Wheel operated cylinder valve in O-ring seal design for technical and medical gases

SWN-12/45

IWN-12/45

- Ergonomic design
- High reliability and low torque operation
- Suitable for small cylinders for industrial and medical application

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

BAM Bundesanstalt für Materialforschung und -prüfung

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ISO 9001 and TPED certified valve manufacturer

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Features and benefits for best-in-class performance

Series SWN-12/45

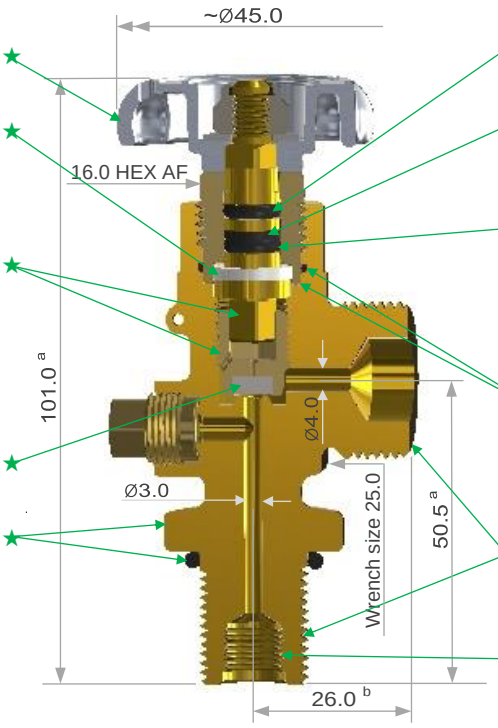
45 mm diameter five flute Al handwheel facilitates easy shut off

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

Naval brass upper and lower spindle provide wear and torque resistance. In case excessive torque is applied to the valve operating device, the upper spindle fails first to allow valve repair when the cylinder is pressurized

PA 66 soft seat provides long service life and low torque operation

Robust flange construction and generous undercut provides resistance to mechanical impact. High durometer EPDM O-ring facilitates leak proof seal with cylinder neck (applicable for parallel inlet threads)



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)

Optionally tapped as per customer requirement for dip tube fitment

Dimensions are in mm

Dimensions shown are for M18 inlet and DIN-9 outlet

a Depends upon inlet connection

b Depends upon outlet connection

Design Specifications

➢ MIN life	:2000 cycles
➢ Operating and storage temperature range	:-46 °C to + 90 °C
➢ MIN closing torque	:4 Nm
➢ Gland nut installation torque	:50 Nm
➢ Handwheel retaining nut installation torque	:5 Nm
➢ MAX test pressure (TP)	:360 bar
➢ Lubricant	
- For oxidizing gases	:Klueberalfa YV 93-302
- For non-oxidizing gases	:Krytox GPL 225
➢ Flow coefficient (C_v)	:0.25
➢ MAX weight of package mass without valve protection	
- High tensile brass body	
• M18 inlet connection	:27.7 kg
• 17E or equivalent inlet connection	:33.3 kg
- Low tensile brass body (M18/17E)	:16.6 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 mark

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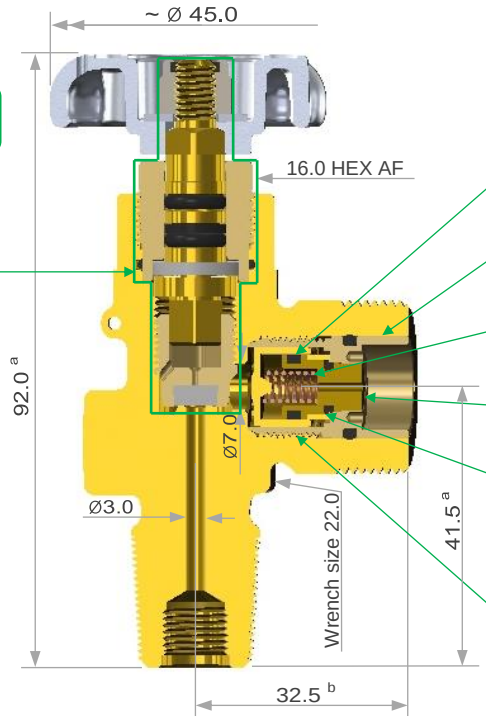
Features and benefits for best-in-class performance

Series IWN-12/45
(SWN-12/45 integrated with inline RPD)

Main shut-off mechanism

Residual Pressure Device (RPD)



Refer features and benefits page of SWN-12/45

- 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 17E inlet and DIN-9 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)
  - For oxidizing gases : 276 bar
  - For non-oxidizing gases : 360 bar
- Closing off pressure : 3 - 5 bar
- Opening pressure : 5 - 8 bar
- MAX stroke length of piston : 3.25 mm
- Lubricant
  - For oxidizing gases : Gleitmo 599
  - For non-oxidizing gases : Krytox GPL 225
- Flow coefficient (C_v) : 0.25

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 mark

Operating principle

Series SWN-12/45 and IWN-12/45

Identifying features

SWN-12/45 is handwheel operated O-ring seal valve using two piece spindle construction. The design is mainly suitable for 10 litres or less water capacity cylinder. 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 has PA 66 soft seat to ensure low torque closure.

IWN-12/45 is SWN-12/45 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 fully open position can be mistaken as closed by inexperienced or untrained operators. When an operator checks a valve to ensure its position, he should always check 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

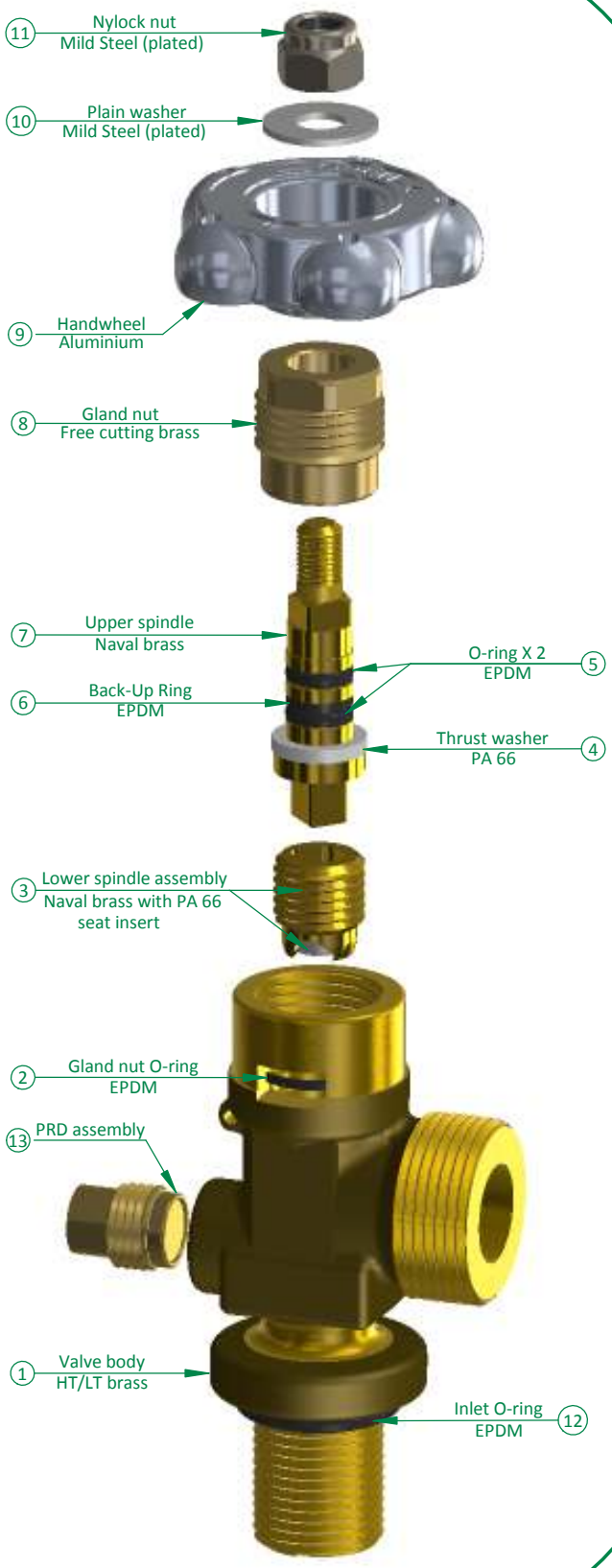
Valving procedure and torque guidelines should be as per EN ISO 13341.

⚠ 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 only make contact with the flats provided in the valve body. 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.

Material of construction and assembly arrangement

Series SWN-12/45



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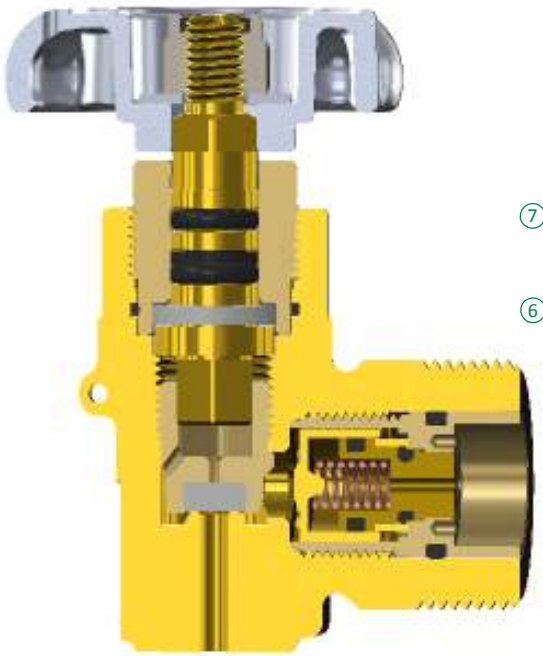
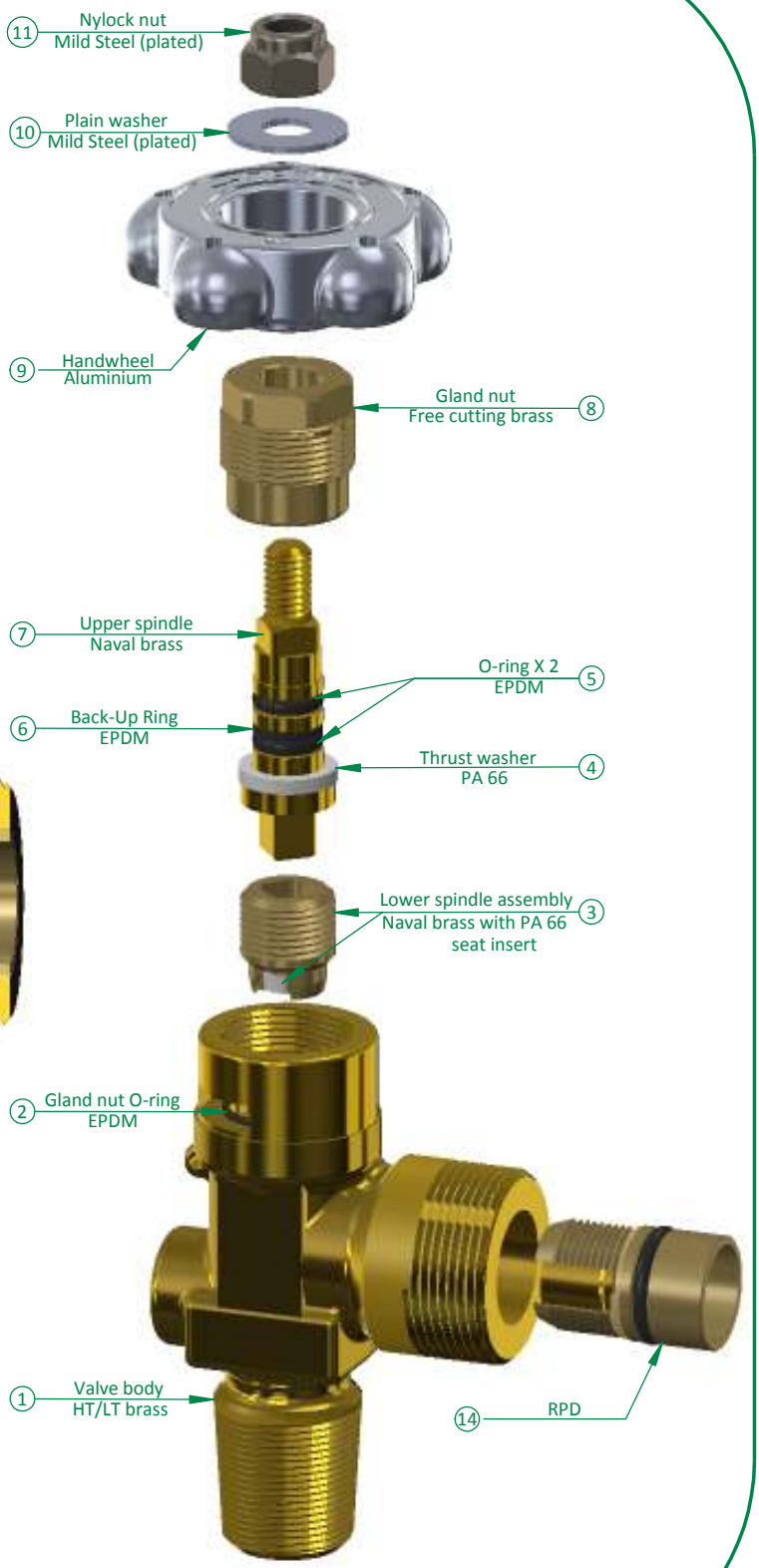
Material of construction and assembly arrangement

Series IWN-12/45





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Disassembly, inspection and assembly instructions

Series SWN-12/45 and IWN-12/45

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. Use a 11 mm socket wrench or hex box wrench to unscrew the handwheel nut (11) by turning it counter clockwise.
3. Remove the handwheel (9) from the upper spindle (7) square. The handwheel nut and plain washer (10) will come out with the handwheel.
4. Using a 16 mm 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 come out 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-12/45, remove RPD (14) if required using special assembly tool available from manufacturer.
7. If required remove the PRD (13) by rotating counter clockwise using a 9.5 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 inside 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 (12) (if installed) for any damage.
   d. Handwheel (9) should only be reused if in good condition.

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 at 50-60 Nm in clockwise direction.
8. Place handwheel (9) on the upper spindle square.
9. Fit handwheel by tightening nylock nut (11) over plain washer (10) by rotating clockwise at 5 Nm.
10. For parallel thread valves fit inlet O-ring (12) in the valve inlet connection so that it rests against the flange.
11. Tighten PRD assembly (13), if applicable, at 15-20 Nm in clockwise direction.
12. Tighten RPD (14), if applicable, at 5 Nm in clockwise direction.

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

Last updated: 12th May, 2016

Series SWN-12/45 and IWN-12/45

Valve item code matrix

Valve series	
S45	SWN-12/45
I45	IWN-12/45

Inlet [A]	
18T	18T to BS 341-1
17E	17E to ISO 11363-1
08N	1/2-14 NGT to CGA V-1
18P	M18 X 1.5mm

Dip Tube [A]	
d	1/8-BSP
f	M8X0.75
h	M10X.75
b	M10X1.0
X	Not required

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

Body	
HB	High tensile brass
HT	HT Brass (Nickel plated)
LB	Low tensile brass
LT	Low tensile brass (Nickel plated)

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

Gas service	
D1	As per List (Refer next page)

Miscellaneous	
000	Not applicable

S45	HB	17E	f	D10	D1	X	XX	L	P	000	360

(For example only)

Outlet [A]	
AFC	AFNOR - Type C
D01	DIN-1
D06	DIN-6
D09	DIN-9
D10	DIN-10
S07	IS-7/BS-8
S12	IS-12/BS-13
UN2	2-UNI

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
63	405-450 bar
XX	Not required

Test pressure [C]	
180	180 bar
190	190 bar
240	240 bar
250	250 bar
276	276 bar
300	300 bar
360	360 bar

Options
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 - For compressed gases, test pressure = 1.2 X working pressure

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List of approved gases

Series SWN-12/45 and IWN-12/45

Sl. No.	UN No.	Name of gas	Chemical formula	ASHRAE No.
01	1002	Air	-	-
02	1006	Argon	Ar	-
03	1009	Bromotrifluoromethane	$CBrF_3$	(R 13B1)
04	1013	Carbon dioxide	CO_2	-
05	1016	Carbon monoxide	CO	-
06	3161	Chlorodifluoroethane	CH_3CClF_2	(R 142 b)
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	-
11	1958	Dichlorotetrafluoroethane	$C_2Cl_2F_4$	(R114)
12	1030	Difluoroethane	$C_2H_4F_2$	(R 152a)
13	1046	Helium	He	-
14	1049	Hydrogen	H_2	-
15	1056	Krypton	Kr	-
16	1065	Neon	Ne	-
17	1066	Nitrogen	N_2	-
18	1070	Nitrous oxide	N_2O	-
19	1976	Octafluoro-Cyclobutane	C_4F_8	(RC 318)
20	2424	Octafluoropropane	C_3F_8	(R 218)
21	1072	Oxygen / Medical oxygen	O_2	-
22	1080	Sulphur hexafluoride	SF_6	-
23	1984	Trifluoromethane	CHF_3	(R 23)
24	2036	Xenon	Xe	-

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