# GEA air dryers and air preheaters

Heat exchange with air “by GEA”: sustainable, versatile, customized

## Benefiting from the HX factor: Focussed competence and excellence in heat exchanging

Efficiency and sustainability are standards. GEA Heat Exchangers (HX stands for heat exchange) offers you more. Because we have the HX factor. Everyone at GEA has it. Every team. Every employee. It can be found in all our products and services. It makes the difference. And gives you the edge in heat exchanging. Thanks to engineering know-how based on market experience and expertise. With skills and understanding leading to the right solution even in the most complex projects. With reliability in every situation. With enjoyment of the challenge. With commitment, foresight and precision. This is all a part of our HX Factor. Experience it. Benefit from it.

# Combined product and application expertise

Wherever heat exchange is required within industrial production processes, GEA engineers regulate it all to a precise temperature. Oil, gas and chemicals, steel plants and power stations, from waste incineration to drying equipment – GEA Heat Exchangers has one of the most comprehensive, if not the most comprehensive heat exchanger portfolio throughout the world.

The GEA Heat Exchangers segment develops and manufactures air dryers and air preheaters in the Air Fin Coolers (AFC) Single Tube Competence Center. The product range comprises all designs of air dryers and air preheaters for all conceivable applications. Whether it's simple components or complex process plants: high manufacturing quality, economic profitability and flexibility form a winning combination in terms of efficiency for our customers. Air dryers and air preheaters often have to prove their worth under extreme conditions and guarantee reliable operation. This is why a team of experts including engineers, welding experts and quality inspectors scrutinizes every apparatus and every single component very precisely. This procedure ensures that we meet all quality requirements. And we achieve this in complete control as numerous certifications demonstrate. As we also install and commission the plants if you want us to, our installation department is comprehensively trained in all aspects of occupational safety. Our confirmation is the SCC Certificate (Safety Certificate Contractors).

The preparatory work by experts on both sides is the decisive factor. GEA is able to adapt the heat exchanger precisely to the customer's processes and design it accordingly because at GEA, engineering and manufacture come from one single source. Many years of experience in manufacturing and welding engineering enables using all weldable materials for a given apparatus. Accordingly, our customers benefit from a differentiated range of the most varied finned tube types and any header shape in all materials or material combinations and from complete service packages

Standards and certifications:

- DIN EN ISO 9001
- KTA 1401
- DIN EN ISO 14001
- OHSAS 18001
- Pressure vessel regulations 97/23/EC; AD 2000 rules
- ASME U-Stamp
- GOST-R
- SQL

Acceptance companies:

- TÜV Rheinland
- TÜV Nord
- ONE/TÜV/BV
- TÜV Austria
- Stoomwezen
- Vincotte
- ISPESL
- SVDB
- Service des Mines
- Lloyd's Register
- TTK
- SA Sweden
- Germanischer Lloyd
- Det Norske Veritas
- RINA

# Air heaters and air dryers: the all-rounders

For almost a century, GEA has been a pioneer in industrial heat transfer and plays a leading role worldwide in this field.

## Air dryers

Air dryers are available in different materials, customized for every application:

- Heavy industrial loadings or high temperatures make no difference to air dryers made of galvanized steel. They are manufactured completely from steel to form a welded unit. The elliptical finned tubes are hot-dip galvanized. Frame and headers are protected against corrosion by zinc-dust primer and an epoxy aluminium finishing paint. It goes without saying that the complete heat exchanger unit is also available as a version galvanized in a dipping bath.

- Air dryers made of stainless steel are the specialists meeting the highest hygiene standards or for applications involving aggressive media. The seamless joint between tube and fin produced using a laser enables longer service life without performance losses: you benefit from state-of-the-art manufacturing technology with laser finned tubes by GEA. The heat exchanging surface consists of elliptical or round stainless steel finned tubes.

- Plain-tube heat exchangers made by GEA are the first choice when high performance is called for despite heavy air pollution. The heat exchanging surface consists of round galvanized plain steel tubes. This variant stands out for its long on-stream times and easy cleaning. Cross-flow heat exchange, stainless steel versions or galvanized steel – GEA engineers will find a solution for your application.

Stainless steel plain tube heat exchangers for the paper industry

Galvanized steel heat exchanger for drying application

Heat exchangers using the single-tube design can be equipped with either finned or plain tubes. Elliptical finned tubes are a GEA speciality. The elliptical core tube has good aerodynamic properties because it reduces the slipstream behind the tube. Thus the cooling surface is increased, pressure loss and soiling decrease and the noise level drops.

## Air preheaters

Air preheaters are heat exchangers for heating and evaporation, for cooling and condensing and for heat recovery. Many decades of experience in designing and manufacturing have made GEA a leading supplier of heat exchangers for cooling and heating of gaseous and liquid media. The wide range of available plain and finned tube systems is certainly an important aspect of our market success.

Finned-tube heat exchangers can be made from numerous materials: steel, stainless steel, copper/aluminium, aluminium and other special materials. Plain-tube heat exchangers are used mostly where a fluid present around the tubes is so polluted that finned tubes can no longer be used. Plain tubes can be configured in different ways either next to one another or serially. Steel and stainless steel versions as well as a hairpin design are also possible.

Air preheater for a waste incineration plant

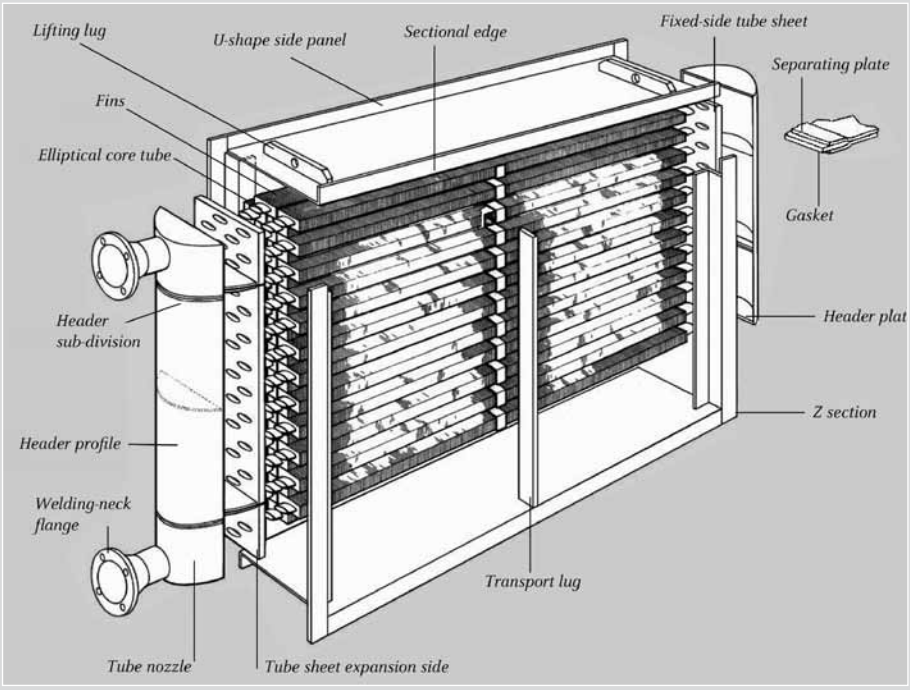
### Benefits of the elliptic finned tube:

- aerodynamically favourable core tube with roughly three to ten times less hydraulic friction as compared with a round tube
- low pressure loss and minimum soiling
- high thermal transmittance resulting in small heat exchanger surface
- low noise level
- good corrosion protection due to hot-dip galvanizing in a dipped bath and at the same time an optimum metal joint between core tube and fin
- compact design leading to good use of a given volume
- maximum service life

### Wide range of special variants:

- Completely galvanized heat exchangers
- Hairpin-design heat exchangers
- Heat exchangers with valves on the steam and condensate sides
- Heat recovery systems made of galvanized steel or aluminium
- Economizers

# Variants for every demand




Air coolers and heaters are designed as single-tube systems. This design is suitable for water, steam and oil as heating or cooling medium. The heat exchangers are made of single elliptical or round finned tubes or of plain tubes. GEA has developed special machines and processes for manufacturing the finned tubes. Manufacture is completely in own production facilities.

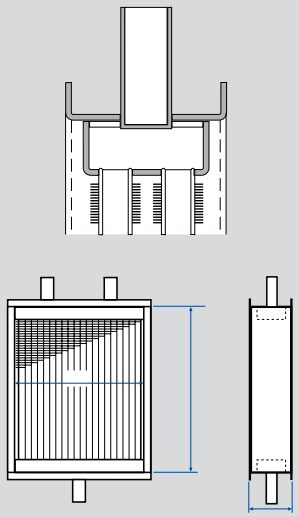
All air heaters have a sliding tube sheet, enabling expansion of the tube bundle independently of the connecting frame. The water and steam connections are arranged so that expansion is not blocked. Split baffle chambers can be used in air heaters for hot water in order to compensate the thermal stress caused by the temperature difference between water inlet and outlet.

Air coolers can be equipped with a condensation water collecting pan.

Designs are governed by the customer's requests and depend especially on the pressure level prevailing in the system.

## Style E

Style E is suited for heat exchangers that are not subject to an acceptance test. The heating and cooling surfaces consist of hot-dip galvanized finned tubes. Heating or cooling medium connections realised as butt welding ends are standard with this style. However, welding-neck flanges can also be fitted upon request. The air connecting frame is provided with a protective coating. Special versions are possible.

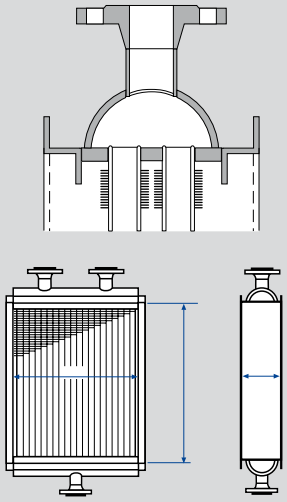


## Example of style E

- With or without air-side connecting frame
- Airtight or non-airtight connecting frame

## Style D

Style D is designed for higher pressure ratings and meets the relevant acceptance criteria. Welding-neck flanges of the required pressure rating are always provided for heating and cooling medium connections. Heating and cooling surfaces consist of galvanized finned tubes. Special versions are of course possible.

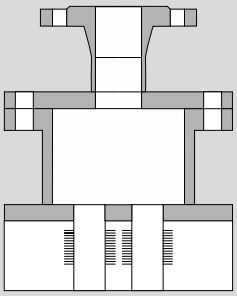


## Example of Style D:

- Heavy-duty welded design
- With or without air-side connecting frame
- Airtight, gastight or non-airtight connecting frame

## Special designs

When is comes to special designs, GEA customers have an extensive choice regarding header and tube design (rolled-in or welded) as well as materials and coatings.

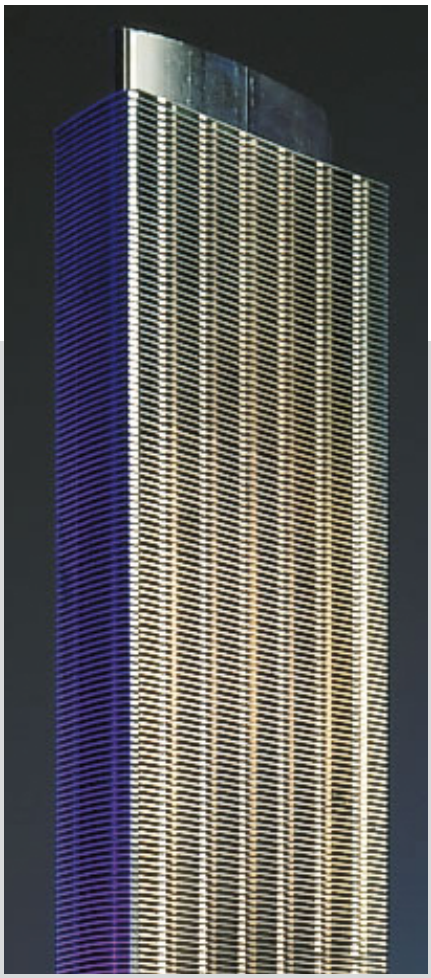


Example of a special design

## Special designs:

- Style R: removable header cover, welded tubes, tubes and headers can be cleaned mechanically
- Style S: removable header, rolled-in or welded tubes, header can be coated internally, tubes and headers can be cleaned mechanically
- Style T: welded non-removable header; welded tubes

# Customized design



## Pitch of elliptical finned tubes

The fins punched out of the sheet metal coil are attached to the elliptical core tube. Hot-dip galvanization ensures a good metallic joint. The heat exchanged depends on the pitch of the fins – between 2.1 and 6 millimetres – and on punchings taking the shape of spacers or turbulators.

## Shape of fins on round tubes

When using round core tubes, the fin shape and material determine the heat exchanged and the field of application.

### FE:

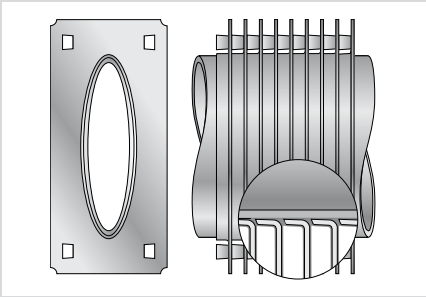
The elliptical finned tubes have a wide punched fin collar enabling excellent heat transmission. The benefit of this design is its absolute insensitiveness against thermal and mechanical loads.
Maximum operating temperature: 360°C

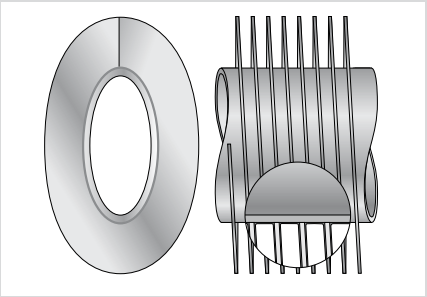
### PI/HI:

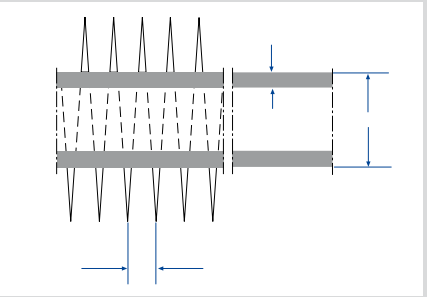
Here the steel strip is wrapped around the core tube like a spiral, followed by hot-dip galvanization in a dipping bath to ensure heat transmission and excellent corrosion protection.
Maximum operating temperature: 360°C

### S-Fin:

In this process, the finned tubes are manufactured by continuously welding helically wrapped fins made of steel strip to seamless steel tubes. They can be used at up to 550°C.





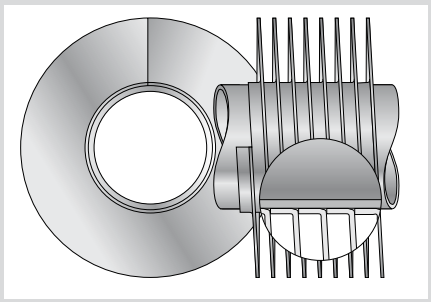


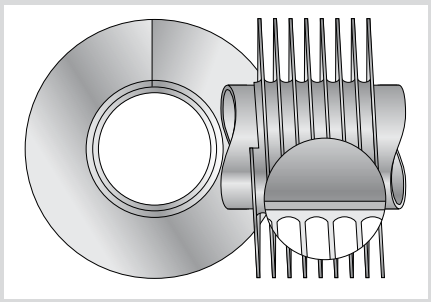
The joint between the fins and the core tube has major influence on the heat exchanged. Fins made of aluminium or galvanized in a dipping bath are mostly used with steel or stainless steel core tubes. Aluminium can be shaped easily and is also a particularly good heat conductor. Fins made of steel make very robust and sturdy tubes that are suitable for high-pressure cleaning.

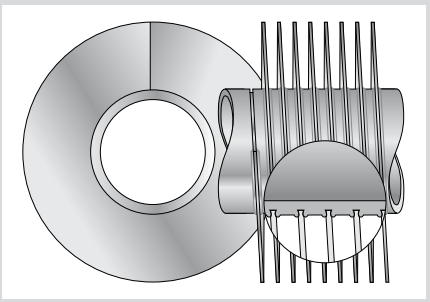
L-Fin:
An L-shaped fin strip is wrapped around the core tube like a helix. The manufacturing process produces a large contact area and the heat is evenly transferred from the entire core tube surface to the fins. This variant is favourably priced, but not suited for very high temperatures.

E-Fin:
Finned tubes of this type are rolled from a pure aluminium hollow blank tube slid over the core tube. These fins are solid, can be easily cleaned and used with chemically aggressive media and up to 200 °C.

G-Fin:
The G Fin type is a high-fin spiral finned tube. The aluminium or steel fin is fitted in a groove in the core tube, making this version highly resistant to thermal and mechanical loads.







## Experience + wide system range = wide range of applications

GEA supplies heat exchangers for numerous branches of industry – for heating and evaporating, for cooling and condensing and for heat recovery. Almost a century of experience in designing and manufacturing and almost a hundred different systems ensure that our engineers can realize solutions for the most varied tasks:

- Air coolers and air heaters for chemical and process engineering
- Air heaters for drying engineering, e.g. stenter dryers with integrated, galvanized steel finned tube heat exchanger or chemicals drying plants using stainless steel heat exchangers
- Air preheaters for boiler plants, e.g. in power stations and waste incineration plants
- GEA Econorm for energy savings and heat recovery
- Economizers for steam, oil and hot water production
- Steam and water recoolers
- Waste gas cooling following thermal incineration
- Air coolers for wind tunnels in the automotive industry
- Production of food and beverages
- Refrigeration and air conditioning, also for the marine sector
- Paper and cellulose industry, wood processing
- Textile industry
- Steel industry
- Plastics-processing industry
- Printing

*We live our values.*

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.

## GEA Heat Exchangers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