

► Perfect climate for travelling ►►

Ventilation and fire protection technology at airports
Comfort and safety for passengers





► 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 has made TROX a leader of innovation in these fields.

Perfect systems from a single source.

The level of interaction between 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.

Working closely 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 well-being and to protect life and the environment.

► Perfect climate for travelling ►►

Airports are huge complexes with many and diverse requirements on ventilation and air conditioning. They are 'places of public assembly' and hence subject to safety regulations that ensure sufficient fresh air by mechanical ventilation and air conditioning systems. In the event of a fire, such systems also aid in the mechanical smoke extract in order to keep escape routes free from smoke.

Air conditioning system solutions for the entire complex.

As a system supplier, TROX offers the broadest spectrum of ventilation and air conditioning components, from air handling units, fire dampers and tunnel dampers to air terminal devices and air-water systems, and to control components and systems, providing specialist consultants with a multitude of options for complete airport solutions. Today, and in fact more than ever before, the focal point of air conditioning system design is energy efficiency. TROX has long been committed to the development of adaptable high-efficiency system solutions that help not only to save resources but also to reduce operating costs.

The highest safety standards due to innovative fire protection and smoke extract technology.

TROX has always provided important input to innovative solutions and been at the forefront of developing and enhancing fire and smoke protection as well as control systems, which are immensely important particularly at airports. Fire tests to determine the fire protection classification of building products for ventilation and air conditioning systems in accordance with national and international standards are regularly carried out in the TROX International Center for Fire Protection (ICB), which is the most modern of its kind.

Perfect air conditioning for airports:

- comprehensive and integrated with the central BMS
- adaptable and efficient
- reliable and safe



Palma de Mallorca, Spain



Hamburg, Germany



Madrid, Spain



► At home in the world's top airports ►►

Whatever your destination, chances are that TROX is already there. In many airports around the world, TROX products ensure well-being and safety for staff and passengers alike: with German engineering at its best!

TROX components and systems are installed at airports on all five continents. Whether international transport hubs such as New York JFK, Frankfurt, Singapore or Dubai, or domestic airports in other countries such as Australia, Ireland, Poland, Switzerland, Hungary, Austria, Greece or Brazil: Ventilation and air conditioning components and, even more importantly, innovative and proven fire protection and smoke control technology from TROX can be found at numerous airports all over the world. TROX has also developed individual solutions. The jet nozzles at Madrid Barajas, for example, blend in perfectly with the terminal's characteristic architecture by star architects Rogers and Estudio Lamela.

This application brochure is dedicated to the most critical ventilation and air conditioning issues that airports face these days. The main focus is on airport terminal ventilation, control, and fire and smoke protection. The requirements on air in the office buildings, restaurants, and shops at an airport are no different from those of other buildings where people go for work or leisure.

*Integration: TROX jet nozzles in the check-in area blend in nicely with the architecture.
Madrid, Spain*



Frankfurt/Main, Germany



► Cosmopolitan air ►►

The load requirements in an airport terminal vary. As a consequence, flexible air conditioning is in demand, creating a complex challenge for designers and specialist consultants. Most terminal buildings are unusually high and comprise diverse functional areas as well as stationary workplaces to which the comfort criteria for workplaces as stipulated in regulations and directives apply. It is therefore possible to create a so-called micro climate in the area where the ground staff works – a micro climate with its own air supply and individual heating or cooling systems.



Other aspects that need attention are related to the specific use of an airport terminal. Load requirements fluctuate and may be extreme – throughout a day but also depending on the season. High levels of comfort for passengers and staff can only be achieved with unconventional air handling concepts. The various concepts as well as the most critical parameters are given on the following pages.



TROX components, units and systems in an airport:

- 1 X-CUBE air handling units
- 2 Active chilled beams
- 3 Jet nozzles
- 4 Floor diffusers
- 5 Ceiling diffusers
- 6 Decentralised ventilation systems
- 7 Control units and systems
- 8 X-FANS EC roof fans
- 9 X-FANS jet ventilation systems
- 10 Fire dampers
- 11 X-FANS impulse jet fans
- 12 Tunnel dampers
- 13 X-FANS axial fans
- 14 Smoke extract dampers
- 15 TROXNETCOM
- 16 X-FANS smoke exhaust fans for roof installation
- 17 External weather louvres
- 18 Filters
- 19 Sound attenuators

Design criteria	Terminal					Shops and		
	Departure hall	Check-in counters	Service counters	Waiting areas	Security (baggage check)	Bars, café, bistro, restaurant	Shops	Lounges
Typical values of the most critical parameters in selected airport areas								
Specific area m ² /person	≥ 3	≥ 5	≥ 5	≥ 3	≥ 2	≥ 1.5	≥ 7	≥ 2
Fresh air flow rate in m ³ /(h m ²)	10 - 12	6	6	10 - 12	18 - 20	20	7	15
Fresh air flow rate in l/(s m ²)	3 - 4	2	2	3 - 4	5 - 6	6	2	4
Design values for room temperature [°C]								
Typical minimum room temperature when heating (winter)		20	20	20	20	20	18	20
Typical maximum room temperature when cooling (summer)		26	26	26	26	26	25	26
Sound pressure level, typical range [dB(A)]								
Standard design value	45	45	45	45	45	45	45	40
Air handling and transport								
Air handling units	•	•	•	•	•	•	•	•
Ventilation fans								
Filters	•	•	•	•	•	•	•	•
Sound attenuators	•	•	•	•	•	•	•	•
Control systems								
Volume flow controllers				•	•	•	•	
Control of AHUs	•	•	•	•	•	•	•	•
Ventilation systems								
All-air system - mixed flow (p. 12)	•	•	•	•	•	•	•	•
All-air system - displacement flow (p. 14)	•	•	•	•	•			•
Air-water systems (p. 16)	•	•	•	•		•		•
Smoke extract / fire protection / smoke control								
Smoke dilution and extract	•	•	•	•	•		•	
Creation of layers and smoke extract	•	•	•	•	•	•	•	•
Smoke exhaust with jet ventilation system	•							
Pressurisation systems								
Components for smoke control and fire protection systems								
TROXNETCOM with AS-i or LON Modbus	•	•	•	•	•	•	•	•
Smoke exhaust fans	•	•	•	•	•	•	•	•
Smoke extract dampers		•	•	•	•	•	•	•
Fire dampers		•	•	•	•	•	•	•
Smoke detectors		•	•	•	•	•	•	•
Duct smoke detectors		•	•	•	•	•	•	•

* For information on dampers please refer to the 'Safety first' section of this brochure.

** Installation in the fire zone, outside of the fire zone, or in a ventilated room; EN 12101, part 3.

restaurants		Administration			Other				Note
	Kitchen (extract air)	Offices	Conference and meeting rooms	Toilets (extract air)	Underground car park	Stairwells	Metro station	Escape tunnels	
		≥ 10	≥ 2						Based on EN 15251
60 - 80 p.p.	6	15	10	6					EN 15251
16 - 22 p.p.	2	4	3	2					EN 15251
20	20	20							EN 15251
-	26	26							EN 15251
55	40	35	45		45	45			EN 15251
•	•	•	•	•	•	•			
				•	•			•	Centrifugal, axial, duct, wall and roof fans
•	•	•							
•	•	•	•						
	•	•	•						
					•				
									Engineering principles
			•		•				DIN 18232, part 2 (natural systems) and part 5 (mechanical systems)
					•				VDI 2053 Engineering principles
						•		•	EN 12101, part 6
			•		•	•	•	•	
Extract air systems			•		•	•	•	•	F600, F400, F300, F200**
									Axial, roof, centrifugal, wall fans
			•		•	•	•	•	EN 12101, part 8
			•		•	•	•	•	EN 15650
		•	•		•	•	•	•	
			•		•	•	•	•	



Departure hall at Düsseldorf International airport, Germany, with jet nozzles, VDW air terminal devices and X-FANS smoke exhaust fans.

*Not shown:
large number of fire dampers.
As a special feature, the fire dampers
are equipped with smoke detectors
and spring return actuators.*



for take-off ▶▶

Airports have their own aerodynamics.

Airport terminals constitute probably the most challenging task for specialist consultants. On the following pages we describe some alternative approaches and deal with the vital role of intelligent control systems and of safe fire protection and smoke extract technology.

TJN jet nozzles

- 20 – 1000 l/s
72 – 3600 m³/h
- ◀▶ Ø 160 – 400 mm



VDL swirl diffusers

- 70 – 1225 l/s
237 – 5040 m³/h
- ◀▶ Ø 315 – 800 mm



For rooms of standard height:

AIRNAMIC swirl diffusers

- 40 – 385 l/s
144 – 1386 m³/h
- ◀▶ Ø 400 and 600 mm
□ 300, 600, 625 mm



PASSCLEAN ceiling diffusers

- 111 – 222 l/s
400 – 800 m³/h
- ◀▶ Ø 600 mm
□ 800, 825 mm



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

▶ Airport air All-air system: mixed flow ▶▶

Good air quality in a terminal building can be achieved only with a sufficient fresh air flow rate that is based on the number of occupants. With a classic all-air system one would need a specific supply air flow rate of 6.0 to 20.0 m³/(h m²). The required temperature is generally provided by the supply air. In the highest areas of the departure and arrival halls, air is usually supplied with either actuator-driven or self-powered jet nozzles.

In functional areas with a clear height of up to 6.0 m, fresh air is supplied with adjustable swirl diffusers or other ceiling diffusers. Mixed flow ventilation means that supply air and room air mix evenly such that a uniform temperature and air distribution is quickly achieved. Sophisticated air terminal devices with specific blade contours ensure that high airflow velocities and temperature differences are quickly reduced.

Variant: Mixed flow ventilation with jet nozzles

Occupied zone: airflow velocity near the ground

- Sitting areas and workstations < 0.2 m/s

- Free jet entry area (should not be used for workstations) < 0.5 m/s

Supply air temperature – mixed flow 16 to 18 °C

Proportional cooling capacity in case of mixed flow up to 80 W/m²

The adjustable TJN jet nozzles are made of high-grade polymer and allow for adapting the supply air flow to different conditions. The enhanced jet nozzles are acoustically optimised and more energy-efficient than similar products since the actuator is fitted on the outside and does not lead to any additional pressure drop.

VDL swirl diffusers are suitable for large volume flow rate ranges and can be adjusted mechanically or manually. Blade adjustment allows for optimum ventilation (purging) of the occupied zone while high comfort requirements are met at the same time.

The stand-alone LON-WA TDC module is used for the control of adjustable air terminal devices independent of the temperature; it can be integrated with a central BMS easily and flexibly.

AIRNAMIC swirl diffusers are fitted with innovative air distribution elements that combine an extremely quiet air discharge with the optimum swirl. The most demanding comfort requirements can thus be met, even with very high volume flow rates.

PASSCLEAN ceiling diffusers are ideal for departure halls with their high passenger volumes. With PASSCLEAN diffusers, contamination of the ceiling is avoided in spite of the high secondary air induction.



401

AIR FRANCE
KLM nwa
business elite elite plus
service bagage drop-off

AIR FRANCE KLM
Lespace elite Business
elite / elite plus
←

AIR FRANCE KLM
AIR FRANCE KLM
AIR FRANCE KLM



↓ Gates Puertas K83, K89

→ Gates Puertas K83, K89

→ Gates Puertas K83, K89

► Airport air All-air system: displacement flow ►►

Displacement flow systems may be combined with mixed flow systems; they can also be used for situations where small or medium air volumes are required and where only smaller heat loads (e.g. from people or equipment) must be dissipated. If necessary, additional passive cooling systems may be used.

Displacement flow systems are ideal in places where maximum comfort is required, e.g. for the airport staff. Low airflow velocities help to keep workplaces free from turbulence while ensuring high room air quality.

Variant: Displacement flow combined with large area heating and cooling systems, e.g. chilled ceilings

Airflow velocity

- Occupied zone, sitting areas and workstations	< 0.2 m/s
- Near zone of displacement flow diffusers (within 5 m)	< 0.5 m/s
Supply air temperature with displacement flow ventilation	20 to 22 °C
Proportional cooling capacity by supply air	20 to 40 W/m ²
Extract air temperature near the roof	up to 32 °C

TROX displacement flow diffusers are available for many different installation situations and in a multitude of forms and appealing designs; they can be aesthetically integrated into existing architectural designs. In fact, special designs have been produced for several airports.

Displacement flow ventilation requires that the supply air temperature is lower than the room temperature. Displacement flow diffusers, which should be installed as close to the floor as possible, supply air to the room such that a supply air pool is created. The convection from people and other heat sources causes the air in this supply air pool to rise. The extract air is then removed above the occupied zone, ideally near the roof.

The QL displacement flow diffusers with their special air distribution nozzles are characterised by an excellent, uniform velocity profile and a smaller near zone.

QL-WR displacement flow diffuser, circular, without duct covering

- 🌀 10 – 430 l/s
36 – 1545 m³/h
- ◀▶ Ø 200 – 630 mm
H: 600 – 2000 mm



QL-WV displacement flow diffuser for wall installation, 90° construction for corners, without duct covering

- 🌀 10 – 411 l/s
36 – 1481 m³/h
- ◀▶ B: 190 – 450 mm
H: 600 – 1500 mm



DID 632 active chilled beams

Primary air:

☞ 6 – 85 l/s

22 – 306 m³/h

◀▶ L: 900 and 3000 mm

B: 593, 598, 618 and 623 mm

H: 210 mm

Cooling capacity up to 2450 W

Heating capacity up to 2970 W



PKV passive chilled beams

Rectangular

◀▶ L: 900 – 3000 mm

B: 180 – 600 mm

H: 110 – 300 mm

Cooling capacity up to 1400 W



▶ Airport air Air-water systems ▶▶

More and more air-water systems are employed today since the heating and cooling capacity of these systems can be provided independent of the required fresh air flow rate. Various types can be distinguished:

- large-area heating and cooling systems, e.g. chilled ceilings, combined with displacement flow systems
- passive chilled beams combined with mixed flow systems
- active chilled beams

Air-water systems have the advantage that the thermal energy is very efficiently transported by water – rather than by air. This means that less energy is required to provide the same heating or cooling capacity. In the airport areas with offices, shops and restaurants, thermal loads are ideally dissipated by water side heating and cooling systems.

Air-water systems are suitable for the ventilation of functional areas with an average required fresh air volume of up to 12 m³/(h m²). For areas with a very high occupancy, such as security, an additional system can provide up to 20 m³/(h m²).

The **DID 632 active chilled beam** offers comfortable ventilation and air conditioning for rooms with a high heat load. The aerodynamic properties of ceiling diffusers in combination with the energy-efficient dissipation of heat loads using water make active chilled beams the perfect solution for sustainable architectural concepts.

PKV passive chilled beams (no supply air) are used to dissipate high interior heat loads, thereby fully achieving the energy benefits of dissipating loads with water.

TROX air-water systems allow for the space-saving integration of additional components such as lighting, smoke detectors, loudspeakers or sprinklers. Air-water systems may be designed as canopies, for example, to accentuate a building's architecture, or blend in inconspicuously with the ceiling construction. All systems can be integrated with the central BMS.





▶ Safety



first



Effective fire protection saves lives.

Ventilation and smoke extract technology are crucial factors for the safety of an airport terminal. Fire professionals will find it reassuring that they can obtain functioning fire protection and smoke extract systems from a single source. From smoke detectors and control components to fire and smoke extract dampers and to smoke exhaust fans: TROX system components complement each other, can be interconnected, and are easy to integrate with the central BMS.



► Fire prevention ►►

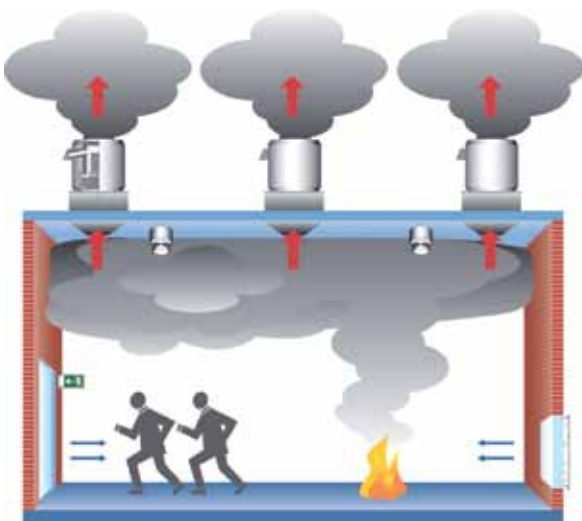
Airports are complex buildings. Huge quantities of air are supplied to and extracted from an airport terminal. In the event of a fire, adjacent areas such as shopping zones must be closed off from the departure hall. Underground car parks present, due to their low ceiling, a particular challenge for smoke extract systems. Following the devastating fire at Düsseldorf airport in 1996, airports all over the world have examined and modernised their smoke control and smoke exhaust systems. Düsseldorf International is today one of the most modern and safe airports with regard to fire and smoke protection.

The prime objectives of fire and smoke protection are as follows:

- Ensure the safety of people
- Support the firefighters in extinguishing the fire and in rescuing people
- Ensure the safety of buildings and equipment (keep disruption of operations to a minimum)

For these objectives to be achieved, modern smoke extract management for complex buildings must fulfil a multitude of tasks:

- A fire must be detected, and an alarm emitted, at an early stage – even if the temperature remains comparatively low, e.g. in case of a smouldering fire.
- The smoke extract system must be automatically triggered at an early stage to give the people in a building sufficient time to escape.
- Spread of the fire and transmission of smoke to adjacent occupied zones must be prevented, e.g. by a mechanical smoke exhaust system.
- Positive pressure must be maintained in corridors, stairwells, and escape and rescue routes; pressurisation systems must be installed.
- Escape routes must allow passengers and staff to safely escape as quickly as possible.
- In the event of a fire, elevators must be made to stop only on floors where no smoke has been detected.



A mechanical smoke exhaust system ensures a smoke-free layer with a height of at least 2.50 m, extending the time available for escape; this is essential for large indoor spaces such as departure halls, atria, or conference rooms.

FK-EU/FKS-EU fire dampers

Rectangular
B: 200 – 1500 mm
H: 100 – 800 mm
Classification to EN 13501-3:
EI 90 (ve, ho i↔o) S



FKRS-EU/FKR-EU fire dampers

Circular
B: 200 – 800 mm
H: 100 – 200 mm
Classification to EN 13501-3:
EI 90 (ve, ho i↔o) S



RM-0-VS-D smoke detector

- Bus-enabled version as an option
- Airflow velocity: 1 to 20 m/s



TROXNETCOM

- Digital monitoring and triggering of fire protection and smoke control equipment
- Highest safety standards to EN 61508 (VDMA 24200-1) tested by TÜEV, Germany
- Easy installation and integration with central BMS
- Integral maintenance function



For more solutions and products
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► Fire protection: tested, CE-certified and with building inspectorate approval ►►

Large airports offer many applications for TROX smoke extract systems. Our smoke extract components and systems are the basis for effective smoke extract management. With such safety-relevant systems, components from a single source are the best solution for critical interfaces.

Our fire dampers and smoke extract dampers as well as the X-FANS smoke exhaust fans have been certified to EN standards and approved by the building inspectorate in Germany for many applications. TROX engineers are experts in their fields and always apply the latest findings from both TROX fire tests and tests by independent testing institutes to the design; as members of standardisation committees they also provide valuable input to these bodies.

Intelligence inside. TROX fire engineering products.

Fire dampers must close at a certain temperature or when smoke is detected. They effectively close off adjacent fire compartments and prevent the spread of fire and smoke.

TROXNETCOM communication systems for AS-i or LON, and with Modbus or BACnet interface, ensure the seamless integration of TROX fire protection and smoke extract components with central building management systems. In airports, which are frequented by many passengers with restricted mobility, complete system solutions for fire protection are indispensable. They ensure that a fire is detected at an early stage and prevented from spreading; they also ensure the smooth escape of people and the evacuation of buildings. TROXNETCOM offers solutions that are SIL2-certified and provide overall safety even in case of a malfunction.

TROX smoke detectors of Types RM-0-VS-D-LON/RM-0-3-D detect smoke in ducts at an early stage and independent of the temperature, and they release the fire dampers such that they close. The detectors are fitted with comprehensive self-monitoring functions (contamination, airflow, electronics) and require maintenance only once per year.





Infrared sensors and emitters on the walls of the Düsseldorf airport departure hall – at 5 m from the ground and with a distance of less than one metre from each other – detect smoke immediately and trigger an alarm. The axial fans under the ceiling start working at once to extract the smoke.

► Smoke is in the air X-FANS smoke exhaust systems ►►

In complex buildings, such as departure halls, smouldering fires can easily have devastating effects if they are not immediately detected. Mechanical smoke exhaust systems can provide a higher level of safety than other systems. They create smoke-free layers along the escape and rescue routes and therefore allow people in the building to escape by themselves. Smoke exhaust fans remove smoke gases, thus preventing smoke from spreading uncontrollably and supporting the firefighters in extinguishing the fire.

Mechanical pressurised smoke exhaust systems remove not only smoke but also dissipate the heat, thus preventing a dangerous flash over. The required air transfer dampers open at the same time.

Requirements of a pressurisation system.

Keeping the layer with smoke gases separate from the smoke-free layer requires a delicate combination of supply and extract air; the following conditions must be met in particular:

- At the boundary between the smoke gas layer and the smoke-free layer, only minimal horizontal and vertical airflows at low velocities should be present, if at all.
- Supply air openings must be adequately sized and be installed at the right distance from each other. They must open automatically before the smoke exhaust fans are switched on.
- Supply air must be discharged into the smoke compartment considerably below the layer with smoke gas, ideally with no or very little impulse, and at a low velocity (< 3 m/s).
- The smoke exhaust openings should be at regular distances and ideally at the highest point.
- The smoke compartment must be limited with regard to the required smoke-free layer, the thermal capacity of the surrounding structure, and the fire capacity to be considered.
- The condition of the fans is to be inspected regularly. The integral X-FANS diagnosis system helps to detect any damages at an early stage and thus allows for condition-based maintenance.
- Keeping spaces free from smoke – pressurisation systems: Systems must be in place that keep escape and rescue routes, especially stairwells, free from smoke. The supply air must be discharged into the direction of the fire and away from the areas to be protected.

The smoke exhaust fans have two operating modes:

- Permanent ventilation and smoke exhaust in the event of a fire
- Smoke exhaust only

X-FANS smoke exhaust fans are available for 200 °C, 300 °C, 400 °C and 600 °C.



There are four types of X-FANS smoke exhaust fans:

- Roof fans
- Axial fans
- Centrifugal fans
- Wall fans

 **Fans**

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

X-FANS smoke exhaust fans remove the smoke gases from the individual fire compartments in the garage. Customers have a choice of different constructions for various temperature ranges, depending on the garage layout.



Construction and performance of X-FANS smoke exhaust fans

Smoke exhaust fans	Volume flow rate up to (m ³ /h)	Temperature
Roof fans	55,000	600 °C
		400 °C
		300 °C
		200 °C
Axial fans	265,000	600 °C
		400 °C
		300 °C
		200 °C
Centrifugal fans	160,000	600 °C
		400 °C
Wall fans	55,000	600 °C
		400 °C
		300 °C
		200 °C

► Smoke exhaust in underground car parks Danger lurks below the surface ►►

Cars catching fire in underground car parks are more common than one should think. A car catching fire in a car park under an airport terminal poses a particularly high safety risk. The real danger, however, are the highly poisonous smoke gases.

Smoke extract via the ductwork.

The first and foremost task of extract air systems is removing the exhaust fumes through extract air ducts while fresh air is led into the garage via ventilation ducts or other openings such as the access slope. The heart of such a system is a two-stage axial fan. In the event of a fire, the second axial fan for smoke exhaust is automatically switched on.

The smoke gases rise towards the ceiling from where they are removed through duct systems. Creating different layers is usually not possible in underground car parks because of the lack of height.

Keeping spaces smoke-free with a jet ventilation system (JVS).

Jet ventilation systems are an alternative to conventional smoke exhaust systems. When in ventilation mode, the combined effect of radiation and induction of the jet ventilation fan ensures a particularly efficient mixing of air, the removal of CO gases and hence fresh air in the underground car park. The volume flows calculated for the car park are created by fans installed in the central shafts and are directed towards the outside; dedicated extract air and smoke extract ducts are not required.

In the event of a fire, the smoke gas temperature increases, and the gases rise towards the ceiling, where they spread. If smoke is detected, the fans, which are installed in the extract air ducts, are switched on and remove the smoke from under the ceiling. At the beginning, a layer is created which is nearly free from smoke. Escape and rescue routes are hence easy to recognise and allow people to leave the building.

The jet ventilation fans are only switched on after about three to five minutes. By that time, the people will have left the underground car park via the short escape routes. The jet ventilation fans dissolve the smoke layers in the previously selected areas, and 'dead corners' are being cleared. The firefighters can now locate and eventually extinguish the fire without being obstructed.

The jet ventilation system allows for large fire compartments so that underground car parks can be designed accordingly – open, spacious, and pleasant. Users will welcome the additional ease of orientation, feel better, feel safer – and are indeed safer in such a garage.



▶ Roger



Düsseldorf, Germany

and clear ▶▶

Intelligent systems ensure quiet, clean and efficient air supply.

The functional areas of an airport are usually divided into different 'control zones'. Volume flow controllers react to the air quality and adapt the volume flow rate for every zone separately and based on demand, while frequency converters control the fan speed, again based on demand. This saves valuable energy and reduces the 'air transport cost' considerably.

X-CUBE air handling units are extremely variable and adaptable to different control strategies and room conditions.



X-CUBE air handling unit



Extensive filter programme – certified by Eurovent.



The wide spectrum of TROX TLT ventilation fans suits the most diverse locations and applications.



To find the best suitable fan, go to the configurator at www.trox-tlt.com

► Air management: handling and conditioning airflows ►►

For an airport with its different buildings and areas, air handling units have to be highly variable and provide utmost adaptability to each control strategy. Flexibility with regard to the installation is an advantage since the units have to be adapted to different locations and conditions.

The air around an airport terminal is, as expected, highly contaminated, mainly by unburnt kerosene. This is why effective filtering is mandatory, as are hygiene and ease of cleaning.

TROX X-CUBE air handling units are very versatile. They can be individually configured and are hence suitable for a wide spectrum of applications. More than 70 construction variants can handle volume flow rates of 1200 to 86,000 m³/h at an airflow velocity of 2 m/s. X-CUBE units are available as supply or extract air units or as a combination of both. Depending on the installation location, they can be arranged side by side or on top of each other. The cubes are also available for outside installation on roofs, and thanks to the lifting eyes at the top they can be easily moved and lifted with a crane. This simplifies installation and reduces the installation time considerably.

The duplex powder coating (corrosion protection class C4) and the stainless steel condensate drip tray, which is sloped on all sides, ensure optimum corrosion protection. Ease of operation and cleaning are further advantages. As an option, the X-CUBE units can be fitted with high-efficiency activated carbon filters for the separation of kerosene mist. Heat recovery systems and EC fans ensure high energy efficiency. The units are available with an integral measurement and control system upon request. And last but not least, they can of course be integrated with various building management systems.

TROX TLT X-FANS ventilation fans can be perfectly adapted to diverse ventilation requirements. Whether large or small airflows – or even extract air from commercial kitchens –, TROX TLT offers a suitable fan. Just go to the configurator software at www.trox-tlt.com.

X-FANS ventilation fans and performance

Ventilation fans	Max. motor rating [kW]	Max. volume flow rate [m ³ /h]	Max. pressure [Pa]
Axial fans	280	400,000	4000
Centrifugal fans	130	200,000	4000
Roof fans	30	55,000	2300
Duct fans	12	12,000	1200





► Air management: control strategies ►►

The functional areas of an airport are usually divided into different 'control zones'. Volume flow controllers react to the air quality and adapt the volume flow rate for every zone separately and based on demand, while frequency converters control the fan speed, again based on demand. This saves valuable energy and reduces the 'air transport cost' considerably.

The control strategy of the air handling unit for the base load of an airport depends on an adjustment of the volume flow rate in relation to the air quality. With an air-water system the temperature is controlled separately by water side systems. Only for peak loads is volume flow control included in the overall control of the room temperature.

Intelligent TROX control systems ensure that all TROX air conditioning components, including the air handling unit, complement each other perfectly. Components, units and systems from a single source reduce the design and coordination effort considerably.

VARYCONTROL VAV terminal units such as TVR/TVT are fitted with electronic controllers. Customers have a choice of many different control components to suit each situation, be it for integration with the central BMS or to safely shut off fire compartments (power off to close). The temperature and/or quality of the room air can be individually adjusted by changing the supply air flow rate. The system only supplies the amount of air required, which saves energy.

TROXNETCOM

- Easy commissioning and integration with the central BMS
- Integral maintenance function

VAV terminal units

TVR, circular

V: 10 – 1680 l/s

V: 36 – 6048 m³/h

Δp: 20 – 1500 Pa

Ø 100 – 400 mm

TVT, square, rectangular

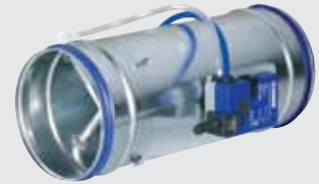
V: 45 – 10,100 l/s

V: 162 – 36,360 m³/h

Δp: 20 – 1000 Pa

B: 200 – 1000 mm

H: 100 – 1000 mm





Wherever you touch down, chances are that TROX is already there. TROX provides a comfortable indoor climate and ensures safety in the most important airports of the world. Our list of reference projects covers airports from A as in Amsterdam to Z as in Zurich.

*AMS – Amsterdam
ATH – Athens
BER – Berlin
BCN – Barcelona
BIO – Bilbao
BUD – Budapest
DRS – Dresden
FRA – Frankfurt/Main
HAM – Hamburg
HKG – Hong Kong
LHR – London
LUX – Luxemburg
MAD – Madrid
MUC – Munich
JFK – New York
PMI – Palma de Mallorca
GUG – Rio de Janeiro
WAW – Warsaw
ZRH – Zurich*

TROX[®] TECHNİK

The art of handling air

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