



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS T 8152 : 2012

(JSAA/JSA)

Gas respirators

ICS 13.340.30

Reference number : JIS T 8152 : 2012 (E)

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T 8152 : 2012

Date of Establishment: 1972-02-28

Date of Revision: 2012-02-25

Date of Public Notice in Official Gazette: 2012-02-27

Investigated by: Japanese Industrial Standards Committee

Standards Board

Technical Committee on Protective Equipment
for Occupational Safety

JIS T 8152 : 2012, First English edition published in 2012-12

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

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Printed in Japan

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Contents

	Page
Introduction	1
1 Scope	1
2 Normative references.....	1
3 Terms and definitions	1
4 Classification	1
5 Performance.....	2
5.1 Airtightness	2
5.2 Airtightness of exhalation valve in normal operation	3
5.3 Air-flow resistance of facepiece.....	3
5.4 Air-flow resistance of cartridge.....	3
5.5 Gas removing capacity of cartridge	3
5.6 Filtering efficiency	5
5.7 Rise value of carbon dioxide density in inhalation	6
5.8 Breakage or uncoupling of breathing hose and breathing hose attaching parts.....	6
5.9 Extension rate of head harness	6
5.10 Breakage or uncoupling of head harness.....	6
5.11 Airtightness of visor	6
6 Construction	6
6.1 Construction in general	6
6.2 Construction according to types	7
6.3 Construction of components.....	7
7 Materials.....	8
8 Tests.....	9
8.1 Airtightness test	9
8.2 Airtightness test of exhalation valve in operation.....	10
8.3 Test of inhalation resistance and exhalation resistance of facepiece	10
8.4 Test of inhalation resistance peak value and exhalation resistance peak value of facepiece	10
8.5 Test of air-flow resistance of cartridge.....	11
8.6 Test of gas removing capacity	11
8.7 Test of filtering efficiency	13
8.8 Test of density rise value of carbon dioxide in inhalation	13
8.9 Strength test of the part between facepiece and cartridge attaching part.....	14

8.10	Test of elongation of head harness	15
8.11	Strength test of head harness and its attaching part	15
8.12	Visor part shock test	15
9	Inspection.....	15
10	Designation	15
11	Marking.....	16
12	Attached documents.....	19
12.1	Instruction manual	19
12.2	Other attached documents	20
Annex A (informative) Examples of the construction of gas respirators.....		21

Foreword

This translation has been made based on the original Japanese Industrial Standard 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 the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS T 8152 : 2002** is replaced with this Standard.

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Gas respirators

Introduction

This Japanese Industrial Standard was established as **JIS B 9903** (Gas respirators) in 1955, and has gone through several revisions to this day. The last revision was performed in 2002. The revision at this time is to respond to the increasing types of toxic gas to be handled, the development of absorbents, the advance of testing technologies and necessity of appropriate expression, etc.

No corresponding International Standard has been published at this time.

1 Scope

This Standard specifies gas respirators for inhaling the air cleaned by removing toxic gases or vapours (hereafter referred to as “toxic gas”) or particulate matters mixed with toxic gas in work area or other places (hereafter referred to as “respirators”).

2 Normative references

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

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

JIS Z 8102 *Names of non-luminous object colours*

JIS Z 8721 *Colour specification—Specification according to their three attributes*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions specified in **JIS T 8001** apply.

4 Classification

The respirators are classified into the types given in table 1.

The cartridges are as given in table 2 and, moreover, they are divided into those with particulate filter (combination filters) and those without particulate filter (gas filters).

The symbols for each class of combination filter classified in accordance with filtering efficiency are as given in table 3.

NOTE : The combination filters are intended as well to collect and remove particulate matters, and there are two types, built-in filter type and separable filter type.

Table 1 Classification of respirators

Respirators	Type of facepiece
Separation type	Full facepiece
	Half mask facepiece
Direct connection type	Full facepiece
	Half mask facepiece
Small size direct connection type	Full facepiece
	Half mask facepiece
Mouthpiece type	—

Table 2 Classification of cartridges

Cartridges	Types of applicable respirators			
	Separation type	Direct connection type	Small size direct connection type	Mouthpiece type
For halogen gases	○	○	○	○
For acid gases	○	○	○	○
For organic gases	○	○	○	—
For carbon monoxide	○	○	—	○
For carbon monoxide and organic gases	○	—	—	—
For ammonia	○	○	○	—
For sulfur dioxide (sulfurous acid gas)	○	○	○	○
For hydrogen cyanide	○	○	—	○
For hydrogen sulfide	○	○	○	—
For methyl bromide	○	○	○	—
For mercury	—	—	○	—
For formaldehyde	—	○	○	—
For hydrogen phosphide	○	○	○	—
For ethylene oxide	—	○	○	—
For methanol	—	○	○	—
NOTE : The meaning of the marks in the table is as follows. The mark ○ means the product specified in this Standard, and the mark — means those not to be specified in this Standard.				

Table 3 Symbols for each class of combination filters

Filtering efficiency	Symbols for each class	
	Test using DOP particles	Test using NaCl particles
99.9 min.	L3	S3
95.0 min.	L2	S2
80.0 min.	L1	S1

5 Performance

5.1 Airtightness

The facepiece and the cartridges shall be those in which there is no air leakage when tested in accordance with 8.1.

5.2 Airtightness of exhalation valve in normal operation

The exhalation valve shall immediately indicate the inside pressure reduction when tested in accordance with 8.2. In addition, the time required for coming back to ordinary pressure after the reduction of pressure shall be 15 s or over.

5.3 Air-flow resistance of facepiece

The inhalation resistance and the exhalation resistance of the facepiece shall, at the most, be the values given in table 4 when tested in accordance with 8.3 and 8.4, respectively.

Table 4 Air-flow resistance of facepiece

Unit : Pa

Item	Respirators		
	Separation type	Direct connection type	Small size direct connection type
Inhalation resistance	70	50	
Mean value of inhalation resistance peak values	165	120	
Exhalation resistance	80		
Mean value of exhalation resistance peak values	190		

5.4 Air-flow resistance of cartridge

The air-flow resistance of the cartridge shall, at the most, be the values given in table 5 when tested in accordance with 8.5.

Table 5 Air-flow resistance of cartridge

Unit : Pa

Cartridges	Symbols for classes	Applicable respirators				
		Separation type		Direct connec- tion type	Small size direct connection type	Mouthpiece type
		For carbon monoxide	For other than carbon monoxide			
With particulate filter	L3 or S3	400		370		
	L2 or S2	320		290		
	L1 or S1	310		280		
Without particulate filter	—	280	250	220		

5.5 Gas removing capacity of cartridge

The gas removing capacity of the cartridge shall be that, when tested in accordance with 8.6, the break-through time thereof satisfies respective values given in tables 6 to 9.

Table 6 Gas removing capacity of cartridge for separation type respirator

Cartridges	Air containing test gas		Maximum allowable penetration ppm ^{a)}	Breakthrough time min
	Test gas	Test density Volume fraction %		
For halogen gases	Chlorine	0.5	1	60 min.
For acid gases	Hydrogen chloride	0.5	5	100 min.
For organic gases	Cyclohexane	0.5	5	100 min.
For carbon monoxide	Carbon monoxide	1.0	50 ^{b)}	180 min.
For carbon monoxide and organic gases	Carbon monoxide	1.0	50 ^{b)}	60 min.
	Cyclohexane	0.5	5	30 min.
For ammonia	Ammonia	2.0	50	40 min.
For sulfur dioxide (sulfurous acid gases)	Sulfur dioxide	0.5	5	50 min.
For hydrogen cyanide	Hydrogen cyanide	0.5	5	50 min.
For hydrogen sulfide	Hydrogen sulfide	0.5	10	50 min.
For methyl bromide	Methyl bromide	0.5	1	50 min.
For hydrogen phosphide	Hydrogen phosphide	0.1	0.3	50 min.
Notes ^{a)} 1 ppm = volume fraction 1×10^{-4} %				
^{b)} So far as the first 5 min after starting the test are concerned, the concentration of transmitting gas is not considered to be breakthrough even when exceeding the maximum allowable penetration, if it is less than 100 ppm.				

Table 7 Gas removing capacity of cartridge for direct connection type respirator

Cartridges	Air containing test gas		Maximum allowable penetration ppm ^{a)}	Breakthrough time min
	Test gas	Test density Volume fraction %		
For halogen gases	Chlorine	0.3	1	15 min.
For acid gases	Hydrogen chloride	0.3	5	80 min.
For organic gases	Cyclohexane	0.3	5	30 min.
For carbon monoxide	Carbon monoxide	1.0	50 ^{b)}	30 min.
For ammonia	Ammonia	1.0	50	10 min.
For sulfur dioxide (sulfurous acid gases)	Sulfur dioxide	0.3	5	15 min.
For hydrogen cyanide	Hydrogen cyanide	0.3	5	20 min.
For hydrogen sulfide	Hydrogen sulfide	0.3	10	20 min.
For methyl bromide	Methyl bromide	0.3	1	15 min.
For formaldehyde	Formaldehyde	0.02	0.1	45 min.
For hydrogen phosphide	Hydrogen phosphide	0.2	0.3	100 min.
For ethylene oxide	Ethylene oxide	0.02	1	10 min.
For methanol	Methanol	0.3	200	30 min.
Notes ^{a)} 1 ppm = volume fraction 1×10^{-4} %				
^{b)} So far as the first 5 min after starting the test are concerned, the concentration of transmitting gas is not considered to be breakthrough even when exceeding the maximum allowable penetration, if it is less than 400 ppm.				

Table 8 Gas removing capacity of cartridge for small size direct connection type respirator

Cartridges	Air containing test gas			Maximum allowable penetration		Break-through time min
	Test gas	Test density		ppm ^{a)}	mg/m ³	
		Volume fraction %	mg/m ³			
For halogen gases	Chlorine	0.02		1		40 min.
For acid gases	Hydrogen chloride	0.03		5		80 min.
For organic gases	Cyclohexane	0.03		5		50 min.
For ammonia	Ammonia	0.1		50		40 min.
For sulfur dioxide (sulfurous acid gases)	Sulfur dioxide	0.03		5		35 min.
For hydrogen sulfide	Hydrogen sulfide	0.02		10		35 min.
For methyl bromide	Methyl bromide	0.02		1		35 min.
For mercury	Mercury vapor		10		0.05	480 min.
For formaldehyde	Formaldehyde	0.002		0.1		85 min.
For hydrogen phosphide	Hydrogen phosphide	0.02		0.3		200 min.
For ethylene oxide	Ethylene oxide	0.002		1		15 min.
For methanol	Methanol	0.03		200		60 min.
Note ^{a)} 1 ppm = volume fraction 1×10^{-4} %						

Table 9 Gas removing capacity of cartridge for mouthpiece type respirator

Cartridges	Air containing test gas		Maximum allowable penetration ppm ^{a)}	Breakthrough time min
	Test gas	Test density Volume fraction %		
For halogen gases	Chlorine	0.02	1	40 min.
For acid gases	Hydrogen chloride	0.1	5	15 min.
For carbon monoxide	Carbon monoxide	1.0	50 ^{b)}	30 min.
For sulfur dioxide (sulfurous acid gases)	Sulfur dioxide	0.03	5	35 min.
For hydrogen cyanide	Hydrogen cyanide	0.02	5	100 min.
Notes ^{a)} 1 ppm = volume fraction 1×10^{-4} %				
^{b)} So far as the first 5 min after starting the test are concerned, the concentration of transmitting gas is not considered to be breakthrough even when exceeding the maximum allowable penetration, if it is less than 400 ppm.				

5.6 Filtering efficiency

When testing the combination filter in accordance with 8.7, the minimum value of filtering efficiency shall conform to any one of the values given in table 3.