Cleanrooms

Air handling solutions for high-precision production with sterile environment

Air handling units are indispensable for hygienic and cleanrooms

High-precision production and research require a completely sterile environment.
Uniformly fresh and hygienic or particle-free air in buildings can only be provided with the help of mechanical ventilation. The highest requirements must be met if pathogenic germs and viruses are to be prevented from triggering serious health consequences, or if particles are to restrict the production of medicines or electronic components in cleanrooms.

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Cleanrooms & area classification

A cleanroom is a specially engineered and carefully designed enclosed area with a separate ventilation system allowing for precise control, monitoring and maintenance of its internal environment. Numerous ventilation system classifications define the levels of filtration and number of air changes per hour with the highest class requiring up to 750 air changes per hour. All filtered through filtration systems able to eliminate more than 99% of 0,3 micron particles and 100% of particles larger than 1 micron. All of these systems revolve around air handling units designed specifically for hygienic applications.

Public areas

The common area is large, designed for a large number of people to visit or pass through. Does not require detailed air quality control as it is generally passable for large amounts of passing traffic with space to spare.

Sensitive areas

Hospitals, laboratories and other standard cleanrooms where ventilation units have the task of reliably providing uniform room air quality around the clock. The air quality must always remain constant with a high level of redundancy in terms of freedom from particles, temperature, oxygen and CO_2 concentration and relative humidity levels.

Critical areas

Specific cleanrooms are used in production facilities where a high level of cleanliness, sterility and strictly defined pressure conditions in ventilated rooms is required. These are usually medical, pharmaceuticals and semiconductor manufacturing facilities.

Depending on the classification of a specific area, different design, components and controls are required to achieve optimal air quality and the required hygienic minimum.

	Mechanical ventilation	Temperature control	HEPA-air filtration	Humidity control	Room pressure control
Public areas					
Sensitive areas					
Critical areas					

VDI 6022

All WOLF air handling units meet the requirements of VDI 6022 in terms of material, structure and operation as standard to ensure room air hygiene sufficient for most applications.

Overview of applications

Healthcare

Operating rooms and laboratories require controlled environments with the highest level of particle filtration to preserve human health at its most sensitive state. High air change rates and controlled air flows ensure only clean and carefully conditioned air reaches the most critical areas.

Pharmaceutical industry

Pharmaceutical industries require cleanroom solutions not just for their laboratories and controlled research environments but oftentimes for the production spaces as well. Hygienically impeccable air with specific humidity and temperature is a prerequisite for high quality pharmaceutical products.

Clean high-tech and food manufacturing

Clean areas in the electronic, machine and food industries are barrier-type rooms that prevent the entry of contaminant particles such as dust, chemical vapours, aerosol particles etc. Engineering equipment (ventilation and air conditioning systems) is installed in these rooms to maintain the permissible number of particles per cubic meter of the air environment, as well as the specific parameters of humidity, temperature, pressure and speed of unidirectional air flow.

Purity and ATEX

Some industries require a high level of hygiene combined with special requirements like anti-explosive protection, maintaining very low humidity levels or specific temperature ranges. In these industries a special design is combined with specifically developed components and control software to maintain the air quality requirements while guaranteeing a safe work atmosphere and an environment suitable for the special manufacturing processes.

What we do for hygiene

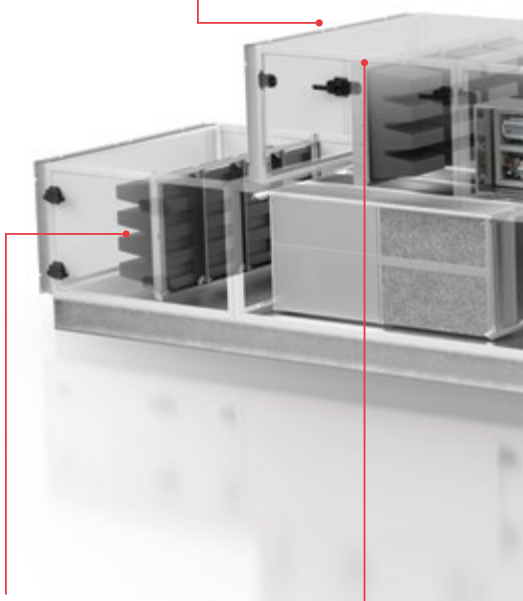
WOLF air handling units are planned strictly according to the requirements of relevant standards and built with the greatest care.

They guarantee planners and builders a great design, problem free acceptance and validation and ensure safe operation in cleanrooms and areas through:

- Using the most innovative technologies for our air handling units, from housing construction to individual components
- Using hygienic designed and safe components with inner surfaces resistant to cleaning and disinfection products
- Customizing dimensions to fit any project requirements in horizontal, vertical, stacked or side-by-side design with or without heat recovery
- Offering fully wired, including controls, and remote controllable at your request
- Ensuring full accordance with VDI 6022 and DIN EN 1946-4

Smooth Surfaces

Powder-coated interior appliance walls and top panel, optionally in stainless steel with all gaps and grooves sealed with close-pore, micro-biologically inert and safe sealing materials, fully cleanable without residue.



Filter frame and slide rails

Made of stainless steel with foamed seals and completely gap free to encase filter ePM1 classes, H10-H13 with test certificates.

WOLF Super Seal

Powerful sealing system for hygienic use.

Cu/Al heaters and coolers

Heating coils with coated or stainless steel frames and fin distances of at least 2.0mm, cooling coils with stainless steel frames, copper header and coated fins with fin spacing of at least 2.5 mm.

EC-fans

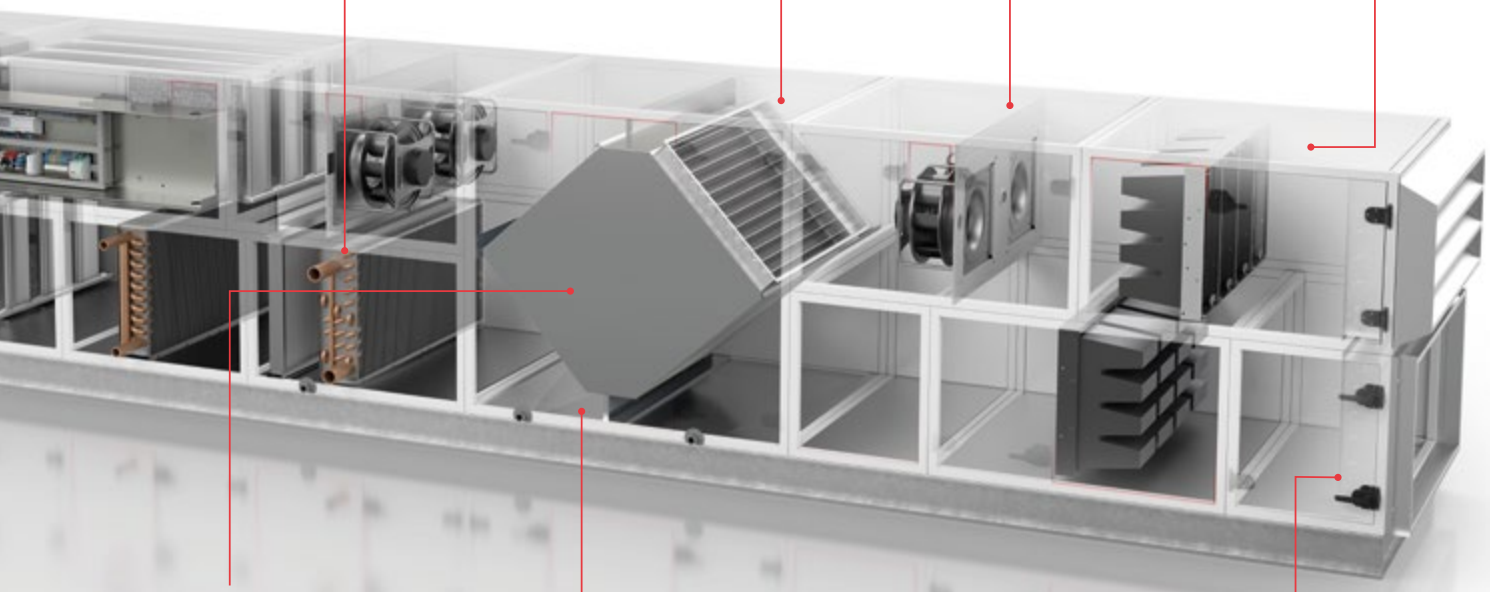
Completely accessible and easy to clean fans with free-running, coated, hygienic impellers.

Insulation layer

Non-combustible insulation layer of 50 or 60 mm thickness.

Easy lifting system

Larger assembly parts for high device hygiene.



Heat recovery

Hygiene and sustainability combined in one technology. Also possible for complete separation of intake and extract air with the WOLF high-performance run-around coil system.

Air humidification

Optimally controlled humidity for a healthy indoor climate. (not integrated in unit above)

Insulated 3D drain pan

Stainless steel interior floors with slopes on all surfaces for full drainage and mist eliminator with a stainless steel frame that can be fully dismantled for cleaning.

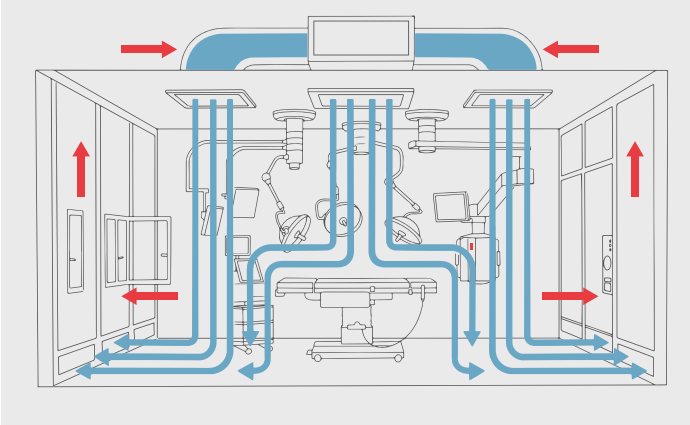
Multiple doors with specials seals

All components can be accessed from both sides for cleaning. Lights and inspection windows with optional blackout function in maintenance and functional segments.

Hygienic parameter control

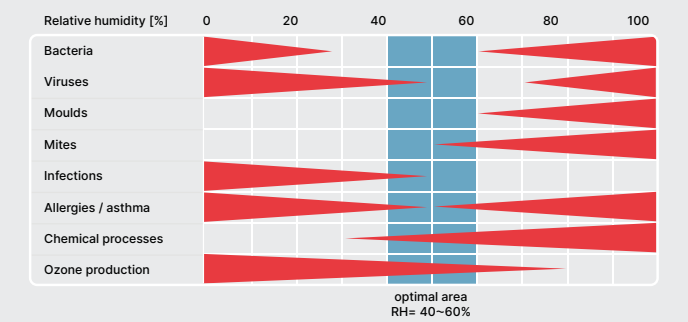
In an air handling system, all air quality characteristics are interdependent. Therefore, the perfect balance between the components and their operating rates is essential. This is achieved by using high-quality components and individually developed and pre-installed software in combination with user-friendly applications and control units.

Airflow



While the difference between uni- and non-unidirectional cleanrooms depends on the design of the cleanroom space itself, the number of air changes can be fully controlled through the unit. By using smart control systems the air flow can easily be changed to suit the specific application and work intensity within the cleanroom.

Humidity



Relative humidity influences both specific manufacturing and research processes as well as human health. While the humidity in special industries is to be kept in extreme ranges, the humidity in healthcare cleanrooms is to kept in a comfortable range that promotes human health and inhibits growth.

WOLF control units provide the end user with a simple and efficient method to control all relevant air quality parameters as well as giving them an option for remote control and a filter alarm system for quick and timely maintenance.

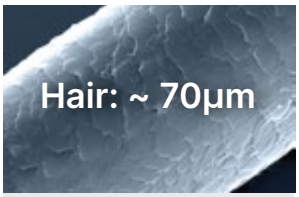
Temperature

In interdependence with humidity, the temperature range can influence both air quality and comfort. The temperature range should always remain constant and in line with the surrounding climate to avoid temperature shocks.

Pressure

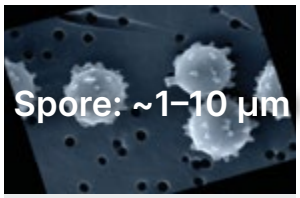
Requirements on the pressure in clean rooms:
The air flow rate is mostly limited at 600 m^3/h by each swirl diffuser.
The minimum pressure drop across the CAV controller is 50 Pa.
The permissible sound pressure level in the cleanroom is 35 dB(A) max.

Filtration

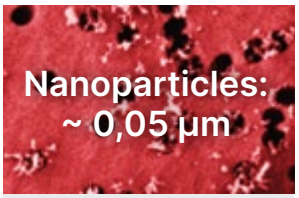


Large particles
Visible, coarse dust, sand, leaves, hair, etc.

PM10
Smoke, dust, dirt and pollen, coarse particulate matter.



PM2.5
Large spores and other organic particles.



PM1
Very fine dust, combustion particles, bacteria, viruses and small spores.

The concept of "purity classes" for sensitive and critical areas refers to strictly regulated standards for the level of suspended aerosol particles of a given size per unit of air. It is the most important characteristic of clean rooms and is regulated by standards.

Filters are the essence of hygienic design. State-of-the-art filter technology in WOLF air handling units ensures top hygiene, high room air quality and protection of built-in parts while positively affecting environmental protection and lowering operating costs.

With special frames and rails, the filters in WOLF hygienic air handling units ensure full air flow coverage and filtration removing all significant particle matter with the possibility of installing filters capable of removing over 99% of nanoparticles from the size of 0,03 microns.

Different filter types are used depending on the design and application area of the unit. The standardized filter solutions, some of which were developed in cooperations between our own engineers and our renowned suppliers, are selected and calculated for all requirements and performance areas on a project-specific basis.

Bag filter

WOLF's energy-optimized pocket filters meet all the requirements of VDI 6022.

- Generously dimensioned filter surfaces with high dust storage capacity
- Low pressure losses
- Available in filter classes ePM10>50%, ePM1>50%, ePM1>80% according to EN ISO 16890
- Energy-optimized pocket filter with excellent hygiene properties to comply with VDI 6022
- Filter medium made of glass fiber, frame made of sendzimir galvanized sheet steel
- Moisture resistant up to 100% relative humidity
- Best air distribution through newly developed pocket design
- Conical filter pockets

Panel filter

Space-saving, panel-type filters with high efficiency:

- Long standing times achievable
- Lightweight yet stable construction
- Minimum installation depth
- Fully incinerable Glass fiber filter medium, plastic frame
- Available in filter classes from ePM10 > 50% to ePM1 > 80% according to EN ISO 16890

Compact filter V-shape

The compact filter impresses with very low energy costs and a long service life.

- Light and robust construction
- Very low energy costs
- Aerodynamic design
- Fully incinerable
- Very long standing times
- Certified performance
- Filter medium made of fiberglass, frame made of polypropylene and ABS
- Available in filter classes from ePM10>50% to ePM1>80% according to EN ISO 16890

Hybrid filter

The carbon combination filter removes the particles with an efficient synthetic filter fleece made of microfibers and achieves filter class ePM1>50% or ePM1>65% according to EN ISO 16890.

- Can be used for large air volumes
- Particle filtration and odor elimination in one filter stage
- Large filter surface, thus longer service life
- No development of carbon dust due to bound activated carbon material
- Environmentally friendly disposal through completely incinerable hollow plastic profiles
- Simplified handling due to low weight
- Compact design with shallow depth
- Self-supporting and rigid construction for reliability in the field

HEPA filter

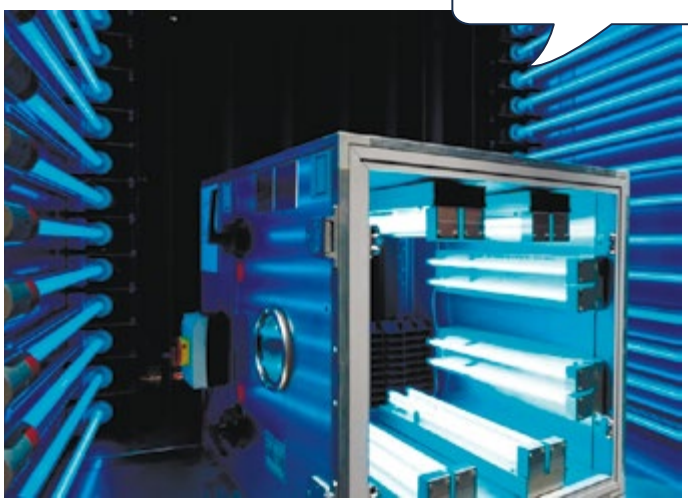
HEPA filter with high quality glass fiber media.

- Can be used for large air volumes
- High quality fiberglass medium
- High degree of separation
- Fully incinerable
- Maximum tightness thanks to special mounting frames
- Filter classes H13 and H14 available

UV-filter

- High disinfection efficiency against a wide range of micro-organisms, including chlorination-resistant micro-organisms such as viruses and protozoan cysts
- No effect on the physico-chemical and organoleptic properties of water and air, no by-products formed, no danger of overdose
- Low capital costs, energy consumption and operating costs
- UV lamps are compact and easy to operate

Amalgam UV lamps (low pressure) are the most energy efficient and environmentally friendly sources of UV radiation available today.



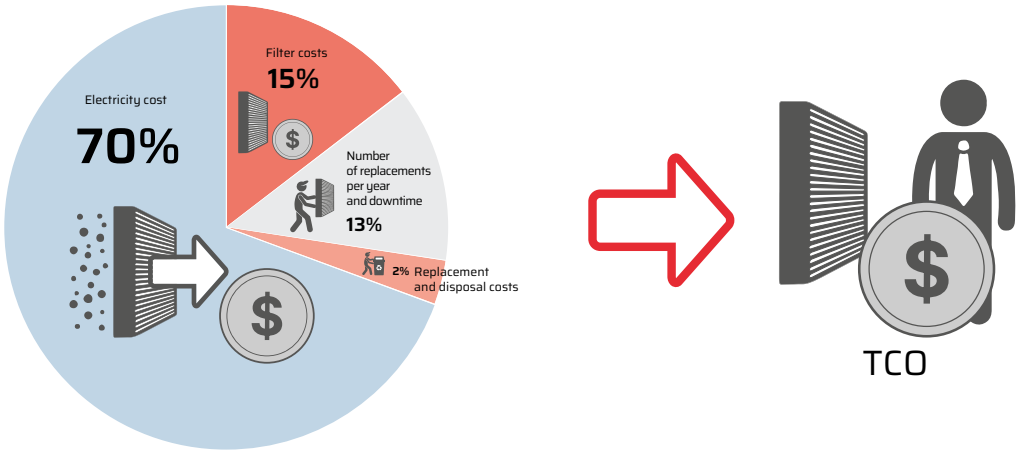
In addition to the filter quality, unwanted bypass leaks and filter maintenance also have a major impact on hygienic indoor air. WOLF has designed its air handling units with the lowest filter bypass leakage and relies on a filter quick-clamping system to meet the highest hygiene requirements. The BMK Touch operating module also enables smart filter monitoring including filter traffic lights.

The minimum equipment for the WOLF system is:

- Three filter stages
- Stainless steel frames with seals for mounting the filters
- A pressure switch or pressure sensor is mounted on each filter unit

Filters TCO (Total Cost of Ownership)

The energy consumption of the filter is up to 30% of the total energy consumption of the system and influence significantly both the total cost of ownership and the life cycle cost of air handling units.



LCC (Life Cycle Cost)

Air handling units have a long life cycle. If you choose a product for long-term use you should look at the TCO, not the purchase price. These are the questions you should ask yourself:

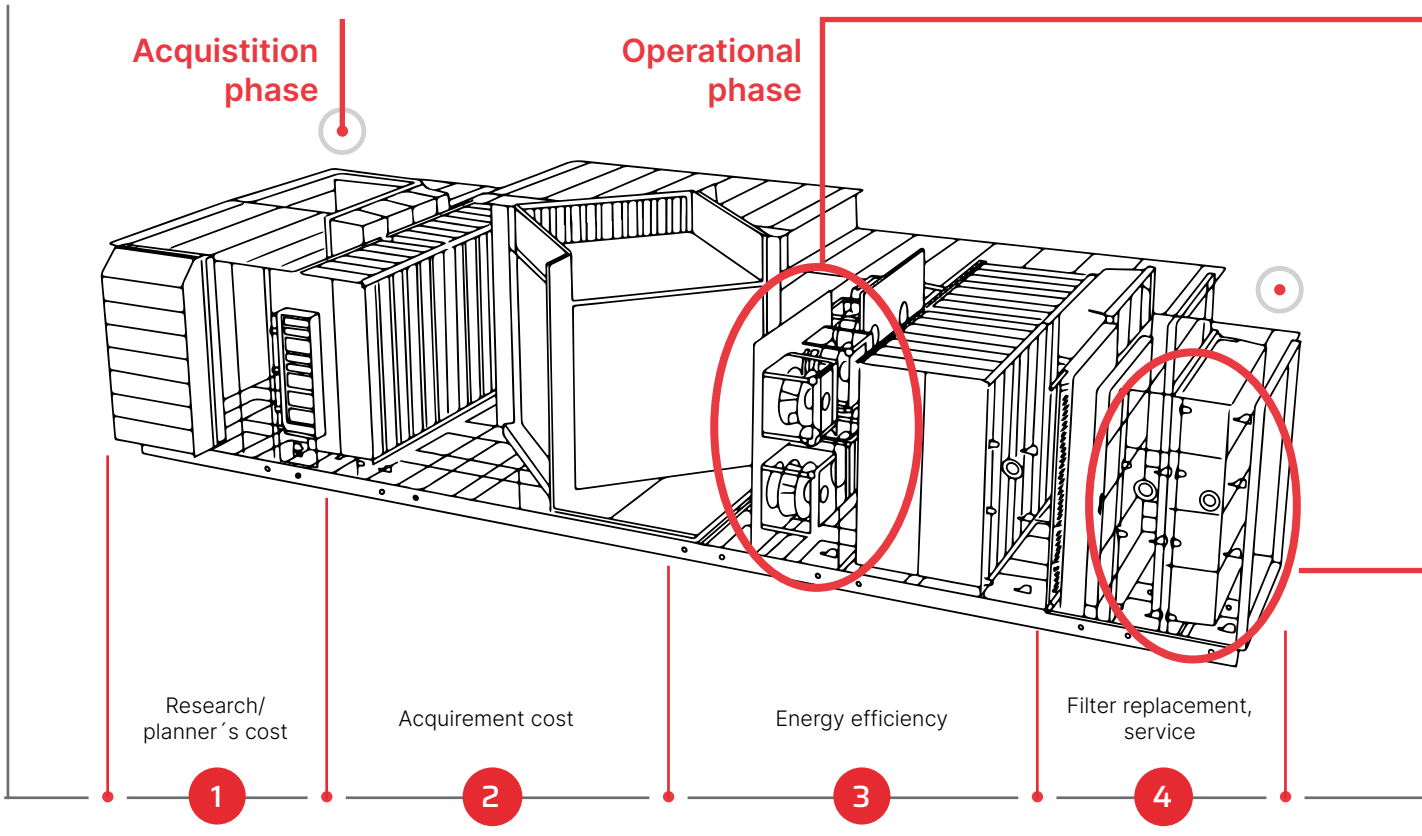
1. How much will I spend on energy with conventional or energy efficient equipment in comparison?
2. How many times a year will I need to change the filters and how much will they cost?
3. How much does it cost to maintain the air handling units and how often will I need to do this?
4. Does the manufacturer provide BIM models to simplify ventilation maintenance?

LCC (Life Cycle Cost)

is an approach to cost control that aims to summarize all the cost of a product, system or service over its entire life cycle. The LCC concept seeks to ensure the best possible choice of different alternatives. The product life cycle consists of two phases: the acquisition phase and the operational phase, valued by TCO.

TCO (Total Cost of Ownership)

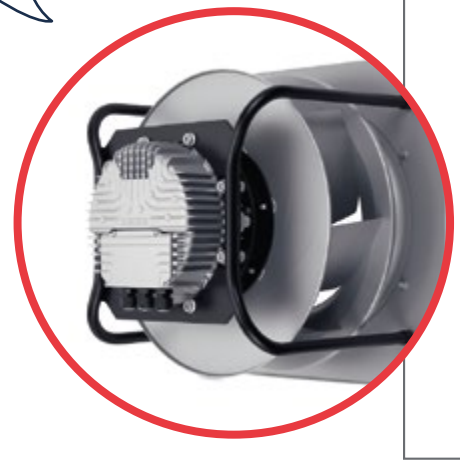
the total costs a company incurs because of the ownership of an asset. The TCO takes into account the life cycle cost of the system after its purchase by an organization and provides the cost of the product from the customer's point of view. Examples of costs included in TCO calculations are purchase, training, energy costs, maintenance and disposal and end-of-life costs.



TCO (Total Cost of Ownership)

One of the most effective measures for energy saving is to replace old fans with new, energy-efficient fans with EC drive technology. Up to 50% energy can be saved with low investment costs and little effort.

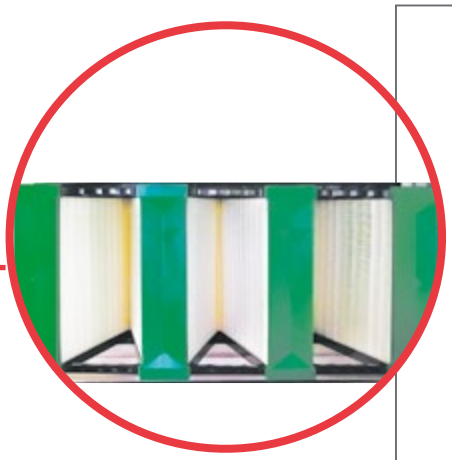
Maximized system efficiency: EC fan with free-running fan impeller in energy efficiency class IE4.

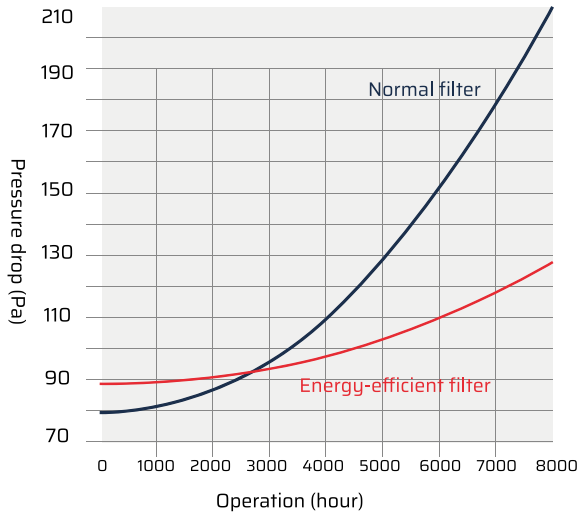


WOLF retrofit service

WOLF offers its own retrofit service, which replaces the existing fans in older air conditioning and ventilation units with suitable, customized replacement packages.

WOLF takes care of everything that is necessary to carry out the replacement without any worries for the operator. The retrofit service is of course not only available for energy optimisation, but also for the quick replacement of defective fans without long-term system downtime.





Why does a BIM application save operational costs?

Once construction is complete, with the help of sensors, the information model can continue to collect the right data about the building, monitoring its functionality and predicting potential emergencies. Using BIM, equipment records can be kept, warranties can be monitored, and resources can be used.

A BIM application combines all data, drawings and information about engineering equipment in one program or file and is available in real time. Any change in any parameter is automatically reflected in other elements of the building information model.

WOLF provides various data formats for all air handling units for integration into a BIM process. Different data formats (e.g. dwg, IFC, VDI 3805 etc.) are offered within the WOLF BIM browser. Easy for planners, easier for service.

Reference projects from all over the world

Cleanrooms

- Agrolab Barendrecht (NL)
- Bayer Berlimed, Madrid (ES)
- Carmat, Bois d'Arcy (FR)
- CNRS, Saclay (FR)
- Decontex, Tielt (BE)
- EDEKA Zentrallager, Oberhausen (DE)
- FIC Wageningen/ Unilever (NL)
- IDB Baarle, Nassau (NL)
- IDEEV, Saclay (FR)
- Institut Curie, Paris (FR)
- Institut Pasteur, Paris (FR)
- Kellogg's, Mechelen (BE)
- KU Leuven, Laboratories, Leuven (BE)
- Laboratorios Viralgen, Donosti (ES)
- Novartis, Cataluña (ES)
- Pharmaloop, Madrid (ES)
- Qualcomm Halbleiterfertigung, Munchen (DE)
- Salvat, Barcelona (ES)
- SCK CEN, Laboratories, Mol (BE)
- SEM Genopole, Evry (FR)
- Takeda (TiGenix), Madrid (ES)
- Tobacco factory (TDR), Rovinj, (HR)
- Ugent, Laboratories, Gent (BE)
- ZNA, Operating and treatment rooms, Antwerpen (BE)

Hospitals

- Antonius Hospital, Sneek (NL)
- Asklepios Harburg (DE)
- Autocruise ISO 7, Brest (FR)
- Clinique Rheina, Strasbourg (FR)
- Hospital de la Linea, Cadiz (ES)
- Hospital de Lugo, Lugo (ES)
- Hospital Fratemidad-Muprespa Habana, Madrid (ES)
- Hospital Niño Jesus, Madrid (ES)
- Hospital Provincial de Pontevedra, Pontevedra (ES)
- Hospital Universitario de Leon, Leon (ES)
- Hospital Universitario Moncloa, Madrid (ES)
- Hospital Universitario Rio Ortega, Valladolid (ES)
- Hospital Universitario Vall d 'Hebron, Barcelona (ES)
- IMQ Bilbao, Bilbao (ES)
- Clinical hospital center, Rijeka (HR)
- Hospital Rebro, Zagreb (HR)
- Multifunctional medical centre, Tashkent (UZ)
- Noordwest Ziekenhuis, Den Helder (NL)
- Nuclear Medicine, Leverkusen (DE)
- St.Adolf-Stift Krankenhaus, Rheinbek (DE)
- Woorzorgcentrum De Schuilhoeve, Badhoevedorp (NL)
- Woorzorgcentrum St.Josef, Hooglarderveen (NL)

Industrial buildings

- Audi, Ingolstadt (DE)
- Bausch and Lomb, Montpellier (FR)
- Belupo, Koprivnica (HR)
- Biopod Interstellar, Ivry sur Seine (FR)
- BMW, Landshut (DE)
- Bosch, Drancy (FR)
- Bridgestone, Béthune (FR)
- DC Jumbo, Bleiswijk (NL)
- EDC Van Marcke, Menen (BE)
- Ferrari Automotive, Maranello (IT)
- General Electric, Belfort (FR)
- Glas Trösch, Strasbourg (FR)
- Haribo, Grafschaft (DE)
- Hauni, Hamburg (DE)
- Inditex, Madrid (ES)
- Innovia, Segre en Anjou (FR)
- Kühne Nagel, Veghel (NL)
- Nanolacke, Eilenburg (DE)
- Neos digital printing solutions, Maranello (IT)
- Olympus, Hamburg (DE)
- Quoouker, Korschenbroich (DE)
- Sahna Fittings, Ternat (BE)
- Zoetis, Girona (ES)

ATEX Solutions

- AD Plastik, Zagreb (HR)
- Airbus, Toledo (ES)
- FACC factory, Jakovlje (HR)
- Frey + Lau, Hamburg (DE)
- Garage Mairie de Paris, Paris (FR)
- Michelin, Valladolid (ES)
- Servier Laboratories, Toledo (ES)
- Stadler Germany, Berlin (DE)
- tesa Werk, Hamburg (DE)
- Wollenhaupt, Gallin (DE)

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We look forward to hearing from you.

Subject to technical modifications. Please note that only the WOLF product is shown in the images of the product. You will usually need incoming and outgoing lines which are connected to the WOLF product from the outside.

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