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**Powered air purifying respirator
(PAPR)**

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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 8157 : 1991** is replaced with this Standard.

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Powered air purifying respirator (PAPR)

Introduction

This Japanese Industrial Standard was established in 1982. After the establishment, it has gone through one revision, which was made in 1991. The revision at this time is made for the purpose of corresponding to the technology trend, multiplicity of usage state and quality improvement.

Further, no International Standard corresponding to this Standard has been established at this point.

1 Scope

This Standard specifies the filter type powered air purifying respirators (hereafter referred to as the “PAPR”) to be used in the place where the inhalation of particulate matter floating in the air (hereafter referred to as the “dust, etc.”) in working places, etc. may exert a harmful influence on human body.

The PAPR specified in this Standard cannot be used in the oxygen deficient atmosphere or the environment in which an explosion hazard exists. This Standard also basically specifies the conditions in which electric fan of the PAPR normally operates. For the PAPR with a facepiece, it is assumed that the PAPR may be continuously used as a filter-type respirator even when the electric fan has stopped due to battery exhaustion or has been intentionally stopped according to the environmental conditions. The PAPR that is certified to have explosion-proof construction as electric machine apparatus may be used in the environment in which an explosion hazard exists.

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

JIS T 8001 *Glossary of terms for 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 terms and definitions apply.

3.1 standard type PAPR

the PAPR with a facepiece of which the internal pressure is found to be positive, or the PAPR with a hood or a face shield of which the air flow volume is found to be not less than the reference value, in accordance with the tests specified in this Standard

3.2 respiratory support type PAPR

the PAPR with a facepiece which feeds air into its facepiece by means of an electric fan in an auxiliary manner to reduce the wearer's inhalation burden

3.3 minimum necessary air volume

the minimum necessary air volume specified in this Standard for the standard type PAPR with a hood or a face shield, which is to be fed into its hood or face shield

3.4 nominal working time

the period of time declared by the manufacturer as the period of time during which the PAPR with a facepiece works while keeping its facepiece's internal pressure within the specified value, or the PAPR with a hood or a face shield works while keeping its air volume within the specified value, when the battery-powered PAPR is connected to the prescribed battery and is actuated in an ordinary room (under the environment of ordinary temperatures and normal atmospheric pressures, and free from an extremely large amount of dust)

3.5 respiratory inlet covering

generic name for facepieces, face shields and hoods which are mainly intended to be fitted onto the face for respiratory protection

NOTE : In **JIS T 8001**, this term is defined as the generic name for facepieces, face shields, hoods and mouthpieces. However, there is no PAPR that has a mouthpiece.

4 Classification

PAPR shall be classified into the standard type and the respiratory support type.

Classification by applicable type of respiratory inlet covering, work intensity, inward leakage and filter type shall be as follows.

- a) Applicable types of respiratory inlet covering shall be classified according to the type of PAPR as shown in table 1.

Table 1 Applicable types of respiratory inlet covering

Type of PAPR	Type of respiratory inlet covering
Standard type	Full facepiece
	Half mask facepiece
	Hood
	Face shield
Respiratory support type	Full facepiece
	Half mask facepiece

- b) The PAPR shall be classified by work intensity into those for heavy work and those for ordinary work.

- c) The PAPR shall be classified by inward leakage as shown in table 2.
- d) The PAPR shall be classified by the type of test particle specified in table 3 into the PL type and PS type, and by collection efficiency of filter as shown in table 3.

5 Performance

5.1 Inward leakage

Inward leakage of the PAPR shall comply with the values shown in table 2 when tested in accordance with 8.1.

Table 2 Grades of PAPR by inward leakage

Grade by inward leakage	Inward leakage %
Grade S	0.1 or less
Grade A	1 or less
Grade B	5 or less
Grade C	10 or less

5.2 Particle collection efficiency of filters

The particle collection efficiency of the filter shall comply with the values shown in table 3 when tested in accordance with 8.2.

Table 3 Symbols for filters by grade of particle collection efficiency

Symbols by grade of particle collection efficiency		Particle collection efficiency %
PL type [Test with dioctyl phthalate (DOP) particles]	PS type [Test with sodium chloride (NaCl) particles]	
PL 100	PS 100	99.97 or more
PL 99	PS 99	99 or more
PL 95	PS 95	95 or more
PL 90	PS 90	90 or more

5.3 Internal pressure of facepiece

As for the standard type PAPR and respiratory support type PAPR with a facepiece, the internal pressure of facepiece shall comply with the following when tested in accordance with 8.3.

- a) **Standard type PAPR with a facepiece** The internal pressure of facepiece shall be obtained using the following formula.

$$0 < P_F < 400$$

where, P_F : Internal pressure of facepiece (Pa)

- b) **Respiratory support type PAPR** The internal pressure of the facepiece shall be obtained using the following formula.

$$0 \leq P_F$$

where, P_F : Internal pressure of facepiece (Pa)

5.4 Minimum necessary air volume for the PAPR with a hood or a face shield

The minimum necessary air volume for the standard type PAPR with a hood or a face shield shall comply with the values shown in table 4 when tested in accordance with 8.4. For the PAPR provided with a manual flow control function, however, the PAPR shall be tested after having adjusted the flow by means of the function so that the minimum air volume is provided.

Table 4 Minimum necessary air volume for PAPR

Type of PAPR	Type of respiratory inlet covering	Classification by work intensity	Minimum necessary air volume L/min
Standard type	Hood	For heavy work	138
		For ordinary work	104
	Face shield	For heavy work	138
		For ordinary work	104

5.5 Nominal working time

When tested in accordance with 8.5, the battery-powered PAPR shall be as described below upon expiration of the nominal working time.

- a) **Standard type PAPR with a facepiece** The internal pressure of the facepiece shall be as specified in 5.3.
- b) **Standard type PAPR with a hood or a face shield** The air volume fed into the hood or the face shield shall be not less than the minimum necessary air volume shown in table 4.
- c) **Respiratory support type PAPR** The internal pressure of the facepiece shall be as specified in 5.3.

5.6 Noise level

When tested in accordance with 8.6, the PAPR shall achieve a sound pressure level of 80 dB (A) or less as measured respectively in the vicinity of the right and left ears.

5.7 Performance of the PAPR with a facepiece in the event its electric fan is powered off

5.7.1 Inhalation resistance

When tested in accordance with 8.7, the PAPR with a facepiece shall have an inhalation resistance of 160 Pa or less with the electric fan powered off.

5.7.2 Increase in value of carbon dioxide concentration in inhaled air

When tested in accordance with 8.8, the PAPR with a facepiece shall show an increase in value of carbon dioxide concentration of 2.0 % or less with its electric fan powered off.

6 Appearance and structure

6.1 Appearance

The appearance of the PAPR shall be as follows.

- a) It is free from cracks, smudges and abnormal warps.
- b) Each connection shall be properly connected.
- c) Components shall be properly installed.

6.2 General structure

The general structure of PAPR shall be as follows.

- a) To allow the worker wearing the PAPR to work without being hindered by the PAPR.
- b) To supply air for breathing to the wearer after having purified the air in the work environment with its filter.
- c) So that junctions shall be securely connected so as not to degrade the PAPR's respiratory protection performance by leakage of air.
- d) So that performance in use shall not be interfered by possible physical shock that may be encountered during ordinary working conditions.
- e) Not to give abnormal discomfort or pain by wearing the PAPR.
- f) To have a fuse or an alternative protective circuit for the prevention of heating or ignition which may be caused by a short circuit or any other problem.

6.3 Structure by classification

According to the classification of respiratory inlet covering, the structure of the PAPR shall be as follows.

- a) **PAPR with a facepiece** The PAPR with a facepiece shall feed the air through a filter by means of its electric fan into its facepiece. It shall be so structured as to exhaust the wearer's exhalation and excessive air (hereafter referred to as "exhalation, etc.") through its exhaust valve and as to allow the wearer to inhale purified air by his/her own inspiratory force even if the electric fan stops (see figure 1).