

Transportable gas containers —

Part 6: Specification for seamless containers of less than 0.5 litre water capacity

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- Associated Offices Technical Committee
- Association of Manufacturers of Domestic Electrical Appliances
- British Compressed Gases Association
- British Fire Protection Systems Association Ltd.
- British Railways Board
- Chief and Assistant Chief Fire Officers Association
- Department of Trade and Industry [Mechanical Engineering and Manufacturing Technology Division (Mmt)]
- Department of Trade and Industry (National Engineering Laboratory)
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- Metal Packaging Manufacturers Association
- Ministry of Defence
- National Association of Soft Drinks Manufacturers Ltd.
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This British Standard, having been prepared under the direction of the Pressure Vessel Standards Committee, was published under the authority of the Board of BSI and comes into effect on 23 December 1987

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Foreword

This Part of BS 5045 has been prepared under the direction of the Pressure Vessel Standards Committee.

The present revision updates the 1981 edition by amending the formulae for deriving minimum values of test pressure and by replacing the bend test requirement by a tensile/hardness test. Opportunity has also been taken to make other changes deemed necessary as a result of experience with the 1981 edition which is withdrawn.

The quality control procedures employed by the manufacturer should be audited with respect to this Part of BS 5045 at least once every two years by an independent inspecting authority. The auditor's report should be made available to the purchaser if required.

BS 5045 deals with the materials, design and construction and testing of new containers and is divided into several Parts to cover the various forms of manufacture. Those Parts published or in preparation are as follows:

- *Part 1: Specification for seamless steel gas containers above 0.5 litre water capacity;*
- *Part 2: Steel containers up to 130 litres water capacity with welded seams;*
- *Part 3: Specification for seamless aluminium alloy gas containers above 0.5 litre water capacity and up to 300 bar charged pressure at 15 °C;*
- *Part 5: Specification for aluminium alloy containers above 0.5 litre up to 130 litres water capacity with welded seams.*

Further related standards are BS 5355, BS 5430, BS 6061 and BS 6071.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This Part of BS 5045 specifies requirements for the design, manufacture and testing of seamless refillable steel or aluminium alloy transportable containers of less than 0.5 litre water capacity, for the conveyance of gases under pressure. Such containers are also suitable for storing gases under pressure.

In addition to the definitive requirements, this Part of BS 5045 also requires the items detailed in clause 4 to be documented. For compliance with this Part of BS 5045, both the definitive requirements and the documented items have to be satisfied.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definition

For the purposes of this Part of BS 5045 the following definition applies.

independent inspecting authority

an inspecting organization approved by the Health and Safety Executive

3 Classification of gases

3.1 General

For the purposes of the design and filling of the container, gases are classified as follows.

- a) *Permanent gases*. Those gases that have a critical temperature below $-10\text{ }^{\circ}\text{C}$.
- b) *Liquefiable gases*. Those gases that are liquefiable by pressure at $10\text{ }^{\circ}\text{C}$ but that are completely vapourized at $17.5\text{ }^{\circ}\text{C}$ when at $1\,013\text{ mbar}^{1)}$.
 - 1) *High pressure liquefiable gases*. Those gases that have a critical temperature between $-10\text{ }^{\circ}\text{C}$ and $70\text{ }^{\circ}\text{C}$ inclusive.
 - 2) *Low pressure liquefiable gases*. Those gases that have a critical temperature above $70\text{ }^{\circ}\text{C}$.

Those toxic substances that are liquids at $1\,013\text{ mbar}$ pressure at $0\text{ }^{\circ}\text{C}$, but that are completely vaporized at or below $30\text{ }^{\circ}\text{C}$ at that pressure, are treated as low pressure liquefiable gases and are included under that heading in Table 1.

Gases that are currently conveyed in commercial quantities are classified in Table 1.

3.2 Gases that are permitted to be contained in aluminium alloy containers

Gases that are permitted to be contained in aluminium alloy containers are indicated by an asterisk in Table 1.

3.3 Gases that shall not be contained in aluminium alloy containers

Subject to the exceptions stated (see 3.2), the following gases shall not be contained in aluminium alloy containers. Where certain of these gases are to be contained in aluminium alloy containers in small quantities as components of gas mixtures, approval for such use shall be sought from the Health and Safety Executive.

acetylene
boron trifluoride
bromotrifluoroethylene
carbonyl chloride
chlorine
chlorine trifluoride
cyanogen chloride
fluorine
hydrogen bromide
hydrogen chloride
hydrogen fluoride
methyl bromide
methyl chloride
nitrosyl chloride

3.4 Unlisted gases

For conditions pertaining to the carriage in containers of any gas not listed in Table 1 or 3.3, reference shall be made to the Health and Safety Executive.

4 Information to be supplied by the purchaser and manufacturer

4.1 Information to be supplied by the purchaser

The following information shall be supplied, as appropriate, by the purchaser to the manufacturer and shall be fully documented. Both the definitive requirements specified throughout the standard and the documented items shall be satisfied before a claim of compliance with this standard can be made and verified.

- a) name or classification of gas(es);
- b) service application;
- c) volumetric capacity (minimum for liquefiable gases);
- d) for permanent gases, the filling pressure at $15\text{ }^{\circ}\text{C}$;
- e) for liquefiable gases, the mass of gas or filling ratio at the prescribed reference temperature or the required developed pressure in service;

¹⁾ $1\text{ mbar} = 10^2\text{ N/m}^2 = 0.1\text{ kPa}$.

- f) material of construction;
 g) preferred dimensions;
 h) shape of base;
 i) internal or external neck screwing dimensions;
 j) fittings required;

- k) external/internal finish required;
 l) any special or adverse conditions under which the container will be required to operate, and any corrosion allowance required;
 m) any requirements in addition to those specified in this Part of BS 5045.

Table 1— Classification of gases

Permanent gases ($T_c < -10\text{ °C}$)	Liquefiable gases	
	High pressure ($-10\text{ °C} \leq T_c \leq 70\text{ °C}$)	Low pressure ($T_c > 70\text{ °C}$)
Air ^a	Bromotrifluoromethane (R.13B1) ^a	Allene ^a
Argon ^a	Carbon dioxide ^a	Ammonia ^a
Boron trifluoride	Chlorotrifluoromethane (R.13) ^a	Arsine ^a
Carbon monoxide ^a	Diborane ^a	Boron trichloride
Carbon tetrafluoride (R.14) ^a	1,1-Difluoroethylene (R.1132a) ^a	Bromochlorodifluoromethane (R.12B1) ^a
Coal gas ^a	Ethane ^a	Butadiene ^a
Deuterium ^a	Ethylene ^a	Butane ^a
Fluorine	Hexafluoroethane (R.116) ^a	1-Butene ^a
Helium ^a	Hydrogen chloride	2-Butene ^a
Hydrogen ^a	Nitric oxide ^a	Carbonyl chloride
Krypton ^a	Nitrous oxide ^a	Carbonyl sulphide ^a
Methane (natural gas) ^a	Phosphine ^a	Chlorine
Neon ^a	Silane ^a	Chlorine trifluoride
Nitrogen ^a	Sulphur hexafluoride ^a	1-Chloro-1,1-difluoroethane (R.142b) ^a
Oxygen ^a	Trifluoromethane (R.23) ^a	2-Chloro-1,1, 1-trifluoroethane (R.133a) ^a
Town gas (excluding coal gas) ^a		Chlorodifluoromethane (R.22) ^a
Xenon ^a		Chloropentafluoroethane (R.115) ^a
		Cyanogen ^a
		Cyanogen chloride
		Cyclopropane ^a
		Dichlorodifluoromethane (R.12) ^a
		Dichlorofluoromethane (R.21) ^a
		1,2-Dichlorotetrafluoroethane (R.114) ^a
		1,1-Difluoroethane (R.152a) ^a
		Dimethylamine ^a
		Dimethyl ether ^a
		2,2-Dimethyl propane ^a
		Ethylacetylene ^a
		Ethylamine ^{ab}
		Ethyl chloride
		Ethylene oxide
		Hexafluoropropene ^a
		Hydrogen cyanide ^a
		Hydrogen fluoride