
LIFE GEM

INSTRUCTION MANUAL

SELF-CONTAINED BREATHING APPARATUS

LIFE GEM **KS-8C**
KS-8CW
KS-6CW

For Ship

- You will please read this INSTRUCTION MANUAL carefully before you use the BREATHING APPARATUS, and keep it safe after reading through, so as to fully exert the functions of your BREATHING APPARATUS safely for yourself.
- We sincerely hope that this INSTRUCTION MANUAL should be filed for immediate use.

If this manual has been lost, please contact with our sales agents.

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LIFE GEM, MODELS KS-8C, KS-8CW and KS-6CW are Self-contained Breathing Apparatuses, exclusively designed for Ship use, approved by Japan Ministry of Land, Infrastructure and Transport.

These models may be classified into the following categories depending on their specific use mainly for ships:

Model KS-8C For fire fighting



Models KS-8CW and KS-6CW For safety equipment

These apparatuses serve at such places or under conditions as follows:

- At areas where are deficient in oxygen or filled with toxic gases.
- ※ The applicable Model name is indicated on the applicable name plate attached on the harness.

< **Indications shown every where in this INSTRUCTION MANUAL** >

The indications of “WARNING” and “CAUTION” are critical, and must be observed strictly.

 WARNING	<p>You must strictly observe conditions and procedures indicated by this WARNING! without fail. If not, an unforeseen disaster might occur. In particular, if the accident is related to the human body, deaths and/or serious injuries might occur.</p>
 CAUTION	<p>You should carefully observe conditions and procedures indicated by this CAUTION. If you neglect the observation, or erroneously handle the Breathing Apparatus disregarding the indication, an accident might occur, resulting in human injuries and or property damages.</p>

1. CAUTIONS TO BE TAKEN IN HANDLING

In order to use the Breathing Apparatus correctly and safely, you will please strictly observe the below cautions and warnings.

If you carelessly handle the Breathing Apparatus in an erroneous manner, or you are not well trained in the handling of it, as well as if the Breathing Apparatus itself is not well inspected and maintained, not only the Breathing Apparatus can not exert its performance fully, but also, it might directly endanger the user's (wearer's) life.

 **WARNING**

< Cautions to be taken in actual use >:

- Periodically check your Breathing Apparatus.
If you use any Breathing Apparatus which is not well-maintained and checked, it might result in an accident caused by a Breathing Apparatus trouble etc.
- Breathing Apparatus users are recommended to be well-trained and to master how to use it rightly.
If you are not well-trained in the handling of it, not only the Breathing Apparatus can not exert its performance fully, but also, it might directly endanger the wearer's life.
- Please note that a person whose eardrum was medically ruptured, must avoid from the use of the Breathing Apparatus.
This is because sufficient air-tightness can not be maintained in the Breathing Apparatus.
- Never use any oil and grease for the adjusting, maintenance, etc., of Breathing Apparatus.
If used, such substances are in danger of burning.
- Prior to use the Breathing Apparatus, surely check on it in accordance with the requirements of section 4. 2 "Inspection for Use" in this INSTRUCTION MANUAL.
On this occasion, if any abnormality has found, do not use the Breathing Apparatus.
If used, it might result in a trouble.
- Don't modify and / or overhaul the Breathing Apparatus without obtaining a permission from us.
If it was modified or overhauled, the normal function and safety can not be guaranteed.

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- Use manufacturers' genuine parts.

If any parts other than the genuine parts was used, the normal function and safety can not be guaranteed.

<Cautions to be taken under the existing environmental conditions>:

- Be careful that this Breathing Apparatus can not be served in water.

If you carelessly use it an underwater condition, you would be exposed yourself to danger.

- In case you need to wear the Breathing Apparatus under special conditions; such as under a toxic gas environmental condition, you must wear protective clothes, in addition to the Breathing Apparatus, so as to protect your skin from injuries caused by the infiltration of toxic gas.

- In case you are requested to wear the Breathing Apparatus under special conditions; such as at extremely high-temperature (at 70°C or more) or extremely low-temperature (at less than -20°C), you must wear not only ordinary protective clothes, but also must install exclusively designed partial or full-fledged protective devices to the Breathing Apparatus to ensure safety.

- In case you are requested to wear the Breathing Apparatus under cold conditions (at -20°C~5°C), you must select an well-dried Breathing Apparatus.

This means that if the Breathing Apparatus is moistened, it will be frozen, and can not be served.

- If you are requested to use the Breathing Apparatus under a high-pressure environmental condition, you must take extreme care to ensure safety in addition to the ordinary care to be taken in the ordinary pressure environmental condition.

<Evacuation actions>:

While you are using the Breathing Apparatus, if one of the following events has occurred, immediately stop the work and evacuate yourself to a safe place.

If you do not take adequate evacuation actions, you could not evacuate safely.

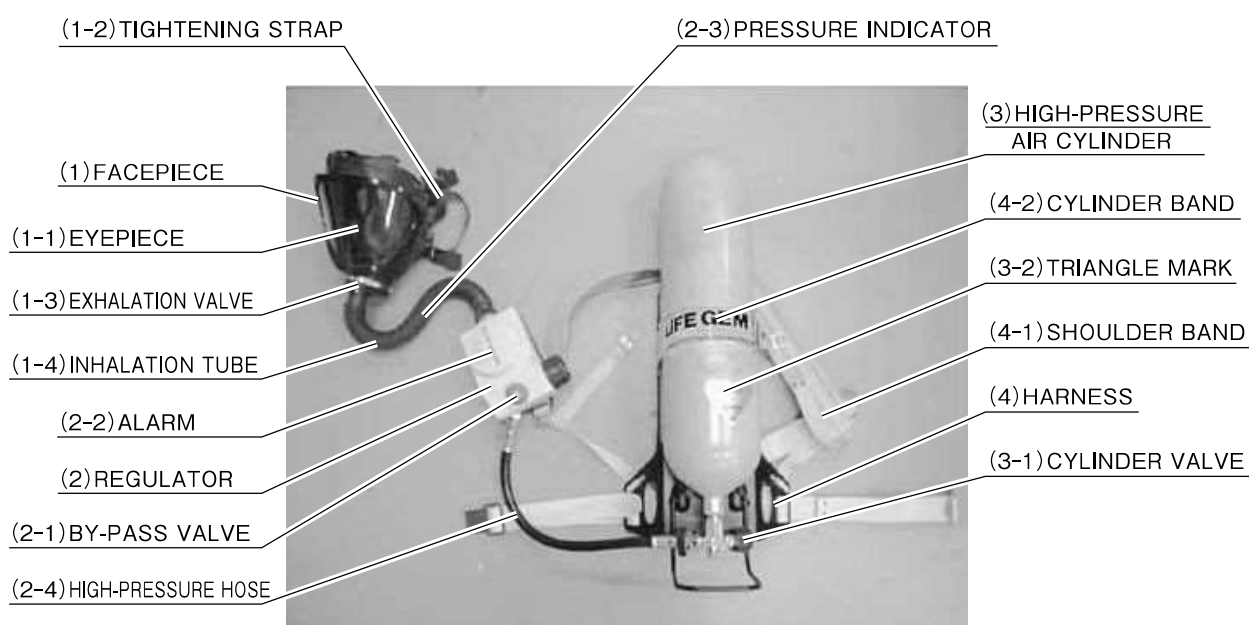
- Whenever the remaining amount of air has decreased down to an amount required for safe evacuation (Refer to Section 4.4 below for details).

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- Whenever the alarm has sounded.
- Whenever you feel difficulty in breathing, caused by the abnormality of the Breathing Apparatus, as well as when you feel any inflow of environmental air into the Breathing Apparatus.
- Whenever you have felt any abnormality in your physical condition.

2. COMPONENT DESCRIPTION AND PERFORMANCE



Overall Configuration of "LIFE GEM" KS-8C

(1) FACEPIECE

There are two types, Model CS and Model SV.

(1-1) EYEPIECE

(1-2) TIGHTENING STRAP

(1-3) EXHALATION VALVE

This valve functions when you breathe; the valve opens when you exhale, and closes when you inhale.

(1-4) INHALATION TUBE

(2) REGULATOR

The regulator consists of a pressure reducer, demand valve, etc., which is used to reduce high-air-pressure down to constant respirable

(2-1) BY-PASS VALVE

This is a manually operated air supply valve used in an emergency, such as when the regulator does not perform properly.

(2-2) ALARM

This can issue an alarm sound to the Breathing Apparatus wearer whenever the inside cylinder air-pressure has decreased down to about 3 MPa{ 30 kgf/cm²}.

(2-3) PRESSURE INDICATOR

(2-4) HIGH-PRESSURE HOSE

(3) HIGH-PRESSURE AIR CYLINDER

This is an air cylinder in which highly-compressed air is filled.

(3-1) CYLINDER VALVE

This valve has been exclusively designed for the opening/closing of an air flow fed from the high-pressure air cylinder.

(3-2) TRIANGLE MARK

This is a matching mark so as to connect the high-pressure air cylinder with the harness easily and accurately by referring to this mark.

(4) HARNESS

This is used to for the wear to carry the Breathing Apparatus on the back safely and well-balanced.

(4-1) SHOULDER BAND

(4-2) CYLINDER BAND

3. HOW TO MAKE SURE YOUR BREATHING APPARATUS WHEN YOU PURCHASED IT

(1) Checking of component parts in a package:

First, check to see the contents of package item by referring to the packing list contained in the package.

If the content of the package is different from the specified item, immediately contact the fact with our nearest sales agent.

(2) Indication of the high-pressure air cylinder's owner.

You are requested to clearly indicate your name on the cylinder by the law according to the requirements of "Japanese High Pressure Gas Safety Law".

You will please clearly write your name (owner's name) on your cylinder referring to the Instruction sample attached to the cylinder.

※ You are also requested to write your name on any spare cylinder in the same way as regular cylinders.

4. HOW TO USE YOUR BREATHING APPARATUS

4. 1 Preparation for Use

First, assemble the components parts according to the following instructions, so that the assembled Breathing Apparatus can be used at all times.

If your Breathing Apparatus is a required to use at lower temperature, please refer to Section 6. 1 "Breathing Apparatus used at Lower Temperature", described in this INSTRUCTION MANUAL.

(1) First, connect the High-pressure air cylinder with the harness according to the following procedures.

- ① Put the Cylinder on the harness accurately so that the center of the triangle mark labeled on the outer surface of the Cylinder may be accurately placed rightly in the upward direction.

- ② Hang the hook on the cylinder fastening band.
Next, tighten the adjust screw manually (Turn the screw clockwise).
- ※ If already the Cylinder is put on a harness, make sure whether the cylinder is firmly installed on the harness or not to ensure safety.

(2) Connect the high-pressure hose set with the cylinder valve.
(Refer to Fig. 1 below)

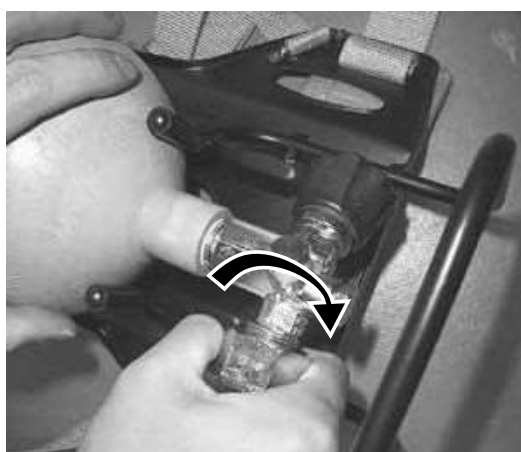


Fig. 1

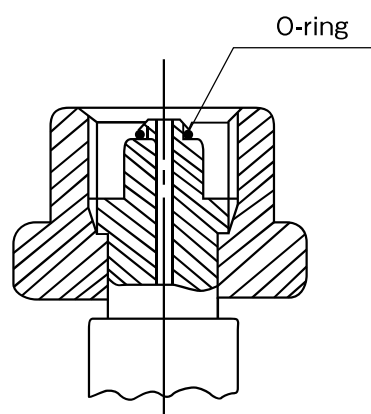


Fig.2

On this occasion, make sure the following matters :

- ① Be sure that the connection of the cylinder valve with the high-pressure hose set is free from sticking of foreign matters.
- ② Be sure that the O-ring and the contacting surfaces with the O-ring are free from injuries. (Refer to Fig. 2 above)

If any abnormality has been found, follow the below procedures:

- ※1 Remove the foreign matters from the connector, etc.
- ※2 Don't use damaged parts.

Such parts can not maintain air-tightness.

 **CAUTION**

Don't tighten the cylinder valve forcibly such as by using a spanner. If not, the O-ring might be damaged, resulting in the insufficient air-tightness.

- (3) Accurately match the matching mark provided on the regulator with that of inhalation tube.

Then connect firmly the regulator with the inhalation tube (Turn the connector clockwise manually).

(Refer to Fig. 3 below)

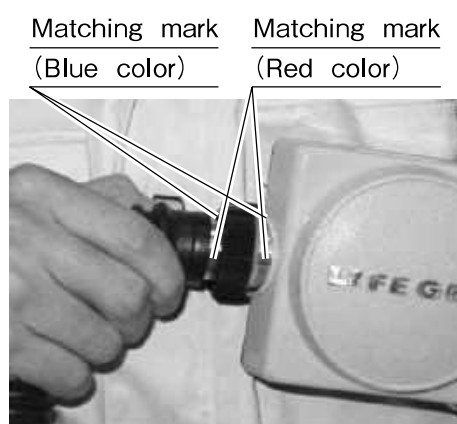


Fig. 3

- (4) Check to see if the exhalation valve is installed correctly.
Next, make sure whether the exhalation valve is free from any damage and/or sticking of foreign matters.
Details are shown in Section 6.2 “How to Check Exhalation Valve”.

- (5) Take away the protection paper from both sides of the eyepiece (Only when a new eyepiece is used for the first time).

※ Keep the eyepiece always clean.

If the surfaces of the eyepiece are afraid to be stained, or to be eroded by cleaning agents, etc., you are recommended to use a “Cover glass”.

If you desire to procure the “Cover glass”, please order it to our sales agents.

4. 2 Inspection for Use

Prior to use your Breathing Apparatus, you should check on the following appearances and functions based on the specified procedures:

(1) Appearance inspection

- ① Check to see that the Cylinder is firmly connected with the harness, the high-pressure hose is firmly connected with the cylinder valve, and the inhalation tube is firmly connected with the regulator, as well as make sure that there is no breakage of component parts.
- ② Check to see if the inhalation tube, facepiece, straps and other rubber materials are aged (stickiness, fissures or other abnormalities), as well as check to see if the eyepiece, strap fittings and other small parts are damaged.
- ③ Make sure that the pointer of the pressure indicator is showing the zero(0) scale.

(2) Inspection of high-pressure and medium-pressure parts/portions.

- ① Gently and fully open the cylinder valve, checking for enough air by reading the pressure indicator.

Next, turn the cylinder valve handle (clockwise) and fully close the valve.

- ② If the Variation of the pointer of the pressure indicator is smaller than 1 scale(10 kgf/cm²) for one minute, air-tightness of high-pressure and medium pressure section are good.

(Refer to Fig. 4)

This means that the Breathing Apparatus is serviceable in this condition.

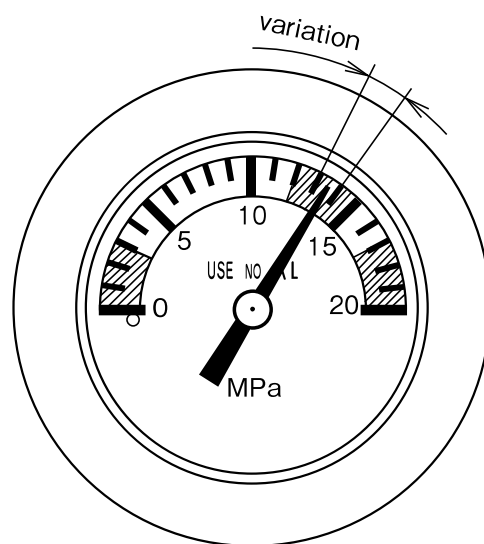


Fig.4

- ③ Following the above procedures, open the by-pass valve a little (Turn the by-pass valve handle counter-clockwise.) and lower the pressure gradually.

Then ascertain that the alarm may sound at approx. 3MPa { 30 kgf/cm²} as pointed by the pressure indicator index.

After making sure that the alarm works normally, close the by-pass valve fully (by turning the by-pass valve handle clockwise).

- ④ Temporarily press put the facepiece on your face, and lightly inhale air once.

This is useful to release pressure from the inside parts of the regulator externally.

 **CAUTION**

If any abnormality has found in the course of checking, don't wear the Breathing Apparatus.

In this case, you are requested to check on the apparatus according to the requirements of Section 7 "INSPECTION & MAINTENANCE MANUAL."

4. 3 How to Put on the Apparatus

(1) Put on the apparatus as follows:

- ① Put the apparatus onto your back.
- ② Pull down the armpit straps and adjust them until the apparatus can rest stably in a comfortable position on your back.
(Refer to Fig. 5)
- ③ Connect, adjust and fasten the breast and waist belts.
In this way, firmly and accurately wear the Breathing Apparatus.
(Refer to Fig. 6)
- ※ If the fittings have been disconnected from the belts and straps, re-connect them according to Section 6. 4 "Illustration of Bands and Other Small Parts Installation" safely.



Fig. 5



Fig. 6

- (2) Turn the cylinder valve counter-clockwise and open the valve carefully until the valve may be opened fully.

⚠ **CAUTION**

In order to use the Breathing Apparatus correctly and to exercise its performance sufficiently, turn the cylinder valve handle fully so as to ensure 100% valve opening.

- (3) Put the facepiece on your face sequentially as follows :

- ① Fit and mate the facepiece tightly with your face profile.

Next, Put On the facepiece from the chin so that it may fit well.

(Refer to Fig. 7)

Then, do not catch hair between face and facepiece.

- ② Stroke the two top head straps down to the back. **(Refer to Fig. 8)**

- ③ Adjust and fasten straps, until sufficient air-tightness is obtainable.
(Model CS:4 straps , Model SV:6 straps)



Fig. 7

※1 You can not put on the facepiece while you are wearing a helmet on your head.

In other words, first, remove the helmet from your head.

Then put on the facepiece on your face.

※2 If you wear glasses, please take off them, before to put on your facepiece, so as to maintain sufficient air-tightness.

(4) Conduct an air-tightness inspection on the facepiece.

First, forcibly pinch (grasp) the inhalation tube. (Refer to Fig. 9)

① Next, while your head is nodding and shaking, attempt to breathe forcefully or weakly, if you attract the facepiece to your face with the inhalations, the air-tightness of your facepiece is OK.



Fig. 8



Fig. 9

 **WARNING**

- If you feel any air leakage from your facepiece, try again to put on it from the beginning.

Be careful that badly fitted facepiece endangers the wearer through the possible ingress of poisonous ambient air.

Therefore, on this occasion, you must not use your Breathing Apparatus.

- ※ Please note that if special hair-style of the head; the tuft of hair under the temple and heavy mustache, as well as a heavy scar, heavy wrinkle and other unfitted face profile might become the obstacle of the air-tightness between the wear's face and facepiece.
- ② Test the performance of the regulator by inhaling air strongly a few times after hands off from the pinching of inhalation tube. Make sure that you can breathe smoothly.

 **WARNING**

- If you hear any abnormal noise during inhalation, or you feel uncomfortable, take off the facepiece. Next, check on the cause of trouble.

- (5) Make sure that there is sufficient amount of compressed air in the Cylinder by observing the pressure indicator.

 **WARNING**

- If the amount of compressed air in the Cylinder is few (lower pressure), the Breathing Apparatus serviceable time will be shortened proportionally.

If no abnormality is detected in the above items, the Breathing Apparatus may be ready for immediate service.

4. 4 Cautions to be Taken during Use

 **WARNING**

- Occasionally check the amount of the Cylinder air by reading the scale on the pressure indicator.
The duration of apparatus use varies depending upon the present air pressure at the inside Cylinder and working condition (degree of activities).

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You are requested to observe the pressure indicator from time to time, so as to make sure the remaining amount of air in the Cylinder.

When you desire to leave the present work, you must reserve a sufficient amount of air in the Cylinder so that you can safely return from the place of the work to the safety zones.

《The standard of the calculation of inside Cylinder pressure at the leaving of the work can be set up as follows》:

- In case of Model KS-8C and Model KS-8CW:

Inside pressure of Cylinder at the leaving of the work (MPa)
= Time required for return (min) × 0.5 + 0.5

- In case of Model KS-6CW:

Inside pressure of Cylinder at the leaving of the work (MPa)
= Time required for return (min) × 0.7 + 0.5

The above calculation is based on the air consumption; approx. 35ℓ/min through air breathing.

- The alarm functions at the cylinder pressure of about 3 MPa { 30 kgf/cm² } (That is, whenever the pointer of the pressure indicator shows around the “Scale 3”), and the alarm sounds.

Immediately upon hearing this alarm, you must stop the present job and must escape to a safe place.

- If you feel uncomfortable and/or feel difficult to breathe caused by the abnormality of your Breathing Apparatus (including apparatus failure or increase of breathing resistance) stop the job. If you feel any harmful gas or environmental air has entered into the Breathing Apparatus, you must immediately open the by-pass valve (turn the by-pass valve handle counter-clockwise) so as to supply excess amount of air.

At the same time, you must escape yourself immediately to a safe place.

Be careful that the unnecessary use of the by-pass valve wastes air and shortens the serviceable time of the Breathing Apparatus.

In other words, the by-pass valve may be necessary only for

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avoiding any trouble with the regulator just in case it does not work properly. In addition, be careful not to dismount the facepiece from your face, even if you feel difficult to breathe or uncomfortable.

If you dismount it, you might be yourself in danger of exposing to dangerous environmental air.

- When your physical condition has become worse (when you feel giddy; feel sick; feel a chill; difficult breathing; be absent minded; have a fever; stimulative to eyes. etc.), you must escape immediately to a safe place.

4. 5 Taking off the Apparatus

(1) Take off your Breathing Apparatus according to the following sequence:

- ① First, take away the facepiece from your face.
Second, close the cylinder valve.
Third, take off the Breathing Apparatus carefully.
- ② Next, open the by-pass valve a little, and check to see that the pointer of the pressure indicator provided in the regulator points zero "0" scale.
Then close the by-pass valve as it was before.
- ③ Finally, push the facepiece lightly toward your face and breathe lightly yourself once.
This is useful to release pressure from the inside of the regulator.

CAUTION

- Do not carelessly throw or drop your Breathing Apparatus, as well as do not give a forcible shock to it.
Moreover, do not leave it in a place where is exposed to water and direct sunshine.
If not, this would become the cause of a trouble.

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- **If the Breathing Apparatus is not used for a while, surely release air from the high-pressure hose externally.**

On the contrary, if the Breathing Apparatus is being kept by applying high-pressure, for a long period of time, the outside parts of high-pressure hose would be swollen up.

- **When you desire to dismount the Cylinder, first, open the bypass valve, and release pressure from the high-pressure hose followed by taking off the Cylinder without fail.**

If you carelessly loosen or disconnect the high-pressure hose from the Cylinder while pressure is remaining, this would damage the O-ring installed to the connector.

(Refer to Fig. 2 in Section 4.1 above)

4. 6 Cleaning after Use

Whenever you used your Breathing Apparatus, the apparatus must not be left as it is without doing required maintenance.

In other words, Users are requested to do the following maintenance :

- Cleaning and disinfection of the facepiece.
- Re-filling of compressed air into the Cylinder.

Moreover, the Users are also requested to check up and to maintain the Breathing Apparatus for the immediate use.

The check-up is recommended to conduct according to the instructions described in Section 4.2 “Inspection for Use” mentioned above.

In the course of the check-up, if any abnormality has been found, check it according to the requirements of Section 7. INSPECTION & MAINTENANCE MANUAL FOR MODELS; KS-8C, KS-8CW and KS-6CW” described below.

If any damage, malfunction or abnormality has been found, immediately repair the defective parts by asking it after contacting with the nearest sales agent.

In other words, do not leave it without doing repair, or do not reuse the defective parts.

 **WARNING**

Never apply grease & oil to the Breathing Apparatus parts for the maintenance of them.

If erroneously grease & oil was used, such substances are in danger of burning.

 **CAUTION**

When your Cylinder is empty (There is no compressed air), you must not keep the Cylinder valve open.

(1) Cleaning of facepiece :

The cleaning of your facepiece should be carried out as follows :

① First, disconnect the facepiece having a inhalation tube from the regulator by unscrewing the connection screw.

② Second, rinse the facepiece with fresh water.

Before the rince, you may wipe the stains off the facepiece using a piece of soft cloth, moistened by a small amount of diluted neutral detergent with water.

※1 Do not use organic solution, alkaline detergent and other similar cleaners except diluted neutral detergent.

Do not use water whose temperature is more than 40°C.

※2 When you use fresh water for rinsing, your are recommended to wash such delicate parts in a fresh-water-contained basin.

On the contrary, if jet water discharged from a faucet is used, this might result in a failure of apparatus.

③ After thoroughly removing water from the surfaces of the facepiece, dry it in a well-ventilated and shady place.

 **CAUTION**

Never dry your facepiece in the direct sunshine, by stove heating. If not, rubber parts and plastic parts will be deteriorated rapidly.

- ④ Finally, re-connect the inhalation tube with the regulator after accurately match the matching marks. **(Refer to Fig. 3 above)**

(2) Disinfection of facepiece:

Disinfect your facepiece according to the below procedures:

- ① First, loosen and remove the connection screw from the connection of the regulator and inhalation tube.
- ② Second, apply disinfectant alcohol moistened with a piece of soft cloth.
- ※ Do not use chemicals other than the disinfectant alcohol.
- ③ Finally, re-connect the inhalation tube with the regulator after accurately match the matching marks. **(Refer to Fig. 3 above)**

(3) For component parts other than the facepiece, stains should be removed with fresh-water-moistened a piece of soft cloth.

(4) The used Cylinder must be promptly re-charged with air in the authorized facilities.

The air filling into the Cylinder should be carried out in accordance with the requirements specified in Section 6. 3 “How to Fill Compressed Air into an Air Cylinder” described later.

Immediately upon filling air into the Cylinder, apply the safety cap to the screw-thread section of the cylinder valve.

Then safely store the Breathing Apparatus in a place where is free from harmful direct sunshine at temperature less than 40°C.

5. MAINTENANCE

- (1) The maintenance and inspection of the Breathing Apparatus shall be done periodically; at least once every three months in accordance with the requirements described in Section 7 "INSPECTION & MAINTENANCE MANUAL FOR MODELS; KS-8C, KS-8CW and KS-6CW so that the apparatus can be serviceable immediately at all times.

 **WARNING**

If your Breathing Apparatus and its component parts are damaged or abnormal, immediately make them to repair by the nearest sales agent.

You must not neglect them, or carelessly reuse them.

- (2) Upon completion of maintenance and inspection, the Breathing Apparatus shall be equipped with the fully-air-filled Cylinder, and put into a storing box.

Next, the Breathing Apparatus set shall be safely stored in a place where is free from harmful direct sunshine at less than 40°C.

The place shall be also a dust-free and no-toxic gas filled, as well as shall be dried, and moisture-less as far as possible.

When the Breathing Apparatus set is put into the storing box, be careful that the facepiece and inhalation tube shall not be deformed.

In addition to the above periodical inspection, the Users are requested to conduct maintenance and inspection on the following items:

- ① Re-inspection of Cylinder and cylinder valve:

Counted from the manufacturing date of the Cylinder, once every legal period indicated on caution label, the cylinder is requested to be inspected by the authorized Gas Cylinder Inspection Agent according to the regulations of Japan High Pressure Gas Control Law.

If the Cylinder's effective date has been expired, the Cylinder is not allowed to re-fill compressed air.

- ② After elapsing one year from your purchasing of your Breathing Apparatus, the inhalation tube, facepiece, high-pressure hose and other small parts made of rubber materials used for the Breathing Apparatus should be checked for fissures, stickiness and other external damages.

If required, immediately replace such a defective part with a new one.

In addition, after elapsing three years from your purchasing of your Breathing Apparatus, all rubber parts must be replaced with new ones.

- ③ The degree of damages of component parts of the Breathing Apparatus is, depending upon the frequency of service, good or bad maintenance after use, or storing conditions, these component parts shall be overhauled every three years after your purchasing of your Breathing Apparatus.

By the way, the repairable period of the component parts of the Breathing Apparatus is within fifteen' (15) years counted from their manufactured date.

6. OTHERS

6. 1 Breathing Apparatus used at Lower Temperature

If you desire to use your Breathing Apparatus at lower temperature, you will please understand that the Breathing Apparatus is cooled down at the environmental temperature.

In addition to the above, simultaneously, the apparatus is further cooled down by the effect of adiabatic expansion of air every time the apparatus is used.

In fact, when the Breathing Apparatus is used at less than 5°C of environmental temperature, if any water is existed in the inside part of the apparatus, the water is frozen and harmful ice, thus produced in the apparatus, might interfere with the breathing performance of the Breathing Apparatus wearer.

On this occasion, if you desire to use your Breathing Apparatus at less than 5°C of environmental temperature, you must strictly observe the following matters :

By the way, if you desire to use your Breathing Apparatus at extremely lower temperature, such as less than -20°C, you are requested to make special provisions against the extreme cold for your Breathing Apparatus itself.

(1) Actions to be taken prior to wear the apparatus :

In addition to the ordinary preparation and checking of wearing the Breathing Apparatus, you are requested to follow the below procedures:

- ① First, fill dried air into the Cylinder.
(Refer to the air composition standard specified in Section 6. 3 “How to Fill Compressed Air into an Air Cylinder”.) below.
- ② Install the fully dried Breathing Apparatus.

 **CAUTION**

Carefully check to see that the inside parts of the facepiece are free from wet.

Next, open the by-pass valve provided to the regulator.

Then check to see if any water is jet out, as well as make sure that water is not adhered to the surfaces.

- ③ Be sure that the inhalation valve and nose cup are accurately installed to the facepiece, as well as make sure that there is no abnormality.

If any malfunction is existed, the facepiece might be fogged caused by exhalation, while the Breathing Apparatus is used in the very low environmental condition.

(2) Cautions to be taken when you wear your facepiece on your face.

- ① In case you put on your facepiece on your face, be careful that if your exhalation hits the facepiece, it would be fogged.

Therefore, it is recommended to temporarily stop your breath until you can fully put your facepiece on your face firmly.

- ② If the inside surfaces of the eyepiece are stained, when you exhale air, the eyepiece may be fogged.

It is necessary to clean the inside surfaces of the eyepiece at all times.

When the eyepiece is fogged by surroundings, apply the attached anti-fog-preparation to the eyepiece.

That is, apply several drops of anti-fog-preparation to the inside surfaces of the eyepiece and spread it evenly with soft cloth, and then, wipe off slightly.

For preventing fog, also “Clear View” anti-fog-preparation is available.

To procure “Clear View”, please order it to the nearest sales agent.

(3) Cautions to be taken whenever your job has interrupted:

Whenever you have interrupted your job temporarily or your Cylinder is required to replace with a new one at below 0°C of surrounding environmental temperature, and after that, you desire to use your Breathing Apparatus, the exhalation valve might be frozen cause by moisture contained in the exhalation air.

On this occasion, you are recommended to put the facepiece on your face and breathe several times until you can make sure that the apparatus is not abnormal.

If any abnormality has found in the course of the above test, first, warm up the exhalation valve and melt ice completely.

After that, put on the facepiece.

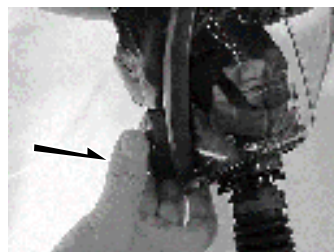
6. 2 How to Check Exhalation Valve

(1) First, open(remove) the exhalation valve cover, and check to see if the exhalation valve is properly fitted, and there are no fissure, stickiness and dust on it. **(Refer to Fig. 10)**

For the opening(removing) and closing(attaching) of the exhalation valve cover, you should do it in the manner as shown in **Fig. 10** below:



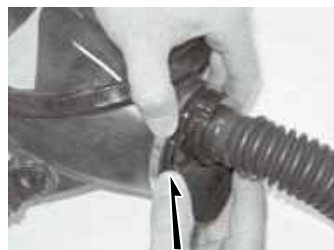
Opening of exhalation Valve cover (In case of Model CS)



Closing of Exhalation Valve cover (In case of Model CS)



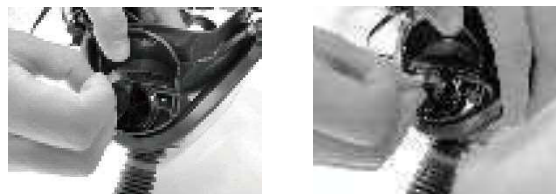
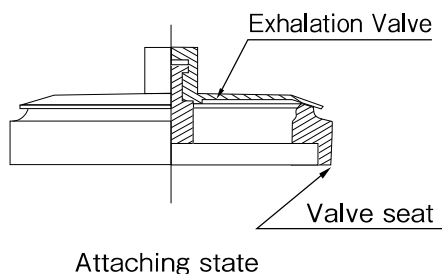
Removing of Exhalation Valve cover (In case of Model SV)



Attaching of Exhalation Valve cover (In case of Model SV)

Fig. 10

(2) If the inhalation valve is required to replace with a new one, follow the below procedures as shown in **Fig. 11**.



In case of Model CS



In case of Model SV

Fig. 11

⚠ WARNING

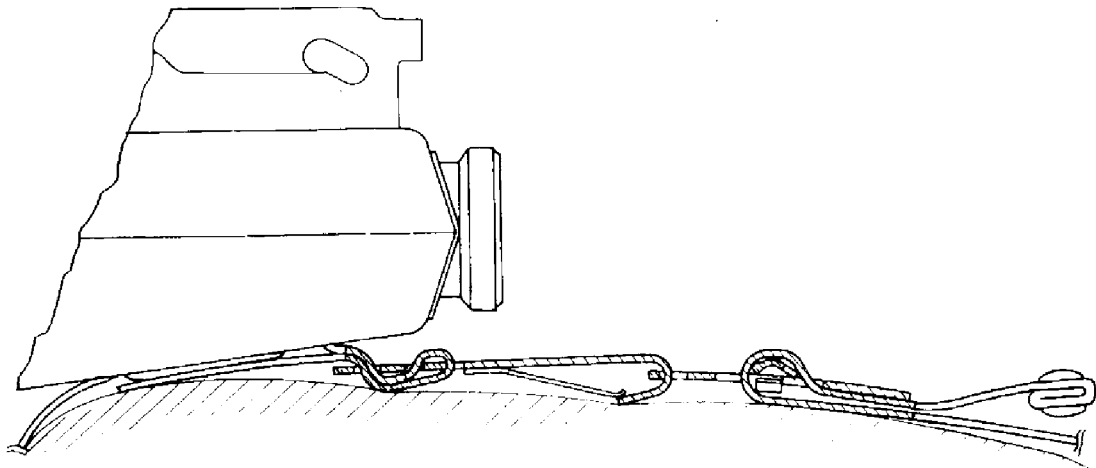
To avoid leakage, the exhalation valve shall be attached to the valve seat without any spacing.

6. 3 How to Fill Compressed Air into an Air Cylinder

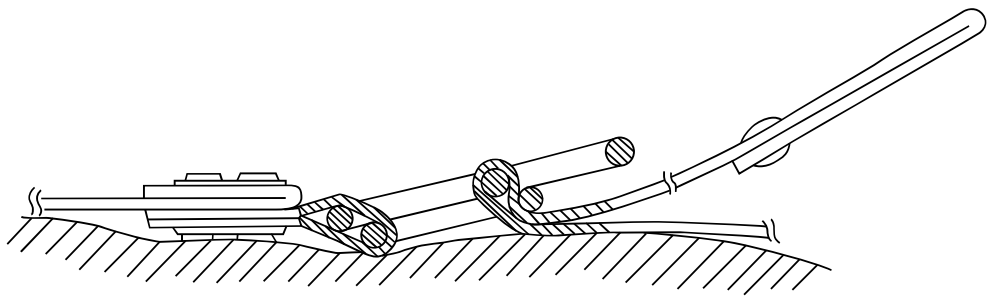
Make fill compressed air into your Cylinder in the authorized facilities. The composition standard of air to be filled into the Cylinder is as follows :

Item		Standard value
Oxygen	vol. %	19.5 ~ 23.5
Carbon Dioxide	vol. ppm	500 or less
Carbon Monoxide	vol. ppm	5 or less
Water Content at atmospheric Pressure		14.7 MPa Cylinder Pressure
	mg / m ³	50 or less
	ppm	49.6 or less
	°C (dew point)	under -49.5
Volatile organic compound (as methane equivalent)		25ml/m ³ or less
Oil and Oil mist		No coloring observed
Odor and Impurities		No odor and no presence of dust, contaminants or metal particles

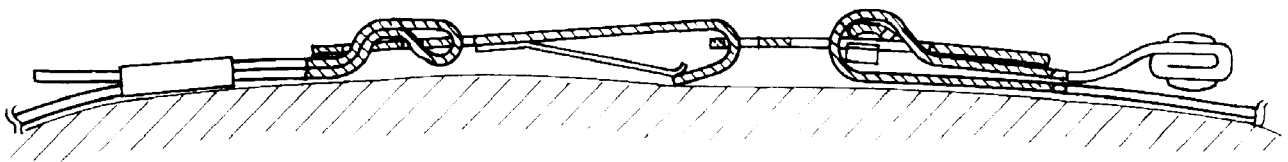
6. 4 Illustration of Bands and Other Small Parts Installation



Body
(Breast)
Breast Belt Arrangement



Body
(Both Sides)
Armpit Strap Arrangement



Body
(Waist)
Waist Belt Arrangement

Fig. 12

7. INSPECTION & MAINTENANCE MANUAL FOR MODELS; KS-8C, KS-8CW and KS-6CW

ITEM	PARTS NAME	CHECKING METHOD	ACCEPTABILITY	ACTIONS TO BE TAKEN	REMARKS
1	Cylinder & Cylinder valve	<p>1. <u>Re-inspection:</u> Counting from the Cylinder manufacturing date, conduct the re-inspection every legal period.</p>	The Cylinder must be acceptable in a test according to the High pressure Gas Safety Law.	Ask to test by a Cylinder Inspection Agent authorized by the prefectural governor.	<p>① Cylinder manufacturing date is indicated on cylinder surface.</p> <p>② Legal period of re-inspection is indicated on caution label.</p>
2	Cylinder valve	<p>1. <u>Opening/closing performance test on cylinder valve:</u> Check to see if compressed air may jet out from the outlet of the valve when the valve handle was turned one time.</p> <p>2. <u>Confirmation of cylinder charging air Pressure:</u> 1) Connect the high-pressure air hose to the cylinder valve and carefully open the valve. Then read the scale on the pressure indicator of the regulator. 2) Close the valve after checking, and remove the high-pressure air hose after releasing high-pressure air completely and safely by operating the by-pass valve.</p> <p>3. <u>Leakage test</u> (for valve seat portion only) After charging the cylinder with air, apply neutral soap-water solution over the surfaces of high-pressure air hose connectors.</p> <p>4. <u>Leakage test (Overall sections)</u> 1) First, screw the cap nut on the high-pressure air hose connectors. Next, turn the handle, open the valve and immerse them in water.</p>	<p>Be sure that the air can be jet out forcibly within one turning of the valve handle.</p> <p>At least 12 MPa 122 kgf/cm² or more air pressure shall be maintained.</p> <p>Be sure that there is no air leakage. If any air-bubble has been observed, this means that air leakage is existed.</p> <p>Be sure that there is no air leakage. If any air-bubble has been observed continuously, this means that air leak is existed.</p>	<p>In case the air can not be jet out forcibly, make repair it.</p> <p>If the air charging pressure is less than the specified pressure, re-charge compressed air.</p> <p>1. If the leakage has been confirmed, a little forcibly close the valve by turning the valve handle. 2. In spite of the above action has been taken, if the leakage does not stop, make repair it.</p> <p>If the leakage has been confirmed, make repair the defective parts thus produced leak.</p>	<p>① Since the maximum air charging pressure is 14.7 MPa 150 kgf/cm² at 35°C, if the pressure is less than the above, the Breathing Apparatus serviceable time will be shortend proportionally.</p> <p>① If the handle of the cylinder valve is turned forcibly, be careful that the valve might be broken, resulting in more air leak. ② Upon completion of the leakage test, surely screw the cap nut on the cylinder valve safely.</p> <p>① Wipe off water drops from parts surfaces thoroughly after testing. ② If the cylinder valve is required to store, surely screw the cap nut on the high-pressure air hose connectors.</p>

(to be continued)

(continued)

ITEM	PARTS NAME	CHECKING METHOD	ACCEPTABILITY	ACTIONS TO BE TAKEN	REMARKS
2	Cylinder valve (cont'd)	2) Upon completion of the leakage test, close the handle firmly as it was before.			<p>③ In cold district, soap-water solution is not allowed to use for the leakage test. In lieu of this, newtral-type soap-water solution is recommended to use.</p> <p>④ If the pressure is required to release, first close the handle of the cylinder valve. Next, carefully loosen the cap nut from the high-pressure hose connectors.</p>
3	Regulator	<p>1. Leakage test</p> <p>1) First, connect the regulator with the high-pressure cylinder charged with 12 MPa (122 kgf/cm²) or more compressed air, through high-pressure air hose. Next, turn the handle of the cylinder valve so as to open the valve until the pointer of the pressure indicator for the regulator shows the highest scale. Then closed the valve handle.</p> <p>2) Disconnect the inhalation tube from the regulator. Then apply detergent-type soap-water solution over the surfaces of inhalation tube connector and other connector screw threads, so as to check to see if any leakage is observed.</p>	<p>Be sure that there is no air leakage. Keep this state at least for one minute. On this occasion, if the pointer does not fluctuate at all, this means that there is no air leakage from the regulator. But, a little pressure decrease; less than 1 MPa (10 kgf/cm²) (approx. 1 scale) per one minute will be acceptable in actual use.</p> <p>If any leakage is generated, soap-water bubbles will swollen up in leaked position.</p> <p>-In case the air leaked location can not be detected: -In case air leakage occurs from the inhalation tube connectors:</p>	<p>If the pressure decrease actually exceeds 1 MPa (10 kgf/cm²) (approx. 1 scale), the regulator is not acceptable and required to make repair.</p> <p>The leakage is preventable by simply retightening the component parts. On the contrary, if the leakage is not preventable by retightening, make the parts repair.</p> <p>If the repair of air leakage is unable to carry out at site, make the repair by the manufacturer.</p>	<p>① Make sure that an O-ring is inserted into the connector provided between the high-pressure air hose and the cylinder valve. If the O-ring is damaged excessively, replace it with a new one.</p> <p>② Check to see if the by-pass valve (provided with a red knob) is firmly closed.</p> <p>③ Be careful not to immerse the regulator into water so as to check up leakage.</p> <p>④ Upon completion of the leakage test, fully wipe off residual soap-water and dry the surfaces of the regulator.</p>

(to be continued)

(continued)

ITEM	PARTS NAME	CHECKING METHOD	ACCEPTABILITY	ACTIONS TO BE TAKEN	REMARKS
3	Regulator (cont'd)	2. <u>Functioning test</u> Turn the handle of cylinder valve fully and open the valve. Then inhale air intermittently, or forcibly, as well as weakly. 3. <u>Functioning test of by-pass valve</u> Following the above procedure, carefully open the by-pass valve gradually. 4. <u>Functioning test of alarm</u> Following the above procedure, close the handle of the cylinder valve. Next, slightly open the by-pass valve and read the scale of the pressure indicator provided for the regulator, when the alarm sounds.	The performance of the regulator is sophisticate and responses delicately with less fluctuations of the indicator pointer. Make sure that the gas splashes out within one turn of the valve handle. When the alarm sounds at approx. scale: 3 MPa 30 kgf/cm ² , the alarm unit functions well and it is acceptable.	If the pressure decrease actually exceeds 0.5 MPa 5 kgf/cm ² (approx. 1/2 scale), the regulator is not acceptable and required to make repair. If the gas does not splash out, make repair the by-pass valve. If the scale of the pressure indicator shows largely exceeding 3 MPa 30 kgf/cm ² , the alarm is not acceptable, and require repair.	
4	High-Pressure air hose	1. <u>Appearance</u> Bend the hose several times and check to see if any fissure has been observed on the surfaces of the hose. 2. <u>High-pressure and leakage tests</u> Whenever any leakage test is required to conduct on the regulator, apply soap-water solution all over the surfaces of the high-pressure air hose, so as to check to see if any harmful air leakage is observed. Pay special attention to the joints provided on both ends of hose: metal fitting and crust.	Be sure that there is no fissure. Be sure that there is no air leakage (Check to see if air bubbles are observed continuously).	If any fissure is observed on the surfaces of the hose, replace it with a new one. If any air leakage is observed on the surfaces of the hose, replace it with a new one.	① The inside cylinder pressure shall be 10 MPa 102kgf/cm ² or more. ② Upon completion of leakage test, or upon completion of functioning test, be sure that the inside pressure of the high-pressure air hose is released. ① When the high-pressure air hose has elapsed 3 years after purchasing it (rubber parts cure date over), it shall be replaced with a new one. ② When any withstanding pressure test and/or leakage test is required to conduct, apply the highest or near cylinder charging pressure to the test articles to be tested as far as possible.

(to be continued)

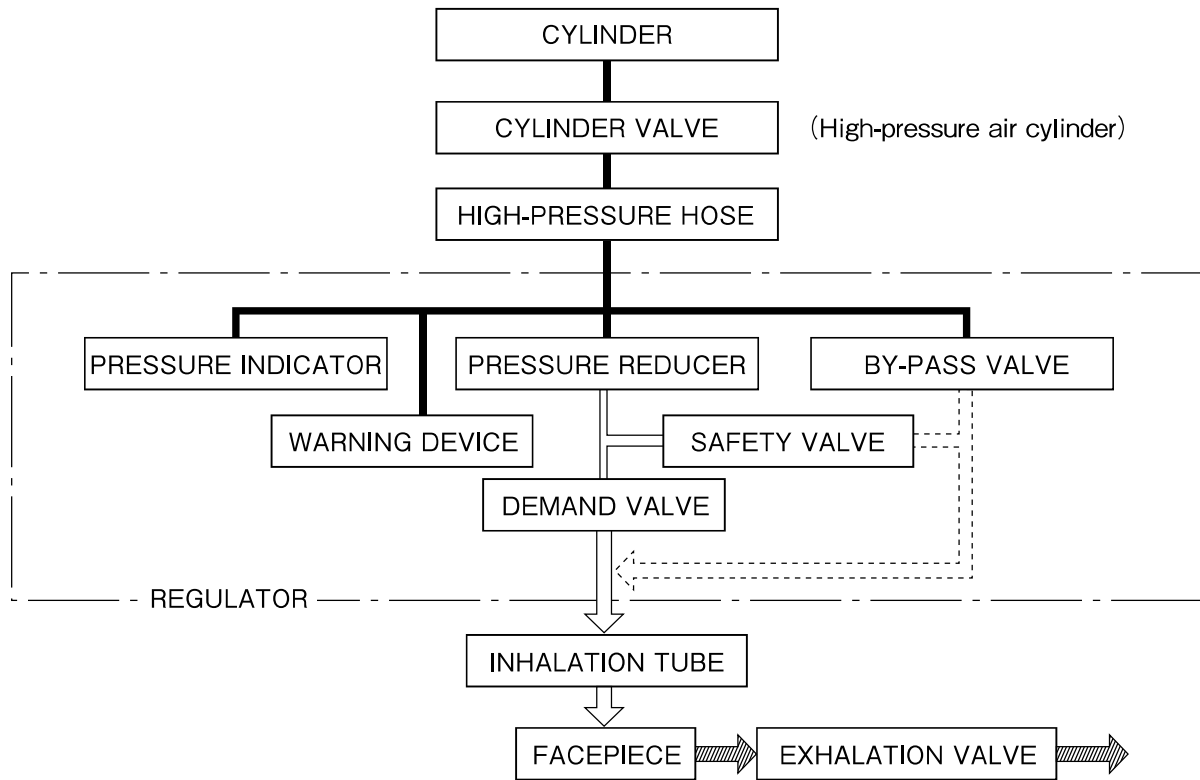
(continued)

ITEM	PARTS NAME	CHECKING METHOD	ACCEPTABILITY	ACTIONS TO BE TAKEN	REMARKS
5	Pressure indicator	1. <u>Index check on the pressure indicator</u> The index check shall be conducted from time to time as required			
		2. <u>Leakage test of pressure indicator</u> Whenever the leakage test of the regulator was conducted, this pressure indicator leakage test shall be conducted simultaneously.	Refer to the Section of "Regulator" above.		
6	Facepiece, Inhalation tube, Exhalation valve, and other Rubber parts	1. <u>Appearance</u> The appearance of rubber parts which were purchased more than one year ago shall be checked (on the stickiness, strength and existence of fissures, etc.).	Check to see if these rubber parts are endurable for use.	If required, replace these rubber parts with new ones.	① Pay special attention to the Exhalation Valve. ② If the Breathing Apparatus is required to use frequently, it is recommended to replace the exhalation valve with new one every 6 months.
		2. <u>Leakage test</u> ※ After wearing the facepiece, forcibly pinch off the exhalation tube, or once close the connection port with the regulator with the hands. Then try to exhale air.	If the wearer does not feel any air leakage, the rubber parts are acceptable and serviceable.	If any air leakage has been felt, make repair the defective parts.	
7	Harness	1. <u>Appearance</u> Check to see if belts, straps and their fittings are serviceable from time to time as required.	Check to see if these parts are endurable for use.	If any defect has been found, make repair it, or replace it with a new one.	

Note: Those locations marked with ※ are recommended to be tested by using a circuit tester: TESTER Model 5 so as to ensure accuracy and convenience.

8. SYSTEM DIAGRAM AND MAJOR SPECIFICATIONS

«System Diagram»



BLOCK DIAGRAM

- where,
- : High-pressure air line
 - == : Medium-pressure air line
 - ⇨ : Low-pressure air (Inhalation) path
 - ⇨ (dashed) : Air supply path through the By-pass valve (at Low-pressure air)
 - ⇨ (hatched) : Exhalation path

《Major Specifications》

The Major Specifications of LIFE GEM, Models KS-8C, KS-8CW and KS-6CW are as follows:

Model		KS - 8 C	KS-8CW	KS-6CW
Type approval No.		No. 2720	No. 2958	No. 2959
Classification		Fire fighting apparatus (MSC.339(91))	Safety & maintenance work apparatus	
Name of compressed gas		A i r		
Serviceable time (minute) ※		30 or more	30 or more	20 or more
Carrying weight (kg)		Approx. 15.8		Approx. 12.8
Max. chargeable air volume (ℓ)		Approx. 1,200		Approx. 900
Air supply system		Self-Contained Compressed Air Supply System, demand type		
Cylinder	Material	Inter manganese steel		
	Inner volume	8 ℓ		6 ℓ
	Max. air charging pressure	14.7 MPa {150 kgf/cm ² }		
Facepiece		Model CS(K2-CST-S) or Model SV(SVT-S) for ships (full facepiece with a nose cup)		

(NOTE):

※ : The Serviceable Time may be shortened due to the following causes:

- Wearer's trained degree.
- Wearer's past experience, as well as physical and spiritual conditions.
- Amount of compressed air (pressure) in the cylinder.

– END –

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