

Advanced heat transfer technology

ATHCO ENGINEERING IS A LEADING SPECIALIST
IN ADVANCED HEAT TRANSFER TECHNOLOGY



Thermo plate products for the process industry
Substantial energy savings through customized designs
Unique heat transfer characteristics

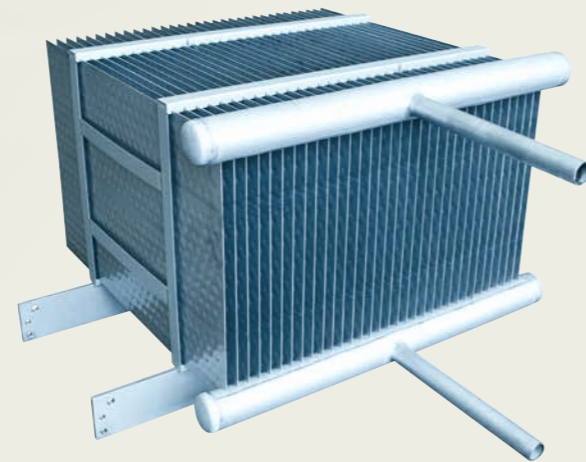
Welcome to ATHCO

SINCE 1947, ATHCO ENGINEERING HAS BEEN A FRONTRUNNER WITHIN THE DESIGN AND MANUFACTURING OF THERMO PLATES (PILLOW PLATES) AND CUSTOMIZED PROCESS EQUIPMENT.

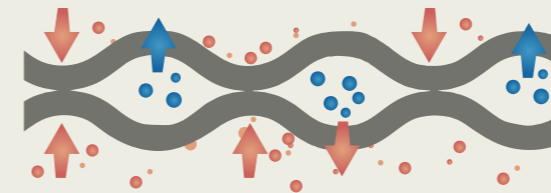
ATHCO Engineering is specialized in the manufacturing of thermo plates (pillow plates) to be used in thermal processes. The plates are used in ATHCO Engineering's own heat exchangers, which have gradually become the standard with many clients in the process industry.

Due to ATHCO Engineering's particular expertise with regard to thermo plates, ATHCO Engineering is also a subcontractor to other manufacturing companies who are using our specially designed plates for tanks, heat exchangers etc. A team of engineers develop other sorts of process equipment according to the specifications of the customer. Examples of such equipment include process tanks, pressure vessels, and so on.

ATHCO Engineering has a modern production facility where certified welders, technicians, and engineers manufacture products and customer adapted solutions. Furthermore, the production unit acts as a subcontractor to offer solutions that have been constructed and specified by other suppliers. ATHCO Engineering has approximately 60 employees.



Unique heat transfer characteristics



The pillow-shaped design of thermo plates allows for optimum flow and turbulence, thus providing excellent conditions for efficient heat transfer.

A thermo plate consists of two thin steel sheets, which are fully welded along the edges. In the middle area the thermo plates are covered with a pattern of spot welds. The interrelated position of these spot welds determine the design pressure of the plate and type of flow inside the plate.

For certain applications we add extra welding paths in order to control the actual flow through the plates. This increases the velocity of the fluid inside the plates and also the heat transfer values.

The welded plates are expanded by either water or gas until the required expansion is reached. The expansion height has great influence on both the heat transfer and pressure drop.

The pillow-shaped design creates excellent turbulence and provides a self-supporting construction. Our thermo plates do not transfer any force outwards onto the next plate, which would otherwise have to be absorbed by housing pressure plates.

Designed for your specific requirements

Thermo plates can be manufactured in any size depending on the application and the physical space available. The distance to the next plate and the number of plates installed can be varied depending on media, flow rate, pressure drop limitation and total heat load required. In- and outlet connections can be fitted as per the customer's request in the size and standard needed for the application.

We design thermo plates for heat exchangers based on counter, co-current and cross-flow, and for combinations of the above. Our thermo plates can be built into existing reactor towers or vessels in a process plant. We also deliver complete ready-to-install plate banks built into a box or vessel shaped structure.

SPECIAL BENEFITS OF ATHCO THERMO PLATE PRODUCTS:

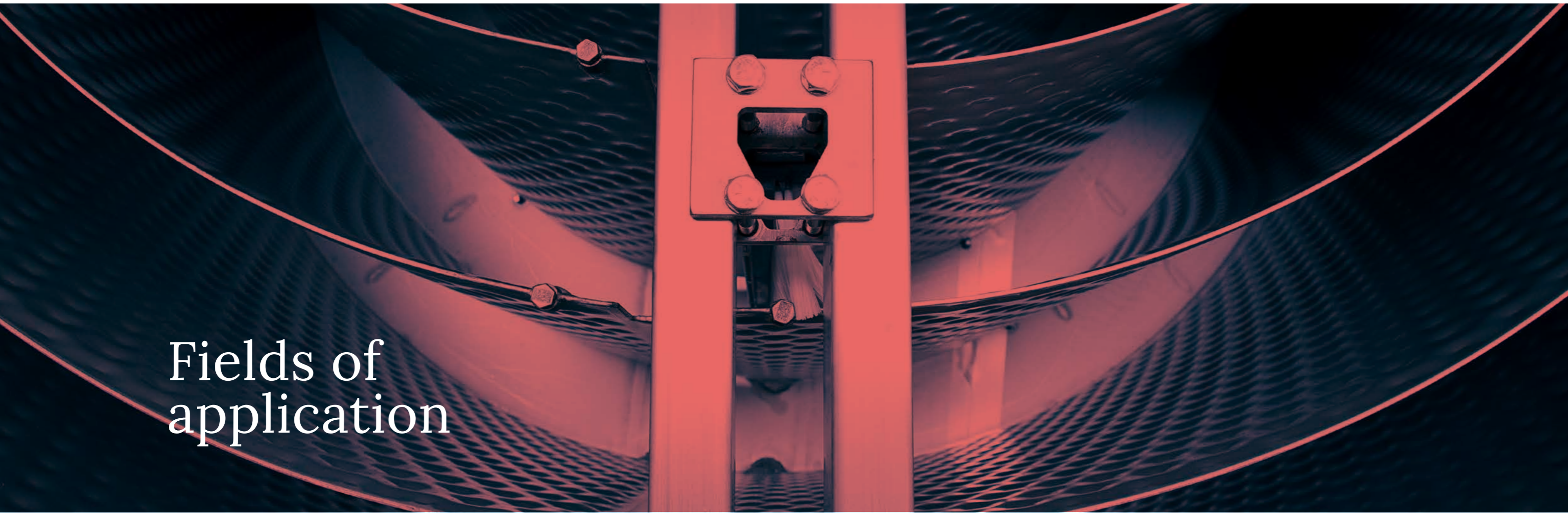
- Compact design and simple installation
- Good thermal operation efficiency due to high heat transfer coefficients
- Each heat exchanger is individually designed for the heat load, flow rate and pressure drop limitations of the specific application
- Self-cleaning effect due to the smooth surface of the thermo plates
- Fouling tendency is reduced to an absolute minimum, and that also applies to the need for maintenance
- Energy-saving and greener solutions



COMPLIES WITH INDUSTRY-RECOGNIZED CODES

Our engineers currently design to the following industry-recognized codes:

- PED
- AD 2000
- EN 3834-2
- EN 1090-1
- SELO/TSG (China stamp)
- ASME U-stamp
- ASME R-stamp
- National Border Register



Fields of application

ATHCO plate heat exchangers are ideal for applications involving contaminated gases or liquid fluids because of the smooth pillow surface that allows CIP cleaning or manual high pressure cleaning.

This is one of the reasons why ATHCO thermo plate exchangers are widely used as recuperator (ProcessTherm) downstream spray drying plants and as flue gas condensers recovering up to 10 MW of heat per unit.

The low pressure drop on the shell side is important in the application as top condenser, where organic vapors are condensed under vacuum conditions.

The compact, pressurized TP-HEX has many applications as condenser, vaporizer or gas-gas exchanger in the chemical industry. It is also ideal for liquid applications where low fouling tendency is important.

Therm-X is a self-cleaning heat exchanger, ideal for heat recovery from heavily contaminated process liquids.



ADVANTAGES COMPARED WITH OTHER TYPES OF HEAT EXCHANGERS:

	Thermo plates	Shell and tube exchangers	Gasketed heat exchangers	Spiral heat exchangers
Temperature range, operation	up to 800°C	up to 800°C	up to 170°C	up to 350°C
Design pressure	up to 60 bar	up to 200 bar	up to 25 bar	up to 25 bar
Comparable HTC-values in water [W/m ² K]	2600	2000	4000	1400
Fully-welded construction	yes	yes	no	no
Weight-to-area ratio	low end	high end	low end	high end
Air or gas to water applications	suitable	suitable	not suitable	limited use
Applies to heavily-polluted liquids/gasses	yes	yes	limited	yes
Falling film, condenser and evaporators	suitable	suitable	limited	limited
Build into existing towers, etc.	very flexible	limited	no	no
Weld to tanks and reactors	yes	no	no	no
Submerge into tanks or rivers	yes	limited	no	no

SOLUTIONS

FIELDS OF APPLICATION

PRODUCT ADVANTAGES

PROCESS THERM



Process Therm is a heat recovery system, especially suited for dust-loaded exhaust air.

Because of its compact design, the Process Therm is easily installed in existing discharge channels. With its fully-integrated CIP system, no production interruptions are needed for cleaning. Recovered heat is typically used in the pre-heater, where it is used to pre-heat incoming air.

The compact design with an average ratio of 150 – 200 m² heating surface per m³ volume lets you integrate Process Therm in practically all existing plants.

ATHCO Engineering is also able to deliver a complete package including transition pieces, air pre-heater and pump station for the circulation water.

All processes with the presence of large amounts of dust in the discharge air

- Food processing plants
- Chemical plants
- Wood and paper processing plants
- Textile industry

- Maintenance-free in dust-loaded air
- No expensive stops as cleaning takes place during production
- Delivered with built-in CIP system
- Low air pressure drop
- Enhanced heat recovery through condensation
- Various high alloy materials can be used to obtain long lifespan

THERM-X



Therm-X is a self-cleaning heat exchanger specially designed for heat recovery, cooling and heating of fiber-containing or contaminated process liquids.

It consists of concentric thermo plates that are mechanically cleaned by moving brushes. This continuous cleaning ensures optimum efficiency as the dirt is kept to a minimum. The brushes make sure that particles do not stick onto the thermo plates, and are thus vital for improving the lifespan of the product.

The heat exchanger can be used with a range of cooling/heating media like steam, water and ammonia.

The heat exchanger is built as a vessel and thus allows for heat exchange in situations where the process fluids flow in an uneven stream or even stop for shorter or longer intervals.

Efficient heat recovery from polluted water streams at moderate temperatures

- Waste water plants
- Sewage water plants
- Textile and paper industry
- Swimming pools
- Public bathrooms
- Industrial laundry washing

- Self-cleaning unit with moving brushes
- Highly efficient due to the movement of the brushes, which create better turbulence and increase efficiency
- Easy to inspect
- Available in various steel qualities
- Variable vessel height and number of rings depending on the application

THERMFLEX® HEAT EXCHANGER



ThermFlex® heat exchanger consists of a rectangular thermo plate unit mounted in a round, pressurized shell.

The ThermFlex® concept combines all the advantages of a pillow plate exchanger with the ability to reach several thousand m² in a single unit. The use of large thermo plates with a surface area of up to 30 m² makes it possible to reach easily a large number of m² in a single unit. The width, length and distance between the plates is adapted for each case depending on flow, heat transfer and pressure drop requirements.

Typical applications are Feed&Effluent exchanger and large scale condenser. The ThermFlex® concept has been successfully introduced into the Chinese coal-to-ethylene glycol industry.

- Feed & effluent heat exchanger. The exchanger is combined with a reactor and raises the temperature of the feed gas through heat exchange with the reactor effluent. The hot effluent from the reactor is recycled back to the feed and effluent exchanger to provide all or a portion of the heat required to preheat the reactor feed stream to the reactor inlet temperature.
- Large condenser units. The hot vapor runs in between the plates and condensation occurs on the surface of the plates. The spot pattern within the plates ensure high turbulent water flow inside the plates thereby increasing the heat transfer coefficient.

- Low pressure drop due to free flow on shell side
- Low fouling due to free flow on shell side
- Superior heat transfer compared to Shell & Tube exchanger giving possibility for:
 - » Fewer units – lower CAPEX
 - » Smaller foot print – lower CAPEX
 - » Closer temperature approach - lower OPEX
 - » Installation, transport, foundation and piping – lower CAPEX
 - » Lower operating costs
- Allows problem-free passage of catalyst fines thanks to the flexible distance between the thermo plates

TP HEX



TP HEX is a compact, pressurized heat exchanger that gives great results.

The TP HEX is a compact, round heat exchanger where, typically, the hot medium runs between the plates and the cold medium inside the plates in counter-current flow.

The narrow channels of TP HEX result in a small exchanger diameter, which together with the shape of the thermo plates, helps to create the highly turbulent flow inside the plates resulting in high heat transfer coefficients.

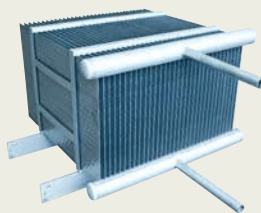
The thermo plates in TP-HEX have a self-cleaning effect due to their smooth surface. Because of this, the fouling tendency is greatly reduced, as well as the need for maintenance. Since TP HEX is built as a fully-welded construction, there are no seals, and the maintenance costs connected with them are avoided.

TP HEX is the perfect match for a wide range of uses within liquid and gas heat transfer

- Coolers
- Heaters
- Heat transfer
- Condensers
- Reboilers
- Evaporators

- Low maintenance due to self-cleaning surface and a construction without seals
- Up to 3 times smaller than a tube heat exchanger
- Efficient heat transfer due to large contact surfaces
- Low fouling tendency due to optimum turbulence
- Low maintenance costs
- Endures higher pressure than seal based heat exchangers

TOP CONDENSER



Thermo plates effectively condensate organic vapours under vacuum conditions

The low pressure drop between the plates and the large ratio between surface area and volume, make thermo plates very suitable for condensating organic vapours under fx. vacuum conditions.

ATHCO Engineering has many years of experience in thermal design, construction and manufacturing of top condensers for the chemical industry.

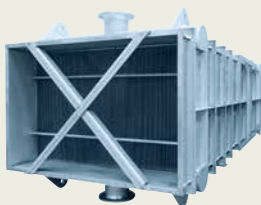
Condensers are produced in stainless steel, SAF 2205, SMO, 904L, etc.

Applicable as top condensers in distillation columns

- Chemical industry
- Pharmaceutical industry
- Food industry

- High efficiency
- Low pressure drop
- Easy to install
- Large surface area / volume ratio

FLUE GAS CONDENSER



Flue gas condensers, based on thermo plates, recover large amounts of heat just before flue gases are released to the stack.

The free gap between the plates make thermo plates ideal for recovering heat from dust-loaded flue gases. The heat is typically used to produce district heating, with district heating water running inside the plates.

Normally, the plates are automatically cleaned by condensate running downwards over the plates.

ATHCO Engineering has extensive experience in the design and manufacturing of small, medium and large scale (> 2000 m²) flue gas condensers.

Especially suitable for heat recovery of dust-loaded flue gases

- Power plants
- Paper factories
- Carpet factories

- Applicable for dust or particle-loaded air or gases
- Suitable in aggressive atmospheres
- Low flue gas pressure drop

Unique thermo plate expertise

The core business of ATHCOEngineering is to design and manufacture tailor-made equipment for the process industry. Our premises, 100 kilometres north of the German border, include a 10,000 m² modern production facility with various welding and laser cutting machinery.

As we are often called upon to address unusual and challenging designs, we have become a leading specialist within thermal design and manufacturing of thermo plates for heat exchangers.

During our 30 years of business we have built up unique expertise within the following industries:

- **Food and dairy**
- **Textile**
- **Chemicals**
- **Paper and pulp**
- **Sewage water**
- **Powder drying**
- **Flue gas heat recovery**
- **And many more**

High-quality Danish design

Experts since 1947

Advanced heat transfer solutions