Boilers

COURSE: NR-13BOI40 – SAFETY TRAINING ON BOILERS OPERATION

SCOPE AND APPLICABILITY:

Establish minimum requirements for the management of structural integrity of steam boilers and its interconnecting pipes in aspects related to the installation, inspection, operation and maintenance, aiming the safety and health of workers.

REGULATIONS & STANDARDS

- NR-13 – Boilers, Pressure Vessels, Pipes and Metallic Storage Tanks;
- NR-37 – Safety and Health on Oil Platforms;
- NBR-ISO-16528 - Boilers and Pressure Vessels: Minimum Performance Requirements;
- NBR-15151 - Qualification and certification of boilermakers.

COURSE CONTENT:

1. Notions of applied physics:
    - 1.1 Pressure:
        - 1.1.1 Atmospheric pressure;
        - 1.1.2 Gauge pressure and absolute pressure;
        - 1.1.3 Internal pressure in boilers;
        - 1.1.4 Pressure units.
    - 1.2 Heat Transfer:
        - 1.2.1 General notions: what is heat, what is temperature;
        - 1.2.2 Modalities of heat transfer;
        - 1.2.3 Specific heat and sensitive heat;
        - 1.2.4 Heat transfer at constant temperature.
    - 1.3 Thermodynamics:
        - 1.3.1 Concepts;
        - 1.3.2 Saturated steam and overheated steam.
    - 1.4 Mechanical of fluids:
        - 1.4.1 Fundamental Concepts;
        - 1.4.2 Flow Pressure;
        - 1.4.3 Gas Flow.
2. Notions of applied chemistry:
    - 2.1 Density;
    - 2.2 Solubility;
    - 2.3 Diffusion of gases and vapors;
    - 2.4 Acid and Base Characterization (Alkali) - Definition of pH;
    - 2.5 Basic Concepts of corrosion.
3. Boiler General Considerations:
    - 3.1 Types of boilers and their uses:
        - 3.1.1 Flamotubular boilers
        - 3.1.2 Aquatubular boilers;
        - 3.1.3 Electric boilers;
        - 3.1.4 Boilers for solid fuels;
        - 3.1.5 Boilers for liquid fuels;
        - 3.1.6 Gas boilers.
    - 3.2 Boiler accessories.
    - 3.3 Boiler control instruments and devices:
        - 3.3.1 Feeding device;
        - 3.3.2 Level display;
        - 3.3.3 Level control system;
        - 3.3.4 Pressure indicators;
        - 3.3.5 Safety devices;
        - 3.3.6 Auxiliary devices;
        - 3.3.7 Valves and piping;
        - 3.3.8 Smoke draft;
        - 3.3.9 Safety Instrumented System.
4. Boiler Operation:
    - 4.1 Starting and stopping;
    - 4.2 Regulation and control:
        - 4.2.1 of temperature;
        - 4.2.2 of pressure;
        - 4.2.3 power supply;
        - 4.2.4 the water level;
        - 4.2.5 of pollutants;
        - 4.2.6 combustion;
    - 4.3 Failures of operation, causes and measures;
    - 4.4 Daily checks scripts;
    - 4.5 Operation of a multi-boiler system;
    - 4.6 Emergency procedures;
5. Boiler Water Treatment:
    - 5.1 Impurities of water and its consequences;
    - 5.2 Treatment of feed water;
    - 5.3 Boiler Water Control.
6. Explosion and another hazard prevention:
    - 6.1 General risks of accidents and health risks;
    - 6.2 risks of explosion;
    - 6.3 Case Studies.
7. Legislation and standardization.
    - 7.1 Regulatory Standard 13 NR13;
    - 7.2 Category of Boilers.
    - 7.3 Equipment inspection and maintenance topics and records.

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COURSE DESIGN:

TOTAL: 40 hours

PREREQUISITE(S):

High school degree.

MINIMUM/MAXIMUM NUMBER OF DELEGATES:

This course requires a minimum of 1, and a maximum number of 12 trainees.

To offshore trainings, the course number of trainees will comply with the vessels/rig necessity.

MAIN SAFETY ISSUES:

- Care when using tools;
- Selection of EPI's and tools to protect against electricity;
- Individual and collective protection measures;
- Risk assessment in the workplace;
- Escape Routes;
- Interpretation and correct reading of data;
- Work distractions;
- Emergency actions to take control of involved systems;
- Care when conducting non-destructive pressures tests;
- Information Project Reading on the indicating signs;

REQUIRED EQUIPMENT:

- Manual of the equipment;
- Procedures;
- Maintenance tools of pressure vessels;

PROCEDURE FOR THE TRAINING:

- Observe the work area;
- Observe boiler(s) plates;
- Observe the boiler type onboard;
- Evaluate all necessary equipment's and accessories for safety operation;

CERTIFICATION:

Training certificate signed by responsible Engineer accredited by Brazilian CREA.

CERTIFICATE VALIDITY PERIOD:

Recommended: 2 years.