectives:

Upon the successful completion of the course, the participants will be able to:

- ✓ Learn the causes of overpressure and how to deal with them
- ✓ Enhance knowledge on sizing, specification and selection of compressors and be able to integrate compressor systems into process facilities
- ✓ Identify water content and hydrate formation conditions for gas streams using hand calculation methods and gain techniques to inhibit hydrate formation
- ✓ Provide professionals with knowledge on how to design, operate and address issues on gas conditioning & processing
- ✓ Effectively select and evaluate processes used to dehydrate natural gas
- ✓ Maximize profitability thru proper techniques on gas conditioning and processing
- ✓ Improve and increase production with the use of new technology, proper design and storage
- ✓ Gain insights from expert on liquefaction and regasification of cryogenic gases

- ✓ Understand gas to liquids conversion and its economic value

Who Should Attend?

This course is intended for all experienced Process, Productions and Operations Professionals who are involved in design, installation, evaluation and operations of gas processing plants and related facilities such as; process engineers, production engineers, plant operators personnel, facilities engineers, field engineers, maintenance engineers & supervisors as well as mechanical engineers.

Course Outline:

Day 1:

Gas and Liquid Hydraulics

- Calculation of pressure drop for single and two-phase systems
- Introduction to flow regimes
- Centrifugal and positive displacement pumps
- Concept of power and head

Exercise: Interpretation and Use of Pump Curves

Day 2:

Relief and Flare Systems

- Causes of overpressure and how to deal with them
- Defining relief cases
- Introduction to and application of API 520 and 521
- Selection and sizing of relief devices
- Design and operation of relief and flare systems

Exercise: Hands-on Calculation on Relief Valve Sizing

Compression Systems

- Types of compressors
 - Centrifugal
 - Reciprocating
- How to apply thermodynamics to compressor performance and operating characteristics
- How to size, specify, and select compressors
- Compressor auxiliary systems
 - lube oil and seal oil systems
 - suction and discharge vessels

Group Discussion: How to Integrate Compressor Systems into Oil and Gas Process Facilities

Day 3:

Principles of Gas Hydrate Formation and Methods of Control

- How to determine the water content and hydrate formation conditions for gas streams using hand calculation methods
- Techniques to inhibit hydrate formation including injection of equilibrium inhibitors such as methanol and MEG
- Dew point control of sales gas stream and removal of natural gas liquids (NGL) using mechanical refrigeration processes

Case Study: Natural gas is produced from offshore wells and injected into dry (depleted) gas wells for storage. As the storage wells are depleted during the consumption phase, the pressure drops in the wells, causing the operating point to move into the hydrate-forming part of the phase envelope. Gas hydrate forms, operations becomes highly erratic, the well becomes blocked with gas hydrate and the well has to be shut down, causing a gas shortage in the national gas grid. A unique method is devised to coat the walls of the wells with a TEG/methanol mixture which is dragged along with the gas and breaks up the hydrate particles as they are being formed.

Day 4:

Principles of Gas Dehydration (glycol)

- Advantages and disadvantages of various glycol species
- Discussion of water content and dew point specification
- Selection and evaluation of processes used to dehydrate natural gas
- Calculation methods of TEG dehydration processes

Gas Treating

- Carbon dioxide removal
- Sulfur removal
- Mercury removal

Principles of Gas Liquefaction and Storage (with emphasis on LNG and ethylene)

- Review of fundamentals of gas processing technology as applied to liquefaction and regasification of cryogenic gases.
- Overview of liquefaction technologies and advantage and disadvantages of each
- Review of heat exchangers used in cryogenic processes
- Review of gas treatment, fractionation and auto refrigeration

Case Study: Actual LNG storage tank is designed. Participants will learn how to design a million barrel-tank that can withstand temperature of minus 160°C and below and the large pressure swings occurring during typhoons. Knowledge on instrumentation and equipment has been developed specifically for very low-temperature (cryogenic) conditions.

Case Study: An ethylene storage tank is emptied and decommissioned. Temperatures below minus 160°C present special operational problems which are not found at temperatures ambient and above. This Case Study explains problems which will have to deal with during cryogenic operation and present practical solutions.

Day 5:

New Technology

- **Floating LNG Units and storage**
 - Advantages and disadvantages over conventional land-based trains
 - Status of the industry
 - Processes employed
 - Challenges
 - Prospects for the future
- **Gas-to-Liquids**
 - Why convert natural gas to liquids?
 - Development and present status of the industry
 - Overview of the processes used
 - Economics of producing specialty paraffins from gas

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test

- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per course location. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session

المركز العالمي للتدريب والتطوير
International Centre For Training & Development