

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS T 8153 : 2023

(JSAA/JSA)

Supplied-air respirators

ICS 13.340.30

Reference number : JIS T 8153 : 2023 (E)

PROTECTED BY COPYRIGHT

T 8153 : 2023

Date of Establishment: 1974-08-01

Date of Revision: 2023-01-25

Date of Public Notice in Official Gazette: 2023-01-25

Investigated by: Japanese Industrial Standards Committee
Standards Board for ISO area
Technical Committee on Safety

JIS T 8153 : 2023, First English edition published in 2024-11

Translated and published by: Japanese Standards Association
Mita Avanti, 3-11-28, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2024

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

HN
 **Documents**
Document Sharing Hub

Contents

Page

1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Abbreviations	3
5	Types and forms	4
6	Performances	4
6.1	Leakage rate	4
6.2	Internal pressure of facepiece of supplied-air respirator having face- piece	4
6.3	Air-supply amount of supplied-air respirator having loose fitting type RI	5
6.4	Air-supply amount of manual blower type fresh-air hose breathing ap- paratus	5
6.5	Airtightness for low pressure part	5
6.6	Airtightness for operation of exhalation valve	5
6.7	Strength of airflow path from RI up to hose connector	5
6.8	Strength for connection between hose connector and SAR hose	5
6.9	Dust collection efficiency of electric blower type fresh-air hose breathing apparatus and manual blower type fresh-air hose breathing apparatus	5
6.10	Strength for head strap attach portion to facepiece and head strap	6
6.11	Pressure resistance of medium pressure hose in airflow path from SAR hose and RI up to hose connector	6
6.12	Resistance to external pressure deformation of SAR hose	6
6.13	Bendability of medium pressure SAR hose	6
6.14	Swirl torsion property of medium pressure SAR hose	6
6.15	Airtightness of visor of full facepiece	7
6.16	Noise level at ear part of RI having ear-covering structure	7
6.17	Strength of harness	7
6.18	Durability of electric blower	7
7	Structure	7
7.1	General	7
7.2	Compressed air-line breathing apparatus	7
7.3	Fresh-air hose breathing apparatus	9
7.4	Structure of each part	11
8	Materials	16
9	Tests	17

9.1	Leakage rate test	17
9.2	Test of internal pressure of facepiece of supplied-air respirator having facepiece	23
9.3	Test of air-supply amount of supplied-air respirator having loose fitting type RI	27
9.4	Test of air-supply amount of manual blower type fresh-air hose breathing apparatus	29
9.5	Airtightness test of low pressure part	29
9.6	Airtightness test for operation of exhalation valve	30
9.7	Strength test of airflow path from RI up to hose connector	31
9.8	Strength test of connection between hose connector and SAR hose	32
9.9	Dust collection efficiency test of electric blower type fresh-air hose breathing apparatus and manual blower type fresh-air hose breathing apparatus	33
9.10	Strength test of head strap attach portion to facepiece and head strap	34
9.11	Test of resistance to external pressure deformation of SAR hose	34
9.12	Bendability test of medium pressure SAR hose	36
9.13	Swirl torsion property test of medium pressure SAR hose	38
9.14	Airtightness test of visor of full facepiece	40
9.15	Noise level test at ear part of RI having a ear-covering structure	40
9.16	Strength test of harness	42
9.17	Durability test of blower	42
10	Inspection	43
11	Marking	43
12	Instruction manual	43
Annex A (informative)	Air-supply source for compressed air-line breathing apparatus	45
Annex B (informative)	Quality of breathable air	46
Annex C (informative)	Combination air-line respirator with auxiliary self-contained air supply	48
Annex D (informative)	Emergency supply-air warning device	50

Foreword

This Japanese Industrial Standard has been revised by the Minister of Health, Labour and Welfare and the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Safety Appliances Association (JSAA)/ Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS T 8153 : 2002**), which has been technically revised.

This **JIS** document is protected by the Copyright Act.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, published patent application or utility model rights. The relevant Ministers and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, published patent application or utility model rights.

Supplied-air respirators

1 Scope

This Japanese Industrial Standard specifies the requirements for the supplied-air respirators to be used in workplaces such as factories and mines, fire sites, ships, tunnels and other places in which inhalation of oxygen-deficient air, particulate matter, gases or vapours may cause a hazard to humans.

2 Normative references

Part or all of the provisions of the following standards, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 1501 *Rolling bearings — Balls*

JIS C 1509-1 *Electroacoustics — Sound level meters — Part 1 : Specifications*

JIS K 6330-2 *Rubber and plastics hoses and hose assemblies — Part 2 : Hydrostatic testing*

JIS T 8001 *Glossary of terms for respiratory protective devices*

JIS T 8141 *Personal eye protectors for optical radiations*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS T 8001**, and the following apply.

3.1

maximum working pressure of compressed air-line breathing apparatus

maximum pressure in the pressure range designated by the manufacturer for proper use of compressed air-line breathing apparatus

3.2

minimum working pressure of compressed air-line breathing apparatus

minimum pressure in the pressure range designated by the manufacturer for proper use of compressed air-line breathing apparatus

3.3

medium pressure SAR hose

flexible tube for passing breathable medium-pressure air from the air-supply source up to the hose connector for use in compressed air-line breathing apparatus

Note 1 to entry The medium pressure herein refers to the gauge pressure from 98 kPa to 980 kPa.

3.4

low pressure SAR hose

flexible tube for passing breathable low-pressure air from a blower or an air intake port up to a hose connector for use in fresh-air hose breathing apparatus

Note 1 to entry The low pressure herein refers to the gauge pressure from 0 kPa to 98 kPa.

3.5

SAR hose

generic term for medium pressure SAR hoses and low pressure SAR hoses

3.6

medium pressure SAR hose of maximum length

longest hose among the medium pressure SAR hoses designated by the manufacturer, which can be used appropriately for each compressed air-line breathing apparatus

3.7

low pressure SAR hose of maximum length

longest hose among the low pressure SAR hoses designated by the manufacturer, which can be used appropriately for each fresh-air hose breathing apparatus

Note 1 to entry “Low pressure SAR hose of maximum length” is not designated based on the individual conditions such as setting of the flow control switch and the number of low pressure hoses to be connected simultaneously, but is determined from among all combinations.

3.8

respiratory interface (RI)

component of respiratory protective device that forms a protective boundary between the breathing area of the wearer and the surrounding environment

Note 1 to entry Equivalent term of “respiratory inlet covering” specified in **JIS T 8001**.

3.9

loose fitting type RI

respiratory interface that does not rely on the air tightness formation by contact with the wearer's body

Note 1 to entry This Standard covers a hood and a faceshield as the loose fitting type RI.

3.10

hose connector

connector dedicated to the relay between SAR hose and an airflow path connected to RI

3.11

air-supply source

source of air sent to a wearer of supplied-air respirator

Note 1 to entry Practical examples of air-supply source are as follows.

- Air-supply source of compressed air-line breathing apparatus : equipment or facility that supplies compressed air, such as air compressors, compressed-air cylinders and compressed air piping (see Annex A).
- Air-supply source of fresh-air hose breathing apparatus : circumstances in which a blower or air intake port is provided.

Note 2 to entry See Annex B for the quality of breathable air for supplied-air respirator.

3.12

flowrate control switch

switch attached to the electric blower to select an appropriate air flowrate according to the length and the number of low-pressure SAR hoses connected to the electric blower (if multiple low-pressure SAR hoses are connectable), etc.

3.13

flowrate control device

device controlled by a wearer for the flowrate of air sent from air-supply source

3.14

flowrate adjuster

device for setting the desired flowrate for the test with flowing air into SAR hose

3.15

breathing hose

flexible hose connected to RI, which is a component of an airflow path from RI up to the hose connector, through which low-pressure air is passed

Note 1 to entry In the case of a structure in which a component subject to medium pressure such as an air-supply valve is connected to a face-piece, a breathing hose is not used.

4 Abbreviations

Table 1 shows the abbreviations used in this Standard.

Table 1 Abbreviations

Abbreviation	Term
SAR	Supplied-Air Respirator
RI	Respiratory Interface

5 Types and forms

Table 2 shows the types and forms of supplied-air respirator.

Table 2 Types and forms of supplied-air respirator

Type	Form	RI type to be used	
Compressed air-line breathing apparatus	Pressure demand type	Facepiece	Full facepiece
			Half mask facepiece
	Demand type	Facepiece	Full facepiece
			Half mask facepiece
	Constant-flow type	Facepiece	Full facepiece
			Half mask facepiece
		Loose fitting type RI	Hood
Faceshield			
Fresh-air hose breathing apparatus	Electric blower type	Facepiece	Full facepiece
			Half mask facepiece
		Loose fitting type RI	Hood
			Faceshield
	Manual blower type	Facepiece	Full facepiece
			Half mask facepiece
	Unassisted fresh air type	Facepiece	Full facepiece
Half mask facepiece			
NOTE See Annex C for the combination air-line respirator with auxiliary self-contained air supply having the both functions of the compressed air-line breathing apparatus and the compressed air open-circuit SCBA.			

6 Performances

6.1 Leakage rate

The leakage rate of pressure demand type air-line respirator, constant-flow type air-line apparatus and electric blower type fresh-air hose breathing apparatus shall be 0.1 % or under, when tested by the method specified in **9.1**.

6.2 Internal pressure of facepiece of supplied-air respirator having facepiece

The internal pressure of facepiece of supplied-air respirator having a facepiece shall conform to Table 3, when tested by the method specified in **9.2** under the conditions of specimen specified in **9.2.3** (if there are multiple conditions, all of them).

Table 3 Internal pressure of facepiece of supplied-air respirator having facepiece

Type	Form	Internal pressure of facepiece (P_f) Pa
Compressed air-line breathing apparatus	Pressure demand type	$0 < P_f < 1\ 200$
	Demand type	$-1\ 200 < P_f < 1\ 200$
	Constant-flow type	$0 < P_f < 1\ 200$
Fresh-air hose breathing apparatus	Electric blower type	$0 < P_f < 1\ 200$
	Manual blower type	$-1\ 200 < P_f < 1\ 200$
	Unassisted fresh air type	$-1\ 200 < P_f < 1\ 200$
NOTE The lower limit $-1\ 200$ Pa and the upper limit $1\ 200$ Pa for internal pressure of facepiece are based on Table 3 of ISO 17420-4.		

6.3 Air-supply amount of supplied-air respirator having loose fitting type RI

The air-supply amount of supplied-air respirator having a loose fitting type RI shall be 138 L/min or over, when tested by the method specified in 9.3.

6.4 Air-supply amount of manual blower type fresh-air hose breathing apparatus

The air-supply amount of manual blower type fresh-air hose breathing apparatus shall be 50 L/min or over, when tested by the method specified in 9.4.

6.5 Airtightness for low pressure part

The airtightness for the low pressure part of supplied-air respirator having a facepiece shall be such that no air leakage is observed, when tested by the method specified in 9.5.

6.6 Airtightness for operation of exhalation valve

The airtightness for operation of exhalation valve attached to the facepiece used in a supplied-air respirator having a facepiece other than a pressure demand type air-line respirator shall conform to the following, when tested by the method specified in 9.6.

- When air is sucked, the internal pressure is immediately reduced.
- After depressurized and left unattended, the time required to return to normal pressure is 15 s or longer.

6.7 Strength of airflow path from RI up to hose connector

The airflow path from RI up to the hose connector shall be free from cracks, breakage or detachment when tested in accordance with 9.7.

6.8 Strength for connection between hose connector and SAR hose

The connection between hose connector and SAR hose shall be free from cracks, breakage or detachment, when tested in accordance with 9.8.

6.9 Dust collection efficiency of electric blower type fresh-air hose breathing apparatus and manual blower type fresh-air hose breathing apparatus

The dust collection efficiency of electric blower type fresh-air hose breathing apparatus

ratus and manual blower type fresh-air hose breathing apparatus shall be 80 % or over, when tested in accordance with **9.9**.

6.10 Strength for head strap attach portion to facepiece and head strap

As to the strength for head strap attach portion to facepiece and head strap, the breakage or detachment force shall conform to Table 4, when tested in accordance with **9.10**.

Table 4 Strength for head strap attach portion to facepiece and head strap

Facepiece type	Breakage or detachment force N
Full facepiece	100 min.
Half mask facepiece	50 min.

6.11 Pressure resistance of medium pressure hose in airflow path from SAR hose and RI up to hose connector

The medium-pressure hose (if used) in the airflow path from SAR hose and RI up to the hose connector shall be tested in accordance with **7.1** of **JIS K 6330-2** using the following pressures, and leakage, cracks, deformation, etc. shall not occur.

- Test on medium pressure hose in airflow path from medium pressure SAR hose and RI up to hose connector : pressure four times the maximum working pressure of compressed air-line breathing apparatus
- Low pressure SAR hose : 1 MPa

6.12 Resistance to external pressure deformation of SAR hose

SAR hoses shall have a rate of change in airflow of not more than 50 %, when tested in accordance with **9.11**.

NOTE This judgement criterion is based on **6.12.5** of **ISO 17420-4**.

6.13 Bendability of medium pressure SAR hose

Medium pressure SAR hoses shall have the bendability shown below, when tested in accordance with **9.12**.

- No cracks on the surface or the inside of medium pressure SAR hose.
- No observation of fibre consisting the medium pressure SAR hose
- Not more than one bubble per second when immersed in water

NOTE This judgement criterion is based on **6.3.3.7** of **ISO 16900-6** and **6.12.6** of **ISO 17420-4**.

6.14 Swirl torsion property of medium pressure SAR hose

Medium pressure SAR hoses shall have a rate of change in airflow of not more than 50 %, when tested in accordance with **9.13**.

NOTE This judgement criterion is based on 6.12.8.2 of ISO 17420-4.

6.15 Airtightness of visor of full facepiece

Any airtightness failure shall not be generated on the visor of full facepiece, when tested in accordance with 9.14.

6.16 Noise level at ear part of RI having ear-covering structure

The noise level at the ear part of RI having a ear-covering structure shall be 80 dB (A) or under, when tested in accordance with 9.15.

6.17 Strength of harness

The joints and seams of harness shall be free from breakage or detachment, when tested in accordance with 9.16.

6.18 Durability of electric blower

The electric blower shall be free from abnormality in the activation part, when tested in accordance with 9.17.

7 Structure

7.1 General

The supplied-air respirator shall have a structure in which air is sent from an air-supply source to the wearer through SAR hose, RI, etc., which shall conform to the following.

- a) Rigid, easy to use, light as much as possible, long use endurance and no easy failure and/or breakage
- b) Secure connection of air flowing connection part and free from the risk of air leakage
- c) No hindrance on the usage performance against the impact in the possible handling
- d) Simple handling of each part without easy breakage, and no addition of abnormal compression by wearing

7.2 Compressed air-line breathing apparatus

7.2.1 General

The compressed air-line breathing apparatus shall have a structure in which compressed air from the air-supply source is sent to the medium pressure SAR hose, hose connector, air-supply valve (or flowrate control device), etc., and the air-supply valve (or flowrate control device) allows the air for respiration to flow into RI in which the pressure of air for respiration is decreased.

The installation of a filtration device in the compressed airflow path is preferable in case oil mist and unpleasant odour remain in the compressed air.

NOTE In case of emergency such as when air-supply from air-supply source is interrupted, an emergency supply-air warning device may be used to se-

cure another air-supply source (see Annex D).

7.2.2 Classification by structures

The compressed air-line breathing apparatuses shall conform to the following according to the type thereof.

- a) **Pressure demand type air-line respirator** The pressure demand type air-line respirator shall have a structure in which compressed air from an air-supply source is sent to medium pressure SAR hose, hose connector, pressure demand valve, etc., and air for respiration flows into the facepiece so that the internal pressure of facepiece always becomes positive by the pressure demand valve activated in response to respiration (see Figure 1).

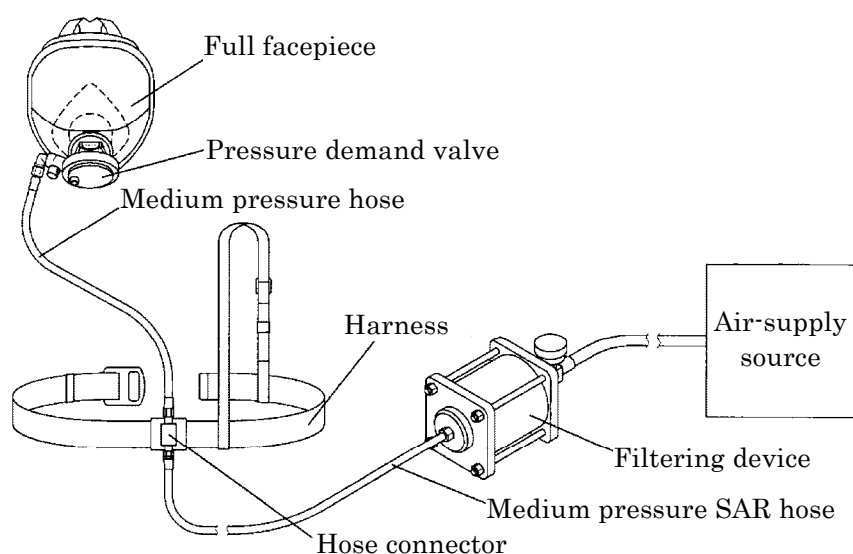


Figure 1 Example of pressure demand type air-line respirator having full facepiece

- b) **Demand type air-line respirator** The demand type air-line respirator shall have the structure in which the pressure demand valve of pressure demand type air-line respirator is replaced by the demand valve. In this case, the demand valve has the function that the air for respiration flows into the facepiece according to the respiration of wearer, and the internal pressure of facepiece at the inhalation of the wearer becomes negative.
- c) **Constant-flow type air-line apparatus** The constant-flow type air-line apparatus shall have a structure in which compressed air from an air-supply source is sent to medium pressure SAR hose, hose connector, flowrate control device, etc., and air for respiration that has been reduced to low pressure by flowrate control devices is flown into the breathing hose, RI etc. at an appropriate flowrate (see Figure 2).

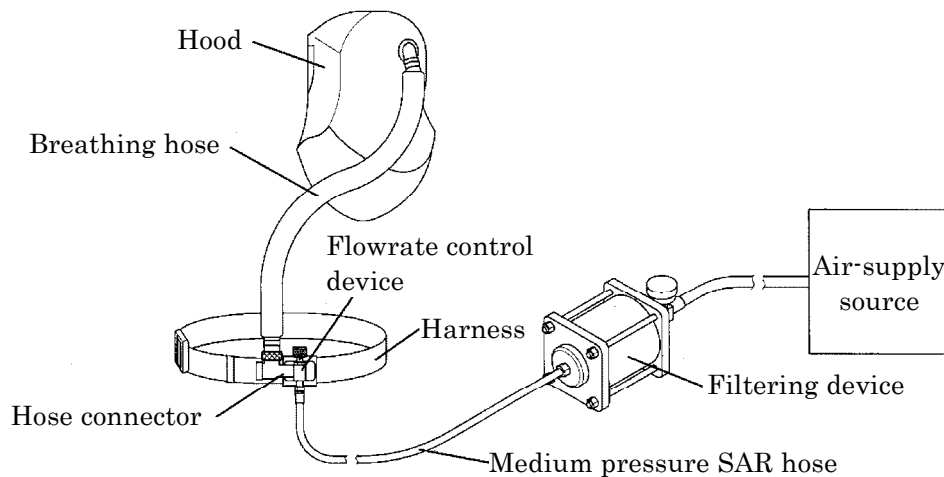


Figure 2 Example of constant-flow type air-line apparatus having hood

7.3 Fresh-air hose breathing apparatus

7.3.1 General

The fresh-air hose breathing apparatus shall have a structure in which the blower or the air intake port is installed in an environment with breathable air, and the air in that environment is sent to RI through low pressure SAR hose, hose connector, etc.

7.3.2 Classification by structures

The fresh-air hose breathing apparatus shall conform to the following according to the type thereof.

- a) **Electric blower type fresh-air hose breathing apparatus** The electric blower type fresh-air hose breathing apparatus shall have a structure in which the electric blower is installed in a breathable air environment, air sucked by the electric blower is sent to low pressure SAR hose, hose connector, flowrate control device, etc., and air for respiration at an appropriate flowrate by the flowrate control device flows into RI through a breathing hose (see Figure 3).

The structure shall allow the wearer to breathe by his/her own suction power in case where the electric blower is suspended due to an accident, etc.

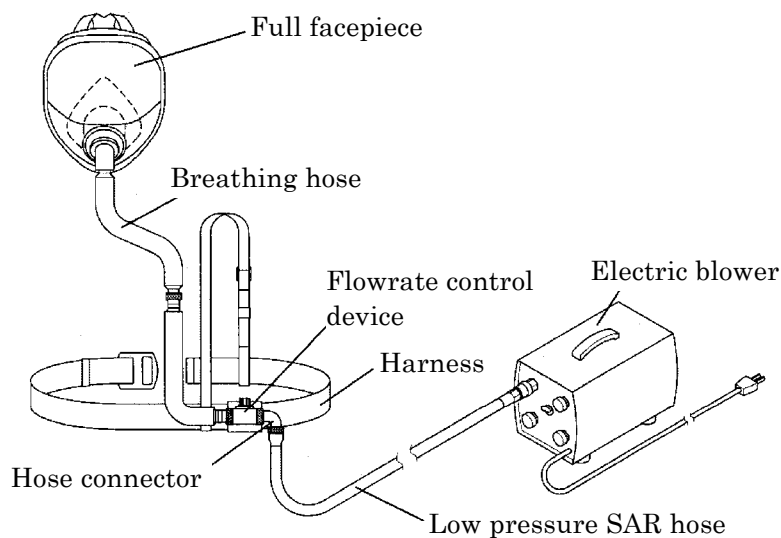


Figure 3 Example of electric blower type fresh-air hose breathing apparatus having full facepiece

- b) **Manual blower type fresh-air hose breathing apparatus** The manual blower type fresh-air hose breathing apparatus shall have a structure in which the manual blower is installed in a breathable air environment, and air sucked by the manual blower is flown into the facepiece through a low pressure SAR hose, hose connector, breathing hose, etc. (see Figure 4).

The structure shall allow the wearer to breathe by his/her own suction power in case where the manual blower is suspended due to an accident, etc.

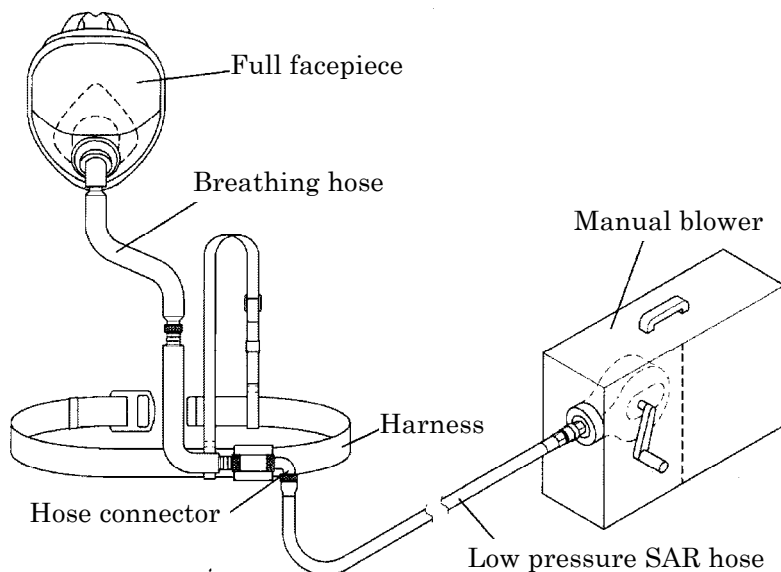


Figure 4 Example of manual blower type fresh-air hose breathing apparatus having full facepiece

- c) **Unassisted fresh air hose breathing apparatus** The unassisted fresh air hose breathing apparatus shall have a structure in which the air intake port is installed in an environment of breathable air, and the air in this environment flows into the facepiece through the air intake port, low-pressure SAR hose, hose connector, breathing hose, etc. by the suction force of the wearer (see Figure 5).

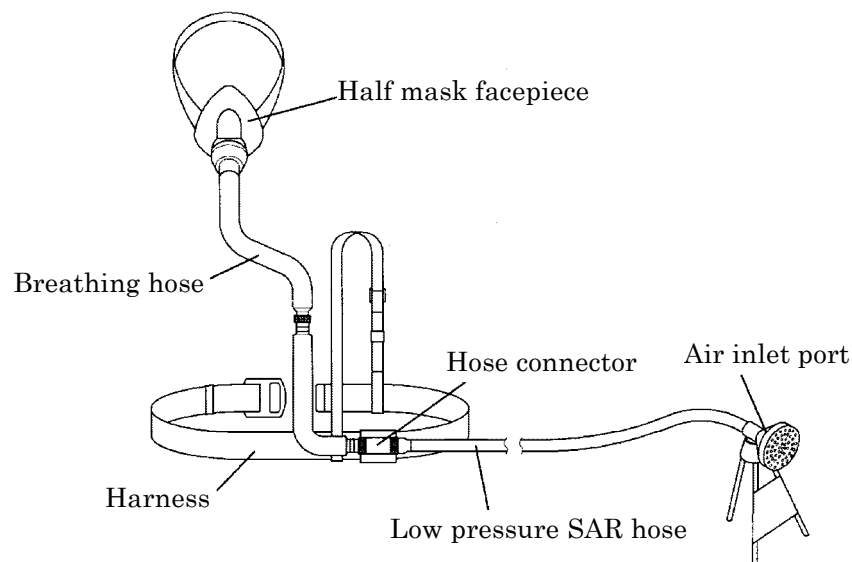


Figure 5 Example of unassisted fresh air hose breathing apparatus having half mask facepiece

7.4 Structure of each part

7.4.1 Respiratory interface (RI)

RI shall be as follows.

- a) **Facepiece**, shall be as follows.

- 1) Classified into two types, a full facepiece and a half mask facepiece (see Figure 6 and Figure 7).

Figure 6 Example of full mask facepiece

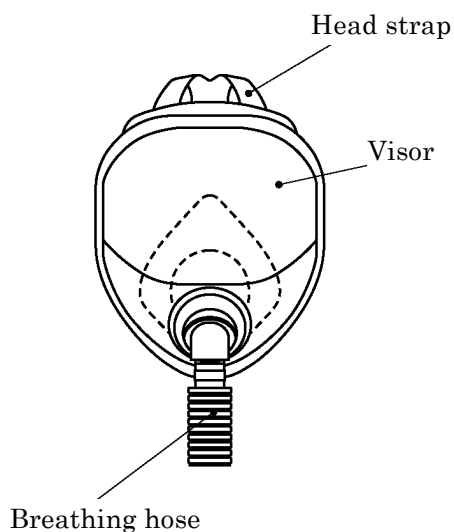


Figure 6 Example of full facepiece

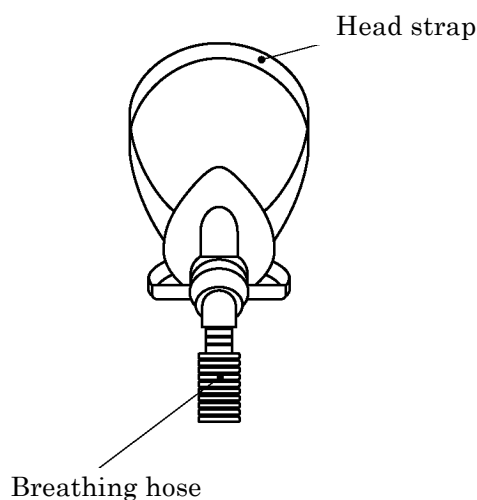


Figure 7 Example of half mask facepiece

- 2) The facepiece used in an unassisted fresh air hose breathing apparatus shall have an inhalation valve that operates sharply for normal breathing.
- 3) The length of head strap shall be adjustable.
- 4) The visor of full facepiece shall be transparent, free from distortion of the image hindrance to use, and having a structure to prevent fogging.
- 5) Exhalation valves of facepieces other than those of pressure demand type air-line respirator shall be as follows.
 - The structure shall be resistant to strain or damage due to external pressure.
 - When the internal and external pressures are in equilibrium, the closed state shall be maintained.