

PROPERATOR

High Pressure Cleaning Protection



UNIQUE PROTECTION EQUIPMENT

Comfort, Function and Safety - ProOperator

Until now there has been no adequate protection for High Pressure Cleaning or Hydraulic fluid leakage, and certainly not certified as High Visibility protection. Nothing that has been adapted to the power of today's equipment or user demands for comfort and functionality. Our experience from waterjetting with very high pressures (up to 3000 bar), and other types of personal protective equipment, has been the basis for this line of clothing.

ProOperator - High Pressure Cleaning and Hydraulics Protection.

The strongest fiber in the world!



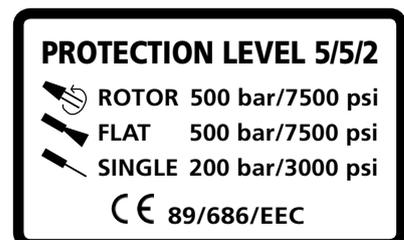
WITH
Dyneema®
Dyneema® is a
registered trademark
of Royal DSM N.V.

Dyneema® is the world's strongest fiber (15 times stronger than steel on a weight for weight basis). This makes it possible to offer high levels of protection against waterjetting hazards even with lightweight fabric. Being much thinner and more flexible than traditional materials, such as leather, cotton and metals, products made with Dyneema® fiber will be very comfortable. Employees will appreciate this comfort, combined with higher protection, and consequently are more likely to wear them at all times.

AREAS WITH PROTECTION

Striped fabric clearly identifies protected areas and the labels tell the level of protection.

As high pressure cleaning and hydraulic fluid leakage is very dangerous, it is essential that the operator knows where and what he or she is protected for.



CE-certified products

ProOperator products are CE-marked – this means that they satisfy the essential requirements in the European directive 89/686/EEC, “Directive for use of personal protective equipment”.



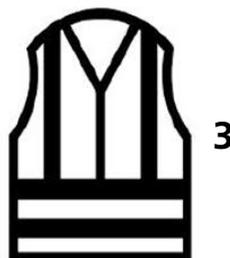
Hydraulic fluid – Tested

High pressure Hydraulic Fluid is nowadays found in many situations in everyday life. All kinds of heavy machines in industry and manufacturing, vehicles and building/construction use hydraulics. Most of the ProOperator garments found in this brochure are, in addition to the CE Certification for pressurized liquids, tested according to the table below. Some of the clothes are developed on inquiries from big actors in the world of hydraulics! ProOperator - Hydraulics Protection.

Pressure bar (psi)	Nozzle type	Dist. (mm)	Speed (m/s)	Break-through time (s)
250 (3750)	0,15 mm Sapphire - pin	5	0	> 60 s
350 (5100)	0,15 mm Sapphire - pin	5	0	35 s
500 (7500)	0,15 mm Sapphire - pin	5	0	4 s

High Visibility – EN ISO 20471:2013 Class 3

There is a growing demand for High Visibility Personal Protective Equipment and therefore we have decided to develop and certify a series of clothes for this purpose. We have kept all the good protective qualities and functional details from the regular ProOperator products, and added the visibility details required. The result is extremely functional clothes, with excellent comfort! The great looks “comes with the bargain”. ProOperator - High Visibility High Pressure Cleaning and Hydraulics Protection.



OVERALL WITH HOOD

3-layer functional overall which is CE certified for protection against High Pressure Cleaning and tested for high pressure hydraulic fluid. Excellent for the toughest conditions! Lined for high comfort. Water- and dirt repellent outside. Openable ventilation in the armpit, waterproof cuffs, adjustable hood. (See more details right.) Use in combination with Gloves and Boots, see page 9-10. Weight 2.5 kg / 5.5 lbs. (Overall size L).

Sizes XS–3XL (see table on last page)

Art. No. 5640025 5000



Detachable hood with 3 adjustment possibilities and room for hearing protection.



2 pockets with waterproof zippers.



Comfortable inside arm cuffs prevent leakage.



Elastical back waist.



Zippers at the bottom of the legs.



Waterproof zippers with overlapping flap.



Knife pocket on right leg.



Pockets for knee pads.

- Lined for high comfort.
- Inside pocket with zipper.
- Special pocket for phone (waterproof).
- Protection on the entire front and head.
- Protected areas identified by stripes.
- Label indicates protection.
- Leg pocket with waterproof zipper on left leg.



Pocket for ID card on the right sleeve.



Reinforcements on the knees.



Cuffs adjustable with Velcro.



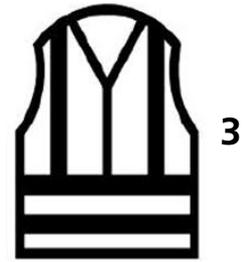
Openable ventilation in the armpits.

HIGH VISIBILITY OVERALL

High Visibility version of the 3-layer functional overall which is CE certified both for visibility AND protection against High Pressure Cleaning. It is furthermore tested for high pressure hydraulic fluid. Excellent for the toughest conditions and required for example on work on oil platforms! Lined for high comfort. Water- and dirt repellent outside. Openable ventilation in the armpit, waterproof cuffs, adjustable hood. (See more details on page 4.) Use in combination with Gloves and Boots, see page 9-10. Weight 2.6 kg / 5.7 lbs. (Overall size L).

Sizes XS-3XL (see table on last page)

Art. No. 5640025 5690





Openable ventilation in the armpits.



2 pockets with waterproof zippers.



Detachable hood with 3 adjustment possibilities and room for hearing protection.



Waterproof zippers with overlapping flap.



Pocket for ID card on the right sleeve.



Comfortable inside arm cuffs prevent leakage.



Cuffs adjustable with Velcro.



JACKET WITH HOOD

3-layer functional jacket which is CE certified for protection against High Pressure Cleaning and tested for high pressure hydraulic fluid. Very smooth and flexible to wear. Lined for high comfort. Water- and dirt repellent outside. Thoughtful details as openable ventilation in the armpit, comfortable cuffs and adjustable hood. (See more details left.) Use in combination with Gloves and Boots, see page 9-10.

Weight 1.6 kg / 3.5 lbs. (Jacket size L).

Sizes XS–3XL (see table on last page)

Art. No. 5622025 5000

High Visibility 5622025 5690

- Lined for highest comfort.
- Waist adjustable with drawstrings.
- Inside pocket with zipper.
- Special pocket for phone.
- Protection on the entire front and head.
- Protected areas identified by stripes.
- Label indicates protection.

TROUSERS

3-layer functional trousers which are CE certified for protection against High Pressure Cleaning and tested for high pressure hydraulic fluid. Very easy to put on and off. Adjustable elastical waist for perfect fit. Water- and dirt repellent outside. Practical details such as knife pocket, leg pocket and dual loops for belt. Zippers down on the legs allows them to widen to facilitate donning the boots. (See more details right.) Use in combination with Gloves and Boots, see page 9-10.

Weight 1.3 kg / 2.9 lbs. (Trousers size L).

Sizes XS-3XL (see table on last page)

Art. No. 5632025 5000

High Visibility 5632025 5690



- Detachable braces (included).
- Leg pocket with waterproof zipper on left leg.
- Protection on the whole front.



Double belt loops.



Zippers down on the legs.



Adjustable elastical back waist.



Pockets for knee pads.



2 pockets with waterproof zippers.



Reinforcements on the knees.



Knife pocket on right leg.





APRON

The full area of the Apron has built-in protection. Good alternative protection in warm environments. The Apron is equipped with a new, cleverly designed shoulderband which improves the comfort of the operator. Properly adjusted, it distributes the weight extremely good. Easy to put on and take off. Recommended for work on flat surfaces. Often used in combination with Gloves and Boots, see page 9-10. The Apron comes in one size.

Weight 0.8 kg / 1.8 lbs.

One size

Art. No. 5623025 5000



Adjustable shoulderband that distributes weight extremely good.

APRON SHORT

The full area of the Apron has built-in protection. Good alternative protection in warm environments. The Apron is equipped with a new, cleverly designed shoulderband which improves the comfort of the operator. Properly adjusted, it distributes the weight extremely good. Easy to put on and take off. This short model is developed and recommended for work at hydraulic test rigs and benches. Often used in combination with Gloves and Arm Protections (see page 9).

The Apron comes in one size.

Weight 0.5 kg / 1.1 lbs.

One size.

Art. No. 5623025 5625



PROTECTIVE GLOVE 500 BAR

Waterproof glove with protection for up to 500 bar pressure.

The glove has a rough, sand patterned surface and the material itself provides lots of friction, all for the best grip on the tools. Generous cuff for easy donning. Supplied with separate inner glove in nylon for good comfort. The glove has also been tested and classified with the highest values in the following categories. 5 for cut protection and 4 for abrasion, tear, and puncture. An extra security in harsh environments!

Made of materials consisting of nylon and Dyneema® fiber. Outside is dipped in nitrile rubber. Shelf life up to 3 years. Certified in accordance with the CE directive 89/686/EEC and EN 388:2004.

The gloves do not withstand high pressure hydraulic fluid. Supplied in 12-pack.

Size 8, 10, 11

Art. No. 5600025 5000



ARM PROTECTIONS

The Arm Protections have built in protection all the way round the arm, from the wrist to the upper arm. Elastic cuffs in both ends for easy donning and good fit. Developed and recommended for personnel working at test rigs for hydraulics. Tested to withstand high pressure hydraulic fluid according to the table on last page.

Weight 0.35 kg / 0.8 lbs.

Length: XS/M 40 cm, L/2XL 50 cm

Sold in pairs.

Size XS/M, L/2XL

Art. No. 5602025 5000





PROOPERATOR BOOTS 500 BAR

Protective boots CE-certified for pressurized liquids and tested for high pressure hydraulic fluid! Waterproof working and protective boots with protection for up to 500 bar / 7500 psi pressure! The boots are professionally designed for hours and hours of hard work, in harsh environments. Completely vulcanized rubber boots with reinforcement to withstand pressurized liquids on the whole foot. (Black parts.) Also fitted with steel toecap and steels inserts to withstand sharp objects from under. Textile inner lining for good comfort. The sole is designed for good grip and to reduce the risk of slipping. If extra grip is needed, eg in winter, it can be fitted with spikes. The boot shaft can be tightened with an adjustable strap and it has two "handles" to make the boots easy to put on. Sold in pairs.

Size EUR 36–48 (Size 36–38 on order)

Art. No. 5652025 5000



Note: Boots 500 withstands 300 bar / 4350 psi single jet.

Conversion table shoe sizes (men's)

EUR	US	UK
36	4	3
37	5	4
38	5 1/2	4 1/2
39	6 1/2	5 1/2
40	7 1/2	6 1/2
41	8 1/2	7 1/2
42	9	8
43	10	9 1/2
44	10 1/2	10
45	11 1/2	10 1/2
46	12	11
47	13	12
48	14	13

HOSE PROTECTION / SHROUD

The gun is held near vital parts of the body and hoses break, often near couplings and connections like on the gun. Be safer with a Hose Protection/shroud. The Hose Protection/shroud provides effective protection for the operator!

It has been tested for 500 bar / 7500 psi. An adjustable strap holds the Hose Protection/Shroud securely in place. The Hose Protection/Shroud is very smooth and flexible. Length: 750 mm / 2.6 ft.

Diameter: 41 mm / 1.6 in.

Weight 0.2 kg / 0.45 lbs.

Art. No. 5660045 5920



TST SPECIAL GREASE REMOVER

Mix the TST Grease Remover 1:10 with warm water 40°C/105°F. Apply to the dirty garment surfaces with a brush. Leave for about 20 minutes. If the garments are extremely dirty, use the brush together with lukewarm water on the dirty areas. Rinse with lukewarm water. Let the garment dry in a drying room and reach a temperature of max 60°C/140°F (to reactivate the water and grease protection).

- Nonionic surfactants >30%
- Solubilising agents (alkane diol)
- Greying inhibitors <5%
- PH 7.3
- Avoid contact with skin and eyes
- Product temperature of less than 15°C/60°F may impair proper function
- Do not store below 15°C/60°F

Size 0.5 litre.

Art. No. 5092000 5010



Protection up to 500 bar/7500 psi

TECHNICAL DESCRIPTION

Outer material: Coated for water- and dirt repellancy. Inner material: Polyester mesh. Protective material: Special fabric containing Dyneema® fiber. Seams are taped. Washing instructions: TST Special Grease Remover and machine wash 40°C/104°F. (No tumble drying.) Approved according to the directive 89/686/EEC and BGR 191.



Dyneema® is a registered trademark of Royal DSM N.V.

TEST RESULTS - PROTECTION LEVELS CLOTHING

The different levels of protection have been determined by testing according to the table below. In High Pressure Cleaning mainly three types of nozzles/jets are used – rotor, flat and single. The safety levels have been chosen to cover the most common working situations and to verify the quality of clothing and protective qualities.

Note! Different values (for example pressure, flow, nozzle, distance or speed) can give significantly different results!

Prot. level	Pressure bar (psi)	Flow (l/min)	Nozzle type	Dist. (mm)	Speed (m/s)	Result
5/5/2	500 (7500)	16,9	Rotor - Rotary jet	75	0,5	No penetration
5/5/2	500 (7500)	16,9	Flat - Single fan jet 15°	75	0,5	No penetration
5/5/2	200 (3000)	10,7	Single - Single round jet	75	0,5	No penetration



TEST RESULTS - HYDRAULICS

The different levels of protection against hydraulic fluid have been determined by testing according to the table below. The smallest Sapphire nozzle, only 0,15 mm, has been used to simulate a so called pin burst. The safety levels have been chosen to cover the most common working situations and to verify the quality of clothing and protective qualities.

Note! Different values (pressure, flow, burst size, distance, speed) can give significantly different results!

Pressure bar (psi)	Nozzle type	Dist. (mm)	Speed (m/s)	Break-through time (s)
250 (3750)	0,15 mm Sapphire - pin	5	0	> 60 s
350 (5100)	0,15 mm Sapphire - pin	5	0	35 s
500 (7500)	0,15 mm Sapphire - pin	5	0	4 s

Sizes (men's)		
Jacket Trousers Overall	Height cm (ft. in.)	Chest cm (in.)
XS	160-167 (5'3"-5'6")	84 (33")
S	168-175 (5'6"-5'9")	92 (36")
M	176-180 (5'9"-5'11")	100 (39")
L	181-186 (5'11"-6'1")	108 (43")
XL	187-192 (6'2"-6'4")	116 (46")
2XL	193-200 (6'4"-6'7")	124 (49")
3XL	201-206 (6'7"-6'9")	132 (52")

