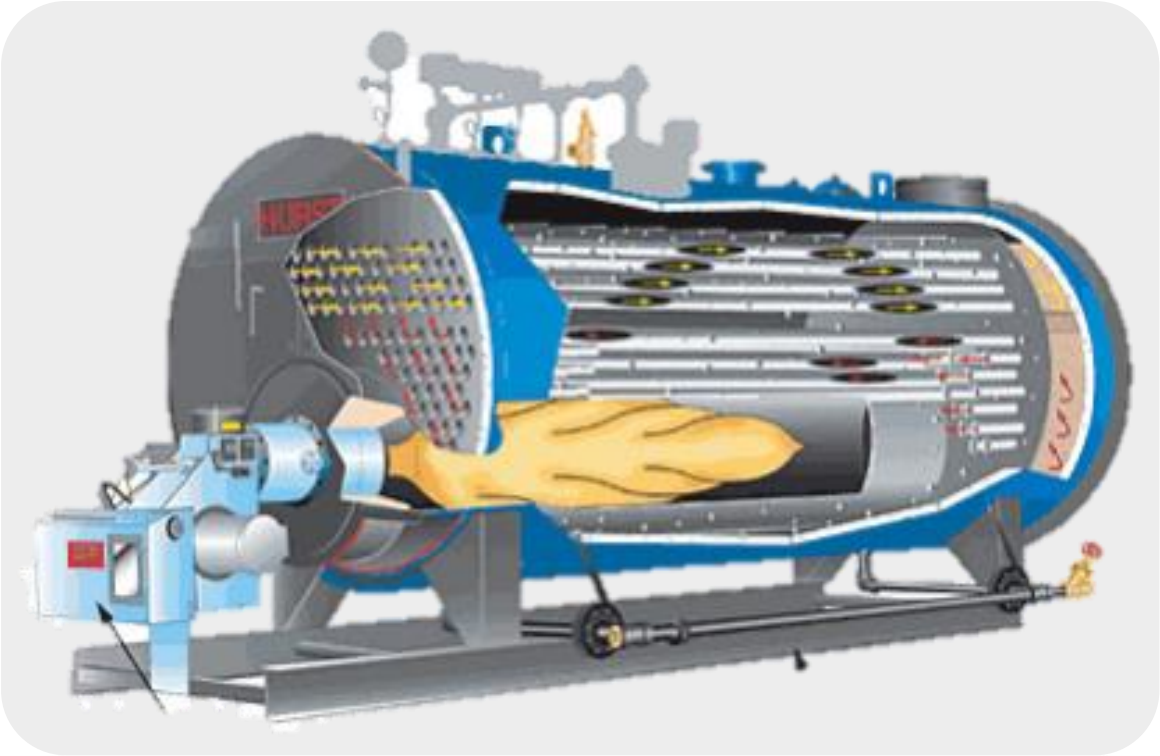
ICTD
المركز العالمي للتدريب والتطوير
International Centre For Training & Development



MUE204
Boiler Technology Process & Management

Course Introduction:

This course will provide a comprehensive review of the principles of boiler water conditioning. The ASME and EPRI Boiler Chemistry Guidelines will be developed. Oxygen control by means of desecration and chemical treatment will be reviewed. Boiler design principles will be developed, including heat transfer, circulation effects, and high-pressure requirements. The special requirements of HRSGs will be reviewed in depth.

The chemistry and control of phosphates, chelant and sludge conditions were be reviewed in depth. Problems and solutions associated with steam purity and condensate corrosion will be covered in detail with several practical examples. Guidelines for chemical cleaning will be developed.

The discussion of the metallurgical analysis of failed boiler tubes includes a workshop. The course concludes with destructive and non-destructive options for boiler tube inspection.

Ion exchange is a critical unit process in purifying water for steam generation, semiconductor manufacture, and pharmaceutical applications. The course reviews resin structure, function, and the gamut of water purification applications from softening to the preparation of ultra-quality water. The course has been modified to focus on monitoring performance and reacting to system upsets (troubleshooting).

Course Objectives:

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

- ✓ Have an understanding of the chemistry of boiler water treatment for scale, corrosion, and carryover control, treatment options for the gamut of industrial boiler system pressures, the options and precautions associated with boiler chemical cleaning, and metallurgical analysis of failed boiler specimens.
- ✓ Have a strong understanding of the chemistry of ion exchange resins and the operation of systems using ion exchange resins for water purification, including system and vessel design parameters. The course also provides practical options to use when troubleshooting resin-based systems

Who Should Attend?

Those new to the field take away a good multi-discipline understanding of the issues involved in their work. It helps them in becoming productive quickly and in building a knowledge framework that will help them identify, understand, classify and remember on the job learning and experiences.

Implementation Teams: This program can be used to train implementation teams? When a new project or initiative is being started in your organization; when a new strategic focus is being initiated; just prior to a consultant being hired to advise the organization.

Course Outline:

Day 1:

Introduction:

- Water Chemistry, Boiler Water Quality Requirements

Oxygen Control:

- Mechanical De-aeration, Chemical
- Scavenging, Testing

Boiler Calculations:

- Cycles of Operation, Blowdown Monitoring

Principles of Internal Treatment:

- Boiler Design and Heat Flux, Circulation

Day 2:

Deposition Control:

- Either Low Pressure—Phosphates, Chelants, Dispersants or High Pressure—Iron Deposition, Dispersants. EPRI
- Guidelines (Participants will Choose One)

Corrosion Control:

- Either Low Pressure—Corrosion Control in Cast Iron Boilers, Boiler System Testing or High Pressure—Coordinated Phosphate/pH, Congruent Control, AVT, Neutral Oxygen

Heat Recovery Steam Generators:

- Flow and Load Considerations, Multiple Pressure System Chemistries

Carry-Over Control:

- Carry-Over Mechanisms, Steam Purifications, Monitoring

Day 3:

Chemical Cleaning of Boilers:

- Commissioning Cleaning, Deposit Monitoring, Deposit Condensate Corrosion: Corrosion Mechanisms, Amine Treatment, Testing

Condensate Polishing:

- Mixed Beds, Powdered Resin Units, Magnetic Filtration

Failure Analysis:

- Boiler Tube Failure Modes, Metallurgical Analysis, Metallurgical

Boiler Tube Testing:

- Workshop
- Destructive Sampling and Non-Destructive Testing Methods, Visual Boiler Inspection

Day 4:

Introduction of Ion Exchange:

- Water Chemistry Units, Pretreatment Requirements of Ion Exchange

Ion Exchange Resins:

- Synthesis, Types, Water of Hydration, Commercial Equivalents

Ion Exchange Softening:

- Equipment, Service and Regeneration Reactions, Troubleshooting

Individual Conferences:

- Participants' Water and Resin Analyses
- Exhaustion Profiles, Distributor Design, Regenerate Dilution Systems

Day 5:

Two-Bed Demineralization:

- Equipment, Service and Regeneration Reactions, Performance Expectation

Troubleshooting Demineralizers

- Short Run, Poor Water Quality, Resin Problems

Mixed Beds:

- Makeup Mixed Beds, Performance Expectations, Regeneration
- Protocols, Three Component Systems, Uniform Particle Size Resins

Resin Testing:

- Vessel Inspection, Sample Procurement, Interpretation of Resin
- Analysis, Decision to Clean or Replace

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 Questionaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per the course location. This rate includes participant's manual, hand-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