

Training Title

HEAT EXCHANGERS: TYPES & APPLICATION, DESIGN, OPERATION & MAINTENANCE

Training Duration

5 days

Training Venue and Dates

ME077	Heat Exchangers: Types & Application, Design, Operation & Maintenance	5	29 September – 03 October, 2019	\$4,250	Dubai, UAE
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In any of the 5 star hotels. The exact venue will be informed once finalized.

Training Fees

- **4,250 US\$ per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch.**

Training Certificate

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

TRAINING DESCRIPTION

Heat exchanger is an important and expensive item of equipment that is used almost in every industry (oil and petrochemical, sugar, food, pharmaceutical and power industry). A better understanding of the basic principles of heat transfer and fluid flow and their application to the design and operation of heat exchangers that you gain from this course will enable you to improve their efficiency and extend their life. Design of heat exchangers, their performance is very important subjects to obtain better efficiency of operation and high effectiveness of the heat exchangers. Also, his will enable to communicate with the designers, manufacturers and bidders of heat exchangers. The methods of maintenance, cleaning and inspection of heat exchangers as well as their troubleshooting will be included.

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TRAINING OBJECTIVES

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

- Understand the principles of heat transfer and fluid flow, application of industry practices and a substantial amount of supporting data needed for design, performance and operation of modern heat exchangers.
- How to use the applicable API, TEMA and ASME recommended practices, standards and codes for the design of heat exchangers shell & tubes.
- Communicate with the designers, manufacturers and bidders of heat exchangers
- Be familiar with technology, operation and performance improvement of heat exchangers.

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- Learn & familiar with the classification & practical aspects and receive tips of the shell and tube heat exchanger thermal design and rating: mechanical design and rating using the applicable API, TEMA and ASME recommended practices, standards and codes, troubleshooting, enhancement & selection procedure for Heat Exchanger.

WHO SHOULD ATTEND?

This course is designed for:

- Develeopes (mechanical, Process, Planning & Vibration Engineers and supervisors)
- Project engineers, process engineers and plant engineers in the oil, chemical, sugar, power, and other industries that requires a wider and deeper appreciation of heat exchangers design, performance and operation.
- The detailed review of thermal and mechanical design is particularly useful to plant and maintenance engineers as well as to those generally knowledge able in the subject, but who require a refresher or update.
- Troubleshooting procedures are important for process engineers.

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.

Very useful Course Materials will be given.

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

DAILY OUTLINE

DAY 1:

1. Essential Considerations & Terminology:

- Why heat transfer
- Nomenclature & Units
- Difference between coolers, condenser, heater, reboiler and exchangers
- Types & physical properties of fluids.
- Methods of heat transfer
- Process heat transfer
- Types of heat transfer equipment
- Heat transfer coefficient
- Measurement of flow rates, pressure and temperature difference.

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2. Heat Transfer by Conduction:

- Heat flow through simple wall
- Heat flow through composite wall
- Heat flow through pipe wall
- Heat flow through composite pipe
- Heat flow through spherical wall
- Heat flow through composite spherical annuli
- Lagging materials

DAY 2:

3. Types of Shell & Tube Heat Exchangers:

- Fixed head
- U tube
- Split backing ring & pull through
- Floating head
- Kettle reboiler
- Packed flowing head
- Double tube plates
- Removable Covers
- Bobbin type
- Bonnets
- All welded construction

4. Standards of Tubular Exchanger Manufacturers Association(T.E.M.A)

- Tube side passes
- Tube size & pitch
- Cross baffles
- Longitudinal baffles
- Impingement baffles
- Outer tube limit, tie rods, spacers
- Shell diameters
- Shell side flow arrangements

DAY 3:

5. Mechanical Design Calculation of shell & Tube Heat Exchanger

- Codes
- Design pressure & temperature
- Pipe tolerance
- Design Tubes
- Shell & Channel Barrel
- Nozzles
- Flanges

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- Tubesheets
- Gaskets & Bolting
- Sizes & Weights
- High pressure exchangers
- Standardization
- Pressure drop calculation
- Temperature difference & heat transfer coefficient calculations.

6. Material Selection:

- Corrosion considerations
- Carbon & low alloy steels
- Copper alloys
- Bi- metal construction
- Metallic linings
- Non - metallic linings
- Stainless Steels
- Aluminum & Nickel alloys applications
- Titanium
- Welding
- Cost Consideration & Factors

DAY 4:

7. Corrosion & Fouling of Heat Exchangers

- Effect of Sea Water
- Biofouling
- Effect of Cooling Water Flow Rate
- Symptoms of Leaks
- Temperature Difference Indications
- Corrosion monitoring
- Plugging of Leaked Tubes
- Retubing

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8. Operation of Heat Exchangers

- Check & Inspection
- Hydrostatic Tests
- Introduce Cold Fluid
- Introduce Hot Fluid
- Check Temperature Differences
- Check Signs of Leaks
- Shutdown & Isolation

9. Air Cooled Heat Exchanger

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- Function & Application
- Description / Geometry
- Efficiency Compared to Water Cooled Heat Exchanger
- Performance Improvement

DAY 5:

10. Fired Heaters Application as a Heat Exchange Equipment

- Indirect & Direct Fired Heaters
- Thermal Efficiency

11. Performance of Heat Exchangers:

- Countercurrent, Co-current
- TEMA Flow Arrangements
- Comparisons
- Two-Phase Flow and Flow Patterns
- Heat Transfer Coefficients
- Pressure Loss
- Effect of Non-Condensable gases
- Heat Transfer Efficiency
- Heat Losses due to Scale Formation
- Heat Exchanger Leaks Problems

Post Course Test

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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