Compact Cooler

GEA Heat Exchangers / **GEA Bloksma BV**

GEA Bloksma BV is part of the GEA Heat Exchangers segment of the GEA Group and specialised in designing and manufacturing coolers.

The benefits of GEA:

- You benefit from the innovative strength of a strong group
- We use the expertise of all company areas when working on your projects
- You utilise the synergies from all GEA segments

[GEA Bloksma BV – background]

Member of an excellent group

GEA Bloksma BV is part of the global GEA Group, which operates in more than 50 countries worldwide. It focuses on the two basic engineering processes of heat exchange and mass transfer and continues to advance the market for these key technologies.

By focusing all heat-exchanger activities in one single Heat Exchangers segment, GEA now highlights its position as world leader on the market of heat exchangers. Concentration of business in this new segment will further improve the proximity to our customers and, at the same time, the access to the product portfolio of GEA. It will likewise vigorously promote high GEA quality standards, in conjunction with the customized solutions of GEA as a leading technology group.

GEA Heat Exchangers covers numerous application areas, from air conditioning systems to cooling towers, and therefore probably provides the widest range of product portfolio of heat exchangers worldwide. Finned-tube heat exchangers, single-tube heat exchangers, Heller systems, air-cooled condensers, wet cooling towers, plate heat exchangers, HVAC systems, and all kinds of shell-and-tube heat exchangers: for all feasible applications, the new GEA segment Heat Exchangers offers from one source the best possible solutions. And it powerfully supports planning efforts in all areas of heat transfer.

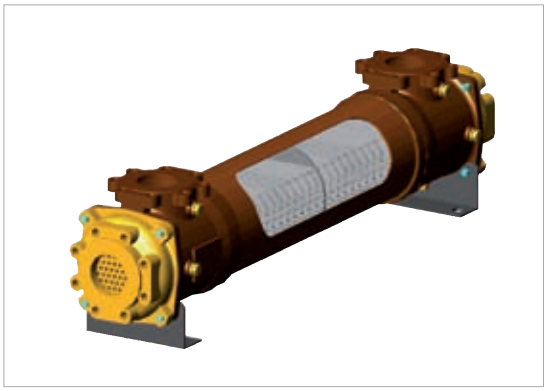
Experience and a world wide reputation

GEA Bloksma has a long experience in designing and manufacturing compact coolers. Many compact coolers have been supplied and are operating successfully.

Due to this long experience GEA Bloksma can evaluate every situation and can advise on installation. GEA Bloksma has a wide variety of standard types and options. This allows a flexible design, based on the operating conditions, taking in account dimensional limitations of the installation.

- Long-time experience in compact coolers
- Proven cooler concept
- Global presence
- Strong focus and ongoing research and development work
- Compact coolers that are optimized to your design because of the modular concept

General



The GEA Bloksma compact cooler range is due to its modular design applicable for many cooling applications. The design contains a wide variation of casted end pieces; these are mechanically bonded to a shell tube. This together forms the cooler shell. The connection is resistant to high pressures and has accurate tolerances. Because the construction is a non welded one, it is not sensitive for deformation.

By varying the diameter and length of the shell, GEA Bloksma is able to make a wide range of sizes. From this range we are able to select the most suitable one for your application. This wide range of shell sizes, in combination with different tube bundle inserts, makes the compact cooler one of a kind and applicable for many variations in cooling needs.

The modular construction results in a compact and efficient cooler. Additional to that, the production lead time is short and production procedures are transparant. As a result of that the price level is competitive.

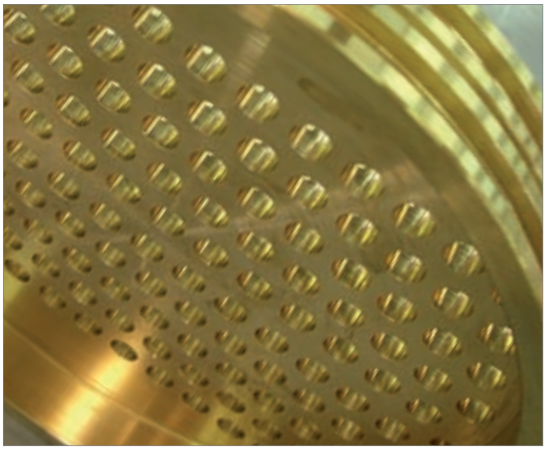
Cooling Applications

- Diesel & gas engines
- Gear boxes
- Hydraulics
- Oil supply units
- Bearings
- Power stations
- Refrigeration
- Turbines
- Air compressors
- Transformers

Common features / Benefits:

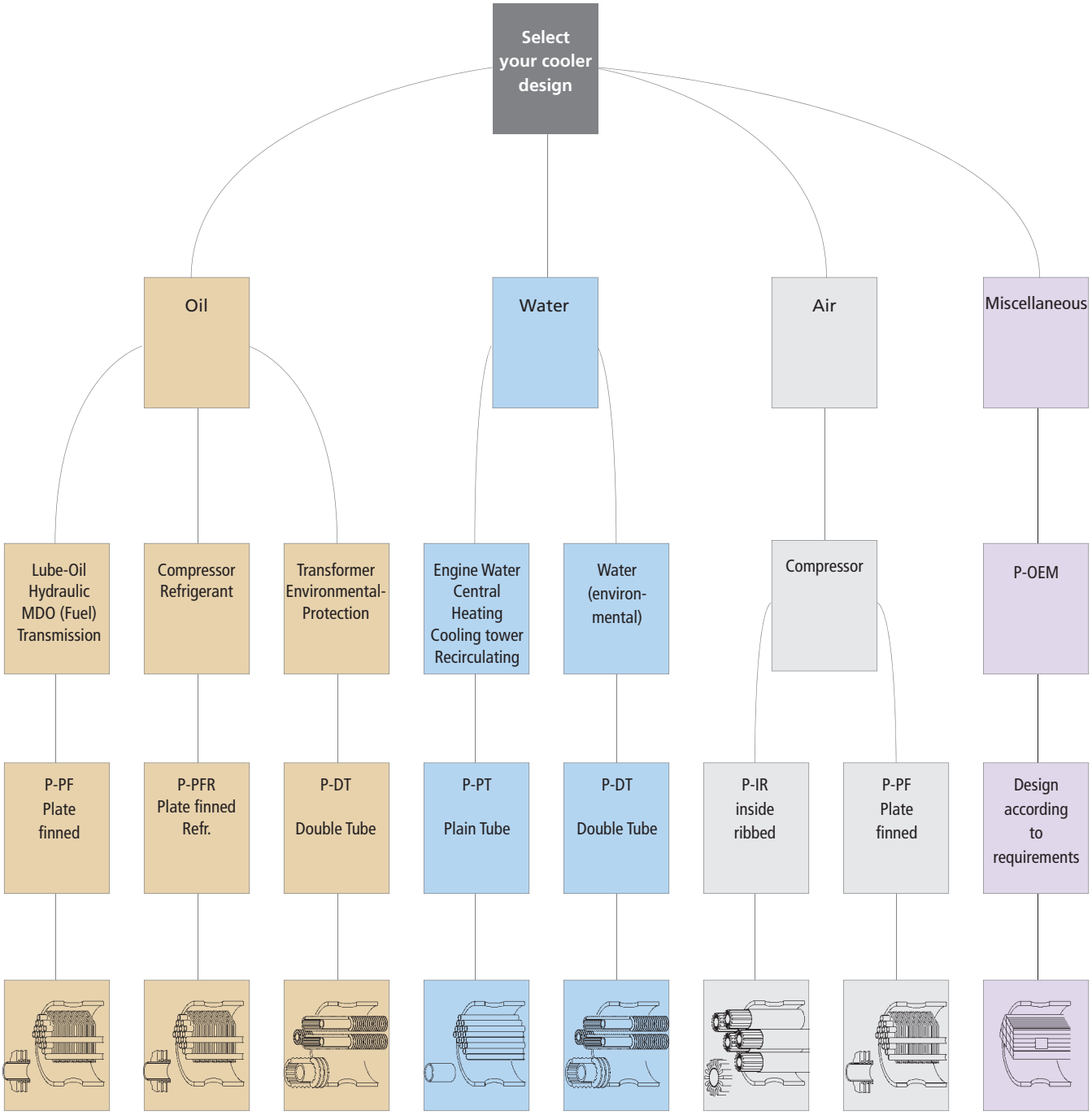
- Compact design
- Low weight construction
- Non welded construction
- Flanged of threaded connections, low installation height
- Less sensitive for vibrations
- Tube bundle retractable from 2 sides
- Design code AD 2000
- CE/PED approved construction
- Approved by all major Marine Classification Societies
- Double O-Ring construction:
  - No intermixing of fluids
  - Easy inspection / cleaning on tube side
  - Shell side can be filled, when tube side inspection is done
- Flexible mounting:
  - Horizontal - Vertical
  - Brackets adjustable (around 90°)
  - Fully adjustable brackets optional
- Shell diameter range from 100 to 280 mm
- Material execution in Marine Version (MV) or Industrial Version (IV)

Complete non welded construction



Double O-Ring construction

How to select?



P-PF (plate finned)

GEA Bloksma's experience on Plate Fin technology goes back many years and started its know-how in radiator manufacturing.
This applied technology has played a big role in the development of the PF Cooler.

The PF Cooler combines both advantages of using a tube bundle and plate finned heat exchanger technology. The bundle exists of a tube stack and special designed plate fins, which is built together as one rigid cooler bundle. Because of this construction in combination with optimized tolerances, the bundle has a very high efficiency combined with a very compact size.
This results in a cooler of only 25% in size compared to conventional tubular heat exchanger with plain tubes.

This specific heat exchanger type has high advantages in applications where oil has to be cooled off with another non-oil fluid. The surface on the shell side is enlarged due to the lower heat transfer value of most oils.
The compact size is in favour where a certain need for a compact, reliable, long-lasting and low maintenance quality product is preferred.
This, for instance is applicable on gearbox systems where Plate Finned Oilcoolers are mounted on top.

Due to the rigid cylindrical execution, vibrations and high pressure pulses do not have any influence on the performance of the Plate Fin Cooler.

A wide range of cooler sizes is available with various configurations. On the tube side a choice can be made for 1, 2 or 3 pass executions in order to select the right layout and size for your system.

Besides the industrial version (closed cooling water circuit, clean water, etc) a marine version is available to meet requirements such as open water systems or sea water systems. The marine version is equipped with sacrificial anodes that protect the tube bundle against corrosion.

P-PF (plate finned)

Common features / Benefits:

High performance:

- Very compact tubular cooler
- Low weight
- Low oil and water contents
- Low pressure drop due to GEA Bloksma design knowledge
- Excellent price/performance ratio

Reliability:

- Excellent resistance to shocks, vibrations and pulsation's because of cylindrical design, and homegeneous bundle
- Double O-rings on both sides, easy maintenance
- Tubes are roller-expanded in the tube sheets
- Easy maintenance on tube side

Flexible design:

- World wide acceptance by all main marine classification societies
- DIN or SAE flanges and BSP connections available
- To be mounted in every required position

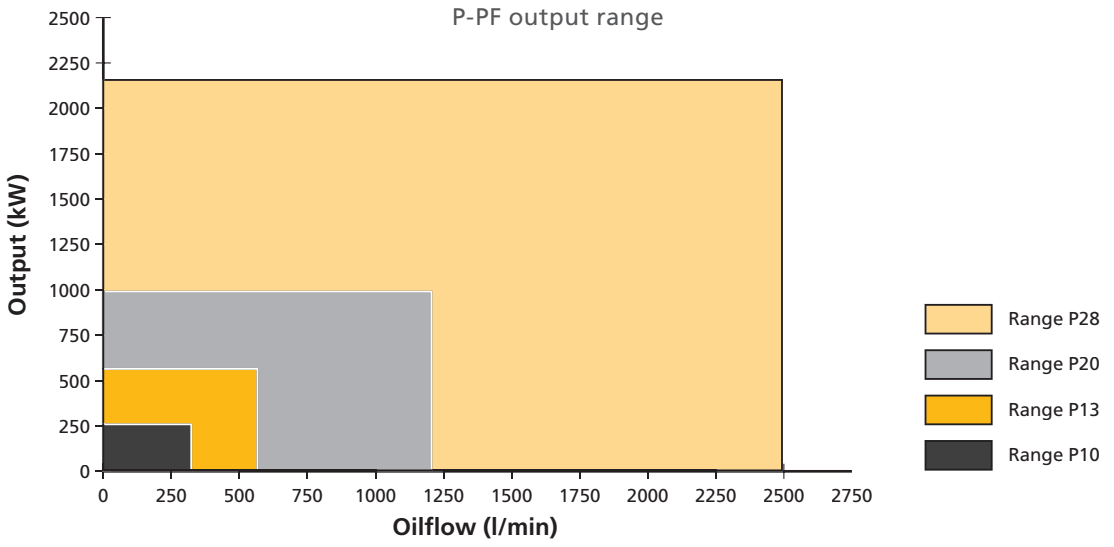
Materials:

Tubes:	Copper Nickel, Steel, Stainless steel
Tube sheets:	Seawater resistant brass
Shell:	Nodular Casting/Carbon steel
Covers:	Cast iron (IV), Bronze with anodes (MV)
O-rings:	Viton

Low maintenance and operating costs:

- Easy to handle low weight tube bundle, removable from both sides
- Tube side inspection and easy cleaning because of tubular design
- Per cooler only four O-rings and a minimum of bolting
- Special cleaning sets available
- Shell side fluid can remain under pressure during overhaul on the tube side
- Delivery from stock

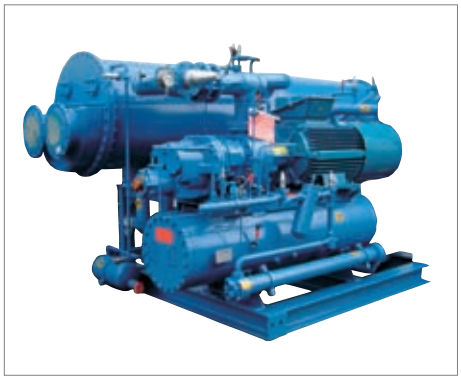
Design data:	Oil side	Cooling medium side
Design pressure bar (g)	16	10
Design temperature (°C)	120	up to 120



P-PFR (plate finned - refrigeration)

The PFR Cooler can be considered as an extension of the Plate Fin technology where GEA Bloksma has many years of experience as mentioned before. The PFR cooler combines both advantages of using a tube bundle and plate finned heat exchanger technology in the same way the PF Cooler range does. Again this results in a cooler of only 25% the size compared to conventional tubular heat exchangers.

This specific heat exchanger type has high advantages where oil cooled screw compressors have to be cooled with another non-fluid, applied in refrigeration systems. The oil with some refrigerant flows trough the cooler shell and plate fin stack where the big surface is, whereas the non-oil fluid is flowing through the tubeside of the stack with it's small surface.



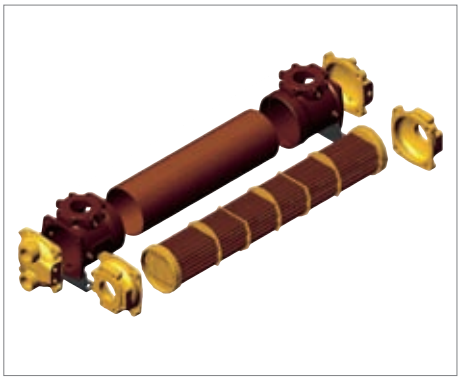
The compact size is in favour where a certain need for compact, reliable, long-lasting and low maintenance quality product is preferred. Because of the rigid cylindrical execution, vibrations and high pressure pulses do not have any influence on the performance of the Plate Fin Cooler.

When choosing on cooling liquids, it is possible to choose for closed loop systems with all steel materials (IV = Industrial version). For aggressive liquids you can choose for bronze with anodes and or coated materials (MV = Marine Version).

For thermo syphon applications, the RV version is developed to be able to stand 25 Bar pressures on cooling medium (tube side).

The PFR cooler is specifically developed for use in refrigeration systems where refrigerant, such as R22 or NH3 is used as coolant. This liquid flows through the cooler (tubeside) and leaves the cooler as a gas, due to heating up. Because this coolant is very clean and executed as a closed loop, very low maintenance is required.

P-PT (plain tube)



The plain tube execution of the GEA Bloksma P cooler is most suitable for cooling of water. Water quality can be clean process water; water/glycol mixtures or sea (open surface) water.

The compact construction of the P shell and the efficient tube pattern of the tube bundle make the P-PT cooler small and compact compared to traditional shell and tube heat exchangers.

The the double O-ring construction, makes it possible to inspect the tube side while the shell side is pressurized. In case of a damaged O-ring, there is no intermixing of circuits. This because there is still sealing secured by the second O-ring.

The tube bundle of the PT cooler can be executed in different materials. Depending on the applications a selection of the suitable tube material is made.
Also different tube diameters can be applied (7.77 mm and 10 mm).

Range of tube materials

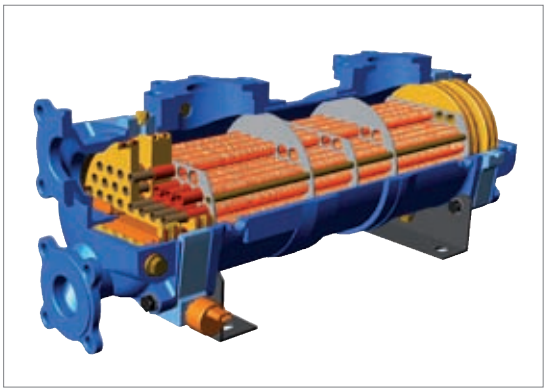
- Carbon steel
- Stainless steel
- CuNi
- AluMessing
- Inside coated (phenolic) tubes

Technical details/Features and benefits:

- Max design pressure 16 bar on shell side and 10 bar on tube side
- Max design temperature 120°C on both shell and tube side
- Single or two pass executions
- Seawater resistant water boxes including sacrificial anodes or cast iron water boxes when applicable
- Diameter range from 100 to 280 mm
- Length up till 3600 mm
- Easy cleaning, maintenance
- Flanged or threaded connections
- Tube bundle removable from 2 sides

P-DT (double tube)

Introduction



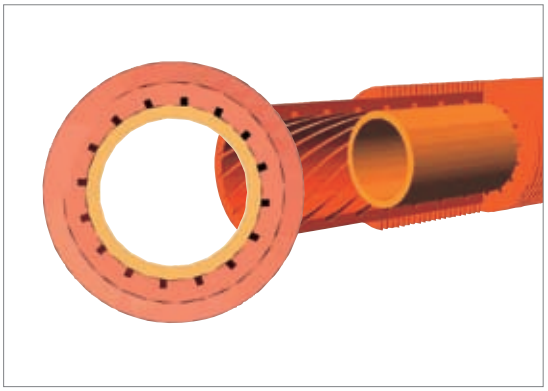
In case environmental rules or safety regulations prescribe the use of a safety system, the GEA Bloksma double tube concept is an excellent solution.

The GEA Bloksma DT concept excludes the risk of intermixing of fluids caused by leakage one of the tubes.

In the rare case of leakage , a detection system is activated which enables the user to take adequate measures to avoid intermixing of fluids of leakage into the environment.

Applications

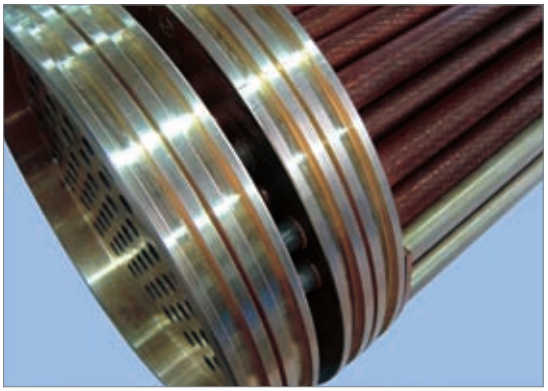
- Transformer Oil coolers
- Oil coolers where environmental or mechanical damage should be avoided under all circumstances
- Process Coolers



Principe

The principle of the Double Tube cooler is fairly simple. The single wall between the two fluids is replaced by two walls with an intermediate circuit.
Any damage in one of the tube walls will result in a filling of the intermediate circuit.
This filling is detected and results in an alarm signal.

As alternative for the Double Tube cooler the use of a secondary circuit could be considered. This alternative however needs a second heat exchanger. This secondary circuit needs conditioned cooling water, extra pumps, piping vales etc.
The required heat and the second heat exchanger will be larger and, as a consequence, more expensive as well as an investment as operational costs.



All design options used for single tube heat exchangers are also possible with the double tube construction, so different material combinations and cooler constructions are possible, depending on the fluids used.

Custom build

GEA Bloksma has been building specific heat exchangers on a custom build basis for many customers. Using its expertise and standardized portfolio, GEA Bloksma is able to design tubular heat exchangers specifically developed for purposes in systems and installations.

Combinations of air coolers and lubricating oil coolers have been developed to cool down both media in one heat exchanger. To meet the demands in size, weight and typical performance, GEA Bloksma has developed moulds for casted cooler parts to be able to fit as component within the system. In some cases complete new combinations of materials were applied after a testing period.

The GEA Bloksma R&D team is able to meet your requirements by means of its expertise, testing facilities and experience on all kinds of custom build heat exchangers over many years of time.

If the demand of your specific tubular heat exchangers exceeds the maximum size and performance or construction features for the P-cooler type, GEA Bloksma has its N-type heat exchanger available. In the N-type a wide variety of materials, construction details as well as design codes are applicable.

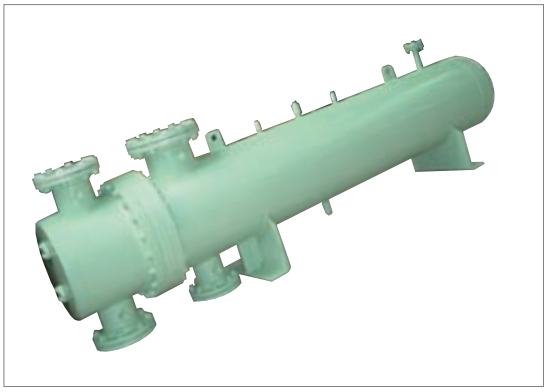
Please ask your local GEA Bloksma representative or GEA Bloksma to select your optimized heat exchanger type.

Some examples:

- Plate Finned oil cooler bundles for lube-oil modules, as an insertable component
- One piece casted shells to meet customers size and pressure demands for hydraulics

Custom built aluminium shells

Combined cooling circuits



N-type according to TEMA

GEA Bloksma complies with the following classification societies:

ABS	American Bureau of Shipping	USA
BV	Bureau Veritas	France
CCS	China Classification Society	China
DNV	Det Norske Veritas	Norway
GL	Germanischer Lloyd	Germany
KR	Korean Register of Shipping	Korea
LRS	Lloyds Register of Shipping	UK
MROS	Maritime Register of Shipping	USSR
NK	Nippon Kaiji Kyokai	Japan
RINA	Registro Italiano Navale	Italy

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