Air Cooled Heat Exchangers

ALZ GmbH

air cooled systems and air heaters
THE COMPANY

Customer focus, flexibility and high quality. This is what we focus on at ALZ GmbH since the founding of our company in 1990. We are specialized in the design and fabrication of air cooled heat exchangers.

Further products are air heaters and economizer with finned and bare tubes.

QUALITY MADE IN GERMANY

Based on the competence of our staff and our extensive experience in the market all our departments work hand in hand. This gives us a high flexibility.

Our customers benefit in terms of a trouble-free project-execution and a high adherence to project schedules.

As a modern, medium sized and owner-managed company we attach special importance to competently advise our customers regarding all questions concerning their heat transfer tasks. From the early stages of plant design to the fabrication, erection and commissioning support we can provide you with every required service regarding our heat transfer solutions.

Process cooling with air as cooling medium is used successfully in many industry branches and becomes more important with steadily increasing costs for cooling water. At locations where cooling water is not available it is often the only possibility for the cooling of process streams.

For the design and construction of complete air cooled heat exchanger units our engineering departments focus on the specific needs of our customers. Design and construction are carried out according national and international standards as well as customer specifications. Through all stages of engineering we are using professional software applications.

The fabrication of all ALZ-heat exchangers is solely carried out in our workshop in Dorsten, Germany. That makes fabrication quality and progress traceable for our customers at all times.

AIR COOLED HEAT EXCHANGERS

Our goal to always deliver the best possible quality is documented and assured through our own quality management system which is certified since 1994 according DIN EN ISO 9001.

FOLLOWING OUR CUSTOMER’S REQUIREMENTS OUR SCOPE OF SUPPLY INCLUDES

- heat-exchanger bundles with welded bonnet headers
- removable cover plate- or plug-headers
- horizontal, vertical, inclined arrangement (A-frame, V-frame)
- axial fans in forced or induced draught installation
- complete steel construction with ladders and walkways
- auxiliary equipment such as frequency converters, control cabinets and water injection systems for the cooling air
- erection on site and commissioning support

OUR SERVICES

- thermal design
- mechanical design
- fabrication
- erection
- commissioning support
Air cooled heat exchangers can have different arrangements of the heat exchanger bundles. These are horizontal, vertical and inclined arrangement. The fans can operate with forced or induced draught.

The selection of a specific arrangement is based on the nature of the cooling process, the ambient conditions and the available plot area.

**HORIZONTAL ARRANGEMENT WITH FORCED DRAUGHT FANS**

The horizontal arrangement of the heat exchanger bundles with forced draught fans underneath the bundles is the most common configuration of air cooled heat exchangers. It gives easy access to the fans and fan drives for maintenance purposes.

**HORIZONTAL ARRANGEMENT WITH INDUCED DRAUGHT FANS**

Induced draught arrangement of the fans above the heat exchanger bundles results in an even distribution of the cooling air to the heat exchanger surface. The plenum shades the heat exchanger surface and therefore protects it from solar radiation.

**A-FRAME**

Air cooled heat exchangers in A-frame configuration are used when the plot area is restricted. The fans are arranged in forced draught.

**VERTICAL ARRANGEMENT**

Air cooled heat exchangers with vertical arrangement of the heat exchanger bundles are used when the plot area is restricted. When the air flow through the fans is vertical they are installed with induced draught. Especially smaller coolers can also have fans with horizontal airflow (forced or induced).
Air cooled heat exchanger bundles can be equipped with different types of headers. Selection is based on the process requirements. Main criteria are the design pressure, cleaning requirements on the tubeside and the requirement for access to the tube-to-tubesheet connection.

Apart from the shown header types other solutions are also possible. For special applications ALZ can manufacture bundles with manifold headers, u-tubes or serpentine-coils.

**WELDED BONNET HEADER**

Here a bonnet header is welded to the tubesheet. The process nozzles are located on the bonnet. This header design is suitable for processes where no access the tubes or tube-to-tubesheet connection is required. The maximum design pressure is approximately 100 bar.

**REMOVABLE COVER PLATE**

The header frame and the tubesheet form a box. The cover plate is mounted to the header box with a bolted flange connection. This design allows the removal of the cover plate for cleaning and maintenance purposes. The process nozzles can be located on the header frame or the cover plate. The maximum design pressure is approximately 50 bar. If higher design pressures are required special designs can be used.

**PLUG HEADER**

A plug header is a fully welded box header. Opposite of every heat exchanger tube a removable plug is installed in the plug-sheet for cleaning and maintenance purposes. This header design can be used for high pressure applications up to approximately 250 bar.

**FINNED TUBES**

**B-FIN (EXTRUDED)**

Tubes with extruded aluminium fins have a high mechanical and thermal stability. The fin is extruded from an aluminium tube that is slid onto the core tube. That creates a strong bond between tube and fin with excellent heat conduction properties.

- Material fin: aluminium
- Material core tube: any metallic material
- Max. operating temperature: 300 °C

**G-FIN (EMBEDDED)**

Tubes with embedded fins have very good heat conduction properties and a high thermal stability. The mechanical stability varies with the choice of fin material. The fin is spirally wound into a groove in the tube and tightly bonded to it by rolling.

- Material fin: aluminium, carbon steel, stainless steel
- Material core tube: carbon steel, stainless steel
- Max. operating temperature: 400 °C

**I-FIN (WOUND ON)**

This tube has a spirally wound, straight fin that is wrapped onto the tube under high tension. For corrosion protection of the fins either a galvanized fin-strip is used or the complete tubes are hot-dip galvanized after finning.

- Material fin: carbon steel
- Material core tube: any metallic material
- Max. operating temperature: 250-300 °C

**L-FIN (WOUND ON)**

Tubes with L-fins (or knurled L-fins) are used in environments with moderate requirements for the mechanical and thermal stability. During fabrication a fin-strip of aluminium is preformed into an L-shape and then wound onto the tube under tension.

- Material fin: aluminium
- Material core tube: any metallic material
- Max. operating temperature: 200 °C
The cooling air that is required for the cooling process is moved through the heat exchanger bundles by axial fans. The design of the fans and the selection of the fan type is based on the particular design point given by the heat exchanger design. Main criteria are the required volume flow of air, the pressure loss and the individual requirements regarding noise emissions.

1. fan ring
2. fan impeller
3. fan bearing
4. v-belt drive
5. drive motor

GENERAL ASSEMBLY

The main components of an axial cooling fan are the fan ring, the fan impeller and the v-belt drive unit. Depending on the particular design requirements different blade profiles made of aluminium or glass fiber reinforced plastic (GRP) are used for the fan impellers.

For the fan rings we are using a construction with an ellipsoid shape at the inlet side. This shape minimizes turbulence resulting in high energy efficiency and therefore reduced required power. Additionally noise emissions are optimized.

The material for the fan rings is steel. For corrosion protection all parts are hot-dip galvanized. Alternatively painting or a combination of galvanizing and painting are possible.

DRIVE-ASSEMBLY

The drive unit is composed of the bearing block for the fan impeller, the v-belt drive and the drive motor. All components are matched for smooth operation. The implementation of special customer requirements is always possible.

For small diameter fans a direct drive is commonly used. In this case the fan impeller is directly mounted to the drive motor shaft.
Air cooled heat exchangers are generally composed of the heat exchanger bundles for process cooling, the fans for the cooling air and the steel construction.

Heating coils, louvers and maintenance platforms with access ladders are commonly used supplementary equipment.

1. heat exchanger bundle
2. heating coil
3. louvers
4. steel construction
5. fan
6. drive motor
7. maintenance platform
8. access ladder