

HIGH-PRESSURE BOILER INSPECTION PROCEDURES: A COMPLETE CHECKLIST

Inspecting high-pressure boilers is a complex process requiring preparation, planning, and a multitude of safety precautions. Regular inspections help to ensure that high-pressure boilers are functioning optimally and can reduce the costs and hassles associated with sudden breakdowns by detecting potential problems before they become major crises.

Here's what you need to do to prepare for and carry out a high-pressure boiler inspection. Note that the steps outlined below are intended to provide general guidance, but as regulations and requirements vary from state to state, the specific steps required in your local area may differ. Thus, it's important to stay up-to-date on all state and local regulations and standards related to high-pressure boiler inspection to ensure compliance.

Administration and General Requirements: Action Steps

PROPER REGISTRATION: Contractors and inspectors should be registered with the appropriate regulatory agency (often at the state level) prior to installing or making any repairs or modifications to boilers.

REVIEW PREVIOUS INSPECTION REPORTS AND DOCUMENTS: Owners should make available all previous inspection reports and other documentation to the inspector for review prior to the date of inspection.

ENSURE PROPER CONSTRUCTION AND INSTALLATION: High-pressure boilers should be constructed, stamped, and installed in accordance with the requirements outlined in ASME Section I.

ASSESS SAFETY CONTROLS: Boilers installed after December 1998 (or refitted after this date) require appropriate safety controls, safety limit switches, and burners, as well as electrical requirements, based on the applicable national or international standard.

ASSESS REMOTE SHUTDOWN: High-pressure boilers must have a manually operated remote shutdown switch, marked clearly for easy identification and positioned outside the boiler room door.

ASSESS INSTRUMENTS, FITTINGS, AND CONTROLS: ASME Section I outlines a variety of requirements related to gages, gage glass, operating pressure, shutoff valves, pressure-temperature ratings, water columns, connections, and other controls. Assess the boiler's instruments, fittings, and controls to ensure compliance with ASME Section I.

Pre-Inspection: Action Steps

NOTIFICATION: Inspectors must notify owners or users at least seven days prior to the date of a planned inspection.

LOCK OUT FUEL SUPPLY AND IGNITION SYSTEMS: Owners should tag out and/or lock out the boiler's fuel supply and ignition system in accordance with the manufacturer's documentation.

DRAIN WATER: Owners should drain water from the boiler, and then thoroughly wash the waterside.

REMOTE PLATES AND PLUGS: Remove all manhole and hand-hole plates, washout plugs, and boiler inspection plugs in water column connections, as required by the inspector.

COOL AND CLEAN BOILER: The boiler should be cooled completely and cleaned thoroughly prior to inspection.

ADDRESS LEAKS: Prevent any leaks of steam or hot water into the boiler by disconnecting pipes or valves at the most convenient point, or by using another method approved by the inspector.

CLOSE, LOCK, OR TAG OUT VALVES: Steam or water system stop valves, including bypass valves, should be closed, locked out and/or tagged out following procedures outlined in the owner's manual. Open the drain valves or cocks between the two closed valves. This must be done before manholes are opened and prior to entering any part of a boiler connected to a common header with other boilers.

CLOSE, LOCK, OR TAG OUT BLOW-OFF VALVES: After the boiler is drained, close, lock out and/or tag out blow-off valves by following the procedures outlined in the owner's manual or operating manual. In some cases, an alternative method may be used, which includes blanking lines or removing sections of pipe.

DISCONNECT BLOW-OFF LINES: Where possible and practical, disconnect blow-off lines between pressure parts and valves. Leave drains and vent lines open.

Safety Checks: Action Steps

PRE-INSPECTION VERIFICATION: Before the inspector enters a boiler, the inspector must ensure that the appropriate safety steps (as outlined above) have been taken, and that all free blow vent and drain valves are open.

TEMPERATURE CHECK: The inspector must ensure that the boiler temperature will not expose any personnel performing or aiding with the inspection to excessive heat.

ATMOSPHERIC SAFETY: Before entering the fireside or waterside of a boiler, inspectors must be satisfied that they are entering a safe atmosphere. Atmospheric monitoring equipment may be used to ensure that the atmosphere is safe. If the area contains toxic, flammable, or inert gases, vapors, or dusts, the inspector should not be permitted to enter without the appropriate personal protective equipment. The oxygen content should be between 19.5% and 23.5%.

PERSONAL PROTECTIVE GEAR: Inspectors should have the appropriate personal protective equipment and clothing, including eye protection, gloves, suitable foot protection, coveralls, a safety hat, and other items as required. These items should be utilized and worn as appropriate, including respiratory protection if hazards exist in the atmosphere.

USE OF INSPECTION ATTENDANTS: At the inspector's request, or when required by regulations or standard procedures, an inspection attendant should be positioned outside the boiler at the point of entry during interior inspection. The attendant should be able to communicate with the inspector as necessary and have the means to request rescue assistance if necessary, as well as facilitate rescue procedures for others inside the boiler while remaining outside the boiler.

Inspection Elements: What to Document

When performing an inspection on a high-pressure boiler, inspectors must document the following information, including any additional information about concerns or issues identified throughout the inspection process.

Unit Identification

Manufacturer's Name

Year Built

Boiler Unit Description

of Modules (if Modular)

Boiler Maximum Input (BTU/KW)

Boiler Horsepower

Heating Surface

MAWP (Psig)

Maximum Temperature (Fahrenheit)

Minimum Required Safety Valve Capacity (LB/HR or BTU)

Safety Relief Valve Set Pressure and Capacity

Lowest Allowable Water Level Marking

Pressure/Temperature Gage Range and Mounting

Type of Piping

Hydrostatic Test Pressure and Duration

Combustion Air Requirements (Indicate if Satisfactory or Unacceptable)

Boiler Clearances (Indicate if Satisfactory or Unacceptable, based on manufacturer requirements)

Indicate Satisfactory or Unacceptable for the Following Requirements:

Stop Valves (if required)

Location of Water Column or Sight Glass

Venting (Chimney)

Observation Port

Lowest Permissible Water Level

Indicate Set Points Acceptable, Location of Control or Device, and Test Date and Result for the Following Boiler Controls and Devices:

Low-Water Fuel Cutout

Forced Circulation Flow Switch

Steam Pressure Control

High Pressure Limit

Water Temperature Control

High Temperature Limit

Indicate Set Points Acceptable, Location of Control or Device, and Test Date and Result for the Following Gas Fuel Train Safety Controls:

Drip Leg

Manual Shut Off Valve

Main Fuel Safety Shut Off Valve (with proof of closure)

Pilot Safety Shut Off Valve

Combustion Air Switch

High and Low Gas Pressure

Primary Flame Safeguards

Purge Air Flow

Gas Regulator

Vent Valve and Lines

Bleed Lines

Relief Lines

**Indicate Set Points Acceptable, Location of Control or Device,
and Test Date and Result for the Following Oil Fuel Train Safety Controls:**

Atomizing Medium Switch

Filters and Strainers

Low Oil Pressure

High Oil Temperature

Safety Shutoff Valves

Loss of Combustion Air Switch

Emergency Shutdown Switch

Low-Fire Start Switch (if required)

Documentation of All Code Violations Identified

Additional Inspection Comments

Ultimately, inspectors verify that high-pressure boilers are configured appropriately according to all applicable standards and regulations and that the boiler is operating within safe and acceptable pressure and temperature regulations, as well as other specified operating conditions.