Wheel operated cylinder valve in O-ring seal design for carbon dioxide and carbon dioxide gas mixtures

SWN-12/C (simple valve)

IWN-12/C (inline RPV)

- Robust construction and built to last
- High flow and reliable performance
- Low torque operation

TPED Certification (CE mark) by BAM as notified body: ID-0589

BAM Bundesanstalt für Materialforschung und -prüfung

tekno valves
driven by excellence

ISO 9001 and TPED certified valve manufacturer

Features and benefits for best-in-class performance

Series SWN-12/C (taper inlet connection)

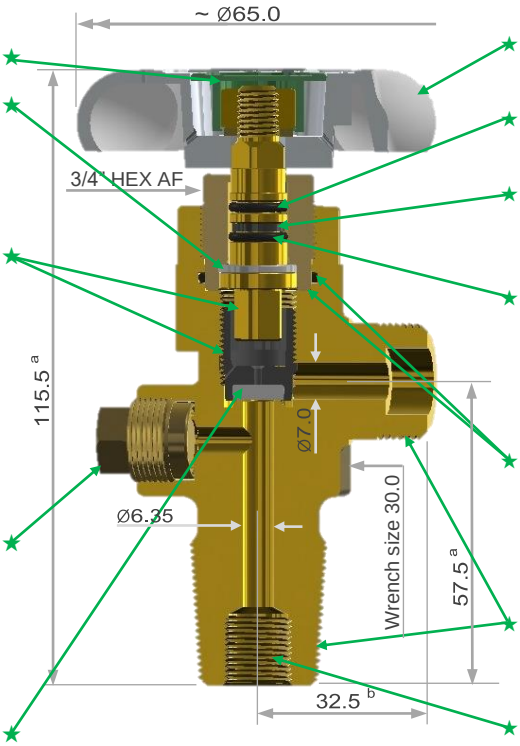
Customer logo can be provided*

PA 66 thrust washer reduces friction when the upper spindle rotates under pressure, also assists in external tightness at high pressure

SS-303 lower spindle provides torque resistance and eliminates stress corrosion cracking associated with brass material in carbon dioxide service. In case of excessive torque being applied to the valve operating device, the upper spindle fails first to allow valve repair even when the cylinder is pressurized

Pressure relief device (PRD) uses corrosion resistant Nickel disc. Internal plug capsule design using copper gasket provides secure sealing with valve body and protects the PRD from loosening or damage in service

PA 66 soft seat provides long life and low torque operation



Handwheel available in 30% glass filled PA 6 and Aluminium

Secondary O-ring prevents moisture / contamination ingress

High durometer EPDM back-up ring prevents extrusion of primary O-ring

Primary EPDM O-ring provides external tightness past upper spindle over entire operating and storage temperature and pressure range

Metal to metal seal prevents leakage past gland nut threads. Gland nut O-ring arrests leakage in case the metallic sealing is compromised by impact

Available in different valve outlet and inlet connection (Refer valve selection guide)

Tapped as per customer requirement for dip tube fitment

Dimensions are in mm

Dimensions shown are for 1" BS inlet and BS-8 outlet

a Depends upon inlet connection

b Depends upon outlet connection

* Subject to MIN quantity

Design Specifications

- MIN life :2000 cycles
- Operating and storage temperature range :-46 °C to + 85 °C
- MIN closing torque :3 Nm
- Gland nut installation torque :60-70 Nm
- Handwheel retaining nut installation torque :8-10 Nm
- MAX test pressure (TP) :360 bar
- Lubricant :Krytox GPL 225
- Flow coefficient (*Cv*) :0.70
- MAX weight of package mass without valve protection
  - Valve body with low tensile brass :100 kg
  - Valve body with brass as per IS 8737 :111 kg

Testing and certification

- ✓ Valve meets EN ISO 10297:2014, tested by BAM Berlin
- ✓ Production testing as per EN ISO 14246:2014
- ✓ Certified by BAM Berlin to European Transportable Pressure Equipment Directive (TPED) and available with TT mark

Features and benefits for best-in-class performance

Series SWN-12/C (parallel inlet connection)

Customer logo can be provided*

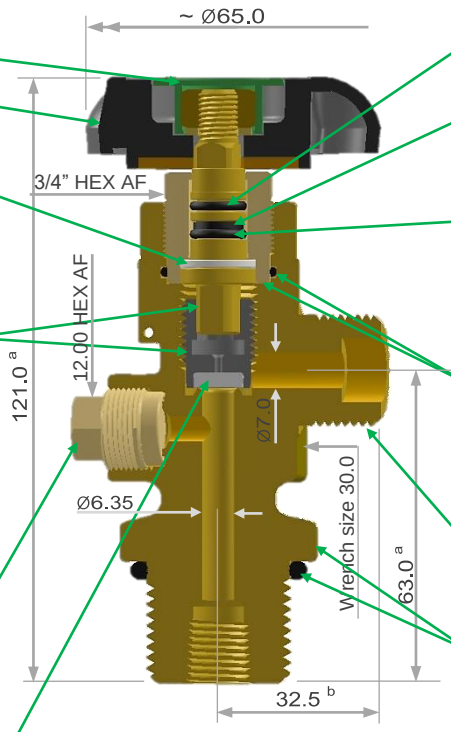
Handwheel available in 30% glass filled PA 6 and Aluminium

PA 66 thrust washer reduces friction when the upper spindle rotates under pressure, also assists in external tightness at high pressure

SS-303 lower spindle provides torque resistance and eliminates stress corrosion cracking associated with brass material in carbon dioxide service. In case of excessive torque being applied to the valve operating device, the upper spindle fails first to allow valve repair even when the cylinder is pressurized

Pressure relief device (PRD) uses corrosion resistant Nickel disc. Internal plug capsule design using copper gasket provides secure sealing with valve body and protects the PRD from loosening or damage in service

PA 66/PCTFE soft seat provides long life and low torque operation



Secondary O-ring prevents moisture / contamination ingress

High durometer EPDM back-up ring prevents extrusion of primary O-ring

Primary EPDM O-ring provides external tightness past upper spindle over entire operating and storage temperature and pressure range

Metal to metal seal prevents leakage past gland nut threads. Gland nut O-ring arrests leakage in case the metallic sealing is compromised by impact

Available in different valve outlet, inlet and dip tube connections (Refer valve selection guide)

Robust flange construction and generous undercut provides resistance to mechanical impact. High durometer EPDM O-ring facilitates leak proof seal with cylinder neck

Dimensions are in mm

Dimensions shown are for M25 X 2 inlet and BS-8 outlet

a Depends upon inlet connection

b Depends upon outlet connection

* Subject to MIN quantity

Design Specifications

MIN life	:2000 cycles
Operating and storage temperature range	:-46 °C to + 85 °C
MIN closing torque	:3 Nm
Gland nut installation torque	:60-70 Nm
Handwheel retaining nut installation torque	:8-10 Nm
MAX test pressure (TP)	:360 bar
Lubricant	:Krytox GPL 225
Flow coefficient (*Cv*)	:0.70
MAX weight of package mass without valve protection	
- Valve body with brass as per IS 8737	:41.6 kg

Testing and certification

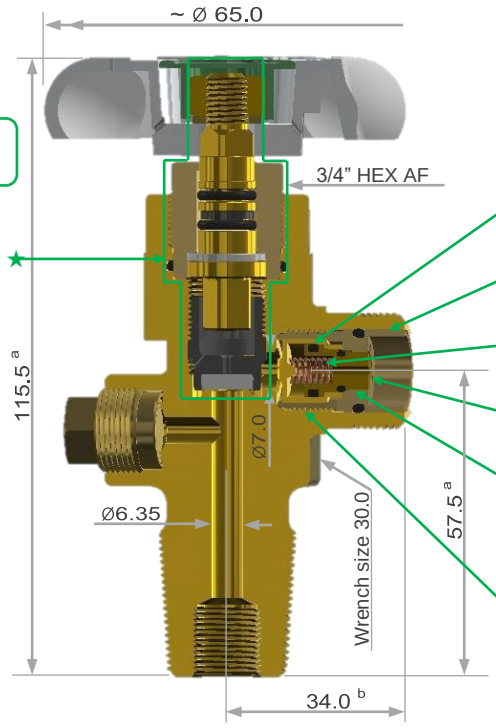
- ✓ Valve meets EN ISO 10297:2014, tested by BAM Berlin
- ✓ Production testing as per EN ISO 14246:2014
- ✓ Certified by BAM Berlin to European Transportable Pressure Equipment Directive (TPED) and available with TT mark

Features and benefits for best-in-class performance

Series IWN-12/C
(SWN-12/C integrated with inline RPD)

Main shut-off mechanism

Refer features and benefits page of SWN-12/C



Residual Pressure Device (RPD)

- Quad ring requires less squeeze and offers improved life
- RPD secured inside valve outlet using special assembly tool
- Oxygen compatible and corrosion resistant copper beryllium spring
- Piston length may be modified to suit buyer's filling connector
- Close tolerances ensure quick and positive shut off with no popping/noise over full range of flow discharge
- Three flute housing design does not restrict flow

Dimensions are in mm

Dimensions shown are for 1" BS inlet and BS-8 outlet

a Depends upon inlet connection

b Depends upon outlet connection

Design Specifications for RPD

MIN life	: 100000 cycles
RPD installation torque	: 5 Nm
MAX test pressure (TP)	: 360 bar
Closing off pressure	: 3 - 5 bar
Opening pressure	: 5 - 8 bar
MAX stroke length of piston	: 3.25 mm
Lubricant	: Krytox GPL 225
Flow coefficient (*Cv*)	: 0.70

Testing and certification

- ✓ Valve meets EN ISO 10297:2014 and EN ISO 15996:2007, tested by BAM Berlin
- ✓ Production testing as per EN ISO 14246:2014
- ✓ Certified by BAM Berlin to European Transportable Pressure Equipment Directive (TPED) and available with TT mark

Operating principle

Series SWN-12/C and IWN-12/C

Identifying features

SWN-12/C is handwheel operated O-ring seal valve using two piece spindle construction suitable for carbon dioxide and carbon dioxide mixtures. The free floating upper spindle and the threaded lower spindle interface through a square drive. The design uses O-rings to create a seal around the upper spindle. Polyamide thrust washer makes contact with the collar of the upper spindle under pressure and acts as anti-friction ring as the upper spindle rotates to open and close the valve. Leakage through the gland nut threads is protected by metallic sealing with secondary protection provided by an O-ring below the gland nut threads. Lower spindle is manufactured from SS-303 to eliminate the problem of stress corrosion of the spindle skirting associated with brass material in carbon dioxide service. PA 66 / PCTFE soft seat ensures low torque closure.

IWN-12/C is SWN-12/C design fitted with an inline residual pressure device (RPD) with non-return function to maintain a positive pressure relative to atmosphere within the cylinder if the valve operating mechanism (main shut-off) is left open and prevent backflow. The positive pressure prevents moisture ingress and contamination which reduces potential for internal cylinder corrosion. Additional benefits of the RPD include productivity improvements in the cylinder fill operation and reducing cylinder maintenance.

Recommended opening procedure

It is recommended that the valves always be opened gradually in anticlockwise direction until the required flow is achieved. Opening the valve fully causes the lower spindle to ride upwards on its threads until it contacts the upper spindle. Valves in the fully open position can be mistaken as closed by inexperienced or untrained operators. 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

Close the cylinder valve by rotating the handwheel in the clockwise direction.

Valve installation

Valving procedure and torque guidelines should be as per EN ISO 13341.

Recommended filling procedure

Fully open the valve before commencing gas filling to avoid any pressure shock in the lower spindle assembly. Pressurizing the valve from the outlet with the valve in closed position and subsequently opening the valve for filling may result in dislocation of soft seat.

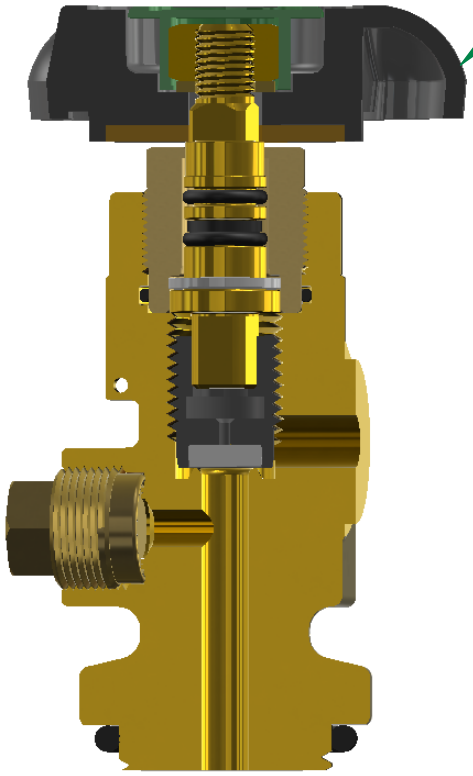
⚠ CAUTION

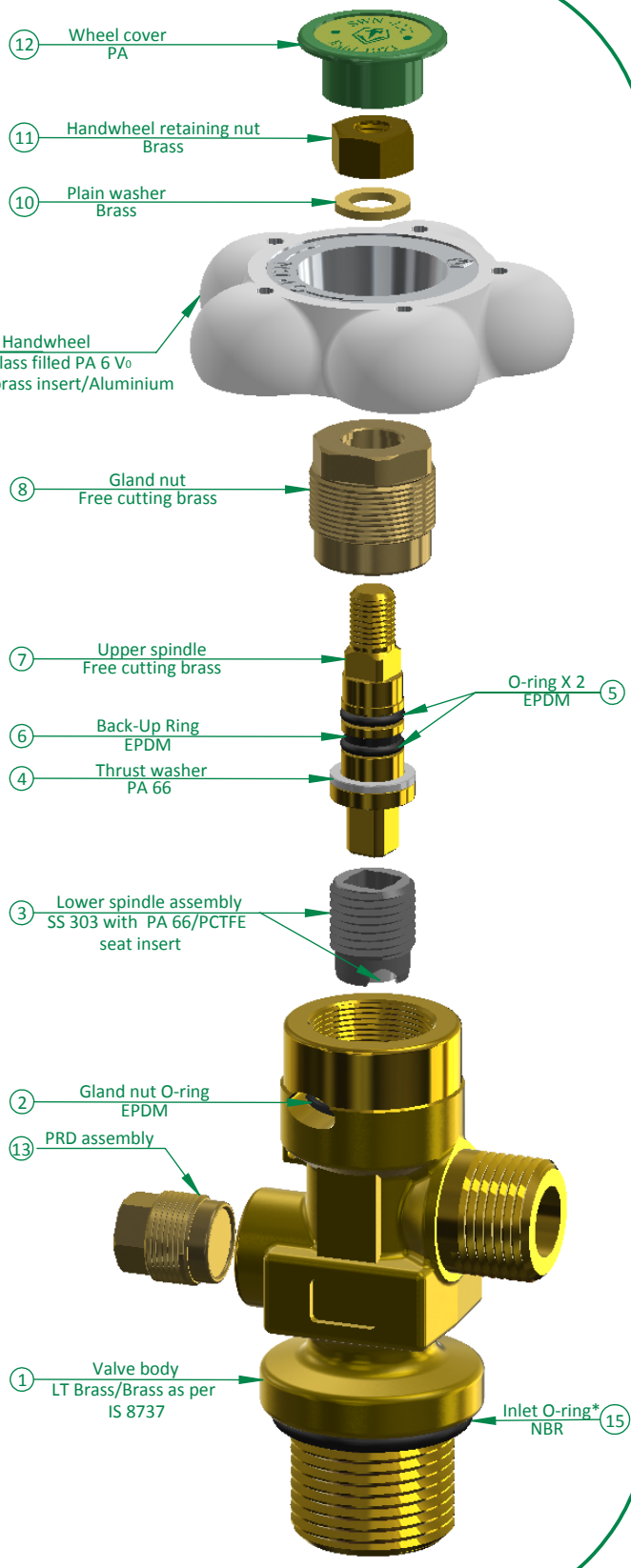
1. NEVER use wrenches or other persuaders to operate the valve.
2. Valving tools (e.g. sockets or jaws) used to screw the valve into the cylinder must make contact with the flats in the valve body and not touching any part of the PRD, if provided. The tools should fit the valve properly without causing 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. As upper spindle is non-rising, do not over torque the valve in open direction.
5. Do not attempt to replace soft seat in the lower spindle.
6. Repair and maintenance should be carried out by trained personnel.
7. Proper filling connectors should be used for filling and discharge ensuring contact only at the intended sealing surface.

tekno valves

Material of construction and assembly arrangement

Series SWN-12/C



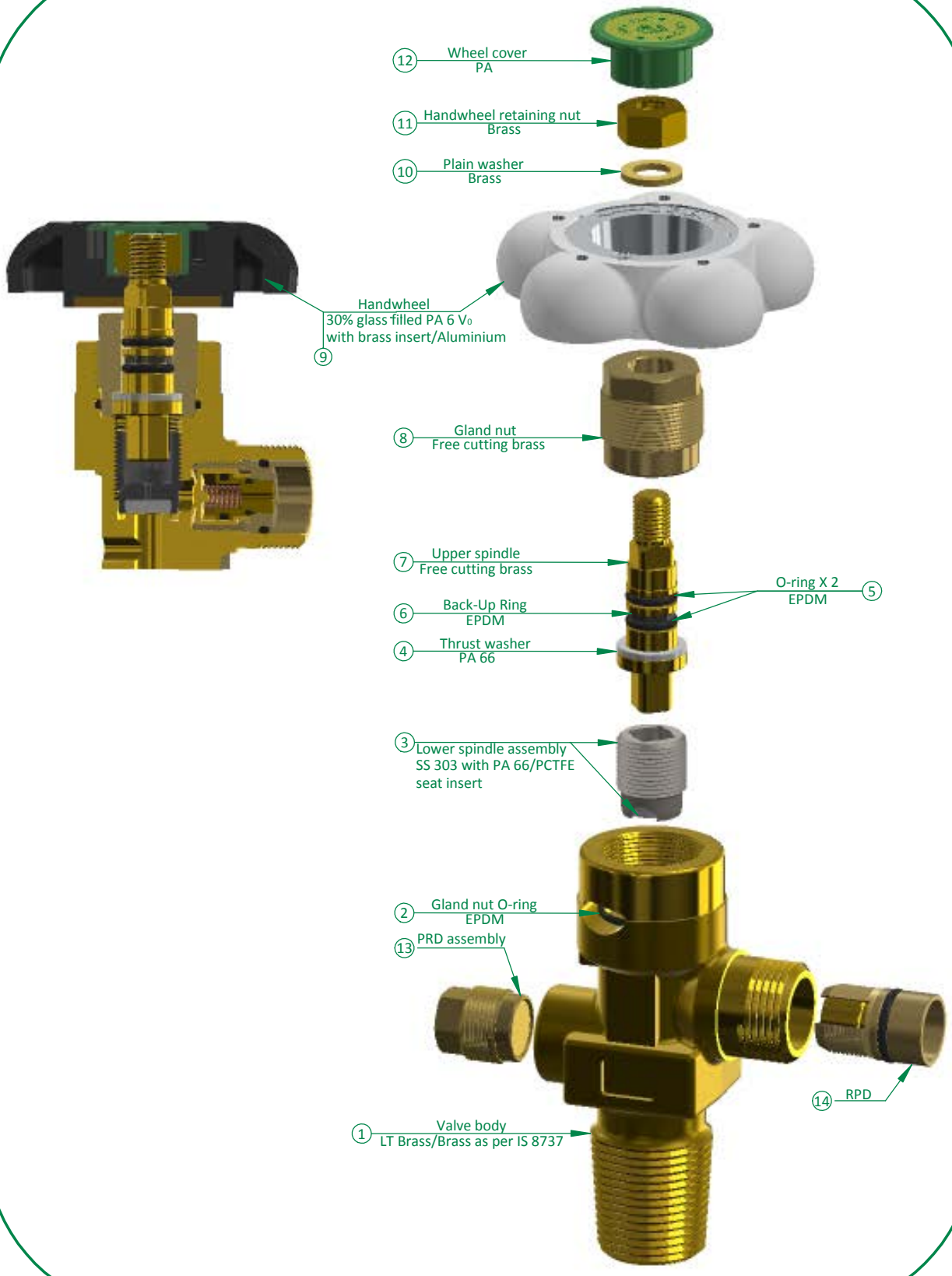


*For parallel inlet connection only

tekno valves

Material of construction and assembly arrangement

Series IWN-12/C



Disassembly, inspection and assembly instructions

Series SWN-12/C and IWN-12/C

Disassembly of valve

1. Place the valve assembly after removing from the cylinder in a vice or similar holding fixture. The holding fixture must securely grip the valve body (1) on the wrench flats so that there is no damage to the valve body plating, internal bores and inlet and outlet threads.
2. Remove handwheel cap (12) by pulling it away from the handwheel (9) using a screw driver or similar tool. Use 13 mm socket wrench or HEX box wrench to unscrew the handwheel nut (11) by turning it counter clockwise
3. Remove the handwheel from the upper spindle (7) square. The handwheel nut and plain washer (10) will come out with the handwheel.
4. Using a 3/4" socket wrench or hex box wrench, unscrew the gland nut (8) in counter clockwise direction. The upper spindle assembly with O-rings (5) and back-up ring (6) will remove with the gland nut. Remove the upper spindle assembly from the gland nut by pushing the upper spindle from the top. Be careful not to scratch the gland nut sealing surface.
5. Use the upper spindle to remove the lower spindle assembly (3) from the valve chamber, by rotating it counter clockwise.
6. For IWN-12/C, remove RPD (14) using special tool provided by manufacturer.
7. Remove the PRD (13) by rotating counter clockwise using a 12.00 mm 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 and 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 and thread wear.
   c. Inspect if gland nut O-ring (2) is in place inside the valve body groove.
   d. Do not attempt to repair the valve body if damaged.
2. Components
   a. Inspect all parts visually for wear, damage. Replace parts as necessary. In case of damage to upper spindle (7) and / or elastomers, replace with new upper spindle subassembly.
   b. Inspect lower spindle (3) threads and soft seating for any sign of wear / damage. Inspect the thrust washer (4). Replace if necessary.
   c. Inspect PRD (13) and RPD (14) (if installed) for any damage.
   d. Handwheel (9) should only be reused if in good condition.
   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 / spare kits in lubricated condition.
2. Place thrust washer (4) to rest above the upper spindle (7) collar.
3. Use special tools to fit O-rings (5) and back-up ring (6) in upper spindle groove. Care should be taken to place the back-up ring above the O-ring in the lower groove and secondary O-ring in the upper groove.
4. Fit gland nut O-ring (2) inside the groove provided in the valve body (1) just below the gland nut threads.
5. Insert upper spindle subassembly inside gland nut (8) with a twisted motion to avoid damage to elastomers and insert till it rests on gland nut counter bore.
6. Place the lower spindle assembly (3) into the valve body. Position the upper spindle to engage with the lower spindle square and screw in gland nut into the valve body by rotating the upper spindle square. This will also drive the lower spindle assembly to rest with the valve body seat.
7. Clamp valve body in bench vice between nylon clamps. Tighten gland nut using a 3/4" socket wrench or hex box wrench at 65 ± 2 Nm in clockwise direction.
8. Place handwheel (9) on the upper spindle square.
9. Fit handwheel by tightening handwheel retaining nut (11) over plain washer (10) using a 13 mm socket wrench or HEX box wrench at 9 ± 1 Nm in clockwise direction. Push fit wheel cover (12) in the handwheel.
10. Tighten PRD assembly (13) using a 12.00 mm socket wrench or HEX box wrench at 32 ± 1 Nm in clockwise direction.
11. Tighten RPD (14), if applicable, at 5 Nm in clockwise direction.
12. For parallel inlet connection, fit inlet O-ring (15) so that it rests against the flange ring.

Last updated: 23rd June, 2017

Series SWN-12/C and IWN-12/C

Valve item code matrix

Valve series	
SWC	SWN-12/C
IWC	IWN-12/C

Body – LT brass (CW617N)	
LB	Standard model
LE	Economy model [D]
Body – Brass as per IS 8737	
FB	Standard model
FE	Economy model [D]

Taper inlet connection [A]	
1BS	1" to BS 341-1:1962
25E	25E to ISO 11363-1
12N	3/4-14 NGT to CGA V-1
32T	31.75 (Type 4, Size 3 of IS:3224)
39J	1.455" [W39-12 TPI, taper 3:26]
16N	1-11.5 NGT
7TO	3/4-14 NGT (7 turns oversize)
Parallel inlet connection [A]	
25P	M25 X 2.0
U18	1.125-12 UNF
S12	3/4"-14 NPSM

Dip Tube [A]	
b	M10X1.0
h	M10X0.75
E	1/4" NGT
s	3/8" BSB
c	1/4" BSP
a	M10X1.25
k	M16 X 1.0
X	Not required

Specification	
L	EN ISO 10297:2014
R	EN ISO 10297:2014 and EN ISO 15996:2007

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

Miscellaneous	
XX6	Seat insert PA 66
XXE	Seat insert PCTFE

Gas service	
CO	As per Annex – S/C [E]

SWC	LB	25E	h	D06	CO	X	XX	L	P	XX6	250

(For example only)

Outlet [A]	
AFC	AFNOR - Type C
320	CGA 320
D06	DIN-6
S07	IS-7/BS-8
UN2	2-UNI
D09	DIN-9
T30	Type 30
W23	W23-14

PRD type [B]	
1	CG-1/Ni
X	Not required

PRD rating	
28	186-207 bar
32	208-232 bar
36	230-250 bar
38	248-276 bar
39	270-300 bar
43	276-306 bar
46	305-334 bar
47	305-340 bar
48	310-345 bar
50	335-386 bar
63	405-450 bar
XX	Not required

Test pressure [C]	
190	190 bar
250	250 bar
360	360 bar

Options - Handwheel
Aluminium
30% glass filled PA 6
30% glass filled PA 6 (V-0)
Options - Others
Seal nut and sealing gasket
RPV filling connector

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

B - PRD shall be provided for hydrogen and carbon monoxide service on request

C - Test pressure 190 bar corresponds to a filling ratio of 0.66 and 250 bar corresponds to a filling ratio of 0.75 for CO2 as per P 200 of ADR

D – Not available with parallel inlet connection

E – Refer next page for list of approved gases

tekno valves

List of approved gases

Series SWN-12/C & IWN-12/C

Sl. No.	UN No.	Name of gas [a]	Chemical formula	ASHRAE No.	Soft seat options	
					PA 66	PCTFE
01	1002	Air	-	-	✓	✓
02	1006	Argon	Ar	-	✓	✓
03	1009	Bromotrifluoromethane	CBrF3	R 13B1	✓	✓
04	1013	Carbon dioxide	CO2	-	✓	✓
05	1016	Carbon monoxide [c]	CO	-	✓	✓
06	2517	Chlorodifluoroethane	CH_3CClF_2	R 142b	✓	✓
07	1018	Chlorodifluoromethane	$CHClF_2$	R 22	✓	✓
08	1020	Chloropentafluoroethane	C_2ClF_5	R 115	✓	✓
09	1022	Chlorotrifluoromethane	$CClF_3$	R 13	✓	✓
10	1957	Deuterium	D_2	-	✓	✓
11	1958	Dichlorotetrafluoroethane	$C_2Cl_2F_4$	R 114	✓	✓
12	1030	Difluoroethane	CH_3CHF_2	R 152a	✓	✓
13	1046	Helium	He	-	✓	✓
14	1049	Hydrogen [b]	H_2	-	✓	✓
15	1056	Krypton	Kr	-	✓	✓
16	1065	Neon	Ne	-	✓	✓
17	1066	Nitrogen	N_2	-	✓	✓
18	1976	Octafluorocyclobutane	C_4F_8	RC 318	✓	✓
19	2424	Octafluoropropane	C_3F_8	R 218	✓	✓
20	1080	Sulphur hexafluoride	SF_6	-	✓	✓
21	1984	Trifluoromethane	CHF_3	R 23	✓	X
22	2036	Xenon	Xe	-	✓	✓

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

tekno valves
driven by excellence

Natun Rasta, Bilkanda, 24 Parganas (N)
Kolkata - 700 113, West Bengal, India
Ph: +91 33 2595 6767 - 74, Fax: +91 33 2595 6779
Email: post@teknovalves.com, Web: www.teknovalves.com

Last updated: 23rd June, 2017 P.Halder