



UNDERGROUND VENTILATION SPECIALISTS

COMPLETE TURNKEY VENTILATION SYSTEMS FOR LARGE
SCALE TUNNELING AND MINING PROJECTS SINCE 1995



ABOUT SWEDFAN



SWEDFAN

UNDERGROUND VENTILATION SPECIALISTS

SWEDFAN (Swedish Underground Ventilation AB) offers complete turnkey ventilation systems for large scale tunneling and mining projects since 1995. SWEDFAN has designed and manufactured ventilation systems for more than 2.000 tunneling projects worldwide.

As a leader in the industry, SWEDFAN has a wealth of knowledge and expertise that's incomparable, utilizing this experience to provide both companies and individuals with quality and innovative products they can truly count on.

UNDERGROUND VENTILATION SYSTEMS

Swedfan undertakes the design and calculations for complete ventilation systems. Swedfan also manufacture and supply heavy-duty high-pressure axial tunneling fans for air flows from 2.5 to 200 cu m/sec for flexible ducting with diameters of 500 to 3,300 mm. Tunneling and mining ventilation systems are characterized by highest possible pressure capacity together with requirements of low energy consumption and low noise. All Swedfan fans are delivered with all necessary accessories such as silencers, frequency inverters, dust filters and cooling machines.

In order to offer market-best quality of complete ventilation systems, SWEDFAN flexible ducting is also manufactured in house. The ducting is manufactured from PVC-coated polyester fabric in diameters from 500-3,300 mm and lengths of 10-300 m. SWEDFAN always offer bends and branch pipes tailored according to each project requirements. The duct fabrics are made with so called "rip-stop" which prevents mechanical damages to cause further tear.

Manufacturing facilities are located in Sweden, Czech Republic and Shanghai, China.

The SWEDFAN underground ventilation system is unique in the way that one and the same company manufacture both fans and ducting, and also undertake the design of the entire ventilation system.

SWEDFAN is taking full responsibility for the functionality of the complete ventilation system.

BO STROMSHOLM
CEO, SWEDFAN

AS A LEADER IN THE INDUSTRY,
SWEDFAN HAS A WEALTH OF
KNOWLEDGE AND EXPERTISE
THAT'S INCOMPARABLE.





**COMPLETE
VENTILATION
SYSTEMS**

PRODUCTS

Swedfan offers complete turnkey ventilation systems for under ground tunneling and mining projects, including:

- High-pressure tunneling fans
- Flexible Ventilation Ducting
- Dust collectors
- Cooling systems
- Ventilation system design
- Project supervision

TURNKEY VENTILATION SYSTEMS

The selection of products manufactured by Swedfan Underground Ventilation are not only of the highest quality but are also available in a variety of options to ensure you find exactly what you're looking for. With top-of-the-line materials, cutting-edge production technologies and a highly qualified team, we guarantee complete satisfaction.



HIGH PRESSURE FANS

 **SWEDFAN**
Underground Ventilation System

FÖRBIFART STOCKHOLM

SWEDFAN IS THE MAIN SUPPLIER OF VENTILATION SYSTEM FOR THE CONSTRUCTION PROJECT FÖRBIFART STOCKHOLM, SWEDEN (ENG. PASSING STOCKHOLM).

SWEDFAN HIGH-PRESSURE TUNNELING FANS
SWEDFAN high-pressure tunneling fans are manufactured in Sweden, ensuring the highest quality in accordance to Scandinavian quality standards.

The Impeller

A large hub, short blades and a small gap (1-3 mm) between the blades and the fan casing result in a high quality fan capable of working well during very high system pressure. The impellers rotate towards specially designed guide vanes which eliminate swirl and turbulence. This, in combination with the extreme twist of the blades, contribute to the high fan efficiency and the low sound levels.

Heavy duty construction

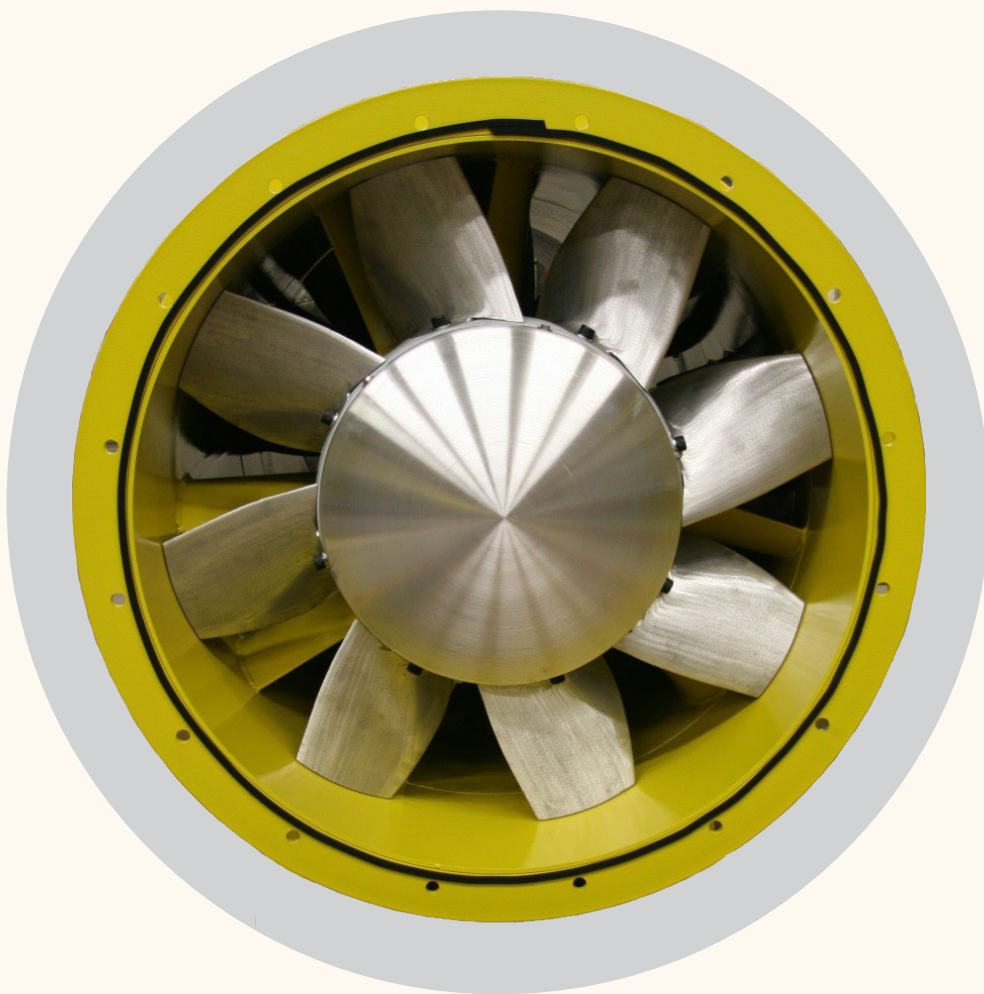
SWEDFAN Mining and Tunnelling Fans are made in a robust and heavy duty design with fully welded flanges. The anti-rust protection is designed for withstanding acid and aggressive environments.

Adjustable airflow

The impellers consist of a hub of cast steel and individually adjustable blades of aluminium. The possibility of changing the blade angle gives the advantage of using the same fan for a number of different tunnel conditions. E.g.a. 1250 mm fan can be set to deliver from $\approx 16 \text{ m}^3/\text{s}$ to $\approx 44 \text{ m}^3/\text{s}$. An additional advantage is that only the blades need to be changed when the impellers are overhauled. The impellers are statically and dynamically balanced.

Made in Sweden

The fans are manufactured in Sweden. Continuous development is carried out in cooperation with both domestic and international research institutes. The aim is to further increase the efficiency, to increase the air delivering capability of the fans at higher system pressures, to further lower the sound levels and to improve the automatically controlled ventilation.



SWEDFAN IMPELLER

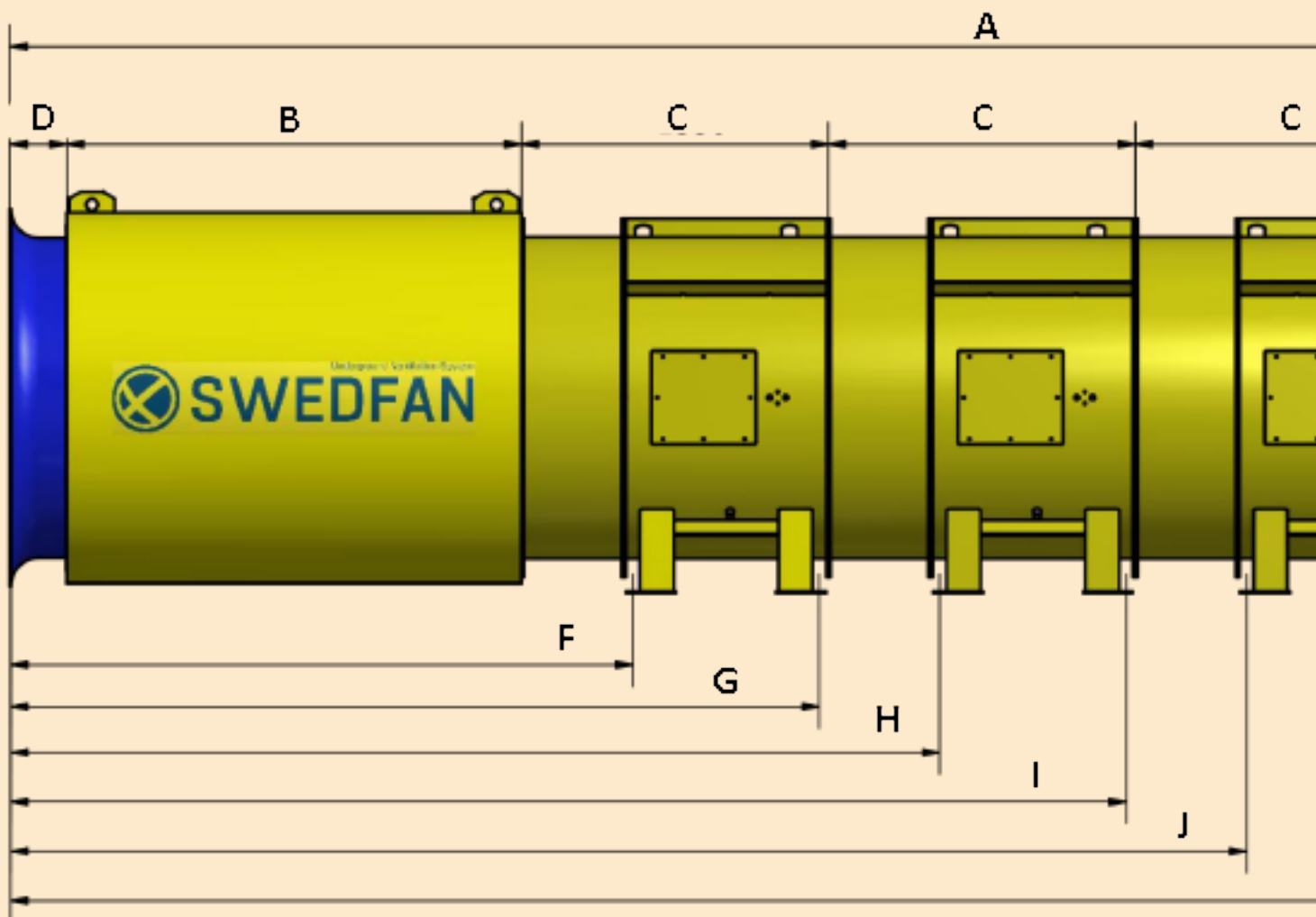
Motor
SWEDFAN Mining and Tunnelling
Fans are equipped with ISO classi-
fied high quality motors. Lubrication
of motor bearings is done from outside the
casing. The motors are labelled with individ-
ual serial numbers for future search of spare
parts etc. Thermistors are mounted direct-
ly onto the motor windings for sensing the
heat of the winding. A reduced cooling of the
motors (due to dirt on the cooling ribs etc)
will not burn out of the motors, provided that
thermistors are connected to monitoring or
shut-down devices.

Great experience

SWEDFAN System Design uses calculations
based on in situ measurements from more
than 600 different tunnelling jobs.

SWEDFAN makes calculations using PC-sup-
ported software and the calculations are pre-
sented as calculation sheets showing proj-
ect specific data. Total leakage is presented
as "leakage factor" which states how much
more air that has to be delivered from the
fan compared to the amount of air delivered
at the heading.

To date SWEDFAN can show a great number
of major tunnelling projects where SWED-
FAN made the ventilation system design
with fully satisfactory ventilation during the
entire project.



Quality Control

SWEDFAN works according to the quality system ISO 9001 and the fans are delivered with CE marking affixed.

Every fan is tested before delivery and accompanied by a test report showing the capacity curve.

Regulated Ventilation

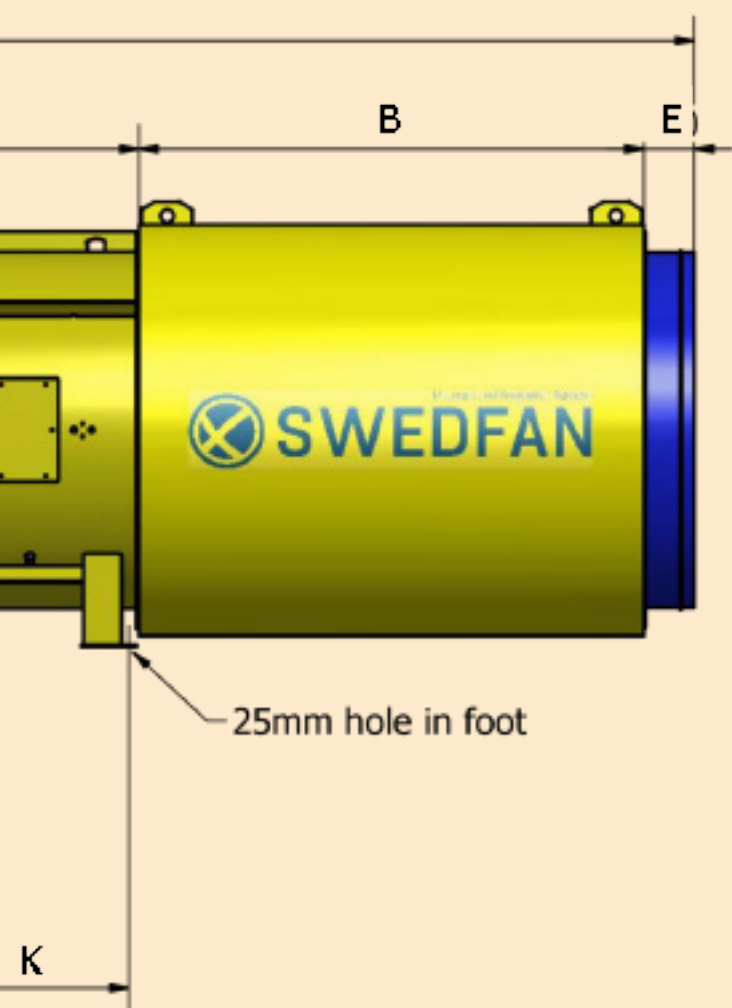
For optimized energy saving and varied air flow, SWEDFAN Mining and Tunnelling Fans can be provided with the following two alternative solutions for adjusting the air flow as the fans are running:

- Two-speed or multi-speed fan motors.
- Frequency inverters.

Large Capacity Range

SWEDFAN Mining and Tunnelling Fans are manufactured in many different diameters and capacities, from Ø630 to Ø2300 mm and from 1.5 to 200 m³/s. The fans can withstand a system pressure of up to 4200 Pa per stage. At higher system pressures two or more fans are mounted in series into one multi-fan station.

FAN STATION FEATURES



SWEDFAN FAN STATION MEASUREMENTS

EDITOR: BO STRÖMSHOLM



ACCESSORIES

SWEDFAN ACCESSORIES

PERFECT FIT - TO ENSURE A HIGH QUALITY VENTILATION SYSTEM, SWEDFAN OFFERS ACCESSORIES TAILORED TO FIT THE VENTILATION SYSTEM PERFECTLY.

Starters
SWEDFAN offers three main types of starters. Direct starters, Dahlander starters (for two-speed motors) and Frequency inverters. Depending on the logistics of the tunnelling job SWEDFAN evaluates which type of starter will give the lowest energy cost and recommends which of the three types will be most suitable.

Highly efficient silencers
Our standard silencers are manufactured with mineral wool as absorbing material. For additional noise reduction, the silencers are provided with a centre core filled with mineral wool which efficiently also reduces the high frequency noise.

Casing is made from 3 or 4 mm steel sheet, depending on size. Anti-rust protection is performed for the fan casing. Silencers are a safe protection against splinter if a fan should burst.

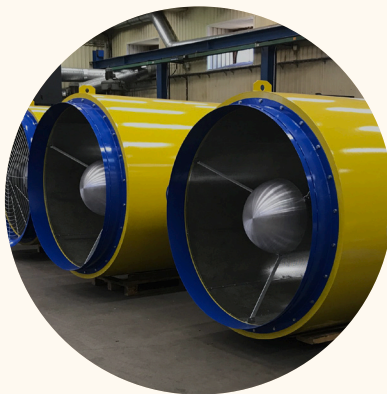
Additional Accessories

- Inlet bells
- Outlet diffusors
- Connection flanges for flexible duct
- Mounting frames
- Air flow measuring devices
- Vibration alarms
- Duct damper



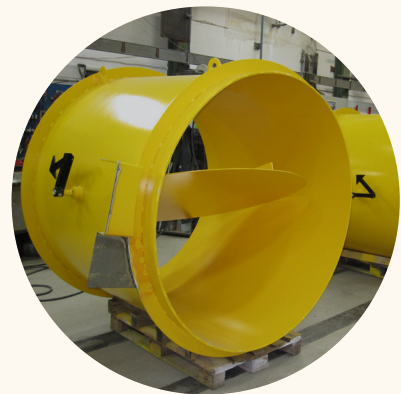
STARTERS

Swedfan evaluates which type of starter will give the lowest energy cost.



SILENCERS

Swedfan offers high quality silencers for efficient noise reduction.



ADDITIONAL

Swedfan offers additional accessories such as Inlet bells, Outlet diffusors, Mounting frames, etc.



FLEXIBLE DUCTING

THE BASE FABRIC IS MADE
WITH AN ENHANCED YARN
WHICH DRAMATICALLY
INCREASES THE TEAR
STRENGTH

SWEDFAN FLEXIBLE DUCTING

SWEDFAN Flexible Ducting is manufactured from PVC-coated polyester fabric and is distinguished by the relatively low weight with kept high strength values which results in a very pliable and easy to handle duct.

FLEXIBLE DUCTING

SWEDFAN Flexible Ducting is manufactured in diameters from 500 up to 3,300 mm and in unit lengths from 10 m up to 300 m. All fabric joints are vulcanized 40 mm wide. Every unit length is marked with information regarding diameter, unit length, quality, max allowed working pressure and manufacturing date.

Diameter and Quality Standard

SWEDFAN Flexible Ducting is manufactured in two different standard qualities and in one antistatic quality which all fulfil the following Flame Retardant standards DIN 4102-B1, MSHA and EN13501-1 regarding fire resistance. SWEDFAN works according to the quality system ISO 9001 and all strength values are continuously tested in the production.

Rip-stop

The base fabric is made with an enhanced yarn which dramatically increases the tear strength. This feature prevents the duct from further longitudinal tear under normal conditions.

Standard coupling system

Every flexible ducting is manufactured with a steel ring vulcanized in one or both ends of every unit length. The outer diameter of the steel ring is equivalent to the nominal diameter of the duct.

The unit lengths are connected together by pulling the end of one duct over the end with a steel ring of the next duct. Around the joint, a SWEDFAN coupling clamp is positioned. The coupling clamp is made of 1.5 mm profiled galvanized steel with mounted threaded crank. The joint is sealed by tightening the coupling clamp using the threaded crank. This is the standard coupling system of SWEDFAN ducting.

SUSPENSION HOOKS

The ducting, as standard, is delivered with mounted suspension hooks c/c 0.75 m in one line (from Ø 300 to Ø 1,700 mm) and c/c 1.0 m in two parallel lines (from Ø 1,800 to Ø 3,300 mm).

Every hook is fixed to the duct by a fabric "strap" which is vulcanized to the duct. This construction eliminates holes in the fabric which would break the armour and weaken the construction (compare "eyelets"). Further, this construction also eliminates the common longitudinal continuous suspension "flap" with eyelets which also contributes to keeping the duct pliable and the weight low.



SWEDFAN ZIPPER

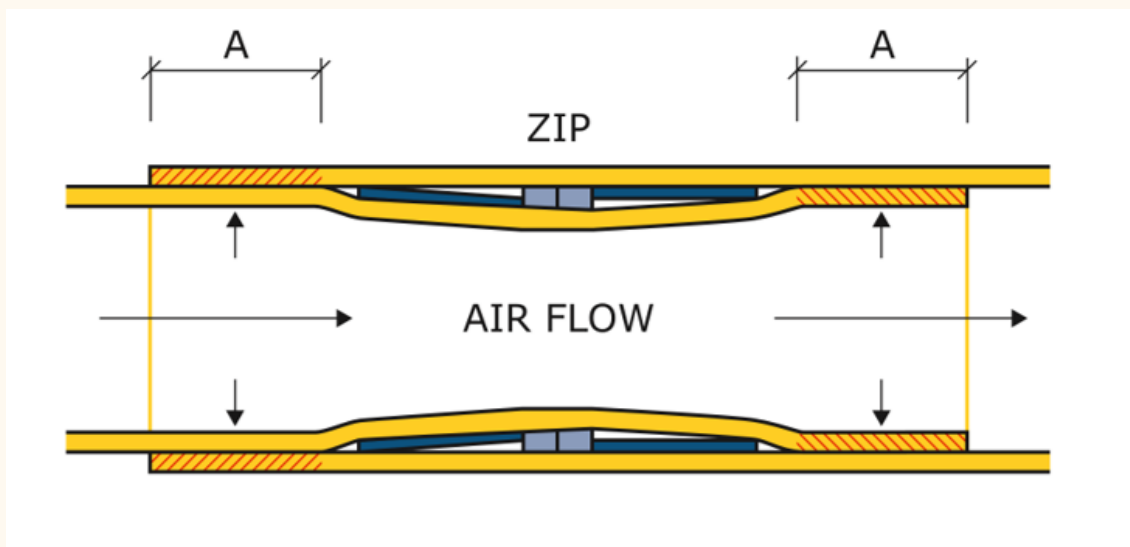


SWEDFAN ZIPP-JOINT

BLACK ZIPPER WITH LOCKING SLIDERS AND
TEETH 8 MM

For SWEDFAN flexible ducting, both duct ends can be fitted with a split zipper of heavy duty PVC-type. The protection-flap hides the zipper on the outside and seals the joint on the inside, according to the principle “the higher pressure the tighter joint”.

The ZIP-joint eliminates the coupling clamp and steel ring at the duct end. With the ZIP-joint the ducting is delivered on standard pallets 1,200 x 800 mm.



The mantles (the sections of duct labeled “A” in the picture above) prevent air leakage through the zip, due to the inner air pressure.

TEST RESULTS OF ZIPPER

SWEDFAN started delivering Air Ventilation Ducts during 1995. In the beginning, several different Zippers were tested for best quality and standard. Since 2009 SWEDFAN Ducting use a Black Zipper with Teeth 8 mm of polypropylene from one and the same manufacturer.

The Requirements for Rating Pass is 470 Newton for Chain Crosswise Strength Test and 60 Newton for Slider Lock Holding Strength Test. The test standard follow BS3084 E class.

Below we present some Test Results of the Zippers used for various projects.

The Zippers were tested for both chain crosswise strength and for the strength of the locking slider.

Zippers from item A, B, C and D have all been used for many air ventilation projects since the latter part of 2018, with good results.

Zipper delivery time	Chain Crosswise Strength Test	Slider Lock Holding Strength Test
	Newton	Newton
A.Sept 2018/18-149	565	148
B.Nov 2018/18-312	568	112
C.Nov 2018/18-411	606	134
D.March 2019/19-109	612	154

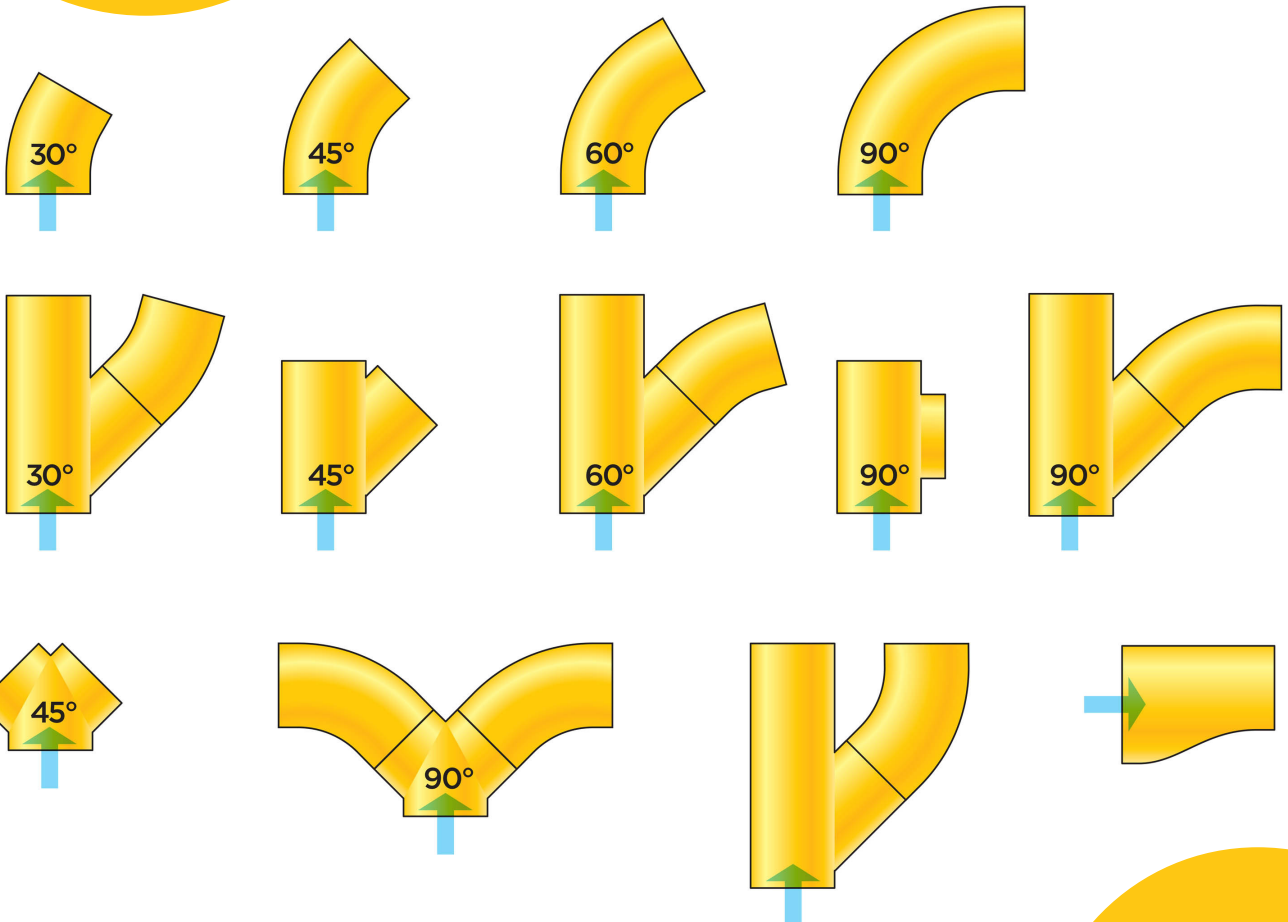


SPECIAL DUCTS

SWEDFAN SPECIAL DUCTS CAN BE MADE IN ALL DIFFERENT SIZES, MEASUREMENTS AND STYLES.

- SWEDFAN BRANCH PIPES, standard
Made of PVC coated fabric Titan
FRRS, suspension hooks on both
upper and lower side.
- SWEDFAN BENDS, standard
Made of PVC coated fabric Titan
FRRS, suspension hooks on upper
side.
- SWEDFAN Y-BRANCH, standard
Made of PVC coated fabric Titan
FRRS, steel ring in all ends, suspen-
sion hooks on upper side.
- SWEDFAN CONE PIPES, standard
Made of PVC coated fabric Titan
FRRS, steel ring in all ends, suspen-
sion hooks on upper side.

BENDS & SPLITS



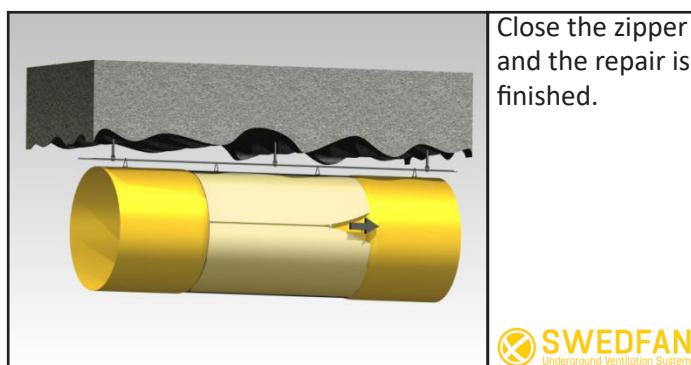
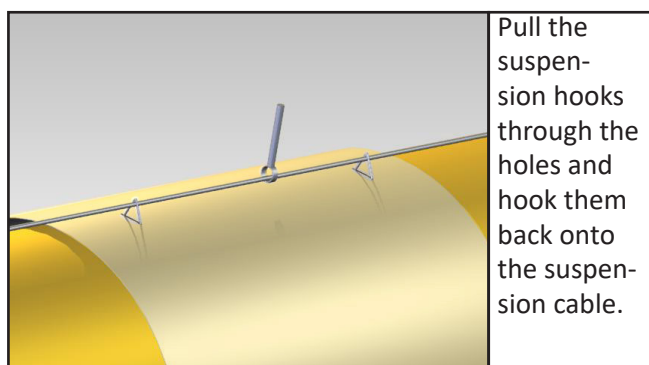
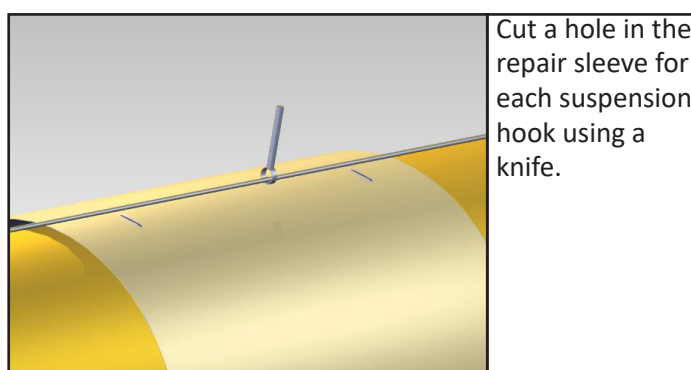
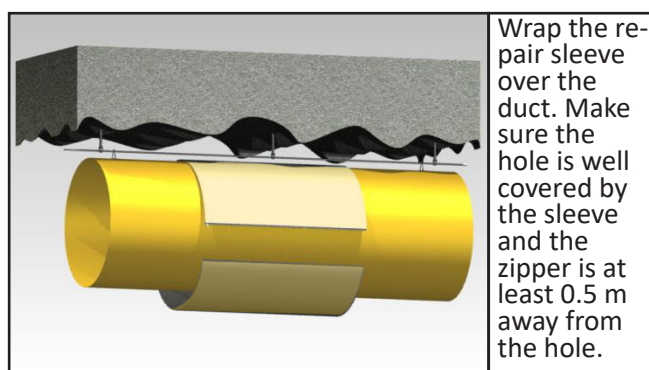
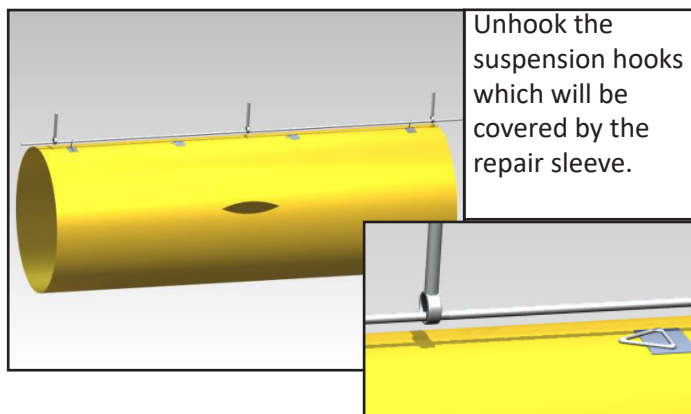
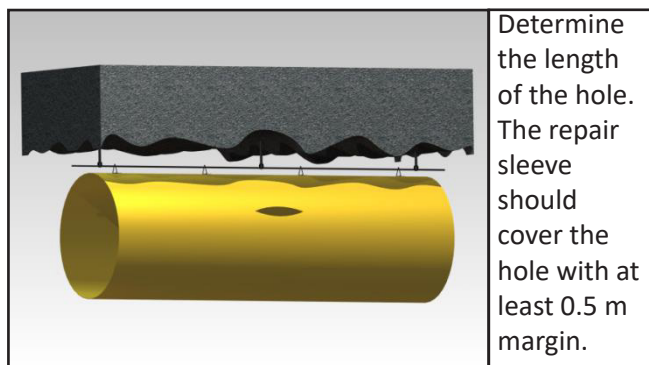
REPAIR SLEEVE

THE SWEDFAN REPAIR SLEEVE IS A FAST AND SECURE TOOL FOR REPAIRING HOLES AND TEARS OF FLEXIBLE DUCTING.

The sleeve is made from standard duct material and a longitudinal zipper for closing the sleeve. The sleeve is made approx. 0.5% smaller than the nominal duct diameter

which will allow the sleeve to be really tight against the duct once the duct is pressurized. With the repair sleeve, the repair will be professionally done and the leakage from any hole will be reduced to a minimum.

The repair sleeves are manufactured in standard lengths 1.0, 2.0, 3.0 and 5.0 m. Other lengths will be manufactured upon request.



REMOTE CONTROL SYSTEM

ABOUT THE REMOTE CONTROL SYSTEM

The Remote Control System enables the control and monitoring of fans and dampers at tunneling sites from mobile applications. Controllers for fans and dampers communicate over a mobile network.

Apart from controlling and monitoring the fans, this application also retrieves the real time power load which the fans are running at and can provide information of both momentous and summary of the energy costs for all fans at the tunneling site.



WHO CAN USE THE REMOTE CONTROL SYSTEM?

The Remote Control System can be useful for both tunneling site workers, construction managers and project managers.



PETER

CONSTRUCTION WORKER

"I want to carry out work in the ventilation duct, stop the fan and lock the control panel on the fan."

"Stuff will be blasted, so all fans in the tunnel must be stopped. Start after blasting to get out the gasses and dust."

"I need more air in the side tunnel, so I'm changing the damper from a 25% opening to a 75% opening."



JON

SITE MANAGER

"I want to know how much power the fans at the building site run on."

"I am over target, so I reduce the speed of fan 3 from 100% to 75% to reduce consumption."



LISA

PROJECT MANAGER

"I am interested in knowing the cost of the fans at all the construction sites in my project."

WHAT DOES THIS MEAN IN TERMS OF MONEY?

The energy costs for running the Ventilation System usually exceed the investment cost of the entire Ventilation System. By adding a control system you can overview and manage the cost and energy consumption of the entire Ventilation System at site.

EDITOR: © by Swedish Underground Ventilation AB.



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