



INTRODUCTION

RAKSHA KAVACH is a single use self-contained, closed circuit oxygen type breathing apparatus. RAKSHA KAVACH will assist a person to escape from irrespirable atmosphere containing smoke, toxic gases or an oxygen deficient atmosphere. As it is a closed circuit apparatus, its operation does not depend on the surrounding atmosphere.

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APPLICATION & LIMITATIONS

RAKSHA KAVACH is a lifesaving apparatus. It is designed for escape from any difficult and life-threatening conditions such as an environment of toxic gases, smoke and oxygen deficient atmosphere. It is used in emergency in:

1. Underground mines, particularly in coal mines
2. Submarines
3. Many branches of industry
4. RAKSHA KAVACH is designed for single use. It has got DGMS approval for 30 minutes duration.

DESIGN

RAKSHA KAVACH is ideally suited for self-rescue because of its small size, light weight and rugged construction. Its outer casing is made of stainless steel and therefore has enough shock support for external mishandling. However, the unit should be handled with all care as the user's life could depend on it. RAKSHA KAVACH is belt wearable and does not impede normal activities. It contains moisture indicator which indicates leak tightness of the system. In the outer case the pictogram is given which gives instruction about the donning of the apparatus.

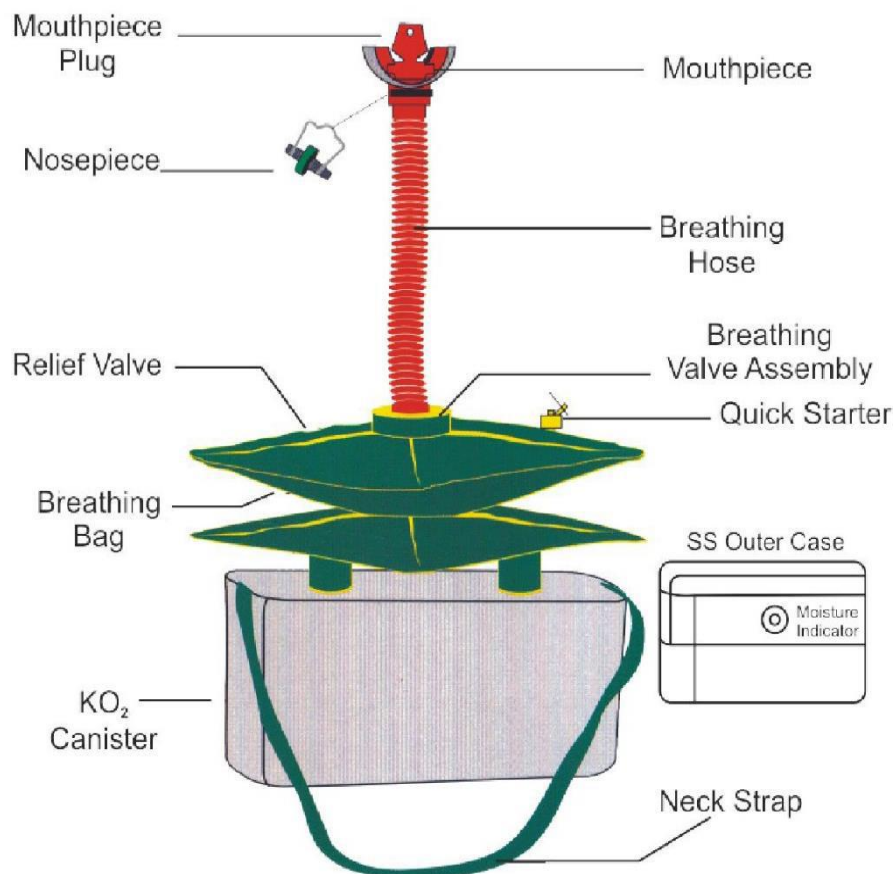
Inside the stainless steel outer casing of RAKSHA KAVACH, the following parts are present:

1. One stainless steel canister containing Potassium Superoxide (KO_2) with indicator system
2. 6 liters breathing bag containing Quick starter system with relief valve
3. breathing valve assembly
4. breathing hose with nose piece, mouth piece and mouth piece plug
5. neck strap
6. heat protection pad
7. Suitable heat exchanger

4. Internal Component

RAKSHA KAVACH

Suparna Chemicals Ltd.
User's Manual



The whole inside unit is fabricated in such a way that it is a one complete sealed unit without any leakage when mouth piece plug is inserted in the mouthpiece. The main chemical potassium superoxide is well protected in this unit. The whole unit is further protected by the outside SS cover which is completely sealed with specially designed gasket and indicator present in the system ensures leak tightness of the system. With this double sealing the efficiency of potassium superoxide is fully assured during use.

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SPECIAL FEATURES IN DESIGN

1. Suparna Chemicals (SCL) manufactures Potassium Superoxide, the core chemical of Raksha Kavach at its plant at Vapi. KO₂ has been so formulated in our factory that it is activated instantly within one or two breaths of the user.
2. RAKSHA KAVACH has been hermetically sealed twice, i.e., in inner casing as well as in outer casing, which ensures foolproof sealing of the unit further the device attached with indicator to ensure moisture free of the system.
3. The whole unit has been simplified to suit Indian conditions and can be operated by any person with minimum training.
4. The quick starter is also provided for initial spurt of oxygen

PRINCIPLE OF OPERATION

After removing the outer cover, the self-starter is activated which gives oxygen around 5 to 6 liters. The oxygen fills the breathing bag which supplies the oxygen to the user at the beginning of the operation. In case of the breathing bag not sufficiently filled up, the user has to exhale inside the KO₂ canister through mouth piece with one or two breaths.

The main KO₂ canister unit is activated with one or two breaths of the user. He exhales CO₂ and water vapour into the KO₂ bed of the apparatus through the breathing hose. KO₂ reacts with water vapour to produce oxygen and simultaneously remove CO₂ from the exhaled gas. The user gets oxygen free of CO₂, This chemical reaction is demand sensitive. The more frequently the user breathes, the more water vapour and CO₂ goes inside the KO₂ bed and more oxygen is generated. At rest, breathing slows down and therefore oxygen generation is also less and KO₂ bed life is also more.

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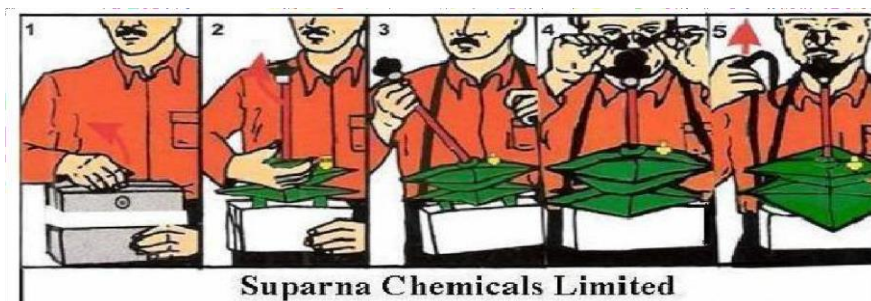
DONNING AND FITTING

Operating Instructions:

1. Remove unit from the belt
2. Lift the latch on the top
3. Remove bottom and top covers
4. Remove helmet & hang the unit over neck using neck Strap facing heat protection pad on body side
5. Remove mouth piece plug from mouth piece
6. Insert and hold mouth piece in the mouth
7. Remove rubber pin head from the locking pin of the Quick Starter
8. Activate the starter by pulling thread / pin attached to it
9. Put nose piece to close both nostrils
10. Inhale Oxygen provided by the starter
11. Exhale into the mouth piece. In case breathing bag is not sufficiently filled up in step 8 or due to non functioning of Quick Starter:
12. Take out mouth piece from the mouth
13. Inhale ambient air through the mouth
14. Exhale into the mouth piece
15. Repeat the process two to three times to fill the breathing bag
16. Breathe normally holding mouth piece in the mouth
17. Put on safety goggles
18. Adjust neck strap to hang breathing apparatus comfortably
19. Put on helmet
20. Move out

Donning Procedure

The donning procedure is schematically shown below:



TECHNICAL SPECIFICATIONS: conforms to BIS 15803:2008.

1.	Scope of delivery	Complete apparatus ready for use with KO2 cartridge, breathing hose, nose clip, breathing bag, relief valve, quick starter, neck strap, heat protection pad, belt wearable carrying case with indicator, etc.
2.	Weight (kg) approx Carried	Less than 2.5Kg
3.	Dimensions (mm) L x H x W Approx	210 x 165 x 80 ± 5
4.	Moisture indicating system	Color changes from blue to light pink or white in case of leakage
5.	Oxygen supply available	Immediately with quick starter
6.	Usage period/ Rated duration(min) - Breathing rate 35 L/min	30 minimum
7.	Breathing resistance (m bar) - Breathing rate 35 L/min	< 10
8.	CO2 content of air inhaled (%)	3 maximum
9.	Temperature of air inhaled (°C)	< 55
10.	Breathing bag capacity (liters)	6
11.	Approval	DGMS approval No. SA-5/2004
12.	Service life (years): stored Carried (one shift operation of 8Hrs)	10 10
13.	Maximum surface temp. during use (°C)	150(on open metal unprotected surface)

USE CARE & MAINTENANCE PROCEDURE

- Keep RAKSHA KAVACH clean.
- Do not clean with any organic solvent.
- Use a damp cloth to wipe clean.
- Do not mishandle the unit.
- RAKSHA KAVACH is designed for a single use. It should not be opened without a need for its use.

TRAINING

RAKSHA KAVACH will be used only in emergency. Therefore, proper training should be given to all users. The efficiency of RAKSHA KAVACH depends on the person how he handles it. The more experience he has with the unit, the more effectively he will operate the unit in actual use. The "Donning unit" of RAKSHA KAVACH is available. Suparna Chemicals will be pleased to provide training to actual users.

IMPORTANT POINTS

RAKSHA KAVACH will be used by persons who are trained to use this equipment.

The unit is a completely sealed unit and it is for single use only. Never open the latch of the unit out of curiosity. Its effectiveness may go down.

Use only for escape in emergency.

While using, do not remove mouth piece and nose clip unless you come to a safe place.

CHECKS PRIOR TO USE / INSPECTION

- The unit should be inspected daily for:
- Visual damage
- Broken seal
- Any substantial dent, crack on the surface of the outer SS casing
- Displaced security strap or latch
- Change in the colour of the indicator from blue to pink / white

Any unit showing above mentioned signs should be removed from service immediately. An inspection book should be maintained to keep all records of inspections.

Suparna Chemicals with the request of the user shall carry out inspection every year. Some units (chosen randomly) will be taken for practical trials to confirm their efficacy.

After 10 years from the date of manufacture, the units must be removed from service.

DURATION

RAKSHA KAVACH is designed for 30 mins. However, there are many factors, such as, health of the user, work load, mental condition of the user, degree of training, etc. which can affect duration.

STORAGE AND SHELF LIFE OF THE APPARATUS

RAKSHA KAVACH must be stored in an enclosed and safe place within the temperature range not exceeding 50°C. A distance of at least ONE meter should be maintained from any heating element in the surrounding. The shelf life of the apparatus is 10 years.

SERVICE

Damaged and expired units should only be sent to the factory of Suparna Chemicals for preparation for re-use.

FACTORY ADDRESS

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