Gas Operations Engineer: Gas Booster Station Ops & Control

PCE138
Process and Chemical Engineering

COURSE TITLE

Gas Operations Engineer: Gas Booster Station Ops & Control

COURSE DATE/ VENUE

5th - 9th JAN 26'

Rome, Italy

COURSE REFERENCE

PCE138

COURSE DURATION

05 Days

DISCIPLINE

Process and Chemical Engineering

COURSE 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.

COURSE OBJECTIVE

Upon successful completion of this course, the delegates will 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.

COURSE 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.

COURSE CONTENT

DAY 1

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

DAY 2

End uses and markets for natural gas

- Environmental advantages
- Physical behaviour of natural gas systems
- Physical and thermal properties
- Phase behaviour analysis
    - Pure substances
    - The phase rule
    - Behaviour 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 3

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;

DAY 4

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.

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_2S and CO_2); 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_2S and CO_2 removal processes (chemical Absorption, physical absorption, solid bed, direct conversion, membranes, and extractive distillation); nitrogen removal (cryogenic fractionation) and mercury removal

DAY 5

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/Lean 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 (CO2 , Sulfur, water and removal of CO2 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

Trouble shootings

- Case Studies Discussions

COURSE CERTIFICATE

TRAINIT ACADEMY will award an internationally recognized certificate(s) for each delegate on completion of training.

COURSE FEES

£5,500 per Delegate. This rate includes participant's manual, Hand-Outs, lunch, coffee/tea on arrival, morning & afternoon of each day.

COURSE METHODOLOGY

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation, discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. 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.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises
- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions