AlfaNova

AlfaFusion technology

From the extreme heat in our furnaces comes AlfaNova, a 100% stainless steel plate heat exchanger. The secret is AlfaFusion, a unique bonding technology patented by Alfa Laval. Resulting in the world's first fusion-bonded plate heat exchanger, AlfaFusion has stunned specialists in the brazing field. AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly. It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications. It also has the muscle to replace large, heavy heat exchangers of other types in a wide range of applications. Fusion-bonded is a new class of plate heat exchanger, available only from Alfa Laval.

AlfaNova comprises a number of corrugated stainless steel plates, a frame plate, a pressure plate and connections - all in stainless steel of 316 type. All components are bonded together by AlfaFusion, a new technology patented by Alfa Laval. The result is the fusion-bonded plate heat exchanger, a new class of PHE offering extremely high mechanical strength. It is also hygienic, corrosion-resistant and fully recyclable.

Unbeatable reliability

Years of research and testing have confirmed AlfaNova's high mechanical strength and unbeatable reliability. The AlfaFusion technology creates a plate heat exchanger with higher mechanical and thermal fatigue resistance than conventional brazed units. Its 100% stainless steel construction enables AlfaNova to withstand temperatures of up to 550°C (1,020°F).

Corrosion-resistant

The AlfaNova's genuine stainless steel construction also ensures high resistance to corrosion. Thus, it represents a major breakthrough for refrigeration system builders using natural refrigerants such as ammonia. It is also the perfect choice for district heating installations in areas with corrosive water or other applications utilizing corrosive liquids.

Maximum purity

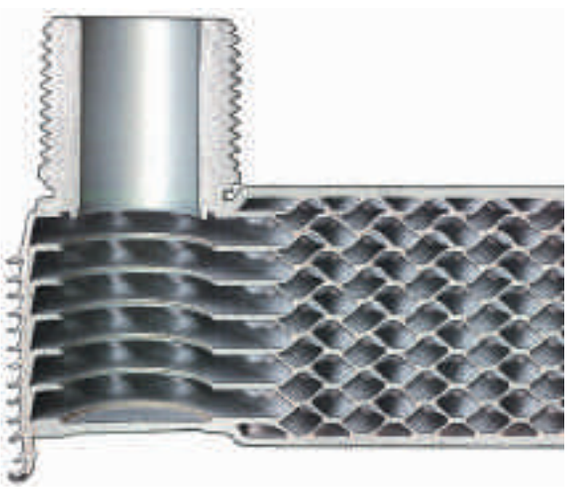
Purity is the subject of increasingly stringent legislation in many countries. Applications affected are clean water chillers in refrigeration systems, tap water heating systems, and a long list of other hygienic areas.

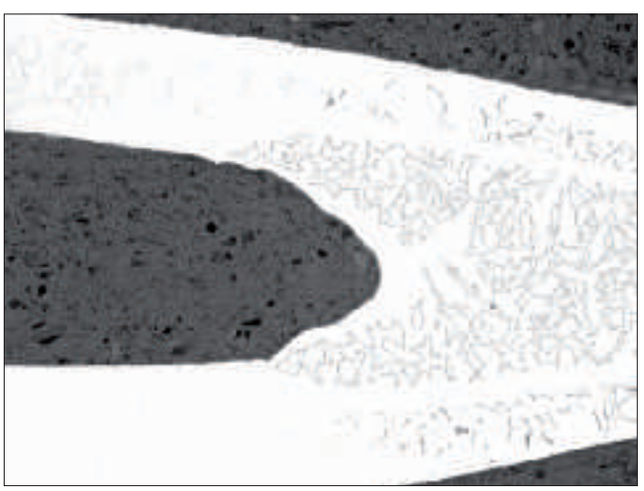
For these applications, the 100% stainless steel AlfaNova, with its clean, hygienic heat transfer channels and high mechanical strength, will be the heat exchanger of the future, challenging other types of heat exchangers.

Four different technologies…

AlfaFusion™

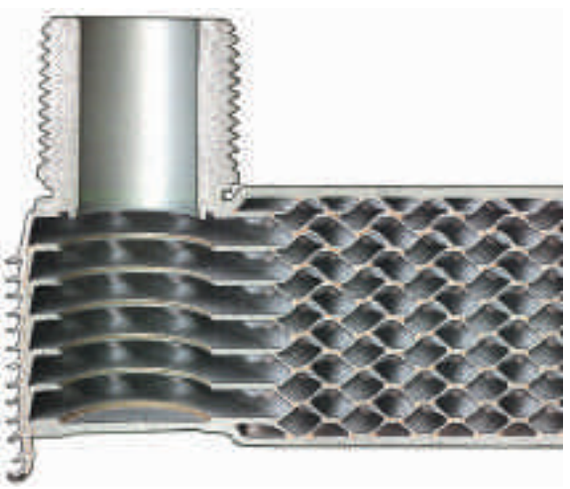
Patented by Alfa Laval, AlfaFusion is a peak performance, one-material process that results in an all-stainless steel, fusion-bonded plate heat exchanger. The result is closer to welding than brazing. AlfaFusion uses stainless steel filler as the activator to bond type 316 grade stainless steel corrugated plates together. The process takes place in a high temperature furnace. At the contact points between the corrugated plates, the filler melts and, unlike brazing, the plate surfaces also melt. The stainless steel filler has a very good capability to wet surfaces and fill crevices. It has almost full interaction with the plates and a fusion zone is created. This zone is also stainless steel and has similar properties to the plates in terms of corrosion resistance and durability. Success lies in precise temperature control to achieve the correct melting depth and to avoid melting through the plates. Due to the properties of the fusion zone, AlfaFusion gives a homogenous plate heat exchanger with a high level of corrosion resistance and higher, or almost the same resistance to mechanical and thermal fatigue as other technologies.

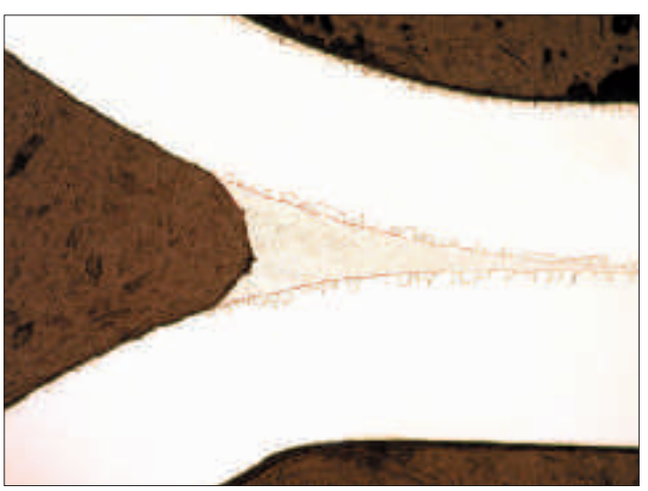




Traditional copper brazing

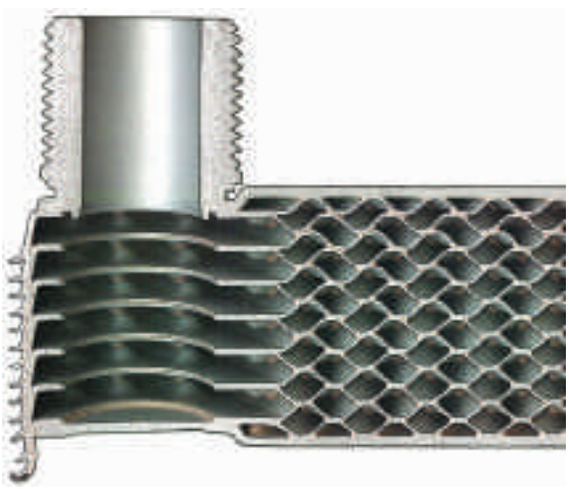
A two-material process, copper brazing is an efficient, cost-effective method of manufacturing plate heat exchangers. It involves using copper filler to join stainless steel plates together by brazing them in a furnace. At the contact points between the corrugated plates, a thin layer of copper is melted at high temperature. Since copper has good capillary action, i.e., good capability to wet the plate and fill crevices, the filler gathers where the plates have contact, sealing and strengthening the plate pack. Although copper brazing causes adhesion between the copper and the stainless steel, there is no surface reaction between the materials. The combination of stainless steel and copper offers good ductility. Under pressure, substantial material deformation can occur before splitting occurs. The build-up of stress in the material causes it to change direction, thus relieving the mechanical load. While copper brazing results in a high quality plate heat exchanger, the brazing process must be carefully controlled, otherwise copper may penetrate the stainless steel. This results in liquid metal embrittlement, a known metallurgical phenomenon which reduces the strength of the heat exchanger.

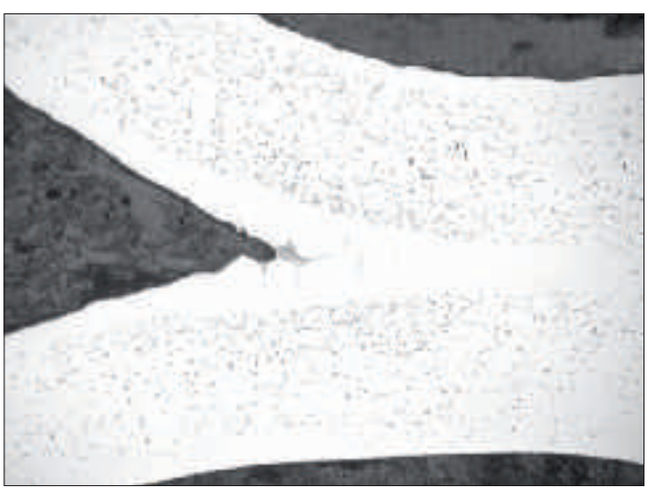




Nickel brazing

Nickel brazing is a two-material process no longer used by Alfa Laval for manufacturing plate heat exchangers. Nickel foil is placed between the corrugated stainless steel plates and the plate pack is brazed in a furnace. Since the melting point of stainless steel is about 1,400°C and that of nickel

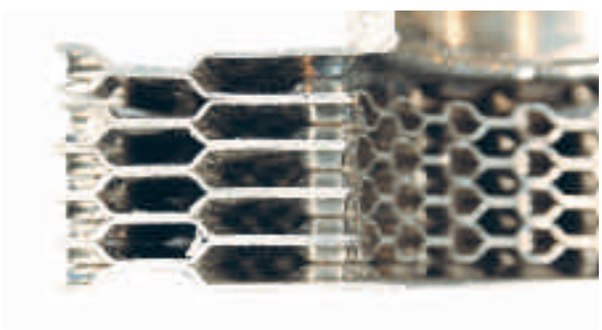


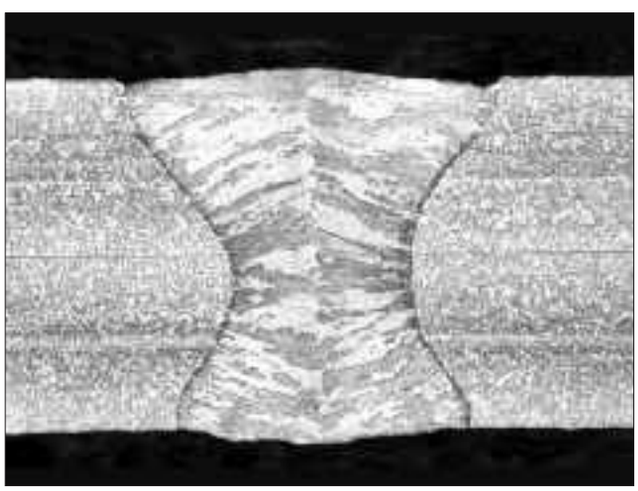


around 1,500°C, boron and silicone are added to the nickel to lower its melting point to approximately 1,100°C. However, adding boron creates problems. While stainless steel normally contains 17% chrome, during brazing, the boron penetrates the stainless steel and forms chrome borides. These lower the chrome content of the stainless steel around the joins to below 14%, lowering the corrosion resistance of the plates and reducing ductility. Stainless steel can normally be extended by 50% before breakage occurs. Nickel brazing decreases ductility to below 5% and it will break immediately when deformed under pressure. The chrome borides also make the nickel filler hard and brittle, further reducing the strength of the heat exchanger. Since nickel has poor capillary action, it is crucial that the plates are in contact with each other during brazing, and rejects in production are common.

Laser welding

Laser welding is an effective method of joining stainless steel plates together in the manufacture of plate heat exchangers. During the process, the corrugated stainless steel plates are placed against each other and a laser is used to melt the material at the points of contact. As the stainless steel





hardens there is diffusion of the metal at the plate surfaces. Since the stainless steel has gained a different micro-structure orientation during hardening, the resulting joins may be different in appearance. However, they possess the same properties as the rest of the plate material in terms of ductility and corrosion resistance. A fully welded heat exchanger has good mechanical properties and can easily withstand high temperature, high pressure and aggressive media. A disadvantage is that it is sometimes necessary to adapt the design of the product to the limitations of the welding technique. It is also an expensive method. The process must take place in an inert atmosphere, otherwise it will react with the oxygen in the air, resulting in less successful welds. The equipment required for the process is also expensive.

Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

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How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com