BOILERS: A TECHNICAL AND OPERATIONAL WORKSHOP

CLASS FORMAT:
Lab + classroom
The participant is able to “learn-by-doing” in the course; this knowledge can be transferred to the workplace.

STANDARD CLASS SIZE:
NTT recommends a course size of 12 participants to obtain the best results.

NTT PROVIDES:
• 3-days (24 contact hours) of on-site instruction
• Textbooks and lab manuals
• Classroom consumables
• Completion certificates
• Shipping and instructor travel logistics

CLIENT TO PROVIDE:
• Classroom, with easy access, of 1,000 square feet or greater
• Projection screen, white board and/or flip chart(s)
• A dock facility or a forklift to unload the training equipment
• A pallet jack to move the crates around after they have been unloaded may also be needed
• The equipment should be placed in the training room for the NTT instructor to test and setup prior to the start of training

SHIPPING:
2 crates at 1,000 lbs
• 1 crate @ 51” x 30” x 31” (500 lbs)
• 1 crate @ 45” x 42” x 38” (500 lbs)

Boiler maintenance is critical because it determines the life of a boiler. Today’s attention to maintenance affects tomorrow’s bottom line.

A well maintained boiler system is reliable and can last 25 years or more. However, it experiences a lot of wear and tear. We teach preventative maintenance to counteract some of the deterioration. We also discuss the common failures and how to diagnose, troubleshoot and fix them.

Gain a basic understanding of operator responsibilities related to safety, reliability and efficiency of commercial and industrial boiler systems.

COURSE AGENDA | 3-Day Hands-On

OPERATOR RESPONSIBILITIES
• Efficiency of operation and safety
• Safety—priorities and hazard of explosion
• Waste stream pollution and stack emissions

THERMODYNAMICS
• Continuity of dependable operation thermodynamics
• Laws of thermodynamics
• Specific/sensible/latent heat
• Superheated
• Steam expansion & quality
• Boiler rating terms
• British thermal unit
• Heat and temperature
• Pressure Saturated Steam (Enthalpy) Table
• Fundamentals of Heat Transfer Boiler Basics
• Steam vs. hot-water boilers
• Strainer
• Hydronic system
• Steam cycle and trap
• Typical steam piping

BOILER TYPES AND DETAILS
• Fire-tube
• Water-tube boilers
### COURSE AGENDA, continued

#### CODES & STANDARDS
- ASME boiler and pressure
- ASME definitions
- Vessel code
- Safety valves
- Hydrostatic testing
- Pressure gauge
- Annual Inspection R (Repair) Stamps
- Fuels
- Classification of boiler

#### EMISSIONS
- Clean Air Act
- Deposition control
- Attainment and maintenance of the Nation Ambient Air Quality Standards

#### FUELS
- Solid fuels
- Fossil fuels

#### WATER TREATMENT
- Water treatment based on analysis of each application
- Three basic impurities
- Pretreatment
- Internal treatment
- Silica
- Oil contamination
- Conducting minimum
- Tests for small low-pressure systems
- Boiler water limits and steam purity
- pH scale
- Water treatment classifications
- Boiler blowdown
- Condensate corrosion
- Condensate testing
- Treatment for hydronic systems

#### COMBUSTION SYSTEMS AND FUEL-BURNING EQUIPMENT
- Combustion system
- Air for combustion supplied
- Fuel supply systems
- Classification of combustion air
- Ventilation
- Fuel trains

#### COMBUSTION THEORY AND TUNING CONTROLS
- Combustion
- Burner tuning
- Firing-rate control
- Gas pressure switches
- Oil pressure switch
- Manual/auto selector switch
- System pressure selector
- Damper position switches
- Condensate receiver
- Feedwater pump and control systems
- Burner operating controls
- Burner on/off switch
- Fuel selector switch
- Lead/lag controls
- Low fire hold
- Low-water cutoff
- Flame sensors
- Boiler management control systems
- Gauge glasses

#### PLANT OPERATIONS MAINTENANCE AND REPAIRS
- Routine and scheduled maintenance and repairs
- Preventive maintenance
- Record keeping

#### EFFICIENCY
- Efficiency improvements

#### HANDS-ON LAB EXERCISES
- Flame safeguard trainer sequence
- Component identification
- Jackshaft linkage adjustments
- Solenoid valve troubleshooting
- Wiring the panel
- Troubleshooting faults