BS EN ISO 22435:2024

BSI Standards Publication

Gas cylinders — Cylinder valves with integrated pressure regulators — Specification and type testing

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National foreword

This British Standard is the UK implementation of EN ISO 22435:2024. It is identical to ISO 22435:2024. It supersedes BS EN ISO 22435:2007+A1:2012 and BS EN ISO 22435:2007, which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PVE/3/1, Gas containers - Valve fittings for gas containers.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Bouteilles à gaz - Robinets de bouteilles avec détendeur intégré - Spécifications et essais de type (ISO 22435:2024)

Gasflaschen - Flaschenventile mit integriertem Druckminderer - Spezifikation und Baumusterprüfungen (ISO 22435:2024)

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European foreword

This document (EN ISO 22435:2024) has been prepared by Technical Committee ISO/TC 58 "Gas cylinders" in collaboration with 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of an identical text or by endorsement, at the latest by October 2024, and conflicting national standards shall be withdrawn at the latest by October 2024.

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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 document 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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 2, *Cylinder fittings*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 23, *Transportable gas cylinders*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 22435:2007), which has been technically revised. It also incorporates the Amendment ISO 22435:2007/Amd. 1:2012.

The main changes are as follows:

— Introduction: clarification that this document gives additional requirements to those specified in ISO 10297, ISO 17871, ISO 17879 and ISO 23826, unless specifically mentioned.

— Scope:

  — requirements in this document are in addition to those specified in ISO 10297, ISO 17871, ISO 17879 and ISO 23826, unless specifically mentioned;

  — clarification of different VIPR types with different positions of primary operating mechanism within the valve;

  — exclusion of VIPRs for liquefied petroleum gas (LPG) and cryogenic applications.

— Terms and definitions: definition of a primary valve operating mechanism.

— Introduction of VIPR types A, B and C for easy referencing of different design types.

— Symbols and descriptions:

  — clarification of inlet pressure to the regulating function p_1 and valve test pressure for different gas types;

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  - additional characteristic column in table with link to test method, if relevant.
- Design requirements and considerations:
  - general: VIPRs to comply with the relevant closure standards;
  - materials: lubricant requirements given in relevant closure standard;
  - pressure and flow indicating devices: relevant pressure indicator requirements in this document;
  - cylinder connection: subclause removed;
  - main shut-off valve: subclause removed because requirements already given in relevant closure standard;
  - pressure adjusting device: addition of a new subclause;
  - leakage: total external and internal leakage shall not exceed 12 cm^3/h;
  - mechanical strength: mechanical strength of inlet side moved to relevant closure standard;
  - resistance to ignition: moved to ISO 10297;
  - resilience to ignition: addition of a new subclause;
  - resistance to vibration and resistance to shock: addition of two new subclauses.
- Type testing:
  - general: clarification of changes to the VIPR design that require repetition of type tests;
  - test schedule: table reformatted for relevant tests;
  - test method for accuracy of VIPR with flowmeter: reference standard changed to ISO 2503;
  - test methods for leakage: test for regulating device only;
  - test method for the endurance test of the VIPR with the pressure regulator valve acting as primary valve operating mechanism: moved to ISO 10297;
  - test method for endurance of the filling connection closing device: moved to ISO 10297;
  - test method for VIPR pressure regulator endurance test: addition of new test.
- Removal of previous Annex A "Valve impact test" and Annex B "Endurance test", because both are already given in relevant closure standards.
- Addition of new Annexes A, B, C and D.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Valves with integrated pressure regulators (VIPRs) are used to reduce the pressure receptacle pressure to a lower pressure suitable for end use processes.

VIPRs incorporate the basic functionality of a primary valve operating mechanism, with the additional ability to regulate the pressure and/or flow at the valve outlet. They remove the need for end users to make and break a high-pressure gas connection.

These valves operate over a wide range of inlet and outlet pressures and flows which require specific design characteristics. It is important that the operating characteristics of these valves be specified and tested in a defined manner.

Such valves are more complicated than conventional cylinder valves yet subject to the same environmental and transport conditions. These conditions should be kept in mind at the design and development stage.

This document gives additional requirements for VIPRs to those given for cylinder valves in general in ISO 10297, for quick-release cylinder valves in ISO 17871, for self-closing cylinder valves in ISO 17879 or for ball valves in ISO 23826.

This document focusses on:

a) suitability of materials;

b) safety (mechanical strength, safe relief of excess pressure, etc.);

c) gas-specificity;

d) cleanliness;

e) testing;

f) identification;

g) information supplied.

When a VIPR has been tested according to the previous version of this document, the organisation responsible for testing the same VIPR to this document should consider which tests need to be performed.

In this document, the unit bar is used, due to its universal use in the field of technical gases. Bar is not an SI unit and the corresponding SI unit for pressure is Pa (1 bar = 10^5 Pa = 10^5 N/m^2).

Pressure values given in this document are given as gauge pressure (pressure exceeding atmospheric pressure) unless noted otherwise.

Tests and examinations performed to demonstrate compliance with this document are conducted using instruments calibrated before being put into service and thereafter according to an established programme.

Any tolerances given in this document include measurement uncertainties.

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Gas cylinders — Cylinder valves with integrated pressure regulators — Specification and type testing

1 Scope

This document specifies design, type test methods, marking and instruction requirements for cylinder valves with integrated pressure regulators (VIPRs) intended to be fitted to gas cylinders, pressure drums or tubes or used as a main valve for bundles of cylinders that convey compressed, liquefied or dissolved gases.

These are requirements for VIPRs that are in addition to those given in the relevant closure standard, for example, in ISO 10297 for cylinder valves, in ISO 17871 for quick-release cylinder valves, in ISO 17879 for self-closing cylinder valves or in ISO 23826 for ball valves. For ISO 17871, these requirements are only applicable to quick-release cylinder valves types B, C, D and E.

NOTE 1 If the pressure regulating system of a VIPR is acting as the primary valve operating mechanism, it is covered by the relevant closure standard, e.g. ISO 10297, ISO 17871, ISO 17879 and ISO 23826. This also includes designs where closure of the primary valve operating mechanism of a VIPR is obtained by closing the seat of the pressure regulating system.

NOTE 2 If the primary valve operating mechanism of a VIPR is located at the low-pressure side of the pressure regulating system, it is covered by the relevant closure standard, e.g. ISO 10297, ISO 17871, ISO 17879 and ISO 23826.

NOTE 3 The term “pressure receptacle” is used within this document to cover instances where no differentiation is necessary between gas cylinders, bundles of cylinders, pressure drums and tubes.

This document does not apply to VIPRs for

a) medical applications (see ISO 10524-3);

b) liquefied petroleum gas (LPG);

c) cryogenic applications.

NOTE 4 Additional requirements for a VIPR with a residual pressure device (RPD) are specified in ISO 15996.

NOTE 5 Additional requirements for pressure relief valves can exist in international/regional regulations/standards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 5171:2019, *Gas welding equipment — Pressure gauges used in welding, cutting and allied processes*

ISO 2503:2009, *Gas welding equipment — Pressure regulators and pressure regulators with flow-metering devices for gas cylinders used in welding, cutting and allied processes up to 300 bar (30 MPa)*

ISO 7289, *Gas welding equipment — Quick-action couplings with shut-off valves for welding, cutting and allied processes*

ISO 9090, *Gas tightness of equipment for gas welding and allied processes*

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

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ISO 10225, *Gas welding equipment — Marking for equipment used for gas welding, cutting and allied processes*

ISO 10286, *Gas cylinders — Vocabulary*

ISO 10297, *Gas cylinders — Cylinder valves — Specification and type testing*

ISO 17871, *Gas cylinders — Quick-release cylinder valves — Specification and type testing*

ISO 17879, *Gas cylinders — Self-closing cylinder valves — Specification and type testing*

ISO 23826, *Gas cylinders — Ball valves — Specification and testing*

ISO/TR 28821, *Gas welding equipment — Hose connections for equipment for welding, cutting and allied processes — Listing of connections which are either standardised or in common use*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10286, ISO 10297, ISO 2503 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

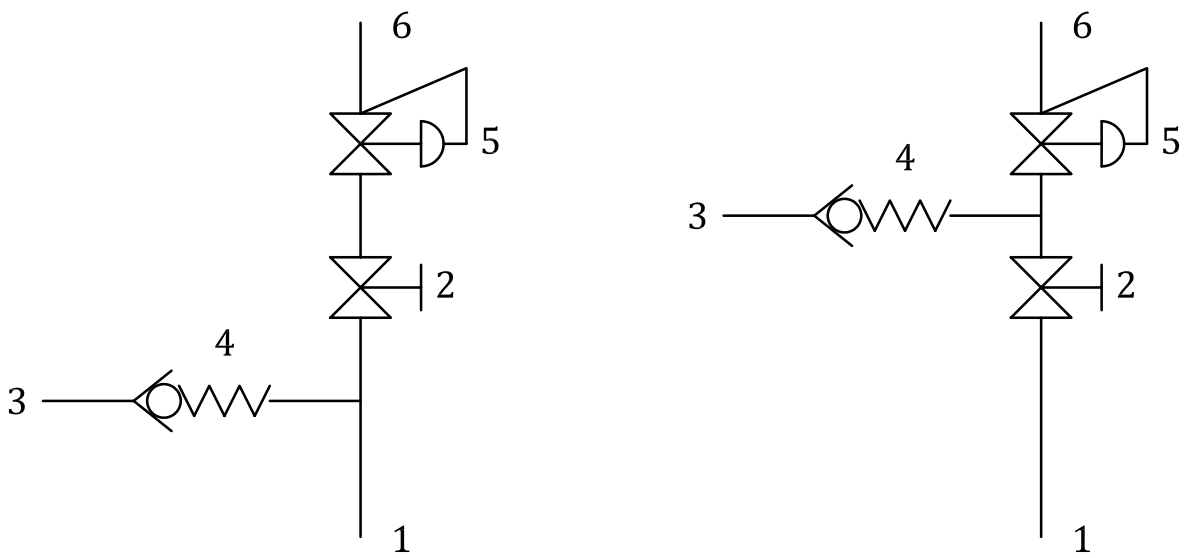
— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
valve with integrated pressure regulator
VIPR
device intended to be permanently fitted to a pressure receptacle which comprises of at least a shut-off function and pressure regulating system

3.2
VIPR type A
VIPR (3.1) design where the *primary valve operating mechanism* (3.5) is located upstream of the *pressure regulating system* (3.7)

Note 1 to entry: For typical designs, see Figure 1. The filling connection can also be located between the primary valve operating mechanism and the pressure regulating system.



a) Filling connection upstream of the primary valve operating mechanism

b) Filling connection between the primary valve operating mechanism and the pressure regulating system

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