

OBSERVING BOILER SAFETY RULES

The rules that follow are brief reminders of the possible consequences in a boiler plant of inappropriate operator response or questionable action in maintaining the boiler plant. In all cases, follow the published or oral safety rules of your employer, jurisdiction, and the Federal OSHA safety regulations to avoid possible disciplinary actions. In addition, study the safety guidelines of the manufacturer of your boiler.

NEVER	ALWAYS
NEVER fail to anticipate emergencies. Do not wait until something happens to start thinking.	ALWAYS study every conceivable emergency and know exactly what moves to make.
NEVER start work in a strange plant without tracing every pipeline and learning the location and purpose of every valve. Know your job.	ALWAYS proceed to proper valves or switches rapidly but without confusion in time of emergency. You can think better walking than running.
NEVER allow sediment to accumulate in gauge-glass or water-column connections. A false water level may fool you and make you sorry.	ALWAYS blow out each gauge-glass and water-column connection at least once a day. Forming good habits may mean longer life for you.
NEVER give verbal orders for important operations or report such operations verbally with no record. Have something to back you up when needed.	ALWAYS accompany orders for important operations with a written memorandum. Use a logbook to record every important fact or unusual occurrence.
NEVER light a fire under a boiler without a double check on the water level. Many boilers have been ruined and many jobs lost this way.	ALWAYS have at least one gauge of water before lighting off. The level should be checked with the gauge cocks. You will not be fired for being too careful.
NEVER light a fire under a boiler without checking all valves. Why take a chance?	ALWAYS be sure blow down valves are closed and proper vents, water-column valves, and pressure-gauge cock are open.
NEVER open a valve under pressure quickly. The sudden change in pressure, or resulting water hammer may cause piping failure.	ALWAYS use the bypass if one is provided. Crack the valve from its seat slightly and await pressure equalization. Then open it slowly.
NEVER cut a boiler in on the line unless its pressure is within a few pounds of header pressure. Sudden stressing of a boiler under pressure is dangerous.	ALWAYS watch the steam gauge closely and be prepared to cut the boiler in, opening the stop valve only when the pressures are nearly equal.
NEVER bring a boiler up to pressure without trying the safety valve. A boiler with its safety valve stuck is nearly as safe as playing with dynamite.	ALWAYS lift the valve from its seat by the hand lever when the pressure reaches about three-quarters of popping pressure.
NEVER take it for granted that the safety valves are in proper condition. The power plant is no place for guesswork.	ALWAYS raise the valve from its seat with the lifting level periodically while the boiler is under pressure. Test by raising to popping pressure at least once per year.
NEVER increase the setting of a safety valve without authority. Serious accidents have occurred from failure to observe this rule.	ALWAYS consult an authorized boiler inspector and accept his or her recommendations before increasing the safety-valve pressure setting.
NEVER change adjustments of a safety valve more than 10 percent. Proper operation depends on the proper spring.	ALWAYS have the valve fitted with a new spring and re-stamped by the manufacture for changes over 10 percent.
NEVER tighten a nut, bolt, or pipe thread under steam or air pressure. Many have died doing this.	ALWAYS play safe on this rule. The one that is going to break does not have a special warning sign.
NEVER strike any object under steam or air	ALWAYS play safe on this rule. You cannot tell

pressure. This is another sure path to the undertaker.	which straw might break the camel's back.
--	---

NEVER allow unauthorized persons to tamper with any steam-plant equipment. If they do not injure themselves, they may cause injury to you.	ALWAYS keep out loiterers and place plant operation in the hands of qualified persons. A boiler room is not a place for a club meeting.
NEVER leave an open blow down valve unattended when a boiler is under pressure or has a fire in it. Play safe; memory can fail.	ALWAYS check the water level before blowing down and have a second person watch the water gauge level while you blow down the boiler. Close the blow down valve, and then recheck the water level. You will avoid dry-firing the boiler this way.
NEVER allow anyone to enter a drum of a boiler without following OSHA rules for entering a confined space.	ALWAYS make sure the boiler is cool to enter, has enough oxygen per OSHA rules, has a sign by the entrance stating "Worker Inside", has an emergency person at the entrance, and that all valves going to and from the boiler are locked and closed.
NEVER allow major repairs to a boiler without authorization. If you do not break a law, you may break your neck.	ALWAYS consult an authorized boiler inspector before proceeding with boiler repairs.
NEVER try to light a second burner from the flames of the first on-line burner. You might be inviting a serious puff back.	ALWAYS follow the starting sequence of the manufacturer on multi-burner boilers, including ignition and main flame proving by installed burner controls, and you will avoid a furnace explosion.
NEVER attempt to light a burner without venting the furnace until clear. Burns are painful.	ALWAYS allow draft to clear furnace of gas and dust for prescribed purge period. Change draft conditions slowly.
NEVER fail to report unusual behavior of a boiler or other equipment. It may be a warning of danger.	ALWAYS consult someone in authority. Two heads are better than one.

STANDARD OPERATIONAL SEQUENCES AND PROCEDURES

Note: This Publication is to be viewed only as a guide.

1. PRE-OPERATION CHECKLIST

- Pre-operational checks should be completed before lighting-up any boiler.
- Necessary to ensure the boiler plant is in a safe and efficient condition.

g. Chemical Cleaning / Boil Out

- For new or existing boilers with excessive deposits.
- Should be done under supervision of experienced personnel / contractors familiar with the hazards of such an operation.

h. Safety Checklist Prior To Inspection

- Before entering any boiler :
 - Lock out and tag all equipment items with movable parts connected to the boiler and fuel system and place a sign at the operating controls indicating that a workman is in the boiler.
 - Make sure it is properly isolated at ALL fuel, flue gas, steam and water sources; make sure it is properly vented and obtain an air sample to check for breathing quality. Use low voltage lights or explosion proof flashlights inside the boiler.
 - Notify the person in charge at the site when beginning and upon completion of the inspection.
 - Inspect with another person.
 - Always be aware of the nearest escape routes.
 - Before closing drum manholes and furnace doors, it is essential to ensure that all personnel are out of the boiler.

i. Before Closing The Boiler

- Thoroughly inspect all available parts of the boiler's interior, both the waterside and the fireside. Ensure no tools, rags or other debris are left lying around inside the boiler that could cause problems.
- Tubes and other areas that are not easily visible should be checked using other suitable methods i.e. push rods, mirrors, etc. All loose tubes and debris should be swept into a dustpan being careful not to sweep into tubes, drains, or blow-down connections.
- Check all internal piping, hangers, brackets, etc. to be sure they not been damaged during maintenance work.
- All sealing surfaces should be given a final check for dents, scratches and gouges. Critical water or steam joints under pressure must be scraped then dressed off flat with a carborundum block, or similar abrasive surface if they were damaged.
- Replace *all* gaskets on the waterside and steam connections. The cost is minor compared with the headaches from leakages later on. Use a graphite paste or other suitable paste to prevent sticking.
- Gas side gasket joints are not as critical, but require close inspection and cleaning and replacement if necessary.

j. Testing The Gas Side For Leakage

- For a forced draught unit, the draft fan may be used to place the furnace under high enough pressure by closing off the outlet damper. Passing a lighted candle along all the joints to be tested, tests the furnace attachments, furnace seals and smoke-box seals. The effects upon the flame will detect any leaks of air from the positive pressure furnace to the atmosphere. Another method is to use a “soap” test, which must be thoroughly dried after the test.
- NOTE: For the first test, a manometer could be installed to give the head pressure the fan can deliver against the closed damper operating at normal speed. This data should be recorded for future reference or fan testing.
- For an induced draft boiler, the same procedure may be followed, but this case calls for the flame behaving differently i.e. the inward suction of air will pull the flame into the leak.

k. Water And Steam Systems

- Visual survey all the areas of the plant to check for damage and ensure no unauthorized persons tampered with the plant.
- Do NOT refill a boiler while it is hot. Treated warm water should be used. The boiler should be vented to permit air to escape.
- Check the water level in the gauge glass (mid point) and all the gauge glass valves are open.
- Test true water level by opening the test cocks, starting with the uppermost.
- Open all the feed water supply valves.
- If water level was low, use the manual bypass valve to raise the water level to slightly below the midpoint of the gauge glass (i.e. head pressure from the hot well).
- Check the make-up water supply system to the hot well and whether it shall function automatically i.e. check float condition and operation.
- Start the feed water pump.
- Check the water treatment plant is in full operating condition.
- Boiler vent valve and any steam line vents should be opened to bleed air out as steam is raised.
- Open the main steam valve bypass. When distribution manifold is up to temperature and pressure, bypass valve is closed and main steam valve is opened.
- Open all steam drains, including steam trap bypasses, when the bypass valve was opened.

l. Fuel Systems

Covers fuel oil and fuel gas supply to a boiler.

- Check furnace internals for obvious signs of fuel leaks due to failure of the fuel valves to shut off (oil).
- Check the gas supply pressure is greater than the minimum permissible.
- Check the fuel oil temperatures (for heavy fuel oil).
- Check all the fuel valves are in final position for light-up sequence. The vent valves between the gas shut-off valve should be closed.

- Check all burner control panel lights are “Ready”. If not, check and rectify the faulty condition.

Safety devices are worthless if they are not kept in operating condition and checked regularly. The fuel safety shut-off valves are no exception. To test the tightness of the safety shutoff valves, a general procedure should be followed. It may slightly vary for different burner suppliers.

1. Ensure the draft fan is operating and close the safety shut-off valves.
2. Open the main manual gas supply valve and the vent valve.
3. Note the pressure gauge reading between the gas pressure regulator and the first safety shut-off valve. It should stabilize at the “lock-up” pressure if the regulator is a tight shut off design.
4. Open the gas cock.
5. Connect the rubber hose with the test valve to the first nipple.
6. Close the vent valve and place the lower end of the test hose in a cup of water.
7. Observe if any bubbles are emanating from the hose end, which would indicate the first shut-off valve is leaking.
8. Move the hose to the second nipple and cap off first nipple.
9. Place the hose end in the cup of water and close the gas cock.
10. Open the first shut-off valve and close the gas cock. If bubbles are observed, then the second (downstream) shut-off valve is leaking.
11. Close the first shut off valve and the gas cock. The pressure gauge after the second shut-off valve should read (kPa). Cap off second nipple and ensure all lines have been vented and closed.

g. Air Systems

Covers the combustion air system and the instrument air system and/or plant air for oil atomizer:

- Check the intake air dampers are open and clear of any debris or obstructions.
- Check both the primary and secondary air dampers are set and ready for automatic operation.
- Check the damper control system is ready to operate.
- Check the flue dampers for readiness to operate.
- Check the draft fans are clear, run free and ready to operate.
- Check the instrument air supply lines are clear of water and pressure is correct.
- If atomizing air is being used for the fuel oil, clear the line of all condensed water by draining and check its pressure.