भारतीय मानक

Indian Standard

IS 8198 (Part 11) : 2023

संपीड़ित गैसों के लिए स्टील सिलिंडर — रीति संहिता

भाग 11 मिथाइल क्लोराइड गैस

(दूसरा पुनरीक्षण)

Steel Cylinders for Compressed Gases — Code of Practice

Part 11 Methyl Chloride Gas

(Second Revision)

ICS 23.020.30

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December 2023 **Price Group 7**

Gas Cylinders Sectional Committee, MED 16

FOREWORD

This Indian Standard (Part 11) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Gas Cylinders Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1980 and subsequently revised in 1988. This standard is being revised again to keep pace with the latest technological developments and international practices. Also, in this revision, the standard has been brought into the latest style and format of Indian Standards, and references of Indian Standards, wherever applicable have been updated. The following major modifications have been incorporated in this revision of the standard:

a) The material requirement of gas cylinder has been referred to IS/ISO 11114 (Part 1) and IS/ISO 11114 (Part 2);
b) ICS Code has been updated; and
c) Health hazard requirement has been added.

For safe handling of cylinders containing liquefied methyl chloride, one should be thoroughly conversant with the properties and characteristics of methyl chloride. There are several precautions and safe practices which are to be observed on account of the nature of the methyl chloride and also-because of the pressure to which the cylinders are subjected.

Manufacturers, fillers and users of the gas cylinders covered by this code should be familiar with the precautions laid down in this code in order to ensure safe and efficient operating conditions. For general information on different gases conveyed in cylinders, SP 9 : 1973 ‘Technical data sheet for gases conveyed in cylinders’ may also be referred to.

This Indian Standard is published in many parts. The other parts in this series are:

Part 5 Liquefied petroleum gas (LPG)
Part 6 Liquefied chlorine gas
Part 7 Ammonia gas
Part 8 Common organic refrigerant gases
Part 9 Sulphur dioxide gas
Part 10 Methyl bromide gas
Part 12 Gases for medical use

Manufacture, possession and use of any gas, when contained in cylinders in a compressed or liquefied form is regulated under the *Gas Cylinder Rules*, 2016 of the Government of India as amended from time to time. Although the code has been prepared in consultation and agreement with the statutory authorities under these rules, should anything in the code conflict with the provisions of *Gas Cylinder Rules*, the latter shall be adhered to.

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 kgf/cm^2 = 98.066 5 kPa (kilopascal)
= 10 m of Water column (WC)
= 0.098 066 5 MPa (megapascal)
= 0.980 665 bar
1 Pa = 1 N/m^2

In using this, requirements of IS 2432 : 1993 ‘Liquid sulphur dioxide — Specification (*first revision*)’ shall be borne in mind.

(*Continued on third cover*)

Indian Standard

CODE OF PRACTICE FOR STEEL CYLINDERS FOR COMPRESSED GASES

PART 11 METHYL CHLORIDE GAS

(Second Revision)

1 SCOPE

The standard (Part 11) covers filling, inspection, testing, maintenance and use of portable steel cylinders for the storage and transportation of liquefied methyl bromide gas in cylinders.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 7241 shall apply.

4 PROPERTIES AND PHYSICAL CONSTANTS

4.1 The properties and physical constants of methyl bromide gas are described briefly in Table 1. The vapour pressure of methyl chloride at different temperatures is given in Table 2.

4.2 Ignition Range in Air

Ignition range in air is 8.1 to 17.4 by volume from Occupational Safety and Health Administration (OSHA). This means that within the above range of concentration, the gas is capable of forming mixtures with air in which at an initial temperature of 20 °C and an initial pressure of 1 atmosphere, there is propagation of ignition, started by an ignition source.

4.3 Maximum Permissible Toxicity

Maximum permissible toxicity by volume is 100 ppm. This is the maximum concentration in air to which nearly all workers may be exposed day after day without adverse effects.

HEALTH HAZARD — Inhalation causes nausea, vomiting, weakness, headache, emotional disturbances; high concentrations cause mental confusion, eye disturbances, muscular tremors, cyanosis, convulsions. Contact of liquid with skin may cause frostbite.

Refer to the Safety Data Sheet (SDS) provided by the manufacturer.

4.4 Suitable Materials

Dry methyl chloride may be contained in such common metals as steel, iron, copper and bronze but it has a corrosive action on zinc, aluminium, and it is thought, magnesium alloys. Methyl chloride should not be used with aluminium, for it forms spontaneously flammable methyl aluminium compounds upon contact with the metal. No reaction occurs, however, with the drying agent, activated alumina. Refer to IS/ISO 11114-1 and IS/ISO 11114-2.

Table 1 Properties and Physical Constants of Methyl Chloride

(*Clause* 4.1)

Sl No.	Property	Physical Constant
(1)	(2)	(3)
i)	UN No.	1063
ii)	Synonyms	Chloromethane, methyl chloride, 74-87-3, methane, chloro-monochloromethane
iii)	Pictograms	 Flammable Health Hazard
iv)	Physical classification	Colourless poisonous gas with a faint sweet odour at normal temperature and pressure. Dry methyl chloride is highly stable at normal temperatures but decomposes at temperatures above 370 °C into and products which may be toxic.
v)	Chemical properties	
a)	Flammability	Flammable gas
b)	Molecular formula	CH_3Cl
c)	Molecular weight	50.49
d)	Boiling point at 760 torr	− 24.2 °C
e)	Melting point	− 97.6 °C
f)	Specific gravity of gas at 0 °C and 1 atm	1.74
g)	Specific gravity of liquid at − 23.95 °C	1.000
h)	Critical temperature	143.1 °C
j)	Critical pressure	65.9 kgf/cm^2
k)	Critical density	0.353 g/cc
m)	Viscosity liquid at 20 °C	0.244 cp
n)	Viscosity, gas at 20 °C	0.010 62 cp
p)	Vapour pressure at 65 °C	14.92 kgf/cm^2

Table 2 Vapour Pressure of Methyl Chloride at Different Temperatures

(*Clause* 4.1)

Sl No.	Temperature	Vapour Pressure
	°C	kgf/cm^2
(1)	(2)	(3)
i)	− 60	0.159
ii)	− 55	0.216
iii)	− 50	0.286
iv)	− 45	0.375
v)	− 40	0.484
vi)	− 37.5	0.548
vii)	− 35	0.619
viii)	− 32.5	0.697
ix)	− 30	0.783
x)	− 27.5	0.877
xi)	− 25	0.979
xii)	− 22.5	1.090
xiii)	− 20	1.212
xiv)	− 17.5	1.344
xv)	− 15	1.487
xvi)	− 12.5	1.641
xvii)	− 10	1.808
xviii)	− 7.5	1.988
xix)	− 5	2.180
xx)	− 2.5	2.387
xxi)	0	2.609
xxii)	+ 2.5	2.846
xxiii)	+ 5	3.099
xxiv)	+ 7.5	3.368
xxv)	+ 10	3.655
xxvi)	+ 12.5	3.961
xxvii)	+ 15	4.284
xxviii)	+ 17.5	4.628
xxix)	+ 20	4.993
xxx)	+ 22.5	5.378
xxxi)	+ 25	5.783
xxxii)	+ 27.5	6.209
xxxiii)	+ 30	6.658
xxxiv)	+ 32.5	7.130
xxxv)	+ 35	7.625
xxxvi)	+ 37.5	8.146
xxxvii)	+ 40	8.690
xxxviii)	+ 42.5	9.262
xxxix)	+ 45	9.861
xl)	+ 47.5	10.48
xli)	+ 50	11.13
xlii)	+ 52.5	11.82
xliii)	+ 55	12.53
xliv)	+ 57.5	13.26
xlv)	+ 60	14.03
xlvi)	+ 65	14.92
xlvii)	+ 70	16.61

5 APPROVED SPECIFICATIONS AND GENERAL GUIDANCE FOR MANUFACTURE

5.1 The cylinders shall conform to one of the specifications approved by statutory authority. A list of approved specifications for filling in this country is available with the chief controller of explosives, Nagpur.

5.2 Cylinders manufactured in accordance with approved specifications shall be provided with an additional wall thickness to allow for corrosion during service. It shall be borne in mind that corrosion is not related to the thickness of the container so that any additional thickness allowed for corrosion should be constant rather than a given proportion of thickness.

5.3 Further additional wall thickness shall also be considered necessary in order that the cylinder can safely withstand stresses due to horizontal acceleration and retardation in normal road transportation. The cylinder shall be so designed that the maximum permissible equivalent stress will not be exceeded when the stresses in the cylinder due to vertical accelerations are superimposed upon the stress due to internal pressure. The vertical accelerations considered should be those occurring in normal road transport. The provisions to be made in these and other respects as well as manufacturing tolerances to be applied will generally be decided between the user and the manufacturer. If a pronounced departure from normal practice is proposed or if other unusual features arise, the statutory authority shall be consulted.

6 INSPECTION

6.1 Inspection During Manufacture

One of the inspecting agents approved by the statutory authority shall visit the manufacturing works to check and verify the following.

6.1.1 That the chemical composition and physical properties of the steel used for the manufacture of cylinders strictly conform in all respects to the required specifications and that the chemical analysis of the material has been verified.

6.1.2 That a steel maker's guarantee certificate ensuring that the steel used for making the cylinder is manufactured in accordance with the approved process is available with the manufacturer, and that the material used for making each cylinder has been examined by him and found to the sound in all respects.

6.1.3 That the mechanical properties, the wall thickness, inner and outer surfaces of the cylinders were found satisfactory and in accordance with the requirements.

6.1.4 That the length, capacity and the mass of each cylinder were found within tolerance limit.

6.1.5 That the hydrostatic test for each cylinder had been witnessed by the inspecting authority and that there was no sign of any leakage in the cylinders.

6.1.6 That the heat treatment of the cylinders was supervised by the inspecting authority and found to be efficient and satisfactory.

6.1.7 That all cylinders which pass the above test and are accepted have been officially stamped by him.

6.2 Inspection During Usage

All the cylinders shall be examined for the following when received for filling.

6.2.1 That the cylinders conform to one of the specifications approved by the statutory authority for use in this country.

6.2.1.1 A cylinder, either not conforming to any of the standard specifications or when the specification is not known, shall not be accepted for filling, unless approved and cleared by the statutory authority.

6.2.2 That the statutory requirements regarding valves, markings, fittings, safety devices and painting are complied with.

6.2.3 That the external condition of the cylinder body is sound. Any defect, such as dent, bulge, cut, gauge, corrosion, etc, which is liable to weaken the cylinder wall as certified by a competent person will render the cylinder unfit for further use. The acceptability limit of such damaged cylinder is detailed in IS 5845.

6.2.4 That the outlet threads of valves are in good condition. That the spindle is sound and not broken and the gland washers which shall be of good quality and compatible with methyl chloride are not worn out.

6.2.5 That the cylinder is not due for periodic inspection and testing as indicated from the markings on the cylinder.

6.3 Periodic Inspection and Testing

Cylinders shall be periodically tested and inspected follows:

6.3.1 All cylinders, when received for filling, shall be checked by the filler if they are due for the

hydrostatic retesting. Hydrostatic test shall be carried out in accordance with IS 5844.

6.3.2 The cylinders are to be tested periodically as stipulated by the statutory authority (*see also* IS 15975).

6.3.3 The testing of cylinder shall be done by a competent person.

6.3.4 All cylinders, whether new or in service, shall be carefully examined internally and externally for any damage. All protective coating and foreign matter, if any, shall be removed, where necessary, prior to such examination so that the surface can be properly examined. The damage, if any, shall be carefully ascertained, the acceptability limit of the sample is detailed in IS 5845.

6.3.5 The internal examination shall be conducted by an efficient electric lamp which will give adequate illumination to have a clear view so that the defect, if any, can be detected.

6.3.6 Care shall be taken to ensure that the cylinder is fully purged with an inert gas alternatively washed with steam and dried before the test lamp is inserted for inspection.

7 DISPOSAL OF CONDEMNED CYLINDERS

7.1 Cylinders which do not comply with the requirements of inspection and testing shall be destroyed in accordance with IS 9200.

7.2 Record of such cylinders shall be closed and kept for a period of one year.

8 FITTINGS

8.1 Cylinders shall be fitted with a valve conforming to either IS 3224 or to any other specification approved by the statutory authority.

8.2 It shall have a suitable protection for the valve.

8.3 Safety device, if provided, shall be properly maintained (*see* IS 5903).

8.4 The colour of the paint on the cylinders (*see* IS 4379) shall always be maintained by periodically repainting them.

NOTE — In case of cylinders meant for export purposes, the colour of the paint may not be changed. If repainting is considered necessary, the colour may be the same as that adopted in the country of use.

9 FILLING

9.1 While filling, the cylinder shall be filled in such a manner that the filling ratio does not exceed 0.87 (*see* IS 3710).

9.2 The amount of liquefied methyl chloride charged into each cylinder shall be determined by weighing after the cylinder has been disconnected from the line and on no account the cylinder shall be charged in excess of the filling ratio.

9.3 All the cylinders shall be carefully examined for leaks after filling. Where leaks cannot be stopped, the cylinders shall be emptied and inspected for the cause of leakage.

9.4 Emptying the cylinder shall not be accelerated by direct heating of the cylinder.

9.5 Cylinders shall be filled in an approved filling station.

9.6 Filling staff shall identify the cylinders from their light brunswick green ground colour and signal red colour of the band, and the methyl chloride symbol CH_3Cl (*see* IS 4379) punched on the cylinder before proceeding to fill them. The colour coding shall be considered as secondary.

10 MARKING AND LABELLING

10.1 Marking

10.1.1 *On Cylinders*

Each cylinder shall be permanently marked on the valve end of the cylinder with the following markings:

a) Serial number, identification and symbol of the manufacturer;
b) Number of the standard to which the cylinder conforms;
c) Test pressure;
d) The date of hydrostatic test with code mark of the station where the test was carried out;
e) Water capacity;
f) Tare and gross weight;
g) Working pressure; and
h) Methyl chloride symbol, CH_3Cl.

10.1.2 *On Valves*

The following markings shall be made on cylinder valves:

a) Number of the standard;
b) Month and year of manufacture;
c) Test pressure of valve; and
d) Manufacturer’s symbol.

10.2 Labelling

10.2.1 Each filled cylinder shall carry a label tacked to the cylinder, detailing the name of the filling station, its location, name of the gas in bold capital, '**METHYL CHLORIDE**', its grade, net weight and the warning instructions as stipulated in the *Gas Cylinder Rules*.

10.2.2 The minimum cautionary notice shall be worded as under:

WARNING — Flammable liquid and gas under pressure vapour harmful keep away from heat, sparks and open flame use only with adequate ventilation avoid breathing vapour avoid contact with skin.

10.2.3 The cylinder shall also be marked with red gas label as given in Fig. 4 of IS 1260 (Part 1).

11 STORAGE

11.1 Cylinders shall be stored in a dry ventilated place away from excessive heat or danger of fire and protected from accumulation of snow and ice. It is preferable that cylinder storage room be fire-proof. The storage shall not be used for any purpose other than storage of cylinders.

11.2 Cylinders shall never be stored near gangways or elevators or near ventilating systems.

11.3 Dangers can be reduced by storing cylinders so that the oldest stock can be used first.

11.4 Keeping the full and empty cylinders separately and storing in an orderly way will reduce the necessary handling and confusion and permit frequent inspection for signs of leaks or other dangers. Valve protection hoods shall always be kept in place except when cylinders are actually being emptied.

11.5 Cylinders shall be stored fin an upright position. Cylinders shall be adequately supported in the vertical position while storing and during use to prevent from falling.

11.6 Cylinders shall be protected iron tempering by unauthorized individuals.

12 HANDLING

12.1 The gas shall be called only by its name.

12.2 Adequate care shall be taken in handling the cylinders so that these are not dropped or struck against each other violently.

12.3 Cylinders shall be moved on properly balanced hand trucks, preferably with rubber tyres. A clamp or chain support two-thirds of the way up the cylinder shall be used.

12.4 Hoisting of cylinders is not recommended. However, if hoisting cannot be avoided, a lifting clamp cradle or carrier shall always be used. Cylinders shall never be hoised with lifting magnet, rope or chain sling. A cylinder shall never be lifted by the hood as it is not strong enough to support the weight.

12.5 The cylinders shall not be used as rollers to move other equipment.

12.6 In case of tonne containers, stationary or movable jib cranes or travelling overhead rail hoists of at least two tonnes capacity and capable of clearing the load at least 2 metres above the track rail, are suitable for lifting tonne containers.

12.7 A beam equipped with hooks to grip the edge of the tonne container is satisfactory device for lifting the tonne containers.

12.8 Travelling overhead hoists or specially equipped trucks and dollies can be used for moving the tonne containers to storage or point of use.

12.9 Tonne containers can be rolled on the flat surface but are more easily handled when rolled on steel rails supported a few centimetres above the floor.

12.10 Repairing, painting or altering colour of cylinders or valves shall not be done by consumer. Marking stamped on the cylinders and valve shall not be tempered with.

12.11 Valves shall always be closed before the cylinders are moved.

12.12 Cylinder shall not be:

a) Lifted with electromagnet;
b) Kept near elevator, gangway or in a location where moving objects can fall on it;
c) Left near a source of heat like furnace, flame or naked light or hot slag;
d) Kept close to welding or cutting work so that spark may fall on it;
e) Used as rollers, supports or for any purpose other than storing gas;
f) Kept in contact with an electric wire or fitting so that it may become a path of an electric circuit;
g) Kept near acid or corrosive substances;

h) Kept so as to obstruct the approach to a fire-extinguisher;

j) Lifted by its cap;

k) Dragged or slided on floor. For this a suitable hand-cart should be used; and

m) Rolled over oily or greasy floor.

13 TRANSPORTATION

13.1 Cylinders may be shipped by truck, rail or water.

13.2 Cylinders shall not be loaded on vehicles in such a manner that they may bounce or strike against each other.

13.3 During transport, cylinders shall not project in the horizontal plane beyond the sides or ends of the vehicle.

13.4 Cylinder vehicle shall be blocked or braced and secured to prevent movement or falling down.

13.5 There shall not be any sharp projections on the inside of the vehicle which can damage the cylinder wall.

13.6 Leaky or defective cylinders shall not be transported knowingly.

13.7 When cylinders are transported by rail, it shall be done in accordance with the *Railway Red Tariff Rules*. Cylinders shall be pasted with label for dangerous and poisonous gas as recommended by the railways.

13.8 The transport contractor or the personnel involved in the transport of cylinders shall be informed about informed of the special care that has to be taken for cylinders and shall be well informed about toxicity of methyl chloride.

14 REMOVING METHYL CHLORIDE

14.1 Connection

14.1.1 Outlet threads on container valves are not tapered pipe threads. Connections shall be made with yoke and adapter.

14.1.2 Flexible 12.7 mm copper tube of at least 35 kgf/cm^2 working pressure shall be used for connections between cylinder and stationary piping.

14.1.3 A shut-off valve suitable for liquid methyl chloride service shall be provided at the beginning of stationary piping to simply changing of containers.

14.2 Valves

14.2.1 To unseat, the end of the valve lever shall be struck with hand and then opened slowly.

14.2.2 One complete turn permits maximum discharge. The valve shall not be forced beyond this point.

14.2.3 If the valve is too tight to open, the packing gland nut shall be slightly loosened to free the stem.

14.2.4 Large wrenches or pipe wrenches shall not be used on valve opening.

15 DISCHARGE

15.1 Cylinders discharge gas when upright and liquid when inverted.

15.2 Inverted cylinders shall be supported at the shoulders and held in place by clamps or chains about the cylinder body.

15.3 Tonne containers are unloaded from a horizontal position, one valve above the other. The upper valve discharges methyl chloride gas, the lower liquid methyl chloride.

15.4 Tonne containers shall be placed in a cradle or carefully blocked during discharge.

16 GAS FLOW

16.1 The rate of gas flow can be increased by improving air circulation about the container or by increasing the room temperature if it is below normal.

NOTE — Heat shall not be applied directly to the cylinder for any reason.

16.2 If a high rate of gas flow is required, methyl chloride shall be withdrawn as liquid and converted to gas by means of vaporizer.

16.3 Joining together or manifolding of the outlets of several cylinders to increase the flow rate shall not be done.

16.4 The amount of methyl chloride remaining in a cylinder shall be best found by comparing the weight of the cylinder with the tare weight when empty. If the container is placed on a scale during unloading, the amount remaining is known at all times.

16.5 When methyl chloride is being absorbed in a liquid, there is sometimes a tendency for the liquid

to be sucked back into the container as it becomes empty. This may result in serious accidents.

NOTE — A vacuum loop shall be employed whenever methyl chloride from cylinders or containers is absorbed in a liquid.

17 GENERAL PRECAUTIONS

17.1 Cylinder shall be handled by properly instructed and trained persons.

17.2 Attempts shall never be made to remove the valve from the cylinder body except by competent persons fully conversant with the job.

17.3 Cylinders with defects shall be immediately labelled appropriately and returned to the supplier.

17.4 Marking and identification colour of a cylinder shall never be defaced.

17.5 If any incident occurs to the cylinder, the supplier shall be immediately informed giving the cylinder number, nature of the damage and, if possible, the reasons for the incident.

17.6 When there is a doubt in proper handling of the cylinder, the manufacturer or supplier of the cylinder shall be consulted.

17.7 The cylinder shall not be filled with any other gas.

18 METHYL CHLORIDE LEAKS

18.1 Methyl chloride leaks shall always be taken care of immediately or they will become worse.

18.2 Corrective measures shall be undertaken only by trained men wearing proper safety equipment.

18.3 If the leak is large, all persons in the affected area shall be warned.

18.4 Leaky cylinders shall be moved quickly to a safe open area.

18.5 If methyl chloride is leaking as liquid, the cylinder shall be turned so that the leaking side is on the top.

18.6 Water shall not be poured on methyl chloride leak.

18.7 Leaks at valve inlet and body usually require special handling and emergency equipment.

18.8 Leaks around valve stems and valve discharge outlet shall be stopped by closing the valve or tightening the packing gland nut or replacing gaskets.

18.9 A leaking container shall not be transported.

18.10 Suitable gas masks with eye shields shall be available within easy reach, whenever cylinders and containers are handled.

19 RECORDS

Filling station shall maintain the following record in respect of each cylinder examined and tested for filling:

a) Name of the manufacturer and the owner;
b) Cylinder number;
c) Specifications to which the cylinder conforms;
d) Date of original hydrostatic test;
e) Test reports and certificates furnished by the manufacturer;
f) Test pressure;
g) Maximum working pressure;
h) Water capacity in litre;
j) Date of the last hydrostatic test;
k) Tare and gross weight of the cylinder;
m) Variation, if any, in the tare weight marked on the cylinder and actual tare weight at the time of hydrostatic test;
n) Type of the valve fitted;
p) Type of the safety device, if fitted;
q) Weight of the methyl chloride charged;
r) Maintenance attended; and
s) Remarks.

NOTE — Permission obtained from the statutory authority permitting the use of cylinder, shall be preserved till the cylinder is condemned.

ANNEX A

(*Clause 2*)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 1260 (Part 1) : 1973	Pictorial marking for handling and labelling of goods: Part 1 Dangerous goods (*first revision*)
IS 3224 : 2021	Valve for compressed gas cylinders excluding liquefied petroleum gas (LPG) cylinders — Specification (*fourth revision*)
IS 3710 : 1978	Filling ratios for low pressure liquefiable gases contained in cylinders (*first revision*)
IS 4379 : 2021	Identification of the contents of industrial gas cylinders (*second revision*)
IS 5844 : 2014	Hydrostatic stretch testing of compressed gas cylinders — Recommendations (*first revision*)
IS 5845 : 1993	Code of practice for inspection of low pressure welded steel gas cylinders other than LPG cylinders in use (*second revision*)
IS 5903 : 2014	Recommendation for safety devices for gas cylinders (*first revision*)
IS 7241 : 1981	Glossary of terms used in gas cylinder technology (*first revision*)
IS 9200 : 2021	Methods of disposal of unserviceable compressed gas cylinders — Code of practice (*second revision*)
IS 15975 : 2020	Gas cylinders — Conditions for filling gas cylinders (*first revision*)

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(*Continued from second cover*)

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Gas Cylinder Sectional Committee, MED 16

Organization	*Representative(s)*
Petroleum and Explosive Safety Organization, Nagpur	SHRI P. KUMAR **(*Chairperson*)** SHRI K. S. RAO (*Alternate* I) SHRI P. SEENIRAJ (*Alternate* II)
All India Industrial Gases Manufacturers Association, New Delhi	SHRI SAKET TIKU SHRI K. R. SAHASRANAM (*Alternate*)
Ashok Leyland Limited, Chennai	SHRI VED PRAKASH GAUTAM SHRI FAUSTINO V. (*Alternate*)
Automotive Research Association of India, Pune	DR S. S. THIPSE SHRI SANDEEP RAIRIKAR (*Alternate*)
Bharat Heavy Electricals Limited, Project Engineering Management, Noida	SHRI SAYAN ROY SHRI KARAN YADAV (*Alternate*)
Bharat Petroleum Corporation Limited, Mumbai	SHRI RAJWINDER SINGH PANESAR SHRI AAKASH AGARWAL (*Alternate*)
Bhiwadi Cylinders Private Limited, New Delhi	SHRI MANVINDER SINGH SHRI SUNIL K. DEY (*Alternate*)
Directorate General of Quality Assurance, Ministry of Defence, New Delhi	COL SABIR HUNDEKAR
Everest Kanto Cylinder Limited, Mumbai	SHRI AYUSH PAWAR SHRI GHANSHYAM GOYAL (*Alternate* I) SHRI A. S. V. S. PRASAD (*Alternate* II)
Gujarat Gas Limited, Ahmedabad	SHRI DHARMESH SAILOR SHRI RAVI RAVIPALLI (*Alternate*)
Hindustan Petroleum Corporation Limited, Mumbai	SHRI RAKESH G. KHADE SHRI SHIVA SHANKAR (*Alternate* I) SHRI DINESH PANGTEY (*Alternate* II)
Ideal Engineers Hyderabad Private limited, Hyderabad	SHRI SATISH KABRA SHRI KUNAL KABRA (*Alternate*)
Indian Oil Corporation Limited, Mumbai	SHRI SOUMITRA CHAKRABORTY SHRI CHANDRAKANT GHATOL (*Alternate*)
Indraprastha Gas Limited, New Delhi	SHRI RAKESH KISHAN AGRAWAL SHRI BIMAL KARAN (*Alternate* I) SHRI AVIRAL RAJEEV (*Alternate* II)
INOX India Limited, Vadodara	SHRI DEEPAK V. ACHARYA SHRI NITIN JANSARI (*Alternate*)
International Industrial Gases Limited, Howrah	SHRI DEVENDRA K. GARG SHRI NIKHILESH K. GARG (*Alternate*)

Organization	*Representative(s)*
Jai Maruti Gas Cylinders Private Limited, Gwalior	SHRI MANU K. NIGAM
Kosan Industries Limited, Surat	SHRI GIRISHBHAI K. DESAI SHRI S. B. BOLMAL (*Alternate*)
LPG Equipment Research Centre, Bengaluru	SHRI T. D. SAHU SHRI SANTOSH KUMAR GUPTA (*Alternate*)
Linde India Limited, Kolkata	SHRI RAMANA VUTUKURU
Mahanagar Gas Limited, Mumbai	SHRI S. MURALI SHRI MILIND M. RANADE (*Alternate* I) SHRI SACHIN GUMASTE (*Alternate* II)
Maruti Suzuki Indian Limited, Gurugram	SHRI GURURAJ RAVI SHRI ARUN KUMAR (*Alternate* I) SHRI RAJESH KUMAR (*Alternate* II)
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