



# **GAS DEHYDRATION & BOOSTER STATION UTILITIES**

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## **TRAINING TITLE**

### **GAS DEHYDRATION & BOOSTER STATION UTILITIES**

## **VENUE**

**Dubai, UAE**

## **DURATION**

**5 Days**

## **DATES**

**20 - 24 June 2021**

## **PRICE**

**US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet.**

## **TRAINING INTRODUCTION**

Throughout this course, sessions will provide opportunities for the trainees to get familiar with the fundamentals and practical aspects of natural gas processing. Further, the course will acquaint the trainees intensely with the most recent technologies applied in the field of condensate recovery & fractionation through delivering real-life case studies to achieve marketable products that meet desired product specifications.

Emphasis is placed on offering plant operating personnel an improved understanding of the condensate recovery & fractionation techniques and equipment used.

Typical equipment and facilities that are found in typical natural gas processing operations will also be discussed including compressors, vessels, and relief, flare and safety systems. This improved understanding of plant process operations and effective process plant surveillance techniques will lead to an increased ability to achieve optimum, economical operating performance.

## **TRAINING OBJECTIVES**

**By the end of the training course, the participants should be able to:**

- Demonstrate knowledge and understanding of the principles of natural gas industry.
- Select and implement most adequate techniques for condensate recovery & fractionation.

- Relate the gained knowledge in the area of natural gas utilization to real-life cases.
- Apply troubleshooting to technical difficulties encountered in the field of specialization.

### **TRAINING AUDIENCE**

The program is ideal for personnel involved in gas plant process operations, troubleshooting, process engineering, and technical services as well as others providing services to the gas industry, should also find this program beneficial.

### **TRAINING OUTLINE**

#### **Natural gas fundamentals**

- Introduction
- Natural gas history
- Natural gas origin and composition
- Gas sources
- Natural gas phase behavior & properties
- Quality and transportation

#### **Basic concepts of natural gas processing**

- Introduction
- Process modules
- Scope of natural gas processing
  - Processing objectives
  - Effect of gas type in field processing
  - Location of the gas field

#### **End uses and markets for natural gas**

- Environmental advantages
- Physical behavior of natural gas systems
- Physical and thermal properties
- 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**

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**Density of liquids**

**Dense phase**

**Surface tension**

**Viscosity**

**Thermal conductivity of gases**

**O Thermodynamic properties**

**Sampling and analysis**

- Natural gas processing plant
  - Flow sheet
  - 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

**Natural gas liquids recovery**

- Introduction
- NGL recovery processes
  - Refrigeration processes
  - Lean oil absorption
  - Solid bed absorption
  - Membrane separation process
  - Selection of NGL recovery processes

basic gas laws; characterization of the flow stream;

**Fundamental of gas reservoirs;**

**Phase diagrams (Low/High Shrinkage, Retrograde Condensate, Wet/Dry Gas); Vapor-Liquid equilibrium; qualitative phase behavior; flash Calculations/Bubble Point/Dew Point; basic thermodynamic concepts; and characterization of natural gas and its components.**

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**Gas-Liquid Separation – Factor affecting separation; separator and scrubber technology (design and application); and maintenance and troubleshooting considerations.**

**Absorption and Adsorption Processes –**

**Mass transfer fundamentals; absorption process; adsorption process; and system considerations. Acid Gas Removal – overview of the process; effects of acid gas; sweetening processes (absorption, adsorption, direct conversion, distillation and membranes); process selection; acid gas components (H<sub>2</sub>S and CO<sub>2</sub>); process selection and design procedure ; and typical operating problems and troubleshooting**

**Gas Dehydration and Hydrate Formation Inhibition –**

Process classification; dehydration theory and principles; moisture content of a saturated gas; calculation of moisture content of different gas compositions; consequences of hydrate formation; prediction of hydrate apparition; hydrate formation inhibitions (injection of inhibitors, molecular sieve adsorption); comparison inhibitors vs. desiccants; key operating parameters for and optimum operation; and most common operational problems and possible solutions.

**Gas Conditioning –** Removes contaminants at inlet of plant; water removal processes (absorption, adsorption, condensation, and membranes) H<sub>2</sub>S and CO<sub>2</sub> removal processes (chemical Absorption, physical absorption, solid bed, direct conversion, membranes, and extractive distillation); nitrogen removal (cryogenic fractionation) and mercury removal.

**Gas Processing –** Purpose of condition gas for sales and/or extract and recover NGL' s; hydrocarbon Dew-point Control (adsorption, Hydrocarbon Recovery Units (HRU' s), and Short-Cycle Units); absorption/lean oil process; Vapor Compression System; Natural Gas Liquid (NGL) Extraction; NGL products concerns of economic justification; NGL products concerns of extraction processes (absorption/Low Oil Process, adsorption, condensation, mechanical refrigeration, Turbo-Expanders, and Valve Expanders (LTX, LTS, J-T (Joule Thompson))); Condensate Stabilization (refluxed distillation and non-refluxed distillation); product treatment (contaminants of interest (CO<sub>2</sub> , Sulfur, water and removal of CO<sub>2</sub> from NGL product and Sulfur compounds from LPG products.

**Natural Gas Liquids (NGL) extraction –** Gas liquefaction objectives and method; NGL Process Flow Diagram (PFD); heat transfer and exchanger (heat and enthalpy concept and phase change and P-H diagram); external refrigeration loop; calculation of cryogenic loop used for hydrocarbon liquids extraction from natural gas; Joule-Thompson (JT) expansion; turbo expander; and optimization of the process performances.

Design considerations

Operational problems

Equipment used in gas plant operations



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Trouble shootings

➤ Case Studies Discussions

### **TRAINING CERTIFICATE**

**MAESTRO CONSULTANTS** Certificate of Completion for delegates who attend and complete the training course

### **METHODOLOGY**

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of “real life” issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.

