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Australian/New Zealand Standard™

Respiratory protective devices — Methods of test and test equipment

Method 12: Determination of volume-averaged work of breathing and peak respiratory pressures



AS/NZS ISO 16900.12:2021

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- Australian Industry Group
- Australian Institute of Health & Safety
- Australian Institute of Occupational Hygienists
- Australian Institute of Petroleum
- Better Regulation Division (Fair Trading, Safework NSW, TestSafe)
- CSIRO
- Composites Australia
- Joint Accreditation System of Australia & New Zealand
- National Measurement Institute
- New Zealand Occupational Hygiene Society
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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee SF-010, Occupational Respiratory Protection.

The objective of this document is to specify the test methods for determining the volume-averaged work of breathing and peak respiratory pressures imposed by the respiratory protective device (RPD).

Elastic work, elastic physiological effects, and information on physiological effects of work of breathing (WOB) are specified in AS ISO 16900.4 and are not included in this test method.

This document is identical with, and has been reproduced from, ISO 16900-12:2016, *Respiratory protective devices — Methods of test and test equipment — Part 12: Determination of volume-averaged work of breathing and peak respiratory pressures*.

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The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

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

ISO 16900 consists of the following parts, under the general title *Respiratory protective devices — Methods of test and test equipment*:

- *Part 1: Determination of inward leakage*
- *Part 2: Determination of breathing resistance*
- *Part 3: Determination of particle filter penetration*
- *Part 4: Determination of gas filter capacity and migration, desorption and carbon monoxide dynamic testing*
- *Part 5: Breathing machine, metabolic simulator, RPD headforms and torso, tools and verification tools*
- *Part 6: Mechanical resistance/strength of components and connections*
- *Part 7: Practical performance test method*
- *Part 8: Measurement of RPD air flow rates of assisted filtering RPD*
- *Part 9: Determination of carbon dioxide content of the inhaled gas*
- *Part 10: Resistance to ignition, flame, radiant heat and heat*
- *Part 11: Determination of field of vision*
- *Part 12: Determination of volume-averaged work of breathing and peak respiratory pressures*
- *Part 13: RPD using regenerated breathable gas and special application mining escape RPD: Consolidated test for gas concentration, temperature, humidity, work of breathing, breathing resistance, elastance and duration*

— *Part 14: Measurement of sound level*

Introduction

This part of ISO 16900 is intended as a supplement to the respiratory protective devices (RPD) performance standard. Test methods are specified for complete devices or parts of devices that are intended to comply with the performance standards. If deviations from the test method given in this part of ISO 16900 are necessary, these deviations will be specified in the performance standards.

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.”

Australian/New Zealand Standard

Respiratory protective devices — Methods of test and test equipment

Method 12: Determination of volume-averaged work of breathing and peak respiratory pressures

1 Scope

This part of ISO 16900 specifies the test methods for determining the volume-averaged work of breathing and peak respiratory pressures imposed by the respiratory protective device (RPD).

Elastic work, elastic physiological effects, and information on physiological effects of work of breathing (WOB) are specified in ISO 16976-4 and are not included in this test method.

2 Normative references

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

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

ISO 16900-5,¹⁾ *Respiratory protective devices — Methods of test and test equipment — Part 5: Breathing machine, metabolic simulator, RPD headforms and torso, tools and verification tools*

3 Terms and definitions

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

3.1

breathing frequency

number of breaths taken in a minute

Note 1 to entry: Expressed in breaths per minute.

3.2

elastance

E

pressure change resulting from a volume change

Note 1 to entry: Expressed in kPa/l.

3.3

tidal volume

V_T

size of a breath

Note 1 to entry: Expressed in litres.

3.4

volume-averaged pressure

WOB/V_T

work for a breath divided by its *tidal volume* (3.3)

Note 1 to entry: Expressed in kPa.

1) To be published.