



**COST SAVING  
ACOUSTIC CLEANERS**

***Nirafon Cleaning Sound Device***  
**ACOUSTIC CLEANER REPLACES WATER AND STEAM CLEANING  
IN THE GAS FLUE OF A BLACK LIQUOR RECOVERY BOILER**



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# **Crystallisable Cooking Chemicals a Nuisance in the Gas Flue of a Recovery Boiler**

*The heat transfer surfaces and the gas flues in recovery boilers have traditionally been difficult to clean. The fluting factory of Stora Enso in Heinola makes no exception.*

*The cooking chemicals in the form of salt in the exhaust gases used to form a sticky salt bank in the bend of the smoke flue. Quickly reaching the thickness of dozens of centimetres, the salt deposit gradually clogged the flue and considerably weakened the draught, resulting in smoke streaming into the boiler room. The clogs and slag were removed out of the flue at intervals of approx. one and half weeks by spraying several cubic metres of expensive desalinated water into the flue at 140 bar pressure. Water causes erosion in the flue and corrosion in the electrofilters. All in all, the effect of the laborious water and steam cleaning was insufficient.*

## **Difficult Task**

*Having been assigned to solve the cleaning problem of the factory's soda boiler, we first tried the 150 dB Nirafon 250 SS pneumatic acoustic cleaner. It was not, however, effective enough to remove the salt layer sticking to the surface. Subsequently, instead of the pneumatic cleaner, we installed the single-pulse 170 dB Nirafon GPC gas pulse cleaner that we have developed for the cleaning of the superheater surfaces in power plant boilers. This cleaner seemed to function well and its acoustic pressure was efficient enough to triple the cleaning interval in the flue. Nevertheless, a permanent level of cleanness was not achieved.*

## **New Third Generation Nirafon Cleaning Sound Device acoustic cleaner solution to the cleaning problems of the Gas Flue**

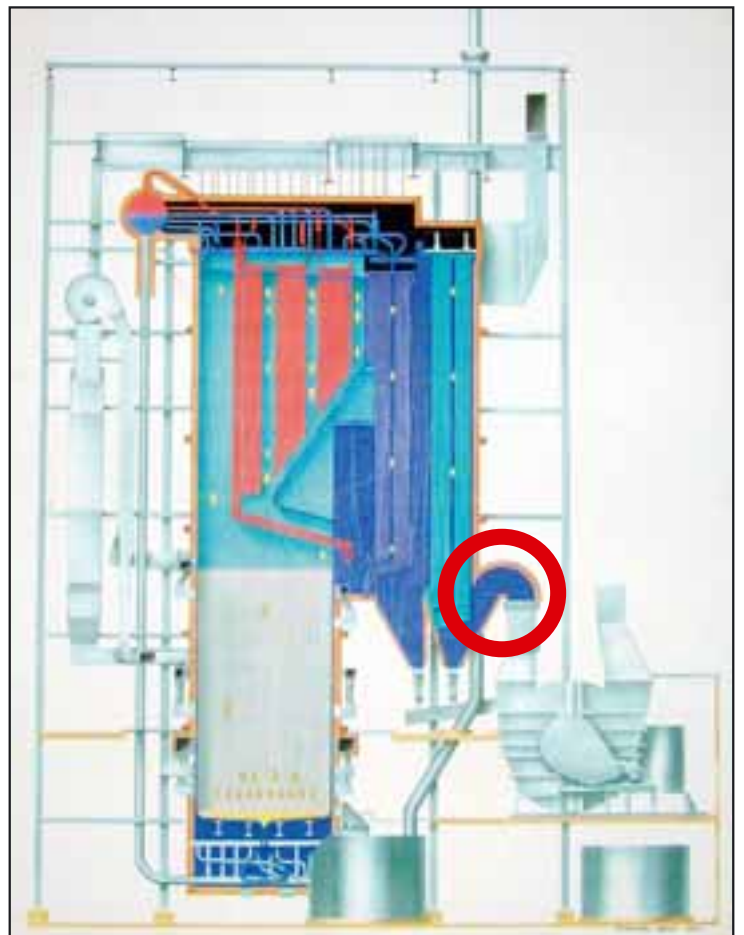
*Thanks to the product development carried out at Nirafon Oy, we had just reached the production stage of a new third generation continuous operation acoustic cleaner. We installed the NCSD, emitting quick over 170 dB sound pulse series, in the bend of the flue.*

*The cleaner was programmed to emit thirty pulse series repeated at a few minutes' intervals. The frequent pulse series of the cleaner prevented the salt granules from clinking to the structures of the flue and the desired level of cleanness was achieved.*

*After the introduction of the new NCSD acoustic cleaner, water cleaning of the flue has been unnecessary. Industrial hygiene and ease of use improved. The boiler's combustion process became more stable than earlier, the management of emissions was facilitated, and the need of water dropped drastically.*



*The new NCSD acoustic cleaner installed in the flue of the black liquor recovery boiler at the fluting factory of Stora Enso in Heinola*



# Nirafon Cleaning Sound Device

## ACOUSTIC CLEANER REDUCES COSTS

The Nirafon Cleaning Sound Device is an innovation for the acoustic cleaning of the high temperature areas of boiler plants. The method enables the cleaning of both the combustion chamber and the superheater area without stopping the production process.

The NCSD cleaner is the newest achievement of the product development carried out at Nirafon Oy. Thanks to the design of the firing chamber, the new ignition and valve system, the cleaner can give many effective pulses per second and it is also more dependable than ever before.

### NCSD Operating Principle

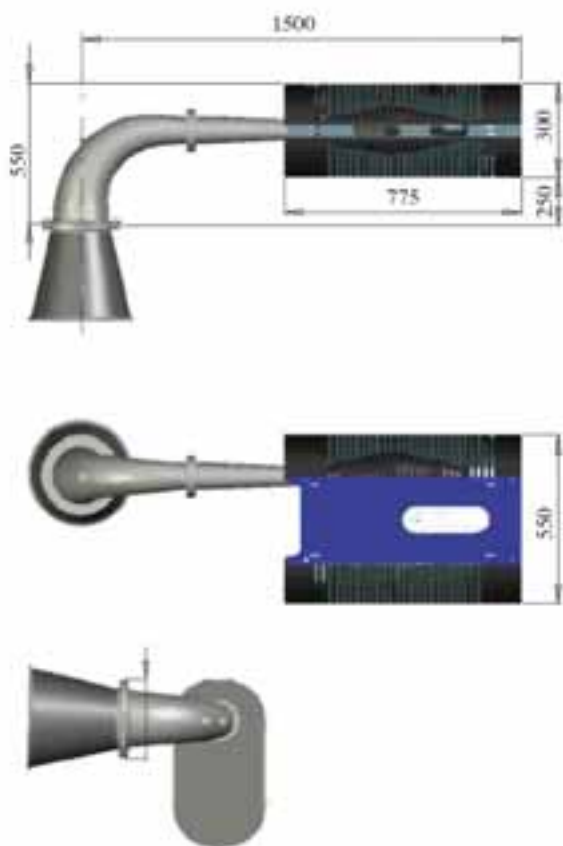
The acoustic cleaning effect of the NCSD is obtained by quickly burning a small amount of LP gas in the firing chamber of the device and leading an acoustic pressure shock through a horn into the space to be cleaned.

The NCSD cleaner produces 1 to 15 cleaning pulses per second. One cleaning pulse consumes about 0.4 g of gas.

### Cleaning Effect up to 1500 °C

During the cleaning pulse, the NCSD acoustic cleaner reaches a sound pressure level of over 170 dB. The device cleans the surfaces of combustion chambers and superheaters up to 1500 °C.

### Limited need of space:



### NCSD Technical Data:

Pulses per sec.	Frequency	Acoustic Pressure
1...15/s	100 Hz	over 170 dB

#### Material

G-X15-CrNiSi 229, SS 2343 and Fe 52

#### Supply of Compressed Air min NS 25

Air handling equipment R1/2"

- ball valve
- pressure regulator with manometer
- magnet valve
- back pressure valve
- hose R3/4" x 1.5 m

#### Compressed Air

Quality: normal working air

Pressure: 6 bar

Quantity: approx. 80 Ndm /s when running

#### Supply of Gas

Gas control equipment R1/4"

- ball valve
- manometer
- back pressure valve
- magnet valve group
- needle valve
- gasfilter
- gashose R1/2" x 1,5 m

#### Gas

Quality LP gas

Pressure 2...4 bar

Quantity approx. 0.4g/ pulse

Rights to modifications reserved.  
Internationally patented device.



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