

BS EN 1089-3:2011



BSI Standards Publication

**Transportable gas cylinders
— Gas cylinder identification
(excluding LPG)**
Part 3: Colour coding

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EUROPEAN STANDARD

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Bouteilles à gaz transportables - Identification de la
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Ortsbewegliche Gasflaschen - Gasflaschen-Kennzeichnung
(ausgenommen Flüssiggas (LPG)) - Teil 3: Farbcodierung

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Foreword

This document (EN 1089-3:2011) has been prepared by Technical Committee CEN/TC 23 "Transportable gas cylinders", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2012, and conflicting national standards shall be withdrawn at the latest by January 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1089-3:2004.

This document has been technically revised by the following:

- a) the white colouration of gas cylinder body dedicated for medical use;
- b) the new specific colour dedicated to nitric oxide/ nitrogen for medical use;
- c) the introduction of definitions (gas for medical use, breathing gas, industrial gas);
- d) the application of bright green colouration for inert gas mixtures N₂ or He with O₂ less than 20 % (exception for the two specific colours);
- e) the restriction of configuration of two colours on shoulder as quadrants to air (medical use or for breathing use);
- f) a guidance for the selection of shoulder with typical examples of assignment of colour.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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Introduction

The labelling of gas cylinders as required by the RID/ADR- Regulations is the primary method of indicating dangers of cylinder contents. However, colour coding is used to identify the contents of gas cylinders from a distance, e.g. in case of a fire. It is recognized that other systems are in use and may be used in conjunction with the requirements of this European Standard.

This European standard, along with EN ISO 13769, EN ISO 21007-1 and EN ISO 21007-2 belongs to a series of European Standards specifying gas cylinder identification requirements.

NOTE Labelling and marking of gas cylinders is subject to provisions of RID/ADR which take precedence over marking clauses in this standard.

1 Scope

This European Standard specifies a colour coding system for the secondary method of identification of the contents of gas cylinders for industrial gases, breathing gas application and gases for medical use with particular reference to the properties of the gas or gas mixture.

This European Standard does not apply to cylinders containing liquefied petroleum gas (LPG), to refrigerant gases, to portable fire extinguishers or stationary cylinder extinguishing. Bundle colour coding is not addressed by this or other standards.

NOTE LPG includes substances carried under the UN number 1965 "Hydrocarbon gas mixture, liquefied, N.O.S."

2 Normative references

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

EN ISO 10156, *Gases and gas mixtures — Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets (ISO 10156:2010)*

ISO 5145, *Cylinder valve outlets for gases and gas mixtures — Selection and dimensioning*

ISO 10298, *Determination of toxicity of a gas or gas mixture*

ISO 13338, *Determination of tissue corrosiveness of a gas or gas mixture*

European pharmacopoeia, monograph 1684

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

gas for medical use

any gas or mixture of gases intended to be administered to patients for therapeutic, diagnostic or prophylactic purposes, with or without pharmacological action, or to be used for surgical tools, and it covers both medicinal and medical gases (see ISO 5145)

3.2

inert gas

non-toxic, non-corrosive, non-flammable and non-oxidizing gas or gas mixture

3.3

synthetic air

for medical use to refer to pharmacopoeia, monograph 1684, and for other use mixtures containing 20 % to 23,5 % oxygen in nitrogen to be considered

3.4

industrial gas

gas or gas mixtures not covered by 3.1 and not used for breathing gas use

3.5

breathing gas

gas filled in cylinders for breathing and diving application, excluding gas for medical use

3.6

body

cylindrical part of a gas cylinder

4 Symbols and abbreviations

For the purposes of this document, the following symbols apply.

4.1

N.O.S.

not otherwise specified

5 Principle

Colour coding is used to give information about the contents of gas cylinders from a distance e.g. in case of emergency and to distinguish between cylinders used for industrial and medical uses.

For all applications, hazard/identification colours shall be applied to cylinder shoulders.

For gases for medical use, the body of the cylinder shall also be colour coded (see 6.3).

For applications other than medical, the cylinder body may be coloured. The use of a colour for the cylinder body that allows misinterpretation of the hazard of the gas is not allowed.

Colours used shall be in accordance with RAL register 840HR given in Annex A or equivalent.

6 Colour coding system

6.1 General

The following colour coding requirements are applicable to the shoulder and the body of the cylinder.

6.2 Shoulder

6.2.1 General

Gas cylinders are assigned colours using three methods. Colours are chosen based on the properties of the contents in accordance with the hazard of the gas filled in the cylinder (6.2.2). Some specific gases and gas mixtures are assigned colours relevant to that gas or gas mixture as noted in 6.2.3 and 6.2.6. Instead of the hazard colour, other colour(s) may be assigned based on the components of a gas mixture (6.2.3 or 6.2.4 or 6.2.5).

Annex D gives guidance for the selection of shoulder colours.

6.2.2 Gas properties

6.2.2.1 Unless specifically identified in 6.2.3, 6.2.4, 6.2.5 or 6.2.6, all gases and gas mixtures shall be identified by a colour coding indicating the properties of the contents in accordance with the colour of the danger labels as specified in RID/ADR.

When two colours are applied to the cylinder shoulder, they should be in one of the formats (bands or quadrants) identified in Annex B.

The property shall be classified in a descending order of hazard as follows:

6.2.2.2 For gases with a single danger:

- a) toxic and/or corrosive (in accordance with ISO 10298 and ISO 13338) — yellow;
- b) flammable (in accordance with EN ISO 10156) — red;
- c) oxidizing (in accordance with EN ISO 10156) — light blue;
- d) inert¹⁾ — bright green.

The colour BRIGHT GREEN shall not be used for air for medical use or breathing application (see 6.2.5).

6.2.2.3 For gases with more than one danger:

When a gas or mixture has two hazard properties, then the cylinder shoulder shall be coloured in accordance with the primary hazard. The colour of the secondary hazard (flammable or oxidizing) may also be applied to the cylinder shoulder:

- a) toxic (and/or corrosive) and flammable — yellow plus red;
- b) toxic (and/or corrosive) and oxidizing — yellow plus light blue.

6.2.3 Specific single gases

6.2.3.1 The following gases shall be identified by specific colours rather than the colour system defined in 6.2.2.

a) Flammable gases:

Acetylene — Maroon.

b) Oxidizing gases:

Oxygen — White;

Nitrous oxide — Blue.

6.2.3.2 Inert gases for medical application shall be further differentiated by use of the following colours:

- a) Argon — Dark green;
- b) Nitrogen — Black;
- c) Carbon dioxide — Grey;
- d) Helium — Brown.

Specific colours of single gases described above are identical to ISO 32.

These colours may also be used for applications other than medical instead of the bright green colour (inert) as indicated in 6.2.2.

1) in accordance with 3.2

NOTE Inert gases for medical use are also differentiated from industrial use by the colouration of the gas cylinder body, white for medical use (see 6.3).

6.2.4 Mixtures of inert gases

Instead of the hazard colour as indicated in 6.2.2, combinations of colours (maximum two, see Annex D) of the specific component gases listed in 6.2.3.2 may be used to identify the cylinder contents.

6.2.5 Oxygen mixtures and air for medical use and breathing application

For medical use, the following gas mixtures containing at least 20 % oxygen shall be identified using the colour of the components listed in 6.2.3. These colours may also be used for breathing applications other than medical.

- a) Air or synthetic air — white plus black;
- b) Oxygen/helium — white plus brown;
- c) Oxygen/carbon dioxide — white plus grey;
- d) Oxygen/nitrous oxide — white plus blue.

If the gas mixture contains more than one other gas than oxygen, then 6.2.2 shall be applied.

All the above gas mixtures containing less than 20 % oxygen shall be coloured bright green.

NOTE A deviation from this requirement is possible for specific mixture use for deep diving, e.g. helium with minor percentage of oxygen.

These colours shall neither be used for industrial gas mixtures containing these components, nor also for breathing gases with less than 20 % oxygen which are life threatening to breathe.

6.2.6 Specific medical gas mixtures

In case of medical gas mixture for inhalation containing less 1 000 ppm(V/V) of NO (nitric oxide) in nitrogen a specific colour on the shoulder, Turkish blue, shall be used.

6.3 Body

All cylinders for gas for medical use shall be coloured white along the body of the cylinder. White colouration of the body shall not be used for any other applications.

7 Implementation

Cylinders colour coded in accordance with this European Standard shall have the letter “N” marked twice on the shoulder of the cylinder except if there is no risk of mis-interpretation. When “N” is used, these markings shall be positioned diametrically opposed and displayed in a colour distinct from the colours of the cylinder shoulder. The size and shape of “N” shall be as indicated in Annex C.

Annex A (normative)

Colour references

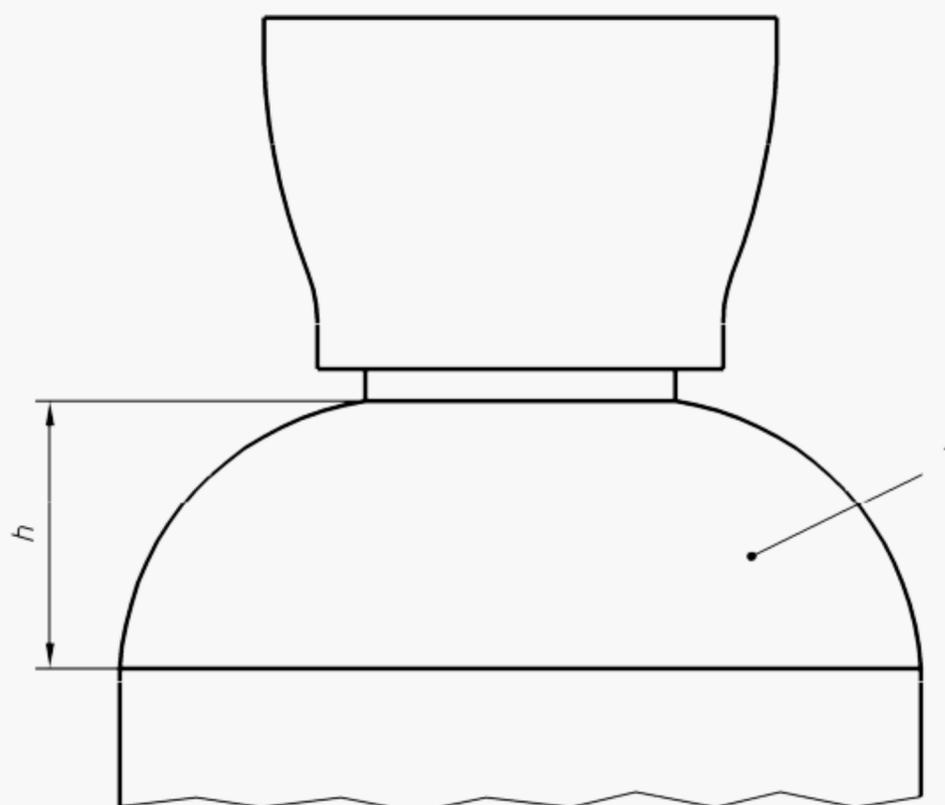
Table A.1 — Colours

Colour	RAL number ^a	RAL designation
Yellow	1018	Zinc yellow
Red	3000	Flame red
Light blue	5012	Light blue
Bright green	6018	Yellow green
Maroon	3009	Oxide red
White	9010	Pure white
Blue	5010	Gentian blue
Dark green	6001	Emerald green
Black	9005	Jet black
Grey	7037	Dusty grey
Brown	8008	Olive brown
Turkish blue	5018	Turkish blue

^a The colours specified are in accordance with the register RAL 840 HR, RAL German Institute for Quality Assurance and Certification, Siegburger Strasse 39, D-53757 Sankt Augustin, Germany www.ral.de

Annex B (informative)

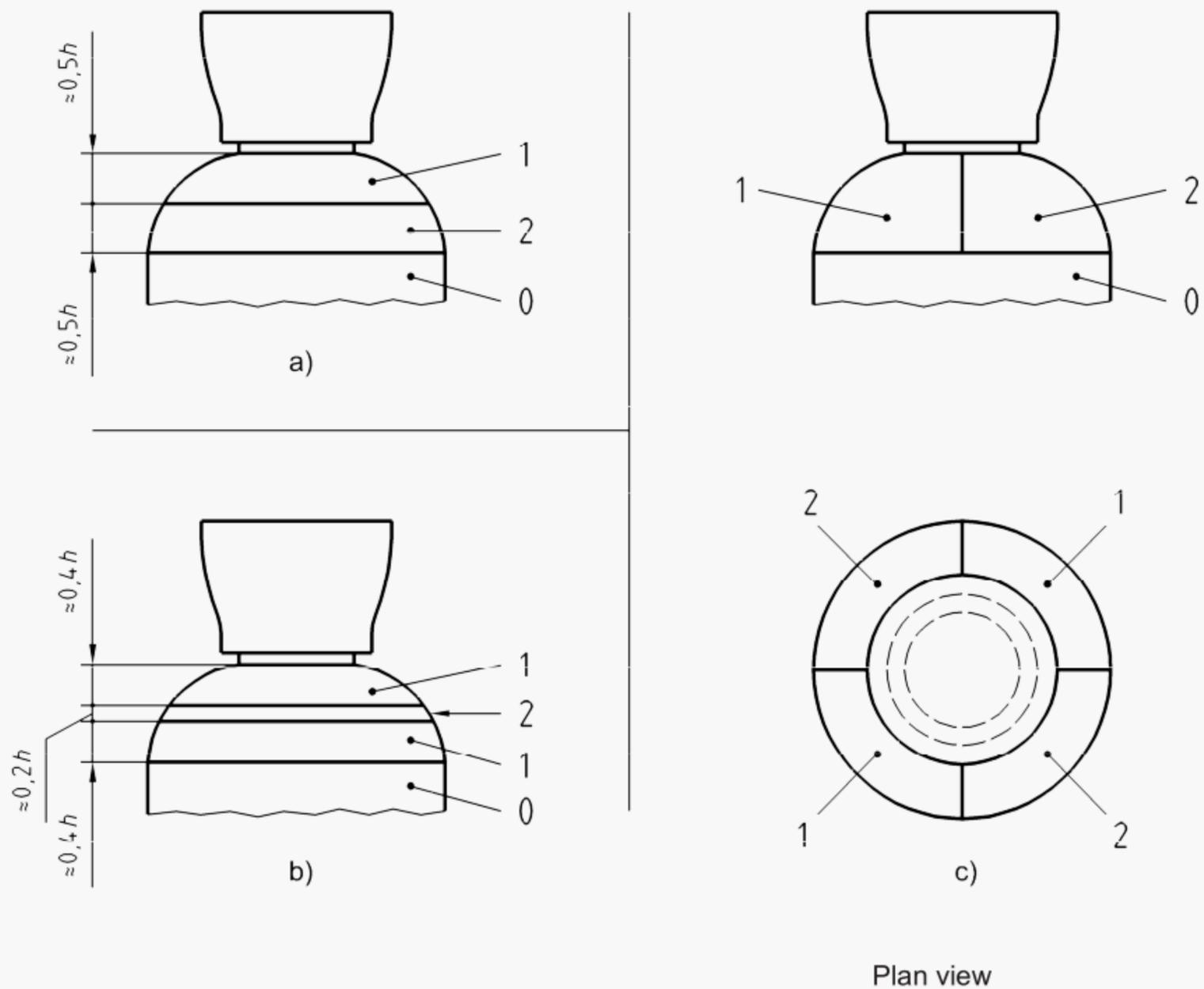
Colour location



Key

- 1 colour
- h cylinder shoulder height

Figure B.1 — Colour coding with one colour



Key

- 0 body colour
- 1 colour 1
- 2 colour 2

Colour 2, in configuration a), shall not be the same as the body colour of the cylinder. It is acceptable to transpose colour 1 and colour 2 to avoid this situation. Configurations b) or c) may also be used.

NOTE The size of the band does not indicate the quantity of the gas.

Quadrants (configuration c) should only be used for breathing air.

Figure B.2 — Choice of schemes for colour coding with two colours

Annex C
(normative)

Letter "N"

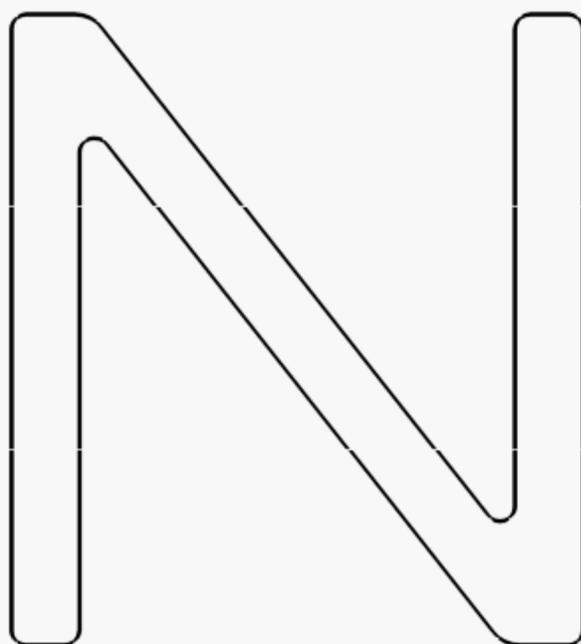


Figure C.1 — Letter "N" - Approximate shape

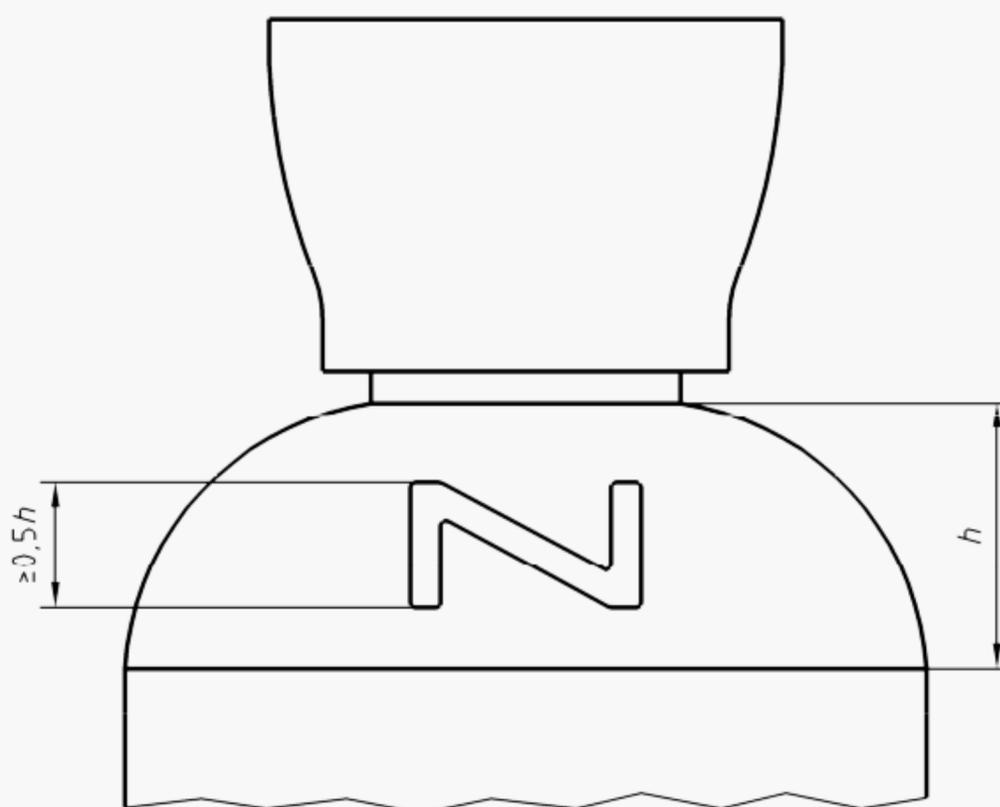


Figure C.2 — Letter "N" - Height relative to shoulder

Annex D (informative)

Guidance for the selection of shoulder colours

D.1 General

This annex is intended to assist the user to find the appropriate colour(s) for the shoulder for gases and gases mixtures as described in Clause 5.

D.2 Typical examples

The following table gives typical examples of assignment of colour(s) in accordance with the requirement of the standard. For gases and gas mixtures not given in this table the rules of the main text are to be followed.

Table D.1 — Specific colours for some gases and gas mixtures

Name of gas	Formula	Industrial gas	Gas for medical use	Non medical breathing gas
Oxygen	O ₂	White		
Oxygen + Nitrous oxide	O ₂ + N ₂ O	Light blue	White + Blue	Not applicable
Nitrous oxide	N ₂ O	Blue		
Carbon dioxide	CO ₂	Grey or bright green ^a	Grey	Not applicable
Helium	He	Brown or bright green ^a	Brown	Not applicable
Nitrogen	N ₂	Black or bright green ^a	Black	Not applicable
Acetylene	C ₂ H ₂	Maroon	Not applicable	Not applicable
Argon	Ar	Dark green or bright green ^a	Dark green	Not applicable
Flammable gases (e.g. hydrogen, methane)	H ₂ , CH ₄	Red	Red (if applicable)	Not applicable
Toxic and/or corrosive gases (e.g. arsine, carbon monoxide, ammonia)	AsH ₃ , CO, NH ₃	Yellow ^f	Yellow (if applicable)	Not applicable
nitrogen + nitric oxide (NO < 1000 ppm (V/V))	N ₂ + NO	Bright green (if applicable)	Turkish blue	Not applicable

Table D.1 (continued)

Name of gas	Formula	Industrial gas	Gas for medical use	Non medical breathing gas
Oxygen + Carbon dioxide (> 23,5 % O ₂)	O ₂ + CO ₂	Light blue	White + Grey ^e	(White + Grey) or light blue ^a
Oxygen + Carbon dioxide (<= 23,5 % O ₂)	O ₂ + CO ₂	Bright green	Not applicable	Not applicable
Oxygen + Helium (> 23,5 % O ₂)	O ₂ + He	Light blue	White + Brown	(White + Brown) or Light blue ^a
Oxygen + Helium (20 % ≤ O ₂ ≤ 23,5 %)	O ₂ + He	Bright green	White + Brown	(White + Brown) or Bright green
Oxygen + Helium (< 20 % O ₂)	O ₂ + He	Bright green	Bright green	(White + Brown) or Bright green ^c
Compressed air	-	Bright green	White + Black	White + Black
Oxygen + Nitrogen (20 % ≤ O ₂ ≤ 23,5 %) ^d	O ₂ + N ₂	Bright green	White + Black	White + Black
Oxygen + Nitrogen (< 20 % O ₂)	O ₂ + N ₂	Bright green	Bright green ^b	Not applicable
Oxygen + Nitrogen (> 23,5 % O ₂)	O ₂ + N ₂	Light blue	Light blue	Light blue

NOTE The expression "medical gas" does not necessarily mean that the gas is only used for breathing purposes, e.g. gas intended to be injected into a cavity (abdominal for coelioscopy).

^a This standard allows the use of one of the two mentioned colour codes above. Inert gases for medical use and other use differ also by the colour by the gas cylinder body (white for medical use).

^b Precautionary label shall indicate the percentage of both components and a mention for restriction on the duration of breathing because mixtures that contain less than 20 % of oxygen are life threatening if they are breathed continuously at atmospheric pressure.

^c See 6.2.5.

^d "synthetic air" is a generic term used by the industrial and medical gases, and is also used in the Pharmacopoeia for medical purposes only in the range: 20 % ≤ O₂ ≤ 23,5 %

^e Mixtures that contain more than 7 % of carbon dioxide are life threatening if they are breathed continuously. Their valve outlet is therefore dedicated (see ISO 5145 Table 2 and 3).

^f Instead of yellow, yellow + the secondary hazard colour (in this case "red") can be used.

Bibliography

- [1] ISO 13769, Gas cylinders — Stamp marking
- [2] ISO 7225, Gas cylinders — Precautionary labels
- [3] RAL 840 HR, RAL German Institute for Quality Assurance and Certification, Siegburger Strasse 39, D-53757 Sankt Augustin, Germany, www.ral.de
- [4] ISO 21007-1, Gas cylinders — Identification and marking using radio frequency identification technology — Part 1: Reference architecture and terminology
- [5] ISO 21007-2, Gas cylinders — Identification and marking using radio frequency identification technology — Part 2: Numbering schemes for radio frequency identification
- [6] ADR, International Carriage Of Dangerous Goods By Road
- [7] RID, International Carriage Of Dangerous Goods By Rail
- [8] ISO 32, Gas cylinders for medical use — Marking for identification of content

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