



MUE149

Heat Exchangers

Mechanical Designs & Specification

Course Introduction:

This course will prepare you for mechanical systems operation and maintenance of heat transfer equipment. There will be an emphasis on mechanical components design, material selection, specification, and performance evaluation in this course. All types of exchangers are addressed including shell and tube, plate, brazed aluminum, air coolers, and fired heaters.

Course Objectives:

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

- ✓ Learn about designing, specifying and comprehending the basics of fabrication for heat transfer equipment used in the petroleum industry.
- ✓ Learn about identifying and selecting the most appropriate type of heat transfer equipment for the application.
- ✓ Learn about developing an understanding of the process design calculations for sizing and positioning heat transfer equipment.
- ✓ Learn about preventing common problems with heat exchangers

Who Should Attend?

This course is intended for mechanical engineers, facility engineers, plant engineers, and design engineers who are involved in the design of heat transfer equipment utilized in petroleum facilities.

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International Centre For Training & Development

Course Outline:

Day 1:

Types and Applications of Heat Exchangers

- Types
 - Shell-and-tube heat exchangers
 - Air coolers
 - Plate-frame exchangers
 - Compact plate-fin exchangers
- Applications
 - Single-phase
 - Boiling/evaporating

- Condensation

Fundamentals of Heat Exchanger Performance

- Energy balance
- Rating methods
 - F-LMTD
 - e-NTU
 - Incremental computer-based
- Pressure drop
- Performance margins
 - Fouling factors
 - Cleanliness factors

Day 2:

Heat Exchanger Selection Criteria

- Cost
- Operating Conditions
 - Transient
- Maintenance needs
 - Cleaning schedule
- Material selection
 - Fluid compatibility
- Mechanical considerations
 - Temperature and pressure

Single-phase Applications

- Heat transfer coefficients
- Pressure drop
- Extended surfaces
- Enhancements
 - Tube inserts

Day 3:

Boiling Applications

- Boiling fundamentals
 - Pool boiling
 - Flow boiling
- Two-phase pressure drop

- Typical services
 - Refrigerant evaporators
 - Re-boilers

Condensing Applications

- Condensing fundamentals
- Film condensation
- Condensing regimes
- Pressure drop considerations
- Condenser geometries

Day 4:

Operational Problems

- Fouling
- Vibration
- Venting and draining
- Re-boiler problems
 - Instability
 - Film boiling
- Temperature pinch

Day 5:

Troubleshooting

- Use of field data
 - Accuracy of measurements
 - Accuracy of performance models
- Inspections
- Typical mechanical defects/degradation

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 the course location. This rate includes participant's manual, and-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	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Coffee/Tea/Snacks)
13:30 - 15:00	Last Session