

This is a preview of "ISO 16900-1:2019". [Click here to purchase the full version from the ANSI store.](#)

Second edition  
2019-08

---

---

# Respiratory protective devices — Methods of test and test equipment —

## Part 1: Determination of inward leakage

*Appareils de protection respiratoire — Méthodes d'essai et  
équipement d'essai —*

*Partie 1: Détermination des fuites vers l'intérieur*



Reference number  
ISO 16900-1:2019(E)

© ISO 2019



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

This is a preview of "ISO 16900-1:2019". Click here to purchase the full version from the ANSI store.

## Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Prerequisites</b> .....	<b>2</b>
<b>5 General test requirements</b> .....	<b>2</b>
<b>6 Principle</b> .....	<b>2</b>
6.1 General.....	2
6.2 Choice of test agent.....	2
<b>7 Human test panel</b> .....	<b>4</b>
7.1 General.....	4
7.2 Test panel.....	5
<b>8 Test agents</b> .....	<b>5</b>
<b>9 Apparatus</b> .....	<b>6</b>
<b>10 RPD preparation</b> .....	<b>6</b>
10.1 General.....	6
10.2 Sample tubes and probe.....	7
10.3 Sample flow rates.....	11
10.4 Filtering RPD preparation.....	11
10.4.1 Unassisted filtering RPD with a connector in accordance with ISO 17420-3.....	11
10.4.2 Unassisted filtering RPD fitted with particle filters or combination filters.....	11
10.4.3 Unassisted filtering RPD with gas/vapour or combination filters.....	11
10.4.4 Assisted filtering RPD with particle filter(s) or combination filter(s).....	12
10.4.5 Assisted filtering RPD with gas/vapour or combination filter(s).....	12
10.5 Supplied breathable gas devices.....	12
10.6 Supplied breathable gas devices incorporating additional filtration facility (combined RPD).....	13
<b>11 Test methods</b> .....	<b>13</b>
11.1 General.....	13
11.2 Test method 1: Sulfur hexafluoride (SF <sub>6</sub> ).....	14
11.2.1 Test equipment.....	14
11.2.2 Calculation of leakage.....	17
11.3 Test method 2: Sodium chloride (NaCl).....	17
11.3.1 Test equipment.....	17
11.3.2 Pulsed sampling — Method 2A.....	22
11.3.3 Continuous sampling — Method 2B.....	24
11.4 Test method 3: Corn oil aerosol.....	24
11.4.1 Test equipment.....	24
11.5 Determination of inward leakage in the ocular zone.....	26
<b>12 Test report</b> .....	<b>26</b>
<b>13 Uncertainty of measurement</b> .....	<b>27</b>
<b>Annex A (normative) Application of uncertainty of measurement — Determination of compliance</b> .....	<b>28</b>
<b>Annex B (normative) Test exercise regime</b> .....	<b>30</b>
<b>Annex C (informative) Material porosity test</b> .....	<b>34</b>
<b>Annex D (informative) Preparation and use of bivariate test panel</b> .....	<b>36</b>

This is a preview of "ISO 16900-1:2019". [Click here to purchase the full version from the ANSI store.](#)

**Bibliography** .....37

This is a preview of "ISO 16900-1:2019". [Click here to purchase the full version from the ANSI store.](#)

## 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](http://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](http://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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 16900-1:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the criteria for selection of test panels has been changed from the principal components analysis (PCA) method to the bivariate grid method. References to the PCA method in other clauses have been modified as necessary;
- a new clause has been added to address measurement of inward leakage in the ocular zone;
- a figure has been added to illustrate the pulsed sampling system;
- the conditions for use of a condensation particle counter have been modified;
- [Annex D](#) has been re-written to reflect changes to the criteria for selection of test panels.

NOTE The list above is not intended as a complete list of all changes.

A list of all parts in the ISO 16900 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](http://www.iso.org/members.html).

This is a preview of "ISO 16900-1:2019". [Click here to purchase the full version from the ANSI store.](#)

## **Introduction**

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