FINEAMIN®
SWISS WATER TREATMENT CHEMICALS

OPERATING INSTRUCTIONS FOR DRYING, BOILING AND BLOW-OUT WITH FINEAMIN®

The following boiling out instructions are based on the experience of the FINEAMIN® manufacturer in collaboration with the leading experts of the boiler industry. Deviations from the instructions, based on considerations, are possible. This should, however, be done after consulting a FINEAMIN® specialist.

An issue often concerning power plants and industrial cogeneration plants, the boiling out of water tube boilers, mainly after construction, represents a necessary step in achieving the steam purity parameteres required for a failure-free operation. Any impurities found inside the boiler (iron oxides, welding waste, grease etc.) can harm the main equipment, especially, steam turbines and, depending on the plant, can damage installations and/or production.

1. Drying of the brick work

Drying of the brick work is required in order to cure and sinter the masonry material and to ensure that there is no more liquid left in the brick work. At the same time, a permanent bonding of the tube walls with the brick work can be achieved. Specific data for the drying curve, temperature increase, and the duration of the set temperature are given in the instructions of the masonry company.

Boiling out of the boiler can be started at the same time with the drying process (*see chapter 3*).

2. Boiling out the boiler system (classic version, 2 x 24 hours)

FINEAMIN® has the same metal passivation properties as traditional boiling out procedure (caustic soda, sodium carbonate, sodium phosphate): the boiler water is strongly alkalized in such way that the manufacturing residues, grease, shavings, loose tinder and dirt and / or other impurities (eg: iron oxides) are removed from the metal surface activating its passivation in order to slow down any corrosive reactions.

But **FINEAMIN®** effects are highly improved **by a strong dispersing effect** on the impurities due to the content of polymers. All dispersed impuritied can easily be removed from the boiler by **blowdown**.

Furthermore, the most important feature of FINEAMIN product is the formation of the protective polyamine layer on all surfaces inside the boiler during boiling out. This protective layer enables corrosion prevention for the whole period between boiling out the boiler and its normal operation startup.

Boiling out the boiler system cleans it of that remain from the manufacturing and installation of the boiler plant.

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2.1. Boiling out procedure

Normally, boiling the boiler two times for 24 hours respectively leads to good results. The boiling process should be done with closed boiler and softened / demineralized water. Pressure should be ¼ of the operational pressure. Higher boiler water temperatures can provide a better cleaning effect.

Before filling up the boiler drum for the first time:

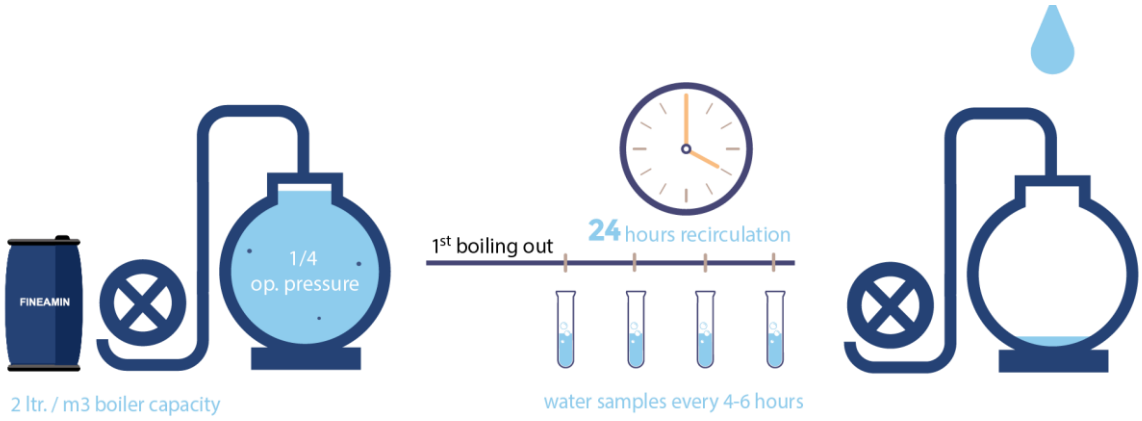
The boiler should be cleaned and rinsed with softened water. Afterwards, the boiler has to be prepared and filled for boiling out.

FINEAMIN injection:

The needed amount of **FINEAMIN®** must be added during the filling process (*see chapter 2.2*). This can be done with an adequate dosing pump or directly into the steam drum before closing the boiler. We suggest the use of a dosing pump which ensures the possibility of dosing more chemicals during the boiling process (maintenance dosage).

1st boiling out:

Now, the first boiling out can be started. During the boiling process, the boiler can be bleeded-off in regular intervals. For additional make-up water, **FINEAMIN®** has to be added accordingly *(see chapter 2.2.)*.

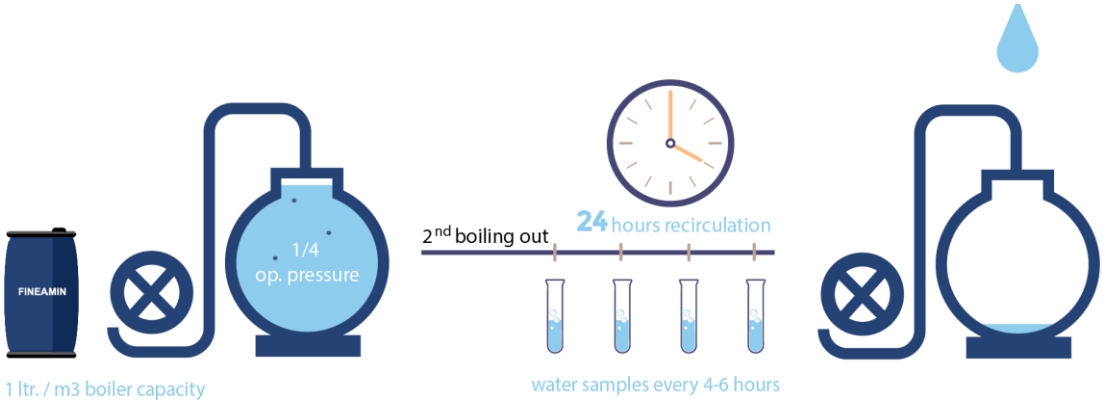


The end of the 1st boiling out:

After approximately 24 hours, the first boiling out can be stopped. The boiler water should be drained with pressure (keep the effluents if the regulation is not respected in terms of pH and temperature). Afterwards, the boiler drum should be washed out with soft / demineralized water two times. Make sure the rinsing water is clear and clean.

2nd boiling out:

This is an operation that depends on the dirtiness of the boiler, but we strongly recommend it. Following the washing, the steam generator can be prepared and filled up with soft / demineralized water for the second boiling process. The required amount of chemicals is described in the following *chapter 2.2*.



The end of the 2nd boiling out:

The second boiling out also lasts 24 hours. At the end of the process, the boiler water should be drained with pressure and the boiler drum should be washed out with soft / demineralized water again, twice. If the boiling process was successful, steam blowing procedure can be started (*see chapter 4*).

FINEAMIN products are up to 80% biodegradable. Still, before discharging the water containing polyamines, please read chapter 5.

Attention!

If you do not blow out the steam generator directly in the connection of the boiling process, appropriate measures are necessary for the conservation of the steam generator (see chapter 6).

2.2. Stewing chemicals

For boiling out and blow out of steam generators, we use **FINEAMIN®** 15. For boiling boiler plants in food industry only **FINEAMIN®** 24 must be used.

The following **FINEAMIN®** amounts are required for stewing and blowing-out:

1st boiling	Fill the boiler completely with make-up water to the maximum level	
	initial dosing	2 ltr. **FINEAMIN®** per m³ boiler volume
	Pressure increase to ¼ of the maximum operational pressure	
	maintenance dosage	1 ltr. **FINEAMIN** per m³ make-up water added during the heating phase
		Recirculate for 24 hours
2nd boiling	Fill the boiler completely with make-up water to the maximum level	
	initial dosing	1 ltr. **FINEAMIN®** per m³ boiler volume
	Pressure increase to ¼ of the maximum operational pressure	

	maintenance dosage	1 ltr. FINEAMIN® per m³ make-up water added during the heating phase
		Recirculate for 24 hours
blow-out	initial dosing	0,5 ltr. **FINEAMIN®** per m³ boiler volume
	maintenance dosage	0,5 ltr. **FINEAMIN®** per m³ make-up water

2.3. Evaluation of the boiling process

To evaluate the boiling process every 4 – 6 hours, samples of boiler water should be taken and analyzed. **FINEAMIN®** excess is an indication of the cleaning effect.

During the first boiling process, the boiler water should have an excess of **FINEAMIN®** of approx. 100 mg/l and during the second process, of approx. 50 mg/l. This has to be guaranteed by maintenance dosage during the stewing.

The pH value should be > 10 for the whole stewing process.

Furthermore, the iron content, total hardness, conductivity and, if applicable, excess of polyacrylates should be monitored during the boiling out process. If the **FINEAMIN®** excess stays stable at the end of the boiling process and the iron content lays in an acceptable range, boiling out can be finished.

3. Boiling out „under operation“ (e.g. when drying brick work)

The boiling process for steam generators can be also done in combination with the drying of the brick work. This procedural method allows a reduction of the downtime and leads to lower cost of operation!

For optimum cleaning results, a minimum temperature of 250°C should be achieved for at least 48 hours in the boiler water. Alternatively, the boiler pressure can be approximately 1/4 of the operating pressure for at least 48 hours. Higher boiler water temperatures can provide a better cleaning effect.

For boiling out under operation, 2 l of **FINEAMIN®** per m3 of the boiler volume have to be added while filling-up the boiler. Afterwards, the boiler can be commissioned to carry out the drying curve accordingly to the manufacturers' specifications. To ensure an excess of FINEAMIN® of approx. 50 mg/l about the whole boiling process, maintenance dosage while boiling out may be necessary.

At the end of the drying curve, the boiler water should be drained with pressure and afterwards, the boiler drum should be washed out with soft /demineralized water two times.

After this process, the blow-out of the plant can be started.

Attention!

If you do not blow out the steam generator directly in the connection of the boiling process, appropriate measures are necessary, for the conservation of the steam generator. (see also Point. 6)

4. Blow-out of the boiler system

Blowing-out steam generators is required to clean all heating surfaces (super heater) downstream of the boiler that could not be boiled out, as well as the steam piping leading to the plant. Blow-out is particularly required for plants with turbine operation to avoid damages of the turbine.

For the blow-out, 0,5 l **FINEAMIN®** per m3 of the boiler volume and make-up water should be added. The steam purity is determined by means of an aluminium or copper mirror that is installed in the blow-out line. The mirror is examined by a representative of the turbine manufacturer.

5. Sewage / Disposal of the boiler water after boiling out

In comparison to conventional chemicals for boiling out boiler plants, **FINEAMIN®** products belong to the ecologically harmless category. **FINEAMIN®** does not contain NOx, ammonia or phosphate. The low amount of nitrogen found in **FINEAMIN®** products is present in the form of surface-active polyamines which get adsorbed to the wastewater sludge flocs where they get degraded biologically.

To meet the disposal conditions of the local authorities regarding pH, COD and BOD, normally the boiler water treated with FINEAMIN® only has to be neutralized regarding the pH value. Afterwards, it can be discharged in the municipal wastewater system.

If required, we can provide water analysis of our past projects.

6. Preservation of steam generator

The blowing out process and the commissioning of the boiler should be done immediately after the alkaline boiling. If this is not possible, appropriate preservation measures should be carried out. Depending of the boiler downtime and commissioning situation there are several options.

For every particular case, we can create a preservation concept.

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