



SEE Cooling Concept

World's **Greenest** Cooling Solution
Renewable Energy & Dramatically Reduced CO₂ Production

see
COOLING

SEE Cooling Concept

The driver of our concept is to provide extremely energy-efficient cooling utilising geothermal energy and simplified and optimized maintenance to deliver by far the lowest running costs in the industry. **World's Greenest Cooling Solution** generates very low CO₂ emissions and **Outstanding Total Economy** in both new installations and upgrades of existing cooling systems. SEE Cooling Concept experience has been derived from more than 200 sites over 15 years. It is a proven product.

SEE Cooling Product Portfolio

The range offers a complete solution for the cooling of telecommunications facilities, data centers, industry, offices and public spaces. There are two main product ranges; the SEE Cooler room unit and the SEE Rack cooling centre.

- **SEE Cooler S**, Standard environment
- **SEE Cooler HDZ**, High Density Zone data environment
- **SEE Cooler LN**, Low Noise, office and retail environment
- **SEE Cooler CF**, Computer Floor for data environment
- **SEE Rack GEO** cooling centre for 60-750 kW optimized for free cooling combined with ground collectors
- **SEE Rack CH**, combining free cooling with Chillers

SEE Cooling Concept includes also bore holes with ground collectors, dry coolers, chillers and centralised maintenance.

Outstanding Total Economy

SEE Cooling Concept offers world-class operational economy. With the lowest power consumption on the market combined with robustness and easy operation and maintenance achieving great savings. The short repayment period and an unmatched Life Cycle Cost give an exceptional return on investment. Compared with the traditional standard systems the energy saving is about 90% and compared with market-leading solutions up to 80%. These results will be even more compelling as energy prices rise.

Technology

SEE Cooling Concept is based on cutting edge and novel patented technology that allows energy-efficient cooling using free cooling to be used for the majority of the year. The required cooling is produced by a combination of free cooling together with geothermal energy to cover the peak load. Chillers may be used as a cheaper but less efficient alternative to bore holes. The total system can achieve a hard to beat COP of 23.

SEE Cooler

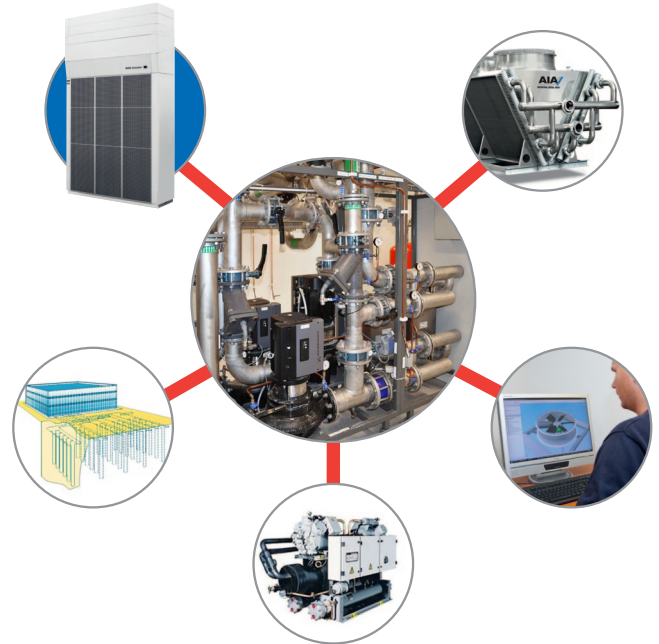
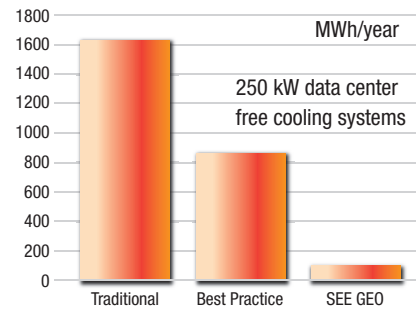
SEE Cooler is a third generation unit with over 1500 units in operation. The product allows 100% free cooling up to about +15°C outside temperature.

Low internal power consumption and high cooling effect compared to conventional technology. Built in redundancy and a minimum of moving parts make it optimal for high cooling effects W/m². SEE Cooler is designed to work in a free cooling solution at coolant temperatures between +5 and 20°C. Specific features are:

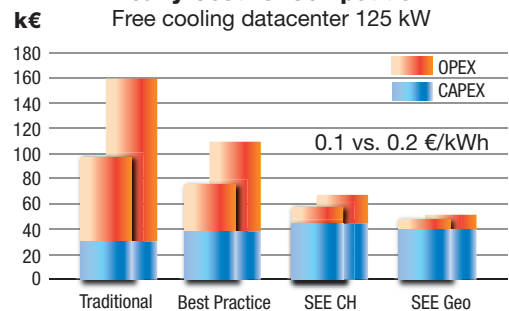
- Maximum inlet velocity of about 0.8 m/s.
- Equipped with EC fans
- Power consumption kW / kW, about 0.8% at 24°C, 50% humidity in the room
- Coolant at 10°C gives a COP of approximately 136.

Available in four variants, Standard, Low Noise, Computer Floor and High Density Zones; the latter with increased capacity and redundancy. Capacity ranges are from 5-56 kW/unit at 20°C coolant temperature.

Power Consumption vs. Competition



Yearly Cost vs. Competition



Operation and Maintenance

SEE Cooling Concept is simple strong and very easily maintained due to a minimum of moving parts and a robust physical design. The main control logic is also robust and integrated into the SEE Rack, it controls all functions and manages all optional add-on products in the installation. The SEE Cooler also has an integrated control unit supplied with different levels of functionality for the measurement of operational data and control of the product. Monitoring from a centralized operation centre is also possible using standard interfaces.



SEE Rack

SEE Rack is available in different sizes and with a variety of options.

The product is a prefabricated unit that replaces the construction of a traditional Cooling distribution centre. It is designed for reliability and has inherent redundancy while still optimised to use an absolute minimum of energy.

SEE Rack is a complete unit containing the pumps, heat exchangers, control valves, valves, filters and control logic needed for efficient and safe operation.

SEE Rack connects to SEE Coolers, dry coolers, geothermal energy, chillers and electricity as well as maintenance and security systems. The product has built-in redundancy and a power range from 60-750 kW. It achieves COP 73, including peak load cooling during the summer.

SEE Rack comes in Geothermal and Chiller variants.

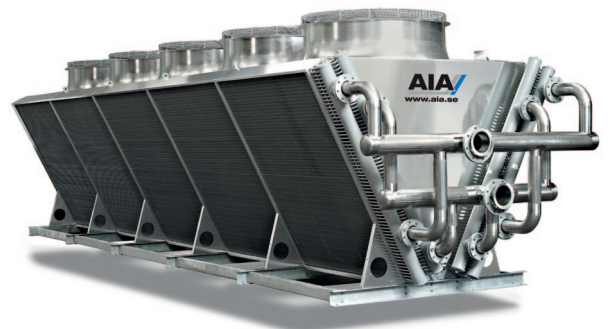


Dry Coolers

SEE Cooling recommends dry coolers with speed-controlled EC fans due to their low power consumption and quiet operation, for example the AIA VX2 range. They come in standard sizes optimized to use with SEE Rack.

In a system with ground collectors the dry cooler is used for free cooling for over 80% of the year depending on the geographic location, transferring to geothermal energy when outdoor temperatures reach 15 to 20°C.

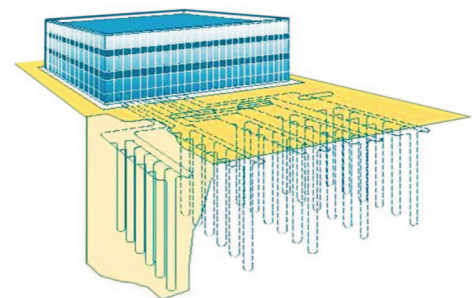
In systems with Chillers the dry coolers are in operation for both free cooling and, due to outdoor temperature conditions, for condensing heat dissipation from the chillers.



Bore Holes with Ground Collectors

SEE Cooling Concept GEO utilize a number of up to 300 m deep close circuit bore holes for peak load cooling during the warmer periods of the year. Typically a SEE Cooling installation maximise the use of free cooling based on climate data for each location. The Geothermic peak cooling is dimensioned based on geological and climate data.

Usage of ground collectors is one of the key factors to achieve SEE Cooling Concepts unique operating characteristics and economy.



Chillers

SEE Cooling Concept without ground collectors utilize conventional chillers to take up the peak load in the cooling system. This Equipment is dimensioned to meet cooling demand during periods when 100% free cooling is impossible.



Product	Capacity	Models	Coolant	COP year Product	COP year System
SEE Rack GEO	60-750 kW	10, 20		73	1) 23
SEE Rack CH-C	60-750 kW	10, 20		43	2) 7,6
SEE Rack CH-D	60-750 kW	10, 20		48	3) 8,0
SEE Cooler S	5-15 kW	1,2,3	20°C	62	
SEE Cooler S	12-36 kW	1,2,3	10°C	136	
SEE Cooler HDZ	18-56 kW	1,2,3	20°C	49	
SEE Cooler LN	5-15 kW	1,2,3	17°C	>200	
SEE Cooler CF	11-34 kW	1,2,3	10°C	35	

1) COP year average, SEE Rack GEO , SEE COOLER S, AIA X2, room conditions 24°C 50% RH

2) COP year average, SEE Rack CH-C, SEE COOLER S, AIA X2, room conditions 24°C 50% RH

3) COP year average, SEE Rack CH-D, SEE COOLER S, AIA X2, room conditions 24°C 50% RH

Product	Application
Bore holes with ground collectors	GEO
Dry coolers	GEO and Chiller
Chillers	Chiller
Centralised management	GEO and Chiller

References

SEE Cooling Concept is currently installed in more than 200 sites mainly in the Swedish telecom and data network. Of those more than 40 use boreholes with ground collectors for peak cooling. Most of these are located in TeliaSonera's network, where the concept was initially developed. The telecommunications operator TeliaSonera is environmentally certified to ISO 14000, and has been able to show significant energy savings over many years using SEE Cooling Concept.

The Swedish companies Stokab and Fiber Data are also clients, and there are further installations in both Austria and Denmark.



About SEE Cooling

SEE Cooling is a Swedish supplier of extremely energy-efficient cooling systems for telecommunications, data centers, industry, office and public spaces.

SEE Cooling Concept is based on cutting-edge patented technologies that enable energy-efficient free cooling. For the warmest periods ground collectors in boreholes are recommended, but a complete range of alternative options are available. SEE Cooling is now ready to offer this technology to the World for the first time.

SEE Cooling was founded by Svante Enlund who is both the inventor and key person behind the SEE Cooling Concept product portfolio.

SEE Cooling has its head quarters in Nacka, outside Stockholm, and has established a management team of experienced specialists from both suppliers and customers within the industry.

The company has key partnerships with the manufacturers AIA and Pretec and the contractor Züblin, as well as sound relationships with the elite of researchers in the industry. Since it was founded the Company has an important cooperation with TeliaSonera.

SEE Cooling will continue to be at the cutting edge technologically, environmentally and financially to provide customers with the very best technology the industry can offer, which has already been evolved and refined for over 15 years.

