How to ventilate, heat and cool high-ceilinged rooms in an energy-efficient manner.

White paper

Hoval

Introduction

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Regardless of the building type – logistics centre, shopping centre, production hall, aircraft hangar or sports hall – all high-ceilinged rooms have one thing in common: they need a reliable, economical climate system that efficiently manages ventilation, heating and cooling.

In both new-build and renovation projects alike, choosing the right climate system is crucial. When making such decisions, investors and planning offices are confronted with a wide range of technical requirements and problems to solve. When deciding on a custom-made system – which should also offer a high degree of flexibility – there is much to consider. Compliance with legal provisions, the structural design, planning costs, installation times, system efficiency (keeping running and maintenance costs as low as possible), system reliability, control concept and ease of use are all aspects which must be taken into consideration.

Since the regulatory framework conditions are increasingly aimed at achieving energy efficiency and reducing the carbon footprint of HVAC systems, decentralised climate units provide an interesting alternative to centralised systems.
With this white paper, Hoval offers its take on the current state of climate systems for high-ceilinged rooms in view of the EU requirements for energy-consuming products, and highlights the advantages of decentralised solutions.

When choosing a climate system for a large, high-ceilinged space, several requirements must be considered – ideally during the planning stages – and fulfilled by the system. **Appropriateness and flexibility** are the most important aspects.

Decentralised recirculation units without ventilation ducts can be integrated into the infrastructure of large spaces without becoming a hindrance to other systems (shelving, crane runways, lighting, and so on).

The reasons for this are as follows:

- Climate systems that use conventional air distribution, and which decision-makers are most likely to consider, are generally designed for smaller rooms. Opting for an inadequate climate system that has not been developed to meet the specific requirements of large rooms with high ceilings usually leads to higher maintenance costs and unsatisfactory performance.
- During their lifetime, large buildings are often used for more than one purpose. Today's supermarket could become tomorrow's pharmaceutical warehouse. And of course, different economic agents have different requirements for a climate system depending, for example, on whether the building is accessed by the public or not.

Summary

When choosing an indoor climate system, you opt for an adaptive system that meets current standards yet is flexible enough to adjust to future requirements.

Content

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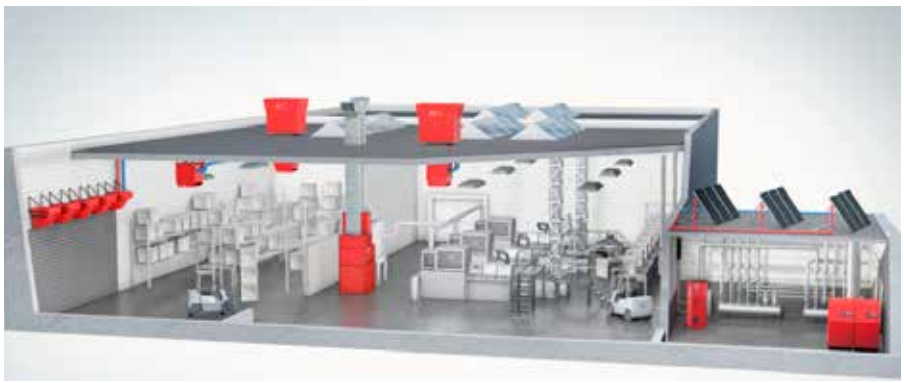


High-ceilinged rooms have specific requirements to consider right from the building stage.

Tip:

Make the decision during the building planning stage

Each system has its own advantages based on how it is configured. Therefore, it is worth considering the key differences:

- Centralised systems weigh around three times as much as a set of comparable decentralised units combined. The central ventilation unit and the network of air ducts, together with flow rate controllers, dampers and air outlets, all have to be weighed up – quite literally – when choosing a system.
- A lower weight makes designing the hall support structure more straightforward, allowing it to be constructed more cost-effectively.
- Integrating decentralised units into production hall infrastructures is often easier than integrating an air duct network among crane runways, conveyor systems and utilities.
- If there is no air duct network, there are no leaks. This means that there is no need to increase the volume flow rate in order to compensate for leakages.
- Pressure drops in the mains are cubed when calculating the electrical power consumption. This means that reducing pressure drops results in a much lower electrical power consumption and very high energy savings compared to a centralised system with an air duct network.
- Without a duct system, maintenance costs also fall by around CHF 16 per metre of duct. Cleaning and maintenance must be carried out once a year (in Switzerland in accordance with SIA directives).
- Through the use of multiple units, decentralised systems provide a higher level of system safety and security.
- Decentralised units can be installed gradually, meaning that the investment can be spread over time.
- In relation to the service life of a large space, decentralised systems present the most cost-effective solution.

Choosing the appropriate climate system

RoofVent® supply and extract air handling units are installed in the roof of a large space, similar to a rooftop unit, and also provide all the advantages of a centralised climate system.

Centralised or decentralised

When choosing a climate system, the first question is whether it should be centralised or decentralised. The two concepts demonstrate significant differences:

- Centralised systems, as the name suggests, prepare the air in a central unit then distribute it via air ducts.
- Decentralised systems condition the air using multiple autonomous units. The units are integrated into the roof of a large space and draw either fresh or recirculation air directly into the room. An air duct system is not required in this case.

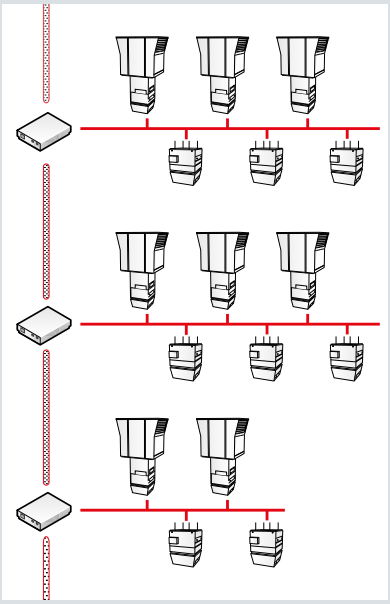
Decentralised systems are a better solution for large spaces, meaning single-storey buildings with a ceiling height of over 4 metres and a floor space of over 500 m². Depending on the size of the space and specific requirements to provide the best level of ventilation within the building, multiple decentralised units are installed at equal intervals along the ceiling or roof.

Decentralised systems are thus more suitable because of the greater flexibility they offer compared to centralised systems. This flexibility provides benefits throughout the entire lifecycle of the building, and in case of a change of use. This means that different requirements can be met in individual areas within the same large space, for example in terms of the operating mode (fresh air supply vs recirculation), the temperature and the operating hours (one, two or three-shift operation). Case studies and other comparison calculations also show that being able to divide the space flexibly into zones achieves greater profitability and reduces running costs.

Tip:

Group multiple units together into control zones

This enables you to respond more effectively to the heat released by machines, for example.



Costs examined

As commercial data from the construction industry shows, the construction costs of a building represent a mere 30% of the total costs. The remaining 70% of costs are allocated to the usage of the building. In order to compare centralised and decentralised systems, both the investment costs and the running and maintenance costs therefore need to be taken into account. The key factor for evaluation is the total cost of ownership.

Investment cost comparison

The advantages of a decentralised system are clear:

- No air duct system is required, therefore the amount of airflow capacity to be installed is around 6% lower.
- The lightweight system places less strain on the building structure, which means that the load carrying system can be simplified.
- Prefabricated components simplify planning and installation.
- Plug and play solution: the control unit, cable harnesses and related components are all pre-assembled.

Overall, there is hardly any difference in investment costs. A detailed analysis shows, however, that the specific areas to which costs are attributed are proportionately very different for each system:

Cost share	Centralised system	Decentralised system
Units, outdoor installation	40 %	90 %
Ducts and outlets	35 %	–
Measuring and control technology	25 %	10 %
Complete system	100 %	100 %

The unit proportion includes the installation of the unit in the case of the centralised system, and the placement of the units on the roof in the case of the decentralised system. The “ducts and outlets” item contains the costs for installation. The table shows that, in systems with comparable control functions, the cost of the measuring and control technology in centralised systems is somewhat higher. It is also apparent that no meaningful conclusions can be drawn by comparing individual items.

Operation and maintenance cost comparison

This is where the greatest cost-saving potential is evident in decentralised systems:

- Maintenance work can be carried out during operation.
- No elaborate cleaning or hygiene inspections are required for air ducts.
- Primary energy usage is lower due to the reduced airflow capacity, lower pressure loss and the fact that there are no leakages from air ducts.
- The patented control system enables different control zones to be optimised based on requirements.
- Crucially, however, optimised air supply and distribution ensures minimum energy loss and maximum comfort.

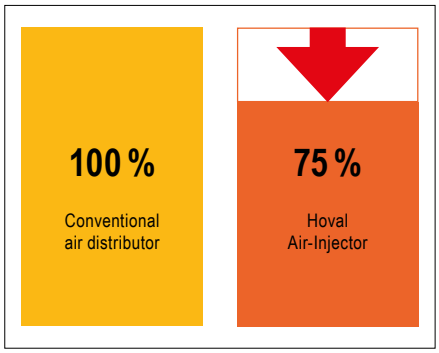
Tip for investors:

Decisions around which climate system to choose should be made during the building planning phase.

This will enable cost reductions in the long term. The somewhat higher initial investment for a decentralised solution is easily earned back over the total lifetime of the building due to the lower running costs.

Costs examined:
Air distribution is the deciding factor

In view of the cost of air distribution via ducts and outlets alone, decentralised systems using the patented Air-Injector offer distinct advantages. It is a core piece of equipment providing optimal air supply and efficient air distribution in Hoval RoofVent® and TopVent® units. The Air-Injector is a high-induction adjustable vortex air distributor, whose functionality saves energy and costs while ensuring high levels of thermal comfort.



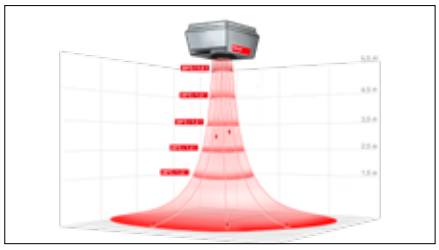
Re 1: Compared to other systems, far lower air flow rates are required to achieve the desired conditions.

Three of the Air-Injector's fundamental characteristics are crucial:

1. The sheer power and efficiency of the Air-Injector enable both a high depth of penetration and a widespread distribution of the conditioned supply air.
The performance data is impressive:

- It is suitable for high-ceilinged rooms up to 40 m, even for heating
- Reaches floor spaces of up to 950 m² per Air-Injector

Therefore, to achieve the required room conditions, around 25% less air flow capacity needs to be installed. Not only does this save on investment costs, but also on drive energy and running costs too. Potential energy savings for specific applications can quickly and easily be calculated using the Hoval calculation tool.



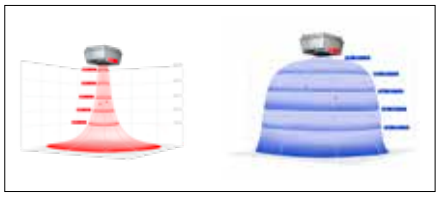
Re 2: Temperature differences between the occupied area and the ceiling space are minimised.

2. In large spaces, there are distinct temperature differences between the occupied area and the area below the ceiling due to the physical conditions. The Air-Injector systematically breaks down the warm air cushion underneath the ceiling using its high induction capacity, which reduces fabric heat loss via the ceiling by around 30%. A series of trials have been carried out on this subject, which show that the system can achieve an extremely low level of temperature stratification using only 0.15 K per metre in height.

3. In addition to its energy-saving benefits, the Air-Injector also meets the highest demands in terms of warmth and comfort by virtue of its constantly low air speeds in the occupied area. The following aspects are responsible for the depth of penetration of the supply air flow into the space – and therefore the air speed within the occupied area:

- Room air temperature
- Supply air temperature
- Flow rate

A control algorithm developed especially for this use case constantly compares the parameters and continuously adjusts the Air-Injector's discharge angle so that a maximum air speed of 0.2 m/s is guaranteed in the occupied area, even under changing conditions.



Re 3:
Heating operation: The supply air is warmer and thus lighter than the room air. The vertical air supply sends heat to the areas where it is needed.

Cooling operation: The inflowing air is colder than the room air and sinks. To avoid draughts, it is injected horizontally.

Heating and cooling using the same unit

Buildings can incur unnecessarily high costs. This is the case, for example, when a cooling system is installed separately from a heating system. Having two solutions means double the investment and double the maintenance and running costs. The solution? Cooling and heating using the same system!

The following section explains how this works using the example of decentralised ventilation and recirculation units, and describes under which circumstances this type of system would be suitable.

How does it work?
It's simple! Theoretically, any heating unit can also function as a cooling unit. All that is required is to replace the hot water with a cooling medium such as cold water, and to fit a condensate drain.

Why do large spaces need to be cooled?
Rising temperatures during the summer months, tighter insulation standards in newly built facilities and increased machinery density in production halls with shifts running 24/7 all inevitably lead to increased requirements for cooling.

In practice, two issues increasingly arise in this context:

- The maximum permitted workplace temperatures as defined in employee protection guidelines are often massively exceeded. Works councils and occupational health and safety authorities are therefore increasingly pressing for compliance with the required limits.
- When large spaces are too hot or the temperature fluctuates too much, this increasingly leads to excessive tolerance deviations in modern manufacturing processes. As these processes require high levels of precision, such deviations lead to higher levels of waste and thus diminishing levels of productivity.

As a consequence, when hall complexes are planned in future, emphasis will also be placed on ensuring that efficient cooling systems are in place.

Fundamental design guidelines:

- In addition to a hot water supply, also plan for a chiller to generate cold water. Alternatively, if there is no hot or cold water supply available, or it is not possible, the fallback option is to use a compact model with a reversible heat pump.
- Define your requirements in terms of the desired room temperature and maximum permissible temperature deviation.
- Take time to select a suitable control system. Control systems that are specially configured for decentralised systems and which take into account the various heating and cooling requirements will bring the best results.

Using TopVent® decentralised air circulation units in a tram maintenance hangar.

Heating and cooling using the same unit

Hoval

Cooling using fresh air and recirculation units – the prerequisites

Are you interested in decentralised ventilation technology that can be used to both heat and cool a building? First, there are a number of prerequisites that must be met. If these are not fulfilled, there is a risk of condensation problems or issues with continuous cold air distribution. The following factors should therefore be considered:

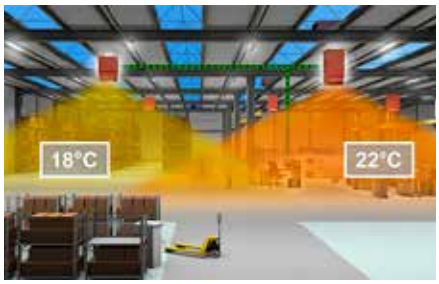
- Hydraulic supply. Would you prefer to use just one coil for both heating and cooling (2-pipe system), or for each function to have its own coil (4-pipe system)? In practice, this depends on the specific requirements of the building being cooled. A 4-pipe system has the advantage that each coil is optimally designed and can be switched between heating and cooling with a very fast response time. This enables the room temperature to be kept within a narrow tolerance range of ±1 K. The disadvantage of the control behaviour being so precise is that the investment costs are higher. In simpler use cases, for example where there is a typical summer/winter changeover, a 2-pipe system is recommended. This type of system does take longer to switch between modes, but it is more cost-effective and still represents an efficient solution.

- Condensate drainage. When air is cooled, it approaches the water vapour saturation point and condensate forms. To avoid damage to buildings, machinery and stock, condensate must be collected and drained away safely. Not only does condensate form on the cooling coil within the unit, but also on cold surfaces on the outside of the unit. Therefore, it is important to choose a unit with good insulation and optimised condensate drainage.

  This is the case with all Hoval TopVent® and RoofVent® cooling units. In addition to enhanced insulation, each unit has a condensate separator with a collecting channel. This special design enables up to 150 l of condensate per hour to be safely drained away, even when using vertical air guidance.

- Air distribution. An automatically adjustable air distributor is crucial when drawing in air under changing temperature conditions. Hoval's Air-Injector solution is described in detail on page 6.

- Free cooling. Depending on the temperature conditions or during the night, fresh air can be used to cool large spaces cost-effectively.



Decentralised units enable different temperature zones to be created.

Centralised or decentralised heating and cooling

Flexibility is very important when planning an industrial building. On the one hand, a building has to be planned in such a way that the warehouse or production facilities can be rapidly expanded or contracted based on operational needs, and on the other hand, the chosen ventilation system needs to be easily adaptable to changing employee needs and/or industrial processes. The following section explains how flexibility can be achieved in a ventilation system.

The end of underfloor heating

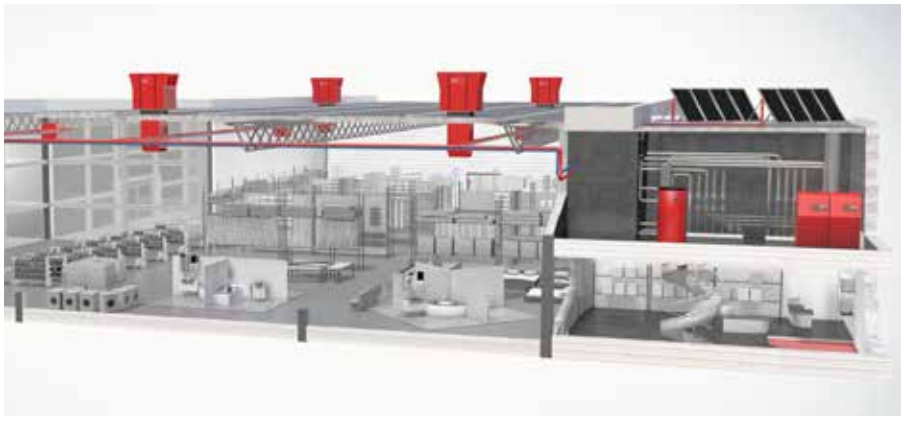
For a long time, underfloor heating was thought to be the ideal solution to meet the demands of large buildings. This thinking is now outdated. The authors of the factbook entitled “Zukunft Hallenheizung” (Perspectives of Large Space Heating) and published by figawa (German Association of Companies for Gas and Water Technologies) describe underfloor heating as follows:

- “Too slow” to accommodate the changing requirements of warehousing and logistics buildings
- “Limiting” in terms of room use due to its uniform distribution
- “Problematic” due to the anchoring of machinery and shelving in the floor, thus hindering any later alterations

With this in mind, is a combination of central heating and decentralised recirculation air heating generally recommended? In the medium to long term, choosing to combine central heating with decentralised ventilation units is an interesting approach. One advantage of this one-size-fits-all approach based on a pre-assembled kit is that it simplifies both the tendering and planning processes.

Tip:

Combining energy from a permanent boiler room and a decentralised ventilation system offers maximum system flexibility and daily cost savings through the ability to incorporate renewable energy sources.



The advantages of combining a boiler with a decentralised ventilation system.

Centralised or decentralised heating and cooling

The extendable system is comprised of the following elements:

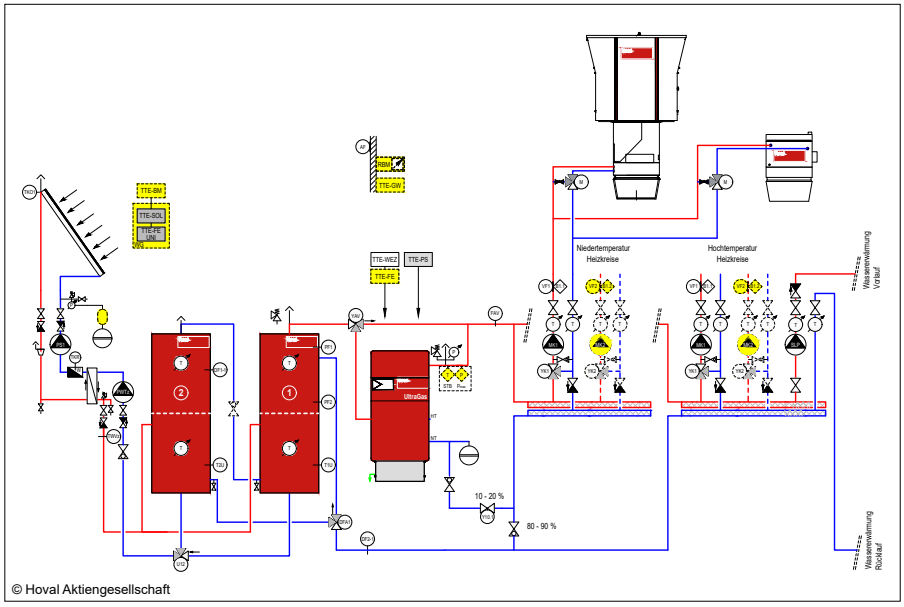
- Hoval UltraGas® double gas condensing boiler and UltraSol® 2
- Control module
- Hoval indoor climate system

This allows the number of fresh air and recirculation units to be altered based on requirements in order to achieve an even distribution of conditioned air throughout the entire indoor space.

- The amount of fresh air required determines the number of fresh air units. Only the necessary amount of fresh air needs to be conditioned.
- Recirculation units cover the remaining load, i.e. the remaining transmission heating and cooling requirements.

Combining a decentralised ventilation system with a Hoval UltraGas® condensing boiler and UltraSol® solar thermal system has two advantages:

- Hoval is a system supplier for heat generation, climate technology, hydraulic systems and control systems. Customer needs are fulfilled with a complete system from a single source.
- The condensing boiler installed in the equipment room is optimised to work in conjunction with the ventilation units that are installed in the main hall. This guarantees an additional increase in energy efficiency of 10%.



A single-source heating, ventilation and control concept to meet all the heating demands of a large space.

What to do if there is no heating or cooling medium available

For decentralised solutions, this is where RoofVent® and TopVent® units with reversible heat pumps for heating and cooling come into play. They enable projects to be delivered without the need for an equipment room, and new system concepts to be implemented in the case of expansions or renovations.

When combined to create a fully decentralised overall solution, the units render both a central chiller and central hot water supply superfluous. This means that equipment rooms no longer have to be included in the plans for new halls. Even the pipework for heating and cooling becomes redundant. As a result, no pipework needs to be routed through the walls and masonry and insulated, or installed below the ceiling.

Summary:
Architects and planners gain freedom, while operators and users gain space. The inside of the building looks completely decluttered.

An additional advantage is the fact that the heat pump uses renewable energy. CO_2 emissions are minimised – in particular compared to centralised heating solutions which use fossil fuels.

Low total costs
While the investment costs are already comparatively low because of the lack of ducts and pipework needed, the running costs are also lower. The total cost of ownership is minimised. This is also due to the fact that the RoofVent® RP ventilation unit and TopVent® TP recirculation unit each communicate with their own heat pump. All of the units come from a single source and, when bundled, create efficient and redundant systems.

Also suitable for hall extensions
A global technology company is already using the RoofVent® RP ventilation unit coupled with a heat pump at its production site in Liberec in the Czech Republic. Twelve systems are installed on the roof of the 8000 m² extension. The units condition 96,000 m³ of air per hour. The reversible heat pumps located at their site are used exclusively for cooling. “If a hall is extended,” says Tobias Brugger (Head of Product Management for Indoor Climate Systems/Segments), “there is generally no longer any need to increase the capacity in the existing equipment room. The decentralised systems deliver the additional performance required for ventilation, heating and cooling.”

Hoval RoofVent® RP ventilation unit and TopVent® TP recirculation unit with heat pumps provided.

In depth: Efficient cooling in large spaces – a particular challenge

Hoval

Planning and engineering a cooling project for a large space is one of the most challenging areas of ventilation technology, especially when it comes to high-temperature production halls. Detailed knowledge of the laws of thermodynamics and their interdependencies as well as extensive experience is crucial.

In practice, standardised methods of calculation are often used to carry out a cooling load calculation for the building shell and internal thermal loads. Even in the case of internal thermal loads such as waste heat from machinery, the machinery's electrical power supply is often multiplied by somewhat arbitrary factors <1 in order to calculate an approximate thermal load. Depending on the factor selected, very different results can be produced, and achieving the correct result can sometimes be a matter of chance.

Common consequences

- The cooling capacity installed is too low: in many cases, the system fulfils its purpose under normal conditions, yet under extreme conditions is insufficient.
- The cooling capacity installed is too high: ultimately, the system is likely to meet the demands placed upon it. On balance, however, the one-off investment costs and, in particular, the annual running costs, will be far too high for the investor.

The choice of room air flow also plays a key role in achieving satisfactory air conditioning in a large space. The required flow of supply air must be controlled and distributed within a large space in such a way that the thermal loads can be optimally captured and transported away with the extract air.

Choosing the indoor air flow

The types of indoor air flow predominantly used in production halls are mixed ventilation and stratified ventilation. Which of the two is most relevant generally depends on the load type. The load profile and corresponding indoor air flow are functionally interdependent and lead to the following correlations:

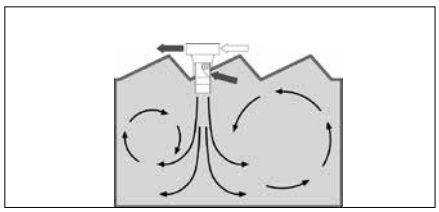


Illustration of mixed ventilation

For large spaces with small heat loads, mixed ventilation is usually used. In this case, an air status which is actually only required within the working area is established to fill the hall. For this reason, the principle is limited to small heat loads. The supply air flow is established based on calculations and/or measurements.

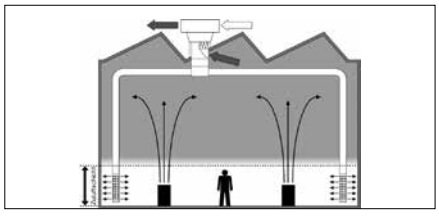


Illustration of stratified ventilation

Large heat loads are handled efficiently by using stratified ventilation. In this case, the calculation is based on the thermal flows. A heat load calculation alone is not sufficient. Calculating the thermal flows of the production facilities provides a sum of the required supply air flow.

In depth: Efficient cooling in large spaces – a particular challenge

In general, it may be said that when the necessary prerequisites are considered, stratified ventilation is the most cost-effective option for cooling a large space.

Why is that the case?

- The underlying principle of stratified ventilation is the key here. Stratified ventilation uses the thermal flows around heat sources to transport the load away into the unused upper section of the large space. The amalgamated thermal flows are then extracted from beneath the roof and gently reintroduced at the same volume, yet at a cooler temperature and at floor level. Depending on the physical properties of the space, this then establishes a sea of cool, fresh air in the occupied area. The amount of air required is significantly lower compared to mixed ventilation and the cost benefits in terms of both investment and operation are self-evident.
- Furthermore, stratified ventilation can continue without using mechanical cooling when outdoor temperatures are ≤ the desired temperature in the occupied area. When outdoor temperatures are high, the fresh air simply needs to be brought down to the desired temperature level. The energy used to bring in supply air at a lower temperature is no longer required, which means that running costs are minimised.

Benchmark data shows that large spaces can be cooled by stratified ventilation using up to ⅔ less airflow capacity compared to mixed ventilation. However, a blanket statement cannot be made in this regard. In fact, the thermal flows need to be recorded individually in each case. The time and mathematical effort involved certainly pay off, however.

In principle, two different methods can be used for this

- **Calculation:** This requires data to be gathered on all the parameters responsible for developing the overall thermal flow, such as machinery surface temperatures, machinery count and machinery density on the one hand, and the machinery's allocation into geometric base plates on the other. By observing non-linear cumulation in the case of compact machinery arrangements, thermodynamic contexts can be used to mathematically calculate the total thermal flow = required supply air flow.

- **Hall climate simulation:** Data also needs to be gathered for hall climate simulation. However, the result of this simulation is always an hour-by-hour temperature record. In addition to machinery data, specific climate data, as well as the mode of operation, special customer requests and most importantly the chosen solution concept are all incorporated into the simulation calculation. This makes it possible to compare different solution variants or unit combinations in terms of their effectiveness and investment costs. As a bonus, the annual running costs per solution approach are also calculated, making the total costs transparent and comparable.

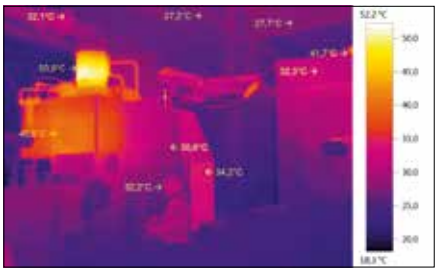
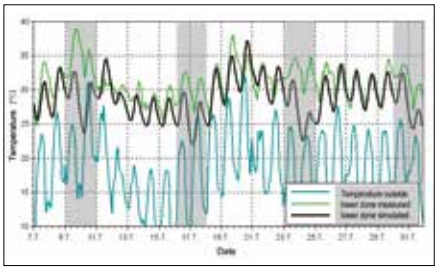


Image from an infrared camera to simulate the hall climate



Graph showing temperatures inside a hall over a specific time period to simulate the hall climate.

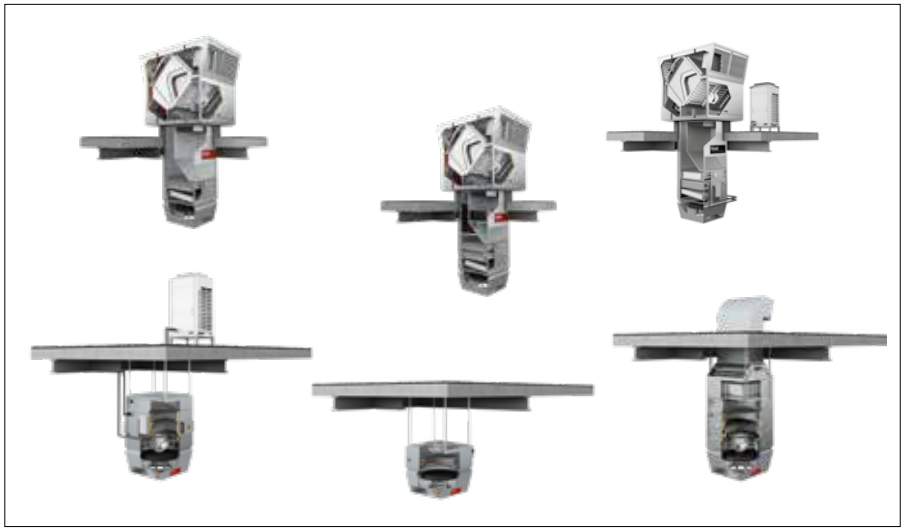
RoofVent® and TopVent®
Hoval's solution for ventilation, heating and cooling in large spaces

As you can see from this white paper, large spaces such as halls are associated with specific requirements, regardless of the industry. Founded 75 years ago, Hoval has been working with indoor climate systems since 1970. Over time, Hoval has been able to develop two extremely powerful unit series for ventilating, heating and cooling high-ceilinged spaces:

RoofVent® and TopVent®
Continually developed and optimised, these series set the modern-day standard for intelligent and efficient indoor climate systems. Whether ventilation, heating and/or cooling is needed, one single system meets all the requirements. The critical factor is that by intelligently combining both unit series, a complete customised solution can easily be adapted to the entire spectrum of room sizes and types, including their specific usage conditions.

Hoval RoofVent® supply and extract air handling unit

Hoval TopVent® recirculation unit



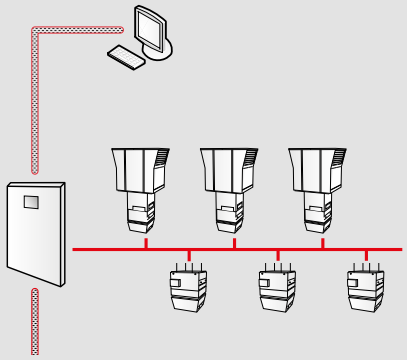
Several models are available within the RoofVent® and TopVent® unit series.

RoofVent® and TopVent®
Hoval's solution for ventilation, heating and cooling in large spaces

Hoval

The right control concept

Each customised indoor climate system has its own control concept to match. This may sound like a great deal of programming effort, but in actual fact, the integrated Hoval TopTronic® C control system has its own comprehensive control system pre-programmed at the ready. Specially developed for decentralised systems, the control algorithm with a choice of 8 pre-installed operating modes can handle every use case and demand in terms of flexibility and thermal comfort. The full potential of a decentralised combination of units is primarily harnessed by dividing the space into zones. Creating zones enables individual areas with different functions to be conditioned based on their actual needs in terms of air quality and temperature control.



The Hoval TopTronic® C control system is used to automatically control each unit and set different temperatures according to zones.

How does it work?

Essentially, each RoofVent® and TopVent® unit can be controlled autonomously and individually using the integrated unit controller. Units and combinations of units working under the same operating conditions are grouped into a specific area to form a so-called "control zone". This does not mean, however, that each unit can no longer be controlled autonomously. In principle, the individual units are regulated individually and controlled based on zones. The criteria concerning how zones are allocated can be, for example, operating times, room temperature set values and so on. With a maximum of 64 possible control zones and up to 25 units per control zone, the options are practically limitless. This also guarantees a flexible response if the building has a change of use involving a new functional allocation. The individual units can be regrouped using the control technology at any time.

About Hoval

Whether you are looking to ventilate, heat and/or cool a large space, Hoval's range of units can always offer the right system solution.

Maybe you are looking for a classic heating and cooling solution using a 2-pipe or 4-pipe system via a central heating and cooling supply, or perhaps you would prefer a more modern, sustainable solution using a reversible heat pump. Whatever the solution, Hoval can supply exact the type of unit you need.

As a specialist in universal systems, Hoval is there for customers at every stage of the system lifecycle – from planning and operation right through to modernisation. In doing so, customers are able to benefit from energy-efficient solutions and first-class air quality both now and in the future.

Final tip: Modernisation

Despite having the highest levels of quality and an above-average lifetime, even a Hoval indoor climate system will eventually come to the end of its life.

But here's the good news:

By virtue of its far-sighted design criteria, Hoval has been able to maintain the same structural installation dimensions for each unit size across each generation of units.

Specifically, this means that the openings already made in the roof can continue to be used. Installed units can therefore be replaced like-for-like by a new-generation unit years later without any issues.

Modernise with ease:
The latest generation of units fits exactly into the existing opening in the roof.

Hoval quality.
You can count on us.

As a specialist in heating and air-conditioning technology, Hoval is your experienced partner for system solutions. For example, you can heat water with the sun's energy and the rooms with oil, gas, wood or a heat pump. Hoval ties together the various technologies and also integrates room ventilation into this system. You can be sure to save both energy and costs while protecting the environment.

Hoval is one of the leading international companies for indoor climate solutions. More than 70 years of experience continuously motivates us to design innovative system solutions. We export complete systems for heating, cooling and ventilation to more than 50 countries.

We take our responsibility for the environment seriously. Energy effi ciency is at the heart of the heating and ventilation systems we design and develop.

Responsibility for energy and environment

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07/2020 | Subject to technical modifications, typesetting and printing errors!

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