

गैस सिलेंडर प्रौद्योगिकी में प्रयुक्त —  
पारिभाषिक शब्दावली  
(दूसरा पुनरीक्षण)

Gas Cylinder Technology —  
Glossary of Terms  
( Second Revision )

ICS 23.020.35

© BIS 2024



भारतीय मानक ब्यूरो  
BUREAU OF INDIAN STANDARDS  
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI - 110002  
[www.bis.gov.in](http://www.bis.gov.in) [www.standardsbis.in](http://www.standardsbis.in)

July 2024

Price Group 8

## FOREWORD

This Indian Standard (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 1974 and subsequently revised in 1981. 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. In this revision some of the new definition has been incorporated.

This glossary has been prepared with the object of standardizing and coordinating the technical terms in current use in the gas cylinder technology.

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 Rule*, the latter shall be adhered to.

The composition of the Committee responsible for the formulation of this standard is given in [Annex A](#).

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.

*Indian Standard***GAS CYLINDER TECHNOLOGY — GLOSSARY OF TERMS***( Second Revision )***1 SCOPE**

This standard covers a glossary of general terms used in gas cylinder technology. Specific terms used for a typical gas or cylinder (for example, those used in acetylene cylinders) have not been included.

**2 REFERENCES**

The standards given below contain provisions which, through reference in this text, constitute provision 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:

<i>IS No./Other Standard</i>	<i>Title</i>
IS 3710 : 1978	Filling ratios for low pressure liquefiable gases contained in cylinders ( <i>first revision</i> )
ASME B16.34 : 2020	Valves — Flanged, threaded and welding end

**3 TERMS AND DEFINITIONS**

**3.1 ACME Thread** — A flat-topped screw thread for power transmission. This thread has a 29 degree included angle between adjacent thread faces compared with the 60 degree angle of the US standard V thread.

**3.2 Actuator Device** — It used to operate a valve using electric, pneumatic or hydraulic means. It is often used for remote control or sequencing of valve.

**3.3 Ageing** — A change in a metal by which its structure recovers from an unstable condition produced by quenching or cold working.

**3.4 Alloy Steel** — A steel consisting primarily of iron with some percentage of one or more other elements such as chromium, nickel, manganese, or vanadium deliberately added to enhance its properties.

**3.5 Ambient Temperature** — The prevailing temperature of the environment immediately surrounding an object.

**3.6 Anaesthetic Gas** — Gas with narcotic characteristics for medical use.

**3.7 Approach Channel** — The passage or passages through which gas must pass from the cylinder to reach the operating parts of the safety device.

**3.8 Asphyxiant Gas** — Gas which can cause suffocation when inhaled by man or animals.

**3.9 Atmospheric Pressure** — The external pressure exerted on a body by the atmosphere is 1.013 bar (14.7 psi) absolute at sea level.

**3.10 Austenitic Stainless Steel** — The common stainless steel, where the primary microstructure is austenite and the composition primarily iron but also includes both chromium and nickel. The steels are designated as 300 series such as 304, 316, CF8M, etc.

**3.11 Back Seat** — A shoulder on the stem of a gate or globe valve which seals against a mating surface inside the bonnet to prevent leakage of media through the bonnet stuffing box when the valve is fully opened.

**3.12 Ball** — The closure element of a ball valve.

**3.13 Ball Valve** — A valve using a spherical closure element which is rotated through 90° to open and close the valve.

**3.14 Bar** — A metric unit of pressure. One bar equals 14.5 psi, also equals to 100 kPa.

**3.15 Batch (for Cylinder)** — Batch shall mean cylinders heat-treated in the same manner and constructed from steel of similar analysis and made by the same steel manufacturer.

**3.16 Batch (for Valve)** — Forged blanks, casting, slugs, etc, all of the same type, size produced from the material from the same heat.

**3.17 Breathing Gas** — Gas used in a breathing apparatus to aid breathing. For example, air, nitrogen/oxygen mixtures.

**3.18 Bolted Bonnet** — A bonnet which is connected to a valve body with bolts or studs and nuts.

**3.19 Bonnet** — The top part of a valve, attached to the body, that guides the stem (spindle) and adapts to extensions or operators.

**3.20 Bore (or Port)** — The inside diameter of the smallest opening through a valve, for example, inside diameter of a seat ring, diameter of hole through ball in a ball valve.

**3.21 Bottom Spindle (also known as Seal Insert Holder or Seat Plug or Lower Plug)** — Lower member of a two-piece spindle actuated by the top spindle.

**3.22 Brinell Hardness Number** — A number indicating metal hardness using the Brinell scale, can be converted to Rockwell B and Rockwell C hardness by reference to conversion tables.

**3.23 BSP Thread** — The principal features of the British Standard Pipe (BSP) thread form are that the angle between the thread flanks is 55 degrees and the thread has radii at both the roots and the crests of the thread.

**3.24 BSW Thread** — The principal features of the British Standard Whitworth (BSW) thread form are that the angle between the thread flanks is 55 degrees and the thread has radii at both the roots and the crests of the thread.

**3.25 Bursting Disc (Rupture Disc)** — An operating part of a safety device in the form of a disc, usually of metal and which is so held as to close the safety device channel under normal conditions. The disc is intended to burst at a predetermined pressure to permit the escape of gas.

**3.26 Burst Pressure (Cylinder)** — Highest pressure reached in a cylinder during a burst test.

**3.27 Burst Pressure (Valve)** — Minimum pressure applied to a valve during hydraulic burst pressure test.

**3.28 Butane Gas** — A mixture consisting predominantly of C<sub>4</sub> hydrocarbons with some C<sub>3</sub> hydrocarbons and a small amount of C<sub>5</sub> hydrocarbons.

**3.29 Butterfly Valve** — A short face-to-face valve that has a movable vane, in the center of the flow stream, which rotates 90 degrees as the butterfly valve opens and closes.

**3.30 Carbon Steel** — Iron containing carbon in the form of carbides, about 0.1 percent to 0.3 percent carbon with no other alloying elements other than the sulphur, phosphorus, and other elements present in almost all steels.

**3.31 Cast Iron** — The common term for cast gray iron or iron containing flake carbon in the range of 1 percent to 2 percent. Cast iron is brittle, exhibiting very little ductility before fracturing.

**3.32 Casting** — A product or the act of producing a product made by pouring molten metal into a mold and allowing it to solidify, thus taking the shape of the mold.

**3.33 Chain wheel** — Operated valve an overhead valve operated by a chain drive wheel instead of a hand wheel.

**3.34 Check Valve (also known as Non-return Valve)** — A one-directional valve that is opened by the fluid flow in one direction and which closes automatically when the flow stops or reverses direction.

**3.35 City Gas** — The gas supplied by the municipality to urban areas and industries and delivered by the gas network.

**3.36 Closure Elements (Obturator)** — The moving part of a valve, positioned in the flow stream, which controls flow through the valve. Ball, gate, plug, clapper, disc, etc are specific names for closure elements.

**3.37 Coal Gas** — The produced by carbonizing coal.

**3.38 Combination Bursting Disc and Fusible Plug (Combination Relief Device)** — A bursting disc in combination with a low melting point fusible plug intended to prevent the disc bursting at its predetermined bursting pressure unless the temperature is also high enough to cause yielding or melting of the fusible metal.

**3.39 Compressed Gas** — ‘Compressed gas’ means any permanent gas, liquefiable gas or gas dissolved in liquid under pressure or gas mixture which in a closed gas cylinder exercise a pressure either exceeding 2.5 kgf/cm<sup>2</sup> abs (1.5 kgf/cm<sup>2</sup> gauge) at + 15 °C or a pressure exceeding 3 kgf/cm<sup>2</sup> abs (2 kgf/cm<sup>2</sup> gauge) at + 50 °C or both including cryogenic liquids.

**3.40 Critical Pressure** — The pressure of saturated vapour of a substance at critical temperature.

**3.41 Critical Temperature** — Temperature above which the substance cannot exist in the liquid state.

**3.42 Critical Volume** — It is the volume occupied by a unit mass of the substance at critical temperature under the critical pressure.

**3.43 Cryogenic Temperature** — Any temperature below about - 240 °F (- 151 °C).

**3.44 Cryogenic Valve** — A valve meant for functioning at cryogenic temperatures.

**3.45 Cycle (Valve)** — A single complete operation or process returning to the starting point. A valve, stroked from full open to full closed and back to full open, has undergone one cycle.

**3.46 Cycle Test/Endurance Test** — Tests typically done to find out whether an application can withstand the processing load it is expected to have to endure for a specified period/cycle.

**3.47 Cylinder Neck** — The part of the cylinder that has the threaded connection for the valve stem (inlet).

**3.48 Cylinder Valve** — Mechanical device attached to a compressed gas cylinder that permits flow into or out of the cylinder when the device is in the open position and prevents flow when in the closed position.

**3.49 Density of Gas** — The mass of unit volume of gas at a specified temperature and pressure.

**3.50 Design Appraisal** — A procedure by which a certifying authority, appointed by the purchaser, appraises the design parameters of the equipment and/or materials they are buying. The supplier shall submit drawings, calculations and documents as required to the CA, in conjunction with those normally required for review and acceptance by the purchaser.

**3.51 Design Pressure (Cylinder)** — Pressure used in the formula for the calculation of the minimum wall thickness.

**3.52 Diaphragm** — A round, thin and flexible sealing device secured and sealed around its outer edge and sometimes around a central hole in the diaphragm with its unsupported area free to move by flexing.

**3.53 Differential Pressure** — The different in pressure across a valve in a pressurized line. The difference in pressure between any two points in a pressurized system under flowing conditions.

**3.54 Dip Tube (also known as Siphon Tube or Eductor Tube)** — Tube fitted to the valve to allow withdrawal of liquefied gas without inversion of the cylinder/tube that is attached to the valve inlet to withdraw liquid from the cylinder.

**3.55 Disc (Globe Valve)** — The closure element of a globe valve. The disc (sometimes referred to as a valve, poppet, or plug) moves to and from the seat in a direction perpendicular to the seat face.

**3.56 Dissolved Gas** — Dissolved gas means a gas which is dissolved under pressure in a fluid solvent appropriate to the particular gas.

**3.57 Dry Gas** — A gas having a dew point, at a pressure of 100 kPa absolute, below - 40 °C.

**3.58 Elastomer** — A natural or synthetic material are used in synthetic rubber parts such as O-rings.

**3.59 Excess Flow Check Valve** — Valve which automatically shuts off or limits the gas flow when the flow exceeds a set design value.

**3.60 Explosion Proof** — A statement associated with a design that is capable of passing certain specified tests after exposure to potentially explosive environment. Generally, these tests must be referenced to a particular specification. This is especially important for electrical devices, such as solenoids and switches.

**3.61 External Coating (Valve)** — Coating applied to protect valves against various environments, sea air, salt water, earth burial, and normal air exposure.

**3.62 External Leak Tightness (Valve)** — Leak tightness to atmosphere (leakage in and/or leakage out) when the valve is open and the outlet is sealed.

**3.63 Fabricated Valve** — One in which the body and hub parts are not cast, but rather are formed from plate or pipe and then welded or bolted together.

**3.64 Failure Torque ( $T_f$ )** — Opening or closing torque (whichever is the lower value) applied to the valve operating device to obtain mechanical failure of the valve operating mechanism and/or valve operating device.

**3.65 Female Thread** — An internal screw thread designed to mate with a component having male (external) thread of the same size and type.

**3.66 Filling Pressure** — The maximum permissible gauge pressure, converted to 15 °C, at which a gas cylinder for permanent gas or gas dissolved under pressure can be filled.

**3.67 Filling Ratio (for Liquefiable Gases)** — Filling ratio means the ratio of the weight of a liquefiable gas introduced in the cylinder to the weight of the water that the cylinders will hold at 15 °C.

**3.68 Fitting** — Any device used for connecting elements in fluid lines, for example, elbows, tees, nipples, unions, flanges, etc.

**3.69 Flammable Gas** — Flammable gas means any gas which, if either a mixture of 13 percent or less (by volume) with air forms a flammable mixture or the flammability range with air is greater than 12 percent regardless of the lower limit and these limits shall be determined at atmospheric temperature and pressure.

NOTE — For the purpose of this clause: 'Flammability range' means the difference between the minimum and maximum percentages by volume of the gas in mixture with air that forms a flammable mixture.

**3.70 Flammability Range** — The difference between the minimum and maximum percentage by the volume of the gas in mixture with air that forms a flammable mixture.

**3.71 Flow** — A fluid in motion in a conducting line/passage.

**3.72 Flow Capacity** — The capacity in cubic metre per minute of free air discharged at the required flow rate pressure.

**3.73 Flow Coefficient ( $C_v$ )** — The flow coefficient of a device is a relative measure of its efficiency at allowing fluid flow. It describes the relationship between the pressure drop across an orifice valve or other assembly and corresponding flow rate.

**3.74 Flow Laminar** — The flow of a viscous fluid in which the fluid moves in parallel layers with a fixed velocity gradient from the centerline to the containing walls of the conduit. Sometimes referred to as 'streamline flow'.

**3.75 Flow Meter** — An instrument used to measure flow rate or total flow or both.

**3.76 Flow Rating Pressure** — The pressure at which a safety device is rated for flow capacity.

**3.77 Flow Restrictor** — Device designed to limit the maximum flow through the valve outlet.

**3.78 Flow Turbulent** — The random flow of a fluid in which the velocity at a certain point in the fluid varies irregularly.

**3.79 Fluid** — Any non-solid substance that can be made to flow. Both liquids and gases are fluids.

**3.80 Fluid Pressure** — Fluid pressure refers to a measurement of the force per unit area that acts on an object in the fluid or on a closed container's surface. Furthermore, the cause of this pressure is due to acceleration, gravity or by forces that are outside the closed container. The application of the pressure is in all directions because the fluid has no definite shape.

**3.81 Force** — The intensity of an influence tending to produce motion, distortions, or change of shape. The product of unit force and the area over which it acts.

**3.82 Forging** — A part that is formed by heating followed by hammering, rolling, pressing or applying other compressive forces to create a specific shape.

**3.83 Friction** — The resistance to motion between two contacting surfaces or substances. Friction also is developed between a flowing fluid and the inner wall of the conducting pipe, resulting in a drop of pressure.

**3.84 Fuel Gas** — The gas supplied to carbonization plants for heating carbonization vessels.

**3.85 Full Flow (Valve)** — Valve's open position when maximum flow capacity is achieved.

**3.86 Fusible Plug (Thermally Activated Relief Device)** — An opening part in the form of plug filled with suitable fresh low melting point material, usually a metal alloy, which closes the safety device channel under normal condition and is intended to yield or melt at a predetermined temperature to permit the escape of gas.

**3.87 Galling** — The tearing of metal when two elements rub against each other. Usually caused by lack of lubrication or extreme contact pressure.

**3.88 Gas** — Any substance that is completely gaseous at 1.013 bar and 20 °C or has a vapour pressure exceeding 3 bar at 50 °C.

**3.89 Gas Cylinder** — Gas cylinder or cylinder means any closed metal container having a volume exceeding 500 ml but not exceeding 1 000 litres intended for the storage and transport of compressed gas, including any liquefied petroleum gas (LPG) container or compressed natural gas (CNG) cylinder fitted to a motor vehicle as its fuel tank but not including any other such container fitted to a special transport or undercarriage and includes a composite cylinder and cryogenic container, however, the water capacity of cylinder used for storage of CNG, nitrogen, compressed air, etc may exceed 1 000 litres up to 3 000 litres provided the diameter of such cylinder does not exceed 60 cm.

**3.90 Gasket** — A seal or packing placed between mechanical joints (such as flanges) to prevent the escape or the flowing medium.

**3.91 Gate** — The closure element of a gate valve.

**3.92 Gate Valve** — A straight-through pattern valve whose closure element is a wedge or parallel-sided slab, situated between two fixed seating surfaces, with means to move it in or out of the flow stream in a direction perpendicular to the pipeline axis.

**3.93 Gauge Pressure** — A instrument, usually with a threaded connection, for measuring and indicating the pressure in a piping system at the point at which it is connected.

**3.94 Gland (or Gland Bushing)** — That part of a valve which retains or compresses the stem packing in a stuffing box (where used) or retains a stem O-ring, lip seal, or stem O-ring bushing. Sometimes manually adjustable.

**3.95 Gland Nut (also known as Packing Nut or Bonnet)** — Thread valve component tightened onto or into the valve body to retain and compress the packing, diaphragm(s) or other sealing member(s).

**3.96 Globe Valve** — A valve whose closure elements is a flat disc or conical plug sealing on a seat which usually is parallel to the flow axis. The tortuous flow path produces a relatively high pressure loss.

**3.97 Graphite** — Flexible carbon material used to make gaskets and packing. The gaskets may be flat graphite sheet or have metal inserts for added strength. The packing is a combination of lattice braided rings used as anti-extrusion or wiper rings and die-formed rings which are compressed to affect the seal.

**3.98 Hardening and Tempering (Cylinder)** — Uniform heating of a cylinder to a sufficient temperature above the upper critical point ( $AC_3$ ) of steel followed by quenching and tempering at a suitable temperature.

**3.99 Hand Wheel** — Manually operated device attached to the valve spindle used to open and close the valve.

**3.100 Head** — The height of an open column of liquid above a given datum, expressed in linear units, for example, feet of water, mm of water column, inches of mercury etc. It is another way of expressing pressure.

**3.101 Header** — Same as manifold.

**3.102 Heat Analysis** — A chemical analysis, conducted by the foundry immediately prior to pouring, which measures the exact chemical composition of a particular batch of molten metal. It does not include analysis of physical properties.

**3.103 Heat Treatment** — Describes any process or procedure by which the internal structure of steel is altered by heating to produce desired physical characteristics. This is usually accomplished by furnace heating followed by controlled cooling.

**3.104 Heat Treatment Charts** — Furnace charts providing a temperature versus time record of the heating and cooling cycle, required by a specific heat treatment process for a particular furnace load of steel or steel parts.

**3.105 High Pressure Cylinder** — Cylinder with a marked working pressure of 35 kgf/cm<sup>2</sup> or more.

**3.106 High Pressure Liquefied Gas** — Liquefied gas which has a critical temperature between - 50 °C and + 65 °C.

**3.107 Hydraulic** — Pertaining to or using water, oil, or other liquids.

**3.108 Hydrostatic Test** — Hydrostatic test means the test to which a cylinder is subjected to a hydrostatic pressure equal to the test pressure of the cylinder.

**3.109 Hydrostatic Test (Cylinder)** — Subjecting the cylinder to a hydrostatic pressure equal to the test pressure of the cylinder. The pressure is increased gradually till the required test pressure is reached, after which the pressure is retained for specified time. The cylinder is then examined for any reduction in pressure, leakage, visible bulge or deformation.

**3.110 Hydrostatic Stretch Test** — Hydrostatic stretch test means subjecting the cylinders to a hydrostatic pressure equal to the test pressure of the cylinder and recording the permanent stretch undergone by the cylinder.

**3.111 Impact Test (Izod and Charpy)** — These tests measure the total amount of energy that a material is able to absorb. The energy absorption is directly related to the brittleness of the material.

**3.112 Industrial Gas** — Gas which is used in technical process in industrial production or similar activity.

**3.113 Inert Gas/Rare Gas** — Inert gas means a gas which is resistant to chemical action under normally encountered conditions.

**3.114 Inspecting Authority** — Person or persons approved by the statutory authority to inspect gas cylinders.

**3.115 Inner Seat Ring** — The inner part of a two-piece valve seat assembly.

**3.116 Internal Leak Tightness** — Leak tightness across the valve seat (leakage in and/or leakage out), when the valve is closed.

**3.117 Leak** — An unintended flow of gas or liquid in excess of specified rate corrected to NTP.

**3.118 Liquefied Natural Gas (LNG)** — Natural gas in the liquid state. For the gas to remain liquefied, the temperature must be maintained in the cryogenic region. The liquid occupies far less volume than an equivalent volume of gas and it can be readily transported by ship and stored ashore in insulated tanks to await re-gasification.

**3.119 Liquid Penetrant Inspection** — An NDE (Non-destructive Evaluation) method of detecting the presence of surface cracks and surface imperfections in welds or castings through use of a special red dye.

**3.120 Liquefaction of Gases** — The act or process of transforming of a gas into a liquid by either cooling or subjecting it to high pressure.

**3.121 Liquefiable Gas** — Liquefiable gas means a gas that may be liquefied by pressure at  $-10\text{ }^{\circ}\text{C}$  but will be completely vaporized when in equilibrium with normal atmospheric pressure (760 mm Hg) at  $17.5\text{ }^{\circ}\text{C}$  which value shall be increased to  $30\text{ }^{\circ}\text{C}$  for toxic gases.

**3.122 Liquefiable Petroleum Gases (LPG)** — Any material which comprises predominantly of any of the following hydrocarbons or mixture of them:

Propane ( $\text{C}_3\text{H}_8$ ), Propylene ( $\text{C}_3\text{H}_6$ ), Butane ( $\text{C}_4\text{H}_{10}$ ), (n-butane and isobutane) and butylene ( $\text{C}_4\text{H}_8$ ).

**3.123 Locking Device (Valve)** — A mechanism provided on valve operators to prevent unauthorized operation or tampering.

**3.124 Low Pressure Cylinder** — Cylinder with a marked working pressure of less than  $35\text{ kgf/cm}^2$ .

**3.125 Low Pressure Liquefied Gas** — Liquefied gas which has a critical temperature above  $+65\text{ }^{\circ}\text{C}$ .

**3.126 Magnetic Particle Inspection** — An inspection procedure for detecting surface cracks in welded areas through the use of fine iron particles in an electrical field.

**3.127 Male thread** — The external thread on pipe, fittings, or valves used in making a connection with mating female (internal) threaded parts.

**3.128 Manifold (or Header)** — A common pipe or chamber having several lateral outlets is also called header.

**3.129 Material Data Sheets (MDS)** — The material data sheets define the minimum requirements for the required materials, for example, chemical requirements, manufacturing, qualification of supplier, mechanical testing and properties, non-destructive examination, repair, marking and certification.

**3.130 Maximum Working Pressure (MWP) (or CWP – Cold Working Pressure)** — Highest pressure permitted to be developed during service.

**3.131 Maximum Developed Pressure ( $T_{\text{max}}$ )** — Pressure developed by the gas contents in a cylinder at a uniform temperature of  $T_{\text{max}}$ .

**3.132 Maximum Service Temperature** — The maximum temperature to which a cylinder will be subjected in normal service. This is taken as  $65\text{ }^{\circ}\text{C}$ .

**3.133 Mechanical Seal** — In a valve, a shut off that is accomplished by a mechanical means rather than with fluid or line pressure. The wedging action of a gate against the seats or the seat springs pushing the seat against the ball or gate are examples of mechanical seals in a valve.

**3.134 Metal-to-Metal Seal** — The seal produced by metal-to-metal contact between the sealing face of the seat ring and the closure elements, without benefit of a synthetic seal.

**3.135 Metric** — The ISO metric screw thread is the most commonly used type of general-purpose screw thread worldwide. The  $M$  designation for metric screws indicates the nominal outer diameter of the screw thread, in millimeters.

Thread form are such that the angle between the thread flanks is 60 degrees.

**3.136 Mill Certificates** — Certificates, provided by the steel mill, indicate the chemical analysis and physical properties of a specific batch of steel. ‘Mill Certs’ are usually required only for pressure containing parts. The customer’s need for such



'Mill Certs' must be made known when the order is first placed, otherwise is it not possible to trace a valve part back to the mill [such as Heat Analysis (*see* [3.102](#))].

**3.137 Mill Test** — All tests required by the material specification. Usually includes both the heat analysis (chemical) and the physical properties, and sometimes impact tests.

**3.138 Minimum Closing Torque ( $T_c$ )** — Torque necessary to be applied to a valve operating device of a newly manufactured valve to obtain internal leak tightness at valve test pressure and room temperature.

**3.139 Mould** — A hollow cavity (frequently in packed sand) for giving a desired shape to a material in a molten or plastic state. Used in making metal castings.

**3.140 Mustard Gas** — The oily liquid which has been used as a war gas, destroyed by oxidizing agents.

**3.141 Needle Valve** — A type of small valve, used for flow metering, having a tapered needlepoint plug or closure element and a seat having a small orifice.

**3.142 NGT** — NGT (National Gas Taper) threads are used to check gas cylinder valve stems and cylindrical neck threads. Taper 1 in 16 on diameters. The principal features of the NGT thread form are that the angle between the thread flanks is 60 degrees.

**3.143 Nitrogen/Helium Test** — A pressure test conducted using nitrogen or helium (inert gases) instead of air, water, or other gases to prevent any danger or fires or explosions. Generally specified by the purchaser when buying a valve or regulator product.

**3.144 Non-destructive Tests** — Inspection tests that are not destructive to the valve structure or function. [such as Liquid Penetrant Inspection (*see* [3.119](#)), Magnetic Particle Inspection (*see* [3.126](#)), Radiographic Inspection (*see* [3.193](#)) and Ultrasonic Inspection (*see* [3.251](#))].

**3.145 Normal Pressure** — Pressure equivalent to 760 mm Hg at 0 °C.

**3.146 Standard Temperature and Pressure (STP)** — Temperature of 0 °C and a pressure of 760 mm Hg, conditions under which the volumes of gases are compared.

**3.147 Normalizing** — A process in which steel is heated to a temperature above its upper transformation temperature (known as solution temperature) and subsequently cooled in still air.

**3.148 Nominal Pipe Size (NPS)** — Dimensionless number used to indicate sizes of pressure pipe and valves used interchangeably with valve size.

**3.149 National Pipe Taper (NPT)** — A uniform standard governing the dimensions of tapered pipe threads.

**3.150 Operating Pressure of the Cylinder** — Varying pressure which is developed in a cylinder during service.

**3.151 Operating Torque ( $T_o$ )** — Opening or closing torque (whichever is the lower value) applied to valve operating device to determine the level of torque, which the valve operating mechanism can tolerate and remain operable.

**3.152 O-Ring** — A torus, a circle of rubber or plastic with round cross section which provides effective sealing against pressure.

**3.153 Outer Seal Cap** — Cap or plug that serves as a protective covering for the valve outlet against contamination from external sources and serves as a pressure barrier to prevent leakage through the valve outlet.

**3.154 Outer Seat Ring** — The outer metal piece of a two-piece seat ring unit [such as Inner Seat Ring (*see* [3.115](#))].

**3.155 Oversized Valve** — A valve having larger than normal stem thread to suit an oversized cylinder neck thread.

**3.156 Oxidizing Gas** — A gas which gives up oxygen readily or removes hydrogen from a compound or attracts negative electrons.

**3.157 Oxidizing Gas Service Valve** — Valves used for oxygen, oxygen enriched gas mixtures (over 23.5 percent oxygen) or other highly oxidizing gases such as nitrous oxide.

**3.158 Packing (Valve)** — Non-metallic material installed around the spindle in a packed valve that when compressed creates a seal against leakage past the spindle.

**3.159 Packing Gland (also known as Packing Follower)** — Ring, usually metal, often installed on top of the packing in a packed-type valve so the gland nut is not torqued directly against the packing.

**3.160 Packing Ring** — Ring installed in a packed-type valve to provide a suitable seat for the packing.

**3.161 Permanent Gas** — Permanent gas means a gas whose critical temperature is below  $-10\text{ }^{\circ}\text{C}$  that is to say a gas which cannot be liquefied under any pressure at a temperature above  $-10\text{ }^{\circ}\text{C}$ .

**3.162 Pilot** — A spring-loaded pressure regulator used to control the pressure and flow of other larger pressure regulators or instruments.

**3.163 Pinhole** — Numerous small gas holes at the surface or just below the surface of castings, generally occurring in the thicker parts of the casting as a reduction in the solubility of gases in the metal as the metal cools.

**3.164 Pitch and Lead** — Pertaining to screw threads, the pitch refers to the measurement between adjacent threads. The lead refers to the distance the screw advances in one complete revolution.

**3.165 Plastics** — A broad classification covering a variety of non-metallic, synthetic, or organic materials capable of being molded or formed into desired shapes. Also used as a protective coating for valves.

**3.166 Plug** — The rotating closure element of a plug valve. Also, a threaded fitting used to close off and seal an opening into a pressure-containing chamber, for example, pipe plug.

**3.167 Plug Valve** — A quarter-turn valve whose closure element is usually a tapered plug having a rectangular port.

**3.168 Pneumatic** — Pertaining to, or using, air or gas.

**3.169 Poisonous Gas** — A gas which has a maximum allowable concentration in air for human respiration not exceeding  $100\text{ mg/m}^3$  at  $15\text{ }^{\circ}\text{C}$  and  $1\text{ kgf/cm}^2$  absolute pressure.

**3.170 Pop Action** — Rapid opening of pressure relief valve sealing elements to achieve full lift, resulting from an increase of inlet pressure creating a sudden increase in force and compression of the spring.

**3.171 Porosity** — A defect found in castings or welds consisting of gas bubbles or voids in the solidified metal.

**3.172 Pressure** — Physical force exerted on the object. The force applied is perpendicular to the surface of the object per unit area.

**3.173 Pressure Drop** — Decrease in pressure along the direction of flow in a piping system caused by fluid friction, restrictions, and change of direction fittings. Pressure drop is related to velocity, specific gravity, viscosity, and the size and roughness of the pipe interior [such as Differential Pressure (*see* [3.53](#))].

**3.174 Pressure Opening** — The orifice against which the bursting disc functions.

**3.175 Pressure-Reducing Regulator** — Regulator designed to control downstream pressure.

**3.176 Pressure Relief Device (PRD)** — Pressure and/or temperature activated device used to prevent the pressure in a cylinder charged with gas from rising above a predetermined maximum pressure and/or temperature thereby preventing rupture of the cylinder.

**3.177 Pressure Relief Nut** — Rupture disc holder threaded into the valve body that incorporates a precisely machined edge around a relief device discharge port against which the disc is designed to rupture.

**3.178 Pressure Relief Plug** — Rupture disc holder threaded into the valve body that retains a rupture disc in place and incorporates a precisely machined edge around a relief device discharge port against which the disc is designed to rupture.

**3.179 Pressure Relief Valve (PRV)** — A safety device containing an operating part that is held normally in a position closing the safety device channel by spring force and is intended to open and to close at predetermined pressures.

**3.180 Pressure Switch** — A switch (electric) activated by a rise or drop in pressure.

**3.181 Pressure-Temperature Ratings** — The maximum allowable working pressures at specified temperatures. For steel valves, the ratings are defined by 'classes' and found in ASME B16.34. For iron and bronze valves, the ratings are defined in the applicable MSS specifications.

**3.182 Pressure Test** — A test using specified pressure of liquid or gases, which can be used to check the sealing, integrity, strength, design standards, etc of a particular product.

**3.183 Producer Gas** — The gas produced by gasifying solid fuel in a mixture of air and steam.

**3.184 Product Standardization** — The process by which purchasers ensure consistency of a product's quality by the approval of the vendors' standardized documentation. This is normally used as the basis for blanket purchase agreements.

**3.185 Propane Gas** — A mixture consisting predominantly of C<sub>3</sub> hydrocarbons with some C<sub>2</sub> hydrocarbons and a small amount of C<sub>4</sub> hydrocarbons.

**3.186 Propellant Gas** — Gas under pressure, used in a machine or apparatus to create a mechanical force.

**3.187 Prototype Test (also known as Design Qualification Test or Type Test)** — A test or series of tests carried out for approval of a valve design to the requirements of the product specification.

**3.188 Pump** — A rotary or reciprocating device using mechanical energy to propel liquids through pipelines or to draw liquids from tanks or sumps by suction.

**3.189 Pure Gas** — Gas which has been purified from undesirable substances to the desired extent.

**3.190 Quality Assurance** — Planned regular and/or preventive actions which are used to ensure that materials, products, or services will meet specified requirements.

**3.191 Quenching** — A process in which a material is heated to a temperature above its upper transformation temperature (known as solution temperature) and then quenched in a suitable medium.

**3.192 R<sub>a</sub>** — Abbreviation for 'arithmetic average roughness height' the measure of the roughness of a surface expressed in microinches. The higher the number, the rougher the surface. Used to designate the desired surface finish for end flange raised faces.

**3.193 Radiographic Inspection** — An X-ray NDE procedure for locating flaws in welds, casting, and fabricated parts.

**3.194 Rare Gases** — Helium series of gases including helium, neon, argon, krypton, xenon and radon. The zero group of the periodic table, completely inactive chemically is also called inert gas.

**3.195 Ratchet Drive** — A shaft or valve that is operated by means of a ratchet mechanism. The ratchet delivers an intermittent stepped rotation through a gear in one direction only.

**3.196 Rated Bursting Pressure (of a Bursting Disc)** — The maximum pressure at which the disc is designed to burst at the rated temperature when in contact with the pressure opening for which it was designed.

**3.197 Rated Flow Capacity of PRD** — The capacity of a pressure relief device measured in cubic metre per minute of free air at the required flow rating pressure at NTP.

**3.198 Rated Temperature (of a Bursting Disc)** — The temperature at which a bursting disc is designed to burst when the rated bursting pressure is applied to the disc and when it is in contact with the pressure opening for which it was designed. Unless otherwise specified and stated, it is to be taken as room temperature.

**3.199 Refrigerant Gas** — Gas which liquefies at 1.013 bar at a temperature below - 30 °C.

**3.200 Refrigerated Liquefied Gas** — Gas which, when packaged for transport, is partially liquid because of its low temperature.

**3.201 Relief Valve/ Safety Valve** — A quick-acting, spring-loaded valve that opens (relieves) when the pressure exceeds the spring setting to protect the tank/vessel etc from over pressurising.

**3.202 Remote Control** — The operation of a valve or other flow-control device from a point at a distance from the device being controlled. It can be accomplished by electrical, pneumatic, or hydraulic means.

**3.203 Resilient Seat** — A valve seat containing a soft seal, such as an O-ring, to ensure tight shut off.

**3.204 Rising Stem** — A valve stem that rises as the valve is opened.

**3.205 Rockwell Hardness Number** — A numerical expression of the hardness of a metal as determined with a Rockwell hardness tester. There are several hardness scales. The most commonly used are the Rockwell B scale for soft metals and the Rockwell C scale for hard materials.

**3.206 Revolutions Per Minute (RPM)** — Rotational speed, turns per minute. For example, the RPM delivered by a power operator to the pinion shaft of a gear operator.

**3.207 Rupture Disc (or Blowout Disc)** — An emergency overpressure relief device, a relatively thin diaphragm designed to burst at a specified pressure. It cannot be reset, but must be replaced after rupture event.

**3.208 SCBA** — Self Contained Breathing Apparatus (SCBA) to protect users against oxygen deficiency, dust, gases, and vapors at plants, aboard vessels, at fire and in tunnels.

**3.209 SCUBA** — It is a breathing equipment in the form of a cylinder to provide breathing gas to the underwater divers.

**3.210 Safety Valve** — A quick-operating, pop-action valve used for fast relief of excessive pressure.

**3.211 Saturated Pressure** — The pressure exerted by a saturated vapour. This pressure is a function of the temperature.

**3.212 Saturated Vapour** — A vapour which can exist in equilibrium with its liquid.

**3.213 Scientific Gas** — Gas which is used for analysis, calibration and other similar purposes in scientific laboratories.

**3.214 Seal (Static)** — A sealing element used as a gasket between two non-moving parts, for example, valve bonnet O-rings, ball valve body O-rings, flange gaskets, etc.

**3.215 Seal Weld** — A weld that does not contribute anything to the mechanical integrity of an assembly, but is made purely to seal or prevent leakage from, for instance, a threaded joint.

**3.216 Seat** — The part of a valve against which the closure element affects a tight shut off.

**3.217 Seat Insert** — Material contained in or on the bottom spindle (sometimes on a one-piece spindle) usually made of a soft material to facilitate sealing against the valve body seat.

**3.218 Self-relieving** — The process whereby excessive internal body pressure, in some valves, is automatically relieved into either the upstream or downstream line by forcing the seats away from the closure elements.

**3.219 Shrinkage** — Internal defect in castings that are internal voids, irregular in shape, caused by volume contraction during solidification. It can be caused by not maintaining a fluid channel to the riser during solidification.

**3.220 Shut-off Valve** — A valve designed only for on/off service, not a throttling valve. Sometimes referred to as a 'Block Valve'.

**3.221 Solenoid Valve** — An electrically operated remotely controlled valve whose inlet orifice closed when the solenoid coil is not energized and whose inlet orifice is open when the solenoid coil is energized, used as shut-off valve.

**3.222 Sour Gas** — Natural gas containing significant amounts of H<sub>2</sub>S. It requires special trim.

**3.223 Specific Gravity** — The ratio of the weight of a given volume of fluid to the weight of an equal volume of water (if the fluid is a liquid) or to the weight of an equal volume of air (if the fluid is a gas).

**3.224 Specific Heat of Gas** — Under given conditions of temperature and pressure it is the ratio of quantity, required to heat 1 kg through 1 kg of the gas to that of air at NTP. It is of two types as given below.

- a) That measured at constant pressure; and
- b) That measured at constant volume.

**3.225 Specific Volume** — The volume at a specified temperature and pressure occupied by one gram of a substance.

**3.226 Spindle/ Stem** — The element(s) of the valve which, when operated, directly or indirectly actuates the sealing member (seal) to 'open' position or 'closed' position.

**3.227 Standard Temperature and Pressure (also known as NTP)** — Temperature of 20 °C and pressure of 760 mm, conditions under which the volume of gases are compared.

**3.228 Start to Discharge Pressure** — The pressure at which the first bubble from a tube of 2.5 mm inside diameter appears through water seal of not over 100 mm on the outlet of the pressure relief valve.

**3.229 Statutory Authority** — Authority which is legally charged with the enforcement of the requirements of the *Gas Cylinder Rules, 2016*, as revised from time to time by the Government of India.

**3.230 Stress Relieving (Valve)** — A process to reduce internal stresses in a metal/forging/component by heating it to a suitable temperature for a stipulated period of time.

**3.231 Stress Relieving (Cylinder)** — Uniform heating of a cylinder to a sufficient temperature below the critical range of steel to relieve the major portion of the residual stresses, followed by uniform cooling.

**3.232 Stud** — A bolt, threaded on both ends, often used in bolting together two members, one of which has blind tapped bolt holes.

**3.233 Stuffing Box** — The annular chamber provided around a valve stem in a sealing system into which deformable packing is introduced.

**3.234 Tang**— Member or extension projecting from either the lower end of a top spindle or the upper end of a bottom spindle, mechanically attached or integral to the spindle, through which torque is transmitted in a two-piece spindle.

**3.235 Tare Weight (Cylinder)** — Tare weight in relation to:

- a) Acetylene cylinder, means the weight of the cylinder together with any fittings, permanently attached and includes the weight of the valve any safety device, porous mass, requisite quantity of solvent for dissolving acetylene, and the weight of acetylene gas saturating the solvent at atmospheric pressure and temperature of 15 °C;
- b) Liquefiable gas cylinder, means the weight of the cylinder together with any fittings permanently attached thereto and includes the weight of valve;
- c) Permanent gas cylinder, means the weight of the cylinder together with any fittings permanently attached thereto and excludes the weight of valve; and
- d) Cryogenic container, means the weight of the container together with any fittings permanently attached thereto along with the weight of insulating material including the weight of the valves.

**3.236 Tensile Strength** — The highest tensile stress that a material can withstand before failure or rupture occurs with force being applied in a direction tending to elongate the material.

**3.237 Tensile Test** — A test performed on specially machined specimens taken from material in its delivered condition, to determine physical properties. For example, yield strength, ultimate strength, and percent elongation.

**3.238 Test Pressure** — Test pressure means the internal pressure required for the hydrostatic test or hydrostatic stretch test or pneumatic test of the cylinder as specified in the cylinder manufacturing codes.

- a) Transport means the moving of a cylinder filled with any compressed gas from one place to another;
- b) Water capacity means the volume of water in litres, a cylinder will hold at 15 °C;
- c) Working pressure for low pressure liquefiable gas means the saturated vapour pressure at 65 °C;

d) Working pressure for permanent gas means the internal pressure of the gas in the cylinder at a temperature of 15 °C; and

e) Yield strength means the stress corresponding to a permanent strain of 0.2 percent of the original gauge length in a tensile test.

NOTE — For the purposes of this clause, it is clarified that the values of saturated vapour pressure of different gases are specified in IS 3710.

**3.239 Thread Sealant** — Material applied to a taper thread to effect a gas tight joint. It fills the cavity remaining in the helix of mating threads.

**3.240 Thrust** — Force applied to a part in a particular direction, for example, thrust on a valve stem.

**3.241 Thrust Bearing/Washer** — Disk like part sometimes inserted between the top spindle and the metal diaphragms to reduce friction.

**3.242 Toggle** — Usually a handle (lever) attached to the valve by pin to rotate the operating mechanism of the valve.

**3.243 Top Spindle** — Upper member of a two-piece spindle that when operated causes the bottom spindle to move.

**3.244 Torque** — The turning effort required to operate a valve. Usually expressed in lb/ft and in reference to the stem nut, hand wheel, or operator pinion shaft.

**3.245 Torque Switch** — An electrical device on a motor operator that cuts off power to the operator when allowable torque is exceeded, thus preventing damage to the valve and/or the operator.

**3.246 Torsional Spring** — A torsion spring is a spring that works by twisting its end along its axis for example, a flexible elastic object that stores mechanical energy when it is twisted.

**3.247 Town Gas** — The gas normally supplied to the public by utility undertaking in accordance with statutory requirements.

**3.248 Toxic Gas** — A gas which has a maximum allowable concentration in air for human respiration not exceeding 200 mg/m<sup>3</sup> at 15 °C and 1 kgf/cm<sup>2</sup> absolute pressure.

**3.249 Ullage Space** — The volume of the vapour phase in a cylinder containing a liquefiable gas.

**3.250 Ultimate Strength** — The stress at which a material will fail [such as Tensile Test (*see* [3.236](#)) and Burst Pressure (*see* [3.26](#) and [3.27](#))].

**3.251 Ultrasonic Inspection** — An inspection procedure using high-frequency sound waves to detect voids and imperfections throughout the thickness of metal parts.

**3.252 UNC Thread** — The most common types of UN (Unified National) thread is UNC – Unified National Coarse Thread. The principal features of the UNC thread form are that the angle between the thread flanks is 60 degrees.

**3.253 UNF Thread** — The most common types of UN (Unified National) thread is UNF – Unified National Fine Thread. The principal features of the UNF thread form are that the angle between the thread flanks is 60 degrees.

**3.254 Vacuum** — A space from which air or gas has been exhausted until its pressure is less than atmospheric pressure, for example, any pressure below 1.013 bar (14.7 psi) absolute or its equivalent.

**3.255 Valve** — A device that controls the flow of a liquid or gas in a conduit or pipeline.

**3.256 Valve Body** — The major portion of the valve (normally single piece) that has been machined to have the inlet, the outlet, connections, and where applicable, a boss for pressure relief device. There are other machined areas to assemble other parts for operation of the valve and fitment of excess flow check valve, filter etc. to create a complete valve assembly.

**3.257 Valve Body Seat/Sealing Face** — Sealing surface surrounding the orifice of the valve body.

**3.258 Valve Data Sheet (VDS)** — A data sheet defining the minimum level of a valve design, including the materials, testing, inspection, and certification requirements.

**3.259 Valve Design** — Classification of valve with regard to the valve operating mechanism.

**3.260 Valve Filling Connection** — Connection on the valve used to fill the cylinder.

**3.261 Valve Inlet Connection/ Valve Stem** — Connection on the cylinder valve which connects the valve to the cylinder is also called valve stem.

**3.262 Valve Operating Device** — Component which actuates the valve operating mechanism.

*Example:* Hand wheel, key, knob, actuator, toggle or lever.

**3.263 Valve Operating Mechanism** — Mechanism which closes and opens the valve orifice and which includes the internal and external sealing systems.

*Example:* A threaded valve spindle which, when rotated, raises and lowers seal.

**3.264 Variable Orifice** — A small variable profile valve put in a flowing and used with a pilot to restrict the flow into the pilot and make the pilot more or less sensitive to changing conditions.

**3.265 Valve Outlet Connection** — Connection on the cylinder valve used to discharge the cylinder.

NOTE — For most valves this connection is also used for filling the cylinder.

**3.266 Valve Test Pressure ( $P_{vt}$ )** — Minimum pressure applied to valve during endurance test and oxygen pressure surge test.

**3.267 Vapour**

- a) A substance in a gaseous state which may be liquefied by increasing the pressure without altering temperature; and
- b) A gas below its critical temperature.

**3.268 Vapour/Liquid Valve (Twin Phase Valve)** — Valve designed so that either vapour or liquid may be discharged without inverting the cylinder.

**3.269 Vapour Density** — A measure of the density of a gas or vapour usually given relative to oxygen or hydrogen.

**3.270 Vapour Pressure** — Pressure exerted at any temperature by a vapour existing in equilibrium with its liquid or solid phase.

**3.271 Velocity** — The speed at which a fluid flows through a line in a specified direction. Usually expressed in ft/sec.

**3.272 Wall Thickness (Cylinder)** — The thickness of the wall of a pressure vessel/ gas cylinder.

**3.273 Water Capacity** — The volume of water, in litres, the cylinder will hold at 15 °C.

**3.274 Water Gas** — The fuel gas obtained by the action of steam on glowing hot coke, giving carbon monoxide and hydrogen.

**3.275 Wear Test** — Verification of a component's resistance under specific wear conditions.

**3.276 Weld Joint Factor** — The arbitrary ratio of the allowable stress in the welded seam to that in the plates welded, expressed as a decimal.

**3.277 Working Pressure ( $P_w$ ) (Cylinder)** — Settled pressure (filling pressure) of a compressed gas (for permanent gas) at a uniform reference temperature of 15 °C in a full gas cylinder for which the valve is intended.

**3.278 Working Pressure for High Pressure Liquefiable Gas** — The Internal gas pressure corresponding to the particular filling ratio at a temperature of 65 °C.

**3.279 Working Pressure for Permanent Gas** — The internal gas pressure at a temperature of 15 °C.

**3.280 Working Pressure for Low Pressure Liquefiable Gas** — The saturated vapour pressure at 65 °C.

**3.281 Yield Pressure** — Pressure at which the actual yield strength of a cylinder is created.

**3.282 Yield Strength (Cylinder)** — The limiting stress beyond which a material will sustain permanent deformation. Up to the yield strength, the material will spring back to its original dimension when the pressure is removed.

**3.283 Yield Temperature (of a Fusible Plug)** — The temperature at which the fusible metal or alloy will yield.

## ANNEX A

*(Foreword)*

## COMMITTEE COMPOSITION

Gas Cylinder Sectional Committee, MED 16

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



<i>Organization</i>	<i>Representative(s)</i>
International Industrial Gases Limited, Howrah	SHRI DEVENDRA K. GARG SHRI NIKHILESH K. GARG ( <i>Alternate</i> )
Jai Maruti Gas Cylinders Private Limited, Gwalior	SHRI MANU K. NIGAM
Kosan Industries Limited, Surat	SHRI GIRISHBHAI K. DESAI SHRI BHUPINDER SINGH ( <i>Alternate</i> )
LPG Equipment Research Centre, Bengaluru	SHRI T. D. SAHU SHRI SANTOSH KUMAR GUPTA ( <i>Alternate</i> )
Linde India Limited, Kolkata	SHRI RAMANA VUTUKURU
Mahanagar Gas Limited, Mumbai	SHRI S. MURALI SHRI MILIND M. RANADE ( <i>Alternate I</i> ) SHRI SACHIN GUMASTE ( <i>Alternate II</i> )
Maruti Suzuki Indian Limited, Gurugram	SHRI GURURAJ RAVI SHRI ARUN KUMAR ( <i>Alternate I</i> ) SHRI RAJESH KUMAR ( <i>Alternate II</i> )
Research and Development Estt (Engineers), Pune	SHRI TAMHANKAR RAVINDRA
Society of Indian Automobile Manufacturers, New Delhi	SHRI K. K. GANDHI SHRI AMIT KUMAR ( <i>Alternate</i> )
Steel Authority Of India Limited (SAIL), Research & Development Centre for Iron & Steel, Ranchi	SHRI K.K.SINGH SHRI SANTOSH KUMAR ( <i>Alternate</i> )
Tata Motors Limited, Pune	SHRI GOWRISHANKAR P. S. SHRI SHAILENDRA DEWANGAN ( <i>Alternate</i> )
Tekno Valves, Kolkata	SHRI Y. K. BEHANI SHRI ROHIT BEHANI ( <i>Alternate</i> )
Trans Valves (India) Private Limited, Hyderabad	SHRI GAURAV JAIN SHRI PRADEEP KUMAR MATHUR ( <i>Alternate</i> )
Vanaz Engineers Private Limited, Pune	SHRI S. J. VISPUTE SHRI A. S. WAGH ( <i>Alternate</i> )
BIS Directorate General, New Delhi	SHRI NAVINDRA GAUTAM, SCIENTIST 'E'/ DIRECTOR AND HEAD (MECHANICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL ( <i>Ex-officio</i> )]

*Member Secretary*

SHRI PRASOON YADAV  
SCIENTIST 'B'/ASSISTANT DIRECTOR  
(MECHANICAL ENGINEERING), BIS

## Gas Cylinder Valves and Fittings Subcommittee, MED 16 : 1

<i>Organization</i>	<i>Representative(s)</i>
Tekno Valves, Kolkata	SHRI Y. K. BEHANI ( <b><i>Convener</i></b> )
All India Industrial Gases Manufacturers Association, New Delhi	SHRI SAKET TIKU
Bharat Petroleum Corporation Limited, Mumbai	SHRI RAJWINDER SINGH PANESAR SHRI AAKASH AGARWAL( <i>Alternate</i> )
Everest Kanto Cylinder Limited, Mumbai	SHRI AYUSH PAWAR SHRI GHANSHYAM GOYAL ( <i>Alternate I</i> ) SHRI A.S.V.S PRASAD ( <i>Alternate II</i> )
Hindustan Petroleum Corporation Limited, Mumbai	SHRI RAKESH G KHADE SHRI SHIVA SHANKAR ( <i>Alternate I</i> ) SHRI DINESH PANGTEY ( <i>Alternate II</i> )
Indian Oil Corporation Limited, Mumbai	SHRI BIDHAN CHANDRA JENA SHRI CHANDRAKANT GHATOL ( <i>Alternate</i> )
Jai Gopal Engineering Works and Gases Private Limited, New Delhi	SHRI JAI GOPAL MEHTA SHRI A. K. SINGH ( <i>Alternate I</i> ) MS RAKHI VERMA ( <i>Alternate II</i> ) SMT MAYUR MEHTA ( <i>Alternate III</i> )
Kabsons Gas Equipments Limited, Hyderabad	SHRI SATISH KABRA
Kosan Industries Limited, Surat	SHRI BHUPINDER SINGH SHRI GIRISHBHAI K. DESAI ( <i>Alternate</i> )
LPG Equipment Research Centre, Bengaluru	SHRI T. D. SABU SHRI SANTOSH KUMAR GUPTA ( <i>Alternate</i> )
Petroleum and Explosives Safety Organisation, Nagpur	SHRI P. SEENIRAJ SHRI SRINIVASA RAO KETA ( <i>Alternate</i> )
Southern Metals & Alloys Private Limited, Mumbai	SHRI VIVEK NORONHA SHRI VINOD NORONHA ( <i>Alternate</i> )
Tomasetto Achille India Private Limited, Thane	SHRI AMIT KUMAR SHAH SHRI RAKESH GURUNATH ( <i>Alternate</i> )
Trans Valves (India) Private Limited, Hyderabad	SHRI GAURHAV JAIN SHRI PRADEEP KUMAR MATHUR ( <i>Alternate</i> )
Vanaz Engineers Private Limited , Pune	SHRI S. J. VISPUTE SHRI A. S. WAGH ( <i>Alternate</i> )



## Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

### Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

### Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-[www.bis.gov.in](http://www.bis.gov.in) or [www.standardsbis.in](http://www.standardsbis.in).

This Indian Standard has been developed from Doc No.: MED 16 (23565).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.gov.in](http://www.bis.gov.in)

### Regional Offices:

	Telephones
Central : 601/A, Konnectus Tower -1, 6 <sup>th</sup> Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern : 8 <sup>th</sup> Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	{ 265 9930
Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western : Manakalya, 4 <sup>th</sup> Floor, NTH Complex (W Sector), F-10, MIDC, Andheri (East), Mumbai 400093	{ 283 25838

**Branches :** AHMEDABAD, BENGALURU, BHOPAL, BHUBANESHWAR, CHANDIGARH, CHENNAI, COIMBATORE, DEHRADUN, DELHI, FARIDABAD, GHAZIABAD, GUWAHATI, HARYNA, HUBLI, HYDERABAD, JAIPUR, JAMMU & KASHMIR, JAMSHEDPUR, KOCHI, KOLKATA, LUCKNOW, MADURAI, MUMBAI, NAGPUR, NOIDA, PARWANOO, PATNA, PUNE, RAIPUR, RAJKOT, SURAT, VIJAYAWADA.