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MEDICAL GASES—PURITY OF COMPRESSED MEDICAL BREATHING AIR

STANDARDS ASSOCIATION OF AUSTRALIA
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The following interests are represented on Committee MD/4:

Association of Consulting Engineers Australia
Australian Society of Anaesthetists
Building Management Authority, WA
Commonwealth Department of Health
Confederation of Australian Industry
Department of Health, New South Wales
Institute of Hospital Engineering Australia
Metal Trades Industry Association of Australia
Public Works Department, New South Wales
Royal Australasian College of Surgeons
South Australian Department of Housing & Construction
South Australian Health Commission

AUSTRALIAN STANDARD

MEDICAL GASES— PURITY OF COMPRESSED MEDICAL BREATHING AIR

AS 2568—1987

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PREFACE

This edition of this standard was prepared by the Association's Committee on Medical Gases and Pipeline Services under the direction of the Medical Materials and Equipment Standards Board.

This standard differs from the 1982 edition in that it clarifies the application of this standard by reserving it for medical breathing air supplied by pipelines.

Air from cylinders is excluded as it is impractical to individually test cylinders for general use, and the quality of air delivered depends not only on the quality of the filling air but also on meticulous cleaning and maintenance of the cylinders which are not dealt with in this standard.

The standard specifies the levels of purity of compressed breathing air supplied from compressors for medical use. The maximum allowable concentration of contaminants is related to the end use of the compressed breathing air. The health and safety of the user may be safeguarded in certain environments by reducing the concentration of a contaminant in the respirable air and so preventing physiological or toxic effects upon the user, or preventing malfunction of equipment.

To assist in achieving the specified purity, consideration must be given to the siting of the air intake of compressors with regard to various possible sources of contamination, e.g. boilers, laundries, refrigeration systems, gas cylinders and other storage areas and to main roads.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

MEDICAL GASES—PURITY OF COMPRESSED MEDICAL BREATHING AIR

1 SCOPE. This standard specifies requirements for compressed medical breathing air supplied by a pipeline directly from an air compressor(s). The standard does not apply to medical breathing air supplied from cylinders, compressed air for laboratory use, driving of suction venturis, process control, surgical tools for dental purposes and other purposes not involving respiration.

2 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 2896 Medical Gas Systems—Installation and Testing of Non-flammable Medical Gas Pipeline Systems

BS 1701 Air Filters for Air Supply to Internal Combustion Engines and Compressors other than for Aircraft.

3 DEFINITIONS. For the purpose of this standard the following definitions apply:

3.1 Medical breathing air—normal air of the lower atmosphere entering a medical breathing air system.

NOTE: Air from the lower atmosphere and compressed air processed from it may be expected to contain certain natural constituents in a reasonably constant concentration, as shown in Table 1.

3.2 Contaminant—material not usually present in normal air of the lower atmosphere, such as scale or oil; or a material that, though often found in normal air of the lower atmosphere, has known toxic properties, e.g. carbon monoxide or a material that, though usually present in air of the lower atmosphere and not toxic, may interfere with the operation of breathing apparatus; or any material listed in Table 1, but exceeding the limits laid down in this standard; or any material not listed in Table 1.

3.3 Threshold limit value—time weighted average (TLV-TWA)—the time-weighted average concentration for normal 8-h workday or 40-h work-week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

3.4 Source—includes the compressor(s) and all subsequent air-processing devices used to achieve the specified level of purity.

4 PURITY OF AIR.

4.1 Composition of ambient air at sea level. The composition of normal atmospheric air at sea level is shown in Table 1.

4.2 Medical breathing air. The maximum allowable concentration of gaseous trace constituents which are regarded as contaminants of air for medical breathing purposes shall be as shown in Table 2. The limit for nitrogen shall be 77 percent to 79 percent by volume, and the limit for oxygen shall be 20 percent to 22 percent by volume.

TABLE 1

NORMAL COMPOSITION OF ATMOSPHERIC AIR
(Exclusive of water vapour)

Gas component	Contents	
	percent V/V	mL/m³
N_2	78.084	
O_2	20.946	
CO_2	0.033	330
Ar	0.934	
Ne		18.18
He		5.24
Kr		1.14
Xe		0.087
H_2		0.5
CH_4		2
N_2O		0.5

TABLE 2

MAXIMUM ALLOWABLE CONCENTRATION OF CONTAMINANTS
(By volume, expressed at 20°C and 101.325 kPa)

Contaminants	Limit
Carbon dioxide	500 mL/m³
Carbon monoxide	5 mL/m³ (See Note 1)
Total volatile non-substituted hydrocarbons as methane equivalents	25 mL/m³
Nitrogen dioxide	0.5 mL/m³
Nitrous oxide	5 mL/m³
Fluorides (as dissociated fluoride ion) (See Note 4)	1 mg/m³
Halogenated hydrocarbons (refrigerant type) (See Note 4)	2 mL/m³
Halogenated hydrocarbons (solvent type)	0.2 mL/m³
Sulphur dioxide	1 mL/m³
Other components identified by dispersive infrared spectroscopy	1/10 TLV
Water vapour	Dewpoint to be less than the minimum recorded ambient temperature or a maximum of 2°C whichever is drier, at pipeline pressure
Particulate matter	See Note 2
Odour	See Note 3
Condensed hydrocarbons	Not detectable

NOTES:

1. To facilitate compliance with the requirements for carbon monoxide, it is critical that careful consideration be given to siting the inlet to the compressor and the design of associated equipment.
2. Air inlet filters are necessary to remove particulate matter. The filters provided must comply with BS 1701 as specified in AS 2896.
3. Specific measurement of odour in air is impracticable. The presence of any odour should render the air unsatisfactory for breathing.
4. Test only for halogenated hydrocarbons (refrigerant type) and fluorides if their presence is suspected.