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Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 8776 (1988): Valve Fittings for Use with Liquefied Petroleum Gas (LPG) Cylinders UP TO and Including 5-Litre Water Capacity [MED 16: Gas Cylinders]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

SPECIFICATION FOR VALVE FITTINGS FOR USE WITH LIQUEFIED PETROLEUM GAS (LPG) CYLINDERS UP TO AND INCLUDING 5-LITRE WATER CAPACITY

(First Revision)

1. Scope — Covers the basic requirements of material and dimensions of valve fittings for gas cylinders for liquefied petroleum gas (LPG) having a water capacity up to and including 5 litres. The standard covers the following types of valves:

- a) Valves with taper inlet threads, Type A;
- b) Valves with parallel inlet threads, Type B; and
- c) Valves with their bodies directly welded to the cylinder, Type C.

1.1 Valve fittings for LPG cylinders of more than 5-litre water capacity are covered separately in IS : 8737 (Part 1)-1979 'Specification for valve fittings for use with liquefied petroleum gas (LPG) cylinders of more than 5-litre water capacity: Part 1 Valve fittings for replacement purposes', and IS : 8737 (Part 2)-1978 'Specification for valve fittings for use with liquefied petroleum gas (LPG) cylinders of more than 5-litre water capacity: Part 2 Valve fittings for newly manufactured LPG cylinders'.

1.2 Valve fittings for compressed gas cylinders for gases other than LPG are covered in IS : 3224-1979 'Specification for valve fittings for compressed gas cylinders excluding liquefied petroleum gas (LPG) cylinders (*second revision*)' and IS : 7302-1974 'Specification for valve fittings for gas cylinder valves for use with breathing apparatus'.

2. Material

2.1 All components used in valve construction shall be made of material compatible with LPG and with material of the cylinder. The material of the valve body shall comply with the material properties given in 2.2, 2.3 and 2.4.

2.2 The valve body shall be either forged or machined out from rolled or extruded sections.

2.3 Tensile Strength and Elongation — The tensile strength and elongation of the material of the valve, determined according to IS : 1608-1972 'Method for tensile testing of steel products (*first revision*)', IS : 1816-1979 'Method for tensile test for light metals and their alloys (*first revision*)' and IS : 2654-1977 'Method for tensile testing of copper and copper alloys (*first revision*)', shall be respectively at least 40 kgf/mm² and 18 percent measured on a gauge length of $5.65 \sqrt{S_0}$, S_0 being the original area of cross-section.

2.4 Impact Strength — The izod impact strength of the material of the valve determined according to IS : 1598-1977 'Method of izod impact test for steel (*first revision*)' or other applicable specifications shall not be less than 2.2 kgf/mm² for brass, manganese-bronze or aluminium bronze and 5.6 kgf/cm² for steel.

2.5 Test Samples — Test samples for tensile and izod impact tests shall, where practicable, be taken from a valve body blank; where this is not practicable, the test sample shall be made from the same raw material (wrought or extruded section) giving the same outside shape as the valve body blanks it represents. The scale of sampling and criteria for conformity shall be in accordance with the requirements of Appendix A, unless otherwise agreed to between the manufacturer and the purchaser.

3. Screw Threads on the Valve Stem and in Cylinder Neck (Valve Inlet Threads)

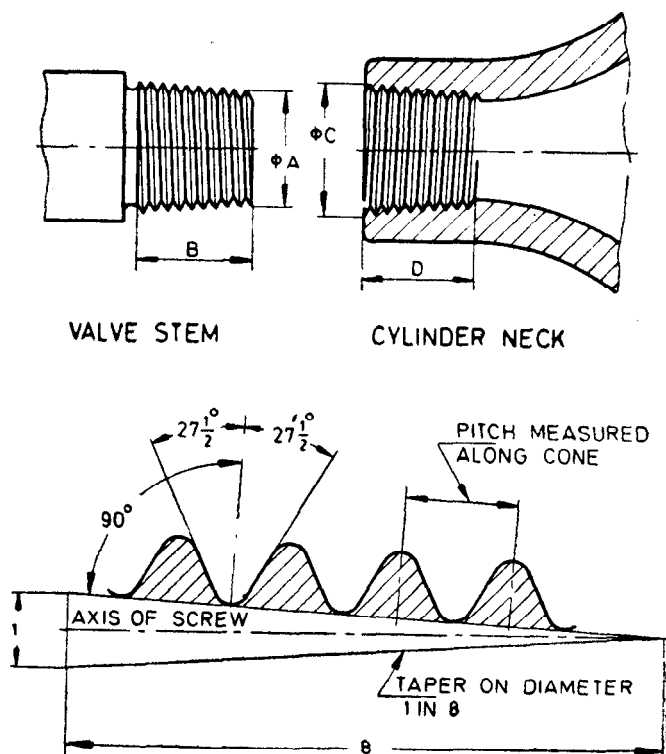
3.1 Taper Threads — The valve inlet of Type A (see 1.1) shall be provided with threads with a taper of 1 in 8 on diameter and nominal size 18.16 mm. The basic form, principal dimensions and their limits are given in Fig. 1 and Table 1.

Note — This type of thread also conforms to thread size 18.16 mm nominal of BS 341 : Part 1 : 1962 'Valve fittings for compressed gas cylinders: Part 1 Valves with taper stems (excluding valves used for breathing and medical purposes)', issued by the British Standards Institution (BSI).

Adopted 12 April 1988

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Gr 3



(Whitworth form thread; right hand, normal to surface of cone; thread angle = 55° ; pitch measured along cone = 1.814 mm; taper 1 in 8 on diameter.)

All dimensions in millimetres.

FIG. 1 BASIC FORM AND PRINCIPAL DIMENSIONS FOR TAPER SCREW THREADS ON VALVE STEMS AND IN CYLINDER NECKS

TABLE 1 PRINCIPAL DIMENSIONS AND LIMITS FOR TAPER SCREW THREADS
(NOMINAL SIZE 18.16 mm) (see Fig. 1)

(Clause 3.1)

All dimensions in millimetres.

Particulars (1)	Dimensions (2)
Form of thread	Whitworth, right hand, normal to the surface of cone, thread angle 55°
Nominal size of valve	18.16
Taper on diameter	1 in 8
Pitch measured along cone	1.814
Diameter of thread on valve stem at small end, A	
Major diameter	18.160 Max 17.958 Min
Pitch diameter	16.998 Max 16.863 Min
Minor diameter	15.834 Max 15.563 Min
Diameter of thread at mouth of cylinder, C	
Major diameter	20.414 Max 20.142 Min
Pitch diameter	19.114 Max 18.979 Min
Minor diameter	18.019 Max 17.816 Min
Length of thread, B	22.23 + 3.17 - 0
Length of engagement	15.88 Min
Length of thread in cylinder neck, D	22.23 Min

3.1.1 Oversize valves — The recommended oversizes are given in Table 2.**TABLE 2 DIMENSIONS OF OVERSIZED VALVE INLETS FOR INLET THREADS OF NOMINAL SIZE 18.16 mm**

All dimensions in millimetres.

Thread Elements at Small End of Valve Stem	First Over-size	Second Over-size	Third Over-size	Fourth Over-size
Major diameter	18.954	19.748	20.541	21.335
Pitch diameter	17.792	18.586	19.379	20.173
Minor diameter	16.628	17.422	18.215	19.009

3.2 Parallel Threads — The valve inlet of Type B (see 1.1) shall be provided with parallel inlet threads conforming to IS : 4218 (Part 3)-1976 'Basic dimensions for design profiles (*first revision*)'. They shall be not less than 20 mm nominal size and shall be of fine pitch. The length of the threaded stem shall not be less than half the diameter.

3.2.1 The body of valve having parallel threads shall be so designed that it shall not be possible to unscrew the valve from cylinder neck by normal standard tools.

3.3 In the case of valves of Type C, the valve body made out of steel may be welded to cylinder body and parts assembled.

4. Valve Outlet Connections

4.1 Outlet connections for valves of Types A and B (see 1.1) shall have left hand parallel threads and the diameter of outlet shall not be less than 12 mm. Where the outlet threads are internal, right hand threads of minimum nominal diameter of 12 mm shall be used. The threads shall be of standard fine pitch conforming to IS : 4218 (Part 3)-1976. However, thread sizes G3 and G4 of IS : 2643 (Part 1)-1975 'Specification for pipe threads for fastening purposes: Part 1 Basic profile and dimensions (*first revision*)', shall also be permitted.

5. Valving Capsule

5.1 A valving capsule, of suitable soft metal, for fitting between the taper threaded portion of the cylinder valve and the internally threaded portion of cylinder neck, may be used to ensure a gas-tight joint when the valve is screwed home. A torque limiting device shall be used. The capsule shall be made of a material compatible with LPG.

5.1.1 Alternatively, either pure unsintered polytetrafluoroethylene (PTFE) manufactured from PTFE powder free from any pigments may be used provided it does not react with the metal of the valve or of the cylinder neck or with LPG, or a jointing compound conforming to IS : 3465-1966 'Specification for jointing compounds for use in liquefied petroleum gas appliances and installations' may be used.

Note — PTFE tape manufactured by reputed firms may be degreased by using any of the degreasing agents, such as trichloroethylene and carbon tetrachloride, and the same should be packed in air-tight polythene bags and duly labelled.

6. Types of Valves and Their Minimum Constructional Requirements

6.1 The construction of valve shall be such that the same would satisfy all the basic, functional and safety requirements.

6.2 Valve outlet may be at any angle, easily accessible for connection.

6.3 Valve spindle may be at any angle to inlet threads but it shall be easily accessible for closing and opening.

6.4 Only valves with self-sealing mechanism shall be used.

6.5 All valve outlets shall have security nuts or plugs to avoid damage to threads and leakage of gas. These shall be either made of metal or of high grade plastic, such as nylon, PTFE or high density polythene.

6.6 The general machining tolerances, unless otherwise stated, shall be of medium class specified in IS : 2102 (Part 1)-1980 'General tolerances for dimensions and form and position: Part 1 General tolerances for linear and angular dimensions (*second revision*)'.

6.7 All rubber and other moulded parts used shall be compatible with LPG and shall be suitable in extreme climatic conditions in which the valve is likely to be used, the range of temperature being -10 to $+65^{\circ}\text{C}$.

6.8 Valve with gland packing shall not be used.

6.9 The minimum finished wall thickness at any part of the valve shall not be less than 2 mm.

7. Safety Requirements

7.1 All valves for commercial butane (vapour pressure up to 17 kgf/cm^2 at 65°C) may be without safety relief valve.

7.2 All valves for commercial propane (vapour pressure exceeding 17 kgf/cm^2 at 65°C) shall have in-built pressure relief valve set for design pressure of the cylinder. However, where the design of valve does not accommodate the in-built pressure relief valve, in such a case, a separate relief valve set per cylinder design pressure can be fitted on the cylinder at appropriate place.

8. Tests

8.1 Hydrostatic Test — Representative samples of machined valve bodies, before assembly, shall be subjected to a hydrostatic test at 1.5 times the maximum working pressure at which it is envisaged that the valve will be used. The scale of sampling and the criteria of conformity shall be the same as that adopted for the tensile strength and elongation test or the izod impact test, unless otherwise agreed to between the manufacturer and the purchaser.

8.2 Each assembled valve shall be subjected to pneumatic proof tests at pressures specified in 8.2.1, 8.2.2 and 8.2.3, and checked for shut-off and leak-tightness/soundness (test period: 15 seconds). The valve shall be considered to be leak-tight if the leakage rate does not exceed $4\text{ N mm}^3/\text{s}$. (The symbol 'N' indicates conversion to normal temperature pressure condition, NTP, that is, 760 mm Hg pressure and 0°C temperature). For conducting the pneumatic proof tests under 8.2.1, 8.2.2 and 8.2.3 on assembled valves, test set-ups with pressure differentimeters, bubble leak detectors or such appropriate devices shall be used to detect leakages. Use of water or any other liquid medium likely to enter the assembled valve shall be strictly avoided.

In case of valves operated with handwheels, the closing torque shall not exceed 1.2 kgf.m .

8.2.1 Tightness of joint packing (in valve outlet) and valve spindle — With valve spindle in closed position, a test pressure of 1 000 mm water column shall be applied from the outlet of the valve assembly by means of a tool. The tool shall make a leak-proof joint with the sealing surface of convolutions in the joint packing (where provided).

8.2.2 Tightness of valve spindle and valve housing — This test shall be carried out with valve spindle in closed position. A test pressure not less than the maximum working pressure shall be applied to the inlet of the valve housing (body).

8.2.3 Tightness of joint packing and housing — A tool shall be used to make a leak-proof joint with the joint packing (as in 8.2.1) which also depresses valve spindle to open position. A test pressure not less than the maximum working pressure shall be applied to the inlet of the valve housing (body).

Note — The dimensions or particulars of tools mentioned in 8.2.1 and 8.2.3 shall be as agreed to between the purchaser and the manufacturer.

9. Type Approval Tests

9.1 Design and Fabrication — Before the design of the valve is approved, it shall be checked for conformity to all requirements of this specification. Whenever there is a change in material or basic design of the valve, it shall be retested and shall conform to all the requirements of this specification.

Note — Change of material implies a basic change from one type of material to another, like steel to copper, etc.

9.2 Cycle Test — The valve shall perform satisfactorily at not less than 5 000 cycles of opening and closing operations. During the cycle test the valve shall be closed in every cycle positively. After the cycle test, the valve shall be subjected to the pneumatic test given in 8.2 and shall perform satisfactorily.

10. Marking

10.1 The valve shall be permanently marked with the following information:

- a) Quarter and year of manufacture,
- b) Manufacturer's identification mark,
- c) Number of this specification, and
- d) Maximum working pressure in kgf/cm².

10.2 Standard Marking — Details available with the Bureau of Indian Standards.

APPENDIX A

(Clause 2.5)

SAMPLING SCHEME FOR EVALUATION OF MECHANICAL PROPERTIES OF THE VALVE MATERIAL**A-1. Scale of Sampling**

A-1.1 Lot — In any consignment, all the valve blanks of the same material and size, and manufactured under similar processes of production shall constitute a lot.

A-1.2 Valve blanks shall be selected and examined for each lot separately for ascertaining their conformity to the requirements of mechanical properties.

A-1.3 The number of valve blanks to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 3. All these samples shall be taken at random from the lot.

TABLE 3 SCALE OF SAMPLING

Lot Size (Blanks)	Sample Size	
	For Izod Test n_1	For Tensile and Elongation Test n_2
N		
(1)	(2)	(3)
Up to 500	2	2
501 to 1 000	4	4
1 001 to 3 000	6	6
3 001 to 5 000	8	8
5 001 to 7 500	10	10
7 501 to 10 000	12	12
10 001 to 15 000	15	15

A-1.4 All the valve blanks selected according to col 2 of Table 3 shall be divided into two equal halves. The tensile and elongation tests shall be carried out on all samples of the first half and the izod impact test on the second half.

A-2. Criteria for Conformity

A-2.1 For Tensile and Elongation Test (see 2.3) — All the samples of the first half (see A-1.1) shall be examined for tensile and elongation test. The lot shall be declared as satisfactory with respect to the requirements of tensile and elongation test if each sample passes the test satisfactorily.

A-2.2 For Impact Test (see 2.4) — All the samples of the second half shall be examined for izod impact test. The lot shall be declared as satisfactory with respect to the requirements of the izod impact test if each valve material passes the test satisfactorily.

A-2.3 The lot shall be declared as conforming to the requirements of mechanical properties if it has been found satisfactory according to **A-2.1** and **A-2.2**.

EXPLANATORY NOTE

Manufacture, possession and use of any gas when contained in cylinders in compressed or liquefied state is regulated under the Gas Cylinder Rules, 1981 of the Government of India as amended from time to time. This specification has been prepared in consultation and agreement with the statutory authorities under these rules.

The cylinders manufactured in accordance with IS : 7142-1974 'Specification for welded low carbon steel gas cylinder for low pressure liquefiable gases not exceeding 5-litre water capacity' are smaller and are likely to be transported more often. The conventional type of valves used in normal domestic cylinders are not well suited for such cylinders. In view of this, it was felt necessary to prepare a new standard which was first published in 1978. The Committee responsible for preparation of this standard decided to revise the same to bring it in line with current manufacturing practice.

In this standard, more emphasis is laid on construction and safety requirement of valve fittings keeping in view the practice of handling of cylinders in the country.

In the preparation of this standard, assistance has been derived from the following standards:

SMS 2237 : 1968. Gas cylinders valves. General technical requirements. Sveriges Standardiseringskommission (Sweden).

SMS 2262 : 1968. Valves for gas cylinders for LPG. Filling weight below 5 kg. Sveriges Standardiseringskommission (Sweden).

The quantities in this standard have been expressed in technical metric units. However, in view of the introduction of International System (SI) units in the country, the relevant SI units and the corresponding conversion factors are given below for guidance:

$$1 \text{ kgf/cm}^2 = 98.0665 \text{ kPa (kilopascal)} = 0.980665 \text{ bar.}$$

AMENDMENT NO. 1 MAY 1998
TO
IS 8776 : 1988 SPECIFICATION FOR VALVE
FITTINGS FOR USE WITH LIQUEFIED PETROLEUM
GAS (LPG) CYLINDERS UP TO AND INCLUDING
5-LITRE WATER CAPACITY

(First Revision)

(Page 1, Title) — Substitute the following for the existing title:

'IS 8776 : 1988 SPECIFICATION FOR VALVE FITTINGS
FOR USE WITH LOW PRESSURE LIQUEFIABLE GAS
CYLINDERS UP TO AND INCLUDING 5-LITRE WATER
CAPACITY'

(Page 1, clause 1) — Substitute the first sentence with the following:

'Covers the basic requirements of material and dimensions of valve fittings for gas cylinders for low pressure liquefiable gases having water capacity up to and including 5 litres.'

(Page 1, clause 2.4, line 3) — Substitute 'kg.m' for 'kgf/mm²' and 'kgf/cm²'.

(HMD 16)