

Eliminating Fouling, Scaling, and Pathogenic Bacteria Inside Heat Exchangers and Chillers

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Chillers are major energy consumer in most commercial and industrial facilities. Fouling and scaling of water-cooled chillers/condensers and plate & frame heat exchangers is nothing new. Accumulation of macro and micro fouling and scaling negatively impacts the heat transfer rate of the condenser, increases the compressor backpressure, and results in increased kw/ton consumption and operating cost for chiller plant. Additionally, micro fouling inside the heat exchanger provides an ideal condition for Legionella and other pathogenic bacteria growth. The presence of micro fouling also results in under deposit corrosion, MIC attack, and tube or plate failure, reducing the equipment life, while increasing maintenance cost

Micro fouling due to buildup of microorganism and soft or hard scale deposit from salts, minerals, and hydrocarbon material inside the tube or the plate surface reduces the performance of the heat exchanger/condenser. The reduction in overall heat transfer negatively impacts the approach temperature, reduces the performance and duty below the design condition, while increasing KW/Ton energy consumption. The impact on the facility is increased operating and maintenance cost while contributing to potential environmental hazard.

In commercial and industrial facilities, the chiller condensers and the plate & frame heat exchangers are periodically taken out of service and manually cleaned by mechanical or chemical means. The process normally requires plant shut down and operator involvement during the manual cleaning. Due to presence of Legionella and other pathogenic bacteria, such manual cleaning is environmentally unsafe and hazardous to plant operator.

The proposed technical presentation describes the application, operation and design of various types of On-Line Automatic Tube Cleaning Systems, including the Circulating Rubber Balls and Brush & Basket type systems that are permanently installed on new or existing heat exchangers/condensers to permanently remove fouling and scaling without impacting the equipment operation or any need for plant shutdown. Case studies will be presented that will demonstrate the performance of typical chillers with and without On-Line Automatic Tube Cleaning System. Applications on water cooled heat exchangers/condensers at chiller plants will be described along with economic justification. The presentation will demonstrate how chiller condenser and plate and frame heat exchangers can be maintained cleaned and operate at their top efficiency at reduced KW/Ton energy consumption without taking the system off line for periodic manual cleaning.