

Australian/New Zealand Standard™

**Electrical equipment for detection of
oxygen and other gases and vapours at
toxic levels—General requirements and
test methods**



AS/NZS 4641:2018

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-023, Electrical equipment in mines and quarries. It was approved on behalf of the Council of Standards Australia on 8 May 2018 and by the New Zealand Standards Approval Board on 6 June 2018.
This Standard was published on 29 June 2018.

The following are represented on Committee EL-023:

Australian Cablemakers Association
Australian Chamber of Commerce and Industry
Australian Industry Group
Aviation and Marine Engineers Association
Construction, Forestry, Maritime, Mining and Energy Union
Department of Mines, Industry Regulation and Safety (WA)
Department of Natural Resources, Mines and Energy (Qld)
Engineers Australia
National Association of Testing Authorities, Australia
NSW Department of Industry, Skills and Regional Infrastructure Development
SafeWork NSW
University of Newcastle
WorkSafe New Zealand

Keeping Standards up-to-date

Standards are living documents, which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com or Standards New Zealand web site at www.standards.govt.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of Standards Australia or the New Zealand Standards Executive at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS 4641:2016.

Australian/New Zealand Standard™

Electrical equipment for detection of oxygen and other gases and vapours at toxic levels—General requirements and test methods

Original was AS/NZS 4641:2007.
Second edition 2018.

COPYRIGHT

© Standards Australia Limited

© The Crown in right of New Zealand, administered by the New Zealand Standards Executive

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 1473, Wellington 6140.

ISBN 978 1 76072 132 9

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-023, Electrical equipment in mines and quarries, to supersede AS/NZS 4641:2007.

The objective of this Standard is to provide general requirements and test methods for manufacturers, testing authorities and certifying bodies concerned with electrical equipment for the measurement of the concentration of oxygen and toxic levels of gases and vapours.

The principal differences between this edition and the 2007 edition are as follows:

- (a) The nomenclature 'equipment' has replaced 'apparatus' but with the same meaning.
- (b) Requirements have been revised to enhance consistency with the principles of IEC 60079.29.1:2016.
- (c) The requirements for vibration testing have been expanded to discriminate between portable and machine-mounted equipment, and fixed and transportable equipment.
- (d) Requirements for software documentation have been simplified.
- (e) The requirements for fast transient testing have been relaxed for equipment intended for exclusive use in intrinsically safe applications.
- (f) Requirements for testing for electromagnetic immunity have been revised to enable testing for specific applications.
- (g) Appendix A has been added to describe tests to be completed on software/firmware revision.

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	5
1.2 REFERENCED DOCUMENTS.....	5
1.3 DEFINITIONS.....	6
SECTION 2 GENERAL REQUIREMENTS	
2.1 INTRODUCTION	1
2.2 CONSTRUCTION.....	1
2.3 LABELLING AND MARKING	15
2.4 INSTRUCTION MANUAL.....	16
SECTION 3 GENERAL TESTING REQUIREMENTS	
3.1 GENERAL.....	18
3.2 UNPOWERED STORAGE.....	18
3.3 STANDARD TEST GAS.....	18
3.4 FLOW RATE FOR TEST GASES.....	19
3.5 STANDARD LABORATORY CONDITIONS	20
3.6 INITIAL CALIBRATION	20
3.7 MULTIPLE RANGE EQUIPMENT.....	20
3.8 EQUIPMENT RESPONSE PRIOR TO TEST.....	20
SECTION 4 PERFORMANCE TESTS FOR TOXIC GAS MONITORS	
4.1 LINEARITY TEST.....	21
4.2 SHORT-TERM STABILITY.....	21
4.3 LONG-TERM STABILITY.....	21
4.4 ALARMS.....	22
4.5 TEMPERATURE VARIATION TEST.....	23
4.6 PRESSURE VARIATION.....	23
4.7 PRESSURE RECOVERY.....	23
4.8 HUMIDITY	24
4.9 AIR VELOCITY.....	24
4.10 FLOW RATE.....	24
4.11 ORIENTATION.....	25
4.12 VIBRATION.....	25
4.13 DROP TEST.....	26
4.14 WARM-UP TIME.....	26
4.15 TIME OF RESPONSE.....	27
4.16 NON-AMBIGUITY TEST.....	27
4.17 RESIDUAL EFFECT TEST	28
4.18 BATTERY CAPACITY	28
4.19 POWER SUPPLY VARIATION TEST	28
4.20 POWER SUPPLY INTERRUPTIONS	29
4.21 ADDITION OF SAMPLING PROBE.....	29
4.22 EFFECT OF OTHER GASES/CROSS-SENSITIVITY	30
4.23 ELECTROMAGNETIC IMMUNITY.....	32

SECTION 5 PERFORMANCE TESTS FOR OXYGEN MONITORS

5.1	LINEARITY TEST	34
5.2	SHORT-TERM STABILITY	34
5.3	LONG-TERM STABILITY	34
5.4	ALARMS	35
5.5	TEMPERATURE VARIATION TEST	36
5.6	PRESSURE VARIATION	36
5.7	PRESSURE RECOVERY	37
5.8	HUMIDITY	37
5.9	AIR VELOCITY	37
5.10	FLOW RATE	38
5.11	ORIENTATION	38
5.12	VIBRATION	38
5.13	DROP TEST	39
5.14	WARM-UP TIME	40
5.15	TIME OF RESPONSE	40
5.16	NON-AMBIGUITY TEST	40
5.17	RESIDUAL EFFECT TEST	40
5.18	BATTERY CAPACITY	41
5.19	POWER SUPPLY VARIATION TEST	41
5.20	POWER SUPPLY INTERRUPTIONS	41
5.21	ADDITION OF SAMPLING PROBE	42
5.22	EFFECT OF OTHER GASES/CROSS-SENSITIVITY	42
5.23	ELECTROMAGNETIC IMMUNITY	43

SECTION 6	FIELD CALIBRATION KIT	44
-----------	-----------------------------	----

APPENDIX

A	SUGGESTED TESTING CRITERIA FOR EQUIPMENT SUBJECTED TO SOFTWARE/FIRMWARE REVISION	45
---	--	----

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Electrical equipment for detection of oxygen and other gases and vapours at toxic levels—General requirements and test methods**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard applies to gas detection equipment, including explosion-protected gas detection equipment, used to measure the concentration of oxygen and toxic levels of gases and vapours. This Standard also applies to those parts of multi-gas detection equipment which are used to measure the concentration of oxygen and toxic levels of gases and vapours.

This Standard does not apply to gas detection equipment, or those parts of multi-gas detection equipment, used to detect flammable gases and vapours below, within and above their flammability limits. Such equipment is covered by AS/NZS 60079.29.1.

NOTE: Equipment that is within the scope of this Standard and AS/NZS 60079.29.1 may be assessed and tested to both Standards.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

60079 Explosive atmospheres

60079.0 Part 0: Equipment—General requirements

60079.20.1 Part 20.1: Material characteristics for gas and vapour classification—Test methods and classification

60079.29.1 Part 29.1: Gas detection—Performance requirements of detectors for flammable gases

61000 Electromagnetic compatibility (EMC)

61000.4.1 Part 4.1: Testing and measurement techniques—Overview of IEC 61000-4 series

61000.4.3 Part 4.3: Testing and measurement techniques—Radiated radio frequency electromagnetic field immunity test

61000.4.4 Part 4.4: Testing and measurement techniques—Electrical fast transient/burst immunity test

Australian Safety and Compensation Council*

Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003 (1995)]

Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:3008 (1995)]

Occupational Safety and Health Service Department of Labour, New Zealand
Workplace Exposure Standards†

* Refer to <http://www.safeworkaustralia.gov.au>.

† Refer to <http://www.business.govt.nz/worksafe>.