



More than you thought possible

The Contherm® range of scraped-surface heat exchangers





Discover more with the complete Contherm[®] range

Contherm[®] scraped-surface heat exchangers

The many processes involved in manufacturing food, chemicals, pharmaceuticals, cosmetics, health and beauty products all require sturdy, reliable heat transfer solutions designed to ensure removal of the fouling layer normally associated with viscous and sticky products, as well as to optimize the integrity of particulates.

For these and many other applications, Alfa Laval provides a complete range of both single and double-wall scraped-surface heat exchangers capable of meeting each customer's processing requirements.

Full spectrum of equipment

Alfa Laval supplies the heat transfer equipment needed, either as individual components or as complete engineered modules to be integrated into processing lines. Such modules are pre-engineered and pre-configured so they can be brought on line as quickly and easily as possible.

The cost-effectiveness of Alfa Laval solutions ensures you the best possible path to processing success.

Full spectrum of know-how

The Alfa Laval global sales network provides you with access to an exceptional pool of knowledge for improving, extending and developing your processing set-up, locally as well as internationally.

Our application experience is backed by the R&D resources, materials technology and know-how available from the world's foremost specialists in the use of heat transfer, fluid handling and separation technologies.

Going global

This vast body of expertise is on tap for our customers. We are fully familiar with all the international technical requirements that you may encounter when tackling both commodity and niche markets throughout the world. Alfa Laval can deliver equipment and systems configured to comply with the national and international codes and standards of your choice.



More demands. More opportunities

Meeting customer requirements

Nowadays, convenience food plays an important role in people's lifestyles. For the modern consumer, fresh flavour and a pleasing texture at an affordable price are still critical. These consumer demands present a challenge to food manufacturers, particularly in the case of prepared foods made from delicate raw materials or featuring consistencies that involve special processing.



For stringent hygienic standards

From a hygienic design point of view, personal care and pharmaceutical applications can be even more demanding than food. The design of the Contherm range is based on aseptic technology that complies with stringent international hygiene standards, including USDA and 3A.



Why scraped-surface heat exchangers?

Many manufacturers need to be able to ensure continuous production. This helps provide a high throughput and uniform heat transfer, which play an important role in profitable production. However, the consistency or contents of many food products normally hinder efficient heat transfer.

The Contherm range of scraped-surface heat exchangers from Alfa Laval is fully capable of meeting such demands, and is able to deal with the kinds of products where other types of heat exchangers are known to clog or foul.





Application examples:

Viscous

Ketchup, mayonnaise, hummus, chocolate spreads, fruit pie fillings, gravies and sauces, whipped/aerated products, peanut butter, pizza sauces, puddings, salad dressings, salsa and taco fillings, sandwich spreads, bread dough, mechanically deboned meat (MDM), gelatine, omelettes, baby food, nougat, skin lotions, shampoos, liquorice, etc.

Heat sensitive

Egg products, meat emulsions, fruit preparations and fruit purées, cream cheeses, whey proteins, fish meal, etc.

Crystallizing and phase change

Coffee/tea extracts, icings and frostings, sugar concentrates, margarines, shortening, spreads, gelatine broth, lard, fondant, biscuit creams, solvents, fatty acids, petroleum jelly, beer and wine, etc.

Particulate

Meat, chicken pieces, fish meal, pet food, jams and preserves, yoghurt fruits, a variety of fruit preparations, rice pudding, vegetable pieces, etc.

Sticky

Caramel, cheese sauces, lecithin, processed cheese, confectionery, yeast extracts, gums, gelatine, mascara, toothpaste and starch, etc.



The complete Contherm® range offers solutions for processing everything from low to extremely high viscosity products.

More solutions to fit your needs

Contherm® models and features

Wide range available

Our customers' processes and applications are by no means identical, and the same is true of the Contherm range of scraped-surface heat exchangers. For products that are easy to process, a basic Contherm design consisting of polymer blades and single mechanical seals would be a suitable solution. Whereas for highly demanding products and processes, the materials and components need to be more rugged and more durable in order to ensure dependable operation.

Alfa Laval provides tailored solutions designed to add the most value to your product and process requirements. To meet the particular requirements of our many different customers and the applications they work with, we offer the market's widest portfolio of scraped-surface heat exchanger models.

Contherm Core

Made for low to medium-viscosity and/or fouling products with or without particles. The Contherm Core is a simplified design made with the high-quality well-proven Contherm components that our customers have come to rely on.

Contherm Core is available in a horizontal installation frame, with an option to stack Contherm Core units on top of each other. This is a truly economical solution for the right applications.

Contherm

Made for medium to extremely high-viscosity and/or fouling products with or without particles, the traditional Contherm is designed with ease of service in mind. Contherm models are ideal for applications that require significant mixing and shear, and for aerated products and applications that require deep cooling, including cryogenic design.

Contherm HP

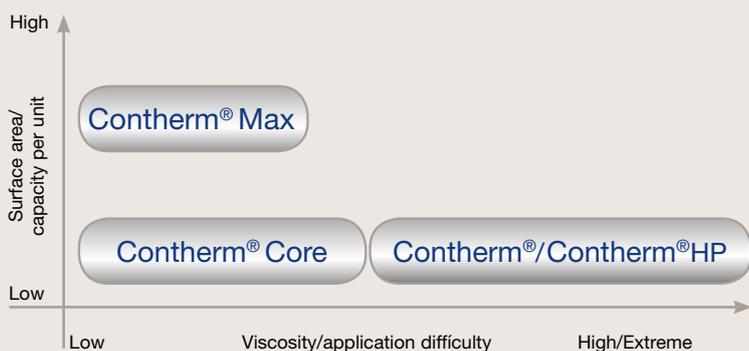
The Contherm HP is designed for medium to extreme viscosity applications that require or produce especially high product pressures. The robust design can handle 41 bar (600 psi), which is twice the pressure rating of the traditional Contherm.

Convap

A modified Contherm scraped-surface evaporator used for removing moisture from viscous and/or heat-sensitive products that tend to cause fouling in static heat exchangers.

Contherm Max

A unique double-wall Contherm made for low to medium viscosity products, offering significantly more surface area and production throughput than the other single-wall Contherm products.



More uptime at Astra Sweets

Astra Sweets, a leading confectionery producer located in Turnhout, Belgium uses six Alfa Laval Contherm scraped-surface heat exchangers to heat the confectionery mass for pasteurization and then to cool it afterwards. The Contherm units are ideal for this production process as they preserve the taste, colour and texture of the product.

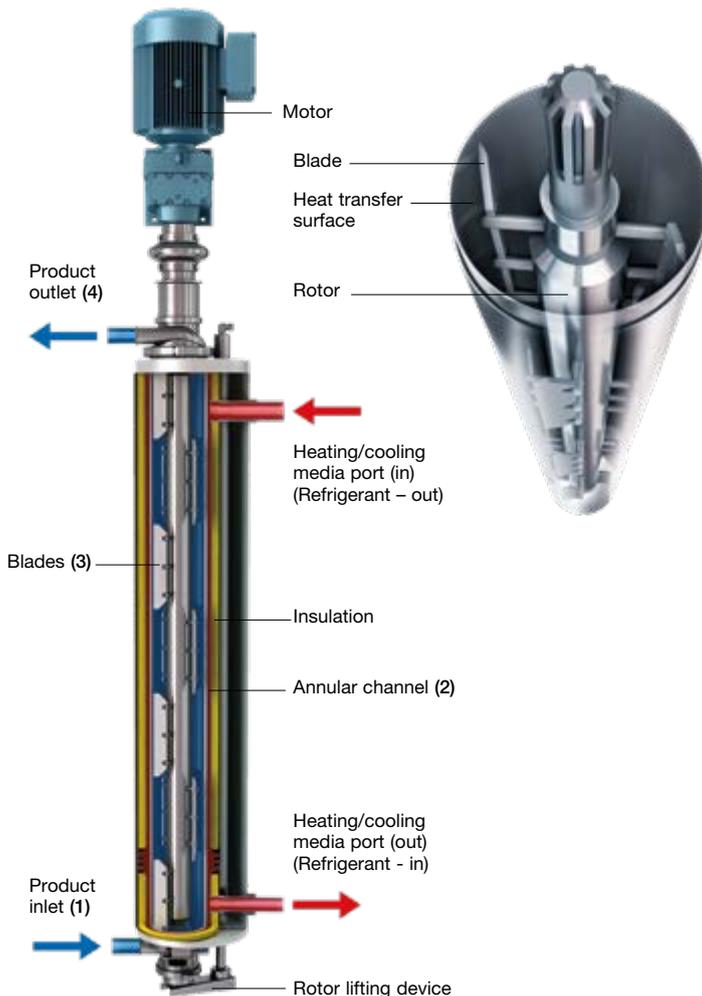


The Contherm heat exchangers allow Astra Sweets to skip daily cleaning routines, which would result in hours of downtime if other types of heat exchangers were used. "As a result, we have lower maintenance costs," says Technical Manager Kris De Vries from Astra Sweets.



How it works

Contherm scraped-surface heat exchanger



Working principle

Product enters the cylinder through the lower product head (1) and flows upwards through the cylinder. At the same time, the heating/cooling media travel in a counter-current flow through the narrow annular channel (2).

Rotating blades (3) that meet the wall through centrifugal force continuously remove product from the cylinder wall in order to ensure uniform transfer of heat from the media to the product. An optional coil in the annulus (2) increases media velocity, adding to the heat transfer efficiency.

Product exits the cylinder through the upper tangential port (4). Product flow and rotor speed can be varied to suit the properties of the particular product flowing through the cylinder.

Tailored to specific needs

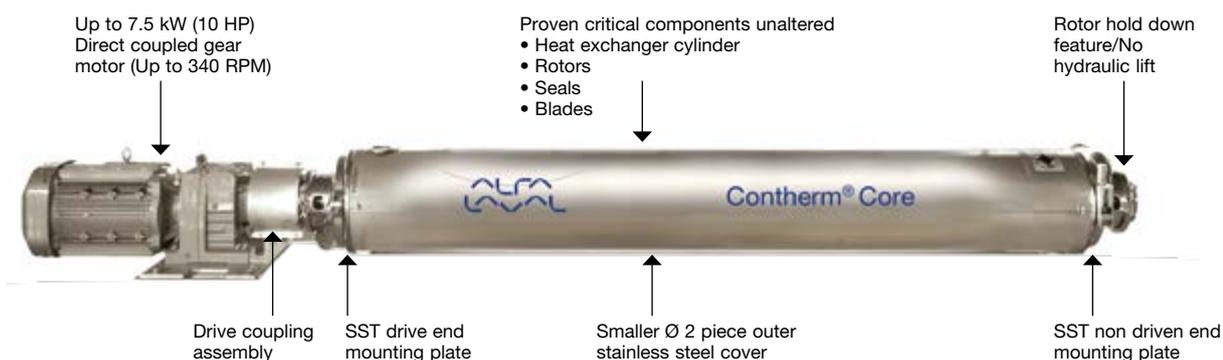
With a wide selection of components, now also including the low shear rotor for large particulates, numerous Contherm configurations are available. Trained, knowledgeable Alfa Laval staff are able to customize each Contherm unit by selecting the appropriate materials, features and options to meet each customer's exact requirements – see complete overview on page 13.

More possibilities in more applications

Contherm Core for low to medium-viscosity and/or fouling products

When processing less complicated low to medium-viscosity products, a more simple scraped-surface heat exchanger solution is often needed. Based on the standard Contherm model and certain “core” components, Contherm Core was developed to provide a straightforward, cost-effective

design with all the quality and reliability customers expect from Alfa Laval. This design ensures ease of installation and reliable operation, adding up to a longer service life and better return on investment.



Contherm Core is designed specifically to process low to medium-viscosity products, such as soups, sauces, ketchups, fruit purées, dressings, baby food and desserts as well as skin lotions, facial creams and shampoos. The Contherm Core is also ideal for batch augmentation, a process in which a product is more efficiently heated or cooled while being circulated from a batch tank, through a Contherm Core unit and back to the original tank. This system provides the advantages of continuous processing, including consistent product quality as a result of exact temperature control, but at a fraction of the cost.

Less is more: Up to 15% CAPEX savings thanks to a simplified design that can handle viscosities ranging from 1000-50,000 cP.

More reliability: Contherm Core utilizes the same reliable pressure vessel components, mechanical seals and scraping blades as the other Contherm models.

Even more savings: Contherm Core's horizontal design offers easy, cost-effective installation. It is also simple to service, since all components are available at floor level.



Contherm models for very viscous, fouling or sticky products

Contherm

For highly viscous applications and process requirements, Alfa Laval offers a range of Contherm design features that result in flexible heat transfer solutions for processing a practically endless range of applications. Stainless steel blades, enlarged blade pins, bearing isolators and hard surface coatings are examples of heavy-duty design features for maximizing the durability and dependability of traditional Contherm models.

More versatile: Contherm can handle products with or without particles and viscosities well in excess of 50,000 cP. It is the most versatile heat transfer solution on the market, with limitless opportunities for full-line utilization in any production environment.

More flexible: Continuous scraping action makes Contherm easy to clean with relatively low hold-up volumes. It can flexibly transition from one product to the next, meaning minimal product loss and downtime.

More performance: Robust designs with multiple material options optimize heat transfer and product throughput, giving long-lasting mechanical performance.

More safety, more savings: Each vertical Contherm has its own hydraulic system, allowing for fast, easy and safe inspection as well as service with minimal labour costs.

Contherm HP

By far the most robust Contherm, suitable for the most extreme applications. Contherm HP can be equipped with all of the features of a traditional Contherm, but is engineered to handle system pressures up to 41 bar (600 psi). A unique, self-aligning rotor design protects Contherm HP from accelerated wear and does not require the use of couplings to connect the shaft to an electric gear motor. In addition to a new exterior, these design features simplify installation, saving you time and money.

More robust: Withstands up to 41.4 bar (600 PSI) of product pressure - twice as much as a standard single-wall scraped-surface heat exchanger.

More simplicity: A new self-aligning motor/gear box assembly eliminates the use of coupling components for simpler, easier, faster installation.

More space: Like the traditional Contherm, Contherm HP can be installed both horizontally and vertically, offering flexibility to meet specific preferences or space limitations.



Contherm HP can be installed either horizontally or vertically depending on customer preference.

Contherm Max double-wall scraped-surface heat exchanger

The Contherm Max double-wall scraped-surface heat exchanger features 4.5 times more surface area than the largest traditional-size Contherm. The Contherm Max utilizes both an inner and outer heat transfer surface, ensuring a low-shear 55 mm (2 inch) product path.

Small footprint and less power provide greater savings

The Contherm Max utilizes a single drive motor, which corresponds to a power reduction of 10–30% when compared to a comparable process utilizing traditionally sized scraped-surface heat exchangers.

In addition, the rotating scraping assembly and scraping blades are specially designed to minimize the power required to achieve effective scraping and continuous heat transfer.

The Contherm Max is a stand-alone unit that only takes up a small amount of space, because it is installed vertically, and does not need to be fixed to adjacent structures such as a wall or ceiling.

The Contherm Max requires up to 80% less floor space than Contherms or heat exchangers of similar design that are installed horizontally. This enables customers to optimize utilization as well as revenues.

How it works

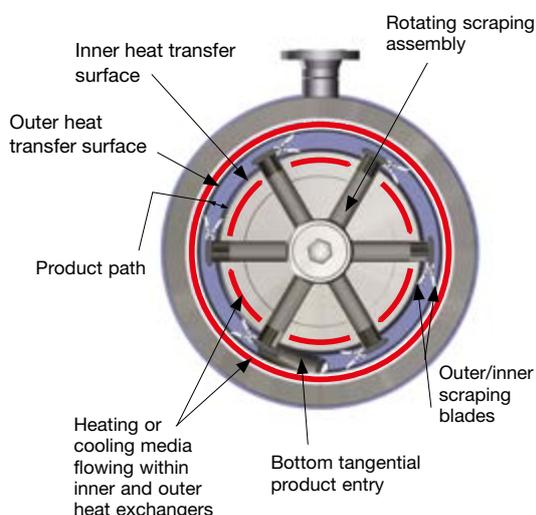
Product enters at the bottom tangential entry port, and exits at the top of the Contherm Max.

Steam or liquid heating or cooling media flow from top to bottom in a counter-current path at high velocity in order to optimize heat transfer to the product.

A highly engineered rotating scraping assembly, fitted with blades that continuously remove fouling material from both inner and outer walls, is mounted within the product path.

The rotating scraping assembly can vary in speed to ensure the most effective scraping and best product quality. At the end of production, the product can be drained or removed by water, resulting in minimal product loss.

The Contherm Max can then be Cleaned in Place (CIP) using recommended guidelines for cleaning.



More capacity: The double-wall design and large surface area provide the thermal equivalent of three traditional single-wall scraped-surface heat exchangers.

More ready to go: The vertical Contherm Max has a compact footprint and comes fully assembled for “plug-and-play” operation, dramatically reducing installation costs.

More product quality: Contherm Max is especially suited to process shear-sensitive products. Low rotational speeds and low internal pressure drop enable the gentlest possible product treatment.

More lifetime savings: Contherm Max provides significantly lower total cost of ownership than single-wall designs, thanks to an efficient single-drive motor that secures energy savings of up to 33% as well as lower lifetime maintenance costs.



More capacity with Contherm Max

Applications

The Contherm Max is ideal for applications that require high throughput as well as the uniform heat transfer of viscous, sticky and heat sensitive products that would tend to foul other types of non-scraped heat exchangers.

The unique design of the Contherm Max and the product path created by the two heat transfer walls make it particularly suitable for high-quality products that require low shear or contain large particulate pieces.

This makes these heat exchangers well-suited for use in the manufacture of a wide variety of prepared foods such as soups, sauces, starch based condiments, baby food, desserts, fruit and vegetable purées and concentrates with or without particles, confectionery creams, cream cheese, spreadable cheese products and hummus. Examples of non-food uses can include pet food and personal care products such as skin creams, lotions, gels, petroleum jelly and shampoo.

Rotating scraping assembly

The Contherm Max utilizes a six-arm rotating assembly as standard. For highly viscous products, a four-arm rotating assembly is available to reduce the required torque output of the Contherm Max motor.

The use of frequency inverters is recommended with the Contherm Max in order to optimize thermal performance and cleaning in place (CIP).

Materials

The heat transfer surface is made of either 316L stainless steel or Duplex 2205 honed to a hygienic finish. The scraping blades are made of a durable polymer materials including metal detectable material that complies with both FDA and EU requirements. The product seal features a durable hard-face flush/aseptic design as standard. The materials used are configured to suit each particular application.

Connections:

Product side: DIN, Tri-Clamp, SMS,
Other Connection size: 102 mm (4 inch)

Media side: Flange connections
Outer Cylinder: 76 mm (3 inch)
Inner Cylinder: 38 mm (1½ inch)



Equipment specifications	Surface area	Maximum product pressure	Maximum media pressure	Maximum temp. rating	Number of seals/ blades per unit	Hold-up volume	Mounting
Contherm® Max	4.5 m ² 48 ft ²	15 bar (220 psi)	8 bar (115 psi)	150°C (302°F)	1/48	130 liter (34.5 gal)	Vertical

Application	Contherm® Max	Contherm® Core	Contherm®/ Contherm® HP
Throughput capacity per units	●●●●●	●●	●●
Particulate processing	●●●●●	●●●	●●●●
Low shear, gentle treatment	●●●●●	●●●	●●●●
Thermal efficiency per area	●●●	●●●●	●●●●●
Rapid, flexible product transitions	●●●	●●●●	●●●●●
Viscosity	●●	●●●	●●●●●

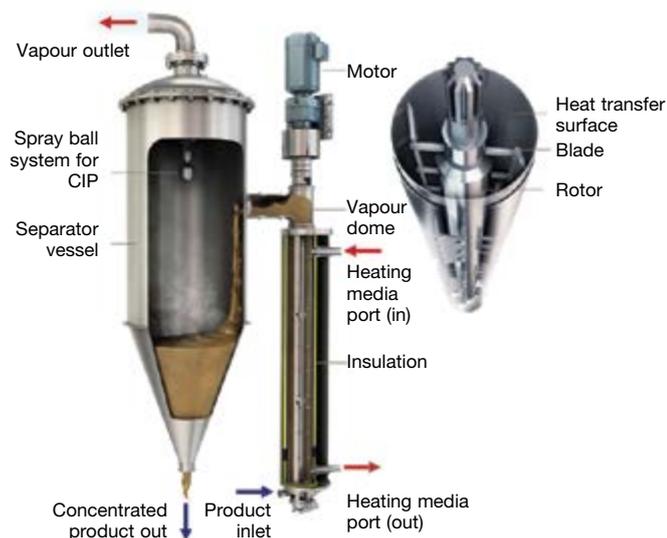
Convap for evaporation of highly viscous products

Convap is a specially modified Contherm unit designed as a continuous, scraped-surface evaporator that can effectively concentrate products to extremely high solids levels. It is often used to process products that rapidly become viscous as they undergo concentration.

Pre-concentration prior to drying

Convap units are especially suitable for concentrating products that have been pre-concentrated by other means and have become too viscous to handle. The Convap can concentrate some products up to 99% total solids.

A Convap unit both heats and concentrates viscous product while the Convap vapour dome and separator allow for vapour separation to occur.



Typical Convap applications include the production of purées, mashes, pulps, concentrates and pastes from fruits and vegetables. Convap units are also used for processing a wide selection of confectionery, protein solutions such as whey protein, lecithin, sugar solutions, chemical and pharmaceutical solutions, and for concentrating plant waste materials into a heavy slurry for easy disposal. Convap units can also be used for concentrating coffee and other extracts.



How it works

Just as in Contherm units, product is pumped into the lower end of the Convap heat exchanger cylinder. The heating/cooling media flows in the annular space between the heat transfer wall and the insulated jacket. Mechanical agitation, provided by the revolving blades, creates the convection conditions essential for efficient heat transfer.

The scraping blades continuously remove the thin product film from the precision-finished cylinder wall. The centrifugal action of the Convap rotor, driven by a motor on the upper end of the unit, spins the heavier liquid droplets toward the cylinder wall. This action assures a continuous re-wetting of the heat transfer surface and prevents product burn-on.

The Convap evaporator is normally operated under vacuum. Vapourization occurs in the Convap scraped-surface heat exchanger cylinder. A separator, connected to the Convap by a custom-designed vapour dome, allows the separation of the concentrate from the vapour phase. In the separation vessel, the water vapour exits the top and concentrated product exits at the bottom.

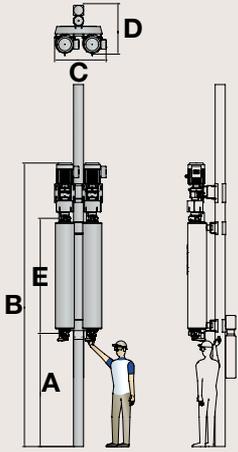
More thermal efficiency: Convap's continuous scraping action and removal of the fouling layer produces the highest achievable heat transfer coefficient, when concentrating high solids material.

More performance: Thanks to expert material selection and advanced equipment design, Convap can handle high-viscosity and high-fouling materials and exceed the limitations of other liquid evaporation solutions.

More product quality: Convap offers high temperature differential between product and media, while also operating under high-vacuum conditions. This allows heat-sensitive products to retain valuable colour, flavour and nutritive components.

More compact design: The vertical Convap requires a minimal amount of valuable floor space.

Technical information for vertical Contherm units (ref. illustration on page 9)



Metric system

Model	Heating surface m ²	A mm	B* mm	C mm	D mm	E mm	Net weight kg	Floor space m ²
6x3	0.279	854	2502	864	933	717	140	0.81
6x6	0.557	1387	3645	864	933	1326	234	0.81
6x9	0.836	1997	4864	864	933	1936	274	0.81
6x11	1.020	2355	5689	864	933	2205	306	0.81

American system

Model	Heating surface ft ²	A in	B* in	C in	D in	E in	Net weight lb	Floor space ft ²
6x3	3.0	33.6	98.5	34.0	36.8	28.2	308	8.6
6x6	6.0	54.6	143.5	34.0	36.8	52.2	515	8.6
6x9	9.0	78.6	191.5	34.0	36.8	76.2	605	8.6
6x11	10.5	92.7	224.0	34.0	36.8	86.8	675	8.6

* The height may vary depending on the size of the motor

Contherm® Portfolio		Single scraped surface Degree of viscosity or fouling			Double scraped surface Degree of viscosity or fouling			
		Low to medium Contherm® Core	Medium to high and unique applications Contherm®	High Contherm® HP	High Convap	Low to medium Contherm® Max	Low to medium Convap Max	
						Low to medium Contherm® Max	Low to medium Convap Max	
Contherm Cylinder Features	Mounting	Horizontal	●	●	●			
	Vertical		●	●	●	●	●	
	Surface Area	0.28 m ² (3 ft ²)		●	●	●		
		0.56 m ² (6 ft ²)		●	●	●		
		0.84 m ² (9 ft ²)	●	●	●	●		
		1.0 m ² (11 ft ²)	●	●	●			
		4.5 m ² (48 ft ²)					●	●
	Certifications	ASME	●	●	●	●	●	●
		PED	●	●	●	●	●	●
		3A		●	●			
		Cryogenic		●	●			
	Materials	316 L Stainless steel	●	●	●	●	●	●
		316 L HIPEX Stainless steel		●	●	●		
		Duplex 2205	●	●	●	●	●	●
		Nickel		●	●	●		
		Chrome	●	●	●	●		
	Unique Coatings	Triple-Chrome		●	●	●		
		Alfaloy		●	●	●		
	Product	15 bar (220 psi)					●	●
21 bar (300 psi)		●	●		●			
27 bar (400 psi)			●					
41 bar (600 psi)				●				
-35°C to +170°C (-30°F to +338°F)		●	●	●	●			
Media	-20°C to +150°C (-4°F to +300°F)					●	●	
	115 psi (8 bar)					●	●	
	250 psi (17 bar)	●	●	●	●			
	700 psi (48 bar)		●	●				
	-35°C to +170°C (-30°F to +338°F)	●	●	●	●			
Heads / Product Connections	-20°C to +150°C (-4°F to +300°F)					●	●	
	51 mm (2 inch) tangential	●	●		●			
	76 mm (3 inch) tangential	●	●	●	●			
	102 mm (4 inch) tangential					●	●	
Media Connection	37 mm (1 ½ inch) lower - NPT or flange	●	●		●			
	51 mm (2 inch) upper - NPT or flange	●	●	●	●			
	76 mm (3 inch) upper & lower - flange					●	●	
Seals	Single mechanical or flushed / aseptic	●	●	●	●	●	●	
	Hard face single or hard face flushed	●	●	●	●	●	●	
	Inboard seal		●	●				
	Huhnseal		●	●	●			
	Industrial packing gland		●	●	●			
Blades	ALFA-LON III, ALFA-LON IV	●	●	●	●	●	●	
	ALFA-LON III-S (metal detectable)	●	●	●	●	●	●	
	Nylon		●	●				
	PEEK		●	●	●	●	●	
	Stainless steel	●	●	●	●			
Rotors	Rotor Diameter	51 mm (2 inch) diameter (particle size)	● - 36 mm	● - 36 mm	● - 36 mm			
		76 mm (3 inch) diameter (particle size)	● - 26 mm	● - 26 mm	● - 26 mm	● - 26 mm		
		102 mm (4 inch) diameter (particle size)	● - 13 mm	● - 13 mm	● - 13 mm	● - 13 mm		
		114 mm (4.5 inch) diameter (particle size)	● - 7 mm	● - 7 mm	● - 7 mm	● - 7 mm		
		126 mm (5 inch) diameter		●	●			
	Double-wall scraping assembly (4, 6 & 8 arms)					● - 26 mm	● - 26 mm	
	Unique Designs	High torque spline for high viscosity		●	●	●		
		Low shear / large particulate design	●	●	●			
		High speed / High shear		●	●			
	Power	5.5 to 7.5 kW / 7.5 to 10 HP	●	●	●	●		
11 kW / 15 HP			●	●	●	●	●	
15 or more kW / 20 or more HP			●	●	●	●	●	

More resources for more peace of mind

Many heat exchangers encounter their limits when handling process fluids that are sticky, cause fouling or are heat sensitive. This is not the case with the Contherm range from Alfa Laval, however. These units are capable of handling products that other heat exchangers find too difficult. As long as a product can be pumped, a Contherm scraped-surface heat exchanger can handle it.

To help verify this prior to installation, a test unit is available to enable our customers to test and develop food and non-food processing techniques on a small scale, prior to making decisions about installing new equipment

Flexible testing facility

Alfa Laval has a number of rental units available for shipping to any location in the world for testing at customer sites. In addition to renting a test unit, customers can also have tests carried out at Alfa Laval Customer Testing Centers in either the US or Europe. Here an expert staff of laboratory technicians assists customers in optimizing both equipment and operating conditions to fit their specific product



Hydraulic lift and blade funnel for easy maintenance

and process. The main components at the Alfa Laval testing centre include Contherm scraped-surface heat exchanger and Convap scraped-surface evaporators. This equipment makes it easy to set up small-scale processing lines for heating, cooling, evaporation and crystallization, enabling customers to “try before they buy.”

Analytical data

At Alfa Laval, we know that a critical factor for our food processing customers is the ability to preserve the exact taste, texture and quality that their customers demand. And it is equally important for our non-food customers to maintain consistent quality in their products.

This is why Alfa Laval provides customers with the ability to determine the best configuration of their process line prior to any actual purchasing decision.

We aim to prove to you that Contherm heat exchangers are robust enough to handle the processing of your particular product. Our analytical test programme provides you with concrete data about the physical properties of each product while being processed using Contherm equipment. This analytical data includes moisture content, pH, specific gravity and particle size.

If you are interested in testing how your company’s product will perform, please contact us via the nearest Alfa Laval sales office or by e-mail: contherm@alfalaval.com



Contherm test unit including Convap evaporator, control panel and mobile feed pump.



More expertise, innovation and reliability with Alfa Laval

Genuine spare parts and service

To enable your staff to run and maintain your Contherm and Convap equipment, Alfa Laval supplies genuine OEM spare parts, services and training for the complete Contherm range.

With Alfa Laval sales companies in more than 50 countries and a global network of regional service centres, you can rely on 24/7 service from trained experts who are close at hand to help you if needed.

Contherm upgrades

Decades of continuous improvement enable our customers to take advantage of the many ongoing Contherm product improvements, most of which are designed to be compatible with existing equipment.

Equipment rental and exchange

Contherm heat transfer cylinders, rotors and other critical components are available on a rental and exchange basis. This enables our customers to continue production should they have to wait for equipment to be replaced or repaired.



Auditing, consulting and training

Trained field service technicians and product specialists can carry out on-site training and equipment audits in order to assist our customers in identifying areas of risk and/or opportunities for optimizing existing set-ups.

Maintenance tools

A comprehensive range of tools is available to assist our customers in maintaining their equipment to ensure consistent, dependable performance and improve product quality. For example, process control equipment can be specified for the Contherm range and we can supply maintenance documentation and instructional videos on how to service the specific Contherm equipment.



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.

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

Contherm and Alfalon are trademarks owned by Alfa Laval Inc., USA. ALFA LAVAL is a trademark registered and owned by Alfa Laval Corporate AB, Sweden. © 2009 Alfa Laval

