



Shell and Tube Heat Exchanger Cleaning

In today's industrial environment of unceasingly consummates and improvement of equipment manufacturing technologies, heat-exchange and water circulation equipments become popular in the manufacture industry. The equipments can run efficiently at rated power if their systems have clean and unimpeded water channel. Once the water running equipments or systems were blocked by scale, it may cause low efficiency, high energy consumption or life-span shortening. If the water scale cannot be cleaned in time, it will increase the risks of equipment maintenance, shut down or replacement. For a long time, traditional cleaning methods, such as mechanical (scrapping or brushing), high pressure water, and chemical (acid) cleaning, had cause many problem when cleaning the equipments. For example, the traditional cleaning methods cannot clean the scales thoroughly, and will cause corrosion to the equipments. The residual acids will cause second etching or corrosion under scales, and lead to equipment replacement.

Case Information:

Refrigerator is an important part of air pre-cooling system. The regular working of refrigerator has a great influence on the stable operation of air separation unit. Especially during the summer time, the temperature of the air separation system circulating cooling water is very high. It cannot drop to appropriate temperature to cool the air in the air cooling tower after the water passes through the water-cooling tower. So the air which enters into the molecular sieve adsorber will reach a high temperature, affect the safe and stable operation of the air separation unit.

1. Equipment Condition:

The following is a example of refrigerator water-cooling system cleaning. The refrigerator was manufactured by China Dalian Refrigerator Co., Ltd.. The compressor is fluorine screw compressor, equipment model is LG20CF2B. The refrigerating fluid is R22, the motor power is 280KW, and the refrigerating capacity is 1080KW.

The horizontal condenser of the equipment has severe scaling in it, which leded to a high discharge pressure and a high temperature in the refrigerating system. It caused the compressor refrigerating capacity decreased, the power consumption increased, hard to lift the load, and restricted the regular production. The model of the horizontal condenser is LSN-67, the design pressure of tube pass is 0.4MPa, the shell pass is 1.9MPa, the maximum working pressure of tube pass is 0.4MPa with the shell pass is 1.85MPa. The media of tube pass is circulating water and the shell pass is R22, and the heat exchanging area is 67m². After being used for two years, there was a layer of hard water scale in the pipe wall. The scale thickness was about 0.3mm. Because the heat conductivity coefficient of the



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water scale was very low. It seriously impacted the heat exchange of the equipment. Usually, the company adopts outsourcing acid cleaning service to clean the condenser. However, the copper pipes and tube sheets of the condenser are connected by expanded connections, the common acid cleaning has serious corrosion to the equipment and easily causes the tube sheets and R22 (Freon) leakage. Therefore, it may lead to the damage of condenser. Once there is leakage in it, the company had to outsource replacement of the copper pipes and expanded connected the tubes with tube sheets again.

2. Processing Procedure:

With the assistance of MICAVA technical engineers, the company cleaned the condenser with 1st TECH Biodegradable Descaler by themselves. The total cleaning time was about 4 hours. The cleaning effect was excellent. The copper pipes in the tube pass exposed metal color. The company did a on-site test to the tube sheet. The result was no leakage. The company was satisfied with the cleaning result. They not only have learned how to clean the condenser and saving costs, but also the 1st TECH had no corrosion to their equipment.



Refrigerator which needs cleaning, and cleaning equipment



The horizontal condenser



Circulating and soak cleaning



Flushing with fresh water



Leakage testing



The cleaning effect is good, the tube sheet exposed metal color



Before



After

Environment Friendly Descaler:

The 1st TECH Biodegradable Descaler is a full-synthetic, safe and compatible with variety materials cleaning, high-effective, and environmental friendly cleaner developed by MICAVA international corporation. It can be used at regular intervals to removed the sediments, and make the equipments recover their efficient, save energy and prolong life-span. It also can reduce the risks of repair, replacement and shut down. It is easily to be used without disassembling or moving the equipment systems, help the users to save labor cost. It is a high efficient descaler, most equipment systems can be cleaned in few hours without closing down. It is a safe product, if it contacted with the skin, it can be wash with fresh water. It has no objectionable odor. It will not generate toxic volatile matters when dissolving water scales, calcium oxide and rust sediments. It adopts biological technology and can be directly discharged, and will not cause environment pollution.



The 1st TECH Biodegradable Descaler brings a new cleaning technology and concept to the industrial cleaning industry. 1st TECH Biodegradable Descaler is non-toxic and can be easily used. It is unlike the high pressure water and other cleaning processes which need high investment and difficult technical operation. You can totally master and implement the cleaning only with a few workers and a set of common cleaning pump. You can cleaning various equipments whenever and wherever possible to ensure the high efficient of the equipments production, and also reduce the high costs to outsource a cleaning service company. So the company can optimize their technical and equipment resource advantages. 1st TECH Biodegradable Descaler help companies achieve “timely cleaning, periodic cleaning, environment friendly cleaning, economic cleaning, energy saving and consumption reducing”.

Compared with other chemical cleaning products, the 1st TECH Biodegradable Descaler has the following advantages:

- 1. Safe and environmentally friendly:** 1st TECH is non-toxic, non-hazardous, non-corrosive, and biodegradable.
- 2. Fast and efficient:** 1st TECH contains special wetting and penetrating agents which can actually dissolve the deposits and can directly wash to the original metal surface of the equipments. Meanwhile, the organics in the product can form a protective pre-film on the metal surface, that can protect the metal from corrosion. Generally, the cleaning can be completed within two to four hours, and no more than 12 hours for large application systems.
- 3. Low costs:** Generally, 4 lb of 1st TECH concentrate can dissolve 1 lb of pure carbonates scales. It can ensure the production time and has non-corrosion to equipments; also it is energy saving; if take these into account, the costs is very low and even can be ignored.
- 4. Easy to use:** 1st TECH can be used via online circulating, immersing, spraying and other cleaning methods to remove the scales. The easy to use of 1st TECH have enable the corporate clients to achieve self-cleaning.
- 5. Biodegradation:** 1st TECH is tested and proved to be biodegradable.
- 6. Widely uses:** 1st TECH can be used widely in various industries, such as marine, manufacturing, commercial central air-conditioning, auto radiators, civil water heater, water dispenser and so on. Meanwhile, it can directly clean equipments which are made of following materials: carbon steel, stainless steel, red copper, brass, aluminum & aluminum alloy, glass, fiber, rubber, titanium, lead and so on. Even workable when several different materials are in a same system.