

S. P. THERMAL SYSTEMS INC.

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PRODUCTS AND SERVICES

Boilers- New Or Used - Hurst & Indeck Boilers
Water Treatment Chemicals & Services

ACID CLEANING SOAK METHOD ACID CLEANING CIRCULATING METHOD

NOTE: Follow all Local regulations for the discharge of Acid Waste.

Do not dump Used Acid or ANY Acid without neutralizing to at least pH 7

BOILER TYPICAL ACID CLEANING PROCEDURES

We recommend that the boiler be acid washed with an **inhibited acid**. The inhibited acid will prevent any attack on the metal surface.

PROCEDURE FOR SOAK METHOD:

1. The boiler has to be taken off line. Boiler pressure dropped to **Zero**.
2. The **Main Steam valve** has to be secured (**Closed**), so no acid leaves the boiler and gets into the steam system. The valve has to be shut tight and must not leak. This is also necessary to prevent any gases during the acid wash going into the steam system.
3. The safety valve on the boiler **is removed** and can be used **to vent gases** from acid wash out.
4. The boiler Feed water pump must be isolated by valve. Also, pressure control system and sight glass valves should be isolated, before acid is added.
5. Open one Hand hole cover which is close **to top** of boiler water level. **Highest hand hole cover**.
6. Take a sample of the scale from the boiler and keep for doing tests.
7. Drop water level in boiler to about $\frac{1}{2}$ on a Fire Tube Boiler.
8. Knowing the **Operating Water content** of the boiler, have approximately **20 - 25%** of the Operating Water content **as acid** available for acid cleaning.
9. If using Total Clean Acid WM 8575 pour through hand hole acid carefully, using a funnel arrangement.
10. **Add Anti Foam** through hand hole cover to stop any foam generated by the acid reacting with the scale.
11. Fill boiler with the acid and water to cover the top layer of tubes.
12. You may have to install back the hand hole cover with gasket to stop acid coming out of the boiler.
13. If the boiler could be started for a short period to raise the water temperature to **120 - 140 F** This would increase the acid reaction time. Sometimes the water in the boiler may be warm enough to use to create a good reaction, if the boiler was just taken off line before acid cleaning..
14. If possible **add an air line** through the safety valve hole and bubble air in the water and acid to create some circulation. Do this for a minimum of **8 hours. Longer period of time is better (24 hours)**
15. Monitor the acid strength in the boiler. When acid level has dropped it is time to stop the cleaning.
16. Drop the water / acid level below the top hand hole by draining from bottom of boiler, and open hand hole if closed.
17. **Add a neutralizing compound**, such as caustic, to the boiler through hand hole, to raise the PH to 7. *Care must be taken, as the neutralizer can burn your skin. Always make sure you have adequate access to water for wash off , in case of emergency.*
18. Drain acid and water out of boiler from bottom blowdown. Monitor pH and neutralize to pH 7 while draining and also dilute drain with water.
19. Open all hand holes and Flush all areas with water using a pressure hose.
20. Check bottom of boiler and remove any loose scale.
21. Replace all Hand Hole Gaskets with **new ones**, refill boiler with *soft water*, open feed water pump valves.

22. Open steam valve and other valves - (Pump Feed water, sight glass, and pressure-trol)
23. The Fresh new water in boiler should be soft water and have chemical treatment.
24. Start the boiler and make sure no leaks are occurring.
25. Follow normal boiler start up on low fire.
- 26 . Manual blowdown boiler more often for the next **3 days** to remove any loose scale that might have lodged at bottom of boiler.
27. When boiler goes back on line, check areas for steam. If steam is not going to certain areas check steam lines for water and drain.

S.P. Thermal Systems Inc. will only use a **safe inhibited acid compound** when doing acid washes. The acid we use is called **Total Clean WM 8575**. It is biodegradable and does not have any strong smells to effect your lungs. In addition the acid if in contact with your skin will not burn you. As the acid is biodegradable, flushing down the sewers is in most areas acceptable, once the pH is around 7 before dumping.

Other acids are available and effective, but are dangerous to handle and most likely cannot be disposed of easily. We do not recommend using these types of acids.

ACID DAMAGE:

S.P. Thermal Systems Inc. accept no responsibility for any damage caused by acid cleaning, to any part of your system. Should a leak occur, it most likely was due to a weak spot on the tubing that had been damaged prior to acid cleaning. Scale sometimes will hold a weak spot for a short period of time. Once the scale has been removed the weak spot will open up.

SAFETY:

When performing acid cleaning make sure you use effective safety equipment including glasses, shoes, mask. Always have someone with you and quick access to water for flushing your body incase of a spill. The room should also have good ventilation. Never carry out this procedure without a buddy system in place. Always read Material Safety Data Sheets and keep on hand during acid cleaning.

S.P. Thermal Systems Inc or its agents will not be responsible to repair or fix leaks associated from the acid cleaning of the boiler or any equipment being cleaned.

It will be the owner of the equipment responsibility to arrange to have all repairs fixed, and pay for these repairs, in the event of such an incident occurring.

NOTE:

As acid cleaning is normally required due to water hardness depositing scale in the system, we recommend that early detection of water softeners malfunctioning, can be prevented, by doing daily checks on your water softener.

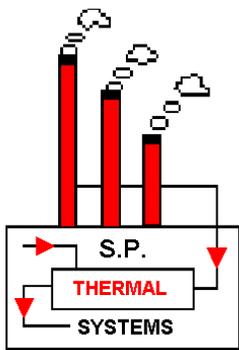
In addition, after an acid wash, the problem of hard water should be rectified, to prevent the same cleaning procedure from happening again.

With the scale deposit removed from the boiler you will see an increase in boiler efficiency.

Deposits of Calcium Scale of

- 1/32" will reduce boiler efficiency by 8%
- 1/8" will reduce boiler efficiency by 25%
- 1/4" will reduce boiler efficiency by 40%

The High cost of fuel makes acid cleaning of scaled boilers very cost effective.



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BOILER TYPICAL ACID CLEANING PROCEDURES

We recommend that the boiler be acid washed with an **inhibited acid**. The inhibited acid will prevent any attack on the metal surface.

PROCEDURE FOR CIRCULATING METHOD:

1. The boiler has to be taken off line. Boiler pressure dropped to **Zero**.
2. The **Main Steam valve** has to be secured (**Closed**), so no acid leaves the boiler and gets into the steam system. The valve has to be shut tight and must not leak. This is also necessary to prevent any gases during the acid wash going into the steam system.
3. The safety valve on the boiler is removed and a 1/2" hose or similar connection made from that outlet back to the external mixing tank which will be used to add the acid.
4. Have a vent arrangement on the top of boiler to remove gasses. The vent must be made so as to stop the circulating water from going through the vent.
5. The boiler Feed water pump must be isolated by valve. Also, pressure control system and sight glass valves should be isolated, before acid is added to mixing tank
6. The bottom blowdown valve on the boiler can be used to connect to the **discharge** of the recirculating pump. This is where the acid mix will enter into the boiler **at the bottom**. Install a **check valve on the discharge of circulating pump**, in case the pump failed, the acid will not flow back out of boiler and flood room.
7. Take a sample of the scale from the boiler and keep for doing tests.
8. Acid is **added to Water** in the mixing tank, until the boiler is full and water starts to returned to the mixing tank. Only add enough water and acid to the mixing tank to cover pump suction.
9. With the circulating method you need to determine **Flooded Water content of boiler** to arrive at the amount of acid needed to do the cleaning. (**Require 20 - 25% of Flooded Boiler Water Volume in acid.**)
10. The Mixing tank should only be half full so that when the returning water comes back, the gasses do not over flow the mixing tank. Add the pails of inhibited acid **Total Clean WM 8575** to the mixing tank.(5 gallons) of Acid for approximately to every 20 gallons of water in the boiler.
11. Add **Anti Foam to the mixing tank** to stop the gasses over flowing the tank.
12. Start the recirculating pump, and pump the acid and water into the boiler from the bottom.
13. If the boiler could be started for a short period to raise the recirculating water temperature to **120 - 140 F** this would increase the acid reaction time. If the boiler was just taken off line, the water temperature should be hot enough.
14. The circulation should continue for at least **8 hours**. **Longer period of time is better (24 hours)**
15. Monitor the acid strength in the mix tank, When acid level has dropped, add more acid to mix tank.
16. When satisfied add a neutralizing compound such as caustic, to the mix tank to raise the PH to 7. *Care must be taken as the neutralizer can burn your skin. Always make sure you have adequate access to water for wash off , in case of emergency.*
17. Stop the pump circulation and drain acid and water in boiler after acid cleaning is complete.

18. Open Steam Drum hand hole and Flush from the top in all areas with water using a pressure hose.
19. When Flushing from Top is complete, flush also the Mud Drum in all areas with a pressure hose.
20. Replace all Hand Hole Gaskets with **new ones**, refill boiler with soft water opening the feed water pump valves.
21. Open steam valve and other valves - feed water, sight glass, and pressure-trol
22. The Fresh new water in boiler should be soft water and have chemical treatment.
23. Start the boiler and make sure no leaks are occurring.
24. Follow normal boiler start up on low fire.
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