Technical Bulletin

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MAINTENANCE OF CHARGE AIR COOLERS ON MARINE DIESEL ENGINES

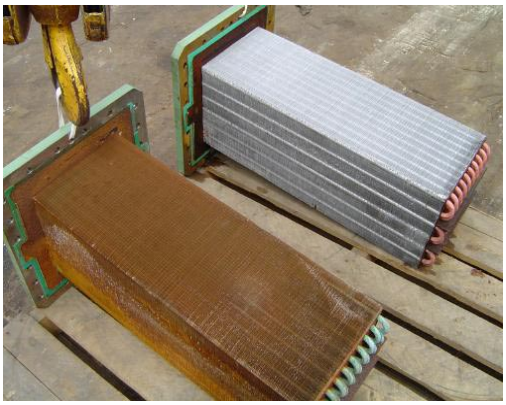
Diesel engines survive on a mixture of fuel and air. The air is forced into the combustion chamber by a turbocharger. The air heats up due to the increase in pressure and in order to reduce this temperature it is passed through a heat exchanger, often called a charge air cooler.
The heat exchanger is constructed of tubes which are covered in copper fins. The air passes over the fins and sea water is passed through the tubes as a coolant.

Problems that can occur
Insufficient air in the cylinders due to a dirty air side or insufficient cooling water due to a build up of sea water scale will result in poor performance and an increased fuel consumption with high exhaust temperatures.

Causes of Contamination
Contamination of the air side occurs due to atmospheric particulate contained in the vast volumes of air that are pulled in by the turbocharger and sent through the air cooler. The finned cooler acts as a filter where the particulate can deposit. This results in a mixture of oil, carbon and dust on the surfaces.
The effect of this is reduction of the rate of heat transfer from the air to the sea water and an increase of the pressure drop across the cooler resulting in less air reaching the engine.

Contamination of the sea water side occurs as scale builds up on the surface. This scale can quickly build up when tubes get blocked or partially blocked by marine growth. As water flow is restricted, the wall temperature increases and more scale deposits on the surface.

Maintenance
Regular maintenance involves the daily injection of Vecom Air Cooler Cleaner before the air reaches the air cooler. This fine mist of solvents and water will help to dissolve the oil and carbon and keep the fins free of build up which can reduce the air flow.

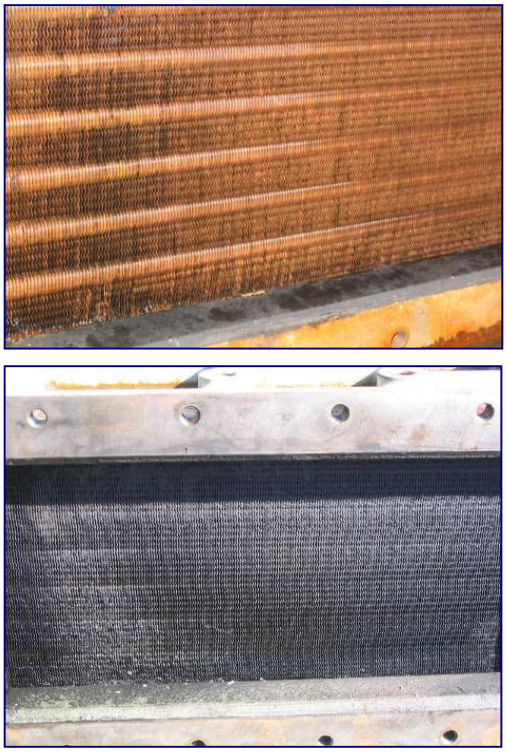


Refurbishment
After many years of service the air coolers should be removed from the ship and sent ashore for soak tank or ultrasonic cleaning. (If necessary, cleaning can also be carried out on board).
Ultrasonic cleaning relies on the generation of air bubbles which penetrates the depths of the air cooler. When they implode the surrounding chemical solution impacts upon the surface. It's this cleaning action which provides such good results.
Alternatively soak tanks with a formulation of solvents and alkalis raised to high temperatures will produce good results.
Washing down is extremely important and large volumes of water are often used to ensure all the contamination is flushed out thoroughly.

Descaling is always carried out by immersion in a soak tank containing inhibited acids. Blocked tubes may never be cleared and sometimes have to be plugged.

With regular maintenance and timely refurbishment charge air coolers can give many years of service and remain in near optimum condition providing much needed vast quantities of cooled air to the diesel engine.

Vecom have many years of experience cleaning charge air coolers and have over the years developed practical solutions to clean the air and sea water side effectively



Before and after cleaning

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