**AMENDMENT NO. 1 SEPTEMBER 2024**

**TO**

# IS 3224 : 2021 VALVE FOR COMPRESSED GAS CYLINDERS EXCLUDING LIQUEFIED PETROLEUM GAS (LPG) CYLINDERS — SPECIFICATION

*( Fourth Revision )*

(*Page* 1, *clause* **1.2**, *first sentence*) — Substitute the following for the existing:

'This standard gives the details of the dimensions of inlet taper threads as well as parallel threads and outlet of the valves so as to ensure interchangeability.'

(*Page* 3, *clause* **3.61**, *Heading*) — Substitute 'Valve Inlet/Valve Stem Connection' *for* 'Valve Inlet Connection'.

(*Page* 5, *Fig.* 2, *Title*) — Substitute the following for the existing:

'ILLUSTRATION OF PRESSURE SEAL VALVE, NON-METALLIC SEAL (WHEEL OPERATED)'

(*Page* 7, *clause* **5.2**, *fourth para*) — Delete.

'Brass components other than valve body shall be made from free cutting brass rods (*see* IS 319) or from any forging quality brass, such as leaded brass or naval brass (*see* IS 6912).'

(*Page* 8, *clause* **5.3.1**) — Substitute the following for the existing:

'The tensile strength and elongation of the material of the valve body determined according to IS 1608 (Part 1) shall be respectively at least 392 MPa (40 kgf/mm$^2$) and minimum 18 percent measured on a gauge length $5.65\sqrt{S_o}$ ($S_o$ being the original area of cross-section) except for valves used for $CO_2$ and $N_2O$ for which the minimum tensile strength of the material of the valve body according to IS 1608 (Part 1) shall be 343 MPa (35 kgf/mm$^2$) and minimum elongation shall be 18 percent on a gauge length $5.65\sqrt{S_o}$.'

(*Page* 8, *clause* **5.3.2**, *Title*) — Substitute 'Izod Impact Test' *for* 'Impact Strength'.

[*Page* 9, *Table* 1, *row* (xxii), *col* (2)] — Substitute 'Difluoromethane' *for* 'Difloromethane'.

(*Page* 10, *Table* 1, *last row*) — Insert the following at the end:

| **Sl No.** | **Gas** | | **Designation of Screw Thread Outlet (Parallel Threads)[1)]** | **Pitch** | **Outlet No.** | **Width Across Flat of the Square of Spindle[2)]** |
|---|---|---|---|---|---|---|
| | Name | Chemical Symbol | | | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| lii) | Bio-CNG | Bio-CNG[5)] | G5/8-14 TPI-LH | 1.814 | 21 | 9.5 mm |
| liii) | Hydrogen (for working pressure up to 300 bar) | $H_2$ | G5/8-14 TPI-LH | 1.814 | 2 | 7.1 |
| liv) | Hydrogen (for working pressure > 300 bar and up to 800 bar) | $H_2$ | 1.250-14NGO-LH-INT | 1.814 | 22 | - |

**Price Group 5**

(*Page* 10, *Table* 1, *Key*) — Insert the following at the end:

'**5)** Bio-CNG valves shall be strictly used for bio-gas conforming to IS 16087.'

(*Page* 10, *clause* **6.3.2**, *line* 4) — Substitute 'values' *for* 'valves'.

(*Page* 10, *clause* **6.3.2**, *second para*, *line* 2) — Substitute 'shall' *for* 'will'.

[*Page* 11, *Table* 2, *col* (4), *sl no.* iii) g)] — Substitute 'other' *for* 'pther'.

(*Page* 12, *clause* **6.3.3**, *Note* 2) — Substitute the following for the existing:

'For special designs, the number of cycles shall be defined by the manufacturer on the basis of a specification from the customer or industry based on the likely service conditions. The number of cycles shall be documented in the drawing. The number of cycles shall be 500 for squeeze grip valves.'

[*Page* 13, *Table* 3, *col* (7), *row* x)] — Substitute '12 to 14' *for* '15 to 1.7'.

(*Page* 14, *clause* **7.2.1**) — Substitute the following for the existing:

'Where the pressure relief device is a bursting disc fitted to the valve of seamless or welded cylinder the bursting pressure of the disc (when tested at temperature of 65 °C) shall not exceed the 110 percent of test pressure of the cylinder for which device is intended and shall be more than the developed pressure of the gas at 65 °C. Bursting disc may be rated at room temperature provided correlation between room temperature and elevated temperature is determined.'

(*Page* 14, *clause* **8.1.1**, *Note*, *line* 2) — Substitute 'CGA Standard CGA-V-1' *for* 'CGA Standard V-1-2013'.

(*Page* 16, *Fig.* 9b, *Title*) — Substitute 'VALVE INLET' *for* 'VALVE STEM'.

(*Page* 16, *Fig.* 9b, *Table*, *first heading*) — Substitute 'Nominal Diameter of Valve' *for* 'Normal Diameter of Valve'.

(*Page* 16, *Fig.* 9b, *Table*) — Substitute the following for the existing:

| SL NO. | NORMAL DIAMETER OF VALVE 1) | VALUE INLET THREAD | | | THREAD IN CYLINDER NECK | | LENGTH OF VALVE INLET THREAD | |
|---|---|---|---|---|---|---|---|---|
| | | *d* *+ 0.12* | *d* *+ 0.12* | $L_1$ | $d_2$ *- 0.12* | $L_2$ *Min* | $L_3$ *Remaining Outside the Cylinder* | $L_4$ *Engaged Inside the Cylinder* |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| i) | 19.8 | 19.8 | 17.4 | 21 | 19.2 | 17 | 5.0 | 16.0 |
| ii) | 28.8 | 28.8 | 25.8 | 26 | 27.8 | 22 | 8.33 | 17.67 |

(*Page* 19, *clause* **8.1.2**, *Note*) — Substitute the following for the existing:

'This type of thread also conforms to DIN 477 : 2021 'Gas cylinder valves for cylinder test pressures up to 300 bar — Valve inlet and outlet connections' and ISO 11363-1 : 2018 'Gas cylinders — 17 E and 25 E taper threads for connection of valves to gas cylinders — Part 1: Specifications'. The 17 E and 25 E threads have profile normal to the cone.'

(*Page* 19, *clause* **8.3.2**, *line* 3) — Substitute 'manufacturer' *for* 'manufacture'.

(*Page* 24, *clause* **9.1.1**, *line* 3) — Delete 'and outlet connection listed in this clause'.

(*Page* 26, *Figure of Outlet No.* 2, *Figure title*) — Substitute the following for existing:

'OUTLET NO. 2 OUTLET CONNECTION FOR ACETYLENE, BUTADIENE, CARBON MONOXIDE, COAL GAS, ETHYLENE, METHANE, DIMETHYL ETHER, ISOBUTYLENE AND HYDROGEN (USED FOR WORKING PRESSURE UP TO 300 BAR)'

(*Page* 27, *Figure of Outlet No.* 5) — Substitute 'CHLOROTRIFLUOROMETHANE' *for* 'CHLOROTRIFLUOROMETHENE'.

(*Page* 27, *Figure of Outlet No.* 5, *last line*) — Substitute 'BORON TRIFLUORIDE AND DIFLUOROMETHANE' *for* 'AND BORON TRIFLUORIDE'.

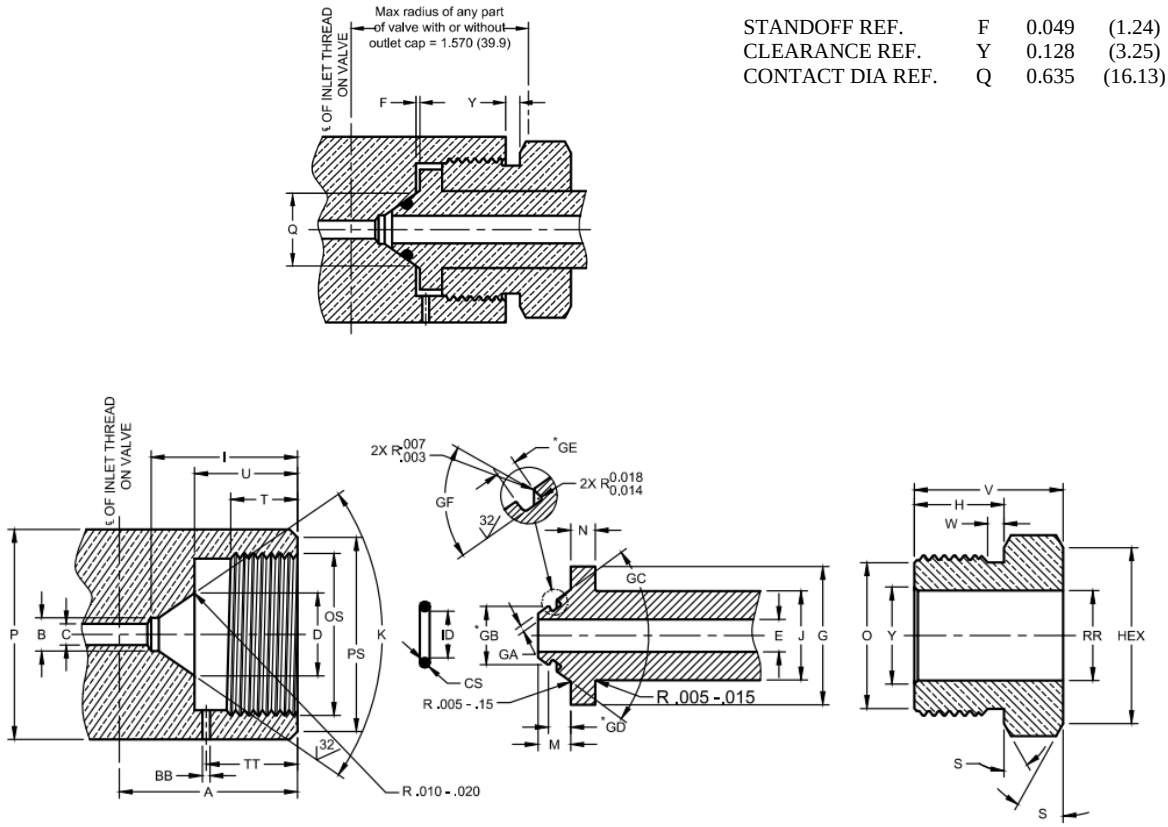
(*Page* 27, *Figure of Outlet No.* 6) — Substitute 'METHYL CHLORIDE' *for* 'METHYLE CHLORIDE'.

(*Page* 30, *Figure of Outlet No.* 17) — Substitute 'CYANOGEN' *for* 'CYNOGEN'.

(*Page* 31, *Figure of Outlet No.* 21, *Figure title*) — Substitute the following for the existing:

'OUTLET NO. 21 OUTLET CONNECTION FOR COMPRESSED NATURAL GAS AND BIO-COMPRESSED NATURAL GAS'

[*Page* 32, *Figure of Outlet No.* 21(A)] — Insert the following at the end:




| | | | |
|---|---|---|---|
| STANDOFF REF. | F | 0.049 | (1.24) |
| CLEARANCE REF. | Y | 0.128 | (3.25) |
| CONTACT DIA REF. | Q | 0.635 | (16.13) |

All dimensions are in millimetres.

**VALVE OUTLET**

| *Sl No.* | *Dimension* | *Symbol* | *Dimension* | |
|---|---|---|---|---|
| | | | in inch | in mm |
| (1) | (2) | (3) | (4) | (5) |
| i) | Thread | 1.250-14NGO-LH-INT | | |
| ii) | Minor dia. | | 1.172 7 to 1.180 4 | 29.787 to 89.983 |
| iii) | Pitch dia. | | 1.203 6 to 1.207 6 | 30.572 to 30.673 |
| iv) | Major dia. | | 1.250 0 *Min* | 31.750 *Min* |
| v) | Length | A | 1.312 *Max* | 33.33 *Max* |
| vi) | Bore depth | B | 0.250 *Max* | 6.35 *Max* |
| vii) | Drill dia. | C | 0.156 *Min* | 3.96 *Min* |
| viii) | Bore dia. | D | 0.635 | 16.13 |
| ix) | C'bore depth | I | 1.125 *Min* | 28.58 *Min* |
| x) | Angle | K | 69° | |
| xi) | Boss dia. | P | 1.625 *Min* | 41.28 *Min* |
| xii) | Full thread | T | 0.600 *Min* | 15.24 *Min* |
| xiii) | Bore depth | U | 0.793 | 20.14 |
| xiv) | Bl hole dia. | BB | 0.062 | 1.57 |
| xv) | Bl hole dist. | TT | 0.685 to 0.715 | 17.40 to 18.16 |
| xvi) | Thd chamfer | OS | 45° × 1.265 | 32.13 |
| xvii) | Chamfer dia. | PS | 45° × 1.495 | 37.97 |

**NIPPLE**[1)]

| *Sl No.* | *Dimension* | *Symbol* | *Dimension* | |
|---|---|---|---|---|
| | | | in inch | in mm |
| (1) | (2) | (3) | (4) | (5) |
| i) | Drill dia. | E | 187 ± 0.60 | 4.75 ± 1.2 |
| ii) | Shoulder dia. | G | 1.055 | 26.80 |
| iii) | Shank dia. | J | 0.675 | 17.145 |
| iv) | Nose length | M | 0.260 | 6.60 |
| v) | Shoulder length | N | 0.177 to 0.192 | 4.50 to 4.88 |
| vi) | Shank length | Z | 1.125 *Min* | 28.58 *Min* |
| vii) | Groove depth | GA | 0.051 to 0.053 | 1.30 to 1.34 |
| viii) | Groove dia.[2)] | GB | 0.446 to 0.454 | 11.33 to 11.53 |
| ix) | Angle | GC | 70° | |
| x) | Groove location[2)] | GD | 0.180 | 4.57 |
| xi) | Groove width[2)] | GE | 0.075 to 0.079 | 1.91 to 2.01 |
| xii) | Dovetail angle | GF | 64° to 68° | |

[1)] Nipple may be made from 1.000 (25.40) hex material.
[2)] Dimension to theoretical intersection.

**HEXAGON NUT**

| *Sl No.* | *Dimension* | *Symbol* | *Dimension* | |
|---|---|---|---|---|
| | | | in inch | in mm |
| (1) | (2) | (3) | (4) | (5) |
| i) | Thread | 1.245-14NGO-LH-EXT | | |
| ii) | Major dia. | | 1.245 0 to 1.240 0 | 31.623 to 31.496 |
| iii) | Pitch dia. | | 1.1986 6 to 1.194 6 | 30.44 to 30.35 |
| iv) | Minor dia. | | 1.157 4 *Max* | 29.39 *Max* |

| | | | | |
|---|---|---|---|---|
| v) | Hex | | 1.375 | 34.92 |
| vi) | Shank length | H | 0.687 ± 0.15 | 17.450 ± 38 |
| vii) | Chamfer dia. | O | 30° × 1.144 | 29.06 |
| viii) | Hole dia. | R | 0.685 to 0.690 | 17.40 to 17.52 |
| ix) | Hex chamfer | S | 30° × 1.375 | 34.92 |
| x) | Length | V | 1.125 *Min* | 28.57 *Min* |
| xi) | Neck | W | 0.16 × 1.144 *Min* | 4.1 × 29.06 *Min* |
| xii) | R chamfer dia. | Y | 45° × 0.720 to 0.750 | 18.29 to 19.05 |

**O-RING**

| *Sl No.* | *Dimension* | *Symbol* | *Dimension* | |
|---|---|---|---|---|
| | | | in inch | in mm |
| (1) | (2) | (3) | (4) | (5) |
| i) | Size (Ref) | 2 - 012 | | |
| ii) | Cross section | CS | 0.067 to 0.073 | 1.71 to 1.85 |
| iii) | Inside dia. | ID | 0.364 | (9.25) |
| iv) | Durometer, shore A | | 85 to 95 | |

OUTLET NO. 22 OUTLET CONNECTION FOR HYDROGEN GAS SERVICE USED FOR WORKING PRESSURE GREATER THAN 300 BAR AND UPTO 800 BAR

[*Page* 33, *clause* **10.1.5 (a),** *first sentence*] — Substitute the following for the existing:

'Repeat of valve impact test, valve burst pressure test, endurance test and subsequent leak tightness test;'

[*Page* 33, *clause* **10.1.5 (n)**, *Title*] — Delete '/Integration'.

[*Page* 33, *clause* **10.1.5 (q)**, *line* 1 *and line* 3] — Substitute 'shall' *for* 'will'.

[*Page* 33, *clause* **10.2 (g)**] — Substitute 'Outlet sizes' *for* 'Outlet sizes and gas services'.

(*Page* 34, *clause* **10.3.2**) — Substitute '$P_{vt} = P_w$' *for* '$P_{vt} \geq P_w$'.

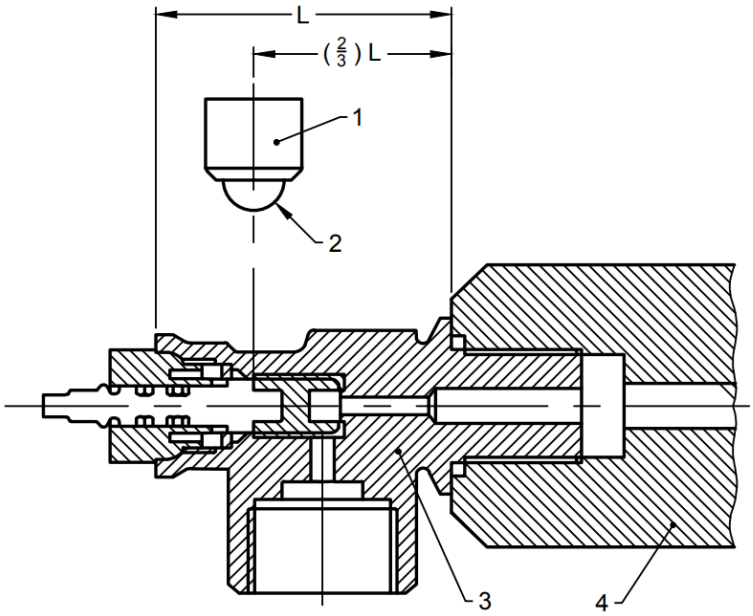
(*Page* 34, *clause* **10.4.1**, *second sentence*) — Substitute the following for the existing:

'The burst pressure test shall be carried out with the valve seat in open position with valve outlet/filling connection(s) plugged.'

(*Page* 35, *Fig.* 13, *Key* 2) — Substitute 'HARDENED' *for* 'HARDEND'.

(*Page* 35, *Fig.* 13) — Substitute the following for the existing:

a




1 PLUMMET WEIGHT
2 HARDEND STEEL BALL, DIAMETER 13 mm
3 TEST SAMPLE
4 TEST FIXTURE OR CYLINDER
a LONGITUDINAL AXIS

(*Page* 35, *Table* 13, *Title*) — Substitute the following for the existing:

'**Table 13 — Recommended Valving Torques for Taper Threaded Valve Stems for Seamless Steel Cylinder and Composite Cylinders with Steel Boss**'

[*Page* 35, *Table* 13, *col* (5) *and col* (6), *Title*] — Delete sub-heading 'Seamless Steel Cylinder'.

(*Page* 36, *Table* 14) — Substitute the following for the existing:

'**Table 14 Recommended Valving Torque for Parallel Threaded Valve Stem for Seamless Steel Cylinders and Composite Cylinders with Steel Boss**

(*Clauses* 10.4.2.3, 10.4.3.4 *and* 10.4.3.5)

| Sl No. | Valve Material | Category | Inlet Thread Code | Valving Torque, Nm | |
|---|---|---|---|---|---|
| | | | | *Min* | *Max* |
| (1) | (2) | (3) | (4) | (5) | (6) |
| i) | Copper base alloy, Carbon steel and Stainless steel | a) I | a) 18P | 100 | 130 |
| | | | b) U12 | | |
| | | b) II | c) 25P | 100 | 130 |
| | | | d) SP12 | | |
| | | | e) U18 | | |
| | | | f) 30P | | |

(*Page* 36, *Table* 15) — Substitute the following for the existing:

'**Table 15 Recommended Valving Torques of Taper Threaded Valve Stems for Aluminium Alloy Cylinders and Composite Cylinders with Aluminium Alloy Boss**

(*Clauses* 10.4.2.3, 10.4.3.4 *and* 10.4.3.5)

| **Sl No.** | **Valve Material** | **Category** | **Inlet Thread Code** | **Valving Torque** | | |
|---|---|---|---|---|---|---|
| | | | | *Min* Nm | *Max* Nm | |
| | | | | | Without cylinder neck reinforcement | With cylinder neck reinforcement |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| i) | Copper base alloy and Carbon steel | a) I | a) 18T | a) 75 | a) 95 | a) 140 |
| | | | b) 08N | | | |
| | | | c) 17E | | | |
| | | b) II | d) 25.4 | b) 95 | b) 110 | b) 180 |
| | | | e) 12N | | | |
| | | | f) 25E | | | |
| NOTE — The torque figures given above are for use with PTFE thread sealant. If different sealant or pressure ranges are introduced, the torque figures given in the table may have to be changed to ensure a gas tight joint. | | | | | | |

(*Page* 37, *clause* **10.4.4.3.3**, *second sentence*) — Substitute the following for the existing:

'This value of $T_o$ shall be applied on the other two test samples then used for determination of $T_f$, in closing and opening direction.'

(*Page* 38, *clause* **10.5.1**, *line* 1) — Substitute 'shall' *for* 'will'.

[*Page* 38, *clause* **10.5.3 (f)**] — Delete.

(*Page* 39, *clause* **10.6.1.11**, *line* 2) — Substitute 'shall' *for* 'will'.

(*Page* 40, *Fig.* 14, *Key* 1) — Substitute 'TORQUE' *for* 'TORQE'.

(*Page* 40, *Fig.* 14, *Key* 8) — Substitute 'DISPLAY' *for* 'DIPLAY.

(*Page* 40, *Fig.* 15) — Substitute 'ATMOSPHERIC PRESSURE' *for* 'ATMOSPHERIC RESSURE'.

[*Page* 41, *clause* **10.9 (b)**, *line* 2] — Substitute '$W_c$' *for* 'W'.

(*Page* 43, *clause* **11.1.5**) — Delete the clause and its sub clause.

(*Page* 44, *clause* **11.1.8.4.1**) — Delete 'Test Procedure:' after heading.

(*Page* 44, *clause* **13.3**, *first sentence*) — Substitute the following for the existing:

'All valves shall be subjected to both internal leak tightness and external leak tightness at room temperature at minimum working pressure ($P_w$).'

(*Page* 45, *clause* **13.3**, *second para*) — Substitute the following for the existing:

'For valves equipped with pressure relief device, testing shall be done at minimum 0.8 times the minimum rated burst pressure of pressure relief device.'

(*Page* 45, *Table 22*) — Substitute the following for the existing:

'**Table 22 Scale of Sampling**

(*Clause* 13.4.1)

| **Sl No.** | **Batch Size** | **Sample Size** |
|---|---|---|
| (1) | (2) | (3) |
| i) | 3 up to including 3 000 | 2 |

(*Page* 45, *clause* **13.4.5**, *line* 2) — Substitute 'shall' *for* 'will'.

(*Page* 45, *clause* **13.4.6**, *line* 2) — Substitute 'shall' *for* 'will'.

(*Page* 45, *clause* **13.4.5**) — Substitute '**13.5 Checking of Inlet Connection**' *for* '**13.4.5** *Checking of Inlet Connection*'.

(*Page* 45, *clause* **13.4.6**) — Substitute '**13.6 Checking of Outlet Connection**' *for* '**13.4.6** *Checking of Outlet Connection*'.

(*Page* 45, *clause* **13.4.7**) — Substitute '**13.7 Checking of Other Dimensions**' *for* '**13.4.7** *Checking of Other Dimensions*'.

(*Page* 45, *clause* **13.4.8**) — Substitute '**13.8 Scale of Sampling**' *for* '**13.4.8** *Scale of Sampling*'.

(*Page* 45, *clause* **13.4.8.1**) — Substitute '**13.8.1**' *for* '**13.4.8.1**'.

(*Page* 45, *clause* **13.4.8.2**) — Substitute '**13.8.2**' *for* '**13.4.8.2**'.

(*Page* 45, *clause* **13.4.8.3**) — Substitute '**13.8.3**' *for* '**13.4.8.3**'.

[*Page* 45, *clause* **14.1 (e)**] — Substitute the following for the existing:

'Working pressure, MPa/bar/(kgf/cm$^2$)'

[*Page* 46, *clause* **14.1 (m)**, *line* 2] — Delete 'or PRD'.

(*Page* 47, *Annex* A, *left side column*, *point* 4) — Substitute 'IS 1608 (Part 1) : 2022/ISO 6892-1 : 2019 Metallic materials — Tensile testing: Part 1 Method of test at room temperature (*fifth revision*)' *for* '1608 (Part 1) : 2018 Metallic materials — Tensile testing: Part 1 Method of test at room temperature (*fourth revision*)'

(*Page* 47, *Annex* A, *right side column*, *point* 7) — Substitute 'IS/ISO 11114-1 : 2020 Gas cylinders — Compatibility of cylinder and valve materials with gas contents: Part 1 Metallic materials (*first revision*)' *for* 'IS/ISO 11114-1 : 2012 Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents — Metallic materials'

(*Page* 47, *Annex* A) — Insert the following in the end:

| *IS No./Other Standards* | *Title* |
|---|---|
| IS 2102 (Part 1) : 1993/ ISO 2768-1 : 1989 | General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*) |
| IS 3745 : 2006 | Yoke type valve connections for small medical gas cylinders — Specification (*second revision*) |

| *IS No./Other Standards* | *Title* |
|---|---|
| IS 7302 : 2018 | Valve fittings for self contained breathing apparatus (SCBA) and self contained underwater breathing apparatus (SCUBA) — Specification (*first revision*) |
| IS 8776 : 1988 | Specification for valve fittings for use with liquefied petroleum gas (LPG) cylinders up to and including 5 litre water capacity (*first revision*) |
| IS 12300 : 1988 | Valve fittings for refrigerant cylinders — Specification |
| IS 16087 : 2016 | Biogas (biomethane) — Specification (*first revision*) |
| IS 16988 : 2018 | Compressed natural gas cylinder valve integrated with solenoid operation (remotely controlled) for automotive use — Specification |
| ISO 10297 : 2014 | Gas cylinders — Cylinder valves — Specification and type testing |
| ISO 11363-1 : 2018 | Gas cylinders — 17 E and 25 E taper threads for connection of valves to gas cylinders — Part 1: Specifications |
| ANSI/ASME B1.2 : 1983 | Gages and gaging for unified screw threads |
| ANSI/ASME B1.20-1 : 1983 | Pipe threads, general purpose (inch) |
| BS 341-1 : 2022 | Gas cylinders — Cylinder valves: Part 1 Threads for connection of valves to gas cylinders — Specification |
| DIN 477 : 2021 | Gas cylinder valves for cylinder test pressures up to 300 bar — Valve inlet and outlet connections |
| CGA V-1 : 2023 | Standard for compressed gas cylinder valve outlet and inlet connections |

(MED 16)

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