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## **BOILER CONSERVATION WITH *CETAMINE* DURING SHUT-DOWN**

## 1. Introduction

To protect boilers and all belonging components from corrosion during a stoppage appropriate actions are required. Corrosion can already occur during a stoppage within few hours if no appropriate conservation-method took place in advance.

The process of conservation depends on the intended duration of shut-down, the boiler water quality, type of boiler and the current treatment.

For shut-down of several weeks or months a dry conservation is recommended. A wet conservation with **Cetamine V 212** is advisable for stand-by boilers when a quick restart of the boiler plant is demanded.

If *Cetamine V 212* is not available a combination of *Cetamine V 210* and *Ferrolix 8340* can be used.

Plants which have not been treated with *Cetamine* so far have to be conserved after

- 48 h for salt-containing (cond.  $\geq 50 \mu\text{s/cm}$ ) \*
- 4 to 5 days for low-salt water (cond.  $< 50 \mu\text{s/cm}$ ) \*
- 10 to 14 days for salt-free water (cond.  $< 0.2 \mu\text{s/cm}$ ) \*.

\* The classification of the water qualities is according to the TRD 611.

Plants which have been operated at least for 3 months permanently with *Cetamine* and for which a regular polyamine excess of 0.5 to 1 mg/l was proved, can be stopped for about 2 to 3 days without any further action due to a *Cetamine* film layer covering the whole system.

This kind of conservation can also be applied for district heating-systems and central heating-systems.

## 2. Mode of action

In general chemicals of the same type than used during normal operation of the boiler should be applied.

*Cetamines* are products based on film-forming polyamines and neutralizing amines. Due to a high level of volatile amines the whole water/steam circuit is alkalized and corrosion is inhibited in the whole system.

The formation of a steady protective film in the whole system takes 1 to 2 weeks.

*Ferrolix 8340* is an oxygen scavenger based on Diethylhydroxylamine (DEHA). A good efficiency is performed at temperatures above 60 °C.

## 3. Operating instructions

### 3.1 Wet conservation of boiler systems with *Cetamine V212*

Before the stand-by the product has to be switched to *Cetamine V 212*.

1 l/m<sup>3</sup> of boiler capacity is added into the system with the same dosage pump at the same injection point for homogenization.

If the stand-by was not planned, keep the boiler with its warm water and add also 1 l/m<sup>3</sup> boiler capacity of *Cetamine V 212*. For homogenization use nitrogen or maintain an internal boiler circulation during 8 hours.

The product dosage can be done manual if no dosage pumps are available. The pH-value has to be adjusted to 9.5 - 10.5 for water tube boilers and 10.5 to 12 for fire tube (three pass) boilers.

For the calculation of the needed product amount all components of the whole system (e.g. boiler volume, pipes, feedwater reservoir) have to be considered.

After closing the steam isolation valve the boiler is filled up to the maximum with purified water. The overfill level control should be deactivated and all exhaust valves be set to the position the vessel can be filled completely. Thereafter the boiler is switched off and all valves are closed.

During the whole shut down period the boiler is maintained with the maximum level of water and the polyamine and DEHA excess in the boiler has to be checked monthly. It has to be proved, that the polyamine excess is above 0.5 mg/l and the DEHA excess is above 2 mg/l. Otherwise more product has to be added until the desired value is reached.

For shut-down of several months and boilers with more than 5000 l of volume an internal circulation should be installed to get a steady and persistent protective film on the metal surfaces. If possible this circulation should run continuously but at least once a week for 8 hours.

### **3.2 Wet conservation of boiler systems with *Cetamine V 210* and *Ferrolix 8340***

If *Cetamine V 212* is not available a combination of *Cetamine V 210* and *Ferrolix 8340* can be used. The shut down procedure is the same as described above.

The product dosage of *Cetamine V 210* is 1.6 l/m<sup>3</sup> of boiler capacity.  
The product dosage of *Ferrolix 8340* is 0.35 l/m<sup>3</sup> of boiler capacity.

## **4. Start up of system after shut-down**

Before the start up make sure that all valves and contacts are reset to working mode.

The boiler water is let off to the regular working level. Thereafter due to *Cetamine* saturation of the whole plant the system can be started immediately with the initial treatment.

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#### **BKG Water Solutions**

**Headquarters:**  
BK Giulini GmbH  
Giulinistrasse 2  
D - 67065 Ludwigshafen  
Phone: +49-621-5709-01  
Fax: +49-621-5709-452

**Office Duesseldorf:**  
BK Giulini GmbH  
Niederheider Str. 22/Geb. Y20  
D - 40589 Duesseldorf  
Phone: +49-211-797-9190  
Fax: +49-211-798-2262

Internet: [www.bkgwater.com](http://www.bkgwater.com)  
Mail: [water.solutions@bk-giulini.com](mailto:water.solutions@bk-giulini.com)

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