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Respiratory protective devices — Performance requirements —

Part 7: Special application marine, mining, welding, and abrasive blasting - Filtering RPD and supplied breathable gas RPD

Appareils de protection respiratoire — Exigences de performances — Partie 7: Applications particulières pour environnements marins, exploitation minière, soudage et projection d'abrasifs - APR filtrants et APR alimentés en gaz respirables.

Member bodies are requested to consult relevant national interests in ISO/TC 94/SC 14 before casting their ballot to the e-Balloting application.

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Foreword

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This document was prepared by Technical Committee ISO/TC 94, *Personal safety — Personal protective equipment*, Subcommittee SC 15, *Respiratory protective devices*.

A list of all parts in the ISO 17420 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document describes requirements for RPD used for special application other than fire services and escape and its elements and components.

Some test methods are described. For other test methods references are given to the ISO 16900 series standards of "Methods of test and test equipment" or other test methods not developed by ISO/TC 94/SC 15.

The sequence of testing follows the principle to minimize the necessary number of samples by carrying out destructive tests at the end. It also includes for safety reason that tests with test subjects are only carried out after the test samples have shown their safe performance in other tests.

Respiratory protective devices — Performance requirements —

Part 7:
Special application marine, mining, welding, and abrasive blasting - Filtering RPD and supplied breathable gas RPD

1 Scope

This document specifies the requirements for supplied breathable gas respiratory protective device (RPD) and filtering RPD to be used for special application marine, mining, welding and abrasive blasting for use in the workplace to protect the wearer.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 8031, *Rubber and plastics hoses and hose assemblies - Determination of electrical resistance and conductivity*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 13506-1, *Protective clothing against heat and flame — Part 1: Test method for complete garments — Measurement of transferred energy using an instrumented manikin*

ISO 16900-1:2019, *Respiratory protective devices — Methods of test and test equipment — Part 1: Determination of inward leakage*

ISO 16900-2, *Respiratory protective devices — Methods of test and test equipment — Part 2: Determination of breathing resistance*

ISO 16900-5, *Respiratory protective devices — Methods of test and test equipment — Part 5: Breathing machine, metabolic simulator, RPD headforms and torso, tools and verification tools*

ISO 16900-6, *Respiratory protective devices — Methods of test and test equipment — Part 6: Mechanical resistance/strength of components and connections*

ISO 16900-7, *Respiratory protective devices — Methods of test and test equipment — Part 7: Practical performance test methods*

ISO 16900-10, *Respiratory protective devices — Methods of test and test equipment — Part 10: Resistance to ignition, flame, radiant heat and heat*

ISO 16900-12, *Respiratory protective devices — Methods of test and test equipment — Part 12: Determination of volume-averaged work of breathing and peak respiratory pressures*

ISO 16900-14, *Respiratory protective devices — Methods of test and test equipment — Part 14: Measurement of sound level*

ISO 16972, *Respiratory protective devices — Terms, definitions, graphical symbols and units of measurement*

ISO/TS 16975-1:2016, *Respiratory protective devices — Selection, use and maintenance — Part 1: Establishing and implementing a respiratory protective device programme*

ISO 17420-1:—, *Respiratory protective devices — Performance requirements — Part 1: General*

ISO 17420-2:—, *Respiratory protective devices — Performance requirements — Part 2: Requirements for filtering RPD*

ISO 17420-4:—, *Respiratory protective devices — Performance requirements — Part 4: Requirements for supplied breathable gas RPD*

ISO 23269-2:2011, *Ships and marine technology. Breathing apparatus for ships. Self-contained breathing apparatus for shipboard firefighters*

IEC 60068-2-27:2010, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock*

IEC 60068-2-64:2009, *Environmental testing — Part 2-64: Tests — Test Fh: Vibration, broadband random and guidance*

IEC 60079-0, *Explosive atmospheres — Part 0: Equipment — General requirements*

IEC 60079-11, *Explosive atmospheres — Part 11: Equipment protection by intrinsic safety "i"*

IEC 60079-32-1:2013, *Explosive atmospheres — Part 32-1: Electrostatics hazards — Guidance*

IEC 60079-32-2:2015, *Explosive atmospheres — Part 32-2: Electrostatics hazards — Tests*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60721-1:1990, *Classification of environmental conditions — Part 1: Environmental parameters and their severities*

IEC 60721-3-2:2018, *Classification of environmental conditions — Part 3-2: Classification of groups of environmental parameters and their severities — Transportation and Handling*

IEC 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity standard for industrial environments*

ISO 6529:2013, *Protective clothing — Protection against chemicals — Determination of resistance of protective clothing materials to permeation by liquids and gases*

EN 50303, *Group 1, category M1 equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust*

ASTM D1003:2013, *Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics*

ASTM D6413, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*

NFPA 1981:2013, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
non pre-conditioned state
without pre-conditioning but possibly modified to carry out tests or already used in non-destructive tests

Note 1 to entry: This includes e.g. cleaning and disinfection.

3.2
RPD in as worn state
RPD where all components are connected and assembled in the way that it is intended to be used (e.g. to the wearer, RPD headform or RPD headform and torso or suitable holder)

Note 1 to entry: All of the various components [e.g. for an assisted filtering device: blower unit, battery, Respiratory Interface (RI), filters, etc.] have been completely assembled and then connected (RI connected to the hose of the blower unit) together in accordance with the information supplied by the manufacturer.

3.3
component in ready for assembly state
component with seals, plugs, packaging or other environmental protective means still in place

3.4
RPD in ready for use state
RPD ready to be donned as described by the manufacturer

Note 1 to entry: In line with the information supplied by the manufacturer for donning the RPD, further actions can be necessary.

Note 2 to entry: For escape devices this includes also the RPD in its carrying container unopened.

3.5
permeation
process by which a chemical moves through a given material on a molecular level

4 Classification overview

ISO 17420-2: —, Clause 4 or ISO 17420-4: —, Clause 4 applies.

4.1 General

ISO 17420-1:—, 4.1 applies.

The following subclauses apply in addition to ISO 17420-2:—, Clause 4:

4.2 Supplied breathable gas RPD

In addition, supplied breathable gas RPD may be classified for one or more special applications, as given in Table 1.

Table 1 — Special application classification supplied breathable gas RPD

Special application	Classes
Marine	MA2 (Marine firefighting) MA1 (Hazardous material)
Mining	MN3 (Mining firefighting and Rescue) MN2 (Underground mining explosive) MN1 (Underground mining non-explosive)
Abrasive blasting	AB
Welding	WE

Example for a special application supplied breathable gas RPD with protection class (PC5), work rate class (W3), RI class (*c*T), supplied breathable gas capacity class (S1800) and special application mining firefighting and rescue class (MN3)

Marking for the given example PC5 W3 *c*T S1800 MN3

4.3 Filtering RPD

In addition, filtering RPD may be classified for one or more special applications, as given in Table 2.

Table 2 — Special application classification of filtering RPD

Special application	Classes
Mining	MN2 (Underground mining explosive) MN1 (Underground mining non-explosive)
Abrasive blasting	AB
Welding	WE

Example for a special application filtering RPD with Protection class (PC3), work rate class (W2), RI class (bT), particle filter performance class (F3) and special application underground mining non-explosive class (MN1).

Marking for the given example PC3 W2 bT F3 MN1

Multi-functional filtering RPD have separate classifications for each function, i.e. one classification for the unassisted mode and one classification for the assisted mode.

5 General requirements for RPD

ISO 17420-1:—, Clause 5 and ISO 17420-2:—, Clause 5 or ISO 17420-1:—, Clause 5 and ISO 17420-4:—, Clause 5 apply.

6 Basic requirements for supplied breathable gas RPD or filtering RPD

All requirements of ISO 17420-2:—, Clause 6 or ISO 17420-4:—, Clause 6 apply unless superseded by this document and indicated in the relevant clauses.

7 Special application for supplied breathable RPD for gas marine, mining, welding, abrasive blasting and filtering RPD formining, welding, abrasive blasting

7.1 Special application marine – Requirement matrices

7.1.1 General

Supplied breathable gas RPD for marine, mining, welding, abrasive blasting shall each fulfil the requirements listed in their respective requirements Table 3 to Table 6.

Filtering RPD for mining, welding, abrasive blasting shall each fulfil the requirements listed in their respective requirements Table 7 to Table 9.

7.1.2 Supplied breathable gas RPD

7.1.2.1 Supplied breathable gas RPD – Marine

Table 3 gives an overview about requirements and preconditioning of special application supplied breathable gas RPD — Marine.

At least one RPD shall be tested after each required preconditioning. Pre-conditionings shall not be combined.

Table 3 shall be read as follows:

In the first column the requirements are listed. In the third and fourth column the required pre-conditioning for different marine classes are listed.

For each pre-conditioning within one line of the cell different sample(s) shall be used.

For the requirement 7.2.1.3 and class marine hazardous material (MA1) the following applies

At least one sample shall be preconditioned VS&IE (Exposure to vibration and shock – marine and intermittent exposure).

At least one further sample shall be preconditioned DR (Exposure to impact from drop).

Table 3 — Special application requirement overview – Supplied breathable gas RPD – Marine

Requirement	Title	Hazardous Materials MA1	Marine Fire-fighting MA2
		Protection class ≥PC5	Protection class ≥PC5
		Work rate class ≥W3	Work rate class ≥W3
		Pre-conditioning	
7.2.1.3	Temperature of operation – level 0	VS&IE	VS&IE
		DR	DR
7.2.1.5	Temperature of operation – level 1	—[a]	AR/NP
7.2.1.6	Temperature of operation – level 2	—[a]	AR/NP
7.2.1.7	Temperature of operation – level 3 and flammability	—[a]	AR/NP
7.2.7.1	Contact with hot and cold surfaces generated by the RPD	AR/NP	AR/NP
7.2.8	Avoidance of frictional sparks	AR/NP	AR/NP
7.2.2	Fabric material flame resistance performance	AR/NP	—[a]
7.2.3.2	Radiant heat – level 1	AR/NP	AR/NP
7.2.3.3	Radiant heat – level 2	—[a]	AR/NP
7.2.4	Resistance to hot particles	AR/NP	AR/NP
7.2.5.1	Chemical resistance – Supplied breathable gas RPD	AR/NP	AR/NP

[a] — means that a test is not required for this combination of requirement and special application class.

[b] X means exposure to dust has to be addressed by the FMEA (see 7.2.9.3).

AR/NP as received (or in non pre-conditioned state).

VS Exposure to vibration and shock – marine (7.3.2).

VS&IE Exposure to vibration and shock – marine (7.3.2) and enhanced resistance to corrosion- intermittent exposure (7.3.5).

DR Exposure to impact from drop (7.3.6).

Table 3 *(continued)*

Requirement	Title	Hazardous Materials MA1	Marine Fire-fighting MA2
		Protection class ≥PC5	Protection class ≥PC5
		Work rate class ≥W3	Work rate class ≥W3
		Pre-conditioning	
7.2.5.2	Chemical resistance –Hazardous Materials	AR/NP	—[a]
7.2.6	Visor after chemical exposure	AR/NP	AR/NP
7.2.9.1	Connections	AR/NP	AR/NP
7.2.9.2	Abrasion resistance of visor	—[a]	AR/NP
7.2.9.3	Exposure to dust	X[b]	X[b]
7.2.12.2	Intrinsic safety and electromagnetic compatibility - General	AR/NP	AR/NP
7.2.12.4	Intrinsic safety and electromagnetic compatibility - Marine	AR/NP	AR/NP
7.2.13.1	Antistatic properties – General	AR/NP	AR/NP
7.2.13.3	Antistatic properties – Exposed RPD hoses	AR/NP	AR/NP
7.2.11.1	Practical performance - Passing through a square hatchway	AR/NP	AR/NP
7.2.11.2	Practical performance - Removing the RPD from the position as donned	AR/NP	AR/NP
7.2.11.5	Eye irritation (external)	AR/NP	AR/NP
7.2.11.6	Operation during submersion	AR/NP	AR/NP
7.2.11.8	Communication performance	AR/NP	AR/NP
7.2.10	Requirements for audible warning devices	VS&IE	VS&IE

[a] — means that a test is not required for this combination of requirement and special application class.

[b] X means exposure to dust has to be addressed by the FMEA (see 7.2.9.3).

AR/NP as received (or in non pre-conditioned state).

VS Exposure to vibration and shock – marine (7.3.2).

VS&IE Exposure to vibration and shock – marine (7.3.2) and enhanced resistance to corrosion- intermittent exposure (7.3.5).

DR Exposure to impact from drop (7.3.6).

7.1.2.2 Supplied breathable gas RPD – Mining

Table 4 gives an overview about requirements and preconditioning of special application supplied breathable gas RPD – Mining.

At least one RPD shall be tested after each required preconditioning. Pre-conditionings shall not be combined.

Table 4 shall be read as follows:

In the first column the requirements are listed. In the third to sixth column in Table 4 the required pre-conditioning for different mining classes are listed.

For each pre-conditioning within one line of the cell different sample(s) shall be used.

For the requirement 7.2.1.3 and class mining non-explosive atmosphere (MN1) the following applies