

IN-TA-CT[®]

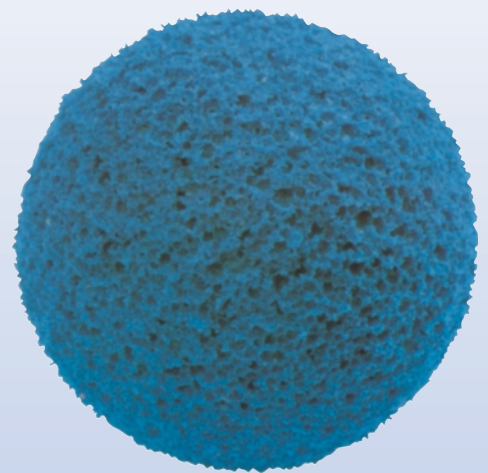
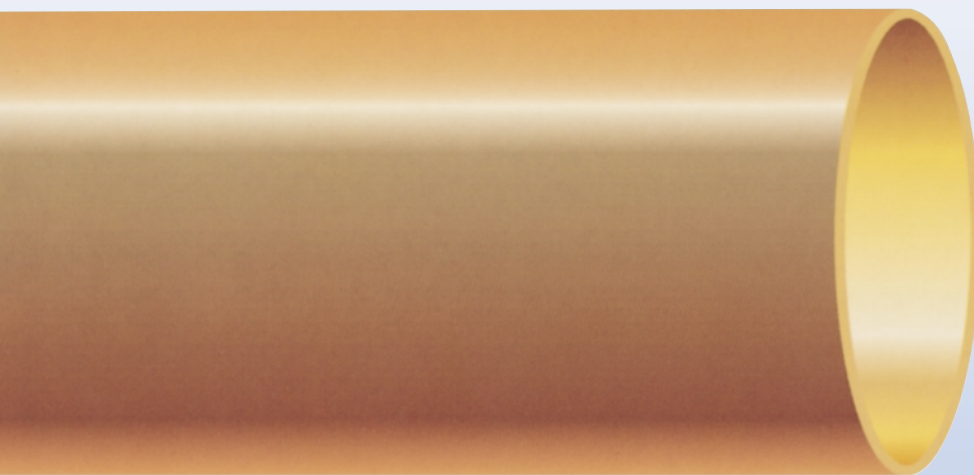
Tube Cleaning for Refrigeration Plants



TAPROGGE CCS: The energy saving programme for refrigeration plants

Tube Cleaning

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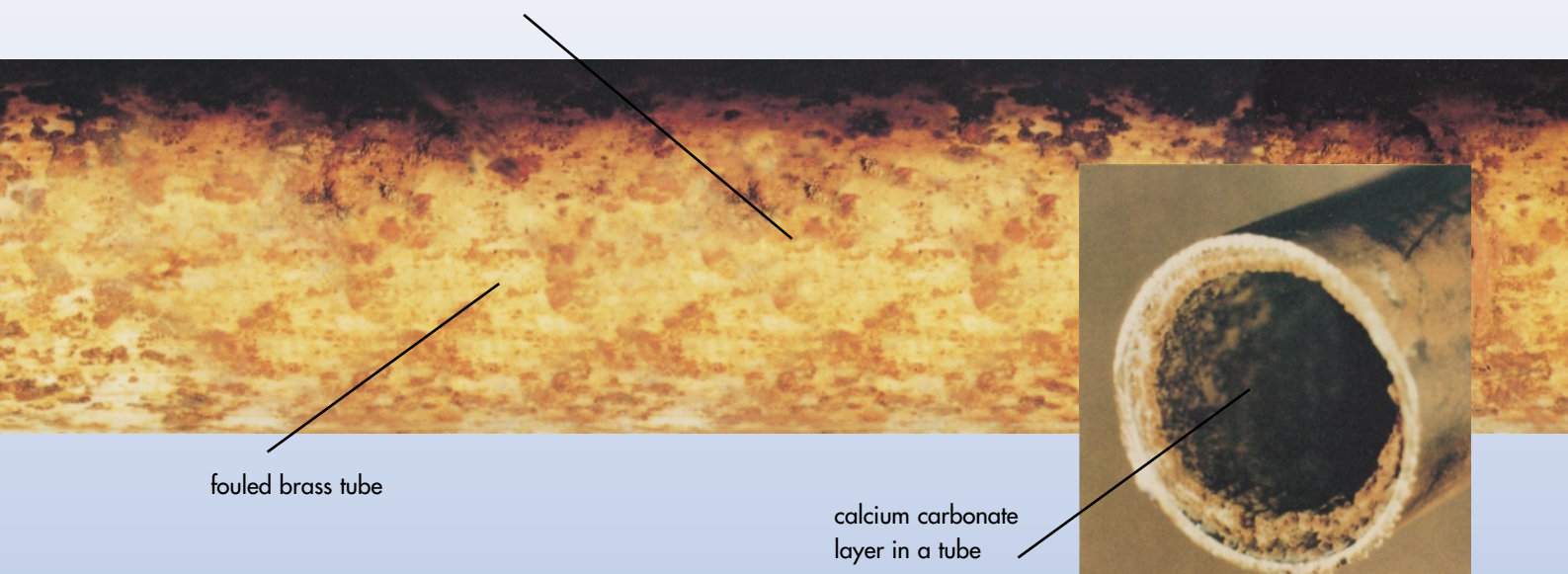


**Investments must be cost effective:
The TAPROGGE CCS will ensure just that.**

Refrigeration plants, in particular air conditioning systems, are investments that must be cost effective. They are purchased to create a comfortable living space, for example, in office highrises, hotels, hospitals, shopping centres, and airports and also for technical purposes, for instance in cold storage houses and in the electrotechnical and textile industries.

Failure of the air conditioning unit to operate effectively, due to tube fouling results in cleaning work becoming necessary more and more frequently. This translates into both long-term loss of money and loss of image. As fouling increases, so does the frequency of maintenance works and the electric power consumption. The cost-benefit ratio is not valid any more. That is why TAPROGGE gives highest priority to the economy of the air conditioning unit. With the TAPROGGE Condenser Cleaning System (CCS) you can be sure that your air conditioning unit operates at maximum performance with minimum cost because you can control its power consumption.

tube without TAPROGGE cleaning



fouled brass tube

calcium carbonate
layer in a tube

What causes poor thermal efficiency in cooling circuits of air conditioning units?

Micro Fouling, i.e. the formation of undesired deposits in cooling tubes, is the main cause of losses in thermal efficiency. Micro fouling increases the energy consumption, damages cooling tubes and causes tube leakages which in turn result in unscheduled outages.

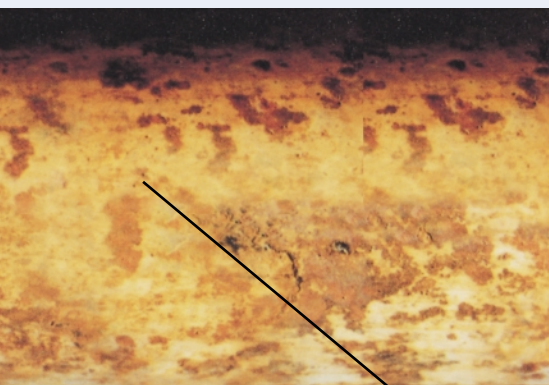
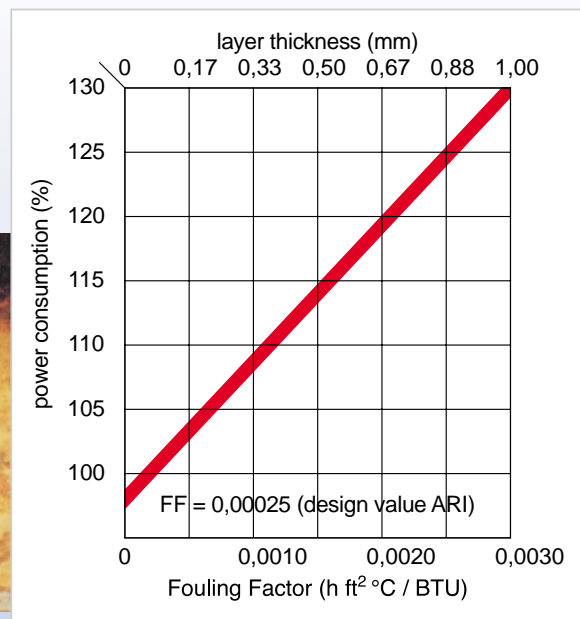
Micro fouling has various appearances:

- **Particulate Fouling:** Suspended solids, such as sand and mud sediment on the cooling tubes impair the heat transfer.
- **Crystallization / Precipitation (Scaling):** Undissolved inorganic salts exceed their solubility limit with rising cooling water temperature. This leads to hard scale deposits on the tubes.
- **Corrosion:** Results from the reaction of the cooling tube material with the cooling water. Tube damage or even leakage are the consequences.
- **Bio Fouling:** Is the formation of organic layers. Even if hardly visible with the naked eye, bio fouling constitutes a great impediment to the heat transfer.

With the TAPROGGE CCS you avoid such losses.

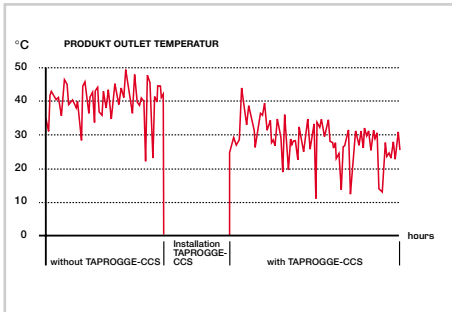
You gain performance - in a technically effective, economic and ecologic way.

The graph shows the electric power consumption in relation to the fouling factor with water-cooled condensers of air conditioning units.



corrosion in a CuNi cooling tube





Electrical power consumption of a typical air conditioning unit (500 USRT) before and after the installation of a TAPROGGE CCS

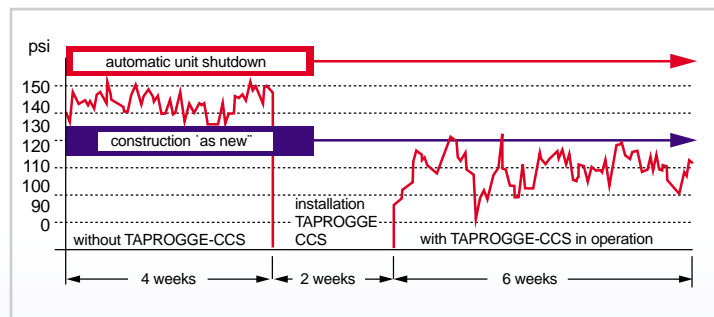
If you save electricity in the 2-digit percentage range how much is that worth for you?

Exact figures are more convincing than words. What percentage of costs you finally save by means of the TAPROGGE CCS depends on the technical factors of your air conditioning unit. Countless applications have shown, however, that the compressor consumption can usually be reduced by 10-20 %.

The graphs show typical savings from operating systems.

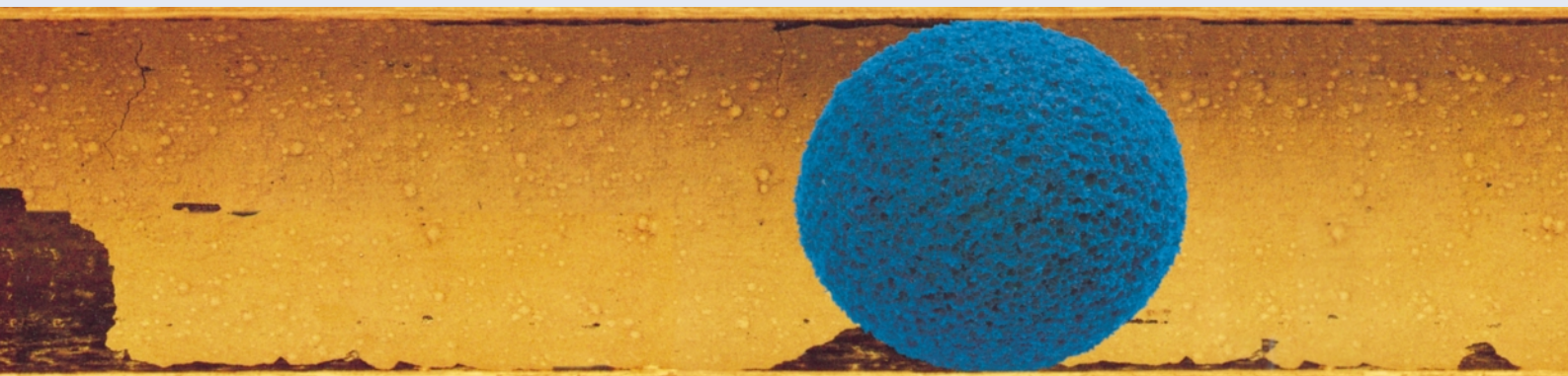
Through the CCS TAPROGGE has innovated further. As the condenser tubes are kept permanently free from deposits the stress on the compressor is reduced. The wear reduces - which is of decisive influence on the lifetime of both the compressor and the tubes.

In addition to the energy saving, this advance in know-how reduces the operational cost of the plant.



At the same unit that had been in operation for 8 years when the TAPROGGE CCS was installed the high-side pressure was reduced to below the design value.

TAPROGGE cleaning ball. Optimal cleaning effect through individual adjustment.



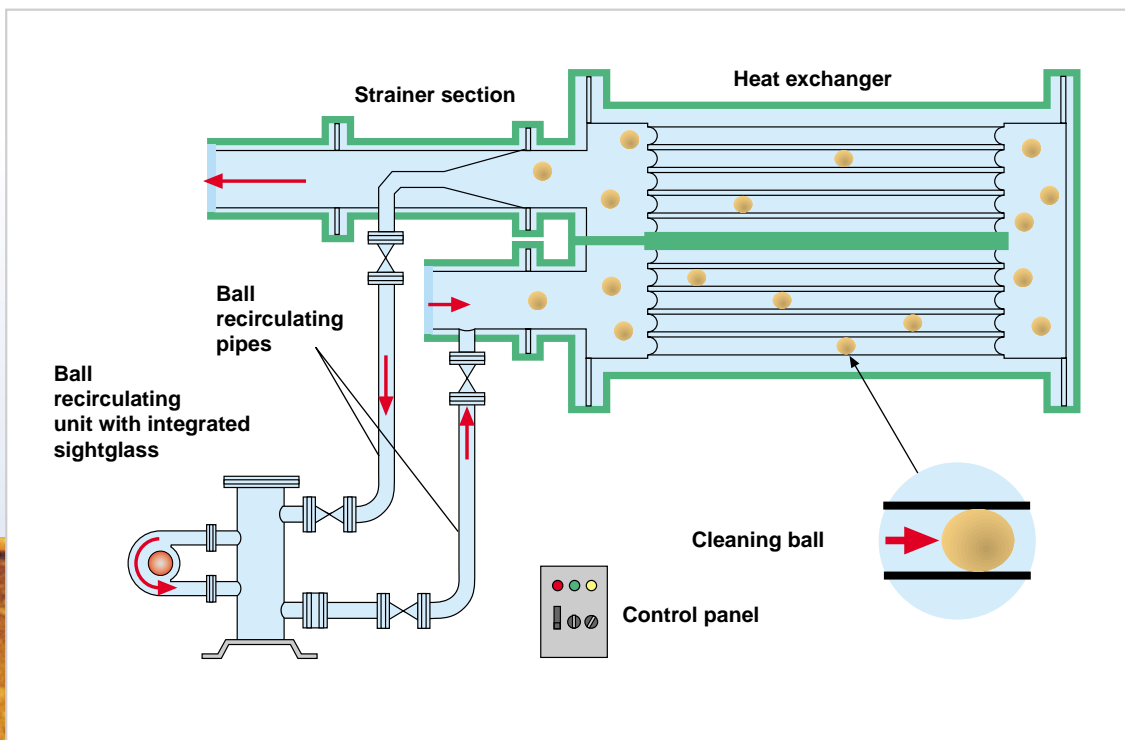
Cooling tube during TAPROGGE cleaning

The TAPROGGE CCS process

At the beginning of each cleaning process, the elastic sponge rubber balls are injected into the cooling water inlet pipe of the condenser. Transported by the cooling water flow they pass through all the tubes and remove the deposits. In this way the tubes are permanently kept clean.

This is effected by the balls being slightly larger in diameter than the condenser tubes. To ensure that every tube is cleaned during a cleaning cycle, the specific weight of each ball is adjusted to that of water.

That is how a uniform distribution is reached and each tube is passed through again and again. After every passage the cleaning balls are separated by a strainer. By a ball recirculating unit they are re-injected into the cycle. The whole operation is smooth and fully automatic and does not require additional personnel.





The ball recirculating unit re-injects the screened-out balls into the condenser for a new cleaning cycle.



The strainer section is installed fixed. It automatically screens out the cleaning balls during operation.

Capitalise on our knowledge

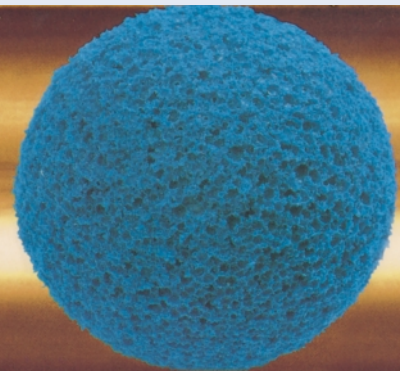
TAPROGGE offers you a performance that in its complexity is as convincing as in the details. A performance that is based upon years of experience and intensive research and development.

More than 12,000 TAPROGGE Systems are being operated world-wide. They are both proof and basis of our know-how in engineering and process technology. Our data base alone is of invaluable importance. We make use of this know-how for the development and implementation of our CCS-process. Every single element of the TAPROGGE CCS has been subject to long-term tests. We take responsibility for its reliability. In this way we have reached our objective to render air conditioning units more effective, reduce their electric power consumption and guarantee lower operational cost.

We think and work in a comprehensive way: from project work to after sales service

Our work starts with a competent, large-scale consultation and cost analysis. If desired by you, we can also offer financing concepts. You receive all from a single source: from planning to realization and service. With the TAPROGGE CCS you make sure that your plant is always operated in the most economic way.

One type of cleaning ball out of thousands - one ball being as perfect as the other one.



Cooling tube after TAPROGGE cleaning

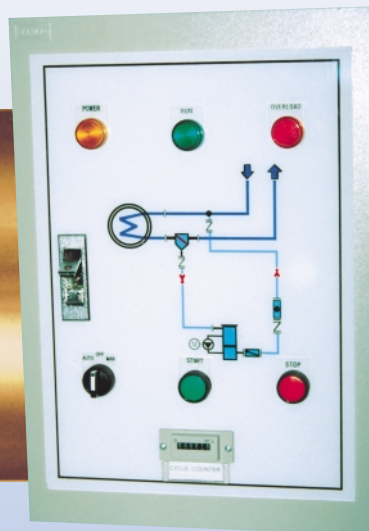
The cleaning ball – that's the key

The quality of tube cleaning stands and falls with it. It is the smallest but most important tool of the CCS process. Its properties must be matched exactly to the operational conditions of the air conditioning unit: to cooling water quality, tube fouling and material, and to the design of the system. The balls are always adjusted to the technical parameters of the relevant air conditioning unit. It is obvious why TAPROGGE gives highest priority to the quality of the cleaning balls, and to their properties. It is no wonder therefore that the balls are manufactured to precision in our own factory. Only in this way can the technical requirements be controlled and the quality guaranteed.

Several hundreds of different ball types can presently be produced by TAPROGGE. The capability to optimally meet the great number of requirements created by most various applications demonstrates TAPROGGE's competence.



Via the control panel the fully automatic operation and the desired cleaning interval are controlled



Your benefits in survey:

Due to its special design, the TAPROGGE CCS can easily be retrofitted to any existing air conditioning plant

- **No reconversion works are necessary at the condenser**

- **Condenser cleanliness is achieved without manual cleaning of the condenser tubes**

Optimal heat transfer coefficient

- **Low electric power consumption of the compressor**

Lower corrosion susceptibility of the condenser tubes

- **Lower wear and tear of the compressor**

No health hazard for workers during manual condenser cleaning

- **No shutdown for the execution of manual condenser cleaning**

References of successful TAPROGGE installations since 1953



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