Contents

Preface

Users must:

＞Read this operating manual carefully before using.

＞Be trained and guided by specialized persons.

This respirator must:

＞Be maintained according to the guidance in this manual.

＞Record in written about the main parts maintenance.

Positive pressure air respirator:

Conform to the standards of XF 124-2013 *Positive Fire Protection Air Respirator*.

This respirator is applied to:

＞ Toxic gas

＞ Toxic particle and aerial fog

＞ Environment with outburst dust

＞ Environment with oxygen concentration ＜17％

＞ Smog caused by fire disaster

Notes: This respirator has the functions of breathing and face protections.

When using in poor working conditions, please use auxiliary

protective articles together, such as: protective gloves, safety shoes, impermeable protective suit, safety helmet, etc.

Notes and warnings are the cautions during using, violated operations may:

> Make the users not get the effective safety protection;

> Destroy the respirator seriously.

Chapter I Overview

(I) Product features

It's a kind of respirator used by firemen or rescue staff. This respirator fits wearer's face well through the mask, making wearer's respiratory organs, eyes and face totally isolate from outside toxic gas or oxygen-deficient environment, then it will release the prepared compressed clean air for wearer breathing. The exhaling gas will be released to the atmosphere directly. During every respiratory process, the pressure inside the mask will be higher than the environment pressure.

(II) Main purposes and scope of application

Positive pressure air respirator (hereinafter referred to as respirator), taking the compressed air in the air bottle as the air source, is a kind of respiration protecting device. It's mainly applied to fire protection, chemical industry, petroleum, metallurgy, shipping, mining, laboratory, oil depot and warehouse emergencies or rescues. This respirator guarantees that the firemen or rescue staff conduct safe and effective fire fighting, dealing with emergencies, disaster relief and rescue in smog, toxic gas, dust or oxygen deficient environment.

(III) Application condition

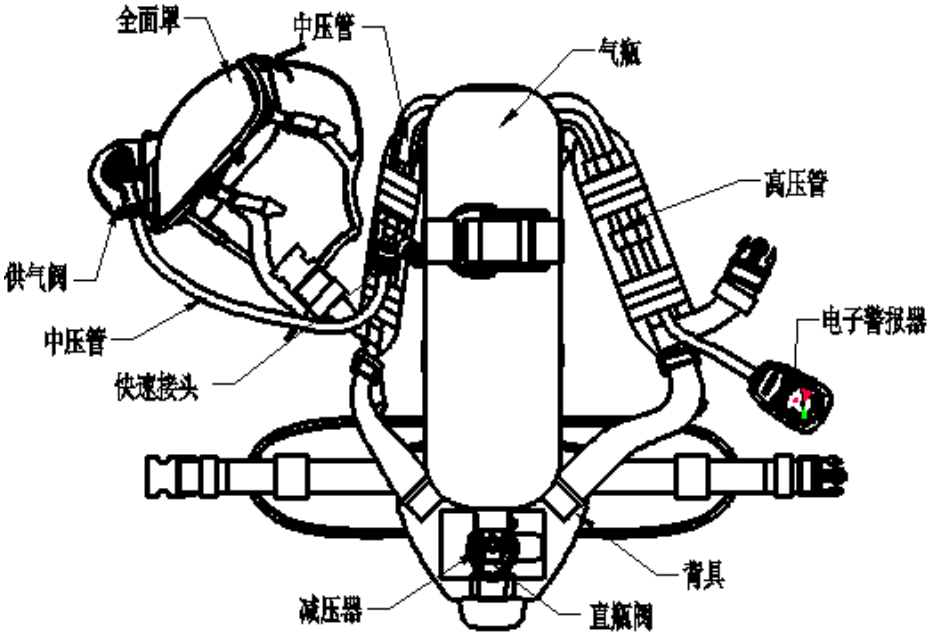
1. Atmospheric pressure (70~125) KPa
2. Relative humidity (0~100) %RH
3. Application temperature (-20~+60)℃

Note: Not suitable for diving.

Chapter II Structure features and working principle

(I) General structure features and working principle and features:

1. See product structure in figure 1



全面罩 Full mask；中压管 Medium pressure hose；供气阀 Air supply valve；快速接头 Quick coupling；减压器 Pressure reducer；直瓶阀 Straight bottle

valve；背具 Back utensil；电子警报器 Electronic alarm；高压管 High pressure hose；气瓶 Air bottle

Figure 1 Product structure

2. Working principle

This respirator adopts the compressed air in air bottle as source, and the flow type of airflow is opening self-contained. When inhaling with this respirator, the fresh air will be inhaled through air bottle, switches, pressure reducer, air supply valve and air mask; when exhaling, the exhaled air will be released to the atmosphere directly through the air releasing valve in the mask. Until then, it completes an entire respiratory process, which will constantly proceed until the work is completed.

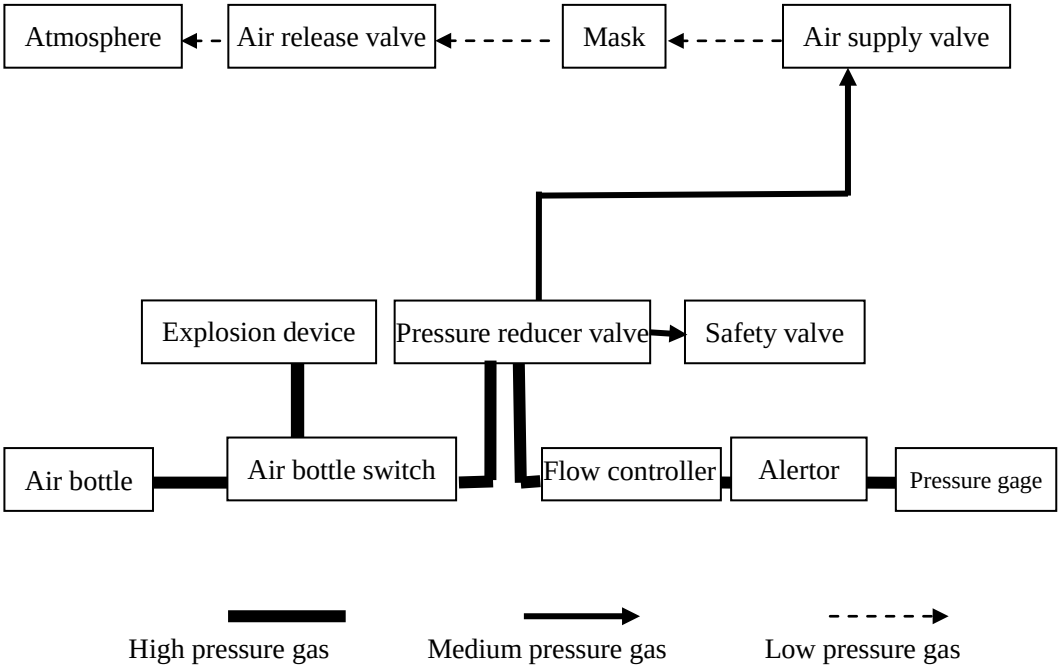
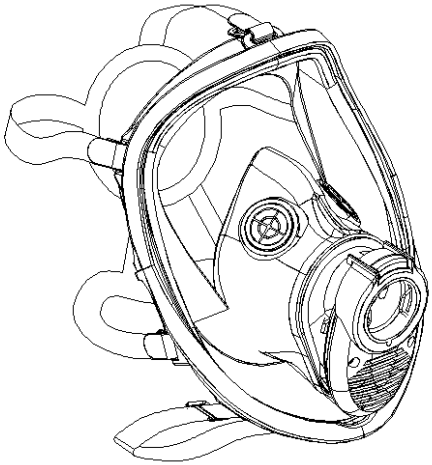


Figure II Air respirator working principle

(II) Main parts or function unit structure, effect and working principle

1. Full face mask



The mask of this respirator is full view with double-layer ring sealing, the nether view is more broader; there is a little mask inside fitting with mouth and nose. The little mask is set with two one-way ventilation valve (inhaling valve); sound transmission mebrane on the lower cheek, there is a strip square hole towards eyes under the mebrane, and under the hole, there is a air release valve. When the air flows into the mask, it will scour the window through the strip square hole, because the air is clean and cool, the scouring could demist and keep bright. When inhaling, the airflow will go through two inhaling valve getting into the little mask for breathing; when exhaling, CO2 containing large amount moisture will be directly released through air releasing valve, so it will not affect the view and reduce the actual harmful space inside the mask. The mask window is made of PC material with brightness. The mask is equipped with a

quick wearing head band. The joint between mask and integrated air supply valve is plug-in type, which guarantees the quick wearing of users.

Head band or mask could be adjusted according to wearer's head, the sealing member fits wearer's face very well without distinct pressure pain, and the view window won't cause visual distortion.

①Three-dimension sphere window with 91% view.

②Best optical property with 95% transmittance of light.

③Conduct hardening and demisting treatment on the surface of window, which can make sure there is no fog for a long time.

④Suitable for the face of asian face, with good comfortability and airtight performance.

⑤Adopt faucet structure to realize quick connection with air supply valve.

⑥The sealed rubber surface adopts good anti-flaming rubber and the mouth-nose mask adopts good rubber with softness and high-temperature resistance.

⑦Ventilated net head band is safe, comfortable and easy to wear.

⑧ Adopt high-strength sound transmission mebrane.

⑨The mouth-nose mask is suitable for asian people face, which will reduce the inhaled CO2 and improve the work efficiency.

2. Air supply valve

There is automatic balance system in the air supply valve, which will track human breathing actions to realize providing air as required and guarantee the pressure inside the mask higher than the surrounding pressure.

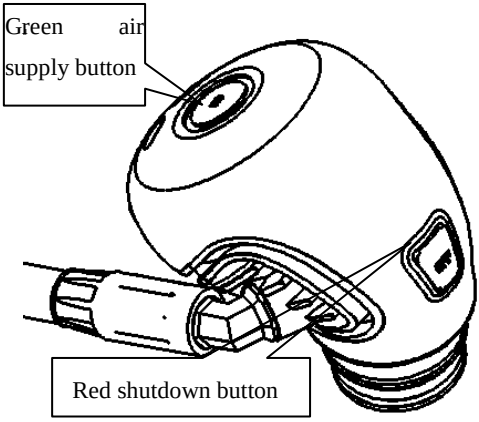


Figure 4 Air supply valve

The front red square shutdown button of air supply valve could close the output airflow and stop supplying air.

When inhaling vigorously, this air supply valve will be switched on automatically. The functions of round greed air supply button in the bottom center are as follows :

- When the valve isn't switched on during vigorously inhaling, press this button to achieve air supply;
- When there is fog, pressing this button could demist;
- When the wearer feels insufficient air supply quantity, press this button, then the valve will improve the supply quantity of air;
- It can release the pressure of residual air in the medium pressure hose for the convenience of inspection and disassembly of quick coupling.

3. Pressure reducer

The function of the pressure reducer is to decompress the high pressure of air from (30～2) MPa to a low extent(0.6~0.9)MPa based on the principle of force balance, and maintain it within this range. The pressure regulator is equipped with a safety valve discharging pressure ranges from 110% to 170% of the maximum design output pressure of the reducer while the shutdown pressure is not less than the maximum design output pressure of the reducer. 2 Output ports for medium pressure and high pressure of the pressure reducer are provided by the connection of locked nut and cylinder valve. Considering respiratory changes in human body, the maximum output flow is designed to be 800L/min which can fully ensure the maximum air amount for human breathing provided by the air supply valve.

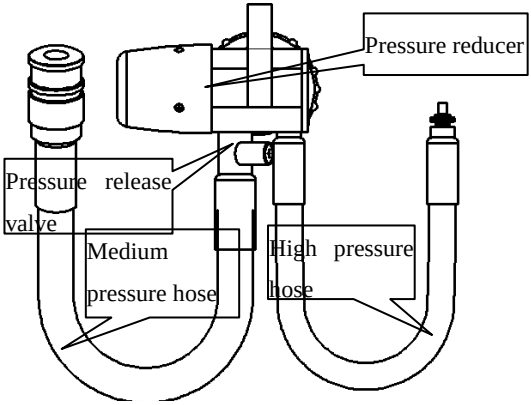


Figure 5 Pressure reducer & high and medium pressure hose

Working principle: 30~2MPa high pressure air gets into the valve of pressure reducer. Under the mutual interaction of pressure valve and pressure reducing spring, it will reduce the pressure to 0.6~0.9 MPa by force balance principle, and then output the air, that is to say, it will guarantee the medium

pressure gas decompressed by reducer can be kept within a constant range. Under the abnormal condition, if the internal pressure of reducer exceeds 110~170％ of the maximum design output pressure, the pressure release valve will be switched on against the spring, so as to release the overpressure air through medium pressure hose.

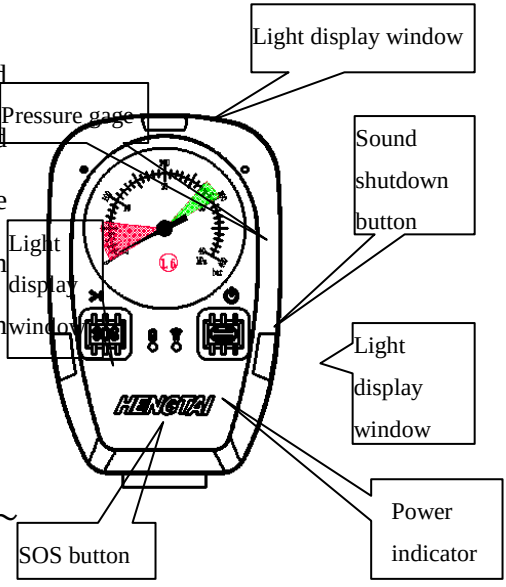
Note: The pressure reducer requires to be tested once a year.

4. Medium and high pressure hose

The medium pressure hose adopts plastic gas-guide hose; it will not obstruct wearer's work and head movement, and will not disturb the connection between air supply valve and mask.

One end of medium pressure hose connects with air supply valve, and the other end connects with output port of pressure reducer. There is quick coupling between them for the convenience of connection and disassembly of air supply valve.

High pressure hose is rubber hose twined by steel wire. It could endure the rated working pressure. One end of high pressure hose connects with the inlet hole of alarm and the other end connects with the high pressure output port of reducer.



5. Pressure gage and alarm

Pressure gage is used for indicating the pressure value of the storage gas in air bottle. There is equipped with night light device making users easily read the pressure value in different environment; Alarm is sound alarm or light alarm when the air pressure drops to the warning value. Pressure gage and alarm are a whole set of pressure indicating and alarm system. When the air pressure inputs, the pressure gage displays its value, then the alarm is automatically switched on and enters into working status. When the air pressure drops to 5.5±0.5MPa, the electronic alarm may make intermittent sound warning with light flickering. The intermittent sound could keep at least 60 seconds with 90 dB(A);

Mechanical alarm could make at least 15-second constant sound alarm with 90 dB(A), the frequency ranges from 2000 to 4000Hz.

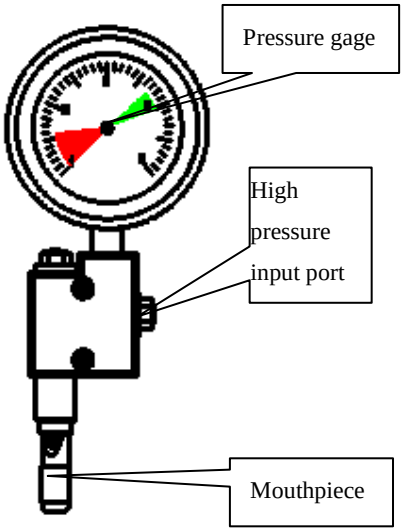


Figure 7 Mechanical alarm

- Sound warning and light flickering will continue until the pressure in the bottle drops to 1MPa.
- Press SOS button and sound shutdown button can control the switch of alarm.

Notes:

- The wearer shall conduct alarm test before using air respirator. It can only be applied after confirming it's qualified;

- When using this air respirator, the wearer shall place the alarm at the position where it's convenient to observe without impact.
- When the power indicator flickers, you shall replace the battery immediately. This alarm adopts two No. 7 1.5V AAA dry battery. The standby life can reaches 3 years.

6. Back utensil

Back utensil consists of back bracket, shoulder band, belt, regulation band, release buckle, fixed mount of pressure reducer and air bottle band. The structure of back utensil conforms to human engineering principle, it can perfectly fits human back curve with large contacting area, which is easy to wear and makes wearer feel no partial pressure pain.

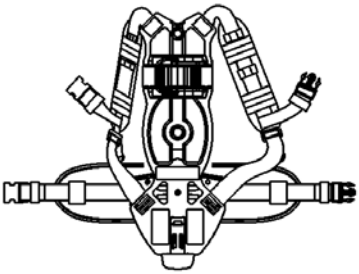


Figure 8 Back utensil

- Back bracket is formed through injection moulding of anti-flaming engineering plastics with high strength, impact resistance and light weight, which is also not easy to be damaged;
- The length of back utensil band is adjustable. It can't slide after lock it tightly.
- The shoulder band and belt adopt anti-flaming, skid resistance and tear growth resistance material with good comfortability;
- The release buckle is also made of anti-flaming material; the pressure reducer is fixed on the back utensil by fixed mount, which is easy to

replace;

- The air bottle could be double fixed by buckle on the band through reverse lucking.

7. Air bottle and air bottle valve

(1) **Air bottle**

Air bottle is made of fully wrapped carbon fiber composite material and contains high strength aluminum alloy liner, so it's also with high strength and light weight. Respirator's using time depends on the compressed air quantity in the air bottle and the air consumption quantity of user, and the air consumption depends on the working property conducted by user.

Type of work	Air consumption（L/min）
Rest	10～15
Mild activity	15～20
Mild work	20～30
Medium-intensity work	30～40
High-intensity work	45～55
Long time work	50～80
Vigorous Activity(a few minutes)	100

Air quantity in the air bottle:

User could calculate the product of air bottle volume and working pressure to get it.

For example: a 6.8L air bottle with the working pressure of 30MPa, the air volume in the bottle is 6.8×30×10=2040L, when the user conduct medium-intensity work, the theoretical using time is:

$$\frac{\text{可呼吸的空气量（}L\text{）}}{\text{耗气量（}L/\min\text{）}}=\frac{2040}{30}=68\min$$

Breathed air quantity (L)/Air consumption (L/min)=2040/30=68min

This calculation does not consider the purity of air, so it requires coefficient 0.9 to rectify. The actual air quantity in the bottle is : 2040×0.9=1836L, thus the actual using time is calculated as 61 minutes.

User could roughly calculate the rest using time before using or during the using process.

As for air bottle with different volume, the theoretical using time could all be calculated according to the above calculation method.

(2) Air bottle valve

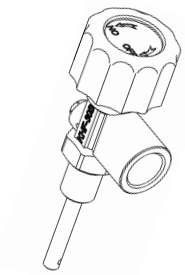


Figure 9 Air bottle valve

The switching direction of air bottle valve is anticlockwise. In order to prevent that the valve is switched off, when turning on, it requires to rotate 720° or above. There is safety mebrane on the valve with the explosion pressure of 37～45MPa, which could prevent transformation or explosion of air bottle caused by the overpressure inside the bottle.

Chapter III Technical parameter of respirator

Rated working pressure of respirator is 30MPa, and the alarm pressure is 5.5±0.5MPa.

Air bottle volume(L)	Rated working time (min)		Weight (Kg)	Dimensions (mm×mm×mm)
	Breathing quantity 50L/min	Breathing quantity 100L/min		
3.0	13.2	6.6	≤14.0	750×245×480
6.8	30.0	15.0	≤15.1	750×280×480
6.8*2	60.0	28.0	≤25.1	750×280×480
9.0	39.7	19.8	≤16.8	750×300×480

Chapter IV Application method of respirator

(I) Preparation before wearing

1. Before wearing the respirator, gas-tightness test shall be conducted on respirator, as follows:

(1) Install the full air bottle on the back utensil, and connect the air supply valve, then turn it off;

(2) Switch on the air bottle valve, making the whole system full of high pressure gas, then record the display pressure value on the gage;

(3) Switch off the air bottle valve and wait for 1 minute, then observe the display value on the pressure gage;

(4) After conducting the above steps, if the decrease value of pressure gage does not exceed 2MPa, the product is regarded as qualified one, otherwise, it would be regarded as defects which can not be put into service.

2. Before wearing, the electric quantity of battery shall be checked. If the electric quantity is insufficient, the new battery must be replaced.

(II) Wearing steps

1. Back utensil wearing

There are two steps to wear the back utensil:

(1) Wear the whole device, lock the shoulder D type ring on both body sides by your hands. Forerake body, then pull the D type ring down and backwards until the shoulder band fits the body well.

(2) Lock the buckle and pull it tightly

2. Mask wearing

Please read the mask operating manual before wearing.

(1) Hold the mask by one hand and make the mouth-nose mask fit the face perfectly. Pull the head band by the other hand to cover the head, then pull the band tightly;

(2) Cover the quick coupling of mask air supply valve by palm, then inhale. If you feel hard to breath and the mask still fits well, the product is proved with good sealing. If you can feel the airflow, then you require to re-adjust the mask and conduct sealing test again.

3. Respiratory preparation

(1) Insert the air supply valve into the inlet hole of mask after wearing the mask well (when hearing “click”, and you can’t pull the air supply valve out which means that the connection is good);

(2) Switch on the air bottle valve

(3) Inhale vigorously to switch on the air supply valve, if fails, please press the “ON” button on the side to turn on the valve manually.

4. Start respiration

(III) Disassembly procedures

1. Press “OFF” to shutdown the air supply valve and disassemble the air supply valve from the mask;

2. Hold the breath, loosen the head band (or mask) to pick off the mask.

3. Unlock the buckle, loosen the belt and shoulder band to disassemble the respirator;

4. Switch off the bottle valve;

5. Switch on the air supply valve and make the air supply button empty the air in the hose.

Note: Please do not throw the respirator on the ground, which will easily damage it.

Chapter V Maintenance and cleaning of air bottle

(I) Air bottle

Compressed air bottle must be conducted periodical inspection according to national relevant laws and regulations. The inspection must be completed by authorized institution and personnel, making relevant record.

Bottle valve is damageable parts, so visual inspection must be conducted after using.

Main reasons causing functional disorder:

1. Unsealing or leakage on the bottle opening;
2. The bottle valve does not screw tightly.
3. Pressure reducer does not screw tightly.

(II) Air quality

When filling the air bottle, the air must conform to the EN-132 standard which stipulates the using condition strictly.

Elements	Quality percentage(dry air)	Volume percentage (dry air)
Oxygen	23.01%	20.93%
Nitrogen	75.51%	78.10%
Argon	1.29%	0.9325%
Carbon dioxide	0.04%	0.03%
Hydrogen	0.001%	0.01%
Neon	0.0012%	0.0018%
Helium	0.00007%	0.0005%
Krypton	0.0003%	0.00015
Xenon	0.00004%	0.000009%

Humidity of air is also an important element influencing the normal working of respirator.

As for this respirator, under the general atmosphere condition, the water content in air bottle with 30MPa working pressure can not exceed 35g/m3.

Note: There must be breathable air in the air bottle.

(III) Air bottle drying

If there is no air in the air bottle, please dry the bottle before filling.

Note:

> Air dryer or drying oven is required with the highest temperature not exceed 90℃;

> Do not empty the air in the bottle (at least keep 0.5MPa pressure)

> Only meeting with the requirements of air bottle, air quality and bottle drying, could the filling be conducted.

(IV) Transportation, storage and moving

When the air bottle is not installed on the respirator, the following rules must be kept during the transportation and storage;

(1) Place vertically during transportation (with bottle valve upwards);

(2) Hold the air bottle tightly during moving;

(3) Do not strike, roll and throw the air bottle during transportation and moving.

Chapter VI Maintenance of other parts

(I) Clean or sterilizing

The fabric band of back utensil could be disassembled for cleaning, washing and sterilizing. Because of the different using conditions, so the contaminated situation is not the same. You must notice that: you can't damage the respirator when cleaning and sterilizing, especially watching out the utilization of disinfectant which can't destroy the parts and raw material, for example: mask, back bracket, buckle, hose and etc.

(II) Washing

The contaminated respirator after using must be cleaned by warm water and cleanser with neutral PH value. When washing, cleanser concentration and using time must be paid attention.

Note: Guarantee the cleanser type won't corrode the parts during using (for example: organic solvent will be harmful to rubber or plastic parts), the joint between mask and air supply valve can't be washed by cleanser.

(III) Drying

After sterilizing, cleaning and rinsing, the respirator must be dried; all parts must be aired under 15～30 ℃; avoid all thermal source (direct solar radiation, drying oven, heater).

Strongly suggest to use compressed air to dry some key parts (pressure reducer, medium pressure hose, etc.), so as to remove the endosmic moisture during rinsing which may cause damage of respirator.

(IV) Inspection

Respirator must be tested after every rinsing and replacing parts.

First of all, conduct visual test to confirm whether the rubber and plastic parts are aged, transformative, bonding, or being cut or under other poor conditions. All sealing joints can't be damaged.

Secondly, the following test items must be conducted by comprehensive respirator instruments:

(1) Low pressure leakproofness test;

(2) Static positive pressure test of air supply valve.

Note: Cleaning, sterilizing, rinsing, inspection, maintenance shall all be recorded.

Chapter VII Faults, reasons and maintenance

No.	Faults	Reasons	Treatment methods
1	Mask air leakage	Wrong wearing position	Adjust the wearing position
		Air release valve leakage	Clean or replace new air release valve plate
		“O” ring on the contacting area between air supply valve and mask damages	Replace the “O” ring
2	Air supply valve leakage	Faults inside the air supply valve	Replace the air supply valve
3	Insufficient air supply	Insufficient air supply of valve	Send back to factory for maintenance
		Insufficient air supply of pressure reducer	
4	Pressure reducer leakage	“O” ring of high pressure joint damages	Replace the “O” ring of high pressure joint
		“O” ring of medium	Replace the “O” ring of

		pressure joint damages	medium pressure joint
		Fixed rocker of pressure reducer loosens	Screw the fixed rocker tightly
		Pressure increase inside the pressure reducer, and the safety valve releases the air	Send back to factory for maintenance
5	Alarm sound is weak or does not work	No battery is equipped on the alarm	Install battery
		Insufficient electric quantity of alarm	Replace battery
6	Quick coupling air leakage	“O” ring inside the socket damages	Replace “O” ring
		Fail to insert, plug transformation or there exists dust	Replace the plug or clean
7	No indications on pressure gage	Fail to switch on the air bottle valve	Switch on the air bottle valve
		Inlet hole of pressure gage is plugged	Replace pressure gage

		Pressure gage damages	Replace pressure gage
8	Air bottle or its valve leakage	Sealing “O” ring for bottle body and valve damages or is aged	Replace “O” ring
		Sealing “O” ring for bottle body and pressure reducer damages or is aged	
		Air leakage of pressure release device	Replace air bottle valve
		Switch axles or valve damages	Replace air bottle valve

Chapter VIII Transportation and storage

(I) Transportation cautions

This respirator is applied to railway, highway and water way transportation, and it shall avoid rain, solar radiation, falling and striking.

(II) Storage condition, period and cautions

This respirator shall be stored at clean, fry and ventilated place with the temperature of -40~+60 ℃. When storing, the product shall be packed in the box to avoid long time blazing sun where it's also at least 1m away from heat source. It can't be stored with oil, acid, alkali or other corrosive material together. Heavy load is prohibited.

This respirator must be stored by category:

(1) Respirator prepared for using after testing.

(2) Temporary unused respirator.

When stored on site and prepare well for using, you shall guarantee that the working condition won't influence the product function. And all parts shall be tested additionally.

Warning: if the user disassembles and misuses the products which causes some damages, all warranties for this products will be invalid immediately.

Chapter IX Out of box audit and inspection

(I) Cautions

When opening the box, you shall conduct the procedures step by step and

check carefully; avoid falling, striking and impact.

(II) Inspection contents

When packing, the standard atmospheric pressure air shall be filled in the air bottle. Every respirator shall have its fixed packing box with moistureproof, quakeproof and pressure-resistant functions. There shall also be product instructions, packing list, certification, air bottle certification, spare parts and tools.

Chapter X Others

(I) Promise, warranty, after-sale service and contacts

1. Quality warranty for all parts of respirator within the period of warranty

Within 12 months after sale, we guarantee that the key parts and components would not influence the normal working of respirator; once there are quality problems, we promise to maintain the product for free.

2. Service promise and guarantee measures out of the period of warranty

If there are faults affecting the normal working over 1 year after sale, we are responsible for the maintenance, but all replaced parts costs and personnel

travelling expenses shall be borne by the user.

3. Respond to product faults and the latest arriving time of maintenance personnel

Once there are problems affecting the normal working, our technicians will guide the user to maintain it in time; if the user requires technician on site, they promise to respond within 24 hours.

4. Spare parts and its supply situation

If you need to purchase the spare parts of this respirator, please contact us at service hotline or fax us, we will provide them to you in time.

5. After-sale service institutions and service hotline

There are technical department and professional maintenance personnel in our company;

Service hotline: 400-1107-699

Fax: 0576—88422009

Address: Nanquan Industrial Park Phase II, Taiping Block, Wenling City, Zhejiang Province

Zip code: 317500

(II) Other matters required to be indicated to users

1. Our company is responsible for conducting technical training and Q&A to users and maintenance personnel;

2. According to user’s demand, we can assign technicians for visiting service;

3. Random spare parts and packing list preparation.

Appendix

Maintenance date	Maintenance personnel	Remarks