

The art of  
transporting  
fresh air into mountains



# Our history could fill an entire book

The foundations for Protan's business were laid between the wars and the production of ventilation systems started back in 1949. We were the first in Europe to manufacture flexible ventilation ducts and over the years we have built up extensive know-how and broad-based experience, from which our customers benefit. We now supply several hundred kilometres of ventilation ducts a year. Our qualities offer outstanding durability, flexibility and low weight. The long service life of our ventilation ducts means that some of our customers re-use them extensively.

Ventiflex qualities are flame retardant, resistant to chemicals, quick and easy to install and maintenance free.



**The Ventiflex system is a world leader.** We have supplied ventilation systems to mines and tunnels on all the world's continents and offer local distribution in many countries. We carry out exhaustive checks and quality control on all our systems before they are delivered. Protan is a driving force in the development of ventilation systems in mines and tunnels and a member of the ITA-AITES through the Norwegian Tunnelling Society.



**More than just ventilation.** Protan is Scandinavia's leading manufacturer of technical textiles and PVC roofing. Our head office and largest production facility are in Drammen, about 40 kilometres southwest of Oslo. At our fabrication plant in Nesbyen we make welded and customised products, tailored to our customers' requirements.

Textile and coating make up a unique fabric and the suspension system makes the duct even stronger



**Our textiles**, which have been developed specially for ventilation ducts, have radial reinforcement to prevent tearing. If a hole should nevertheless occur, our textiles are knitted precisely in order to limit the length of the tear. Our textiles are also designed to be dimensionally stable so as to prevent expansion under high pressure.

**The PVC coating** on the outside has been developed to withstand damage and mechanical wear, and is thick enough to protect the textile. Internally Ventiflex is designed to offer low flow resistance, which helps save energy. Our unique coating method produces a strong structure and also reduces the risk of delamination. The fabric also comes in a colour that reflects light.

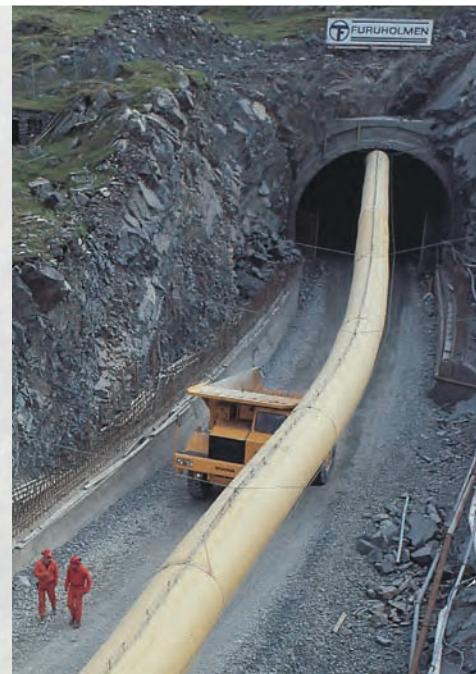
**Fully automatic industrial welding method** ensures uniformity and high quality.

**The suspension system** with its plastic eyelets is also unique and employs a strong continuous suspension rib, which runs along the length of the ducting and is welded on.

The plastic eyelets contribute to the overall strength of the system. Ventilation ducts in mines and tunnels are exposed to extreme stress, including pressure waves caused by blasting, which put every part of the construction to the test.

**Couplings and hooks.** We have a wide range of components that contribute to the great flexibility and adaptability of the ventilation system.

*The duct is made from a soft, flexible material that is flame-retardant, resistant to chemicals and maintenance free.*



*Strong suspension and coupling systems that are easy to fit.*



# Fittings that count

Burst pressures for Ventiflex, safety factor n=1

| Diameter [mm] | 9104FR | 6298FR | 6698 FR | 7198FRAS | 7498FR | 7498FRAS |
|---------------|--------|--------|---------|----------|--------|----------|
| 200           | 270000 | 450000 | 540000  | 470000   | 620000 |          |
| 300           | 180000 | 300000 | 360000  | 313333   | 413333 |          |
| 400           | 135000 | 225000 | 270000  | 235000   | 310000 |          |
| 500           | 108000 | 180000 | 216000  | 188000   | 248000 |          |
| 600           | 90000  | 150000 | 180000  | 156667   | 206667 |          |
| 700           | 77143  | 128571 | 154286  | 134286   | 177143 |          |
| 800           | 67500  | 112500 | 135000  | 117500   | 155000 |          |
| 900           | 60000  | 100000 | 120000  | 104444   | 137778 |          |
| 1000          | 54000  | 90000  | 108000  | 94000    | 124000 |          |
| 1100          | 49091  | 81818  | 98182   | 85455    | 112727 |          |
| 1200          | 45000  | 75000  | 90000   | 78333    | 103333 |          |
| 1300          | 41538  | 69231  | 83077   | 72308    | 95385  |          |
| 1400          | 38571  | 64286  | 77143   | 67143    | 88571  |          |
| 1500          | 36000  | 60000  | 72000   | 62667    | 82667  |          |
| 1600          | 33750  | 56250  | 67500   | 58750    | 77500  |          |
| 1700          | 31765  | 52941  | 63529   | 55294    | 72941  |          |
| 1800          | 30000  | 50000  | 60000   | 52222    | 68889  |          |
| 1900          | 28421  | 47368  | 56842   | 49474    | 65263  |          |
| 2000          | 27000  | 45000  | 54000   | 47000    | 62000  |          |
| 2100          | 25714  | 42857  | 51429   | 44762    | 59048  |          |
| 2200          | 24545  | 40909  | 49091   | 42727    | 56364  |          |
| 2300          | 23478  | 39130  | 46957   | 40870    | 53913  |          |
| 2400          | 22500  | 37500  | 45000   | 39167    | 51667  |          |
| 2500          | 21600  | 36000  | 43200   | 37600    | 49600  |          |
| 2600          | 20769  | 34615  | 41538   | 36154    | 47692  |          |
| 2700          | 20000  | 33333  | 40000   | 34815    | 45926  |          |
| 2800          | 19286  | 32143  | 38571   | 33571    | 44286  |          |
| 2900          | 18621  | 31034  | 37241   | 32414    | 42759  |          |
| 3000          | 18000  | 30000  | 36000   | 31333    | 41333  |          |

Subject to changes

Y piece



Branch



Tee



Bend



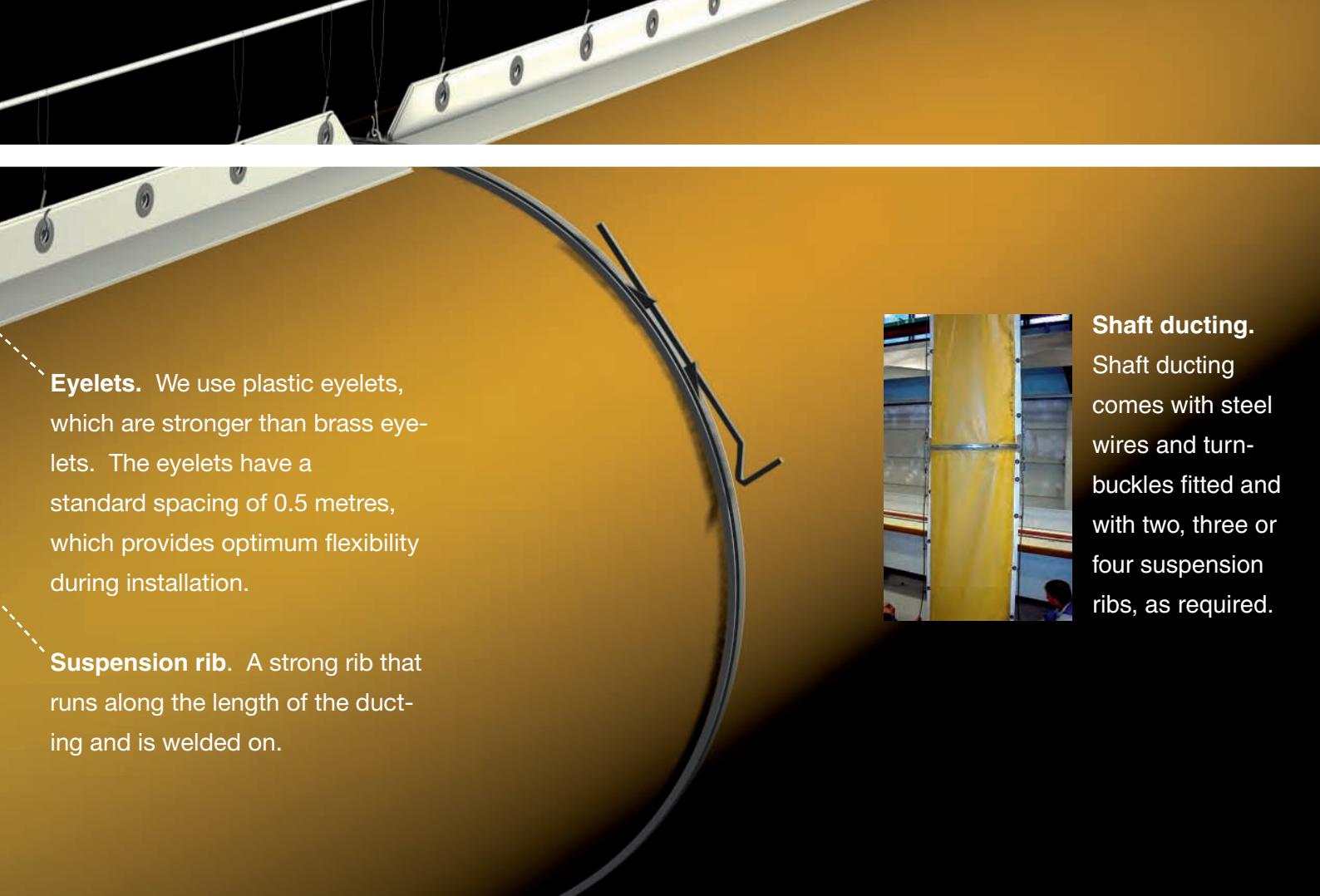
Adapter,  
fan section,  
nozzle



Spiral duct



**Fittings.** We offer Y pieces, tees, bends, branches, adapters, fan sections and nozzles in standard versions in all diameters, and also customise fittings on the basis of drawings.



**Eyelets.** We use plastic eyelets, which are stronger than brass eyelets. The eyelets have a standard spacing of 0.5 metres, which provides optimum flexibility during installation.

**Suspension rib.** A strong rib that runs along the length of the ducting and is welded on.



**Shaft ducting.**  
Shaft ducting comes with steel wires and turn-buckles fitted and with two, three or four suspension ribs, as required.

#### Duct qualities

Ventiflex is made in various thicknesses of fabric for different pressures and requirements. We supply diameters of 200 – 3000 mm and lengths of 10 – 500 m.

Ventiflex 9104FR

Ventiflex 6298FR

Ventiflex 6698FR

Ventiflex 7498FR

We also have two antistatic qualities:

Ventiflex 7198FRAS

Ventiflex 7498FRAS



#### Zip coupling:

Simple assembly. Flexible, quick and easy to store.



#### Velcro coupling:

Simple assembly and disassembly. Flexible, quick and easy to store.



#### Ventiflex

#### VF coupling:

User-friendly steel coupling with steel ring welded in and VF compression ring on outside.



#### Ventiflex

#### LP coupling:

Basically the same as the VF coupling, but stronger. Available with nut for tightening by machine.

**Hooks.** Ducts come with one hook per metre as standard.



#### VF hook:

Standard hook. Height to suspension wire can be adjusted by a soft steel wire fitted to the hook.



#### LP hook:

Attaches straight onto the wire. Simple and quick to fit.



#### Snap hook:

Attaches straight onto the wire. Simple and quick to fit.



#### S hook:

Quick-release solution.

# Full control of the production chain ensures quality

- The polyester fabrics used in Ventiflex have been developed under our direction and we conduct systematic product development in cooperation with leading textile producers.
- We coat the fabrics with top-grade virgin PVC in our own production facility and carry out high-frequency welding using fully automated machines.
- We have a high capacity in sales and sales support, and provide highly flexible customer follow-up.
- Complete duct systems are delivered to the right place on time.
- We also offer advice, training and assistance with installation.



*ITV continuously monitors and controls air quality and gas levels, reducing energy consumption by the fan.*



*The entire process from production to delivery is ISO-certified.*



*We conduct continuous product development in collaboration with leading mines and tunnelling contractors.*

### **Intelligent Tunnel Ventilation (ITV®).**

ITV is about achieving good, uniform air quality for everyone working inside mountains and underground. The system is PC-based and ensures that air quality and gas levels are monitored and controlled continuously.

ITV reduces the energy consumption of the fan.

This plug-and-play system comes complete with both software and hardware. It can also be remote-controlled via a modem.

We cooperate extensively with leading fan suppliers and ITV can be used with virtually any ventilation system.

### **Protan AS is approved and certified in accordance with the ISO 9001 quality standard and the ISO 14001 environmental standard.**

This means that the entire production chain and every aspect of our business are quality-controlled and operated with as little environmental impact as possible – both locally and globally. We also have the necessary certificates for supplying goods and services globally.

Lifecycle analyses demonstrate that our fabric is a very environmentally friendly product that can be recycled.

### **Own laboratory**

Our laboratory in Drammen is where all our qualities are tested and developed.





## Long-term peace of mind

The help we provide can take the form of assistance with installation and maintenance, for example.

If the worst happens and the fabric is holed, we know what needs to be done to achieve a good outcome.

We supply practical, versatile repair kits for Ventiflex.



We are equipped to deal with most repairs.

### We are highly experienced when it comes to practical problem solving in the field

During tunnelling it can happen that too little air is reaching the face. A small hole may need repairing. A bend may require straightening or larger ducts may be needed. Or perhaps another duct is required? Talk to us. We've dealt with such challenges before.



If a mishap occurs, we can also use sleeves that fit easily round the duct with Velcro.



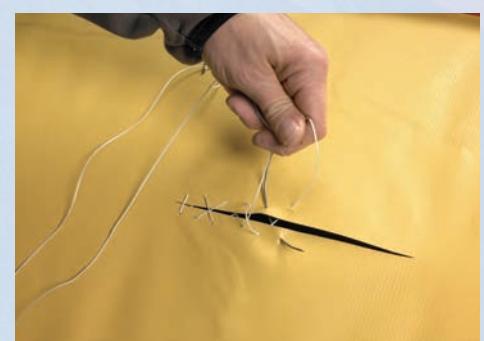
Repair box.



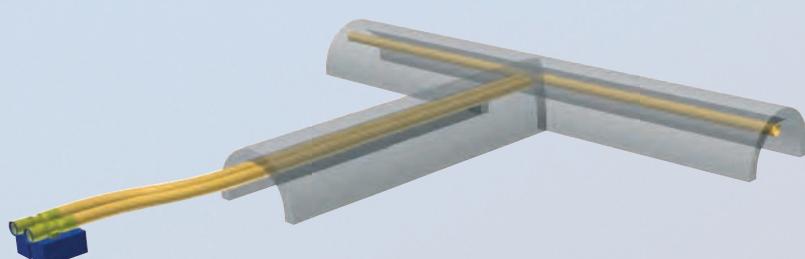
Hot air welded repair.



Glued repair.



Stitched repair.



### Ventiflexcalc

We assist with calculating the optimum ventilation solution. Ventiflexcalc is a calculation tool that helps create good solutions.

# Ventiflex Duo

Protan Ventiflex Duo is a concept that has been developed for use in installations with limited headroom. With its two separate ducts hanging from the same wire, it is both simple and reliable.

The most important advantages of Ventiflex Duo are as follows:

1. A larger cross-section means lower energy consumption for the fan with the same installation height and volume of air
2. More air to the face than with the same fan output
3. No intermediate walls that might cause problems with ruptures, vibrations, etc.
4. Two separate ducts that can function independently
5. Secure couplings with very low friction
6. Protan Ventiflex Duo can be installed very close to the tunnel roof because the suspension system is placed between the ducts.



**PROTAN**

**Ventiflex**

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