



PE076: Process Engineering Calculations





Training Description:

This course is designed to provide participants with a detailed and up-to-date overview process engineering calculations. It covers the chemical engineering principles and the equipment design including heat transfer and heat exchangers, evaporators, heaters, mass transfer and distillation towers, separator vessels sizing and design considerations, etc.; the hydraulics and fluid mechanic calculations for hydraulics of fluids and pressure drop; the pipeline piping design; and the various control valves sizing including gas service, liquid service and steam service as well as the pressure relief, flare and blowdown.

In this intensive training, participants will learn the summary and calculations for various utilities including cooling water, chilling medium and instrument air; the pump, compressor and heat exchanger calculations in the oil and gas industry; the flow line/pipeline sizing, crude oil assay characterization and heat and mass balance; the losses from storage tanks and crude oil heating value; and the combustion temperature of fuels as well as the references for software calculations.

Training Objective:

By the end of the training, participants will be able to:

- ✓ Apply and gain an in-depth knowledge on process engineering calculations
- ✓ Discuss the chemical engineering principles and identify the equipment design including heat transfer and heat exchangers, evaporators, heaters, mass transfer and distillation towers, separator vessels sizing and design considerations, etc.
- ✓ Explain hydraulics and fluid mechanic calculations for hydraulics of fluids and pressure drop
- ✓ Describe pipeline piping design and enumerate various control valves sizing including gas service, liquid service and steam service as well as the pressure relief, flare and blowdown
- ✓ Differentiate the summary and calculations for various utilities including cooling water, chilling medium and instrument air
- ✓ Practice pump, compressor and heat exchanger calculations in the oil and gas industry and determine flow line/pipeline sizing, crude oil assay characterization and heat and mass balance
- ✓ Estimate losses from storage tanks and crude oil heating value and discuss combustion temperature of fuels as well as the references for software calculations

Training Designed for:

This course is intended for those who are involved with process engineering, chemical engineering, instrumentation & control including process engineers, Mechanical & Equipment Engineers, Project Engineers and Maintenance Engineers, Field Engineers, Operators and Technicians and other Technical Personnel. The course covers systematic techniques on process engineering calculations.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request”.

Please note that the below topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- ❖ PRE-TEST





- ❖ Introduction
- ❖ Chemical Engineering Principles
- ❖ Equipment Design
 - Heat Transfer & Heat Exchangers, Evaporators, Heaters
 - Mass Transfer & Distillation Towers
 - Separator Vessels Sizing & Design Considerations
 - Liquid Settling Space Velocity & General Tips
 - Air Coolers
 - Pump Sizing
 - Tank Sizing, Drum Types & Pressure Storage Vessel Design Considerations
 - Batch Heating/Cooling Time Estimation
 - Reboiler Heat Load Calculation
 - Heating Coil in Storage Tanks
 - Estimation of Number of Stages for Crude/Condensate Stabilization

DAY TWO:

- ❖ Hydraulics & Fluid Mechanic Calculations
 - Hydraulics of Fluids and Pressure Drop
- ❖ Pipeline /Piping Design
 - Pipe Thickness and Schedule
 - Estimation of Pressure Drop
 - Hydrate Formation Temperatures and Pressures
 - Pipeline Design - Quick Estimates
 - Hydrate Inhibitor Injection

DAY THREE:

- ❖ Valves Sizing
 - Control Valve Sizing – Gas Service
 - Control Valve Sizing – Liquid Service
 - Control Valve Sizing – Steam Service
- ❖ Pressure Relief, Flare and Blowdown
 - Pressure Relief Valve Sizing – Gas Service
 - Pressure Relief Valve Sizing – Liquid Service
 - Pressure Relief Valve Sizing – Thermal Expansion
 - Relieve Valve (PSV) Calculations
 - Flare KO Drum Sizing
 - Flare Network Capacity Checks and Calculations
 - Estimation of Flare Radiation and Sizing of Flare Utilities
 - Estimation of Blow-Down

DAY FOUR:

- ❖ Utilities
 - Cooling Water Summary and Calculations
 - Chilling Medium Summary and Calculations
 - Instrument Air Summary and Calculations
- ❖ Oil & Gas
 - Pump Calculations



- Compressor Calculations
- Heat Exchanger Calculations
- Flow Line/Pipeline Sizing
- Crude Oil Assay Characterization
- Heat and Mass Balance

❖ **Practical Sessions**

- This hands-on, highly-interactive course includes real-life case studies and exercises

DAY FIVE:

- ❖ Estimation of Losses from Storage Tanks
- ❖ Heating Value & Combustion Temperature of Fuels
- ❖ Crude Oil Heating Value Estimation
- ❖ References for Software Calculations
- ❖ Course Conclusion
- ❖ POST-TEST and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:

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Training & Career Development Department

