Training Title

GAS CONDITIONING & PROCESSING

Training Duration

5 days

Training Venue and Dates

REF PE035	Gas Conditioning & Processing	5	04-08 November 2024	$6,000	Kuala Lumpur, Malaysia

In any of the 4 or 5 star hotels. The exact venue will be intimated once finalized.

Training Fees

$6,000 per participant for Public Training. Fees Includes Course Materials/Handouts, Tea/Coffee, refreshments & Lunch.

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

TRAINING INTRODUCTION:

The rapidly increasing worldwide demand for natural gas as an energy source requires expertise in gas engineering technology, which involves several production operations such as dehydration, acid gas removal, recovery of natural gas liquids and the production of liquefied natural gas. In addition, one involved in such industry needs to be familiar with different gas sources, specifications, storage requirements, transportation and distribution

TRAINING DESCRIPTION:

This course will start by defining what natural gas is, its properties, specifications and end uses. Then, typical gas processing operations will be discussed, including dehydration, acid gas removal, recovery of ethane, propane and NGL (natural gas liquids), and liquefied natural gas (LNG) operations. Sulfur recovery, tail gas conditioning and process control will also be discussed. Typical equipment and facilities that are found in typical natural gas processing operations will also be discussed including compressors, vessels, relief systems and safety systems. Finally, the fundamentals of gas transportation and distribution will be discussed.

TRAINING OBJECTIVES AND BENEFITS:

This short course is designed to give the attendants the fundamentals of natural gas conditioning and processing including some of the details of the process. Specifically, by attending this course you will:

- **Gain a deep knowledge of the properties, specifications and end uses of natural gas.**

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- **Gain a deeper understanding of typical natural gas processing operations, including:**
  - **Dehydration**
  - **Acid gas removal**
  - **Recovery of ethane, propane and NGL (natural gas liquids)**
  - **Sulfur recovery**
- **Gain a deeper understanding of the production of liquefied natural gas (LNG).**
- **Gain a deeper knowledge of the different equipment and facilities found in natural gas processing plants.**
- **Learn about fundamentals of gas transportation and distribution.**

WHO SHOULD ATTEND?

Technical and non-technical personnel involved in the activities of natural gas industry. Specifically, technical, operations and maintenance personnel who had limited exposure to this area, or professionals involved in other areas of the gas industry who require a comprehensive overview of natural gas processing will find this course ideally suited for them.

TRAINING METHODOLOGY:

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course. All presentations are made in excellent colorful power point. Very useful Course Materials will be given.

- **30% Lectures**
- **30% Workshops and work presentation**
- **20% Group Work& Practical Exercises**
- **20% Videos& General Discussions**

COURSE OUTLINE

Day 1:

- **What is natural gas?**
- **Origins**
- **Properties**
- **Specifications**
- **End uses and markets for natural gas**
- **Environmental advantages**
- **Physical behavior of natural gas systems**
- **Physical and thermal properties**

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- **Phase behavior analysis**
  - **Pure substances**
  - **The phase rule**
  - **Behavior of mixtures**
  - **Vaporization by gas pressure**
  - **Molecular theory of gases and liquids**
  - **Natural gases**
  - **Density of natural gas**
  - **Density of liquids**
  - **Dense phase**
  - **Surface tension**
  - **Viscosity**
  - **Thermal conductivity of gases**
  - **Thermodynamic properties**
  - **Sampling and analysis**

Day 2:

- **Natural gas processing plant**
  - **Flowsheet**
  - **Equipment and components**

- **Heat exchange in gas processing**
  - **Heat transfer theory**
    - **Mechanisms of heat transfer**
    - **Process heat duty**
  - **Heat exchangers types**
    - **Shell and tube**
    - **Double-pipe**
    - **Plate and frame**
    - **Aerial coolers**
  - **Fired heaters**
  - **Heat recovery units**

Day 3:

- **Hydrates**
  - **Determination of hydrate formation temperature or pressure**
  - **Condensation of water vapor**
  - **Temperature drop due to gas expansion**
  - **Thermodynamic inhibitors**
  - **Kinetic inhibitors and anti-agglomerators**
- **Low temperature exchange (LTX) units and line heaters**

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  - LTX units
  - Line heaters
  - Heat duty
  - Fire-tube size
  - Coil size
  - Standard size line heaters
- Condensate stabilization
  - Partial pressure
  - Multistage separation
  - Multi flashes
  - Cold feed distillation tower
  - Distillation tower with reflux
  - Condensate stabilizer design
  - Trays and packing
  - Condensate stabilizer as a gas processing plant
  - LTX unit as a condensate stabilizer

Day 4:

- Acid gas treating
  - Gas sweetening processes
    - Solid bed absorption
    - Chemical solvents
    - Physical solvent processes
    - Direct conversion of H2S to sulfur
    - Sulfide scavengers
  - Process selection
  - Design procedure for iron-sponge units
  - Design procedure for amine systems
- Amine absorber
- Amine circulation rates
- Flash drum
- Amine reboilers
- Amine stripper
- Rich/lean amine exchanger
- Amine cooler
- Amine solution purification
- Materials of construction
- Gas dehydration
  - Water content determination
  - Glycol dehydration
    - Process description

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        - Choice of glycol
        - Design considerations
        - System sizing
    - Solid bed dehydration

Day 5:

- Gas processing
    - Absorption/lean oil
    - Refrigeration
    - Choice of process
- Compressors
    - Types of compressors
    - Specifying a compressor
    - Reciprocating compressors process considerations
- Mechanical design of pressure vessels
    - Design considerations
    - Inspection procedure
    - Specification and design of pressure vessels
- Pressure relief
    - Relief requirements
    - Type of devices
    - Valve sizing
    - Installation
- Valves, fittings and piping details
- Safety systems
    - Hazard tree
    - Developing a safe process
    - Failure mode effect analysis (FMEA)
    - API recommended practice 14C
    - Manual emergency shutdown
    - Hazard analysis
    - Safety management systems
- Gas transportation and distribution

Note:

Pre & Post Tests will be conducted

Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.

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