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Marine Heat Exchangers



Marine Heat Exchangers

50 YEARS OF EXPERIENCE OVER 100.000 MARINE HEAT EXCHANGERS



: NRF - NETHERLANDS RADIATOR FACTORY

Founded in 1927 as designer & manufacturer of radiators for the automotive and the industry. Today, more than 450 employees are active in sales, engineering and production in 3 factories and 10 branch offices throughout Europe. A worldwide agent network completes the sales and support of our products.

In 1959 NRF invented the boxcooler, when they where and manufacturing is still located at the head office in Mill asked to find a simple solution in order to keep the engines of The Netherlands. In 2007, NRF reorganised its production river boats, who where cooled with surface water, free of line of boxcoolers in order to keep up with the worldwide fouling. Due to the success of this product, more and more increasing demand. Nowadays NRF is still able to vessels changed over to this type of cooling. Today, NRF is manufacture and ship less than 6 weeks after receipt market leader in this field and supplies heat exchangers all of order. over the world. In order to secure our quality, engineering



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BOXCOOLER •

Boxcoolers offers an alternative for the existing known cooling systems such as Plate Heat Exchangers and Shell and Tube Heat Exchangers. From equipping small inland vessels in the 1950's, NRF has progressed to be a leading global supplier of boxcoolers to the world largest shipyards and fleets in all continents and oceans. The concept of fixed dimensions on one side and a flexibility of length and width leads results into a variety of more than thousand different designs. This means that for every individually case, according to the technical parameters given by the customer, NRF can make a design that fits.

Short lead times, know-how and high quality products have lead to an extreme growth within NRF.

	from 1 kW to 20.000 kW Fresh water and /or a mixture of water and refrigerant
Materials: - Bonnets - Tubestack	Carbon steel Aluminium brass Aluminium brass externally coated
Pressure range: - Tube side	95℃ – 3,3 Bar
All boxcoolers can be supplied with certificates such as:	

Mounting

Standard all boxcoolers are designed to be installed topdown through the engine room. In some cases, designs forces to install through the seachest. (Bottom-up.) For that, NRF has a special design.

Operation

Once the boxcooler and optional ICAF system is installed and set into operation, the coolers only have to be inspected during dry docking.

Coated and uncoated boxcoolers

For sweet water applications s.a. rivers, lakes etc NRF supplies its coolers made out of aluminium brass hairpin tubes. Since seawater (which is a good electrical rectifier) causes galvanic corrosion on ship hulls, NRF coats their aluminium brass boxcoolers with an electrical insulating coating. For the coating is environmental friendly, it is founderable for animal growth. In those cases where fouling by means of animal growth is a high risk, NRF advises to install an Impressed Current Anti fouling system that guarantees a fouling free operation between docking intervals.

Application

In principle all kind of vessels that are being used in coastal operation, dredging, oil industry, ice- and inland going. Designed for main engines, generator engines, gears, hydraulics, air-conditioning, compressors, winches etc

Guarantee Boxcoolers

The boxcoolers have a standard 5 years guarantee after delivery.

: ICAF (IMPRESSED CURRENT ANTI FOULING)

The NRF boxcooler is in principal a maintenance and breakdown free cooler. Our boxcoolers are used on all kind of vessels operating worldwide. Like every type of ships cooling system witch is exposed to seawater, is a potential victim for fouling. Although NRF keeps a safety margin in sizing their boxcoolers, excessive biological marine growth will affect its heat transfer.

Since many years NRF combines the ICAF system with the installation of its boxcoolers. The ICAF System is a highly effective and environmentally friendly option for preventive biological fouling.

Impressed Current Anti Fouling

The function principle is based on an artificially triggered voltage difference between the copper anodes and integrated steel plate cathodes. As the copper dissolves into the seawater, an ambient environment is created precluding fouling and protection of the boxcoolers. The Power Unit of the system ensures that the copper anodes add the exact required amount of copper particles to the seawater. Perfect protection is guaranteed under all conditions and the amount of dissolved copper is minimized to prolong the lifetime of the anodes. By ordering the system, the lifetime of the anodes shall be adjusted to the docking intervals of the vessel.

ICAF components



Copper nodes

Mounting ICAF

The best method is by mounting the copper anodes on a steel frame together with the steel uncoated cathode plates welded in the sea chest on the structure of the ship.

Operation ICAF

In practice only supervision is required which means that a daily check of the current is recommended. The power supply unit can also be connected with the ships monitoring system. In that case, the system can be checked automatically.

Maintenance ICAF

Maintenance of the anodes is only required when the ship is dry docked for its 3 or 5 year maintenance check. The copper anodes have to replaced by new ones.

Guarantee ICAF

The ICAF system can be guaranteed for 5 years which means that in this period of time the marine growth on the boxcoolers will not exceed more than 7% of the cooling surface of the boxcooler. (ask NRF for these extended guarantee conditions)



Excessive biological marine growth.

SHELL & TUBE

The successful concept of the boxcooler is also used for the range of shell & tube heat exchangers. A few diameter ranges and a variety of materials, lengths, and different kind of inserts creates a standard with a thousand possibilities. Also here short delivery times and custom-made designs is one of our strongest points. Thanks to their very compact construction, the heat exchangers can be integrated directly in the equipment. The dimensioning is made individually for each case of application according to the technical parameters given by the customer.

The basis for the whole the series heat exchangers construction as well as for the employed materials is the German Pressure Vessel code (AD-Regelwerk 2000). In principle, constructions and materials deviating from the standard are possible and offered on request. For applications where the water quality poses a problem, we deliver the heat exchanger tubes with a baked coating for extra protection against corrosion and incrustation, or also with a titanium tube bundle. On request, our heat exchangers are obtainable with accessories like switch-over valve, other valves etc.

Application

Water/water, water/oil and refrigerant/oil Designed for main engines, generator engines, gears, hydraulics, compressors, winches, thrusters etc.

Guarantee Shell & Tube heat exchangers

The Shell & Tube heat exchangers have a standard guarantee of 12 months after delivery.



Heat Exchanger on a gearbox. Material

gaskets to avoid

Pressure range











Design

All our products are machined, assembled and tested within our factory in Mill, The Netherlands. Due to a flexible production method, our factory makes it possible to keep a standard delivery time of 6 weeks after receipt of order ready for shipment.

OEM Quality



: See you on board at NRF!

All our products are engineered within our premises and meet the necessary requirements for all of the classification societies. Our software gives us the possibility to make a selection of the best possible solution for every application within a standard range.

Manufacturing

Due to our design and production method, our coolers are build to last for many years. In order to secure our quality, our factory is ISO 9001 certified and meets many other regulations that also apply for the automotive and the industry.

