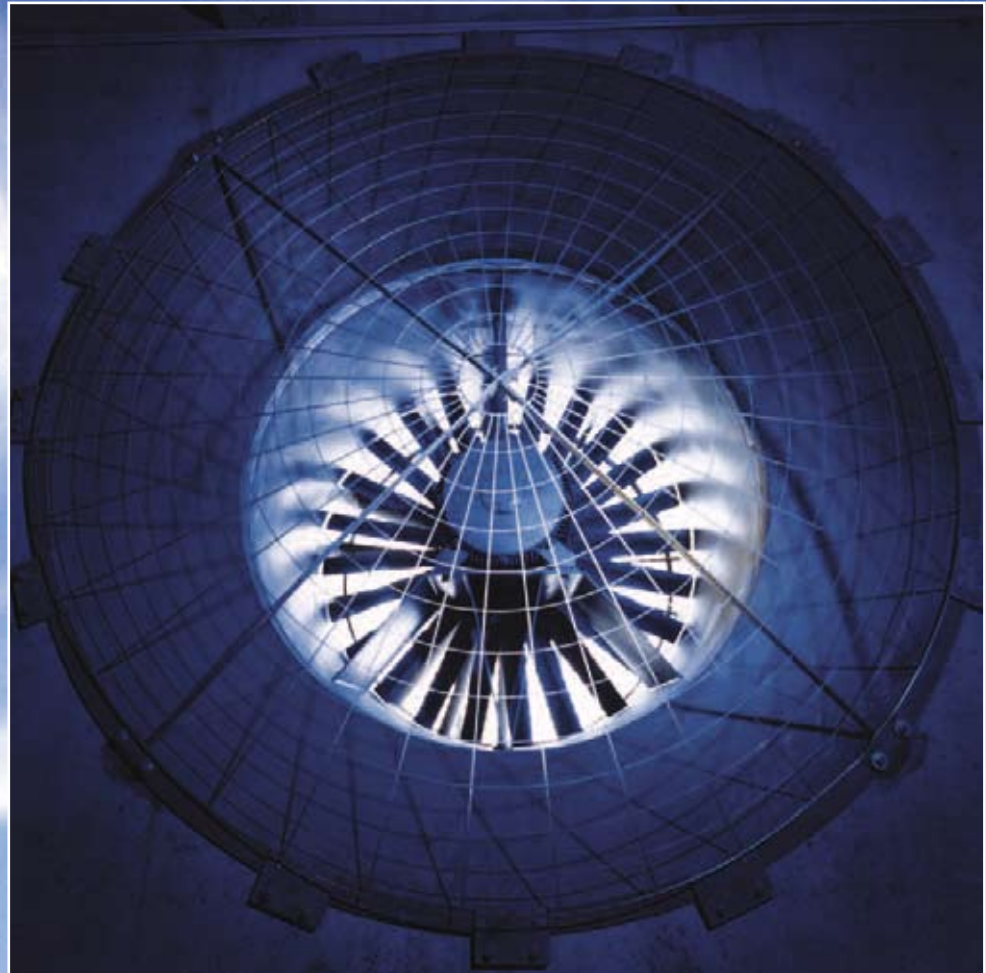


Precise Air Management
Global Leaders in Tunnel & Metro Ventilation



Fläkt Woods experience – at your service

Fläkt Woods is a global leader in air management. We specialise in the design and manufacture of precision technology to deliver complete, integrated solutions. In everything we do, energy efficiency and environmental responsibility are always our major priorities. And our collective experience is unrivalled.



Our knowledge and reputation has been built up through a century of engineering innovation and development. This reflects an impressive track record that equips all our customers with a special confidence. An assurance that, whatever the need or application, Fläkt Woods can deliver the product, the performance and the service that is required. Precisely.

Our expertise is not confined to original manufacture and supply. It is available to you from the selection process onwards, and continues well beyond installation, throughout each system's operating life.

When you first select and install one or more of our systems, our partnership with you is only just beginning. Because you'll always be able to call on Fläkt Woods experience. We're at your service.



Leaders in Air Movement

Our extensive knowledge of design and applications is based on over 100 years of experience in tunnels, buildings, industry and original equipment manufacturers. Fläkt Woods' global coverage reaches over 100 countries and is supported by an extensive distribution network.

Our expertise in tunnel ventilation applications covers road and rail tunnels, metros, tunnel construction, mining and wind tunnels. Fläkt Woods' products have been successfully used in underground projects throughout the world and our Jetfoil and JM Aerofoil product ranges are unrivalled in their technology, innovation and efficiency.



Certification - EN 12101-3 and ISO 21927-3

Emergency, High Temperature, Smoke Extract Fans fall within the scope of the EU Construction Products Directive.

The implementation of the Construction Products Directive and the publication of the product specific standard, EN 12101-3 have made it a mandatory requirement for smoke control fans sold into the European Union to carry a CE Mark from April 1st, 2005. The CE mark may only be affixed after successful completion of testing, auditing of factory production control and the issue of a certificate by accredited independent authorities.

This procedure is intended to prevent fan failures during an emergency smoke situation, where a fan failure can ultimately lead to the loss of life.

ISO 21927-3 is in accordance with the aims and objectives of the EU's Harmonised Standard EN12101-3 (described above); however, because ISO 21927-3 applies globally, it provides specifications against which powered smoke and heat exhaust ventilators can be evaluated and certified outside EU member states.

Fläkt Woods fully endorse the concept that, in such a safety critical application, only fully verified and certified products should be specified. This made the decision to test and certify this core product range all the more easier. The decision was made to embark on a major testing programme, the JM HT range was successfully tested in compliance with this demanding new legislation with minimum complications.

The certification of large fans has been made challenging as there were no independent laboratories capable of testing the largest fans. Since 2006, Fläkt Woods have been working with the certifying authorities to built and certify a high temperature facility capable of testing fans up to 3.5 meters diameter at up to 400°C. This investment resulted in Fläkt Woods being able to offer a British Standards Institution Certified, CE marked JM HT product including 200°C/2 hours, 300°C/2 hours, 400°C/2 hours ranges, in diameter starting at 1400mm up to a maximum of 2800mm at relevant time/temperature categories. Fläkt Woods offers a comprehensive range of approved accessories.

Fläkt Woods have enhanced their position as the foremost provider of specialist products for emergency high temperature smoke control by becoming the first fan manufacturer in the world to be able to apply CE marking to these safety critical products, ensuring that Fläkt Woods has one of the most comprehensive range of products available in the World.

It is also believed that Fläkt Woods is now the only manufacturer to have successfully tested a 2.24 metre diameter fan, running at 1500 rpm, with a 1MW motor.



Applications

Tunnel and Underground Construction

Fläkt Woods products provide safe ventilation during the construction of tunnels. Our underground ventilation product range provides fresh air and removes pollution, heat, humidity and dust caused by blasting.

Mining

Mine ventilation requires control of both the air quality and air movement to ensure the health, safety, and comfort of the workers is not compromised. Fläkt Woods have the fans and the expertise to meet this challenge.

Wind Tunnels

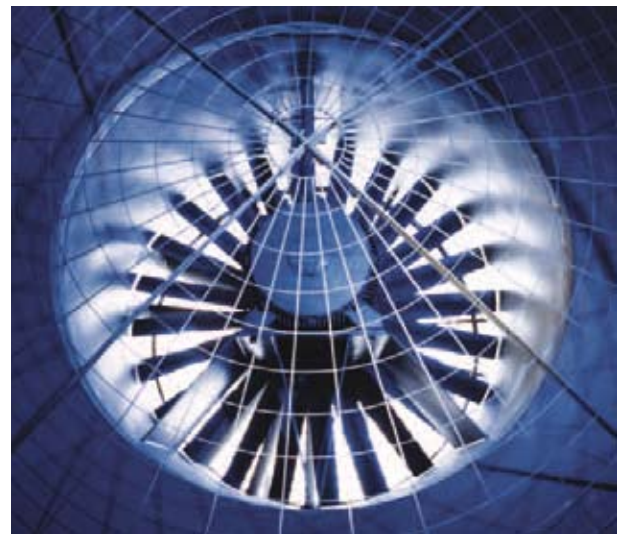
Using our extensive knowledge and experience in aerodynamics, acoustics and mechanical design, Fläkt Woods is an ideal partner for wind tunnel applications. Fläkt Woods has fans for aeroacoustic, climatic, aerodynamic or other types of wind tunnels, regardless of whether the impeller diameter is 500 mm or 15 m.

Road Tunnels

Fläkt Woods' Jetfoil and JM AEROFOIL fans are ideal for the efficient ventilation and removal of pollution and smoke in all types of road tunnels.

Metro and Underground Railways

High levels of heat are generated by trains and electrical equipment and Fläkt Woods' Jetfoil and JM AEROFOIL fans are used throughout the world to effectively ventilate metros. Heat removal, fire smoke control and ventilation are just some of the features provided by our innovative fans.



Axial Tunnel Fan Range

Performance

The range of tunnel fans have been designed and developed using the latest design tools for aerodynamics and acoustics. Tested in accordance with ISO 5801 and ISO 5136 in order to give guaranteed performance.

Products

The fan is available as either a high efficiency unidirectional fan or fully reversible fan with the same performance in both directions of flow. JM AEROFOIL fans are available in horizontal and vertical arrangement.

Reversibility

The truly reversible fans have the same performance in both directions of flow.

Anti-Stall

The unique stabilising ring controls and stabilises the turbulence occurring in a heavily throttled fan. An axial fan without this stabilising ring would be forced to surge, which may eventually lead to material fatigue and operation disturbances.

Efficiency

The fans are designed for high efficiency in both directions of flow. A wide range of diameters is offered allowing the optimum size fan to be selected.

Quality

Engineered to the highest standards our design and manufacturing systems also carry BS EN ISO 9001 accreditation. The fans have a 2 year ex-works warranty as standard.

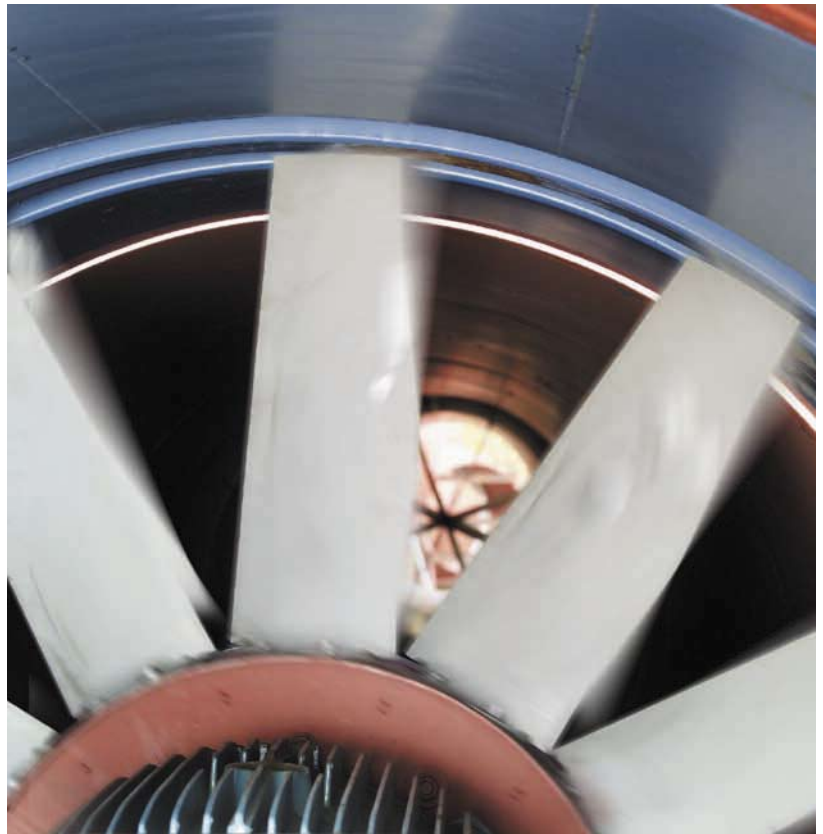
Reliability

Our experience gained from installations throughout the world assures our reliability.

Range

Large fans - range from 1.4 m to 2.8 m with flow up to 200 m³/s and pressure up to 400 Pa.

Jetfoils - up to 1.6 m and thrust up to 3500 N.



Product Life Cost

The Axial Tunnel fan range combines high efficiency, low operating costs and a low maintenance requirement to ensure a low life cycle cost.

Designed for Installation

The fans are delivered as a complete unit allowing quick and easy installation.



Tunnel Research Centres

Expertise in Tunnels and Metros

Our Tunnel Centre of Excellence is located in Colchester, UK where we are constantly developing and testing new ideas and materials for the tunnel fans of the future. At this laboratory we use state of the art computer modelling techniques to improve the performance of our fans in every area from high efficiency dynamics to low sound power acoustics. This experience and expertise is also available to our customers. The Tunnel Centre of Excellence is the strongest source of up to date information for specifiers in underground ventilation.



Further information and guidance

Whatever the size of your planned air management systems installation, you can be sure that, at Fläkt Woods, we're always ready to help.

To supply expert advice, information and guidance.

And to ensure selection and specification of an integrated system that exactly matches the detailed needs of each building.

We're also equipped to provide the best possible support throughout the operational service life of each installed system.

About other Fläkt Woods systems

Tunnel fans are just one part of our comprehensive solutions for your air management needs.

To get the bigger picture, you can request introductory literature for our other air management systems:

- Air Handling Units
- Chillers
- Fans
- Chilled Beams

Selection and specification advice

If you'd welcome expert assistance with design, selection and system specification, the Fläkt Woods Sales Team can be contacted on:

01206 222555 or

email info.tunnels@flaktwoods.com

Upgrades and system monitoring

If you're looking to upgrade or refurbish an existing installation, Fläkt Woods Technical Site Services Team are the experts. They can also help extend operational service life, ensure legal compliance, and monitor and maintain efficient operation of your installed systems. Our brochure can tell you more.

Call 01206 222547 or

email service.uk@flaktwoods.com



Unrivalled R&D facilities

As leading pioneers in our specialist fields, Fläkt Woods has one of the world's largest networks of facilities for testing entire air climate solutions.

Our dedicated laboratory in Colchester, unique in the UK, is equipped to demonstrate and prove product performance and control strategies. We have further R&D facilities in Sweden, Finland, France and the USA.

Specific dynamic testing capabilities include measurement and study of:

- Comfort levels
- Cooling and heating outputs
- Velocity profiles
- Noise criteria

We also use advanced software tools for theoretical design, covering:

- Computational fluid dynamics [CFD]
- Product/component design
- System selection

In all, across Europe, there are 6 Fläkt Woods Technical Centres. More than 270 skilled personnel are constantly focused on maintaining technological progress, system performance and product quality.

Sample Project Tunnel & Metro Reference List

Road Country	Project		
Algeria	Algerian Road Tunnel	UK	Limehouse Link
Australia	Mitcham Frankston Freeway	UK	Terminal 5 - Coach Station
Australia	M5 East Tunnel	UK	T5 - Taxi Bridge
Australia	Lane Cove	UK	Blackwall Tunnel
Austria	Wske Tunnel	UK	New Tyne Crossing
Belgium	Gare De Namur	Yemen	Sayhut-Nishtun Road Project
China	Hu Rong Su Tunnel		
China	Chong Qin Fang Dou Shan	Rail/Metro Country	Project
China	Sky Pier (Tunnel 1)	Australia	Parramatta Rail Link
China	Hu Nan Jia Hou Yan	Austria	U3 Station Erdberg
China	Hu Nan Xue Feng Shan Tunnel	Austria	U2/1 Schottenring
Croatia	Tunnel Trsat	Austria	River City
Croatia	Tunnel Skurinje	Austria	U1 Unterwerk
Croatia	Sveti Rok 2	Austria	U2 Messe
Croatia	Mala Kapela	Austria	U4 Schottenring
Croatia	Veliki Glozac	Austria	Vienna Metro - Gross
Croatia	Tunnel Bisko	Austria	Vienna Metro - Leoup
Croatia	Tunnel Mravince	Brazil	Sao Paulo Metro Line 4
Croatia	Tunnel Strazina	Canada	TTC Shepherd
Croatia	Cardak	Canada	TTC Petrofit
Croatia	Brezovica	Canada	Montreal STCUM
Croatia	Sveta Tri Krajlja	China	Guangzhou Metro
Croatia	Mala Kapela	Denmark	Copenhagen Metro
Dubai	Dubai International Airport	Dubai	Dubai Light Railway
Finland	Kehu Project	Greece	Attiko Metro - Elliniko Ext.
Finland	Hakamaentie/Kivihaka Tunnel	Greece	Egnatio Odos Driscos Tunnel
Finland	Vuoli Tunnel	Greece	Attiko Metro, Athens
Greece	Egnatia Odos-Panagia-Grevena	Hong Kong	TKO South Hong Kong
Greece	Eftaxias	Hong Kong	Beacon Hill Tunnel
Hong Kong	Route 8	Hong Kong	Lok Ma Chau
Hong Kong	Sky Plaza	Hong Kong	Penny's Bay Line
Hong Kong	Lantau Airport & Railway	Hungary	Budapest Metro Line 2
India	DAMEL	Hungary	Budapest Metro Line 4
India	C Doctor	India	Delhi Metro Phase II
Italy	Seiano Tunnel	India	Delhi Metro
Italy	Montenegrone Project	India	DMRC Phase 1 (Mc1b)
Italy	Martignano	Iran	Mashhad Metro
Italy	Gran Sasso	Italy	Passante Ferroviario Di Torino
Italy	Mongrando Tunnel	Italy	Torino Di Bologna
Italy	Gra Salva Candida	Italy	Nodo Di Bologna
Italy	Cesena Tunnel	Italy	Passante Ferroviario
Italy	Valsassina Tunnel	Italy	Turin Metro
Italy	Spezia	Italy	Turin Metro Lot 6c Project
Italy	Lonato Tunnel	Italy	Rome Rail Station
Italy	Ronco Tunnel	Italy	Avigliana
Italy	Val Badia Tunnel	Italy	Alifana Metro
Italy	Marinasco Tunnel	Italy	Milan Metro
Malaysia	SMART	New Zealand	Britomart Project
New Zealand	JHT New Zealand	New Zealand	Otira Rail Tunnel
Norway	E18 - Bjorvika Tunneln	Portugal	Lisbon Metro
Norway	Norway Road Tunnel	Romania	Bucharest Metro
Norway	Mesta As	Singapore	CCL2
Poland	Rondo Tunnel	Singapore	CCL3
Portugal	Tunnel Do Rossio	Singapore	CCL4
Puerto Rico	Tven Urbana	Singapore	CCL5
Qatar	New Doha International Airport	Singapore	KPE Expressway
Qatar	NDIA Free Trade Zone	Singapore	North East Line
Saudi Arabia	Jamarat Bridge Phase II	Taiwan	Nankang Extension Project
Saudi Arabia	Jamarat Bridge Basement	Taiwan	KMRT
Saudi Arabia	King Khalid Road Tunnel	Turkey	Adana Metro
Serbia	Vrmac Tunnel	UK	Bank Station
Singapore	Singapore Metro Link	UK	Channel Tunnel Rail Link
Sweden	Arlandabanan, Stockholm	UK	Cooling the Tube
Switzerland	Biasca Tunnel	UK	Docklands Light Railway
Taiwan	Pinglin	UK	Jubilee Line Extension
UK	A3 Hindhead Tunnel	UK	Liverpool Street Station
UK	Bell Common Tunnel	UK	T5 Track Transit
UK	Holmesdale Tunnel	UK	Woolwich Arsenal Extension
		Venezuela	Valencia Metro

Precise Air Management

Fläkt Woods is a global leader in air management. We specialise in the design and manufacture of a wide range of air climate and air movement solutions. And our collective experience is unrivalled.

Our constant aim is to provide systems that precisely deliver required function and performance, as well as maximise energy efficiency.

Solutions for all your air climate and air movement needs

Fläkt Woods is the only company in the UK capable of providing total system solutions from the following portfolio:

- Fans

Advanced axial, centrifugal and boxed fans for general and specialist applications. Comprehensive range including high temperature and ATEX compliant options. Engineered for energy efficiency and minimised life cycle cost.

- Air Handling Units (AHUs)

Modular, compact and small AHU units. Designed to ensure optimisation of indoor air quality, operational performance and service life.

- Chillers

Air-cooled and water-cooled chillers with cooling capacity up to 1800kW. Designed to minimise annual energy consumption in all types of buildings.

- Chilled beams

Active induction beams for ventilation, cooling and heating, and passive convection beams for cooling. For suspended or flush-mounted ceiling installation – and multi-service configuration. With unique Comfort Control and Flow Pattern Control features.

- Smoke control and car park ventilation systems

Unique approach to car park ventilation, aided and optimised by Computational Fluid Dynamics (CFD) software. Complete turnkey solutions for designing, installing and commissioning mechanical and natural smoke ventilation.

- Controls and drives

Variable speed drives and control systems, all tested to ensure total compatibility with our products. Specialist team can advise on energy saving and overall system integration.

- Technical Site Services

Our dedicated team providing comprehensive post-installation services. Including condition-based contract monitoring, preventative and routine maintenance, refurbishment and system upgrades.

Fläkt Woods operates a policy of continuous development and improvement. Accordingly, the Company reserves the right to supply products that may differ from those illustrated and described in this publication. Certified dimensions will be supplied on request on receipt of order.

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FläktWoods