



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS T 8151 : 2018

(JSAA/JSA)

Particulate respirators

ICS 13.340.30

Reference number : JIS T 8151 : 2018 (E)

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Date of Establishment: 1972-02-28

Date of Revision: 2018-04-25

Date of Public Notice in Official Gazette: 2018-04-25

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

JIS T 8151:2018, First English edition published in 2019-01

Translated and published by: Japanese Standards Association
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

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Printed in Japan

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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 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 8151**:2005 is replaced with this Standard.

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Particulate respirators

1 Scope

This Japanese Industrial Standard specifies the particulate respirators used at the workplaces and other locations under the environment that may cause harmful effects on a human body by the inhalation of particulate substances floating in air (hereafter referred to as dust and the like).

WARNING 1 Do not use a particulate respirator under the oxygen deficiency environment.

WARNING 2 Do not use a particulate respirator in a place where a toxic gas or vapour, or volatile mist exists.

WARNING 3 Do not use a replaceable type particulate respirator equipped with an inhalation assisting device under the environment in which an explosion may occur, unless it is proved as the explosion-proof electrical apparatus.

WARNING 4 Select the particulate respirators correctly based on the type and concentration of the dust and the like.

Criteria for the selection of suitable respiratory protective devices are specified in **JIS T 8150**.

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 (including amendments) indicated below shall be applied.

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

JIS T 8150 *Guidance for selection, use and maintenance of respiratory protective devices*

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

replaceable type particulate respirator

particulate respirator designed so that it is not disposal but can be used by replacing a particle filter or other parts, even if they are damaged or their functions are declined after the start of use

The particulate respirators are available in two types, those equipped with an electrically-powered inhalation assisting device intended for reducing the inhalation load of a wearer, and those not equipped with.

3.2

disposable type particulate respirator

particulate respirator of disposable type designed so that the entire respirator will be discarded and replaced with a new one if the respirator in use cannot be used anymore

The disposable type particulate respirator consists of an assemble of particle filter and facepiece, head harness, and exhalation valve, if equipped, and the like.

3.3

inhalation assisting device

small fan that blows air into the facepiece to assist the inhalation

3.4

fixture for filtering efficiency measurement

fixture attached to the particulate respirator used in the filtering efficiency test, having an air flow port

3.5

fixture for air-flow resistance measurement

fixture attached to the particulate respirator used in the measurements of inhalation resistance, exhalation resistance, etc., having an air flow port and a pressure measurement port

4 Types and classes

The types and classes of particulate respirators shall be as follows.

- a) **Types of particulate respirators** Table 1 shows the types of particulate respirators.

Table 1 Types of particulate respirators

Type			Type of facepiece
Replaceable type particulate respirator	With inhalation assisting device	Front- or back-mounted type	Full facepiece
			Half mask facepiece
		Direct connection type	Full facepiece
			Half mask facepiece
	Without inhalation assisting device	Front- or back-mounted type	Full facepiece
			Half mask facepiece
		Direct connection type	Full facepiece
			Half mask facepiece
Disposable type particulate respirator	With exhalation valve	—	—
	Without exhalation valve	—	—

- b) **Classification of performances of particulate respirators** Table 2 shows the classes of particulate respirators according to their performances.

Table 2 Classification of performances of particulate respirators

Type	Class
Replaceable type particulate respirator	RL3
	RL2
	RL1
	RS3
	RS2
	RS1
Disposable type particulate respirator	DL3
	DL2
	DL1
	DS3
	DS2
	DS1

5 Performances

5.1 Filtering efficiency

When the particulate respirators are tested according to **8.1**, the filtering efficiency shall conform to Table 3.

Table 3 Filtering efficiency

Type	Class	Filtering efficiency %	Test particles
Replaceable type particulate respirator	RL3	99.9 min.	Diethyl phthalate (DOP) particles
	RL2	95 min.	
	RL1	80 min.	
	RS3	99.9 min.	Sodium chloride (NaCl) particles
	RS2	95 min.	
	RS1	80 min.	
Disposable type particulate respirator	DL3	99.9 min.	Diethyl phthalate (DOP) particles
	DL2	95 min.	
	DL1	80 min.	
	DS3	99.9 min.	Sodium chloride (NaCl) particles
	DS2	95 min.	
	DS1	80 min.	

5.2 Inhalation resistance

When the particulate respirators are tested according to **8.2**, the inhalation resistance shall conform to Table 4.

5.3 Exhalation resistance

When the particulate respirators are tested according to 8.3, the exhalation resistance shall conform to Table 4.

Table 4 Inhalation resistance and exhalation resistance

Unit: Pa

Type		Class	Inhalation resistance	Exhalation resistance
Replaceable type particulate respirators	With inhalation assisting device	RL3, RS3	160 max.	80 max.
		RL2, RS2		
	Without inhalation assisting device	RL1, RS1		
		RL3, RS3	160 max.	80 max.
Disposable type particulate respirators	With exhalation valve	RL2, RS2	80 max.	70 max.
		RL1, RS1	70 max.	70 max.
		DL3, DS3	150 max.	80 max.
	Without exhalation valve	DL2, DS2	70 max.	70 max.
		DL1, DS1	60 max.	60 max.
		DL3, DS3	100 max.	100 max.
		DL2, DS2	50 max.	50 max.
		DL1, DS1	45 max.	45 max.

5.4 Airtightness of exhalation valve

When the exhalation valves are tested according to 8.4, the results shall conform to the following.

- An internal pressure reduction starts immediately after the air suction.
- The period is 15 s or longer from the stabilization of pressure reduction to the timing at which the pressure returns to ordinary pressure.

5.5 Elevated level of carbon dioxide concentration

When the particulate respirators are tested according to 8.5, the elevated level of carbon dioxide concentration shall be 1.0 % or under.

5.6 Strengths of head harness mount part and head harness

When tested according to 8.6, a force required for the breakage or separation of the head harness mount part and the head harness shall satisfy Table 5.

Table 5 Strengths of head harness mount part and head harness

Type of particulate respirator	Type of facepiece	Force required for breakage or separation N
Replaceable type particulate respirator	Full facepiece	50 min.
	Half mask facepiece	25 min.
Disposable type particulate respirator	—	10 min.

5.7 Strengths of breathing hose mount part and breathing hose

When tested according to 8.7, a force required for the breakage or the separation of the breathing hose mount part and the breathing hose shall be 98 N or more.

6 Constructions

6.1 General matters of construction

General matters of construction shall be as follows.

- a) Highly resistant to damage
- b) Simple to handle, and giving no abnormal sense of oppression or pain when worn
- c) Not much disturbing the wearer's visual field
- d) No possibility of the wearer inhaling the particle filter and other material

6.2 Constructions according to types

6.2.1 Replaceable type particulate respirator

A replaceable type particulate respirator shall have a particle filter, inhalation valve, exhalation valve and head harness that are easily replaceable. Also, they allow the wearer to check the contact closeness between the respirator and the face easily by oneself at any time, and have the following constructions.

- a) **Front- or back-mounted type** Composed of a particle filter, inhalation valve, facepiece, exhalation valve, head harness, breathing hose and inhalation assisting device (if equipped). This type is constructed so that the ambient air inhaled by a wearer or sucked by the inhalation assisting device (if equipped) flows through the particle filter, a clean air flows into the facepiece through the breathing hose and the inhalation valve after the dust and the like are filtered, and the expiration of the wearer is discharged to the air outside through the exhalation valve (see Annex A).
- b) **Direct connection type** Composed of a particle filter, inhalation valve, facepiece, exhalation valve, head harness and inhalation assisting device (if equipped). This type is constructed so that the ambient air inhaled by a wearer or sucked by the inhalation assisting device (if equipped) flows through the particle filter, a clean air flows into the facepiece through the inhalation valve after the dust and the like are filtered, and the expiration of the wearer is discharged to the air outside through the exhalation valve (see Annex A).

6.2.2 Disposable type particulate respirator

A disposable type particulate respirator shall consist of an assemble of particle filter and facepiece, and head harness. A clean air is inhaled after the dust and the like are filtered, and the expiration is discharged to the air outside through the particle filter (including the exhalation valve if it is equipped) (see Annex A).

The leakage rate (see Annex B), wet resistance (see Annex C) and moistened inhalation resistance (see Annex D) of disposal type particulate respirators should not be remarkably large.

If any of the following occurs, the disposable type particulate respirator in use shall be discarded and replaced with the new one.

- a) Where one part is damaged and its function is declined (never reuse the particulate respirator by replacing only that part).
- b) Where staining has become serious and cleaning such as washing is necessary.
- c) Where the contact closeness with the face becomes unassured due to a change in shape, etc.
- d) Where the expiration of use shown on the particulate respirator and in the instruction manual is exceeded (see Annex E).
- e) Where the breathing resistance is possibly exceeding the limit due to the cumulated particulate substances on the particle filter.
- f) Where the user of the respirator changes to another.
- g) Where the proper functions of particulate respirator are likely to have declined.

6.3 Constructions of respective parts

6.3.1 Facepiece

The construction of facepiece shall be as follows.

- a) The full facepiece shall cover the entire face without air leakage, and shall prevent the fogging on the visor. The visor shall be mounted on the facepiece firmly to keep the airtightness so that the air unlikely leaks against the external impact.
- b) The half mask facepiece shall cover the nose and mouth without air leakage.

6.3.2 Inhalation valve

The inhalation valve shall operate reliably and accurately for normal respiration.

6.3.3 Exhalation valve

The construction of exhalation valve shall be as follows.

- a) Operable reliably and accurately for normal respiration irrespective of the humidity condition of the valve and the valve seat. However, the exhalation valve of a replaceable type particulate respirator equipped with an inhalation assisting device shall satisfy the requirements above under the condition where the inhalation assisting device is suspended.
- b) Capable of keeping the closed condition irrespective of the direction of the facepiece, when the inner and outer pressures are balanced.
- c) Having a protection by a cover, etc. to prevent the damage due to the external force.

6.3.4 Head harness

The construction of head harness shall be as follows.

- a) Having an adequate length and elasticity.

- b) The length shall be easily adjustable. However, this is not applicable to the disposal type particulate respirators if good contact closeness to the face is secured.

6.3.5 Breathing hose

The construction of breathing hose shall be as follows.

- a) Adequately extensible, and capable of being bent in various ways without disturbing the air flow.
- b) No hindrance to the air flow even if the chin, the arm or the like are oppressed.
- c) Having a length not hinder the free movement of neck.

6.3.6 Inhalation assisting device

The construction of inhalation assisting device shall be as follows.

- a) Having an air-supply function.
- b) No hindrance due to water, dust and the like for operation.

6.3.7 Power supply

The power supply used for an inhalation assisting device shall be as follows.

- a) The power supply shall be batteries or an external power supply. The voltage near the body of wearer shall be 24 V or under.
- b) The power supply cord shall be hard to be cut, even if it is caught by a protrusion or the like during work.
- c) The power supply using batteries shall be so constructed that batteries do not fall off due to an impact or the like during work.
- d) The power supply connector shall be so constructed that it does not come off due to an impact or the like during work.
- e) The power supply switch shall be so designed that it is not easily turned off even if it touches something during its use.

7 Materials

The materials used for respective parts of particulate respirators shall be as follows.

- a) The materials used for the areas in contact with the skin shall not have harmful influence on the skin. Also, the materials used in the replaceable type particulate respirators shall be those capable of sterilizing.
- b) In normal handling, the materials shall not produce cracks, deformation or other abnormalities.
- c) The exposed metal part shall be corrosion-resistant or subjected to a suitable anti-corrosion treatment.
- d) The materials used for particle filters shall not give any trouble to human body.
- e) The material used in the air-flow passage shall not generate any hazardous substances.