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## PRESERVATION OF STEAM BOILERS

### Introduction

Vecom Industrial Services B.V. has carried out the chemical cleaning of various types of boilers over the last few years. This has been either a pre-commissioning cleaning or a cleaning of older boilers that experienced performance problems due to contamination (post commissioning cleaning).

In the above cases the boilers will often be decommissioned for an extended period.

During a new construction project it could be that, due to circumstances, there is a substantial delay between finishing the construction and the start of the chemical cleaning of the boiler. This can vary from a few days to several months. A long shutdown period is often chosen with older boilers that have to be cleaned due to contamination, in order to check all the ancillary installations for wear and the like. If such is the case, it could be that the boiler will have to be decommissioned for a longer time after the chemical cleaning.

In these cases a fitting preservation of the boilers will have to be considered, as in time corrosion problems will occur in the internal parts of the boiler due to the action of oxygen. Consider here the most important parts of the boiler, such as the supply water pre-heater, the evaporator, the drum and the excess heater(s).

### The preservation

Vecom defines preservation as the introduction of a high pH medium (pH 10-10.5) to the boiler. This can be done by adding trisodium phosphate to the demineralised water that is used to fill the boiler. The added phosphates will react with the surface of the steel. This will produce an iron phosphate layer, several microns thick. This will form a protective layer on the base material.

This layer could still be attacked by oxygen anyway, and it will therefore be necessary to add an oxygen binder to the preservative. Sodium sulphite for example is used for this purpose. Sodium sulphite takes oxygen out of the water and therefore prevents corrosion of the iron phosphate layer. It is extremely important for all air to be removed from the boiler when it is being filled. It will however, due to its construction, not always be possible to actually fill a system



completely with water. Also, there is always a chance that oxygen intrusion will occur because of a slight partial vacuum in the boiler, e.g. via leaking gaskets etc. The boiler will have to be put under a slight excess pressure with nitrogen in order to expel these last remaining traces of oxygen and to prevent intrusion of oxygen from the atmosphere. An excess pressure of approx. 0.3 bar(g) nitrogen will already be sufficient.

Once the boiler is preserved it can theoretically be left for many months without corrosion occurring.

It will however still be necessary to check and record the pH at various points in the boiler at least twice a week. This is to detect premature deterioration of the preservation. The nitrogen pressure will also have to be checked. A sudden increase in the nitrogen consumption can indicate a leak or loss of water from the boiler. If preservation water should after all be lost due to leaks or the incorrect emptying of the boiler, it will be necessary to refill the boiler with preserving liquid in the short term and to completely depressurise it again.

