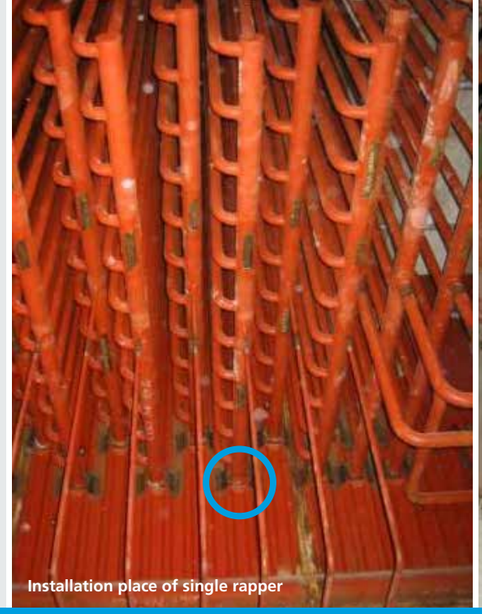
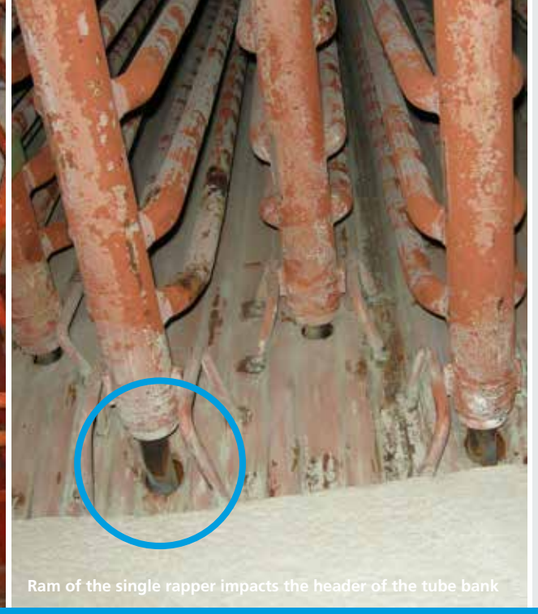
PNEUMATIC SINGLE RAPPING SYSTEM

Removal of Deposits From Heating Surfaces Without a Cleaning Medium

CLYDE BERGEMANN



Installation place of single rapper



Ram of the single rapper impacts the header of the tube bank

Ideally Suited for Fouling on Heat Exchangers of Porous Characteristics

Application Range

Especially long-stretched horizontal designed boiler passes such as those often found in waste incineration plants, can be ideally cleaned by automatically operated pneumatic rapping as the deposits are mostly of porous characteristics. This cleaning technique can be applied to remove deposits from the heating and reaction surfaces of the convection area and economisers without any cleaning media like steam, air or water.

The rapping system can be designed to work mechanically or pneumatically. In our experience, a pneumatic single rapping system is the best solution. The main reason for this conclusion is the individually adjustable impact energy to match to the degree of fouling as well as the selected activation of single rapping points to match to deposit formation. These are key capabilities for an efficient on-load cleaning of heat exchanger bundles in convection area and economiser and sowith untroubled heat transfer and boiler availability.

Via BUS-conncetion, frequency and quantity of rapping actions can be monitored and adjusted easily by the control centre according to current process needs.

Patented Technology

We develop and produce pneumatic rapping devices in cooperation with Norgren company.

NORGREN®

Your Benefits:

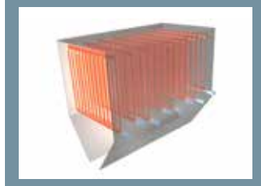
- Removal of deposits without use of cleaning media and sowith no additional risk of erosion and corrosion
- Highly flexible cleaning by impact energy and frequency adjusted to fouling degree
- Single rapping points can be selected/deselected according to fouling formation
- Space saving: due to hose connection of single rappers with control cabinet the positioning can be done very flexibly
- Low air consumption for activation of single rappers
- Low noise level
- Service-friendly: virtually maintenance free and easy visual inspection of the abrasion level of the rams
- Easy installation

Flexible, Individual and Process-Oriented Cleaning

Typical Engineering Designs

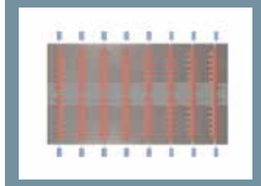
Prerequisite of using any kind of rappers is a sufficient vibration capability of the heat exchangers. The design of the pneumatic single rapper system follows the design of the heat exchanger. A single rapper is placed on a level with every header. The quantity of required single rappers is dependent from having one-piece or parted heat exchangers:

- Steam generators with one-piece heat exchanger



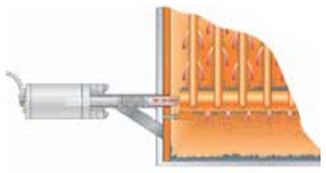
The single rappers are placed on one boiler wall only.

- Steam generators with parted heat exchanger



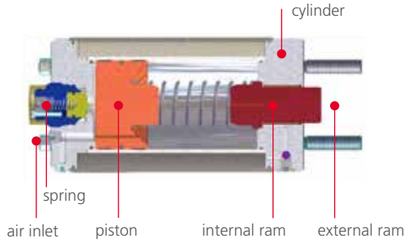
The single rappers are placed on both boiler walls. The specification of the impact energy follows the fouling degree which results from flue gas temperature and the chemical composition of the ash. As the frequency setting is process-dependent this flexibility is supported by a BUS-connection which enables the control centre to take action.

Principle of Operation



1. By activating the solenoid valve at the control cabinet, air flows into the cylinder via the air inlet
2. Pressure increases and forces the spring to open the valve
3. The piston is accelerated and hits the internal ram
4. The applied impact energy is transferred to the external ram and causes the header to vibrate – the oscillation continues through the complete heat exchanger bundle
5. Deposits fall off

Single Rapper in Detail



Wear measurement of the striking pin (optional)

Extended Plant Availability for Higher Efficiency

References
Germany
MVA Leuna Boiler I + II
MVA Sonne (Großräschen)
MVA Premnitz
MVA Hameln
MVA Herten
MVA Mannheim
International
WTE Turin (Italy)
WTE Bern (Switzerland)
WTE Dürnrohr Boiler I + II (Austria)
WTE Dürnrohr Boiler III (Austria)
WTE Pfaffenau (Austria)
WTE Delfzijl Boiler I + II (NL)
KEBAG Emmenspitz (Switzerland)
KVA Chevenez, Geneve (Switzerland)
KVA Turgi Aarau (Switzerland)

Technical Data	
Impact cylinder	Impact energy: 125 Joule at 7.5 bar control pressure Pressure range: 3-7.5 bar Air consumption: approx. 11 standard litres per impact Temperature range: -20 °C to +80 °C Compressed air: filtered 40 um Junction: hose fitting PA-pipe Ø10 mm
Control cabinet	PLC Touch panel for field operation Coupler for profibus or fibre optic cable Solenoid valve station

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