

# ALIEN PROPERTY CUSTODIAN

## PROCESS FOR PREVENTING THE FORMATION OF SCALE AND/OR FOR REMOVING ANY SCALE FORMED IN BOILERS

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The invention relates to a process for preventing the formation of scale and/or for removing any scale that may have been formed in boilers.

According to the invention the formation of scale in boilers is prevented by adding the resins of the various kinds of *Boswellia* to the boiler water and operating the boiler in the presence of these resins.

A preferable method of carrying the process into effect is to charge a quantity of resin proportionate to the quantity of water contained in the boiler into the boiler itself. Following this the boiler is operated in the usual manner. After the lapse of a substantial period of operation, e. g. of a period of operation of 2 to 4 weeks, a new charge of *Boswellia* resin is added. The sludge precipitated is removed from the boiler from time to time.

If scale has already formed on the boiler surfaces, such scale will peel off under the action of the *Boswellia* resin, and in this condition it will be easily removable. In such a case it will be necessary, pending the time until the peeling-off of the scale is completed, to increase the quantity of resin charged into the boiler at each occasion, and to repeat such charging at more frequent intervals.

Tests have shown that at the start it is advisable to charge 30 to 60 grams of *Boswellia* resin per cubic metre of water contained in the boiler. The resin, preferably employed in ground condition, is charged into the boiler at the beginning of the operation of the latter. The boiler is operated in the usual manner, the water is fed into it continuously and the sludge formed is blown-off from time to time. We found that, in order to ensure that the resin should exert its action to the best advantage, the boiler should not be blown-off during at least three days following the charging. The charging of resin may be repeated from time to time. Thus, it was found advantageous that a new charge of 30 to 40 grams of resin per cubic metre of water contained in the boiler should be administered after a period of operation of two to four weeks.

In the case of boilers the surfaces of which are covered with scale, the charging of resin is effected at more frequent intervals, e. g. at intervals of one to two weeks. After the fourth or fifth charging the existing scale will as a rule already have peeled off completely, so that during the operation going-on from that time onward complete absence of scale is already assured. It will then be possible to increase the intervals at which resin is administered to, say three or four weeks.

If the boiler water possesses a very high degree of hardness, it will be necessary to employ slightly greater quantities of resin, and at more

frequent intervals, and to effect the removal of the sludge formed from the boiler at more frequent intervals likewise. In view of the fact that it is not on a chemical reaction that the action of the resin is based, the quantity of resin to be employed is, between wide limits, independent of the degree of hardness of the water.

After the completion of a period of operation of substantial length, say at intervals of six months' service, the boiler should preferably be shut down and should, after having cooled down, be cleaned of the sludge formed, making use for this purpose of a strong jet of water or possibly of suitable brushes.

### Example

A water-tube boiler holding 850 litres of water and evaporating one cubic metre of water per day was covered with a layer of scale of 5 to 6 millimetres thickness. The chemical data of the feedwater employed were the following:

Degree of alkalinity-----degrees--	4.08
Variable hardness---German degrees--	11.44
Invariable hardness -----do-----	9.78
Total hardness -----do-----	21.22
Quantity of MgO contained in 1 litre of water -----grams--	0.04639
Quantity of CaO contained in 1 litre of water -----do-----	0.1477

50 grams of *Boswellia* resin were charged into the boiler. On the fourth and fifth day of operation the sludge was blown off. After operation continued during one week, another 30 grams of resin were added and this was repeated another three times; at each occasion the scale formed was blown off on the fourth day following the charging. After the completion of a period of six weeks the boiler was shut down. The scale by which the boiler surfaces were originally covered peeled off completely and its greater part had already become removed in the form of sludge during the period of operation. Following this the boiler was operated during a period exceeding six months, adding 30 grams of resin each month. After the lapse of this period of over six months, either, it was not possible to detect any formation of scale. The sludge removed from the boiler may, after drying and grinding it, be sold as a metal polishing powder. It is also possible to employ *Boswellia* resin in combination with other water-softening preparations. The resin may, after having been ground, be mixed with some filling material as e. g. with sodium carbonate or sodium sulphate, compressed into tablets and used in this form, thereby facilitating the charging of the exact quantities required and their uniform distribution in the water contained in the boiler.

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