SLOVENSKI STANDARD
oSIST prEN ISO 14456:2016

01-maj-2016

Plinske jeklenke - Lastnosti plina in pripadajoči razvrstitveni razredi (FTSC) (ISO 14456:2015)

Gas cylinders - Gas properties and associated classification (FTSC) codes (ISO 14456:2015)

Gasflaschen - Eigenschaften von Gasen und zugehörige Klassifizierungscodes (FTSC) (ISO 14456:2015)

Bouteilles à gaz - Propriétés des gaz et codes de classification associés (FTSC) (ISO 14456:2015)

Ta slovenski standard je istoveten z: **prEN ISO 14456**

ICS:

23.020.35	Plinske jeklenke	Gas cylinders

oSIST prEN ISO 14456:2016 **en,fr,de**

INTERNATIONAL STANDARD

ISO 14456

First edition
2015-09-15

Gas cylinders — Gas properties and associated classification (FTSC) codes

Bouteilles à gaz — Propriétés des gaz et codes de classification associés (FTSC)

Reference number
ISO 14456:2015(E)

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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).

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 58, *Gas cylinders*, SC 2, *Cylinder fittings*.

Introduction

This International Standard establishes a method of allocating a four-digit code number (FTSC) to any gas, liquids that are transported under pressure or mixture of gases contained in cylinders. This code number categorizes the gas, liquids that are transported under pressure or gas mixture in terms of its physical-chemical properties and/or flammability, toxicity, state of the gas, and corrosiveness (see 4.1). FTSC is the abbreviation of these properties.

The FTSC code enables a gas, liquids that are transported under pressure or gas mixture to be assigned to one of the 15 “compatible” gas groups.

The FTSC codes and the method for their determination are currently given in ISO 5145:2014, Annex A for use in the selection of valve outlets. This annex from ISO 5145 will be removed when the present standard is published.

The properties and the selection criteria are aligned as appropriate with the Globally Harmonized System for the Classification and Labelling of Chemicals (GHS).

Gas cylinders — Gas properties and associated classification (FTSC) codes

1 Scope

This International Standard gives a list of FTSC (fire potential, i.e. "oxidizing potential and flammability", toxicity, state of the gas, and corrosiveness) codes determined according to the relevant properties of gases and of some liquids that are transported under pressure.

It does not cover gas material compatibility which is covered by ISO 11114 (all parts).

2 Normative references

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

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

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

ISO 10286:2015, *Gas cylinders — Terminology*

3 Terms and definitions

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

3.1
gas mixture
combination of different single gases deliberately mixed in specified proportions

[SOURCE: ISO 10286:2015, definition 704]

3.2
liquefied gas
gas, which, when packaged for transport, is partially liquid (or solid) at temperature above −50 °C

[SOURCE: ISO 10286:2015, definition 706]

3.3
compressed gas
gas, which, when packaged under pressure for transport, is entirely gaseous at −50 °C

Note 1 to entry: This category includes all gases with a critical temperature less than or equal to −50 °C.

[SOURCE: ISO 10286:2015, definition 705]

3.4
lethal concentration 50
LC_{50}
concentration of a gas (or a gas mixture) in air administered by a single exposure during a short period of time (24 h or less) to a group of young adult albino rats (males and females) which leads to the death of half of the animals in at least 14 d

[SOURCE: ISO 10298:2010, definition 2.1]

4 Gas properties

4.1 Numerical gas code (FTSC)

4.1.1 General

The code number assigned to a gas or liquid is based on the following four physical-chemical properties:

a) Category I (F): fire potential, defining the gas behaviour with respect to combustion;

b) Category II (T): acute toxicity;

c) Category III (S): gas state, defining the physical state of the fluid in the cylinder at 15 °C within a given pressure range;

d) Category IV (C): corrosiveness (ability to damage or destroy living tissues: eyes, skin, and mucous membranes).

Each category is subdivided into different characteristics (subdivisions), each identified by a different digit. In this way, a gas in a given state is characterized by a series of four digits (one digit per category) as illustrated below.

4.1.2 Fire potential, category I

Subdivision 0: inert (any gas not classified under subdivisions 1 to 5 below);

Subdivision 1: supports combustion (gas having an oxidizing power equal to or less than a mixture containing 23,5 % of oxygen in nitrogen);

Subdivision 2: flammable (gas having flammability limits in air);

NOTE 1 See ISO 10156 for more information.

Subdivision 3: pyrophoric (spontaneously flammable);

Subdivision 4: oxidizing (gas having an oxidizing power greater than a mixture containing 23,5 % O_2 in N_2);

NOTE 2 See ISO 10156 for more information.

Subdivision 5: chemically unstable (flammable and subject to rapid decomposition or polymerization).

NOTE 3 When considering the properties of gases from subdivisions 1 and 4, the following applies:

a) Subdivision 4 considers the risk of accelerating combustion more than air does;

b) For gas material compatibility with gases under pressure of subdivisions 1 and 4, it is considered that the risk of ignition exists when the oxygen partial pressure is more than 30 bar;

c) For valves outlet selection (for example, see ISO 5145), the risk is to mix a flammable gas (subdivision 2 and/or 3) with a gas of subdivision 1 and/or 4.

4.1.3 Acute toxicity, category II

Subdivision 0: supporting human life;

Subdivision 1: non-toxic $LC_{50\ rat\ 1h}$ > 0,5 % by volume (5 000 ppm);

Subdivision 2: toxic; 0,02 % by volume (200 ppm) < $LC_{50\ rat\ 1h}$ ≤ 0,5 % by volume (5 000 ppm);

Subdivision 3: very toxic $LC_{50\ rat\ 1h}$ < 0,02 % by volume (200 ppm).

NOTE See ISO 10298 for more information.

4.1.4 State of the gas (in the cylinder at 15 °C), category III

All pressures for compressed gases are working pressures according to the definition given in ISO 10286.

For liquefied gases, this is the developed pressure at 65 °C (normally equal to the cylinder test pressure).

Subdivision 0: liquefied gas of 35 bar or less;

Subdivision 1: liquefied gas at a pressure greater than 35 bar;

Subdivision 2: liquid withdrawal – liquefied gas (optional);

Subdivision 3: dissolved gas;

Subdivision 4: gas phase withdrawal at 35 bar or less;

Subdivision 5: compressed gas between 35 bar and 250 bar (Europe);

Subdivision 6: compressed gas between 35 bar and 207 bar (North America);

Subdivision 7: compressed gas above 207 bar (North America) or 250 bar (Europe).

NOTE 1 Subdivisions 5 and 6 have been adopted as a result of a compromise between the European and the North American approach. The European preference for a limit of 250 bar reflects the current tendency towards higher pressure applications. The current North American practice requires a limit of 207 bar for which their pressure reducing valves are designed. This is the working pressure at the referenced temperature of 15 °C. Therefore, three pressure classes have been retained. Other jurisdictions might use different values.

Either subdivision 5 or subdivision 6 shall be used, never both. The selection of either subdivision will determine the applicable pressure for subdivision 7.

Subdivision 5 or 6: medium pressure range, each user being required to select one subdivision exclusively to determine the upper limit of the medium pressure range (i.e. 182 bar or 250 bar).

Subdivision 7: high pressure range, the lower limit (182 bar or 250 bar) of which depends on the subdivision selected for the medium pressure range.

After the introduction of subdivisions 5, 6, and 7, a number of pressure ranges have been (or are being) established to make the selection of the proper cylinder valve outlet connection (e.g. 500 bar, 800 bar, sub atmospheric pressure. These ranges have been chosen to protect downstream regulators and other ancillary equipment from over-pressurized conditions. Consequently, for the tables in 5.3, the third digit (S) used for all compressed gases is “5” to indicate that this is a compressed gas.

NOTE 2 Subdivisions 8 and 9 have been allocated for liquid withdrawal cylinders of cryogenic gases in the USA.

4.1.5 Corrosiveness, category IV

Subdivision 0: non-corrosive;

Subdivision 1: non-halogen acid forming;

Subdivision 2: basic;