

ÖSTBERG 



Rotary Heat Exchanger

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1 Company Presentation

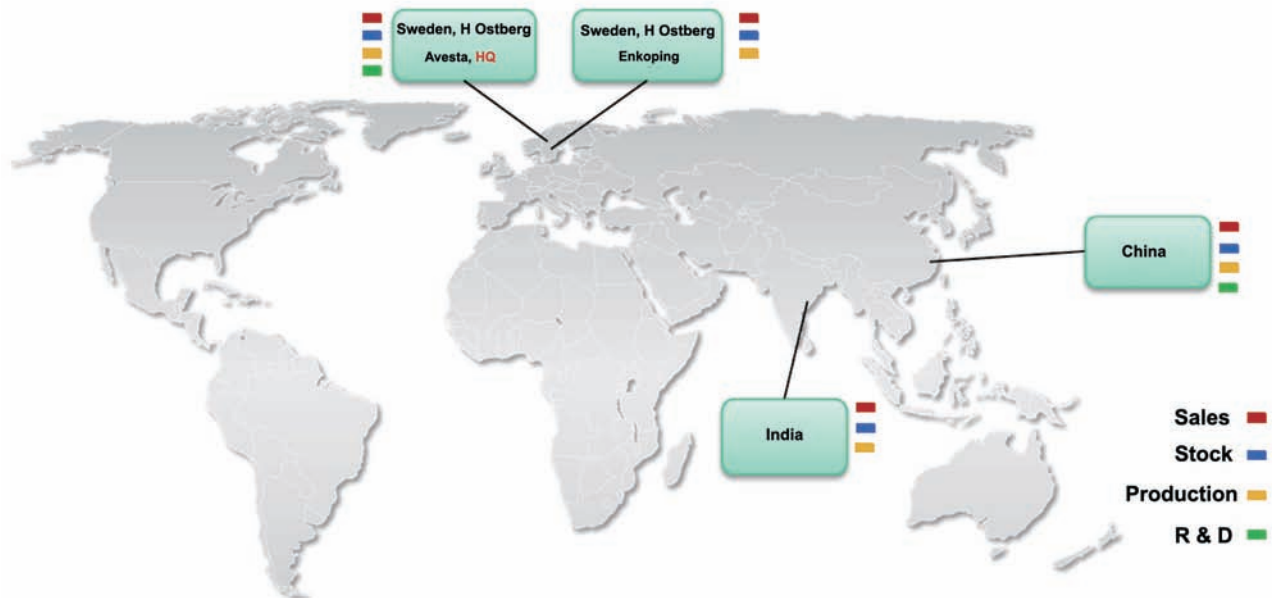


Östberg is a Swedish company with roots all the way back to 1971 when Hans Östberg was one of the recognized inventors of the circular duct fan. Today Östberg is one of the leading global players in ventilation and energy recovery.

With 4 manufacturing facilities on 2 continents in 3 different countries and with a global network of Distributors and Partners Östberg secure a close connection to the local market. Östberg name is connected with high quality and energy efficient products with continually development to match new demands from the global market.

Today Östberg is a multimillion dollar company with focus on duct connected fans, small energy recovery units for the family home market, large air handling units for shopping malls and factories, and energy recovery rotors for all applications.

1.1 Footprint



1.2 Quality insurance

All Östberg operations are certified by ISO 9001 Standards

The ISO 9000 family addresses various aspects of quality management and contains ISO's best known standards. The standards provide guidance and tools for companies and organizations who want to ensure that their products and services consistently meet customer's requirements, and that quality is consistently improved.



Östberg Energy Recovery Rotors are certified by EUROVENT

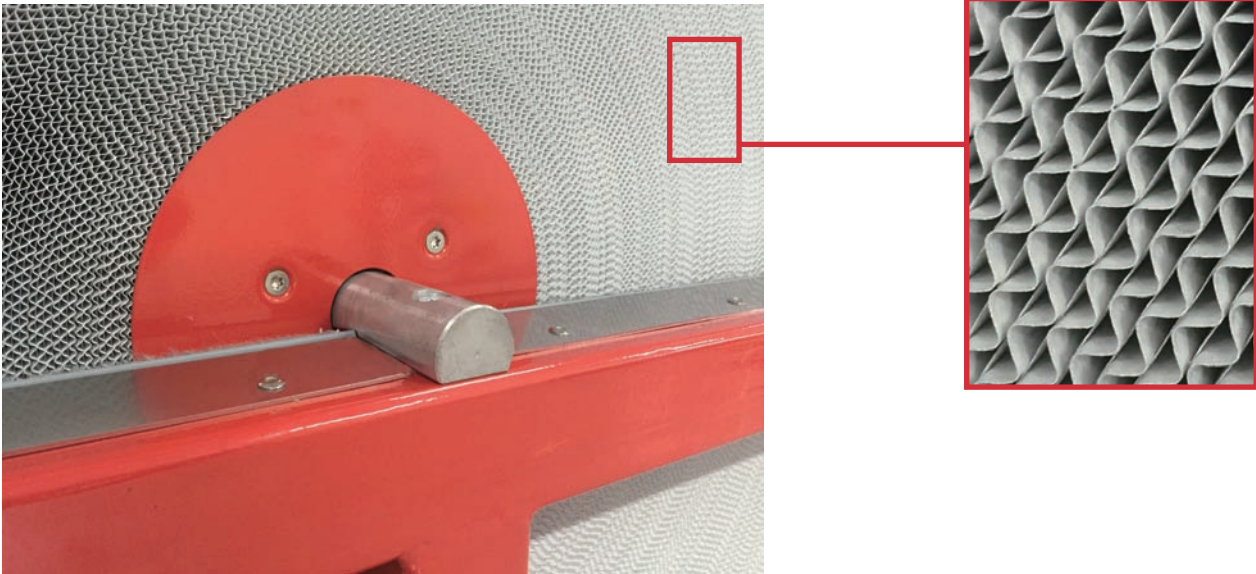
www.eurovent-certification.com

Eurovent Certification: certifies the performance ratings of air-conditioning and refrigeration products according to European and international standards. The objective is to build up customer confidence by levelling the competitive playing field for all manufacturers and by increasing the integrity and accuracy of the industrial performance ratings.



2 Product components

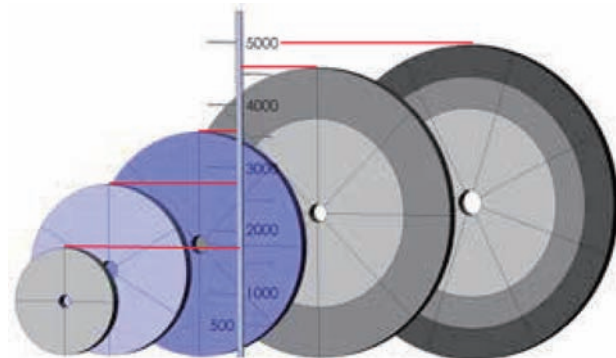
2.1 rotor matrix



The rotor matrix is made for laminar airflow using alternating layers of flat and corrugated foil to provide a structure comprising small, triangular channels.

The rotor are either in one piece or sectorized. One piece rotor are made in diameters ranging between $\varnothing 300$ -2450 mm, while sectorized rotor have diameters ranging of $\varnothing 801$ -5000 mm. Sectorized rotor are divided into segments that are assembled when the rotor is installed.

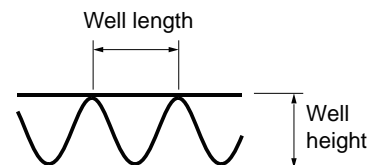
The rotor are as standard manufactured for vertical installation, horizontal installation is an option and must be notified at ordering. One piece rotor up to $\varnothing 2100$ mm may be installed horizontally, and sectorized up to $\varnothing 3200$ mm.



The illustration above shows the number of segments for sectorized rotors of different dimensions.

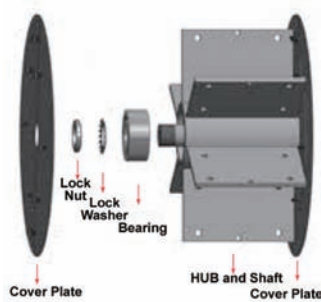
Five different well heights are available to enable optimization of efficiency and pressure drop

Rotor type	Well height	Well length
Extra Low (XL)	1.5 mm	3.0 mm
Special Low (SL)	1.65mm	3.0 mm
Low (L)	1.7 mm	4.0 mm
Normal (N)	2.0 mm	4.0 mm
High (H)	2.7 mm	5.5 mm

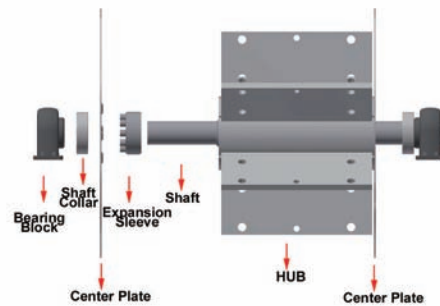


Rotors are available in widths of 250, 200, 150 or 100 mm. in all type of foil. For large OEM customer a customized width can be provided.

Rotors have maintenance-free hubs with life-time lubricated ball or roller bearings in a protected location in the hub (std). For special applications pillow block can be installed on the casing. All bearings are sealed to prevent dirt and humidity from entering the bearing.



Standard Hub, shaft and bearing



Special Hub, shaft and pillow block

2.1.1 Foil/Media

Condensation rotors (Sensible), non-hygroscopic rotors (OT, OC, OK)

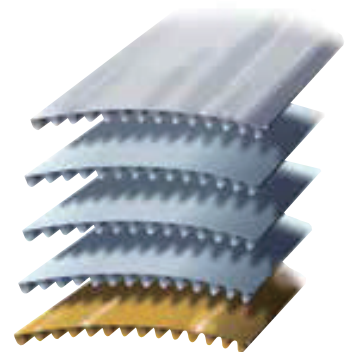
The condensation rotor is a cost-efficient solution to recover heat and is suitable for standard applications in comfort ventilation. Humidity is only transferred in cases when the dew point of one of the air streams is reached.

Hygroscopic rotors (OE)

The hydroscopic surface of this rotor class supports humidity transfer. Typically used for standard applications in comfort ventilation systems to recover humidity.

Hygroscopic rotors (OH)

60% of the media in this rotor is coated with molecular sieve 3Å the remaining 40% is standard sensible media. The mix of sensible and Sorption rotor gives a HYBRID with extended support for humidity transfer. The OH have a performance slightly lower than OM, used for standard applications in comfort ventilation systems where extended need of humidity transfer is requested.



Sorption rotor (OM)

The high performance desiccant coatings of the sorption rotor OM (molecular sieve 3Å) provide a MAXIMUM of humidity transfer capacity for MINIMAL Carry Over. The high humidity efficiency is constant throughout all climate conditions. Sorption rotors are especially designed for summer season cooling recovery and dehumidification of supply air. Therewith, it should always be used in humid and hot climates, with dry cooling systems (chilled beams) and when in winter time humidifiers are used. This substantially reduces the cooling and humidification demand of the HVAC system. The OM rotor also provides an extended corrosion protection and is therefore also suitable for marine applications.

Increased rigidity (OK)

Under extreme strain, for example, applications with automatic cleaning devices using high pressure water in industrial equipment, we suggest a foil thickness of 100 micron.

Increased corrosion protection (OC, OK)

In an environment with aggressive components in the air it is either recommended to use a rotor with epoxy coating (OC) or a sea water corrosion resistant foil (OK) for better corrosion protection. Such applications can be, e.g. dairy industry, on ships or for coastal areas. Other applications for additional corrosion protection are adiabatic cooling and cooling rotors of Direct Evaporative Cooling (DEC) units.

Type	Condensation	Hygroscopic	Sorption	Remarks
OT	x			Untreated aluminium foil
OE		x		Oxidized aluminium foil
OC	x			Epoxy-coated foil
OK	x			Seawater resistant foil (AlMg), 100 µ.
OH		x		3Å Molecular sieve and untreated aluminium foil
OM			x	3Å Molecular sieve

2.2 Casing

Casing is consist of a frame structure, purge sector and seals.

2.2.1 Structure

There are two different casing types; the slide-in model and the modular unit.

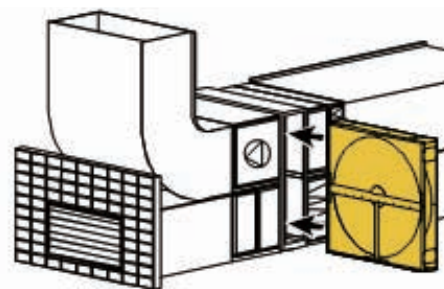
Slide-in model, (CS, CSD, DS)

Slide-in models fit into air handling units (AHU's) thus making a uniform AHU appearance possible. Slide-in casings are always uninsulated and have a large, exposed rotor surface in relation to casing size. Slide-in casings can be provided with one piece (max Ø2450 mm) or sectorized rotors (max Ø5000 mm).

CS type casing: Slide-in casing for one piece rotors, Ø300-2450 mm.

CSD type casing: Slide-in casing for sectorized rotors Ø 801 -2800 mm.

DS type casing: Slide-in casing for sectorized rotors Ø3001-5000 mm.



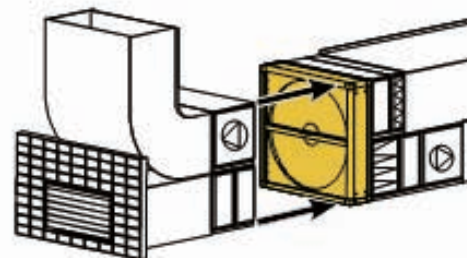
Modular units (CS, CSD, D)

Complete units for connection to other parts of air handling unit or directly to ducting. The unit is modified so that connection can be carried out using e.g. connection panels or corner connectors. The modules are delivered with or without insulation. The modular unit can be made with a one piece casing (one piece rotors) up to Ø2450 mm and divided casings (sectorized rotors) up to Ø5000 mm. Accessories such as inspection window, tubular frame, lighting and condensate trays are available.

CS type casing: Modular unit for one piece rotors Ø300- 2450mm.

CSD type casing: Modular unit for sectorized rotors Ø801-3000 mm.

D type casing: Modular unit for sectorized rotors Ø3001-5000 mm.



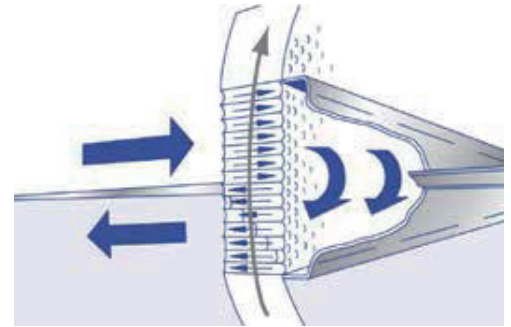
2.2.2 Standard dimensions:

Östberg Energy Recovery units can be ordered in 40 standard sizes, this gives 4000 options as standard, with price competitiveness and short delivery time. If the requested dimension is missing, Östberg can manufacture any dimension in between the standard sizes according to the customers demand.

Diameter (mm)	W/S	Type	Casing			Net Weight Including Drive (Kg)	Power (w)	Recommended Supply Air (m ³ /h)	Recommended Extract Air (m ³ /h)
			Width(mm)	Height(mm)	Depth(mm)				
400	W	CS	570	570	290	20	40	700	700
500	W	CS	650	650	290	26	40	1000	1000
600	W	CS	720	720	290	32	40	1500	1500
700	W	CS	800	800	290	41	40	2000	2000
800	W	CS	900	900	290	50	40	2500	2500
900	W	CS	1060	1060	330	60	40	3500	3500
1000	W	CS	1160	1160	330	71	40	4500	4500
1050	W	CS	1210	1210	330	78	90	5000	5000
1100	W	CS	1260	1260	330	84	90	5500	5500
1150	W	CS	1310	1310	330	91	90	6000	6000
1200	W	CS	1360	1360	330	99	180	6500	6500
1250	W	CS	1410	1410	330	106	180	7000	7000
1300	W	CS	1460	1460	330	113	180	7500	7500
1350	W	CS	1510	1510	330	120	180	8000	8000
1400	W	CS	1560	1560	330	128	180	8500	8500
1450	W	CS	1610	1610	330	136	180	9000	9000
1500	W	CS	1660	1660	330	144	180	10000	10000
1600	W	CS	1760	1760	330	160	180	11000	11000
1700	W	CS	1860	1860	330	175	370	12000	12000
1800	W	CS	1960	1960	330	192	370	14000	14000
1900	W	CS	2060	2060	330	210	370	15000	15000
2000	W	CS	2160	2160	330	230	370	17000	17000
2100	W	CS	2260	2260	330	250	370	19000	19000
2200	W	CS	2360	2360	330	270	370	20000	20000
2300	W	CS	2460	2460	330	290	370	22000	22000
2400	W	CS	2560	2560	330	310	370	25000	25000
900	S	CSD	1060	1060	330	66	40	3500	3500
1000	S	CSD	1160	1160	330	77	40	4500	4500
1050	S	CSD	1210	1210	330	85	90	5000	5000
1100	S	CSD	1260	1260	330	91	90	5500	5500
1150	S	CSD	1310	1310	330	98	90	6000	6000
1200	S	CSD	1360	1360	330	106	180	6500	6500
1250	S	CSD	1410	1410	330	122	180	7000	7000
1300	S	CSD	1460	1460	330	131	180	7500	7500
1350	S	CSD	1510	1510	330	140	180	8000	8000
1400	S	CSD	1560	1560	330	150	180	8500	8500
1450	S	CSD	1610	1610	330	160	180	9000	9000
1500	S	CSD	1660	1660	330	169	180	10000	10000
1600	S	CSD	1760	1760	330	179	180	11000	11000
1700	S	CSD	1860	1860	330	189	370	12000	12000
1800	S	CSD	1960	1960	330	199	370	14000	14000
1900	S	CSD	2060	2060	330	210	370	15000	15000
2000	S	CSD	2160	2160	330	221	370	17000	17000
2100	S	CSD	2260	2260	330	244	370	19000	19000
2200	S	CSD	2360	2360	330	285	370	20000	20000
2300	S	CSD	2460	2460	330	310	370	22000	22000
2400	S	CSD	2560	2560	330	338	370	25000	25000
2500	S	CSD	2660	2660	330	366	370	27000	27000
2600	S	CSD	2760	2760	330	395	370	30000	30000
2800	S	CSD	2960	2960	330	429	750	34000	34000
3000	S	CSD	3160	3160	330	460	750	38000	38000
3200	S	DS	3400	3400	430	869	750	43000	43000
3400	S	DS	3600	3600	430	961	750	48000	48000
3600	S	DS	3800	3800	430	1092	750	54000	54000
3800	S	DS	4000	4000	430	1181	750	60000	60000
4000	S	DS	4200	4200	430	1272	750	70000	70000
4200	S	DS	4400	4400	430	1368	750	77000	77000
4400	S	DS	4600	4600	430	1466	750	84000	84000
4600	S	DS	4800	4800	430	1568	750	90000	90000
4800	S	DS	5000	5000	430	1673	750	100000	100000
5000	S	DS	5200	5200	430	1782	750	110000	110000
5200	S	DS	5400	5400	430	1898	750	120000	120000
3200	S	D	3430	3430	430	895	750	43000	43000
3400	S	D	3630	3630	430	990	750	48000	48000
3600	S	D	3830	3830	430	1125	750	54000	54000
3800	S	D	4030	4030	430	1216	750	60000	60000
4000	S	D	4230	4230	430	1310	750	70000	70000
4200	S	D	4430	4430	430	1409	750	77000	77000
4400	S	D	4630	4630	430	1510	750	84000	84000
4600	S	D	4830	4830	430	1615	750	90000	90000
4800	S	D	5030	5030	430	1723	750	100000	100000
5000	S	D	5230	5230	430	1835	750	110000	110000

2.2.3 Purge sector

To prevent exhaust air mixing with supply air by carryover, most installations have a purge sector. Its function is to flush the rotor matrix with outside air before it rotates into the supply air duct. In this way only outside air is present in the matrix and no carryover of exhaust air to supply air is possible. The purge sector is located on the supply side of the supply air duct. No purge sector is installed on the opposite side, where the matrix leaves the supply air duct, as transfer of outside air to outlet air does not impair supply air quality.



2.2.4 Seals

To achieve the best possible prevention from leakage between exhaust and supply air the Östberg Casing design offer multiple options of sealing system. For standard applications a brush sealing is installed on the casing (between the rotor matrix and the casing). For improved sealing a second sealing can be installed on the rotor periphery which give a "wrap-around" sealing system. The wrap-around sealing system provide the best possible sealing system to prevent leakage along the rotor periphery. See also "3.2 Leakage/Cross contamination".

2.3 Drive equipment

Drive equipment is consist of motor, control unit and drive belt. Rotors are driven by a motor mounted on a bracket inside the casing. All rotors are driven by the motor via a belt to the rotor periphery.

2.3.1 Constant drive

Constant drive means that rotor speed remains constant during operation, or is switched off to remain stationary – so called on/off drive.

Induction motors with reduction gearing are available in three-phase and single-phase versions.

Asynchronous motors with worm gears are available in three-phase and single-phase versions.



2.3.2 Variable drive

Variable drive enables rotor speed regulation and thus optimal control throughout the year.

The drive unit consists of a motor and control unit that regulates motor rpm in relation to an input signal.



MicroMax



MiniMax



VariMax

3 Knowledge

3.1 Principle of rotary heat exchangers

Östberg rotary heat exchangers are classified as regenerative air-to-air energy recovery units.

Air-to-air energy exchangers can recycle up to 85% of the energy from conditioned building exhaust, or high temperature exhaust from industrial processes. Exhaust recovery ventilation utilizes energy from the exhaust air stream to precondition the outside air being introduced into the building. In the winter it provides free heating and in the summer free cooling.

Applying air-to-air energy recovery can help achieve a higher LEED® status, meet the requirements of ASHRAE 90.1, and save significantly on operating cost with a quick payback. Choose from stand-alone heat exchangers or pre-engineered, yet customizable modular units that incorporate heat recovery, humidity control, and other air treatment options.

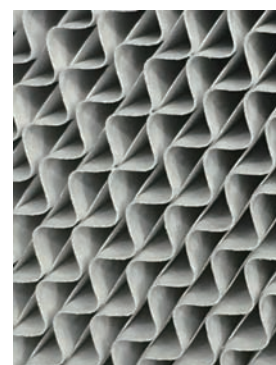
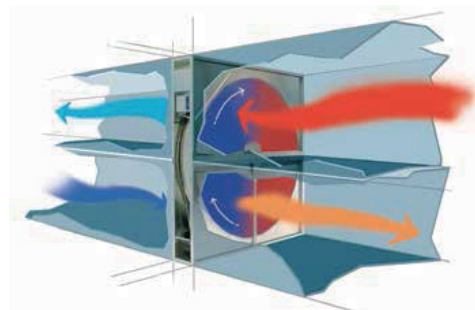
Thanks to the alternating airflow direction, the rotor is self-cleaning and frost proof to a large extent.

The rotor matrix consists of small sinusoidal channels made from thin aluminum foil.

Untreated aluminum foil is used for sensible heat recovery. Epoxy-coated aluminum or seawater resistant foil with higher magnesium content is best suited in installations in aggressive environments such as industrial or maritime locations. Sensible rotors transfer only humidity during the winter when exhaust air condenses in the rotor matrix and is taken up by the supply air stream.

Hygroscopic or sorption-treated rotors transfer airborne humidity (latent energy) year round. The aluminum foil in hygroscopic rotors is oxidized to create a surface that transfers humidity.

Sorption rotors foil is permanently coated with sorption material of the type 3Å molecular sieve, which has an extremely high humidity transfer capacity.



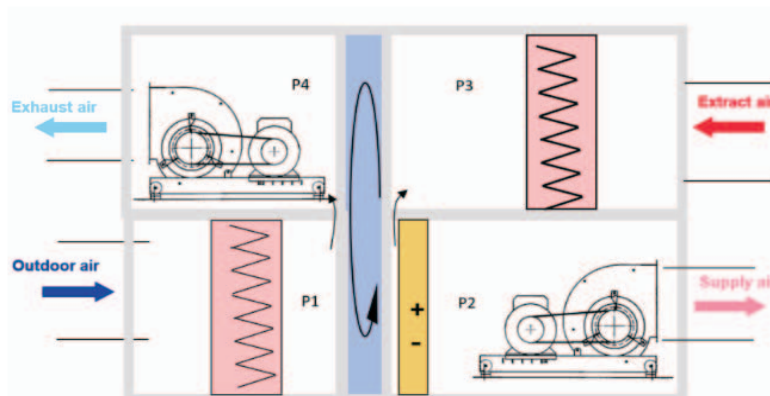
3.2 Leakage/Cross contamination

Definition of leakage: leakage is the % of air that's transferred from one airstream to another airstream.

Definition of Cross contamination: cross contamination is the % of air or substrate in one airstream transferred to the other airstream due to type of sorption material.

Leakage:

Leakage occurs either around the periphery of the rotor or via the middle beam dividing the airstreams. The positioning of the fans are vital for the % of leakage, in a correct planned Air-handling Unit the fan positioning prevents the exhaust air to "leakage" over to supply air stream. The positioning of the fans is the responsibility of the designer of the ventilation system.

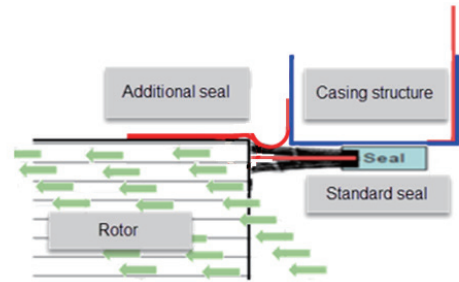


To ensure no leakage between the air-streams, pressure shall be higher in P1 (OA) than in P4 (RA) and higher in P2 (SA) than in P3 (RA).

Periphery leakage:

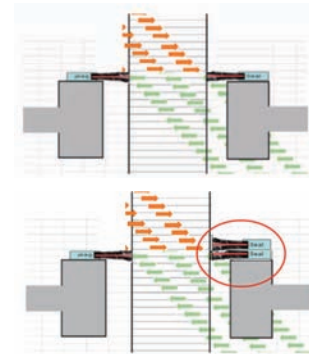
The rotor is sealed- off from leakage around the periphery of the rotor. The standard application is a brush sealing attached to the casing that seals off the air toward the rotor surface.

Östberg offer the possibility to add an additional sealing along the rotors periphery. This sealing type is called “wrap- around sealing”.



Middle beam leakage:

The rotor is sealed- off from leakage at the middle beam using a brush sealing. This gives under normal application enough sealing function. But if the Air handling unit have unfavable pressure differences between the two airstreams an additional brushsealing can be applied to minimize leakage.

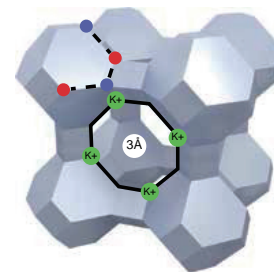


Cross contamination:

To prevent cross contamination rotors with pure 3Å molecular sieve shall be used. All other known adsorptions media on the market today will transfer compounds in the exhaust air stream to the supply air stream. Östberg OM is a pure 3Å molecular sieve media. See 3.3 for more information.

3.3 Molecular Sieves 3Å

A molecular sieve is a material with uniform pores size (very small holes). The molecular sieve is measured in ångströms (Å). Molecular sieve 3Å do not adsorb compounds with diameters larger than 3 Å. The water vapor (humidity) is smaller than 3Å and is therefore adsorbed by the Molecular sieve 3Å. Installations and tests show that a 3Å molecular sieve is the best choice for reducing the risk of odor transfer via the sorption coating.

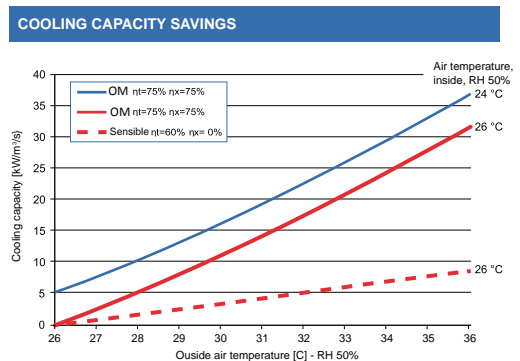


Sorption rotors

Östberg Molecular Sieve 3Å OM rotors provide exceptionally high humidity efficiency up to 85%. Sorption rotors provide an excellent method of cooling and de-humidifying outside air before it reaches the air handling unit cooling coil.

Cooling capacity savings

- Direct investment pay off
- Lower investment cost in cooling capacity
- Lower energy consumption in cooling period
- Better indoor air quality
 - Minimum Carry Over
 - Increased humidity in winter season
- Lower investment and running costs for humidification
- Better performance for dry cooling systems
- Increase cooling capacity in existing systems
- 5-10 °C lower temperature for freezing protection



Advantages of 3Å molecular sieves

The Östberg OM Molecular Sieve 3Å provides high selectivity for water molecule absorption (2.7Å size).

- Performance of 3Å technology is proven in several international and independent studies
- It is recommended in cases where cross contamination needs to be minimized
- Minimized Carry Over of VOC's from exhaust air to supply air

Lower investment costs in cooling capacity both in AHU's and cooling system

- The cooling capacity saving is 20 – 50%
- The required cooling capacity will decrease by 10- 25 kW/m³/s air flow compared to sensible energy recovery systems
- Smaller compressors, condensers or cooling towers or higher evaporation and lower condensing temperatures
- Smaller electrical connection costs and power consumption in cooling system
- Lower water flows to cooling coils and smaller pipe works and valves
- Savings in cooling equipment investments are higher than additional cost of sorption treatment of the rotor

Lower investment cost in supply air humidification

- Supply air humidification equipment will be smaller, due to high rate of humidity recovery from the exhaust air

Lower running costs of ventilation, cooling and humidification

- Cooling recovery in summer time
- Humidity recovery in winter time

Better working conditions for dry cooling systems (chilled ceilings or beams)

- Almost constant humidity efficiency provides effective dehumidification of outside air in extreme summer conditions
- Smaller requirement for raised water temperature to unit

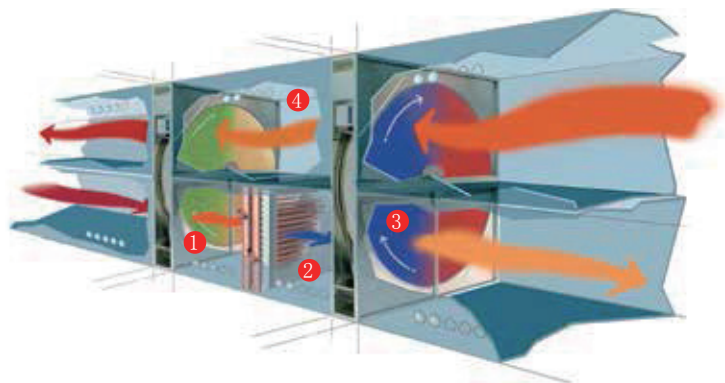
Better indoor air quality during winter

- High humidity recovery from exhaust air during winter season

3.4 Double Wheel Concept

In regions with high air temperature and humidity or buildings with dry cooling systems (chilled beams, chilled ceilings), the supply air needs to be cooled and dehumidified. Traditionally air dehumidification has been done by cooling the air to condense the humidity from the air and reheating it to the requested air temperature.

Compared to traditional systems the Double Wheel Concept is cooling, dehumidifying and reheating the supply air more energy effective.



The Double Wheel Concept comprises the following components and functions:

1. OM sorption rotor: The OM rotor dehumidifies and cools warm outside air very efficiently.
2. Cooling coil: Outside air is further dehumidified by the cooling coil until the preferred temperature is reached.
3. OT Condensation rotor: The condensation rotors warms the air to the required supply air temperature.
4. At the same time, exhaust air is cooled which means the OM rotor works more efficiently.

The Östberg Double Wheel Concept saves up to 60% of the total cooling capacity and requires lower investment and running costs compared to traditional systems. As rule of thumb, the additional cost of the sensible wheel can be saved in the lower investment compared to traditional system components, coils, chillers, cold and hot water piping installation, pumps, valves, controls and electric power supply costs. Accurate total investment costs analyze of the complete installation will show major savings in initial costs. Both cooling and heating energy savings will be additional profit of the investment.

3.5 Anti-Corrosion

High corrosion risk

Great care should be taken when choosing materials in areas where there is a high risk of corrosion such as industrial use.

All casing parts can be powder coated to enhance corrosion resistance, or a stainless steel casing can be selected. All bearings are life-time lubricated and extra sealed for extended life. Vital parts such as bearing components are coated with tectyl for enhanced corrosion resistance.

Epoxy-coated foil (OC) should be selected. Epoxy-coated foil provides extremely effective protection against corrosion. Seawater-resistant foil (OK) with magnesium content is available; an alternative to epoxy-coated foil, it provides excellent corrosion protection.

Marine ventilation

In maritime environment there's a request of increased corrosion protection, both for parts and media.

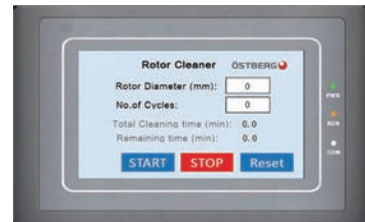
Östbergs standard marine option is casing in Powder coated Galvanized steel and rotor media in OM for sorption performance and OK for sensible performance. Östberg standard marine application have passed SWAAT test with non-corrosion for a period of 10 years. If demand for higher corrosion resistance is needed the casing is offered in stainless steel.

3.6 Rotor cleaner (air)

Östberg Rotor Cleaner use the latest technology to ensure that the whole rotor is cleaned.

The cleaning nozzle is controlled by a Screw Actuator which makes is possible to move the nozzle speed down to 3 mm / minute. The Östberg Rotor Cleaner is controlled via a PLC, where the user types in the rotor diameter and number of cleaning cycles (number of cycles depends on type of dirt and grade of dirt) the Östberg Rotor Cleaner will stop when the number of cycles has been achieved.

Östberg Rotor cleaner is as standard offered as a Single unit for permanent installation.



Accessories:

- Dust collection tray with Vacuum system
- Double nozzle (increases the cleaning speed)
- Rotor Cleaner for movable version (service version, excl. air compressor)
- Rotor Cleaner for movable version (service version, incl. air compressor)
- Quick Klick (for movable service version, 1 quick click/Air Handling Unit)

4 Reference

4.1 Governmental Project



Project Name: National Museum of China

The National Museum of China (NMC) is located at the east side of Tiananmen Square, opposite the Great Hall of the People. NMC, an integrated national museum under the Ministry of Culture of China, draws equally from both history and art and is dedicated to its collections, exhibitions, research, archeology, public education and cultural communication. 2010, NMC carried out a project to expand the museum so that it now covers 192,000 square meters. Today NMC is the largest museum in the world, with first class facilities and capabilities.

National Museum of China used 45 sorption rotor as energy recovery equipment for transfer of sensible and latent energy.



Hong Kong Science & Technology Parks Corporation



Hong Kong-Shenzhen Western Corridor



Guangzhou South Railway Station



Suzhou Museum

4.2 Hospital project



Project Name: Children's Hospital of Shanghai

The first pediatric hospital in China, Children's Hospital of Shanghai is a 370-bed comprehensive pediatric hospital and specializes in leading-edge pediatric clinical care, health care, education, research and rehabilitation. In the more than 70 years since its founding, Children's hospital of Shanghai is famous for its historical culture and research achievements.

Östberg provided energy recovery equipment to ensure the hospital is done in a pleasant environment.



The First Hospital of China Medical University



Tianjing Medical University General Hospital



Beijing Children's Hospital



Shanghai Huashan hospital

4.3 Casino project



Project Name: The Seminole Casino in Hollywood

The Seminole Casino in Hollywood offers 500 rock star suites, signature and award-winning restaurants, a 5,500-seat Hard Rock Live arena, a 4.5 acre tropical pool oasis & Beach Club, a full-service Rock Spa, fitness center, high-energy nightlife, boutique shopping and convention space.

The Seminole Casino in Hollywood use rotary heat exchanger from Östberg in the ventilations system to recover highest possible energy from the exhaust air. To ensure the best possible Indoor Air Quality the rotors is coated with Molecular Sieve 3Å.

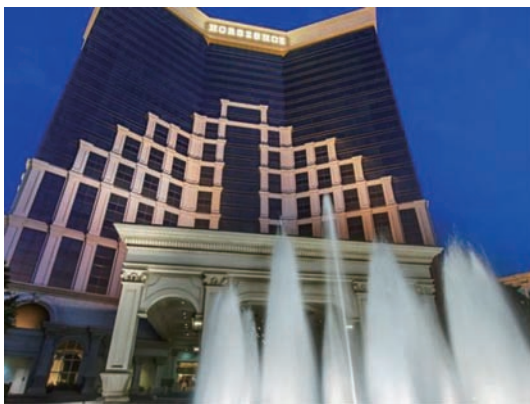
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Niagara Falls Casino



Mt. Airy Casino



Horseshoe Casino



Harrah's Casino

4.4 Hotel project



Project Name: InterContinental Shanghai Puxi

InterContinental Shanghai Puxi is strategically located in the Zhabei District, adjacent to a transportation hub and convenient for many attractions. The hotel boasts 533 rooms with 25 Executive Suites, three Penthouse Suites, one InterContinental Suite and two Presidential Suites plus a spacious Club InterContinental Lounge.

Östberg rotors not only used in InterContinental, but also can be found in many other five-star hotel hotels, such as Lincoln, those of the Hilton, Shangri-La, Marco Polo and Ritz-Carlton Hotel.



Pudong Shangri-La Hotel



The Ritz-Carlton Hotel Xi'an



Suzhou's Jinji Lake Grand Hotel



Marco Polo Hotel Wuhan

4.5 Commercial Building



Project Name: Beijing Jiaming Center

Jiaming focuses on high-end residential houses, commercial houses and new urbanization construction. Jiaming proactively pushes application of scientific technologies for energy saving and other green purposes. Jiaming was awarded Platinum Certificate and Gold Certificate twice by LEED.

Actually Östberg rotors play an important part for the whole building energy saving and green purposes.

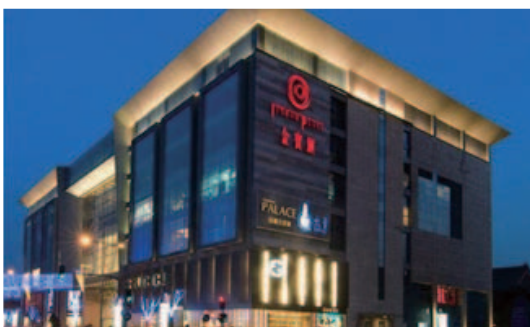
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Oriental Fisherman's Wharf



Galaxy SOHO



Jinbao Place Shopping Center



Twin Towers in Guiyang

4.6 Industry Project



Project Name: Volkswagen Automatic Transmission Tianjin Co., Ltd.

Volkswagen Automatic Transmission (Tianjin) Co., Ltd (VWATJ) is a wholly owned subsidiary of the Volkswagen (China) Investment Co. Ltd .VWATJ will launch three new types of transmission products. This new standard for efficient and comfortable transmissions represents the most advanced technology in the automotive industry.

Volkswagen chose Östberg rotor which is also the advanced technology in energy recovery.



Volvo car engine manufacturing (Zhangjiakou) co., LTD



Evonik Degussa (China) Co., Ltd. Shanghai Branch



Beijing SIEMENS Center Building



Bayer (Shanghai) Research and Development Center

4.7 Marine Project



Project Name: Celebrity Silhouette

Östberg Rotors has been successfully used in many Luxury liners. The energy is more expensive to produce on a vessel than on a land based power plant. This makes it very important for the ship owner to maximize the energy recovery on the vessel. Östberg OH has been chosen by many ship owners due to its extremely high energy recovery but also because the high corrosion resistance. The unique combination of high performance and corrosion resistance gives not only a fast payback of investment but also an extended life time of the investment.

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Disney Magic



Celebrity Equinox



Celebrity Solstice



Celebrity Eclipse

4.8 Reference List

Area	Project Name	Type	Year	Item Category
Beijing	China International Exhibition Center (New Center)	HX1	2008	Government Project
Jiangsu	The memorial hall of the victims in Nanjing massacre by Japanese invaders	HX1	2007	Government Project
Beijing	Beijing Zhongguancun Science Park	HX1	2009	Government Project
Shanghai	Children's Hospital of Shanghai	HM1	2010	Hospital Project
Jiangsu	Jinji Lake Shilla Hotel	HX1	2008	Hotel Project
Guizhou	Huangguoshu Hotel Guiyang	HX1	2014	Hotel Project
Hubei	Wuhan Fanhai Part I	HX1	2015	Hotel Project
Henan	Langfang New World center	HX1	2015	Hotel Project
Beijing	Jingyaguang Buiding	HX1	2009	Commercial Building
Beijing	Beijing Yintai Centre	HX1	2007	Commercial Building
Zhejiang	Wanda Plaza	HX1	2012	Commercial Building
-	SOHO in Beijing, Shanghai, Wuhan	HX1	2011-2014	Commercial Building
Liaoning	Shenyang Xingyue south shore	HM1	2015	Commercial Building
Liaoning	Olympia 66 · Dalian	HM1	2014	Commercial Building
Tianjing	Riverside 66 · Tianjin	HM1	2013	Commercial Building
Liaoning	Forum 66 · Shenyang	HM1	2012	Commercial Building
Hebei	New world center in Langfang	HM1	2014	Commercial Building
Hebei	Tangshan financial center	SH1	2015	Commercial Building
Beijing	Changping Central Plaza	HM1	2015	Commercial Building
Beijing	Beijing Yuetan Cente	HM1	2015	Commercial Building
Beijing	Northern Territory	ST1	2015	Commercial Building
Beijing	Tongzhou poly Central Plaza	SH1	2015	Commercial Building

Area	Project Name	Type	Year	Item Category
Beijing	Beijing West Center	SH1	2015	Commercial Building
Guangzhou	Guangzhou Leatop Plaza	HM1	2008	Commercial Building
Liaoning	New World Shenyang Convention and Exhibition Centre (NWSYCEC)	HX1	2015	Commercial Building
Hongkong	Hong Kong General Chamber of Commerce Building	HM1	2007	Commercial Building
Chongqing	Ruian Chongqing new world	HX1	2012	Commercial Building
Jiangsu	Wuxi Ikea	HM1	2013	Commercial Building
Liaoning	Eton Place Dalian	HX1	2009	Commercial Building
Zhejiang	Bosch in Hangzhou	HX1	2007	Industry Project
Shanghai	Evonik Degussa (China) Co., Ltd. Shanghai Branch	HM1	2013	Industry Project
Shanghai	ExxonMobil (Shanghai) R&D center	HM1	2011	Industry Project
Guangzhou	Dongguan HUAWEI South Factory	STE1	2009	Industry Project
Liaoning	Shengyang GM Factory II (including paint shop)	HX1	2012	Industry Project
Shanghai	Shanghai automobile Commercial Vehicle Co., Ltd. No. 3 workshop	HX1	2014	Industry Project
Beijing	China Construction Bank Beijing Data Center	HM1	2013	Industry Project
Beijing	Agricultural Bank of China Beijing Data Center	HM1	2015	Industry Project
Beijing	Institute of physics, Chinese Academy of Sciences	HX1	2011	Industry Project
Beijing	China National Center for Biotechnology Development	HX1	2012	Industry Project
Shanghai	Solvay (Shanghai) R & D Center	HM1	2012	Industry Project
Beijing	Novartis (China) biomedical research center	HX1	2013	Industry Project
Shandong	Yantai Dongyue GM factory	ST1	2012	Industry Project
Fujian	ABB group in Xiamen	HM1	2016	Industry Project
Zhejiang	Cixi Geely new factory	ST1	2016	Industry Project



healthy
indoor
climate

energy
efficient
ventilation

every
detail
counts

ÖSTBERG

In the 1970s Hans Ostberg, owner and founder of Ostberg was one of the inventor of the inline duct fan, which revolutionary the ventilation system design. Ostberg inline duct fans are installed in more than 2.8 million applications.

By acquisition 2004 Ostberg group became one of the largest manufacturer of Energy Recovery rotor. The last 10 years Ostberg Group has delivered over 0.5 million Energy Recover Rotors to customer in more than 80 countries.

At Östberg, we work to continually develop our products. Our innovative power is the driving force in our company and we work to consistently maintain the very best quality on the market.

ÖSTBERG GROUP AB

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