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Handwheel Operated Brass Valves in Diaphragm Design for Speciality & Refrigerant Gases

Detailed Series Catalogue

RWH-03

BAM

TPED Certification by BAM as notified body: ID-0589

Your safety is valued

ISO 9001 & TPED certified valve manufacturer

Index

	Page
1. Operating Principle & Identifying Features	2
2. Features & Benefits for Best-in-Class Performance	
Valve with Parallel Inlet	3.1
Valve with Taper Inlet	3.2
3. Material of Construction & Assembly Arrangement	4
4. Disassembly, Inspection & Assembly Instructions	5
5. Product Selection Guide – Valve Item Code Matrix	6
6. List of Approved Gases	7.1 -7.2
7. Notes	8

Series RWH-03

Identifying Features

RWH-03 design uses two-piece spindle separated by non-perforated diaphragms. Five diaphragms in series act as gland packing and prevent external leakage when the valve is in open condition. The replacement of elastomeric seals (as in O-ring seal design) with metal diaphragms gives the valve superior leak integrity to the atmosphere. The valve has no threads or lubricants in the gas stream. This prevents generation of particles and contamination of gas and makes the design ideal for use for refrigerant and high purity gases.

The lower spindle is non-threaded, fitted with a soft seat and encased in a spring. The upper spindle is threaded into the diaphragm retaining gland nut. When the handwheel is in the closed position, the upper spindle pushes on the diaphragms, which deflect downward, forcing the lower spindle against the valve seat. When the handwheel is rotated toward the open position, the upper spindle is moved away from the diaphragms, allowing the spring to push the lower spindle away from the seat and allow flow of gas.

When working with diaphragm gland seal valves, it is very important to use good cylinder change-out procedures. These procedures must incorporate adequate purge and evacuation times to allow the valve interior to be properly cleaned.

Recommended Opening Procedure

The handwheel rotates approximately 2 turns from fully open to close. When opening a diaphragm valve, the operator will feel resistance for approximately 3/4 turn, at which point the resistance on the handwheel will disappear.

This is the point where the upper spindle would lose contact with the diaphragms, the handwheel becomes free from resistance and full flow is achieved. Therefore fully back seating the upper spindle is not necessary and should be avoided. The operator should always check the position of the valve by attempting to close the valve, never by trying to open the valve.

Recommended Closing Procedure

When the valve is open, full cylinder pressure is exerted on the diaphragms. The pressure on the large surface area of the diaphragm makes it difficult to push the diaphragms down. When closing the valve against cylinder pressure, about 60% of the closing force goes toward overcoming the gas pressure, while about 40% of the force is transmitted to the seat. Therefore, when a pressurized diaphragm valve is closed to the recommended closing torque of 6 Nm and the valve outlet is depressurized, the closing force on the seat is only about 2-3 Nm. The valve may be either "weeping" through at this point or are just barely closed. Because of this effect, it is necessary to use a "double-close procedure" on these valves which requires the operator to close the valve as tightly as possible by hand to vent the pressure in the valve outlet, and then to retighten the valve immediately. This also allows the valve to not be prone to inadvertent opening when exposed to vibration and shock.

Valve Installation

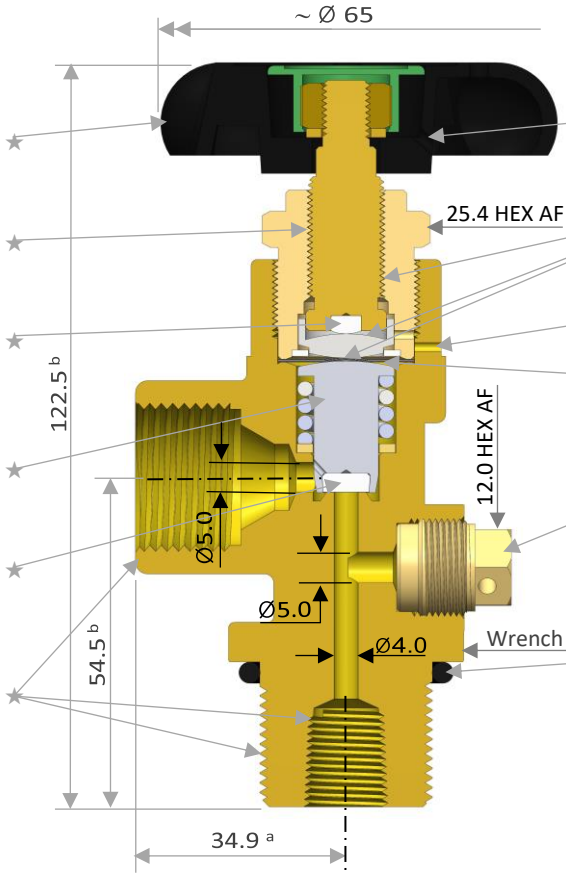
1. For 25E or equivalent thread, valving procedure & torque guidelines should be as per EN ISO 13341.
2. For NGT threads, use hand tight + 3 turns wrench tight to install the valve in the cylinders (refer http://teknovalves.com/Information_Center)
3. Valve installation torque for UNF threads:

	Nm	ft.lb
0.750-16 UNF-2A	80-100	60-75
1.125-12 UNF-2A	100-130	75-95
NOTE The cylinder manufacturer should be contacted to ensure torque values are appropriate.		

⚠ CAUTION

1. NEVER use wrenches or other persuaders to operate the valve.
2. Valving tools (e.g. sockets or jaws) used to screw the valve into the cylinder must make contact with the flats in the valve body and not touching any part of the PRD, if provided. The tools should fit the valve properly without causing damage.
3. Over-torquing the valve into the cylinder must be avoided as they cause high stresses in the cylinder neck, leading to overload failures. Over-torquing also leads to irreparable damage to the valve stem.
4. Do not attempt to replace soft seat in the lower spindle.
5. Repair and maintenance should be carried out by trained personnel.
6. Proper filling connectors should be used for filling and discharge ensuring contact only at the intended sealing surface.

Series RWH-03 (Valve shown with Parallel Inlet)



- Handwheel available in 30% glass filled PA 6 and Aluminium material variant
- Fine pitch (20 TPI) provides gradual valve opening
- Moly filled nylon tip reduces friction between rotating upper spindle and thrust metallic pad
- Non-threaded lower spindle prevents particulate generation in gas wetted area
- Available in PA 66 and PCTFE seating options *(refer product selection guide)*
- Inlet, outlet & dip tube connections provided as per requirement
- Drain hole on handwheel prevents water trapping
- Lubrication in non-wetted area ensures smooth movement
- Vent hole prevents air trapping
- SS 301 x 5 diaphragms prevent external leakage
- Capsule design PRD uses corrosion resistant Nickel burst disc (except for hydrogen service) and copper gasket to secure sealing with valve body and protect damage in service
- Available in PTFE and NBR inlet O-ring options

All dimensions are in mm

Dimensions shown are for 1.125-12UNF-2A inlet & CGA 580 outlet

a Depends upon outlet connection
b Depends upon inlet connection

Design Specifications

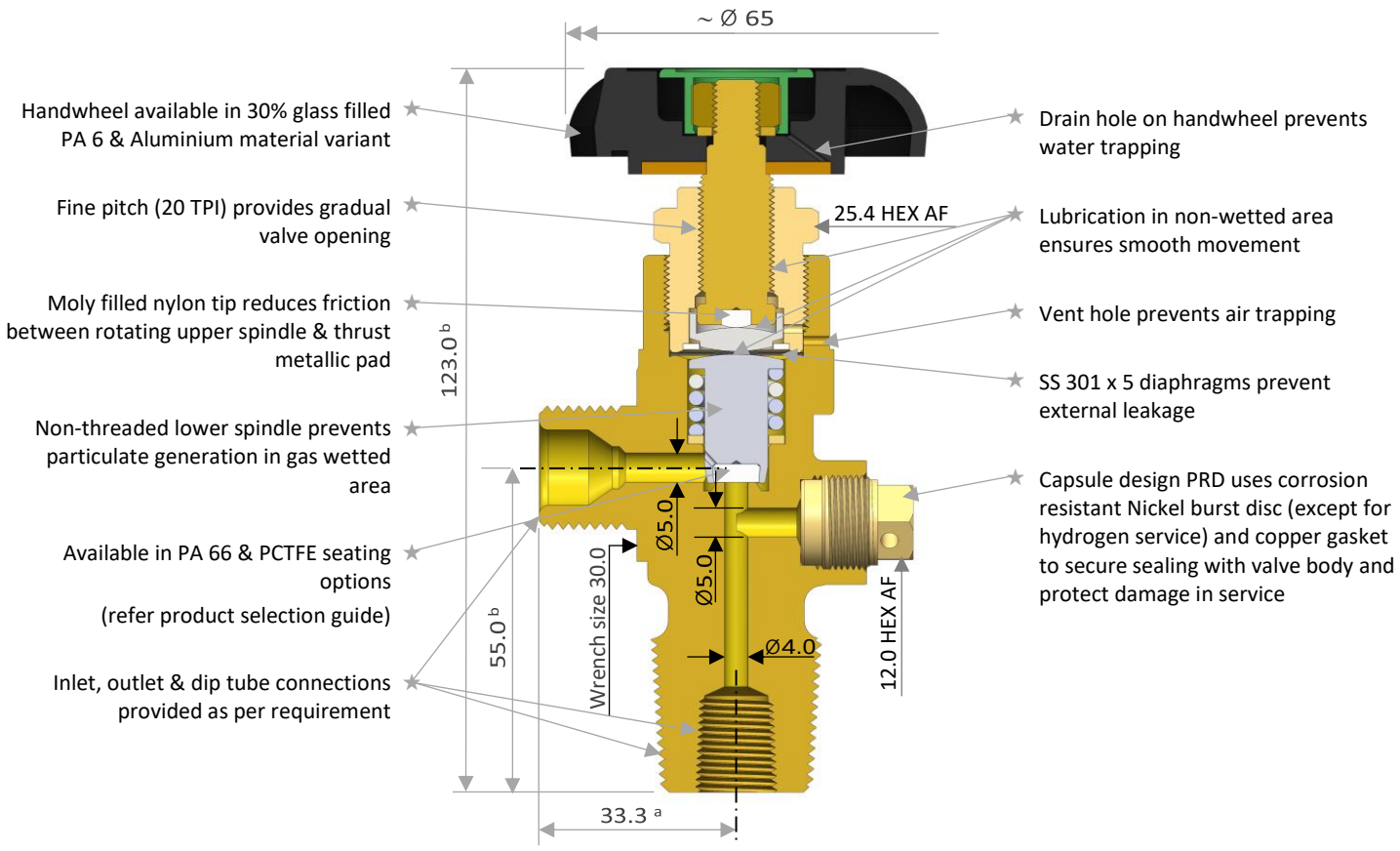
	Metric	English
Minimum life	2000 cycles	
Pressure rating	250 bar	3600 psig
Oxygen pressure surge test	50 cycles at 250 bar	50 cycles at 3625 psig
Temperature range	–40 °C to +65 °C	-40 °F to +149 °F
Flow coefficient (C_v)	0.27	
Minimum closing torque	6 Nm	4 ft.lb
Gland nut installation torque	95 Nm	70 ft.lb
PRD installation torque*	32 Nm	24 ft.lb
Lubricant	Krytox GPL 225	

**Optional*

Testing & Certification

- Valves meet EN ISO 10297:2017
- Valves are certified by BAM to European Transportable Pressure Equipment Directive (TPED) & available with ᵀᵀ mark
- PRD complies with CGA S-1.1
- Production testing as per EN ISO 14246

Series RWH-03 (Valve shown with Taper Inlet)



All dimensions are in mm

Dimensions shown are for 25E inlet & CGA 350 outlet

a Depends upon outlet connection

b Depends upon inlet connection

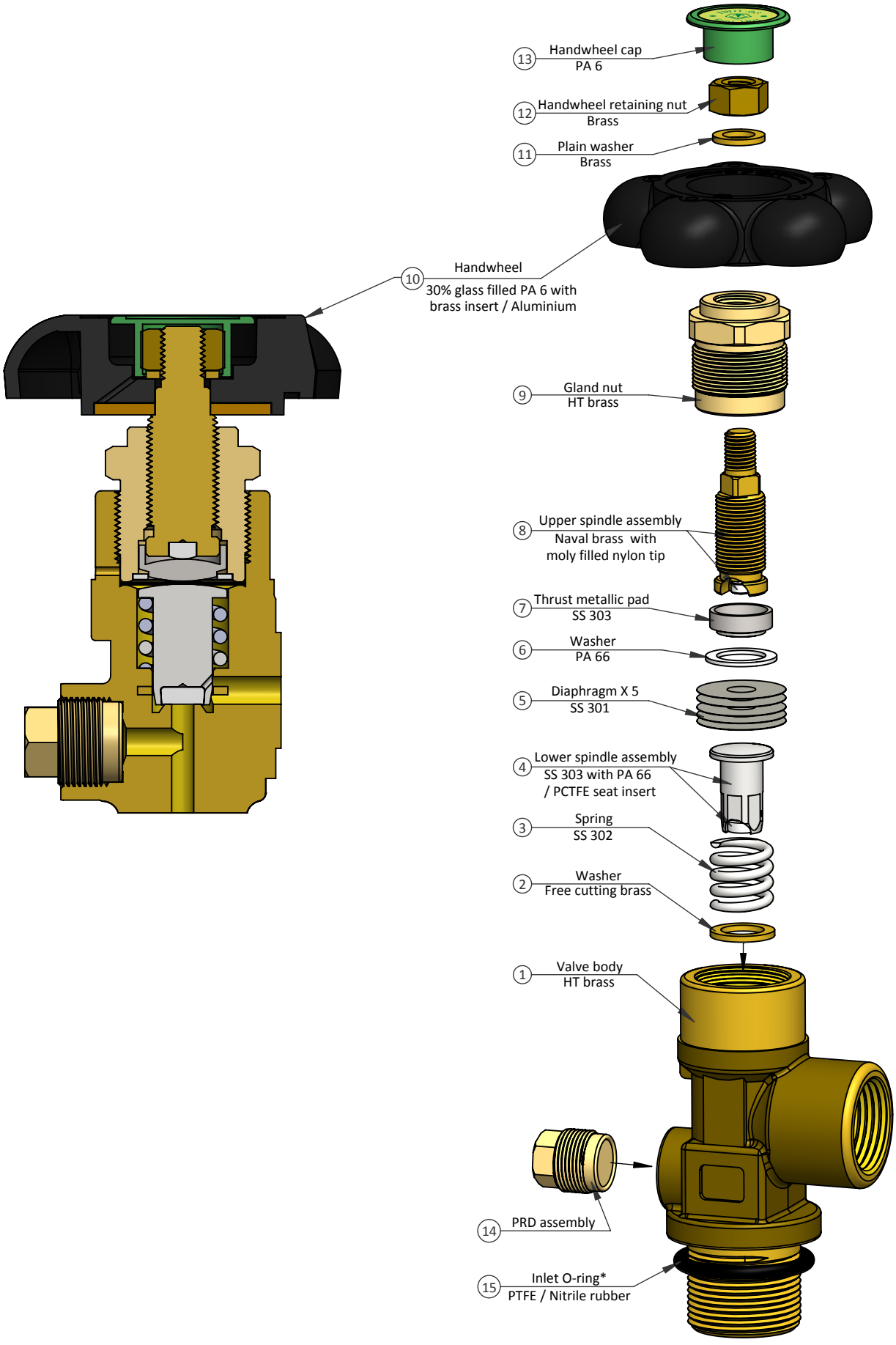
Design Specifications

	Metric	English
Minimum life	2000 cycles	
Pressure rating	250 bar	3600 psig
Oxygen pressure surge test	50 cycles at 250 bar	50 cycles at 3625 psig
Temperature range	–40 °C to +65 °C	-40 °F to +149 °F
Flow coefficient (C_v)	0.27	
Minimum closing torque	6 Nm	4 ft.lb
Gland nut installation torque	95 Nm	70 ft.lb
PRD installation torque*	32 Nm	24 ft.lb
Lubricant	Krytox GPL 225	
MAX weight of cylinder package mass for which valve can be used without protection	111 kg	244 lb

**Optional*

Testing & Certification

- Valves meet EN ISO 10297:2017
- Valves are certified by BAM to European Transportable Pressure Equipment Directive (TPED) & available with ᵀᵀ mark
- PRD complies with CGA S-1.1
- Production testing as per EN ISO 14246



*For parallel inlet connection only

Valve shown with Parallel inlet and CG-1 PRD

Disassembly of valve

1. Place the valve after removing from the cylinder in a vice or similar holding fixture. The holding fixture should securely grip the valve body on the wrench flats so that there is no damage to the internal bores, inlet & outlet threads or pressure relief device.
2. Remove handwheel cap (13) by pulling it away from the handwheel (10) using a screw driver or similar tool. Using a 13 mm socket wrench or hex box wrench, remove the handwheel retaining nut (12) by turning it counter clockwise.
3. Remove the plain washer (11) & the handwheel from the spindle.
4. Using a 25.4 mm socket wrench or hex box wrench, unscrew the gland nut (9) in counter clockwise direction. The upper spindle assembly (8) will come out with the gland nut. Remove the upper spindle assembly, thrust metallic pad (7) & washer (6) from the gland nut by rotating it in clockwise direction.
5. Remove the valve from the vice & invert the valve body (1) to remove the diaphragms (5) followed by the lower spindle assembly (4) encased by the spring (3) & brass washer (2).
6. Pressure Relief Device, PRD (14)
   If required remove the PRD by rotating counter clockwise using a 12 mm or 17 mm (as applicable) socket wrench or hex box wrench. Be careful not to scratch / damage the sealing surface of the PRD with the valve body.

Inspection of valve & components

1. Valve body (1)
   a. Inspect the valve body chamber for dirt, debris or damage. Where possible, blow out the valve body chamber using clean, dry compressed Air or Nitrogen to remove any foreign particles.
   b. Inspect the valve body for seat damage & thread wear.
   c. Do not attempt to repair the valve body if damaged.
2. Components
   a. Always discard the diaphragms (5) once removed from the valve & replace with new diaphragms.
   b. Inspect all parts visually for wear / damage. Replace parts as necessary.
   c. Handwheel (10) should only be reused if in good condition.
   d. Inspect the PRD (14) for any wear / damage. Replace PRD assembly if damaged or actuated.
   e. Replace inlet O-ring (15) if valve is removed from the cylinder.

Assembly of valve

1. Lubricate parts as per GA drawing.
   NOTE Customer will receive parts in lubricated condition.
2. Place brass washer (2) inside the valve body (1) step bore & place the SS spring (3) on top. Position the lower spindle assembly (4) inside the spring ensuring the spindle collar rests on top of the spring.
3. Place SS 301 x 5 diaphragms (5) in the valve body so that it rests on the top face of the lower spindle.
4. Fully screw the upper spindle assembly (8) in counter clockwise direction ensuring the collar face rests against the gland nut (9) counter face (fully open position).
5. Insert SS 303 thrust metallic pad (7) inside the gland nut assembly so that the cup face touches the spindle tip.
6. Push fit PA 66 washer (6) in the gland nut counter groove ensuring the lubricant in the other face of the thrust metallic pad is not displaced.
7. Screw in gland nut assembly inside the valve body by rotating in clockwise direction.
8. Clamp the valve body in vice with nylon clamp pads, ensuring no damage to the valve body & tighten the gland nut at torque between 90-100 Nm
9. Tighten PRD assembly (14), if applicable, at torque between 30-35 Nm in clockwise direction
10. Fit handwheel (10) by tightening handwheel retaining nut (12) over plain washer (11) by rotating clockwise at torque of 8-10 Nm
11. Push fit wheel cap (13) in the handwheel.
12. For parallel inlet connection, fit inlet O-ring (15) so that it rests against the flange.

NOTE Refer “Material of construction & assembly arrangement” page to identify the part No. given in the bracket.

Series RWH-03

Valve Series	
RWH	RWH-03

Body	
HB	High tensile brass

Inlet [A]	
1BS	1" to BS 341-1:1962
25E	25E to ISO 11363-1
12N	3/4-14 NGT to CGA V-1
CL2	3/4-14 NGT (Cl)-2 (4 turns oversize)
7TO	3/4-14 NGT (7 turns oversize)
08N	1/2-14 NGT to CGA V-1
17E	17E to ISO 11363-1
U18	1.125-12 UNF-2A
U12	0.750-16 UNF-2A

Dip Tube [A]	
E	1/4" NGT
i	1/4" NPT
c	1/4" BSP
G	3/8 NGT
h	M10X.75
b	M10X1.0
X	Not required

Specification	
L	EN ISO 10297:2017

Inspection	
P	"Pi" mark (In-house inspection service)

Gas Service [B]	
N2	"As per approved list" (refer page-7.1)

Seat Insert [C]	
XX6	PA 66
XXE	PCTFE

RWH	HB	25E	c	660	N2	1	36	L	P	XX6	250

(For example only)

Outlet [A]	
296	CGA 296
320	CGA 320
326	CGA 326
330	CGA 330
350	CGA 350
510	CGA 510
540	CGA 540
580	CGA 580
590	CGA 590
660	CGA 660
670	CGA 670
AFC	AFNOR - Type C
AFE	AFNOR - Type E
D01	DIN-1
D05	DIN-5
D06	DIN-6
D09	DIN-9
D10	DIN-10
D14	DIN-14
S02	IS-2/BS-2/BS-4
S03	IS-3/BS-3
UN1	1-UNI
UN2	2-UNI
UN8	8-UNI

PRD Type [B]	
1	CG-1/Ni
6	CG-1/Cu
4	CG-4/Ni
8	CG-5/Ni
7	CG-4/Cu
5	CG-5/Cu
X	Not required

PRD Rating	In bar	In psig
28	207	3000
32	232	3360
36	250	3775
38	276	4000
39	300	4350
46	334	4833
XX	Not required	

Test Pressure (bar)	
180	180 bar
190	190 bar
250	250 bar

Working Pressure (psig)	
124	1800 psig
139	2015 psig
156	2265 psig
166	2400 psig
200	2900 psig

MATL Options - Inlet O-ring
PTFE
NBR

Options - Handwheel
Aluminium (CED coated)
30% glass filled PA 6 with brass insert

Options - Others
Seal nut and sealing gasket

A - Other inlet, outlet & dip tube connections are available as per customer requirement

B - Valves for hydrogen service shall use copper burst disc in PRD (see next page)

C - PCTFE seat insert is not available for oxygen & other oxidizing gases & their mixtures

Series RWH-03

Liquefied Gases								
Sl. No.	UN No.	Name of Gas [A]	Chemical Formula	ASHRAE No.	Soft Seat Options		Inlet O-ring Material	
					PA 66	PCTFE	PTFE	NBR
01	1009	Bromotrifluoromethane	$CBrF_3$	R 13B1	✓	✓	✓	✓
02	1013	Carbon dioxide	CO_2	-	✓	✓	✓	X
03	2517	Chlorodifluoroethane	$C_2H_3ClF_2$	R142b	✓	✓	✓	✓
04	1018	Chlorodifluoromethane	$CHClF_2$	R22	✓	✓	✓	X
05	1974	Chlorodifluoromethane	$CBrClF_2$	R12B1	✓	✓	✓	✓
06	1020	Chloropentafluoroethane	C_2ClF_5	R115	✓	✓	✓	✓
07	1021	Chlorotetrafluoroethane	C_2HClF_4	R124	✓	✓	✓	X
08	1983	Chlorotrifluoroethane	CH_2ClCF_3	R133a	✓	✓	✓	X
09	1022	Chlorotrifluoromethane	$CClF_3$	R 13	✓	✓	✓	✓
10	1028	Dichlorodifluoromethane	CCl_2F_2	R12	✓	✓	✓	✓
11	1029	Dichlorofluoromethane	$CHCl_2F$	R21	✓	✓	✓	X
12	1958	Dichlorotetrafluoroethane	$C_2Cl_2F_4$	R114	✓	✓	✓	✓
13	1030	Difluoroethane	$C_2H_4F_2$	R152a	✓	✓	✓	✓
14	1959	Difluoroethylene	$C_2H_2F_2$	R1132a	✓	✓	✓	✓
15	3252	Difluoromethane	CH_2F_2	R32	✓	✓	✓	✓
16	1035	Ethane	C_2H_6	R170	✓	✓	✓	✓
17	1037	Ethyl chloride	C_2H_5Cl	R160	✓	✓	✓	✓
18	1962	Ethylene	C_2H_4	-	✓	✓	✓	✓
19	3296	Heptafluoropropane	C_3HF_7	R227	✓	✓	✓	✓
20	2193	Hexafluoroethane	C_2F_6	R116	✓	✓	✓	X
21	1858	Hexafluoropropylene	C_3F_6	R1216	✓	✓	✓	X
22	1062	Methyl bromide	CH_3Br	R40B1	✓	✓	✓	X
23	1063	Methyl chloride	CH_3Cl	R40	✓	✓	✓	X
24	1070	Nitrous oxide	N_2O	-	✓	X	✓	X
25	2422	Octafluorobutene	C_4F_8	R1318	✓	✓	✓	✓
26	1976	Octafluoro-Cyclobutane	C_4F_8	RC318	✓	✓	✓	✓
27	2424	Octafluoropropane	C_3F_8	R218	✓	✓	✓	✓
28	3220	Pentafluoroethane	C_2HF_5	R125	✓	✓	✓	✓
29	1978	Propane	C_3H_8	R290	✓	✓	✓	✓
30	1080	Sulphur hexafluoride	SF_6	-	✓	✓	✓	✓
31	2191	Sulphuryl Fluoride	SO_2F_2	-	X	✓	✓	X
32	3159	Tetrafluoroethane	C_2F_4	R134a	✓	✓	-	-
33	1982	Tetrafluoromethane	CF_4	R14	✓	✓	✓	X
34	1081	Tetrafluroethylene	C_2F_4	R1114	✓	✓	✓	✓
35	1984	Trifluoromethane	CHF_3	R 23	✓	X	✓	✓
36	2036	Xenon	Xe	-	✓	✓	✓	✓

Compressed Gases							
Sl. No.	UN No.	Name of Gas [A]	Chemical Formula	Soft Seat Options		Inlet O-ring Material	
				PA 66	PCTFE	PTFE	NBR
01	1006	Argon	Ar	✓	✓	✓	✓
02	1016	Carbon monoxide [C]	CO	✓	✓	✓	✓
03	1957	Deuterium	D_2	✓	✓	✓	✓
04	1046	Helium	He	✓	✓	✓	✓
05	1049	Hydrogen [B]	H_2	✓	✓	✓	✓
06	1056	Krypton	Kr	✓	✓	✓	✓
07	1971	Methane	CH_4	✓	✓	✓	✓
08	1065	Neon	Ne	✓	✓	✓	✓
09	1066	Nitrogen	N_2	✓	✓	✓	✓
10	1072	Oxygen	O_2	✓	X	✓	✓

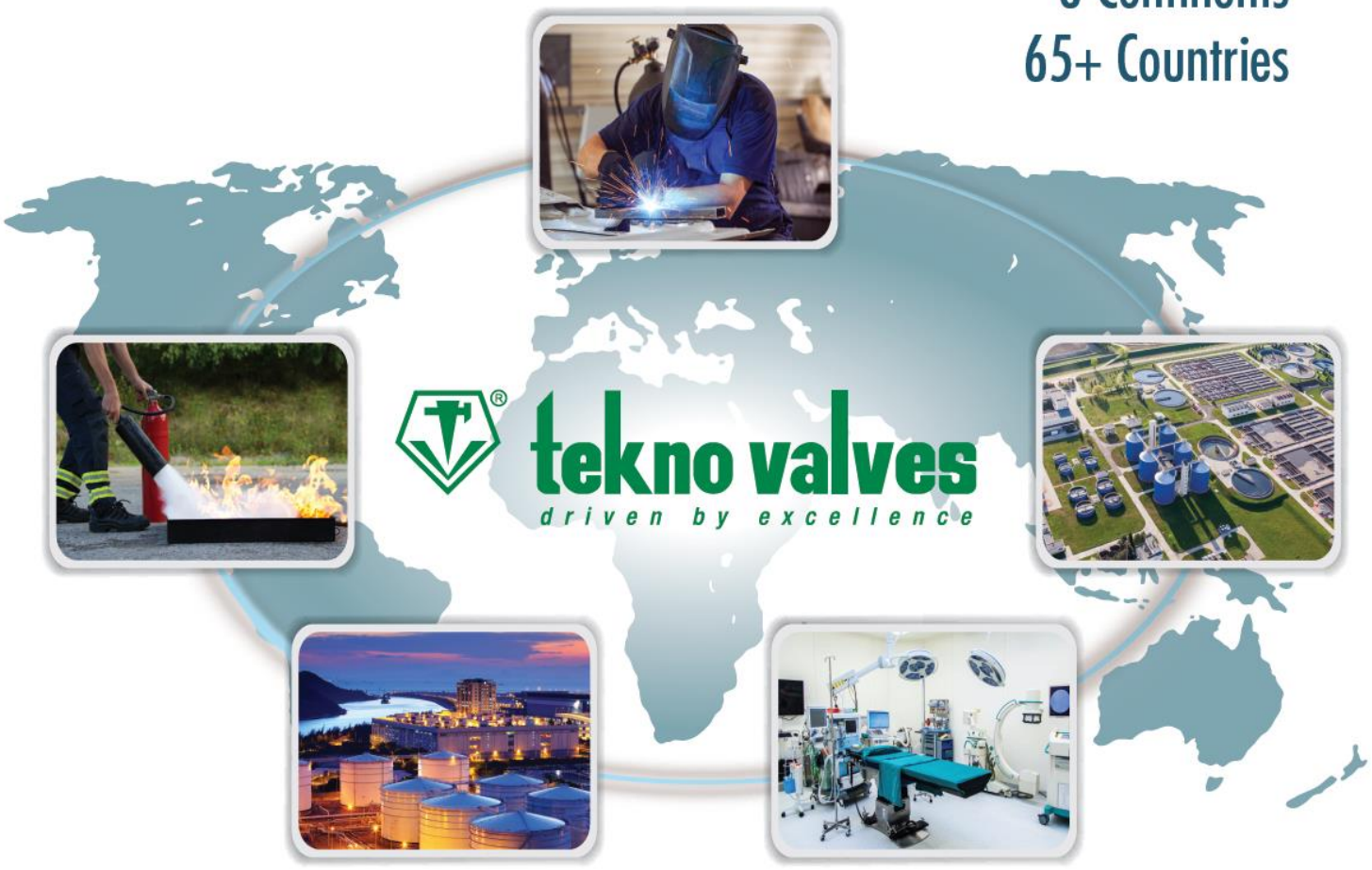
A – Valve may also be used for mixtures of the listed gases. PRD, if provided, shall be offered with nickel burst disc unless mentioned otherwise.

B - Valves for hydrogen service, if equipped with PRD, shall be offered with copper burst disc

C - Valves for carbon monoxide service / carbon monoxide gas mixture shall not be equipped with PRD.

Notes

6 Continents
65+ Countries



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