

Inspection Procedure of Medium Risk installed boilers as per IBR, 1950

Medium Risk : All Vertical Cross Tube Boilers and Lancashire Boilers.

Inspection requirement: Thorough Examination only shall carry out to medium risk **boilers** for every renewal inspection. However when inspector feels required Hydraulic Test can also be carried out.

Procedure for Thorough Examination as per Reg 390 of IBR, 1950:

- a) For examination of boiler, the boiler shall be empty and thoroughly clean in all its parts i.e., shell, tubes and furnace chambers internally as well as externally.
- b) All doors of manholes, hand holes, sight holes and cleaning plugs shall be opened. All valves and cocks comprising the boiler mounting shall be opened up and taken apart and the valves or cocks ground.
- c) Wherever there is accessibility to go inside, the Inspector should make a thorough inspection of all its internal parts through manholes provided. Before doing so, he should of course, satisfy himself that proper provision has been made for disconnecting the boiler from any other boiler under steam.
- d) If the inspector finds that proper provision for disconnection has not be made or the boiler is unreasonably hot or the boiler is not been properly cleaned or scaled, he shall decline to proceed for inspection.
- e) **Scales & Oil solvents:** The Inspector shall examine all internal surfaces to observe the action caused by the water used for, oil scale solvents, or other substances which have been in feed water. The oil or scale often leads to scaling & rupture.
- f) **Corrosion & Grooving:** The Inspector shall examine for amount of corrosion along or around the seam which may lead to grooving or cracks due to poor circulation of water all such parts should be examined carefully. Grooving along longitudinal seams is especially significant as grooving or cracks are likely to occur when the material is highly stressed. Shell plate shall be examined for pitting and wasting which may reduce the thickness.
- g) **Stays:** All stays, whether diagonal or through, shall be examined to note that they are in even tension. All fastened ends shall be examined to note whether cracks exist where the stays are punched or drilled for rivets or bolts and, if not found in proper tension, the Inspector should recommended their proper adjustment.
- h) **Manhole & other openings:** The manhole and other reinforcing plates, as well as nozzles or other connections flanged or screwed into a boiler, shall be examined internally as well as externally to see that they are not cracked or deformed. All openings to external attachments, such as water column connections, openings in dry pipes and openings to safety valves shall be noted to see that they are free from obstructions.
- i) **Fire surfaces:** The parts exposed to fire i.e., furnace, tube internals & welding, tube sheets shall be examined for deformation which may be caused during operation by bulging or blistering or cracks.
- j) **Lap-joints, Fire cracks:** Lap-joint boilers are apt to crack where the plates lap in the longitudinal or straight seam; if there is any evidence of leakage or other distress at this point, it shall be thoroughly investigated and, if necessary, rivets removed or the plate slotted in order to determine whether cracks exist in the seam. Any cracks noted in shell plates are usually dangerous except fire cracks that run from the edge of the plate into the rivet holes of girth seams. A limit number of such fire cracks are not usually a very serious matter.
- k) **Stay bolts:** The Inspector shall test stay bolts by tapping one end of each bolt with a hammer and when practicable a hammer or other heavy tool should be held on the opposite end to make the test more effective.

l) **Tubes:**

1. The tubes of vertical tubular boilers are more susceptible to deterioration at the upper ends open when exposed to the products of combustion without water protection.
2. The surfaces should be carefully examined to detect bulges or cracks, or any evidences or defective welds. A leak from a tube frequently causes serious corrosive action on a number of tubes in its immediate vicinity.

m) **Pipe connections & Fittings:** The steam and water pipes, including connections to the water column, shall be examined for leaks, and if any are found it should be determined whether they are the result of excessive strains due to expansion and contraction, or other causes. The Inspector shall determine whether there is proper provision for the expansion and contraction of such piping, and that there is no undue vibration tending to crystallize the parts subjected to it

n) **Safety Valves:** Safety valves shall be examined to ensure there is no accumulation of rust, scale, or other foreign substances located in the casings so as to interfere with the free operation of the valves. The valves shall be tested by means of the try levers to ascertain if they are free. The steam discharged pipe is free and in accordance with the Regulations.

o) **Boiler mountings:** Check the physical & operation condition of all the valves, automatic water level control, blowdown valve, stop valve, water gauges, pressure gauge, fusible plug, feed valves, air vent valves

Note: If Hydraulic test is required, inspection procedure of Hydraulic test for low risk boilers shall be followed.

Check list:

1. Verify the engraved Boiler Registration number.
2. Check the physical condition of safety valves i.e., any rust, scale or other foreign substances.
3. Quality of boiler feed water (pH, TDS or hardness).
4. Working of feed water pumps.
5. Availability of boiler attendants & verify their certificates.
6. Condition of all valves (main stop valves, feed check valves, air vent, blow down, feed inlet, water gauge mountings, water level controller) & fusible plug etc.
7. Condition of internal surface of shell, gussets, stays provided, stiffeners on furnace, external surface of tubes shall be checked.
8. Any scale or oil solvents in internal or external parts of boiler.
9. Any corrosion or grooving or cracks observed in internal and external parts of boiler.
10. Condition of tubes internal for any blockages & leakages, bulges or cracks or defective weld.
11. Any distortions or bulging or blistering or leaks in furnace or fire box.
12. Condition of stay bolts or tube ends.
13. Any leaks, expansions or contractions in steam pipe connections.