

Technobrief

# Waterside Protection of Boilers



# Neglect of boilers during standby periods frequently leads to serious corrosion in the steam and water spaces. Further attack can develop during subsequent working periods.

Various methods of corrosion protection can be applied, though the choice and method should depend on the length of time for which the boiler is to be idle.

## Standby or Banked Boilers:

Boilers kept on standby can lose boiler water, through level sensor checking, blowdown and sampling. To minimize corrosion under these conditions, the level of oxygen scavenger should be increased to at least three times the maximum values normally carried. The pH value of the boiler water should be kept to a minimum of 10.5. To ensure full protection, the treatment residuals should be compared with the specification each day.

## Wet Method:

If the boiler is likely to be out of service for more than a few days, but may be needed for steaming at short notice, all parts, including the economizer and superheater, should be completely filled with correctly conditioned water. Distribution of these chemicals throughout the bulk of the boiler water should be ensured by filling with a pre-mixed solution, by use of a circulating pump or by heating the boiler when partially filled and then topping up with conditioned water. It is recommended that any volumetric change be compensated for by connecting the air cock on the drum to a surge tank located at a higher level.

This will ensure a positive pressure, thus preventing admission of oxygen to the unit. This tank should be covered and kept dosed with oxygen scavenger and alkali.  
(See Figure 1)

The oxygen scavenger reserve and the pH value or alkalinity should be checked regularly. Additional treatment chemicals should be added as necessary and distributed to maintain the recommended treatment levels. When required for service, the boiler should be drained down to normal working level before firing.

For efficient protection, sodium sulphite should be added to maintain a residual of 100 to 200 mg/l as  $\text{Na}_2\text{SO}_3$ . In addition, sufficient alkali should be added to ensure that a pH value of 10.0 to 11.5 is maintained.

For boiler systems with non-drainable superheaters, the sulphite and alkali should be substituted with volatile components such as Carbohydrazide and neutralising amines, to avoid the risk of deposition of salts in the superheater tubes. Typically a residual of 100 - 200 mg/l as DEHA ( $\text{N}_2\text{H}_4$ ) will suffice.



## Dry Method:

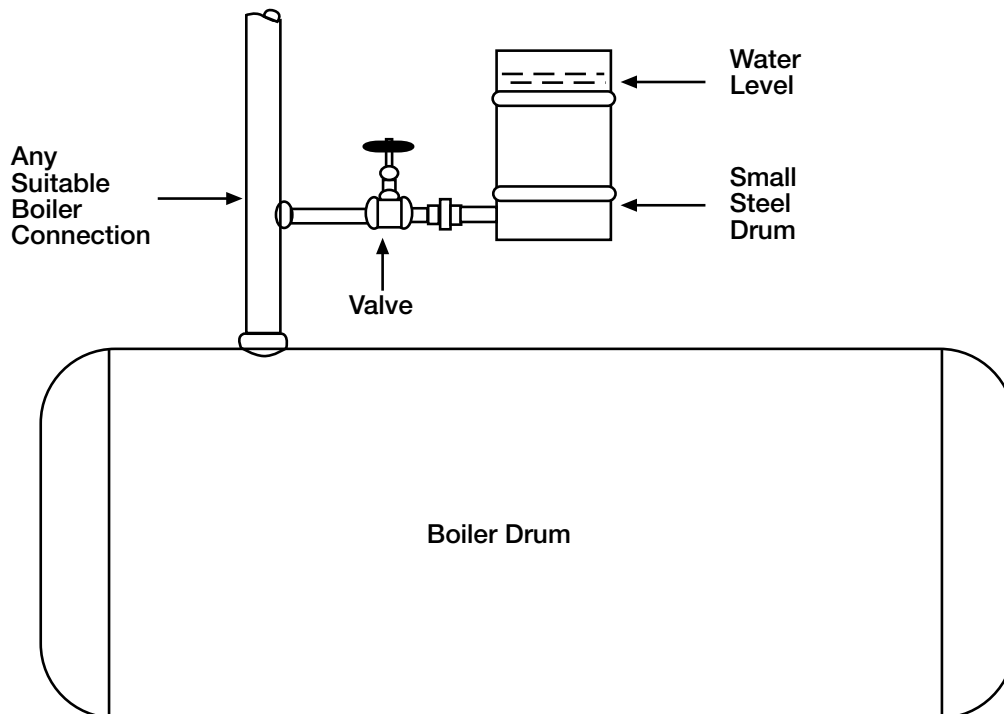
When a boiler is not likely to be required for more than 2 to 3 months, it should be emptied completely and dried thoroughly with a small wood fire or similar. Particular attention should be paid to any parts that are not self draining.

Any deposits should be removed since they tend to retain moisture. To avoid the ingress of moisture to the boiler, all connections should be removed and blanked off.

Trays of silica gel or quicklime should be placed inside the boiler drum or shell, which should then be sealed. A typical quantity in practice is  $1.5 \text{ kg/m}^3$ . Inspections should be made at intervals, initially after one week, and the desiccant should be dried or replaced as necessary. The trays and their contents should be removed before the boiler is restored to service.

Alternative dry methods of protection against corrosion require that the boiler be dried thoroughly and either an inert gas such as nitrogen or a vapor phase inhibitor (VPI) introduced. The boiler is then sealed.

**Figure 1**





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