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ISO 10882-2:2000

AS 3853.2—2006

Australian Standard®

# Health and safety in welding and allied processes—Sampling of airborne particles and gases in the operator's breathing zone

## Part 2: Sampling of gases

This Australian Standard® was prepared by Committee CH-031, Methods for Examination of Workplace Atmosphere. It was approved on behalf of the Council of Standards Australia on 19 September 2006.
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The following are represented on Committee CH-031:

- Australian Aluminium Council
- Australian Chamber of Commerce and Industry
- Australian Institute of Occupational Hygienists
- Australian Mines and Metals Associations (Incorporated)
- Bureau of Steel Manufacturers of Australia
- Clean Air Society of Australia & New Zealand
- Coal Services
- Commonwealth Department of Health and Ageing
- Department of Administrative and Information Services, SA
- Department of Consumer and Employments Protection Worksafe Division WA
- Department of Mineral Resources, NSW
- National Association of Testing Authorities Australia
- WorkCover New South Wales

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Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through public comment period.

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Australian Standard®

# Health and safety in welding and allied processes—Sampling of airborne particles and gases in the operator's breathing zone

## Part 2: Sampling of gases

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# PREFACE

This Standard was prepared by the Standards Australia Committee CH-031, Methods for Examination of Workplace Atmospheres to supersede AS 3853.2—1991, *Fume from welding and allied processes*, Part 2: *Guide to methods for the sampling and analysis of gases*.

This Standard is identical with and has been reproduced from ISO 10882-2:2000, *Health and safety in welding and allied processes—Sampling of airborne particles and gases in the operator's breathing zone*, Part 2: *Sampling of gases*.

The objective of this Standard is to provide a method for the determination of personal exposure to welding gases as well as and provide information about the use of chemical analysis to determine personal exposure to specific gases in welding fume.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number appears on the cover and title page while the International Standard number appears only on the cover.

(b) In the source text, 'this part of EN ISO 10882' and 'this European Standard' should read 'this Australian Standard'.

(c) A full point should be substituted for a comma when referring to a decimal marker.

This Standard is Part 2 of the following series:

AS
3853 Health and safety in welding and allied processes—Sampling of airborne particles and gases in the operator's breathing zone
3853.1 Part 1: Sampling of airborne particles
3853.2 Part 2: Sampling of gases (this Standard)

References to international Standards should be replaced by Australian Standards or other publications, as follow:

| *Reference to International Standard* | | *Australian Standard* | |
|---|---|---|---|
| ISO | | | |
| 3534 | Statistics—Vocabulary and symbols | — | See Note 1 |
| 3534-1 | Part 1: Probability and general statistical terms | | |
| 6879 | Air quality—Performance characteristics and related concepts for air quality measuring method | — | See Note 2 |
| EN ISO | | AS | |
| 4063 | Welding and allied processes—Nomenclature of processes and reference numbers | 2812 | Welding, brazing and cutting of metals—Glossary of terms |
| EN | | AS/NZS | |
| 175 | Personal protection—Equipment for eye and face protection during welding and allied processes | 1337 | Eye protectors for industrial applications |
| | | 1338 | Filters for eye protectors—Filters for protection against radiation generated in welding and allied operations |

| EN | | NOHSC | |
|---|---|---|---|
| 482 | Workplace atmospheres—General requirements for the performance of procedures for the measurement of chemical agents | 1003 (1995) | Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment and subsequent updates (See Note 3) |
| 689 | Workplace atmospheres—Guidance for the assessment of exposure by inhalation to chemical agents or comparison with limit values and measurement strategy | 3008 (1995) | Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment and subsequent updates (See Note 3) |
| 1540 | Workplace atmospheres Terminology | 1003 (1995) | Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment and subsequent updates (See Note 3) |
| 838 | Workplace atmospheres—Requirements and test methods for diffusive samplers for the determination of gases and vapours. | — | See Note 4 |
| 1231 | Workplace atmospheres—Short term detector tube measurement systems—Requirements and test methods. | — | See Note 5 |
| 1232 | Workplace atmospheres—Pumps for personal sampling of chemical agents Requirements and methods | — | See Note 6 |

NOTES:

1 ISO 3534 contains the definition of 'true value' that is reproduced as definition 3.24 in this Standard.

2 ISO 6879 contains terms and definitions of performance characteristics related to air quality measuring methods. It does not include specific methods for determining air quality or obtaining representative samples.

3 Subsequent updates to NOHSC 1003(1995), NOHSC 3008 and all NOHSC exposure standards can be found in the Hazardous Substances Information System (HSIS) at http://www.nohsc.gov.au/applications/hsis/

4 Practical guidance on sampling is given in the Health and Safety Executive (UK), *Monitoring Strategies for Toxic Substances, Environmental Hygiene 42,* HMSO, January 1989 and National Institute for Occupational Safety and Health, (USA), *Occupational Exposure and Sampling Strategy Manual*, DHEW (NIOSH), pub.no.77-173, 1977. A method for using diffusive samplers is given in AS 2986.2—2003, *Workplace air quality—Sampling and analysis of volatile organic compounds by solvent desorption/gas chromatography*, Part 2: *Diffusive Sampling Method* which is identical to ISO 16200-2:2000, *Workplace air quality—Sampling and analysis of volatile organic compounds by solvent desorption/gas chromatography*, Part 2: *Diffusive sampling method.*

5 Detector tubes sold in Australia may claim compliance with this EN Standard.

6 Pumps sold in Australian may claim compliance with this EN Standard.

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

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# INTRODUCTION

Gases encountered during welding and allied processes are so numerous that it would be impracticable to cover them all in this European Standard. Depending on the process, they can include:

a) fuel gases which are used in gas welding and cutting which on combustion produce carbon dioxide and in some instances carbon monoxide;

b) shielding gases such as argon, helium, carbon dioxide or mixtures of these gases, which can be toxic or asphyxiant;

c) gases produced by the action of heat upon the welding flux or slag, e.g. carbon dioxide and carbon monoxide;

d) gases produced by the action of heat or ultraviolet radiation upon the atmosphere surrounding the welding arc, e.g. nitric oxide, nitrogen dioxide and ozone; and

e) vapours produced as a result of thermal degradation of surface coatings in the welding or cutting of metals treated with paint, primer, sealer or other substances. Vapours can also be produced as a result of degradation of solvent vapour from degreasing operations, but their measurement is not dealt with in this standard because good working practices will avoid their production.

The scope of this part of EN ISO 10882 has been limited to those gases which are produced by welding operations. In particular, fuel, oxidant and shielding gases used in welding and allied processes are not covered, since the hazards associated with their use (e.g. asphyxiation, explosion) are different from those arising from the gases dealt with in this guide.

This part of EN ISO 10882 gives a generalised description of measurement methods suitable for the assessment of personal exposure to gases produced by welding and allied processes; gives details of relevant European Standards which specify required characteristics, performance requirements and test methods; augments guidance provided in EN 689 on assessment strategy and measurement strategy; lists basic sampling requirements; and provides specific information about the availability of direct reading electrical apparatus, detector tubes and indirect methods involving laboratory analysis for individual gases.

It has been assumed in the drafting of this standard that the execution of its provisions, and the interpretation of the results obtained, is entrusted to appropriately qualified and experienced people.

NOTES

AUSTRALIAN STANDARD

# Health and safety in welding and allied processes—Sampling of airborne particles and gases in the operator's breathing zone

## Part 2: Sampling of gases

### 1 Scope

This part of EN ISO 10882 provides guidance for the determination of personal exposure to gases and vapours in welding and allied processes. It applies to the following thermal processes used to join, cut, surface or remove metals:

(111) Manual metal arc welding (metal arc welding with covered electrode); shielded metal arc welding /USA/

(114) Self-shielded tubular-cored arc welding

(131) Metal inert gas welding; MIG welding; gas metal arc welding /USA/

(135) Metal active gas welding; MAG welding; gas metal arc welding /USA/

(136) Tubular-cored metal arc welding with active gas shield; flux cored arc welding /USA/

(137) Tubular-cored metal arc welding with inert gas shield; flux cored arc welding /USA/

(141) Tungsten inert gas arc welding; TIG welding; gas tungsten arc welding /USA/

(15) Plasma arc welding;

(31) Oxy-fuel gas welding; oxy-fuel gas welding /USA/

(52) Laser beam welding;

(912) Flame brazing; torch brazing /USA/

(97) Braze welding;

— arc and flame gouging;

— arc and laser cutting processes;

— flame, plasma and laser and plasma cutting processes;

— metal-spraying (see EN ISO 4063).

The following gases and vapours which can be produced or be present during welding and allied processes are covered:

— ozone ($O_3$);

— carbon monoxide (CO);

— carbon dioxide ($CO_2$);

— nitric oxide (NO) and nitrogen dioxide ($NO_2$);

— vapours produced in the welding or cutting of metals having paint or other surface coatings.

Fuel, oxidant and shielding gases used in welding and allied processes are not covered.

The general background level of gases and vapours in the workplace atmosphere influences personal exposure, and therefore the role of fixed point measurements is also considered.