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# INSTRUCTION MANUAL

## KS – 2E

### EMERGENCY ESCAPE BREATHING DEVICE

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◇ Breathing Apparatus Model KS – 2E is a breathing apparatus exclusively designed for marine application, approved by the “Type Approval Regulations for Marine Use”.

- Please read this instruction manual thoroughly to confirm proper use.
- Please keep this instruction manual. If lost, please inform a sales agent.



*AIR WATER SAFETY SERVICE INC.*

### < Important notes to take before reading this Instruction Manual >

Various symbols are used in this instruction manual and on the product to ensure that the product is used safely and properly and to prevent in advance injuries to the user and others as well as damage to property. A description of these symbols and their meanings are provided below. Please familiarize yourself with these symbols before reading this manual.



#### **WARNING**

Death or serious injuries may result if information indicated by this symbol is disregarded and the product is handled incorrectly.



#### **CAUTION**

Injuries or property damages may occur if information indicated by this symbol is disregarded and the product handled incorrectly.

#### Examples of Symbols



This symbol indicates matters requiring caution (including dangers and warnings).



This symbol indicates prohibited matters. Specific matters that are prohibited are either written inside the symbol or nearby.











This symbol indicates mandatory matters or instructive matters.

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### < For Safe and Proper Use >

Please observe the following warning strictly to confirm safe use of the breathing apparatus. Misuse of it may endanger the life of the person wearing the apparatus

 <b>WARNING</b>	
	Please be completely familiar with the directions for use after completing adequate training.
	Improper usage may lead to accidents. Cylinder pressure shall be confirmed by referring to the pressure indicator before use.
	Serviceable time will be shorten in proportion to the cylinder pressure. Do not make any alterations or disassemble the apparatus.
	Proper function and safety cannot be guaranteed. Use only genuine parts from the manufacturer.
	Proper function and safety cannot be guaranteed if parts other than ones from manufacture were to be used. Do not use the apparatus where temperatures are above 55°C or below 5°C.
	Normal function and safety cannot to be maintained. Never throw, drop or give excessive impact to the apparatus.
	Proper function and safety cannot be guaranteed to a damaged apparatus.

## Introduction

KS-2E BREATHING APPARATUS (EMERGENCY ESCAPE BREATHING DEVICE) is exclusively designed for marine (ship) application such as in engine rooms and ships' dwelling rooms, in accordance with the relative regulations of Ship Safety Law. Do not use the apparatus for purposes other than escapes in cases of emergency.

### 1. Confirmation Points at Time of Purchase

(1) Confirmation on scope of supply:

Please confirm the scope of supply and confirm that all components are safely delivered. The component parts consists of:

Breathing apparatus	.....	1
Instruction manual	.....	1

(2) Displaying owner's name on the cylinder:

According to the High Pressure Gas Safety Law and Cylinder Safety Regulations of Japan, it is mandatory to display the name of the owner and other information on the cylinder.

Please enter the owner's name and other matters into the sticker slip by using inerasable pen. Then stick the slip on the cylinder (Refer to below figure):

高圧ガス容器所有者		
氏名		← Name
住所		← Address
電話		← Tel. No.

Sticker slip  
(Actual size)

## 2.Names and Functions of Component Parts

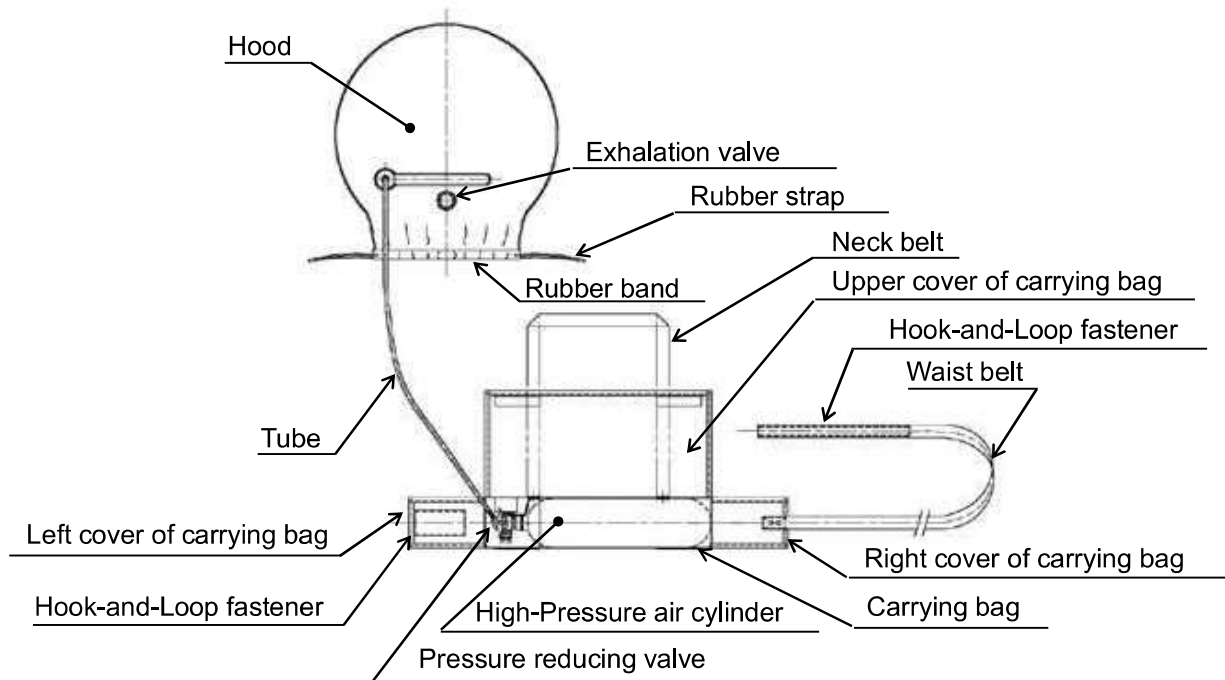


Fig. Overall View Configuration

Then high-pressure air stored in the high-pressure air cylinder is reduced by means of the pressure reducing valve.

As a result, the pressure controlled air at a certain pressure in the outlet section of the pressure reducing valve may be fed to the inside part of the hood passing through the tube.

The wearer of the apparatus can breathe air contained in the hood.

Supplied air is used for inhalation, then mixed with exhaled air, which is then discharged through the exhalation valve.

The pressure inside the cylinder can be confirmed by the pressure indicator.

The neck belt shall be hung either from the neck or shoulder for carrying the apparatus.

In actual use, the cylinder may be stably fixed with the wearer's abdominal region by securing the waist belt.

### 3.Directions for Use

- (1) Hang the neck belt on the neck. Next, open the upper cover of carrying bag. Then take out the waist belt and hood from the carrying bag.

(See Fig. 1 and Fig. 2 below)



Fig. 1



Fig. 2

- (2) Transfer the belt from back then around and to front of your body. Then connect the belt to the hook and loop fastener located on the left cover of carrying bag.

(See Fig. 3 and Fig. 4 below)



Fig. 3



Fig. 4

- (3) Open the hood. Next, turn the handle 90° either clockwise or counter-clockwise.

(See Fig. 5 and Fig. 6 below)



Fig. 5



Fig. 6

 **CAUTION**

Fully open the folded hood with your both hands alongside the rubber band.



If the hood is unable to open fully, sufficient amount of gas may not be supplied.

- (4) Put on the hood over your head.

Next, pull the rubber straps away from your face to both left and right and confirm that the rubber band is fed alongside your neck. The hood may be placed with spectacles on.

(See Fig.7 and Fig.8 below)



Fig. 7



Fig. 8

 **CAUTION**

- (1) Put on the hood over your head so that the transparent part of the hood comes in the front.
- (2) The rubber band shall be fully extended when placing the hood from the rear of your head.
- (3) Pull the rubber straps away from your face as much as possible so as to keep air tightness around your neck.



Proper function and safety can not be guaranteed if the apparatus is not worn properly.

#### 4.Cautions During Use

- (1) Note that once the air cylinder valve is opened, the air will fully discharge. Never open the valve other than in cases of actual use.
- (2) The apparatus may not be used if a sound of air flow cannot be confirmed after opening the valve.
- (3) The hood shall be removed from your head when the sound of air flow is weakened and the hood shall start deflating.
- (4) The hood shall be kept free from direct flame and sparks.
- (5) If a hole has been made to the hood while escaping, temporary patch the hole by pinching with your fingers.
- (6) If the view is fogged, rub the hood against your face.
- (7) The wearer is to expect some disturbances in their ears caused by pressure differentials inside the hood. This disturbance is normal and shall not cause any bodily affect.
- (8) When the ambient temperature is low or when the filled amount in the cylinder is low, the service time will shorten proportionally.

#### 5.Safe Maintenance and Storage

- (1) The apparatus shall be stored in a place free from direct sunlight and at an ambient temperature within 0°C~ 40°C, as well as easily accessible and clearly noticeable.
- (2) Keep the apparatus at least 2 meters away from flammable or ignitable substances.

#### 6.Periodical Inspection:

The apparatus shall go under a periodical inspection in accordance with the below table. :

Checking period	Items to be checked	Actual checking procedures
Every 6 months	Checking on air filling pressure at cylinder	Conduct checking according to the requirements in Attached Table 1.
Every year	Appearance inspection	
Every 3 years	Functional inspection	
Every 5 years	Checking on high-pressure air cylinder and on cylinder valve	

#### 7.Air Filling into High-pressure Air Cylinder

Refer to Attached Table 2 High-pressure Air Refilling Procedures.



## 8. Maintenance and Storage of Hood

(1) First, lay the yellow side of the hood upwards.

Next, fold up the hood in order of procedure as shown in Fig. 9 below:

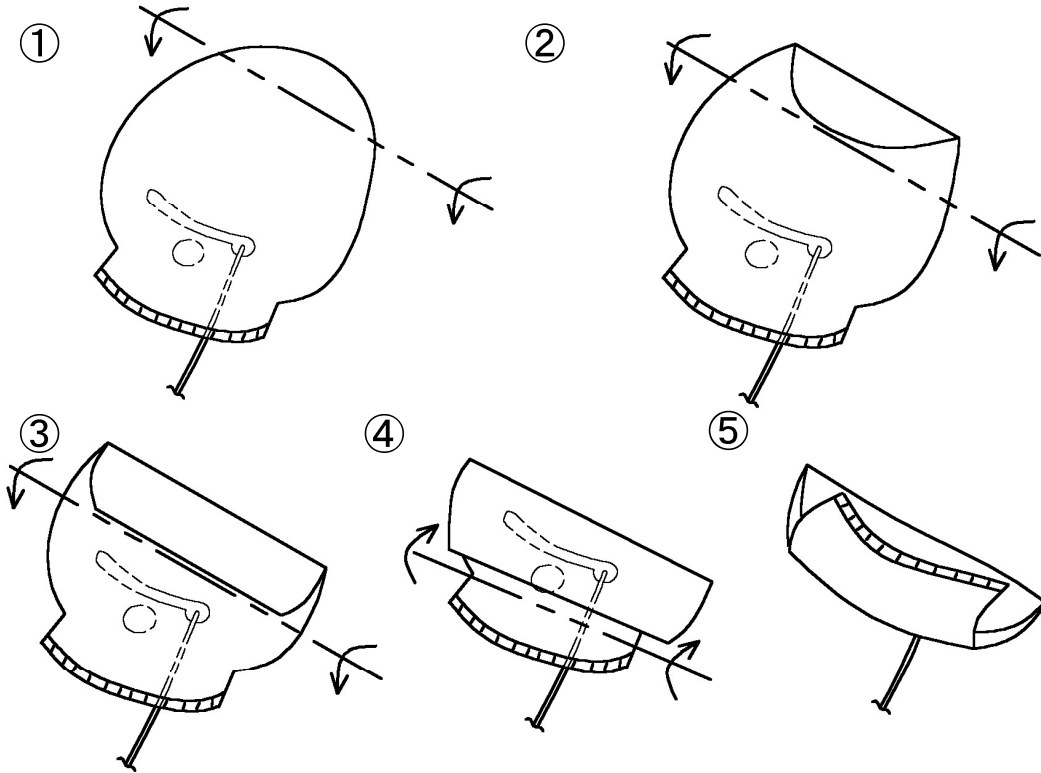


Fig. 9 Stowing the hood

(2) Place the folded hood into the carrying bag.

Next, bend the tube and carefully place it on the hood, confirming that it is not tangled to the valve handle or other components. Place the left cover of the carrying bag over them. (Refer to Fig. 10 below)

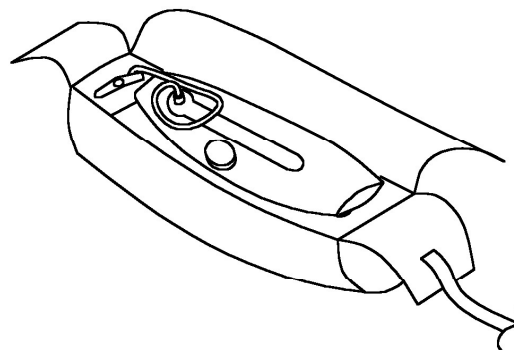


Fig. 10 Storing Method (Part 1)

(3) Close the right cover of the carrying bag.

Next, fold up the waist belt onto the cover in an adequate length.

(Refer to Fig. 11 below)

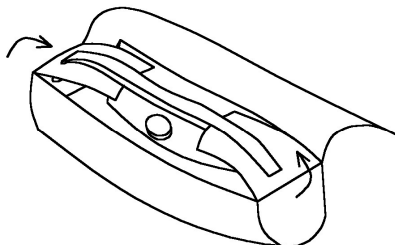


Fig. 11 Storing Method (Part 2)

(4) Close the upper cover of carrying bag.

The upper cover of the carrying bag shall be shut with a little stretch.

(Refer to Fig. 12 below)

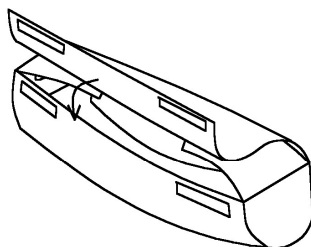


Fig. 12 Storing Method (Part 3)

## 9. Main Specification

Application		Emergency escape use aboard a ship
Model No.		KS-2E
Type approval No.		4474
Classification		Consistent supply of compressed air type ※1
Serviceable time		Approx. 10 minutes
Gross weight		Approx. 5.3 kg
High-pressure air cylinder ※2	Volume	2.3ℓ
	Max. filling pressure	19.6MPa
Type of facepiece		Hood
Dimensions (when stored)		Approx. 470 × 150 × 110mm
Expiration date		Refer to ※3 below

※ 1 The rated amount of air supply is approx. 35 ℓ/minute.

※ 2 This cylinder has been designed exclusively for filling air.

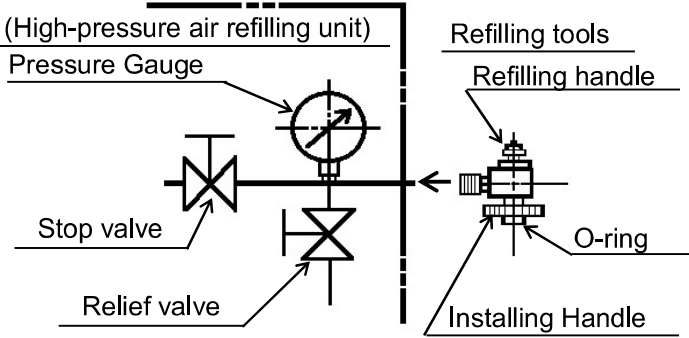
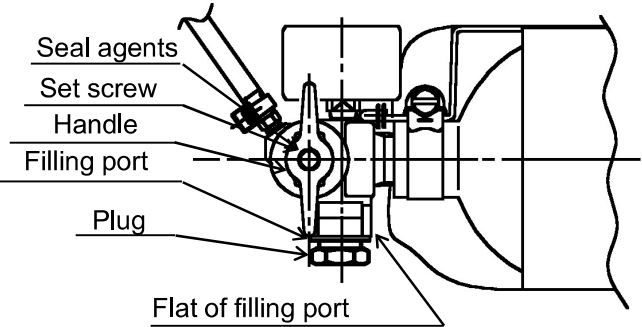
※ 3 Maintenance of the cylinder shall take place according to the requirements of “Attached Table 1 Inspection and Maintenance Procedures” specified in this manual.



**Attached Table 1 Inspection and Maintenance Procedures**



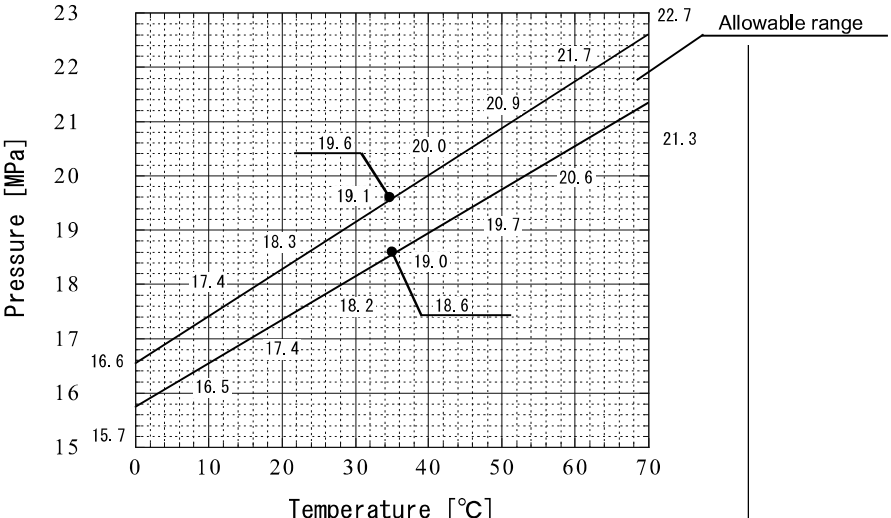
<b>Item</b>	<b>Inspection &amp; maintenance procedures</b>	<b>Standard</b>	<b>Actions to be taken</b>	<b>Remarks</b>
Filling pressure inspection	Confirm air pressure by using the pressure indicator.	18.6MPa or more (at 35°C).	If it is less than 18.6MPa, replenish air.	According to refilling item.
Visual inspection	1. Hood and tube (1) Check to see if any damage/abnormality is observed visually on the hood.	To be free from damage/ abnormality	If any damage/ abnormality has observed, replace the hood.	
	(2) Check on resiliency on the rubber band and strap.	To be provided with sufficient resiliency	If resiliency is insufficient, replace the hood and/or the rubber strap.	
	Check to see if any damage/abnormality is observed visually on the tube.	To be free from damage/ abnormality	If any damage/ abnormality has observed, replace the tube.	
	(3) Check to see if any damage/deformation etc. is observed visually on other parts.	To be free from damage/ deformation in practical use.	If any damage/ deformation has been observed replace it with a new one.	
	2. Pressure reducing valve: Visually check to see if any dent, deformation, damage or other defect is observed on the pressure regulator, handle and pressure indicator.	To be free from damage/ abnormality	If any damage/ abnormality is observed, request for repair.	
	3. High-pressure air cylinder (1) Inspection must be conducted on every cylinder, at a cylinder inspection station, once every 5 years counted from the manufacturing date of cylinder indicated on the cylinder stamping. Ex.: 6-02:(manufactured on June, 2002) In addition, the valve shall be inspected at the same time.	To be in conformity with the requirements of re-inspection issued by "the High Pressure Gas Safety Law of Japan".	Re-inspection shall be applied if the cylinder serviceable date is expired.	If an air-filled cylinder is available, this cylinder should be re-inspected after elapsing 5 years for re-use.
	(2) Check to see if any corrosion, crack, dent, flaw and other damages are observed visually.	To be free from corrosion, crack, dent, flaw and other damages.	If any damage/ abnormality is observed, request for re-inspection.	



	<p>4. Carrying bag: Check to see if any looseness, damage and defects are observed on the carrying bag, belt, face fastener and other sewn products. Then make sure whether the above defective parts are serviceable or not.</p>	To be serviceable	If it can not be served, request for replacement.	
Functional Inspection	Turn the valve handle and measure the time of air flow.	When air filling pressure is at 17.5 MPa, the air supplying time shall be 10~12 minutes.	If air supplying time is insufficient, request for repair.	Functional inspection shall be conducted only when required.
Maintenance	<p>Disinfection and cleaning of the hood: Remove contaminants from outer surfaces. Also, remove contaminants including sweat, saliva, fat, etc. from inner surfaces. Clean the hood according to the below procedures: (1) Wipe off outer &amp; inner surfaces of the hood by using a moistened piece of soft cloth soaked with alcohol. Clean the rubber band neck section in the same way as above. (2) Immerse exhalation valve into fresh water, lightly rinse and clean the exhalation valve. (3) Dry the hood and the exhalation valve thoroughly in the shades.</p>			Exhalation valve should be washed with the hood attached.
Air refilling	Perform air refilling according to the requirements of "Attached Table 2 High Pressure Air Refilling Procedures."			
Storage	Store the hood, etc. into the carrying bag. (Storing procedures are specified in the manual. )			

**Attached Table 2 High Pressure Air Refilling Procedures.**

Procedures	Instructions	Remarks
Connection with high-pressure air refilling tools	<p>1. First, make sure that the pressure relief valve is closed.</p> <p>2. Second, turn the air refilling handle in the counter-clockwise direction, until the handle stops lightly.</p> <p>3. Then, make sure that the O-ring is free from flaws, as well as from oil, grease and other foreign matters.</p> <p>4. Referring to the below figure, connect high-pressure air refilling tools (optionally procurable tools) with the high-pressure air refilling unit.</p> 	
Preparation of Breathing Apparatus	<p>1. First, turn over the carrying bag which covers the pressure reducing valve, and then expose the pressure reducing valve externally.</p> <p>2. Set the handle according to the below procedures:</p> <ol style="list-style-type: none"> <li>(1) Remove and peel off seal agents from the surfaces of set screw located in the central part of the handle by using a pair of tweezers.</li> <li>(2) Turn the set screw counter-clockwise approx. one turn.</li> <li>(3) While lightly pushing the handle, turn the handle up to the "CLOSE" position.</li> <li>(4) While maintaining the "CLOSE" position, turn the set screw clockwise, followed by the tightening of the set screw. The recommended tightening torque value is 1.5~2 N · m.</li> <li>(5) Coat seal agents over the surfaces of the set screw. Seal agents shall be CEMEDINE C<sup>®</sup>.</li> </ol> 	Hood and tube are folded up, and then, put them in to a vinyl carrying bag etc. so as to protect the hood and the tube from damage/contaminates.

	3. Disconnect the blind plug from the high-pressure air refilling port by applying spanner and other tools to the plan section of the blind plug and the high-pressure air refilling port.																						
Connection of high-pressure air refilling unit with refilling tools	<p>1. Manually connect the high-pressure air refilling tools to the high-pressure air refilling port of the pressure reducing valve. (Be careful not to tighten by using pliers or other tools)</p> <div style="border: 1px solid black; padding: 5px; text-align: center;">  <b>WARNING</b> </div> <p>In order to ensure correct connection, tighten until the installing handle rotation comes to a complete stop.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;">  </div> <p>If tightening is insufficient, high-pressure air refilling unit may disconnect from the pressure regulator.</p> <p>2. Turn the high-pressure air refilling handle clockwise until it comes to a light stop.</p>																						
Air refilling	<p>1. Air specifications should be as shown below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Item</th> <th style="width: 50%;">Standard value</th> </tr> </thead> <tbody> <tr> <td>Oxygen vol. %</td> <td>20 ~ 22</td> </tr> <tr> <td>Carbon dioxide vol. ppm</td> <td>Less than 500</td> </tr> <tr> <td>Carbon monoxide vol. ppm</td> <td>Less than 5</td> </tr> <tr> <td rowspan="3">Water Content at atmospheric Pressure</td> <td>mg/ m<sup>3</sup></td> <td>50 or less</td> </tr> <tr> <td>ppm</td> <td>49.6 or less</td> </tr> <tr> <td>°C (dew point)</td> <td>-48 or less</td> </tr> <tr> <td>Volatile organic compound (as methane equivalent)</td> <td>25ml/m<sup>3</sup> or less</td> </tr> <tr> <td>Oil and oil mist</td> <td>Coloring should not be recognized.</td> </tr> <tr> <td>Odors and foreign substances</td> <td>To be free from odor, as well as dust, contaminants, metal particles, and other foreign substances.</td> </tr> </tbody> </table> <p>2. While carefully watching the pressure gauge provided to the high-pressure air refilling tools, open the stop valve for the high-pressure air refilling unit, and refill compressed air. Confirm that the max. Filling air pressure is 19.6 MPa at 35°C.</p>	Item	Standard value	Oxygen vol. %	20 ~ 22	Carbon dioxide vol. ppm	Less than 500	Carbon monoxide vol. ppm	Less than 5	Water Content at atmospheric Pressure	mg/ m <sup>3</sup>	50 or less	ppm	49.6 or less	°C (dew point)	-48 or less	Volatile organic compound (as methane equivalent)	25ml/m <sup>3</sup> or less	Oil and oil mist	Coloring should not be recognized.	Odors and foreign substances	To be free from odor, as well as dust, contaminants, metal particles, and other foreign substances.	
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	<div style="text-align: center; border: 1px solid black; padding: 5px;">  <b>Warning</b> </div> <p>(1) During refilling, never mix with toxic gases.                  (2) Avoid speedy refill; filling procedures must be followed slowly.                  (3) Do not to exceed air refilling pressure from the specified pressure.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>An accident may occur if air refilling procedures are not properly carried out.</p> <p>3.The relationship between cylinder temperature and the max. Air refilling procedures is shown below:</p> <div style="text-align: center;">  <p>The graph shows the relationship between cylinder temperature and the maximum air refilling pressure. The x-axis represents Temperature in degrees Celsius (°C), ranging from 0 to 70. The y-axis represents Pressure in MPa, ranging from 15 to 23. Two parallel lines define the allowable range. Data points are plotted and connected by lines, showing a positive correlation between temperature and pressure.</p> <table border="1"> <caption>Data points from the graph</caption> <thead> <tr> <th>Temperature [°C]</th> <th>Pressure [MPa]</th> </tr> </thead> <tbody> <tr><td>0</td><td>15.7</td></tr> <tr><td>0</td><td>16.6</td></tr> <tr><td>10</td><td>16.5</td></tr> <tr><td>10</td><td>17.4</td></tr> <tr><td>20</td><td>17.4</td></tr> <tr><td>20</td><td>18.3</td></tr> <tr><td>30</td><td>18.2</td></tr> <tr><td>30</td><td>19.1</td></tr> <tr><td>35</td><td>18.6</td></tr> <tr><td>35</td><td>19.6</td></tr> <tr><td>40</td><td>19.0</td></tr> <tr><td>40</td><td>20.0</td></tr> <tr><td>50</td><td>19.7</td></tr> <tr><td>50</td><td>20.6</td></tr> <tr><td>60</td><td>20.9</td></tr> <tr><td>60</td><td>21.7</td></tr> <tr><td>70</td><td>21.3</td></tr> <tr><td>70</td><td>22.7</td></tr> </tbody> </table> </div> <p>4. Upon completion of air refilling, close the stop valve</p>	Temperature [°C]	Pressure [MPa]	0	15.7	0	16.6	10	16.5	10	17.4	20	17.4	20	18.3	30	18.2	30	19.1	35	18.6	35	19.6	40	19.0	40	20.0	50	19.7	50	20.6	60	20.9	60	21.7	70	21.3	70	22.7	
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<p>Inspection on scale of pressure indicator</p>	<p>Compare the indication on the pressure gauge of air refilling unit with the indication on the pressure indicator of the apparatus.                  Then make sure that the difference of power indicator indication in proportion to the pressure gauge indication is within the range of 1 MPa (1 scale).</p>	<p>If the pressure difference is 1 MPa or more, request for repair of the pressure indicator.</p>																																						
<p>Separation of air refilling tools from the breathing apparatus</p>	<p>1.Return the air refilling handle lightly in the counter-clockwise direction until it comes to a stop.                  2.After closing the stop valve of the air refilling unit, open the pressure relief valve.                  Then release pressure from the inside air refilling tools.                  Close the pressure relief valve when the (air) discharging</p>	<p>If the pointer of the pressure indicator on the breathing apparatus</p>																																						

	<p>noise stops, or when the pressure gauge of the air refilling unit shows zero (0).</p> <p>3.Finally, disconnect the air refilling tools from the air refilling port.</p>	<p>drops, request for repair to the manufacturer.</p>
<p>Re-assembly of the breathing apparatus</p>	<p>1.Tighten the blind plug with the air refilling port by using a torque wrench. The torque value shall be 24.5 ~ 29.4 N · m.</p> <div data-bbox="427 524 1107 819" style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;"> <b>Caution</b></p> <p>Be careful that the end of a blind plug should be free from flaw and other foreign substances.</p> <p style="text-align: center;"></p> <p>If the above defects exist, air-tightness during storage of the apparatus can not be maintained.</p> </div> <p>2.Finally, set the carrying bag to the original state as it was before.</p>	





**Manufacturer**

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