



PE012: Heat Exchangers & Fired Heaters Operation & Troubleshooting

Training Description:

This intensive course covers a detailed and up-to-date overview on the operation and troubleshooting of heat exchangers and fired heaters. Participants will be able to respond to typical heat exchanger and fired heater problems that may occur during operation. The course will also cover the principles of heat transfer and the factors affecting heat transfer; the flow arrangements of fluids inside heat exchangers; and the various types and its major components.

During this course, participants will learn to apply the proper procedure in taking out of service and putting in service of heat exchangers; identify the various types of furnaces and the major parts of a horizontal and vertical furnace; recognize the types of gas burner and its properties; apply combustion process; employ furnace start up, shutdown and troubleshooting; identify the thin tube, hot spot, tube fire side heater, furnace explosion, flame temperature, flame stability and combustion.

Training Objectives:

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

- ✓ Operate and troubleshoot heat exchangers and fired heaters in a professional manner
- ✓ Discuss the principles of heat transfer and the factors affecting heat transfer
- ✓ Illustrate flow arrangements of fluids inside heat exchangers and identify the types and its major components
- ✓ Apply proper procedure in taking out of service and putting in service of heat exchangers
- ✓ List the various types of furnaces and identify the major parts of a horizontal and vertical furnace
- ✓ Enumerate the types of gas burner and describe its properties as well as combustion process
- ✓ Employ furnace start up, shutdown and troubleshooting
- ✓ Identify thin tube, hot spot, tube fire side heater, furnace explosion, flame temperature, flame stability and combustion

Training Designed for:

This course is intended for heat exchangers and fired heaters operation for process engineers, section heads, shift controllers, shift supervisors, operators and for those who are interested in heat exchangers and furnaces.

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."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course 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
- ❖ Heat Exchangers

- Introduction to Heat Exchangers, Principles of Heat Transfer, Factors Affecting Heat Transfer
 - Conduction, Convection & Radiation
- Flow Arrangement of Fluids Inside Heat Exchanger, Types of Heat Exchangers, Major Components

❖ Shell & Tube

- Fixed Tube Sheet, Floating Tube Sheet, Return Bend Heat Exchanger, Plate Type Heat Exchanger, Double Type Heat Exchanger, Parallel Flow, Counter Flow, Temperature Approach in Heat Exchanger, LMTD, Correction Factor, Allocation of Fluid in Heat Exchanger, Shell & Tube Passes, Cross Flow Heat Exchanger, Overall Heat Transfer Coefficient

DAY TWO:

❖ Principles of Heat Allocation

- Corrosion, Fouling, Temperature, Pressure, Differential Pressure, Viscosity, Design Considerations, Hair Pin Heat Exchanger, Aerial Cooler

❖ Main Components

- Draft, Louvers, Blades, Vibration

❖ Causes & Correction

- Fouling Factor, Factors Affecting Heat Transfer, Procedure to Take Heat Exchanger Out of Service, Procedure to Put Heat, Exchanger in Service

DAY THREE:

❖ Fired Heaters

- Type of Furnaces, Major Parts of a Horizontal Furnace, Major Parts of a Vertical Furnace, Fire Box, Shock Tubes, Radiant Cone, Convection Section, Stack Temperature, Causes of High Stack Temperature, Flue Gas Composition, Burners, Effect of Excess Air on Combustion, Fuel - Air Ratio, Types of Burners, Gas Burner Construction, Draft Inside Gas Burner, Pre-Mix Gas Burner, Non Pre-Mix Gas Burner, Properties of Gas Burner, Draft Inside Gas Burner, Flash Back, Fuel Oil Burner, Steam - Air Atomising Burner, Combination Burner, Pilot Burner, Burner Management System

DAY FOUR:

❖ Combustion Process

- Fuel & its Flame Colour, Combustion Losses, Ignition Temperature, Flame Temperature, Excess Air, Combustion Control, NOX Formation, Furnace Operation, Furnace Draft, Coking, Ignition, Furnace Operation, High Pressure Fir - Box Furnace, Furnace Tube Life

❖ Practical Sessions

- This hands-on and includes real-life case studies and exercises

DAY FIVE:

❖ Furnace Start Up

- Maximum Skin Temperature, Flame Distribution, Balance of Flow
- Pre-Start Up, Ignition of Burner Under Pressure
- Furnace Shut Down, Furnace Heat – Off, Furnace Emergency Shut Down

- Action in the Event of Tube Rupture, Minor Tube Leak, Furnace Typical Operating Problems, Effect of Reduced Air, Absolute Combustion, Oxygen Starvation, Fir Box and Flame Appearance, Secondary Combustion, Furnace Troubleshooting, Loss of Flame, Flame Control, Heater Tube Failure, High Temperature Creep, Purge Steam, Identifying Thin Tube & Hot Spot, Tube Fire Side Heater, Furnace Explosion, Flame Temperature, Flame Stability, Combustion
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT 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, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

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

Training Fees:

TBA 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 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

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

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