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Respiratory protective devices — Classification for respiratory protective device (RPD), excluding RPD for underwater application

Appareils de protection respiratoire — Classification pour les DPR, à l'exclusion des DPR pour application sous-marine

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Foreword

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The committee responsible for this document is ISO/TC 94, Personal safety — Protective clothing and equipment, Subcommittee SC 15, Respiratory protective devices.

Introduction

This document contains the classification of Respiratory Protective Devices in accordance with the requirements of ISO 17420-1 Supplied breathable gas RPD, ISO 17420-2 Filtering RPD, and ISO TS 17420-4 Chemical, Biological, Radiological and Nuclear RPD.

The Basic Classification, which apply to all RPD, are: Protection Class, Work rate class, and respiratory interface class.

For Supplied Breathable Gas RPD the classification also includes gas capacity class.

For Filtering RPD, the classification also includes a particle filter class and/or the gas filter types and classes.

RPD designated to be used for Special Applications are further classified accordingly.

The special applications identified are:

— Fire Fighting,
— Chemical, Biological, Radiological and Nuclear (CBRN),
— Marine,
— Mining,
— Abrasive Blasting,
— Welding, and
— Escape.

Each RPD will have an individual classification based on its performance specified in ISO 17420-1, ISO 17420-2 or ISO TS 17420-4.

Explanations of the classification and examples of the classification of RPD are given in the Annexes.

The following definitions apply in understanding how to implement an ISO International Standard and other normative ISO deliverables (TS, PAS, IWA).

— “shall” indicates a requirement
— “should” indicates a recommendation
— “may” is used to indicate that something is permitted
— “can” is used to indicate that something is possible, for example, that an organization or individual is able to do something

3.3.1 of the ISO/IEC Directives, Part 2 (sixth edition, 2011) defines a requirement as an "expression in the content of a document conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted."

3.3.2 of the ISO/IEC Directives, Part 2 (sixth edition, 2011) defines a recommendation as an “expression in the content of a document conveying that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.”

Respiratory protective devices — Classification for respiratory protective devices (RPD), excluding RPD for underwater application

1 Scope

This Standard specifies the classification of Respiratory Protective Devices based on their performance. The performance requirements are given in ISO 17420-1, -2 and -4[1)]

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16975-1, Respiratory protective devices – Selection, use and maintenance

ISO TS 16976-1:2007, Respiratory protective devices – Human factors Part 1: Metabolic rates and Respiratory flow rates

ISO 16972:2010, Respiratory protective devices – Terms, definitions, graphical symbols and units of measurement

ISO 16900-3 Respiratory protective devices - Methods of test and test equipment - Part 3: Determination of filter penetration

ISO 17420-1 Respiratory protective devices – Performance requirements – Part 1: Supplied breathable gas devices

ISO 17420-2 Respiratory protective devices – Performance requirements – Part 2: Filtering RPD

ISO 17420-3 Respiratory protective devices – Performance requirements – Part 3: Thread connection

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16972 apply.

4 Mode of operation

The two means of supplying breathable gas to the wearer are described in Table 1.

1) Under preparation

Table 1 — Mode of operation

Mode of operation	Means of supplying breathable gas to the wearer	Typical examples of RPD
Breathable gas supply	The RPD supplies the wearer with breathable gas from a remote supply of breathable gas or from breathable gas stored in, or regenerated by, the RPD.	Compressed airline breathing apparatus, self-contained breathing apparatus (SCBA)
Filtration	The RPD removes gases, vapours and/or particles from the ambient air depending on the air-purifying element (filter) used. These can be assisted or unassisted devices.	Half mask with gas filter(s) Filtering facepiece

Combined RPD are devices which have both filtering and breathable gas supply modes. Combined RPD can have different classes depending on the operating method being used. An example will be a RPD which can operate as a compressed airline breathing apparatus and has an auxiliary filter.

Multi functional RPD are RPD which have different methods of operation within either filtering or breathable gas supply modes. Multi-functional RPD can have different classes depending on the operating method being used. An example would be an RPD which can operate as a compressed airline breathing apparatus with an auxiliary self-contained breathing apparatus. Another example is a powered air-purifying respirator (PAPR) which can operate with the blower in the power-off mode.

5 Protection classes

5.1 Total Inward Leakage (TIL)

TIL is the ratio of the concentration of a test agent in the breathing zone inside the RPD compared to the concentration outside the RPD, expressed as a percentage.

This is the level of total inward leakage of the RPD as measured in the laboratory under standard defined conditions.

TIL levels used in RPD evaluation are given in Table 2.

Table 2 — Total inward leakage levels

TIL_{MAX} %
0,001
0,01
0,1
1
5
20

5.2 Protection class (PC)

RPD shall be classified by Protection Class.

The protection class are derived from the results of a laboratory Total Inward Leakage (TIL) test. The protection classes are listed in Table 3 and Figure A.1 corresponding with the maximum percent TIL.

Table 3 — Protection classes

Protection Class	TIL_{MAX} %
PC6	0,001
PC5	0,01
PC4	0,1
PC3	1
PC2	5
PC1	20

For the purposes of selection and use of an RPD, as described in ISO 16975-1, a protection level is assigned to each PC, see Annex D.

6 Work rate

RPD shall be classified by work rate class.

The work rate is a measure of how hard a wearer is physically working expressed in the demand of breathable gas per time period. The work rate therefore can be expressed as the amount of breathable gas needed by the wearer for work, expressed in l/min of inhaled breathable gas.

The explanation of work rate and its associated class descriptions are given in ISO TS 16976-1.

Work rates in Table 4 and Figure A.1 are based on the mean work rates from ISO TS 16976-1, plus one standard error, for a 2,1m^2 body surface man. The numbers given in the work rate column of the classification scheme are in minute volume.

Four work rate classes are designated for RPD.

They are class:

— W4, which is equivalent to ISO TS 16976-1 work class 8 (maximal);

— W3, which encompasses ISO TS 16976-1 work classes 7 and 6 (extremely heavy and very-very heavy);

— W2 which encompasses ISO TS 16976-1 work classes 5 and 4 (very heavy and heavy); and

— W1, which encompasses ISO TS 16976-1 work classes 3, 2 and 1 (moderate and light).

RPD designated for special applications may have performance requirements with minimum work rates.

Table 4 — Work rate class

Work rate class	Work minute volume l/min
W4	Maximal 135
W3	Extremely heavy 105
	Very-very heavy 85
W2	Very heavy 65
	Heavy 50
W1	Moderate 35
	Light 20
Level for testing only	Resting 10

7 Respiratory interface class

Respiratory interfaces shall be classified by coverage area [see Figure E.1, a) to e)].

Respiratory interfaces shall be further classified by type: tight fitting; those that form a seal with the wearer's skin, and loose fitting, those that have a partial seal or no seal with the skin of the wearer, see Table 5 and Figure A.1.

Table 5 — Respiratory interface classes

RI Class	Coverage area	Type
eL	e - Body	L-Loose fitting
eT	e - Body	T-Tight fitting
dL	d - Head	L-Loose fitting
dT	d - Head	T-Tight fitting
cL	c - Face	L-Loose fitting
cT	c - Face	T-Tight fitting
bL	b - Nose and mouth	L-Loose fitting
bT	b - Nose and mouth	T-Tight fitting
aL	a - Mouth only	L-Loose fitting
aT	a - Mouth only	T-Tight fitting

8 Supplied breathable gas RPD capacity class

Supplied breathable gas RPD that have a fixed volume of breathable gas (self-contained) shall be classified by the volume of breathable gas available for respiration, and shall be designated by the letter "S" followed by