

► 5-Star Climate. ►►

Ventilation and air conditioning technology in hotels. More comfort for guests.





► The art of handling air. ►►

TROX understands the art of competently handling air like no other company. Since its foundation in 1951, TROX has been developing sophisticated components and efficient systems for ventilation and air conditioning as well as for fire and smoke protection. Dedicated research and development have made TROX a leader of innovation in these fields.

Everything from a single source.

The interaction between all technical building services can make or break the whole system. This is why TROX offers everything from a single source. Air handling unit and ventilation components complement each other perfectly. This results in maximum energy efficiency while the coordination effort during the design and installation stages for a project is reduced to a minimum.

The perfect system for each building.

Together with its customers TROX develops specific systems that take the relevant criteria for each building into account and meet the requirements of its occupants. This close cooperation leads to sustainable solutions that help to increase people's wellbeing and to protect life and the environment.

► Comfort and wellbeing. ►►

Hotel guests have high expectations and very individual demands when it comes to the room climate. Some like it cool and fresh; others prefer it warm and cosy. All of them, however, want a quiet room. Every hotel has an array of many different rooms and areas, each with different and often complex requirements for ventilation and air conditioning. From the lobby to restaurants, kitchen and bar, and from conference and meeting rooms to the spa. The demands on the air in a hotel could hardly be more diverse.

Hotel air.

At TROX, we are committed to providing flexible and adaptable solutions for hotels. Comfort, wellbeing and safety of people are clearly our main focus. This does not mean, however, that we compromise on sustainability and protection of the environment. With all these factors in mind, we offer not only classical standard solutions for hotel rooms but also bespoke and innovative system solutions such as air water systems that provide quiet and efficient service without being noticed by hotel guests.

The perfect air conditioning system for hotels:

- invisible
- inaudible
- unnoticeable



Kameha Grand Hotel, Bonn, Germany

Hotel Porta Fira, Barcelona, Spain

Hotel Grande Bretagne, Athens, Greece

► **A guest in the best hotels.** ►►

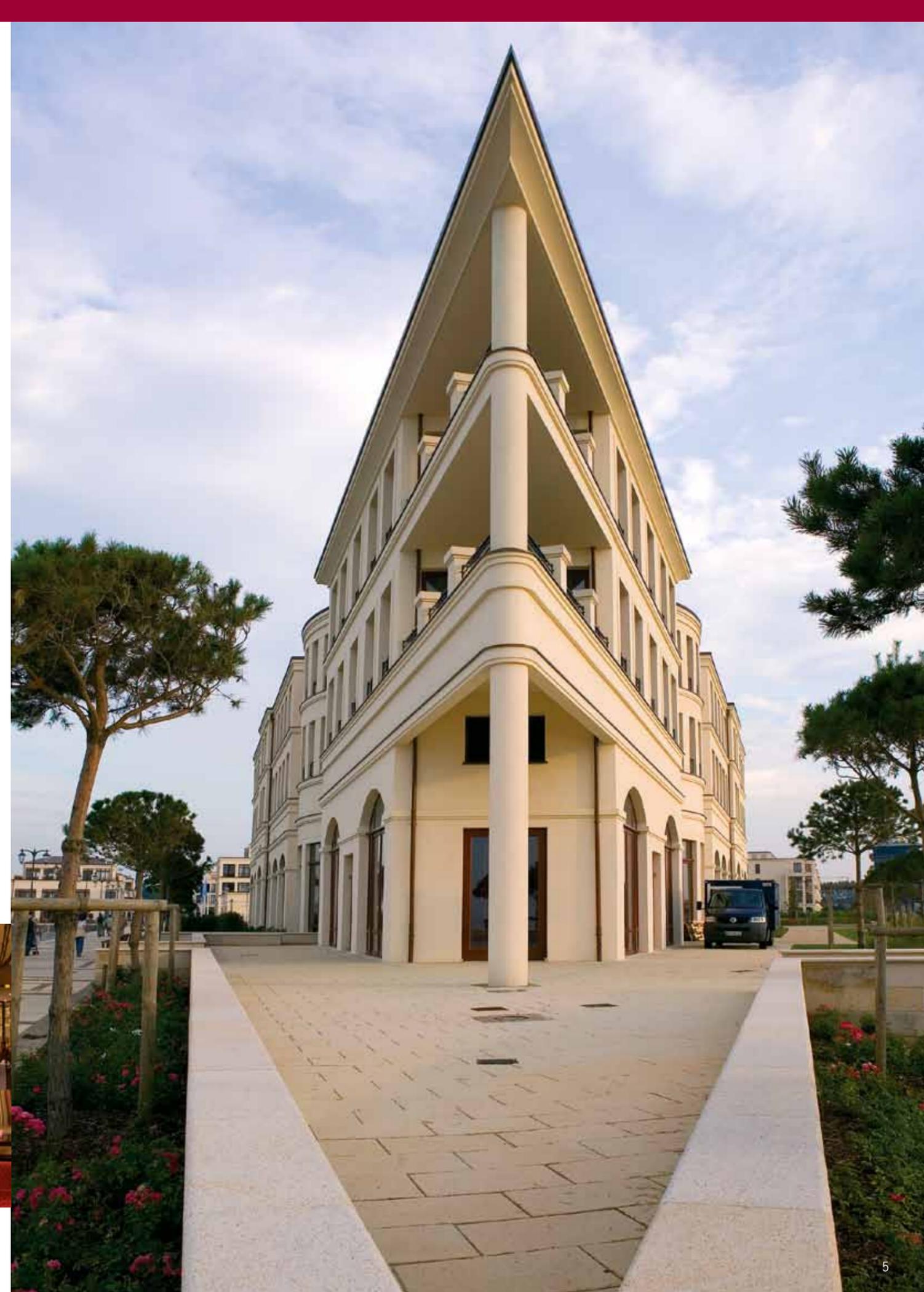
A pleasant indoor climate and room air of good quality are essential in hotels, just like in office buildings, conference centres, theatres, and schools. The ventilation system should neither be heard, nor felt. Noise and draughts are to be avoided. For normal room air quality, the ventilation system should per person supply 45 m³/h of filtered fresh air of a pleasant temperature. It should also provide maximum safety, i.e. hygiene (EN 13779, Ventilation and Air Conditioning of Buildings).

TROX components can be found in the best hotels all over the world. This is a result of TROX engineers developing bespoke and efficient solutions for each project and building: German engineering at its best.

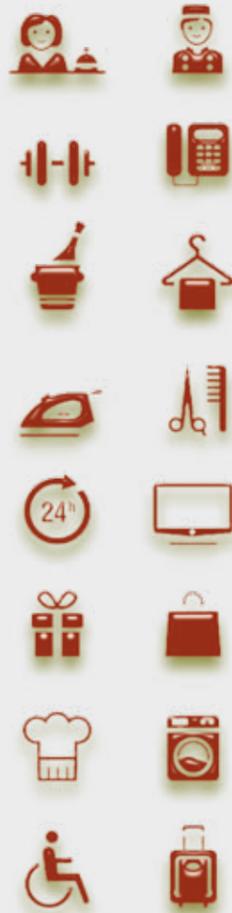
This application brochure not only gives you an overview of specific TROX solutions for hotels but provides an invaluable source of information with regard to the air conditioning in what is often referred to as 'a home away from home'.

We invite you to read on and find out about legal standards and regulations for hotel buildings as well as about air conditioning parameters in various functional areas. This brochure shows the different solutions that will provide optimum ventilation and air conditioning in a hotel.

Hotel Hohe Düne (High Dune), Rostock, Germany



Hotel Villa Kennedy, Frankfurt/Main, Germany



► Everything under control. ►►

The guest of Room 412 has just left; the next guest will arrive in two hours; things in the kitchen are in full swing; the spa, on the other hand, has become quiet, with only a few guests relaxing such that the humidity level is still acceptable; in the conference hall 120 doctors are holding a symposium; and the ballroom is being prepared to host a glamorous evening event for over 800 guests.

In a place where such diverse ventilation and air conditioning requirements must be met simultaneously, intelligent building management systems ensure that each guest feels comfortable: anywhere, any time.

Intelligent systems ensure a climate of efficiency.

The components of modern building technology communicate and function in a coordinated way thanks to innovative automation systems. The integration of the ventilation and air conditioning system with the central BMS increases its safety and functional reliability. It also enables the flexible and energy efficient use of buildings, something that is very much in demand today. Systems adapt automatically to changing conditions, thus enabling demand-based and more efficient service.



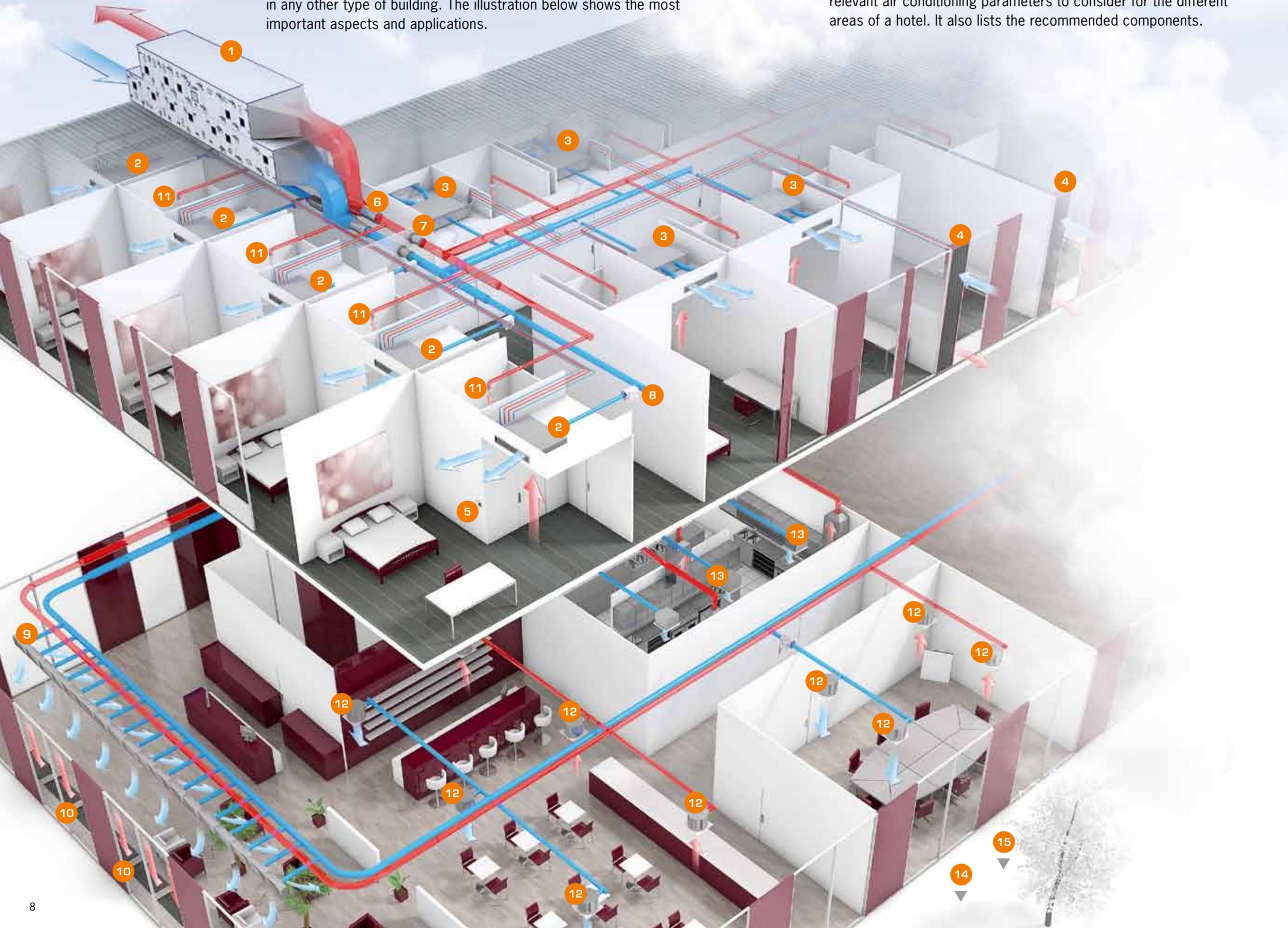
Atlantic Hotel Sail City, Bremerhaven, Germany

Hotel Hohe Düne (High Dune), Rostock, Germany

► **Complex requirements of the room air.** ►►

The room air conditioning in a hotel is probably more diverse than in any other type of building. The illustration below shows the most important aspects and applications.

The table on the fold-out page provides an overview of the most relevant air conditioning parameters to consider for the different areas of a hotel. It also lists the recommended components.



Components and systems.

- 1 Air handling unit
- 2 Active chilled beam
- 3 Fan coil unit
- 4 Decentralised ventilation unit
- 5 Room control panel
- 6 Circular silencer
- 7 Fire damper
- 8 Volume flow controller
- 9 Slot diffuser
- 10 Extract air grille
- 11 Disc valve (extract air)
- 12 Swirl diffuser
- 13 Fire damper for the extract air of commercial kitchens

On the underground level, hence not visible:
spa and car park

- 14 Jet nozzle
- 15 Smoke extract damper

► Air conditions and flow rates. ►►

Basics of air conditioning systems in hotels.

In buildings such as hotels the demands placed on ventilation and air conditioning are manifold and challenging. The more varied the rooms and their use, the more flexible the planner must be in tailoring

solutions to meet individual requirements. With the following overview we try to 'decode' the hotel air complex, or complex hotel air, in order to arrive at the most efficient and suitable options.

	Single room (with attached bath and toilet)				Double room (with attached bath and toilet)				Public areas										Work areas				
	Single room (with attached bath and toilet)	Double room (with attached bath and toilet)	Conference room, banquet hall, ballroom	Breakfast room, lounge ('cafeteria' according to EN 15251)	Bar, cafeteria, bistro, restaurant ('restaurant' according to EN 15251)	Entrance area, lobby with seating, reception area	Swimming pool, sauna, spa (for more information you may want to refer to VDI 2089, technical building services for pools)	Leisure area, gym, bowling alley, entertainment	Corridors ('hospitals' according to EN 15251)	Nursery, play area ('child care facilities' according to EN 15251)	Shops ('commercial buildings' according to EN 15251)	Library	(Underground) Car park (for more information you may want to refer to VDI 2053, air handling units for car parks)	Kitchen (for more information you may want to refer to VDI 2052, air handling units for kitchens)	Office/administration	Changing rooms							
Room size [m²]	14	18	22	30	14	18	22	30	200 m²		≥ 1.5 m²/person						≥ 7 m²/person					≥ 10 m²/person	
No. of people	1	1	1	1	2	2	2	2	≤ 100														
Fresh air flow rate [m³/h]									≤ 3,000								≥ 43 m³/h, per person					≥ 50 m³/h, per person	
Standard room (low-polluting building)	60	71	81	101	86	96	106	126															
Room for smokers (low-polluting building)	86	103	120	155	111	128	145	180															
Design values																							
Minimum room temperature winter [°C]	20 – 22				20 – 22				20	20	20		17.5	17.5	16	17.5	16					20	
Maximum room temperature summer [°C]	26				26				26	26	26		25.5	25.5	–	25.5	25					26	
Sound pressure level, typical range [dB(A)]	25 – 35 at night/30 – 40 by day				25 – 35 at night/30 – 40 by day				30 – 40	35 – 50	35 – 50	35 – 45	40 – 50			35 – 45	30 – 45	40 – 50	28 – 35		40 – 60	30 – 40	40 – 50
Sound pressure level, design value [dB(A)]	30 at night/35 by day				30 at night/35 by day				35	40	45	40	45			40	40	40	30		55	35	45
Type of ventilation																							
Mixed flow	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Displacement flow	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Quasi displacement flow	•	•	•	•	•	•	•	•								•						•	
Ventilation system																							
Ventilation grilles	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	
Swirl diffusers	○	○	○	○	○	○	○	○	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Slot diffusers	○	○	○	○	○	○	○	○															
Induction units	•	•	•	•	•	•	•	•	○	○	○					•	•	•				•	
Fan coil units	•	•	•	•	•	•	•	•															
Decentralised ventilation system	•	•	•	•	•	•	•	•								•						•	

• recommended ○ recommended for certain situations

Based on EN 15251 Category II low-polluting building

Volume flow rates according to EN 15251

Fresh air flow rates for normal room air quality:
 Person 25.20 m³/h
 m² very low polluting 1.26 m³/h
m² low polluting 2.52 m³/h
 m² non low polluting 5.04 m³/h

Fresh air flow rate for single room, 14 m²:
 m² very low polluting 42.84 m³/h
m² low polluting 60.48 m³/h
 m² non low polluting 95.76 m³/h

Fresh air flow rate for single room, 18 m²:
 m² very low polluting 47.88 m³/h
m² low polluting 70.56 m³/h
 m² non low polluting 115.92 m³/h

Fresh air flow rate for double room, 22 m²:
 m² very low polluting 78.12 m³/h
m² low polluting 105.84 m³/h
 m² non low polluting 161.28 m³/h

Fresh air flow rate for double room, 30 m²:
 m² very low polluting 88.20 m³/h
m² low polluting 126.00 m³/h
 m² non low polluting 201.60 m³/h

Volume flow rates according to EN 13779

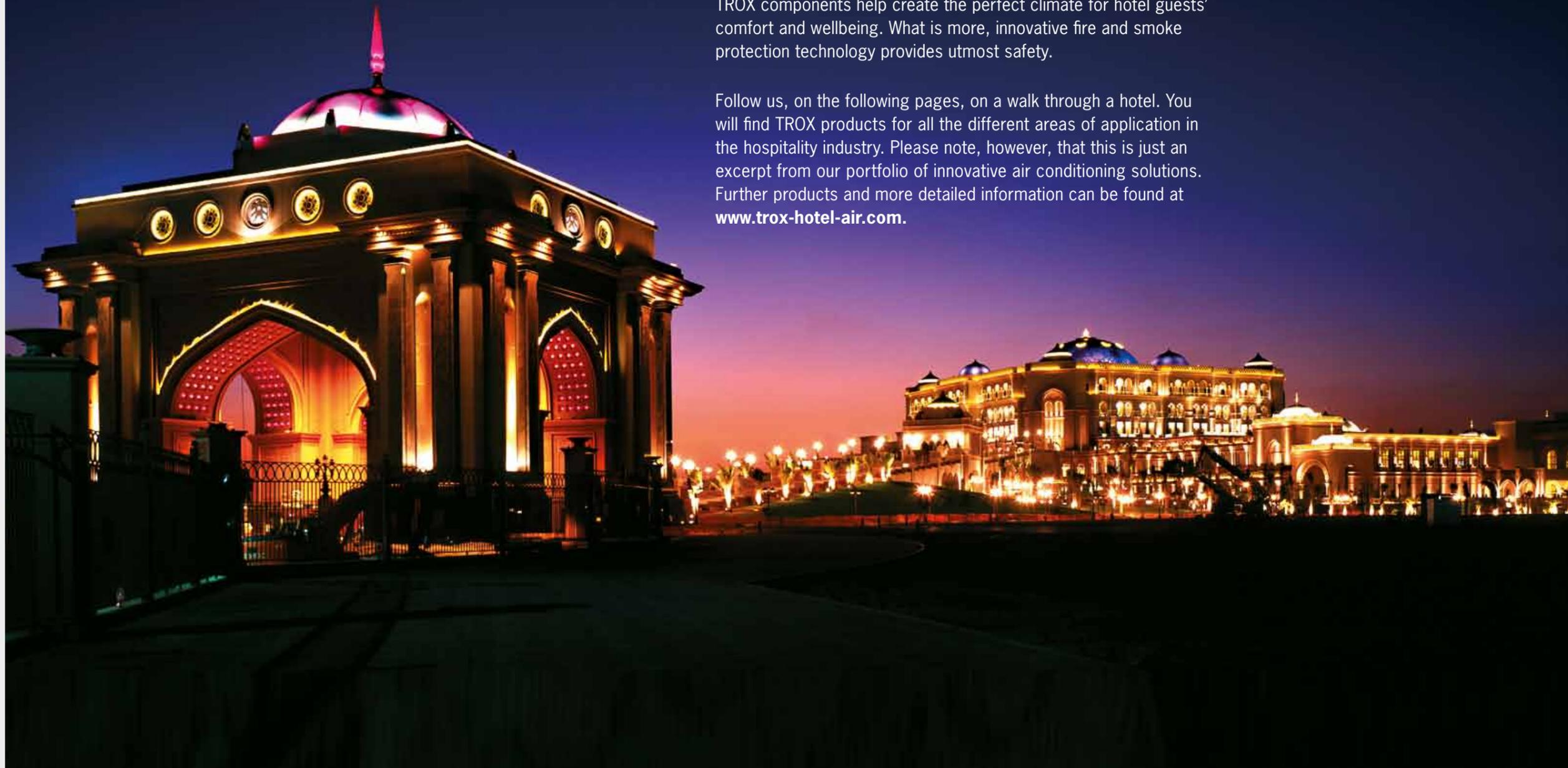
IDA I High room air quality
 72 m³/h, per person

IDA II Medium room air quality
 45 m³/h, per person

IDA III Moderate room air quality
 29 m³/h, per person

IDA IV Low room air quality
 18 m³/h, per person

Emirates Palace, Abu Dhabi



► Warmly recommended by hotel reviewers. ►►

TROX components help create the perfect climate for hotel guests' comfort and wellbeing. What is more, innovative fire and smoke protection technology provides utmost safety.

Follow us, on the following pages, on a walk through a hotel. You will find TROX products for all the different areas of application in the hospitality industry. Please note, however, that this is just an excerpt from our portfolio of innovative air conditioning solutions. Further products and more detailed information can be found at www.trox-hotel-air.com.



Burj al Arab, Dubai



Platzlalm mountain lodge, Zillertal, Austria



Corinthia Grand Hotel Royal, Budapest, Hungary



Radisson Royal Hotel, Moscow, Russia



Hotel Juan Alcorta, Logroño, Spain



► Lobby/reception. ►►

In the lobby you will mostly find mixed flow systems. Guests are welcomed by a comfortable climate created by ceiling swirl diffusers. Modern central building management systems allow for quick adjustments to ever changing indoor climate conditions.

The type XARTO and AIRNAMIC swirl diffusers are innovative air terminal devices that combine an extremely quiet air discharge with optimum swirl generation. The most demanding comfort requirements can thus be met, even with very high volume flow rates.

DUK jet nozzles are perfect for large and high reception areas, where the supply air discharge point is quite a distance from the occupied zone. The jet nozzles are suitable for heating or cooling applications and can be adjusted electrically or manually. The supply air flow can thus be ideally adapted to the actual conditions.

The type FBA floor diffusers are made of aluminium and have been designed to withstand very heavy usage. They provide comfortable and energy-efficient air discharge into rooms by complementing existing upward convection streams present in the occupied zone. This principle allows for the local heat loads to be dissipated very effectively.

Swirl diffusers XARTO

- 🌀 90 – 275 l/s
324 – 990 m³/h
- ◀▶ □ 598 and 623 mm



Jet nozzles DUK

- 🌀 20 – 835 l/s
70 – 3,000 m³/h
- ◀▶ Ø 100 – 400 mm
- Aluminium



Floor diffusers FBA

- 🌀 5 – 50 l/s
20 – 180 m³/h
- ◀▶ Ø 150 and 200 mm



Active chilled beams DID-E

Primary air:

- ↻ 10 – 78 l/s
36 – 281 m³/h
- ↳ L: 550 and 614 mm
B: 900, 1,200 and 1,500 mm
H: 200 mm

Cooling capacity: up to 1,000 W

Heating capacity: up to 500 W



Decentralised air water system

- ↻ 42 – 69 l/s
150 – 250 m³/h,
Boost 320 m³/h
- ↳ L: 400 mm
B: 360 mm
H: 2,400 mm

Cooling capacity

up to 1,170 W

Heating capacity

up to 3,920 W



Volume flow controllers VFC

- ↻ 6 – 370 l/s
20 – 1,332 m³/h
- ↳ Ø 80 – 250 mm
Δp 30 – 500 Pa

Casing air leakage rate according to
EN 1751, class A



► Guest rooms. ►►

Enabling guests to control the room climate individually and enjoy perfect comfort is becoming a significant competitive factor for hotel owners. Guest rooms may be comparatively small, yet they constitute major challenges to the air conditioning:

1. Blending in with the architecture
2. Highly efficient, thereby saving operating costs
3. To be individually controlled by guests
4. Quiet and draught-free
5. Standby mode to be centrally controlled and adapted to different loads; with minimum volume flow rate to remove odorous substances

Active chilled beams of type DID-E have been specially developed such that guests are not disturbed while sleeping. The mixed flow air distribution ensures a pleasantly quiet climate of wellbeing also at night. The DID-E is a unit with one way air discharge that is predestined for hotel applications, for example for installation in a suspended ceiling and thus not visible.

The type DID-E active chilled beams are available in six sizes for volume flow rates from 36 to 300 m³/h and with a heating/cooling capacity of up to 1.7 kW, i.e. for the efficient air conditioning of both smaller single rooms and larger suites.

Guests can adjust the room climate at any time and create their own comfort zone using the control panel.

Decentralised air water systems, or façade ventilation systems, blend in with the façade. They are available as sill units or under sill units or can be installed to the side of windows. The compact units provide up to 120 m³/h of fresh air. The fresh air is filtered and supplied to the room as warm or cold air, depending on users' needs. As these units work very quietly, the guests are not disturbed while sleeping even if the air condition is running all night. The air and water quantities can be individually controlled and adjusted for each guest.

VFC volume flow controllers are mechanical system-powered controllers for constant and variable volume flow systems with low air velocities.





Kameha Grand Hotel, Bonn, Germany

Automatic extract air valve ATVC-100

- 20 l/s
- 80 m³/h
- ▣ Ø 100 mm



For more solutions and products visit
www.trox-hotel-air.com

► **Bathroom.** ►►

The automatic extract air valve ATVC-100 is an electrically operated device that ensures rapid air change and removal of humidity. The valve is usually closed or just slightly open but opens fully to remove higher volume flows when the switching contact is made, i.e. when the bathroom light is switched on.

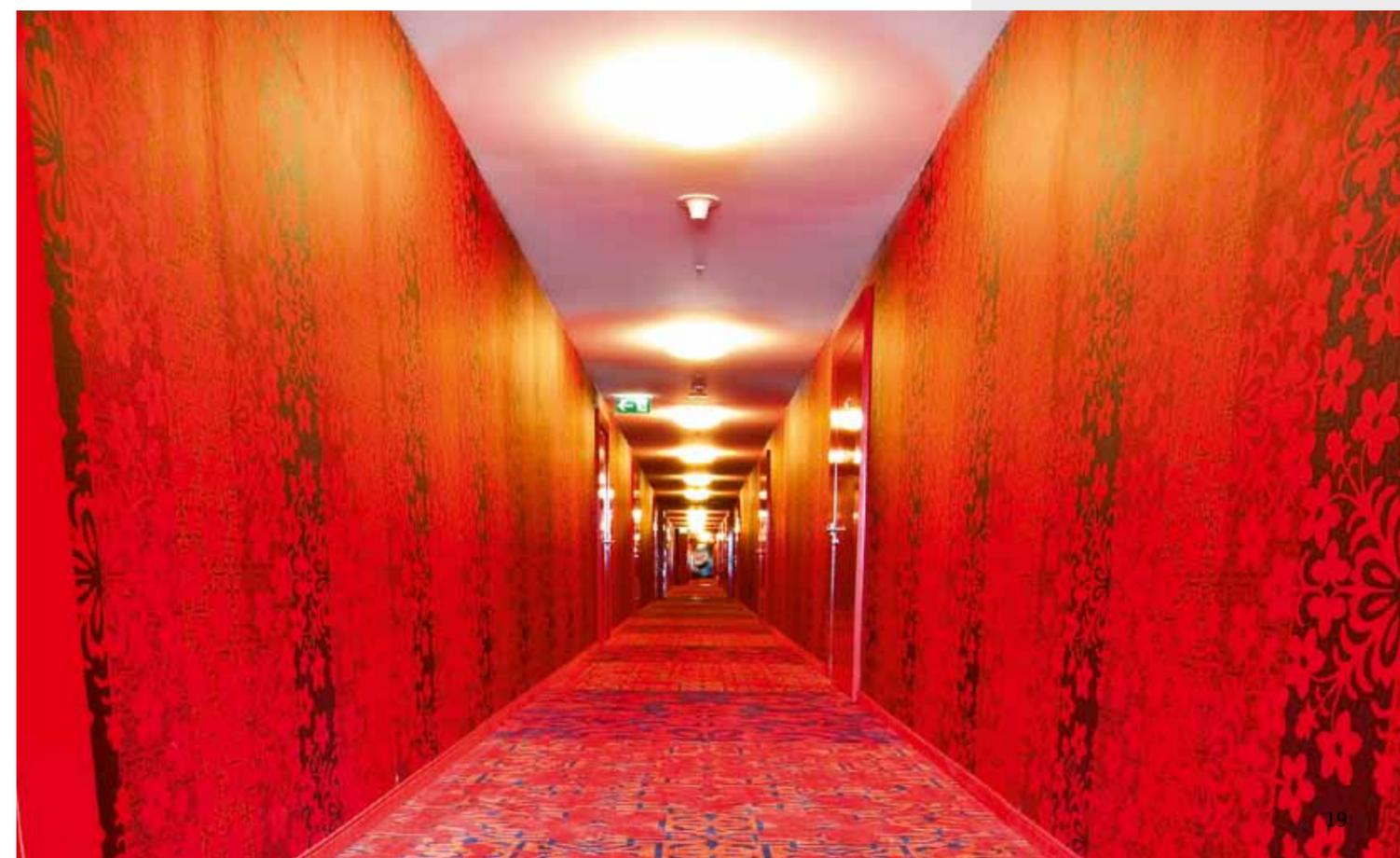
► **Corridors and circulation spaces.** ►►

Hotel guests pass through these areas rather than staying there. These are usually inside areas where large numbers of people walk, and they must consequently be provided with sufficient supply air.

PASSCLEAN ceiling diffusers provide optimum secondary air induction but prevent contamination. The square or circular/square face plate can be used in 600 × 600 mm or 625 × 625 mm grid ceilings instead of a ceiling tile.

ADLR ceiling diffusers for radial air discharge ensure a high degree of comfort. The ceiling diffusers are available with circular or square face plates to be integrated into grid ceilings.

Kameha Grand Hotel, Bonn, Germany



Ceiling diffusers PASSCLEAN

- 165 l/s
- 600 m³/h
- ▣ 600 x 600 mm and 625 x 625 mm



Ceiling diffusers ADLR

- 20 – 550 l/s
- 70 – 2,000 m³/h
- ▣ Ø 244 – 654 mm, ▣ 593 and 623 mm



For more solutions and products visit
www.trox-hotel-air.com



► **Bar and restaurant.** ►►

When the bar or restaurant is fully occupied, the staff as well as the ventilation system face a major challenge and must work quietly, efficiently, and without causing turbulence. Both the staff and the system need to use the time between meals to recover.

LG linear grilles made of light metal are aesthetic diffusers. They can, for example, be used as supply air grilles or recirculation grilles for floor induction units and provide draught-free comfort even in a full restaurant.

The air quality sensors of the volume flow controllers continuously measure the air quality and signal the required flow rate to the control system.

HESCO SB slot diffusers are available for one-way, two-way or even three-way air discharge thanks to their adjustable blades.

With their unique blade geometry, the **circular AIRNAMIC diffusers** provide an extremely quiet air discharge with optimum swirl generation. The most demanding comfort requirements can thus be met, even with very high volume flow rates.

Linear grilles LG

- 27 – 270 l/s
- 100 – 1,000 m³/h
- ◄► L: 400 – 1,250 mm



Slot diffusers HESCO SB

- 20 – 835 l/s
- 70 – 3,000 m³/h
- ◄► L: 1,000 – 2,000 mm
- with 1 to 4 slots



Swirl diffusers AIRNAMIC

- 40 – 385 l/s
- 144 – 1,386 m³/h
- ◄► Ø 400 and 600 mm



Air terminal unit TVR

- 10 – 1,680 l/s
36 – 6,048 m³/h
 - ▶ Δp 20 – 1,500 Pa
Ø 100 – 400 mm
- Casing air leakage rate according to EN 1751, class A
Closed blade air leakage according to EN 1751, class 4
(Nominal sizes 100 and 125, class 3)



Active chilled beam DID632

- 6 – 85 l/s
20 – 300 m³/h fresh air
 - ▶ L: 900 – 3,000 mm
B: 600 mm
H: 210 mm
- Cooling capacity up to 2,500 W
Heating capacity up to 3,000 W



Swirl diffuser TDV-SilentAIR

- 30 – 280 l/s
100 – 1,000 m³/h
- ▶ Ø 300 – 625 mm



For more solutions and products visit
www.trox-hotel-air.com

► Conference room. ►►

The climate in the conference room must be adjustable to various conditions such as the size of the room and the number of people present. Sufficient fresh air must be supplied to ensure that conference participants feel comfortable and do not tire too easily because of stale air.

VARYCONTROL air terminal units are equipped with electronic or pneumatic control components. The temperature and/or room air quality is controlled individually by means of the supply air. The system only supplies the quantity of air required, which saves energy.

TDV-SilentAIR swirl diffusers feature high volume flow rates at low sound power levels. Supply air discharge in a swirl or horizontally as well as high induction levels ensure a balanced temperature and rapid decrease of the initial air velocity. Both square and circular models are available.

The DID632 active chilled beam features an optimised nozzle configuration and new geometry. It can provide high cooling capacities at low fresh air flow rates (up to 2,500 W at 250 m³/h). This results in low and comfortable air velocities in the occupied zone.

Berlaymont, Brussels, Belgium





► Kitchen. ►►

When things are heating up in the kitchen, powerful supply air and extract air systems are required to keep any kitchen odours away from the guests. And where chefs juggle pans with hot grease and oil, hygiene and safety are musts.

The KA-EU fire damper for the extract air of commercial kitchens is a compact unit; thanks to its 100% free area there is no 'additional' pressure drop that might otherwise be caused by the blade. In case of a fire the damper shuts automatically to prevent the propagation of fire and smoke through ductwork to adjacent designated fire compartments.

The PROCONDIF diffuser is a ventilation system that discharges air from the top yet offers the aerodynamic advantages of displacement flow ventilation. The function is based on a homogeneous velocity profile at the point of discharge that results in only low levels of induction and hence superb and nearly draught-free performance.

Fire damper KA-EU
◀▶ B: 250 – 1,200 mm
H: 225 – 500 mm
Fire resistance class K90
according to DIN 4102



Diffuser PROCONDIF
⌚ 80 – 160 l/s
300 – 600 m³/h
◀▶ □ 600 x 600 mm and 625 x 625 mm





Hotel Divani Apollon, Kavouri/Athens, Greece

Ceiling diffusers ADLR

- 20 – 550 l/s
- 70 – 2,000 m³/h
- ▶▶ Ø 244 – 654 mm, □ 593 and 623 mm



Jet nozzles DUK

- 20 – 835 l/s
- 70 – 3,000 m³/h
- ▶▶ Ø 100 – 400 mm
- Aluminium



For more solutions and products visit www.trox-hotel-air.com

▶ Spa. ▶▶

High humidity and temperature changes put considerable strain on systems and materials. But the spa is the very place where comfort and wellbeing are the ultimate goals and must be provided by the air conditioning system.

The square ceiling diffusers of type ADLR are made of aluminium. They are particularly suitable for flush installation into ceilings and for room heights of up to 4 m. The diffusers can be used in supply air or extract air systems. Due to the fixed blade arrangement they are preferably used for horizontal air discharge.

As an alternative, energy efficient air water systems can be integrated into the floor and covered with **type BDX stainless steel grilles**.

Large AH grilles can handle adequate extract air flows.

DUK-V jet nozzles are used when the supply air has to overcome a large distance from the point of discharge to the occupied zone, such as in the indoor pool area. The nozzles are adjustable, and the discharge direction of the supply air flow can be easily changed by hand or else using an actuator.

▶ Underground car park. ▶▶

In underground car parks of hotels more than in other areas the ventilation must include a reliable fire protection and smoke extract system to provide maximum safety in case of a fire.

Type FKRS-EU fire dampers shut automatically to prevent the propagation of fire and smoke through ductwork to adjacent designated fire compartments. They are tested to EN 1366-2.

The purpose of **smoke extract dampers such as the EK-01** is to remove smoke via smoke extract systems.

Fire dampers FKRS-EU
 ▶▶ Ø 100 – 315 mm
 Classification: EI 90 (ve, ho i ↔ o)
 according to EN 13501-3
 Fire resistance class: K90
 according to DIN 4102-6



Smoke extract dampers EK-01
 ▶▶ B: 200 – 1,500 mm
 H: 200 – 800 mm
 Fire resistance class: EK30, EK60, EK90
 depending on application



For more solutions and products visit www.trox-hotel-air.com

Behnischhaus building, Krefeld, Germany





► Plant room. ►►

This is where you find the heart of the building management system. It is from this central location that all building services, including ventilation and air conditioning, are controlled. The air handling unit (AHU) is the 'lung' of the central BMS as it provides the air that is needed.

The X-CUBE air handling unit by TROX is a modular unit that can be optimised for different project conditions. All components are made in Germany and are of superior quality. They ideally complement each other and make the X-CUBE particularly efficient. Intelligent features simplify installation, maintenance and operation of the AHU considerably.

With their aerodynamically profiled splitter frames, **splitter attenuators** reduce the pressure drop in comparison with conventional splitters by up to 30%, which makes high energy savings possible. The splitters comply with the hygiene requirements of the VDI 6022 guideline. This ensures that the materials used are generally recognised as safe and do not provide a breeding ground for micro-organisms.

Filter technology from TROX.

In city centres the concentrations of particulate matter, ozone, and carbon dioxide are often higher than the levels permitted by the EU. TROX ensures that guests of hotels in city centres can also breathe fresh air. Thanks to its innovative filter technology TROX can manufacture filters for virtually every application situation. Minipleat filters with different pleat sizes and pleat spaces of only a few millimetres are just one example. Filters can thus be selected depending on the requirements of efficiency, volume flow rate, and pressure drop; the fan power can be reduced as a consequence.

X-CUBE air handling unit



Attenuators MKA 200

◀▶ L: 500 – 1,500 mm
H: 300 – 1,800 mm
Thickness: 100, 200 mm
Sheet steel, galvanised



Activated carbon filters

for wall and duct installation
for the adsorption of
gaseous emissions



Air handling unit X-CUBE

For more solutions and products visit
www.trox-hotel-air.com



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The art of handling air

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