A photograph of an industrial facility, likely a refinery or chemical plant, featuring several large, cylindrical air-to-air heat exchangers. The exchangers are arranged in rows and are connected by a complex network of pipes and scaffolding. The image is overlaid with a semi-transparent red and blue gradient. The text "A Look at Air-to-Air Heat Exchangers" is centered over the image in a white, serif font.

A Look at Air-to-Air Heat Exchangers



Available in several styles, air-to-air heat exchangers effectively achieve heat transfer and manage temperatures in industries like pharmaceutical, food and beverage processing, and more. They enable increased efficiency in clean-in-place (CIP), sterilization, pasteurization, and other hygienic operations.

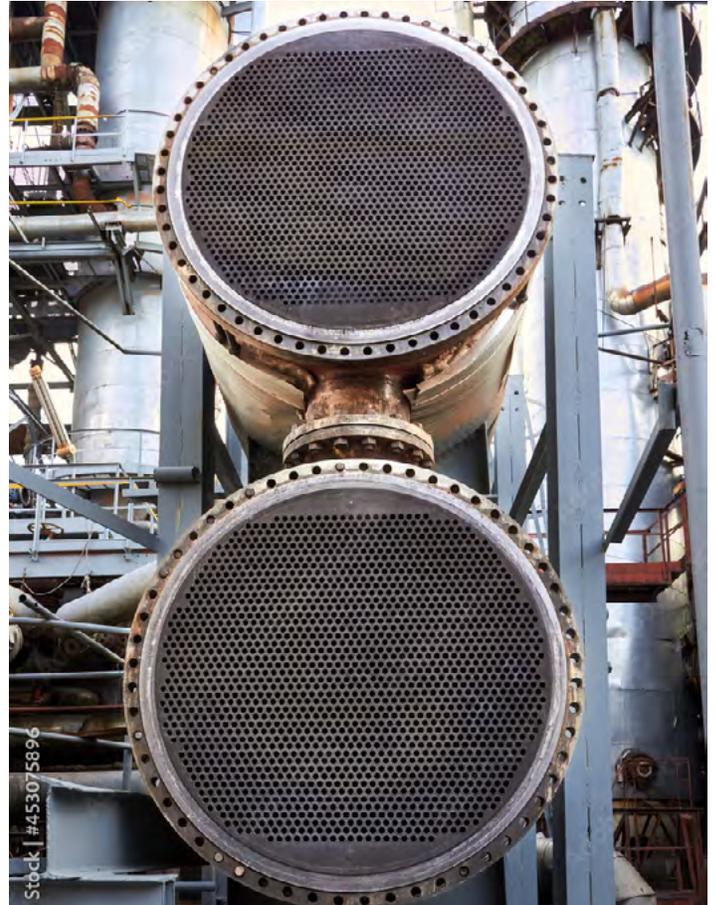
For more than 40 years, **PRE-heat, Inc.** has been designing and manufacturing industrial air-to-air heat transfer equipment and packaged heat recovery units with this goal: “Design and deliver equipment that saves energy and exceeds the customer’s performance and quality expectations.”

For production managers, mechanical engineers, and processors attempting to select the optimal heat exchanger, this eBook will review the applications, advantages and disadvantages, and components of multiple heat exchangers and provide more information on how PRE-heat can support your business with our comprehensive services and product line.

Types of Heat Exchangers

Heat exchangers transfer heat, or thermal energy, from one liquid or gas to another by facilitating thermal contact of these fluids at differing temperatures, based on the kind of heat exchanger used. The heat exchange process can occur through direct fluid interaction or by using a solid separator that safeguards against fluid mixing.

Specific design characteristics, such as heat transfer mechanisms, flow configurations, construction material, and structural components, assist in categorizing the kinds of available heat exchangers. With applications across a myriad of industries, we offer a varied selection of heat-exchanging devices for cooling and heating processes.



Shell & Tube Heat Exchangers

In this style of heat exchanger, a shell encloses a series of tubes. The design allows the heat exchanger to hold up well through a broad range of temperatures and pressures, particularly compared to wheel- and plate-style heat exchangers. In environments with a high concentration of dust or particles in the air, this design is the ideal option.

Shell and tube air-to-air heat exchangers can recover valuable heat energy from furnaces, dryers, kilns, and ovens while delivering optimal performance. They are also a dependable primary and secondary recovery system for volatile organic compound (VOC) abatement systems and fume incinerators.

Plate-Type Air-to-Air Heat Exchangers

This cost-effective type allows for decreased cooling and heating loads in the air treatment procedure. The heat exchanger plates keep the exhaust and supply air apart, passing the exhaust on one side of the plate and the supply air on the other to effectively precool or preheat the supply air as it enters the system without mixing with it.

These air-to-air heat exchangers safeguard their thermal plates utilizing their box-like design that can slide within the enclosure. They have ideal applications in ovens, fume incinerators, and kilns for precooling or preheating the air. Two variations of plate-type heat exchangers are:

Dimple plate heat exchangers. Offering versatility for rugged applications, the plate's dimples improve turbulence while handling low pressure drop. The consistent dimple patterns on these flat plates enable easy maintenance and cleanup.

Wave plate heat exchangers. These metal, all-welded heat exchangers incorporate both a wave pattern and in-line dimple patterns on the heavy-duty plates. This facilitates cleaning and ensures greater turbulence while maintaining the integrity of the structure and handling low pressure drop.

Industrial Air-to-Air Heat Exchanger Applications



Companies typically use industrial heat exchangers for more rugged applications than the standard variety, meaning they must withstand high temperatures and pressures and have sturdy material construction. The main applications of each industrial style air-to-air heat exchanger include:

Shell & Tube Heat Exchangers



Food and beverage. This sector uses heat exchangers in everything from farm equipment and tank heaters to ammonia exchangers and condensers.



Petrochemical. The petrochemical industry utilizes them in tank and chemical process heaters; gas, lube oil, pump and compressor, and chemical process coolers; and electric hot oil systems for processing and refining.

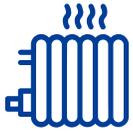


Pharmaceutical. This industry uses heat exchangers for thermal control in purified water, water for injection (WFI), product mixing, and more.

Plate-Type Air-to-Air Heat Exchangers



Cooling tower isolation. Particles in cooling tower water have the potential to quickly stop up or damage components within other heat exchange systems in the same building. To resolve this, cooling towers separate water in the cooling tower from the water that is in regular circulation within the building.



Heat pump isolation. Most water sources have contaminant particles or dissolved solids in the water supply, which can be damaging to heat pumps. Plate-type heat exchangers safeguard against such particles.



Ovens, incinerators, kiln cupolas, and dryers. Heat exchangers have applications in this equipment for handling heat recovery with exhaust containing high particulate levels. They will cool or dry the air before transferring it to temperature-sensitive collection equipment.



Thermal (ice) storage systems. Energy savings increase when using chiller capacity at off-peak rather than peak timeframes. Storage tanks cool ice or brine in storage tanks when lower electricity rates are in effect or when the cooling load demands.



Waste heat recovery. Equipment like chillers and steam condensers give off heat that heat exchangers can recover and supply for warming air or water. This equates to considerable savings in energy costs.



Water heaters. Heat exchangers with stainless steel plates resist corrosion and enable high rates of heat transfer, which is perfect for heating applications in equipment like water heaters.

Advantages & Disadvantages of Air-to-Air Heat Exchangers

Each style of air-to-air heat exchanger has distinct benefits and drawbacks, particularly as compared to other models. These include:



Shell & Tube Heat Exchangers

Advantages

- Fairly affordable
- Leakage is simple to identify
- Moderate regeneration of heat
- Optimal for products of average viscosity or with particulates
- Superior CIP capability

Disadvantages

- Larger in size
- Less surface area
- More costly

Plate-Type Air-to-Air Heat Exchangers

Advantages

- Ability to increase or decrease capacity with ease
- Compact footprint
- Fairly inexpensive
- High turbulence and heat regeneration
- Simple maintenance and cleaning
- Superior CIP capability

Disadvantages

- Fairly low temperature for operation
- Incompatible with containing large particulates

Air-to-Air Industrial In-Line Wave Plate Heat Exchangers

Advantages

- Design facilitates easy cleaning and inspecting
- Heavy-duty structural integrity
- High turbulence
- Low pressure drop
- Prevents cross-contamination between gas streams
- Versatility in sizes, spacing, and plate thicknesses

Disadvantages

- Not as easy to clean
- Not for large particulate applications

Parts of Air-to-Air Heat Exchangers

Shell & Tube Heat Exchangers

These exchangers utilize a shell enclosure and bundled, parallel tubing. The product moves through the tubing while the heat exchanger circulates heated liquid or gas around the tubes in a counter-flow direction for heat transfer. The tubes in concentric tubular varieties of heat exchangers vary in diameter for added efficiency and the capacity for high-viscosity fluids.

Dimple Plate-Type Air-to-Air Heat Exchangers

The dimple plate exchanger design utilizes two side-by-side plates that create a channel between them, and with counter-flow movement, the heating or cooling agents pass through the channel in one direction with the product going in the other. This structure leads to high levels of efficiency in heat transfer, as well as enhanced pressure drop.

Air-to-Air Industrial In-Line Wave Plate Heat Exchangers

With greater efficiency than that of dimple plate heat exchangers, the wave plate provides superior coefficients of heat transfer and higher turbulence. Containing a hot and a cold side, each one is capable of different rates and volumes of flow.

Our Capabilities

PRE-heat has developed a reputation for innovative, customizable heat exchange and recovery systems that are robust, durable, and available in varying thicknesses and configurations. They possess an all-welded construction with all-metal composition. We also offer comprehensive services to best serve our customers.



Our Services

PRE-heat works closely with our clients to design and build heat exchangers and packaged recovery systems that ensure satisfaction and fully meet all specifications for airflow and heat transfer. We supply clients in diverse industries with high-performance solutions for heating and cooling while adhering to exacting quality assurance regulations. We offer a wide range of customized, value-added services, including:

- Precision machining and fabrication
- CAD design
- Turnkey models
- Startup and installation
- Breakdown
- Model efficiency improvement
- Replacement and retrofit

For clients with systems that are old, not functioning optimally, or have leaks, we have the capability to either repair heat exchangers or design a new assembly that will easily integrate into the existing system.

Our Products

Air-to-air industrial in-line wave plate heat exchangers.

Our ILW heat exchangers use wave and dimple patterns to increase turbulence and maintain spacing between plates.

Air-to-air industrial shell and tube ALT-imate heat exchangers.

These heat exchangers function as primary and secondary exchangers and also efficiently handle heat recovery.

Air-to-air industrial dimple plate heat exchangers.

The rugged and versatile DPL achieves plate spacing maintenance and enhanced turbulence through the plates' dimples.

Replacement and retrofit of heavy air-to-air industrial heat exchangers.

PRE-heat will replace inefficient or malfunctioning heat exchangers, even those from other manufacturers.

Air-to-air industrial cooling towers.

These vertical shell and tube heat exchangers are ideal for cooling air streams containing excessive particulates.



Superior Air-to-Air Heat Transfer Equipment From PRE-heat

The experts at PRE-heat are here to assist you in selecting the right heat transfer equipment for your application, whether that means a new system or heat exchanger optimization or repair.

Contact us today to **request a quote** and find out more about our heat exchanger capabilities.

About Us

PRE-heat, Inc. specializes in custom industrial air-to-air heat exchangers and packaged heat recovery systems. We have been designing and building industrial, packaged air-to-air heat recovery units for over 40 years.

Our custom designed packaged heat exchanger assemblies include our proprietary designed plate-type heat exchangers and shell and tube heat exchangers. By adding inlet and outlet plenums, expansion joints, bypass ducts, dampers, insulation, and cladding, our heat exchanger assemblies meet in the field with our OEM customers' fume combustion chambers to form a high-quality, high-efficiency catalytic or thermal recuperative fume incinerator package.

[Contact Us](#)

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PACKAGED RECOVERY EQUIPMENT



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