chlorine techservices

INSTRUCTION BOOKLET

(CTS-IB-PPE-01)

SELF-CONTAINED BREATHING APPARATUS (SCBA)

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Read and understand the respective instructions for use for each Device before using the equipment.

1. SAFETY REGULATIONS

1.1. Correct Use

This Self-contained Breathing Apparatus - referred to hereafter as SCBA - is self-contained open-circuit compressed air apparatus operating independent of the ambient air.

Breathable air according to EN 12021 is supplied to the user from a compressed air cylinder via a pressure reducer, a lung governed demand valve and a full-face mask (Refer to Instruction Booklet Full-Face Mask). The exhalation air is released directly into the ambient atmosphere.

It is imperative that this instruction booklet be read and observed when using the product. In particular, the safety instructions, as well as the information for the use and operation of the product, must be carefully read and observed.

Furthermore, the applicable national regulations applicable in the user's country must be taken into account for safety use.

Alternative use, or use outside this specification will be considered as non-compliance. This also applies especially to unauthorized alterations to the product and to commissioning work that has not been carried out by authorized persons.

This product is supporting life and health. Inappropriate use, maintenance or servicing may affect the function of the device and thereby seriously compromise the user's life. Before use the product operability must be verified. The product must not be used if the function test is unsuccessful, it is damaged, a competent servicing/maintenance has not been made, or if genuine spare parts have not been used.

1.2. Liability Information

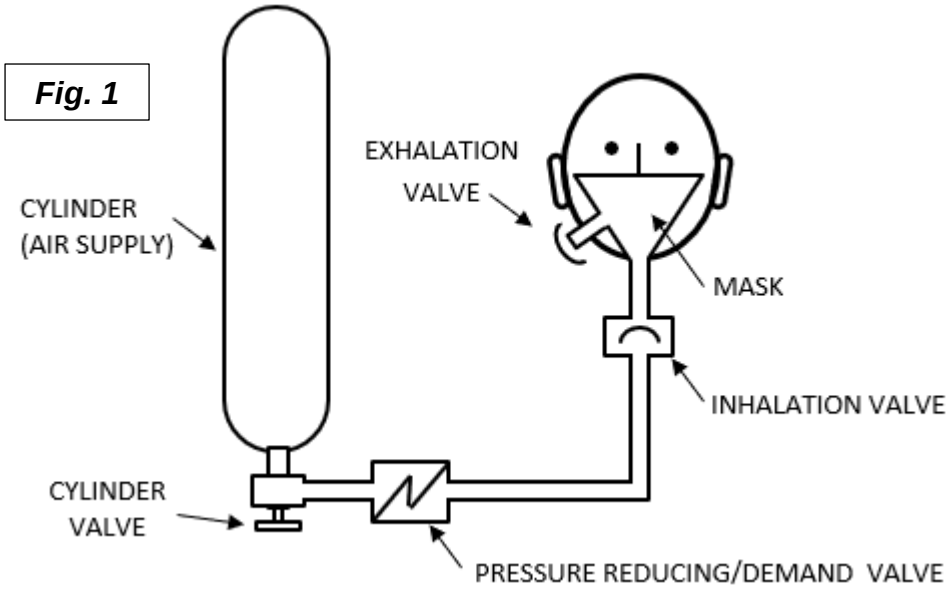
Chlorine Tech Services accepts no liability in cases where the product has been used inappropriately or not as intended. The selection and use of the product are the exclusive responsibility of the individual operator. Product liability claims, warranties also as guarantees made by the manufacturer with respect to the product are voided, if it is not used, serviced or maintained in accordance with the instructions in this instruction booklet.

2. THE SCBA ARRANGEMENTS

2.1. Schematic

The equipment consists of:

- A cylinder containing air under pressure
- A harness to mount the cylinders on the back of the person
- A respiratory system which has a means to reduce the pressure of air from the cylinder and of supplying the wearer with air on demand
- A facemask attached to a demand valve which maintains a positive pressure inside the mask at all times



2.2. **Workings of the SCBA**

2.2.1. The cylinders contain about 1240 litres of compressed air at 300 bar. This gives the wearer around 30 minutes of air supply for full usage or about 20 minutes for working conditions (person breathes heavily during work hence there is more consumption of air and that is why the time is lesser).

2.2.2. The reducing valve reduces the pressure by about 4 bars which is further reduced by the demand valve which is attached to the mask.

2.2.3. The demand valve is the one that supplies the air to the wearer when inhaling.

2.2.4. The exhalation valve releases the air from the facemask.

2.2.5. When the air left inside the apparatus will last about 10 minutes (50-55 bar pressure), a warning whistle is sounded continuously till the cylinder gets emptied. The start of this whistle is an indication for the wearer to move out of the space he's in to fight fire or whatever purpose it is used for.

2.2.6. The face mask is of soft moulded nature rubber and five adjustable head straps and a neck strap. It has a foam filled or air cushion seal and a full vision visor. For correct positioning of the mask, the straps should be tightened in the sequence where the first two lower (chin) straps then the middle pair (cheek straps) and finally the head strap is tightened. Care should be taken to not over tighten them causing discomfort to the wearer. The mask is made of rubber and plastic with a shatterproof visor. It has an exhalation port with a speech diaphragm and a nose guard.

2.2.7. The wearer should have a good, clear field of vision through the visor.

2.2.8. A gauge is provided, clipped or attached to the harness that carries the cylinder and it monitors the pressure within the cylinder. It is positioned to be visible to the wearer.

2.2.9. Spare cylinders must be provided for each set of breathing apparatus.

2.2.10. In case that the facemask is dislodged in a toxic atmosphere, the wearer should hold his breath and position the mask correctly. Any inlet of such toxic air can be highly dangerous.

2.3. Air Consumption

Approximate consumption by a person is as follows:

Degrees of work	Air consumption (litres/minute)	Duration of cylinder in minutes (1200 litres capacity in minutes)	Duration of cylinder in minutes (1800 litres capacity in minutes)
Resting	8-12	150-100	225-150
Light Work	12-20	100-60	150-90
Moderate Work	20-40	60-30	90-45
Heavy Work	40-60	30-20	45-30

$$\textbf{Nominal Working Duration} = \frac{\textbf{(Fully Charge Cylinder Capacity) – 10}}{\textbf{40}}$$

We subtract 10 as 10 minutes is when the alarm starts ringing and it is a safe period which must be taken into account. So, a 1200 litres cylinder will last for 1200/40 = 30 minutes minus the 10 = 20 minutes.

Nervousness and excitement can cause an increased demand of oxygen and a proportionate increase of respiration rate.

2.4. Basic Unit – Backplate, pneumatic system without second connector

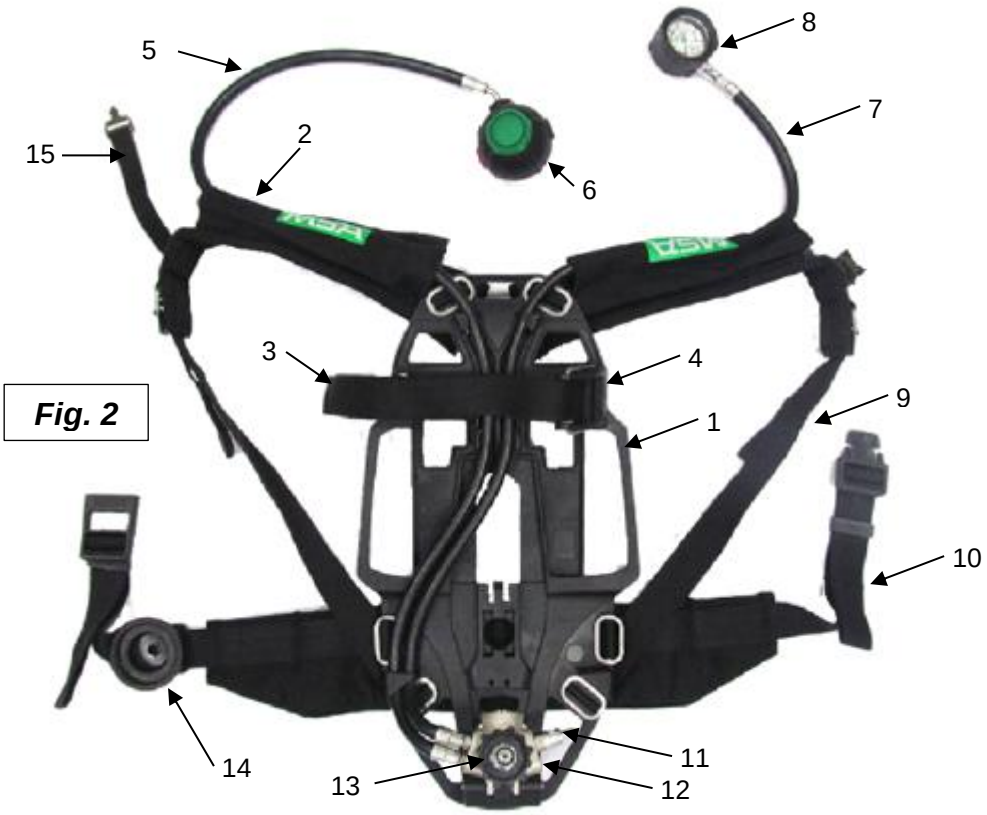


Fig. 2

Fig. 2 Basic Unit Parts

1. Back Plate
2. Shoulder Strap
3. Cylinder Strap
4. Cylinder Strap Buckle
5. Medium Pressure Hose
6. Demand Valve
7. High Pressue Hose
8. Pressure Gauge
9. Tightening Straps
10. Waist Belt
11. Alarm Whistle
12. Pressure Reducer Support
13. Pressure Reducer
14. Demand Valve Holder
15. Chest Strap

The basic breathing apparatus is made up of back plate, shoulder strap, reducer, medium pressure hose, high pressure hose, pressure gauge and demand valve. Back plate is designed to use symmetrical plastic handles for convenient movement of device. Reducer is mounted under the back plate. Cylinder bracket is mounted in the guide groove at the upper part of back plate. Lengths of waist belt and shoulder strap can be adjusted. Material of the back plate is fibre reinforced material. Materials of the shoulder strap and waist belt are flame-resistant polyester webbing, flame-resistant fabric and flame-resistant padding material. Wide shoulder padding and waist protective padding make the wearing very comfortable. The metal on the back plate, straps and waist belt are made of stainless steel, are not easily rusted.

2.5. **Pressure Reducer**

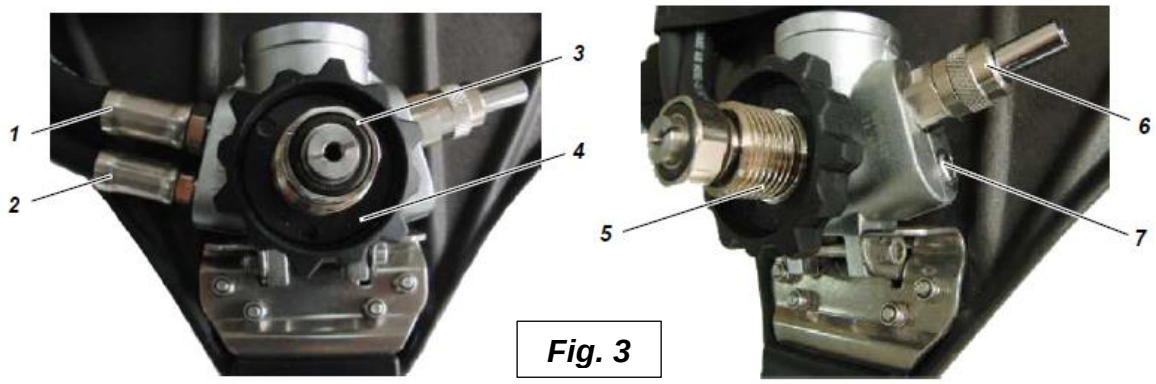


Fig. 3

1. High Pressure Hose
2. Medium Pressure Hose
3. O-ring
4. Hand Wheel
5. Cylinder Connector
6. Alarm Whistle
7. Safety Pressure Valve

Once the air releasing phenomenon by the safety pressure release valve of the reducer is noticed, withdraw from the working place immediately and stop using this breathing apparatus. Send it to authorized service centres for inspection and repair. It can only be used after all trouble removed. It's forbidden to adjust any parts in the reducer by user. The breathing apparatus must be sent back to an authorized service centre for repair if any failure occurs. It is no allowed to disassemble the reducer by the user. Don't damage the seal surface when replacing the seal O ring on the high-pressure connection.

The reducer is mounted in the lower area of the back plate. It reduces pressure of the high-pressure air from the cylinder to mid pressure at about 7 bar. The air is delivered through medium pressure hose to demand valve, reduce the pressure again and then used by the user. Turn the hand wheel and connect the cylinder connector with the cylinder. Once the cylinder valve is opened, the user can view the pressure indication from the pressure gauge as which is connected to the high-pressure hose. A pressure alarm device is equipped in the reducer. When the pressure of the cylinder is lowered to 55 ± 5 bar, it will give off audible alarm signal ≥ 90 dB. The alarm device will not be dependent on the ambient air when alarm device gives an alarm, so the alarm device will not lose its function even if in high humid atmosphere or under sprinkle water, or even in very low temperature. In addition, the air consumed for the alarm device's alarm is ≤ 5 L/min.

There is also a safety release valve, which is set to about 11 bar, in case there is anything wrong and the medium pressure rises, the valve will be opened, release the over pressure to guarantee the performance of the demand valve.

2.6. The Demand Valve

The demand valve is a lung governed demand valve for a compressed air breathing apparatus. It is connected between compressed air supply and full-face mask and controls the inhaled and exhaled air. The demand is not an independent breathing apparatus. It must be used exclusively mounted on a full-face mask. The demand is not suitable for underwater diving.

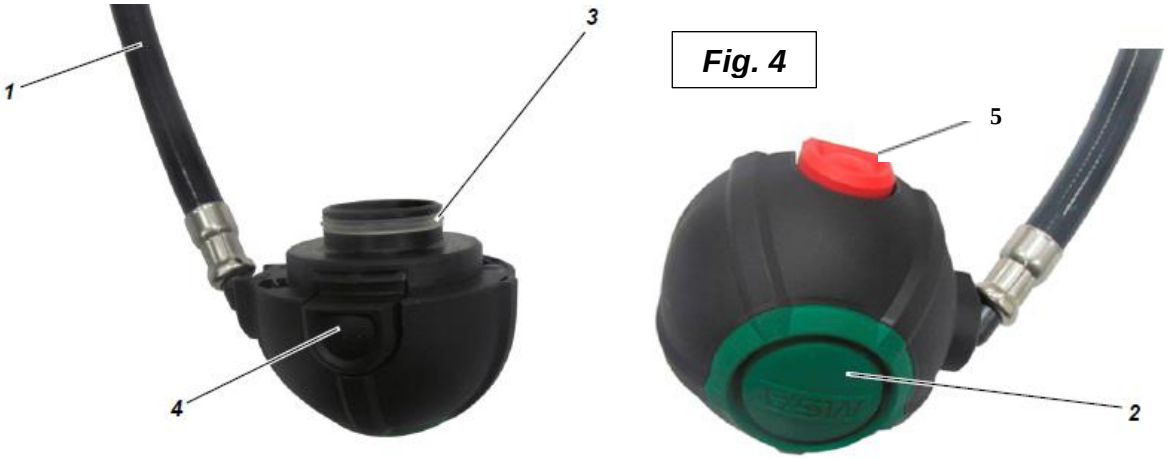


Fig. 4

1. Medium Pressure Hose
2. Exhaust Button
3. Port of Mask
4. Operating Button
5. LDV Button

Don't push operating button and exhaust button at the same time. Don't press down the red and black button during the use, because pushing both buttons can disconnect the demand valve from the mask.

The outer housing of the demand valve is made of high strength engineering plastic to endure possible collision. The demand valve must be used with full mask.

2.7. Medium Pressure Hose

The explosion pressure for medium pressure hose is not less than four times of the reducer output pressure. Connection of the medium pressure hose with the demand

valve is flexible and swivelling, which can automatically fit head movement of the operator.

2.8. High Pressure Hose

A high-pressure gauge is connected with the high-pressure hose. The pressure gauge surface is luminescent, so the pressure display can be viewed clearly even in the dark. Connection of the pressure gauge and the high-pressure hose is swivelling and can turn in 360°, this makes easy for the operator to view the pressure gauge at any position.

There is a small hole in the high-pressure hose, which is safety hole. In case there is leak from the high-pressure hose, air will be released from the small safety hole, thus to avoid the high-pressure hose from exploding.

3. USE

The device can be used only after fully maintained and tested. If malfunctions or defects were found before using, do not use the device. Prevent the respirator from sharp objects and prevent it from collision with any objects during the use. The device shall be checked and repaired by MSA authorized service centre.

3.1. Mounting cylinder

	(1) Insert the cylinder into the cylinder strap (In this picture it only shows a composite cylinder). (2) Erect the cylinder and the back plate (3) Align the cylinder valve outlet centre with the reducer hand wheel centre. (4) Turn the hand wheel, to connect the reducer with the cylinder. (5) Not to make it too tight, just hand-tight. (6) Don’t use any tools.

3.2. Connecting cylinder

(1) Place compressed air breathing apparatus horizontally so that the back face is on top.

(2) Check gasket on pressure reducer for proper condition.

(3) Open cylinder buckle on the cylinder strap eliminating any tension and extend the strap.

(4) Push compressed air cylinder through the cylinder strap with the cylinder valve toward the pressure reducer, so that it lies on the central support.

(5) Thread cylinder valve onto pressure reducer, if necessary, bring the compressed air breathing apparatus with valve up into a vertical position.

(6) Tighten cylinder strap by pulling the free end.

(7) Check position of compressed air cylinder, retighten if necessary.

(8) Push cylinder buckle down until it catches.

(9) Fasten end of the cylinder retaining strap onto Velcro strip.

(10) Briefly open cylinder valve and check for escaping air, retighten if necessary.

3.3. Donning (putting on) the SCBA

Step 1

- Place the SCBA in front of you with the cylinder facing down and the cylinder valve away from you
- Fully open the shoulder straps and waist belt
- Lay the shoulder straps and waist belt out to prevent them from tangling
- Check all components of the device for defects and malfunctions

Step 2 (Overhead Method)

- Grasp the carrying frame of the backplate with both hands
- Carefully lift the SCBA over and behind your head
- Your elbows must go through the shoulder harness straps.
- Slide the backplate down your back and grasp the shoulder harness straps as the unit slides down the middle of your back

Step 2 (Coat-style Method)

- Fully extend all straps
- If using the coat-style method of donning, grasp the shoulder harness straps at the padding
- Place the SCBA over one shoulder
- Then the other harness over the remaining shoulder
- SCBA must rest in middle of back

Step 3

- Place the face mask, via strap, around neck
- Grasp the ends of the pull-down adjustment shoulder straps
- Pull the straps downwards towards your hips until waist belt pad aligns with hips
- Adjust the SCBA into position (top of cylinder should be neck high)

Step 4

- Connect waist belt buckle
- Pull adjusting straps (as shown) until device is secure
- Adjust the waist (weight) belt to suit the weight of the SCBA which should rest comfortably on your hips
- Tuck strap loose ends into belt

Step 5

- Press **RED** LDV button (Fig 4) to switch off positive pressure

Step 6

- Fully open the cylinder valve (slowly) to pressurise the system
- Check the pressure gauge (should read between 250/300 bar)

Step 7 (Method 1)

- Holding the facemask as shown, place over head with centre plate at the back
- Place chin in facemask chin cup
- Tighten chin (lower) straps
- Tighten cheek (upper) straps
- Tighten centre (head) strap if necessary.

Step 7 (Method 2 - preferred)

- Holding the facemask as shown
- Place chin in facemask chin cup and pull head harness over the head
- Tighten chin (lower) straps
- Tighten cheek (upper) straps
- Tighten centre (head) strap if necessary.

Step 8

- First breathe will switch on LDV to positive pressure mode
- Inhale and hold breath – there must be no leak (audible)
- Breathe normally and expelled air should pass free through exhalation valve
- Check supplementary air supply is working by pressing centre button on LDV – then release

Step 9

- Check that a strong air flow is heard when two fingers are inserted between the sealing edge and face
- Check that the pressure on the pressure gauge reads full

Step 10 (Vacuum Test)

- Close the cylinder valve and breathe down (slowly) the system
- The alarm whistle should sound at +/- 50 bar
- Continue breathing down the system
- Once empty, hold breath for 8 seconds – the face mask should collapse and hold to face (indicating a positive seal)

3.4. Doffing (taking off) the SCBA

Step 1

- Loosen the chin and cheek straps, by pressing the buckles forward using your thumbs

Step 2

- Reach under and pull the mask off backwards over your head (do not pull on the front port).
- Reset Demand Valve by pushing the RED button (this will shut the air flow)
- Close the cylinder valve
- Vent system by pressing Exhaust Button
- Check that Pressure Gauge is on Zero pressure
- Press Red Button to reset system

Step 3

- Extend waistbelt straps and open waist belt buckle.

Step 4

- Lift shoulder strap buckles and open fully. Remove facemask strap from neck and remove apparatus from shoulders.

4. MAINTENANCE INSTRUCTIONS

Below is the requirement for the maintenance schedule for each part. Testing for the mask and demand valve should be done on the complete set of the apparatus, and cylinder pressure should not be lower than 250 bar.

Component	Maintenance Item	Minimum intervals for checking, maintenance and repair				
		Before use	After use	Every year	Every 3 years	Every 9 years
Demand valve	Cleaning & disinfection		X			
	Check diaphragm		X	X		
	Replace diaphragm				X	
	Tightness check	X	X	X		
	Check closing pressure		X	X		
	Overhaul inspection					X
Reducer	Alarm device	X	X	X		
	Replace high pressure seal			X		
	Full-function test		X	X		
	Overhaul inspection					X
Medium & High-pressure parts	Appearance	X	X	X		
	Sealing properly			X		
	Cleaning		X	X		
	Pressure gauge		X			
Breathing device	Complete set cleaning		X	X		
	Function test, leak test	X		X		
	Completeness test	X		X		

5. CLEANING

Contaminated apparatus after usage must be cleaned thoroughly. If necessary, wash the back plate with warm water. For cleaning, disassemble the reducer from the carrying plate (loosen the fixing screws) and disassemble the demand valve.

Do not immerse the reducer and demand valve into the water. The air for drying the apparatus should be less than 60 °C. When cleaning, never to use any organic solvent, such as nitro solution, alcohol, alcohol solution, gasoline, trichloroethylene, etc. If there is too much dirt, the carry straps, including metal parts, could be machine-washed with water not above 40 °C. Buckles should be well-inserted during washing. After washing, hang them in a ventilated place for a naturally dry.

6. STORAGE

The apparatus should be stored in a clean, dry and well-ventilated place. Put the apparatus into the package and keep it away from long-term exposure to sunshine, heat radiation, electromagnetic field and devices that may produce ozone, electrical spark or silent discharge device. Do not store the apparatus with oil, acid, alkali or other corrosive substances, no heavy press on the apparatus.

7. TECHNICAL SPECIFICATIONS

High pressure connection: 300 bar

Medium pressure: 5 bar to 9 bar

Operating temperature: -30 °C to +60 °C

Alarm pressure: 55 ± 5 bar

8. ACKNOWLEDGEMENTS

8.1. MSA 2015 - Operating Manual - Self-contained Open-circuit Compressed Air Breathing Apparatus

8.2. INTERSPIRO – User Manual

8.3. Dräger – Donning and Start-up Procedure