



Heat recovery in commercial kitchens and industrial operations

ACO LipuTherm



Rapidly rising energy costs

Energy prices continue to pose new challenges for industrial and commercial companies. It is foreseeable that the cost of energy will play an increasingly important role in the planning of corporate resources in the future.

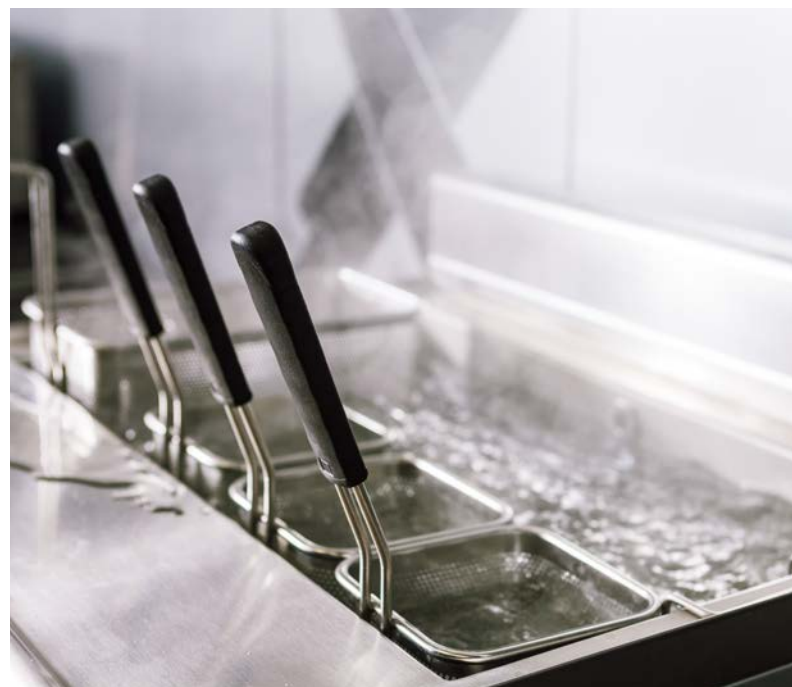
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In addition, there is a growing focus on how these resources are used - wasting unused energy potential often leads to higher economic and environmental costs.

Therefore, in addition to the search for potential savings, the focus is shifting to the identification of potential uses that have received little attention to date: the heat content in waste water streams from commercial kitchens.

ACO Haustechnik recognised this potential as early as the beginning of the 2010s and considered how the heat in kitchen wastewater could be put to good use in commercial operations. The result: the ACO LipuTherm heat exchange system. The ACO LipuTherm for use with grease separators has undergone further optimisation phases in recent years as a result of practical experience.

The application, efficiency and cost benefits are clearly presented on the following pages.



The use of Gastronorm pasta cookers produces large quantities of hot water.



Emptying a boiling pot

Hot kitchen waste water - untapped potential

Studies have shown that heat accounts for almost 60 percent of the energy consumed in a commercial kitchen. Even with energy-optimised kitchen processes and highly efficient technical systems, there is still a blind spot - kitchen waste water.

Against this backdrop, interest in wastewater heat recovery in commercial kitchens has increased significantly, as large volumes of kitchen wastewater with high wastewater temperatures are particularly attractive for economic reuse of this otherwise untapped heat source.

Another important aspect of kitchen wastewater is that if it is discharged into the public sewer system, it can cause damage to the sewer system. For this reason, local authorities generally require that commercial wastewater does not exceed certain maximum temperatures when it is discharged into the public sewer system.



Unused heat potential is lost in the sewerage system.

ACO LipuTherm

Efficient use of the heat in kitchen waste water



Heat pump with heat exchanger, connected to a grease separator (with sampling and lifting system) with appropriate piping to the drainage objects of the commercial kitchen.

The ACO LipuTherm heat recovery system is designed for connection to ACO grease separators in accordance with DIN EN 1825.

Local authorities generally require canteen kitchen operators to pre-clean their greasy kitchen waste water via grease separators before discharging it into the public sewerage system. The warm wastewater from the kitchen operation first enters the grease separator via an inlet pipe. This waste water is drawn out of the separator outlet by the recirculation unit via the connecting sleeve provided on the grease separator.

The waste water then flows into the ACO LipuTherm heat exchanger.

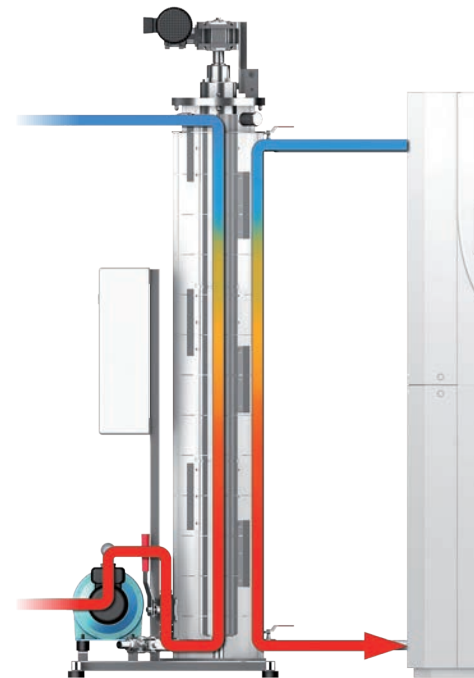
The hot kitchen wastewater from the grease separator system flows through the ACO LipuTherm heat exchanger on

the primary side. The highly efficient heat exchanger surface enables high heat transfer.

The kitchen wastewater, cooled by the heat exchanger process, is returned to the grease separator after passing through the heat exchanger circuit.

The water from the secondary circuit, heated by the ACO LipuTherm heat exchanger, is now available as an energy source for further use via a heat pump for various applications.

Possible applications include heating systems and hot water supply.



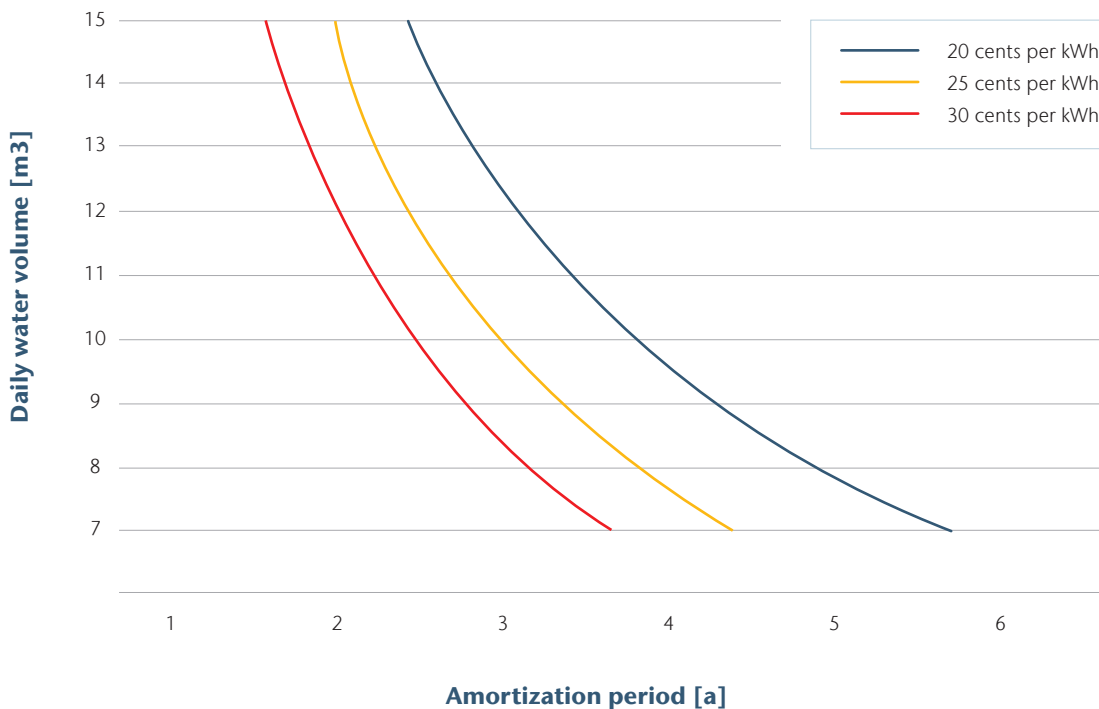
Sample calculation

The figure below shows the payback time as a function of the "daily wastewater volume" of wastewater and the "cost per kWh". The "daily wastewater volume" is a more accurate parameter than the nominal size of the grease separator installed, as smaller nominal sizes can produce higher daily volumes spread over the day, depending on the kitchen's operating hours. The "cost per kWh" takes into account the current cost of energy supply at three different prices, regardless of the energy source (gas, oil, etc.). The figure below is based on a kitchen operating

220 days per year, an investment cost for the ACO LipuTherm heat exchanger of €25,000, operating costs of €1,000 for annual maintenance and electricity for the system technology, and a temperature reduction of 15°C. Even with these conservative assumptions, wastewater volumes of approximately 7 m³ per day are sufficient to pay for the system in approximately 3-5 years.

Amortization time depending on the daily volume and costs per kWh

(Investment: € 25,000, operating costs approx. € 1,000 per year, assumed temperature reduction: 15° C)

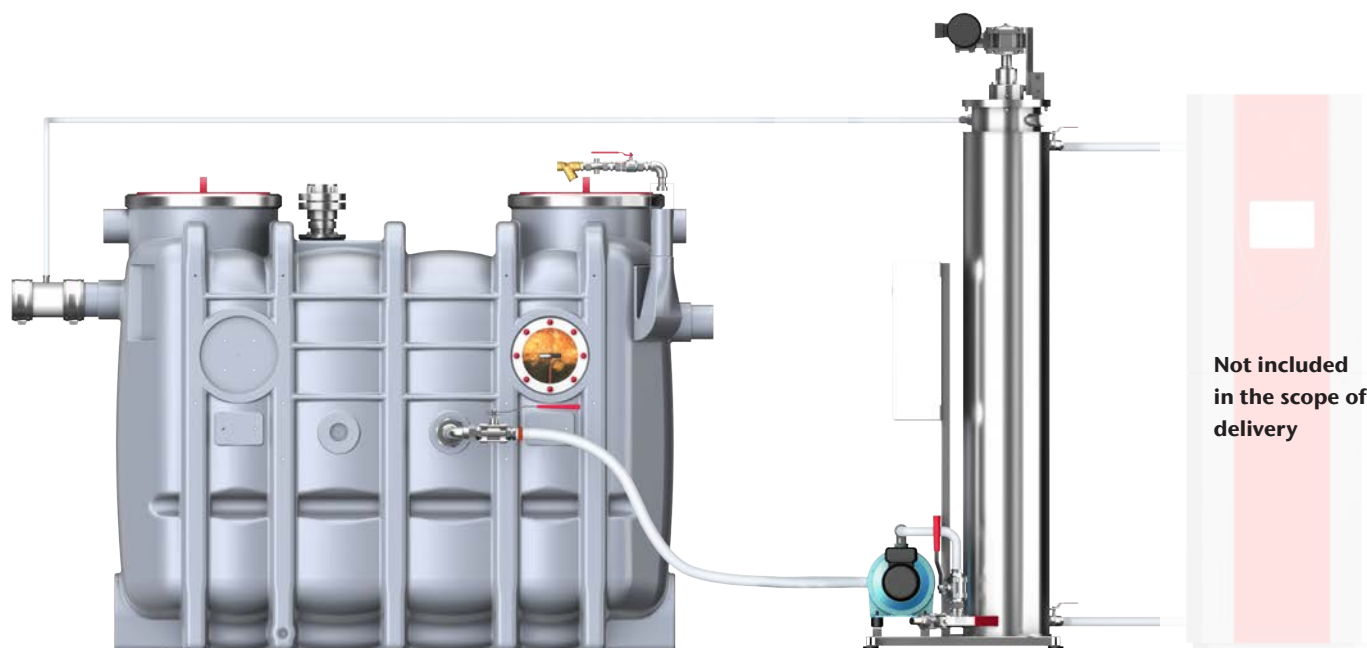


In principle, the following are the main influencing factors for efficient waste water heat recovery:

- Kitchen operating times (the longer the wastewater is generated throughout the day, the more energy can actually be recovered)
- Wastewater temperature (the higher the average temperature, the higher the heat transfer rate)
- Daily wastewater flow (the more continuous, the more effective the overall system is)

The last point in particular plays a decisive role in the efficiency of the ACO LipuTherm. For example, if the hydraulic load of the grease separator is characterised by regular peak loads, these wastewater volumes are only partially cooled sufficiently by the heat exchanger. On the other hand, hydraulic loads that are not too high or short breaks in kitchen operation are ideal for effective and gradual energy recovery via the continuous circulation process.

Product portfolio



The product range of ACO grease separators for free installation in frost-protected rooms includes a series up to nominal size (NS) 30. Depending on the application, these separators can be made of plastic (polyethylene) or stainless steel (material 1.4571) in round or oval design, and the ACO LipuTherm heat exchanger must also be installed in a frost-protected room on a level installation surface. The maximum distance to the on-site grease separator

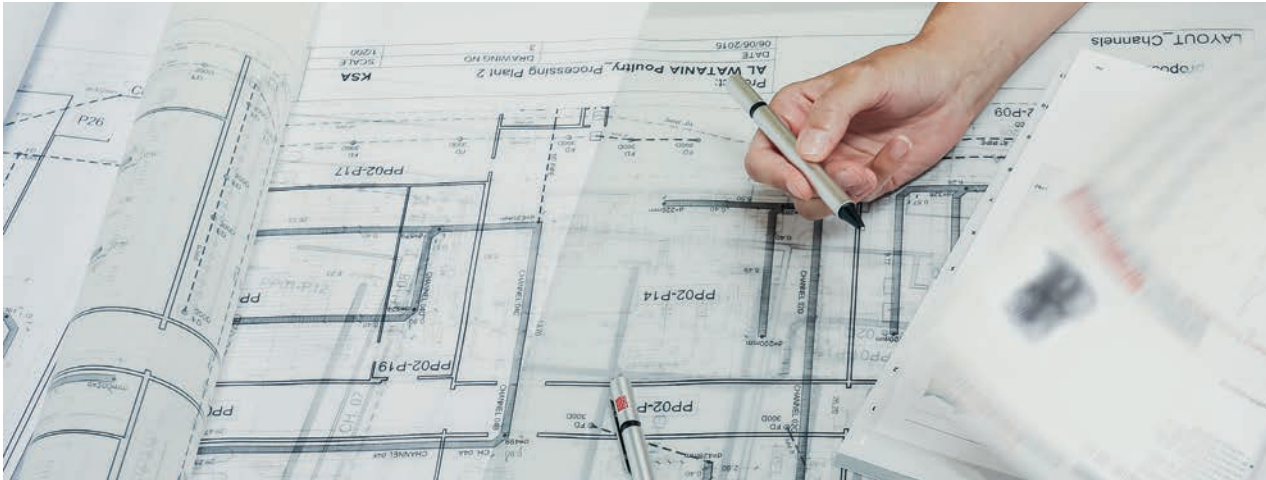
must not exceed 10 metres. All ACO grease separators for free standing installation have a connection socket on both side walls for connecting the circulation pump of the heat exchanger. Depending on the design of the separator, the connection sleeves can be easily drilled out or opened by removing the sleeve plugs.

Order information

Description	Suitable for	Power (max.)	H	W	D	Weight	Article no.
		[kW]	[mm]	[mm]	[mm]	[kg]	
ACO LipuTherm	■ Grease separator NS 2 – 5,5	4 ¹⁾	2005	600	630	120	7980.70.00
	■ Grease separator NS 7 – 10	6 ¹⁾	2005	900	700	200	7980.70.01
	■ Grease separator NS 15 – 20	8 ¹⁾	2005	1500	700	360	7980.70.02

¹⁾ These figures refer to an average temperature profile of a commercial kitchen.

What should be generally taken into account in project planning?



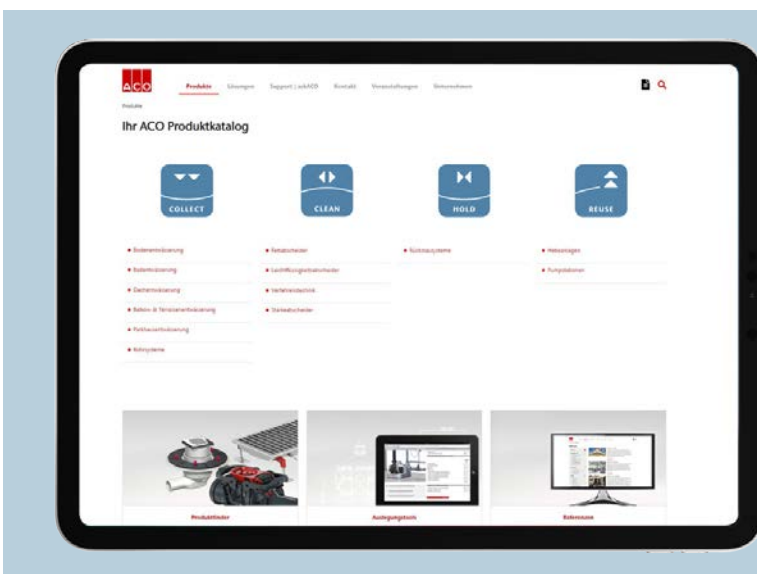
With regard to the efficiency of the heat exchanger ACO LipuTherm, it should be noted that there are three performance factors are of particular importance:

- Waste water temperature
- Kitchen operating hours
- Daily course of the wastewater volume

Recommended applications include for example, the hotel industry, care facilities or hospitals. Hospitals, for example, because the kitchen can be kept in operation for longer periods of time and energy is still consumed after the heat is still consumed after the heat exchange process.

It makes no difference whether the project is a refurbishment or a new build. Depending on the situation, the challenge of the project is either the hydraulic integration (renovation) or the determination of the performance factors (new design). Basically, the question should be asked about the potential for savings and the acceptance of the recovered energy. Where are the highest current costs for energy supply and where is thermal energy needed regularly throughout the year, e.g. for heating or domestic hot water?

Where can I download data sets for use in project planning?



The online catalog of ACO Haustechnik contains the category **Process engineering** and the sub-category **ACO LipuTherm**. Data sheets for the various heat exchangers, the associated instructions for use and tender texts can be downloaded in various formats. Dimensional drawings of the heat exchangers in dxf format can also be found here for better planning of the components.

ACO. we care for water

Intelligent drainage systems from ACO increasingly use smart technology to ensure that rainwater and wastewater are drained, or temporarily stored. With innovative separation and filter technology, we prevent water contamination. We accept the challenge of reusing water, and thus establishing a resource-saving cycle.

ACO Haustechnik

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