# BACK PRESSURE VALVES
## FAMILY 06 - GROUP 17

Master handbook description: Guide to selection, operation and maintenance Back Pressure Valves (English)

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Drawn up by: MBL
Checked by: MB
Approved by: SO



Via Amendola 125 - 13836 Cossato (BI) ITALY
Phone (+39) 015980641 a.s.
Telefax (+39) 015926297



Home page: http://www.italvalvole.it
Pec: italvalvole@cert.italvalvole.it
E-mail: itv@italvalvole.it

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# 1 Foreword

Italvalvole back pressure valves are made in stainless steel: all the parts in contact with the fluid are in S. S. 316, in PTFE and in EPDN. Generally they are used on the pipes of pumps delivery in order to avoid the return of the pumped flow. The acting principle is very easy: the plug will open and let the fluid pass, when the pumped fluids reach a pressure value to win the spring strength. The plug will close when the pressure value goes down, below the value that resist the spring strength. Peculiarity of those valves is the possibility to adjust the opening pressure value within a certain values range to allow the fluids to reach the consumption with a fixed pressure value.
Table 2 report a list of fluid which are perfectly compatible with valves.
For any other fluid or use, which has not been expressly indicated in this list, contact directly our technical department.

**Back Pressure Valve**

# 2 Legend

- $\Delta p_{allowed}$ (allowed differential pressure): pressure whose algebraic value corresponds to the difference in pressure between the two sides of a partition panel at a given temperature and with the valve closed.
- **Maximum/minimum allowed temperature:**
  minimum/maximum temperature for which the equipment has been designed, as specified by the manufacturer.
- **Maximum allowed pressure:**
  maximum pressure for which the equipment has been designed, as specified by the manufacturer.
- **DN:** it is an alphanumeric designation of size for components of a pipework system, which is used for reference purposes.
  It comprises the letters ND followed by a dimensionless whole number which is indirectly related to the physical dimension, expressed in millimetres, of the hole or of the outer diameter of the ends of connection pipes .
- **Kv**: flow rate, expressed in $m^3/h$, of water (10 to 25 °C with a volume equal to 1000 $Kg/m^3$) flowing through two ways of a valve, with a pressure drop $\Delta p$ of 100 KPa (1 bar)

$$Kv = \frac{Q}{\sqrt{\Delta p}}$$

  where : Q is the flow rate in $m^3/h$.

# 3 Technical Characteristics

| | |
|---|---|
| *General notice:* | ⇒ all the pressure values indicated hereinafter are gauge pressure values. |
| | ⇒ **valve destined to fluids of group 2 (directive 2014/68/UE).** |
| *ND:* | ⇒ 11 ÷ 65. |
| *Connections:* | ⇒ internal GAS threaded |
| | ⇒ Socket welding ends |
| | ⇒ Butt welding ends |
| | ⇒ on demand flanged NP16 |
| | ⇒ for external GAS threaded contact our service department. |
| *Pmax allowable:* | ⇒ 10 bar. |
| *Pmin allowable:* | ⇒ 0 bar |
| *Seal:* | ⇒ PTFE , EPDM coated PTFE |
| *Tmax allowable:* | ⇒ 150 °C |
| *Tmin allowable:* | ⇒ -20 °C (in liquid phase) |
| *Flow direction:* | ⇒ 2-way valve, with angle body, unidirectional (under shutter flow). |
| *Working materials:* | ⇒ See working drawings and relevant tables. |
| *Overall dimensions:* | ⇒ See overall dimensions drawings and relevant tables. |

## 3.1 Table 1: Back Pressure Valves's Range of Calibration.

| | ND 11 (3/8") | ND 15 (1/2") | ND 20 (3/4") | ND 25 (1") | ND 32 (1"1/4) | ND 40 (1"1/2) | ND 50 (2") | ND 65 (2"1/2) |
|---|---|---|---|---|---|---|---|---|
| **Range of Calibration [bar]** | 1,2 – 3.5 | 1,2 – 6 | 0,7 – 6 | 0,7 – 7 | 0.5 - 5 | 0.5 – 4 | 0.5 – 3 | 0.5 - 3 |

## 3.2 Table 2: Compatible Fluids

| TYPE OF FLUID | SEAL TYPE | | TYPE OF FLUID | SEAL TYPE | |
|---|---|---|---|---|---|
| | EPDM | PTFE | | EPDM | PTFE |
| Vinyl acetate | **A** | **A** | Sodium chloride 20% max | **A** | **A** |
| Phenol acetylene | **B** | **A** | Potassium chloride 5% max | **A** | **A** |
| Glycerol fat acids | **A** | **A** | Butyl ether | **C** | **A** |
| Phenol | **B** | **A** | Petroleum ether | **D** | **A** |
| Phosphoric acid 20% max. | **A** | **A** | Dibenzile ether | **B** | **A** |
| Phthalic acid | **A** | **A** | Dibutyl ether | **C** | **A** |
| Gallic acid | **B** | **A** | Ethylene glycol | **A** | **A** |
| Nitric acid 5% - 65% max | **C** | **A** | Ammonium nitrate | **A** | **A** |
| Oleic acid | **C** | **A** | Copper nitrate | **A** | **A** |
| Stearic acid | **B** | **A** | Sodium nitrate | **A** | **A** |
| Tannic acid | **A** | **A** | Ethylene perchlorate | **D** | **A** |
| Butanol | **B** | **A** | Potassium sulphate 20% max at T=100 °C | **A** | **A** |
| Ethanol | **A** | **A** | Sodium sulphate | **A** | **A** |
| Methanol | **A** | **A** | Zinc sulphate 40% max at T=100 °C | **A** | **A** |
| Propanol | **A** | **A** | Potassium sulphite 10% max | **A** | **A** |
| Aniline | **B** | **A** | Sodium sulphide | **A** | **A** |
| Sodium carbonate 20% max | **A** | **A** | Toluene | **D** | **A** |
| Borax (sodium tetraborate) | **A** | **A** | Water Steam $T_{max}$=130 °C P=2.7 bar | **A** | **A** |
| Sodium carbonate | **A** | **A** | Water Steam $T_{max}$=170 °C P=8 bar | **C** | **A** |
| Potassium chlorate 30% max | **A** | **A** | | | |

Table legend: **A** good resistance (weak or no attack)
**B** conditioned resistance (medium attack)
**C** no resistance (strong attack)
**D** decomposition (swelling and decay)

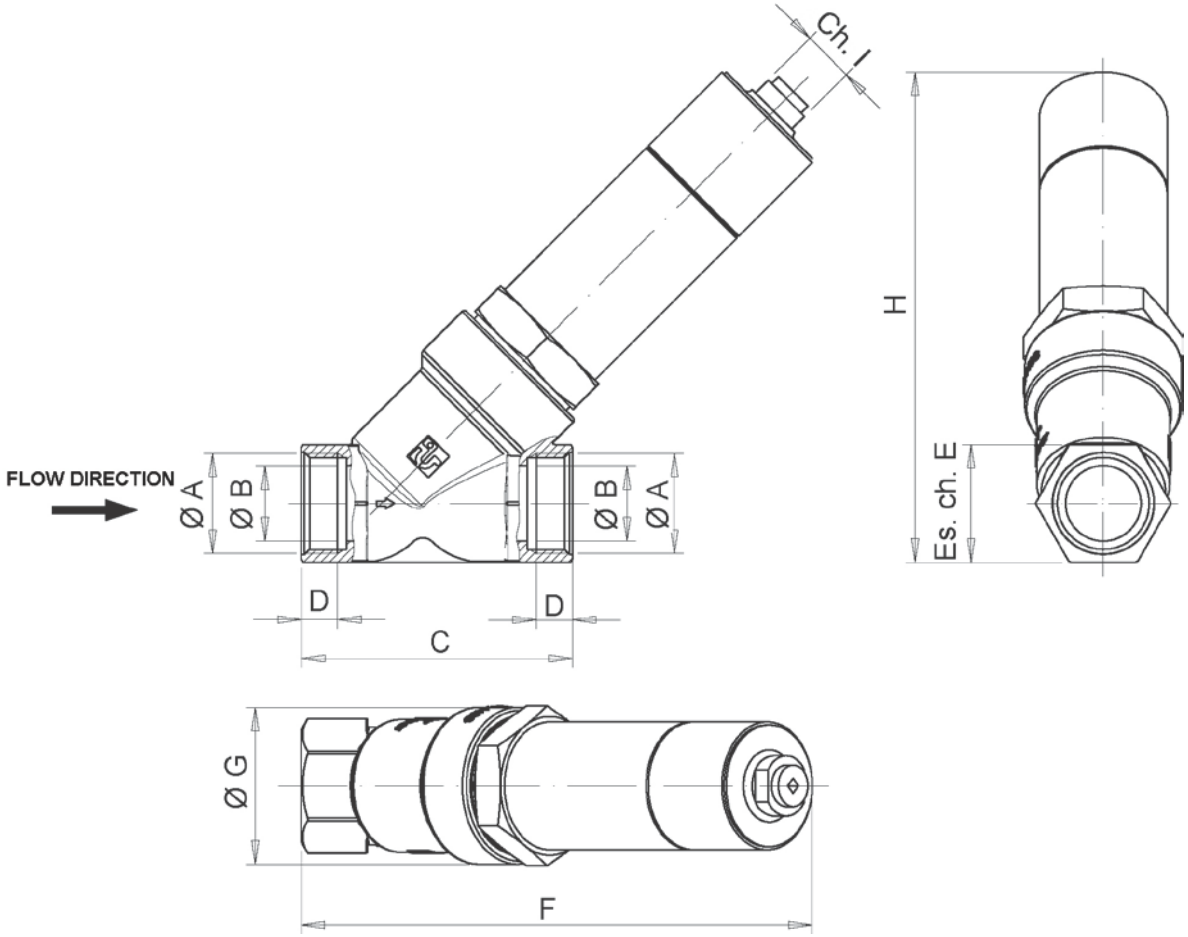
All data indicated under table 2, if not otherwise indicated, are relevant to a temperature of 21°C.
All data are general and are not valid for all possible working conditions. These data may considerably vary depending upon various conditions, such as: temperature, concentration, fluid speed.
For reliable and exhaustive information, please get in touch with the technical department.
Any use of the valve on explosive, easily inflammable, comburent and toxic gases is strictly forbidden.
Any use of the valve on liquids based on: chlorine, fluorine, bromine, iodine and derivative elements is strictly forbidden.
Any deviation from such prohibitions may be issued for special applications by our technical department, upon written request.

## 3.3 Safety Notes

- The valve body, under the maximum operating temperature conditions, depending upon the system, may reach a temperature T equal to 150 °C. It is up to the engineer provide the system with the necessary safety guards and/or warning signals aiming at removing/indicating the risk of possible burns by the user.
- Whatever operation may be performed on the valve, the fluid must be present neither in pipes, nor inside the valve itself.

## 3.4 Overall Dimensions of Back Pressure Valves

### 3.4.1 Internal GAS threaded Back Pressure Valves Group 17




Drawing Nr. 040500 Rev.:00

| ND | ND 11 3/8" | ND 15 1/2" | ND 20 3/4" | ND 25 1" | ND 32 1" ¼ | ND 40 1" ½ | ND 50 2" | ND 65 2" ½ |
|---|---|---|---|---|---|---|---|---|
| Ø A | 3/8" GAS | 1/2" GAS | 3/4" GAS | 1" GAS | 1" ¼" GAS | 1" ½" GAS | 2" GAS | 2" ½" GAS |
| Ø B | 11 | 15 | 20 | 25 | 32 | 40 | 50 | 65 |
| C | 65 | 65 | 75 | 90 | 110 | 120 | 150 | 185 |
| D | 8 | 8 | 9 | 12 | 14 | 14 | 16 | 26 |
| Ch. E | 22 | 27 | 32 | 39 | 49 | 55 | 68 | 88 |
| F | 136 | 140 | 157,5 | 264 | 302 | 307 | 322 | 366 |
| Ø G | 41 | 41 | 47 | 70 | 70 | 85 | 88 | 150 |
| H | 131 | 133,5 | 153,5 | 270 | 305 | 313 | 330 | 370 |
| Ch. I | 17 | 17 | 17 | 36 | 36 | 36 | 36 | 36 |

Dimensions are in mm.

# 4 Storage, Assembly, Check and Maintenance

## 4.1 Transport, Storage and Handling

Back valves, during transport and assembly, must be handled very carefully.
Collisions and anomalous stresses, which could endanger the setting and the working of the valves, must be avoided.
Valves are delivered with dust-proof protections on all connections and these protections must not be removed until they are installed.
Valves shall be stored in areas which are not exposed to the sunshine to prevent inner gaskets from getting dry and old before time.
Storage temperatures shall range between 0 °C and + 50 °C.

## 4.2 Assembly instructions

### 4.2.1 General

The valve installation on the system shall be carried out by qualified personnel only, within the hydraulic and pneumatic fields, provided with all the equipment normally used in the industrial hydraulic and pneumatic plant engineering. The personnel shall always wear proper accident prevention garments, taking particular care to the protection of face, eyes and hands.

**NOTE: A compression spring is included inside the valve.**

In no case the valve must be disassembled or modified, under pain of revocation of each type of guarantee.
Before assembly, all protections shall be removed from the valve body.

### 4.2.2 Assembly Of Valves With internal GAS threaded Connections

In the event that the body has internal GAS threaded connections, it is necessary to seal the ends of connection pipes with PTFE tape to ensure a perfect seal; moreover, it is necessary to tighten connections to the prescribed torque, as specified hereinafter, in table 3. **Caution:** the installer shall verify that the parts connected to the valve support the required tightening torque.

### 4.2.3 Assembly of valves with welding ends

In case of bodies having butt and socket welding ends, before starting welding, the cap holder and the gasket cap shall be remouved from the body valve, so as not to damage it during welding.

1) Unscrew the Intermediate back pressure in order to remove the spring body completely.
2) Remove the cap holder from the body.
3) Extract the body gasket.

Welding must be carried out considering the material of the valve body and the required thickness, according to the provisions in force for the whole system.
In order to prevent foreign matters (welding slags, chips and others), located in the pipes, from damaging the valve seat, before operating the valve, open it completely and make the fluid pass through at the maximum operating pressure of the system, without the gasket cup holder, so as to clean the pipe.

## 4.3 Operation Test

Before starting up the system and after any repair or overhaul, the following operation test shall be carried out:

1) Supply the valve with fluid below shut-off at the required setting pressure, (verify that it is always below the max. allowable pressure of the valve), and check for valve opening
2) Supply the valve with fluid above shut-off, (verify that the fluid pressure is always below the max. allowable pressure of the valve), and verify that no fluid flows into the valve.

## 4.4 Troubleshooting

Troubleshooting operations shall be always carried out by qualified personnel only, adequately equipped for the hydraulic and pneumatic operations and provided with the proper safety clothing, paying particular attention to the protection of face, eyes and hands.

In case of anomalous operation or valve leakage, the operation shall be immediately stopped and the following checks shall be carried out:

**Caution:** during troubleshooting, the valve must not be removed, nor placed elsewhere. No components of the valve shall be disassembled or unloosened.

Check, by means of a pressure gauge, that the pressure of the valve inlet fluid (before the valve) is not higher than the maximum allowable pressure.

Should anomalies still be present after this check, valve inner parts are to be verified, disassembling the valve as indicated under the “Instructions for disassembly, gasket replacement and re-assembly of valves” of this manual.

Should leakages still persist, please contact our technical department.

## 4.5 Scheduled Maintenance

Scheduled maintenance operations shall be carried out apart from the ones due to possible failures, which always need an immediate intervention.

The time interval between one maintenance operation and the following shall be included in the lower time interval between the one corresponding to 500.000 cycles and three years; it consists of a complete disassembly of the valve, replacement of all the gaskets and a complete cleaning of all other components. For disassembly and re-assembly operations, make reference to the relevant paragraphs of this manual.

## 4.6 Instructions For Disassembly, Gasket Replacement, Reassembly Back Pressure valves ND 11 ÷ 20

For the disassembly and assembly operations of valve, refer to the annexed Drawing Nr. 16525.
All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
**NOTE: Read the procedures thoroughly before starting any operation.**

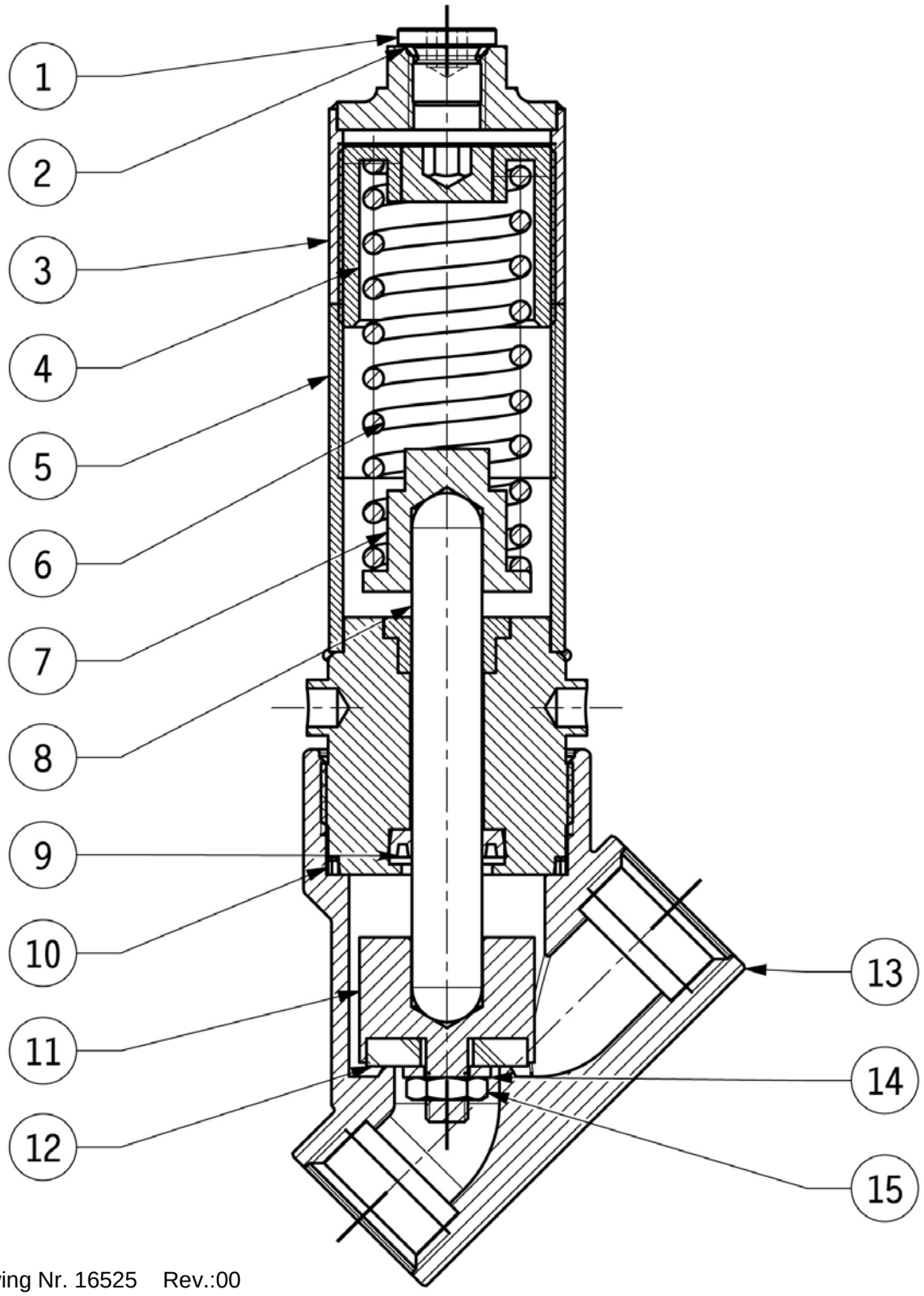
### 4.6.1 Disassembly

1) Lock the valve body (13) in the vice.
2) Unscrew the intermediate (5) from the valve body (13).
3) Remove the cap holder (11) from the valve body seat (13).
4) Withdraw the body gasket (10) from the valve body (13).
5) Unscrew the male cap (1) from the regulation block cap (3).
6) Remove the OR (2) from the male cap (1).
7) Unscrew the regulation block cap (3) from the spring's regulation bell (4).
8) Unscrew the regulation bell (4) from the counterpressure intermediate (5). **Caution! Inside the cylinder there is a compressed spring.** Please, use a suitable tool to avoid that the spring regulation bell (4) quickly pulls away from the counterpressure intermediate, when the thread which joins them is no longer holding.
9) Remove the spring (6).
10) Remove the spring holder plate (7).
11) Remove the shaft (8) from the seat of the counterpressure intermediate (5).
12) Remove the gasket DI (9) from the counterpressure intermediate (5).
13) Unscrew the hexagonal nut (15).
14) Remove the cap lock washer (14).
15) Remove the cap (12) from the cap holder (11).
16) Now the valve is fully disassembled and it is possible to remove the selected parts.

### 4.6.2 Assembly

1) Carefully clean all the parts, especially the threads.
2) Insert the cap (12) in the cap holder (11).
3) Fit the cap lock washer (14).
4) Use the thread stopper, tighten to the required torque (see table 3) the hexagonal nut (15) and punch.
5) Fit the gasket DI ( 9) in the counterpressure intermediate (5).
6) Fit the shaft (8) in the seat of the counterpressure intermediate (5).
7) Rest the spring holding plate (7) on the shaft (8).
8) Fit the spring (6) on the spring holding plate (7).
9) Screw the spring regulation bell (4) on the counterpressure intermediate (5).
10) Screw the Regulation block cap (3) on the regulation bell (4).
11) Fit the OR (2) on the male cap (1).
12) Screw the male cap (1) on the regulation block cap (3).
13) Insert the body gasket (10) in the valve body (13).
14) Lock the valve body (13) in the vice.
15) Fit the cap holder (11) in the valve body (13) and rest it on the seat.
16) Screw to the required torque (see table 3) the counterpressure intermediate (5) on the valve body (13) until beat. **Caution! Verify that the stem which protrudes from the body enters the cap holding seat.**

### 4.6.3 Exploded View Back Pressure Valve ND 11 ÷ 20




Drawing Nr. 16525 Rev.:00

# 4.7 Instructions For Disassembly, Gasket Replacement, Reassembly Back Pressure valves ND 25 ÷ 65

For the disassembly and assembly operations of valve, refer to the annexed Drawing Nr. 11472.
All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
**NOTE: Read the procedures thoroughly before starting any operation.**

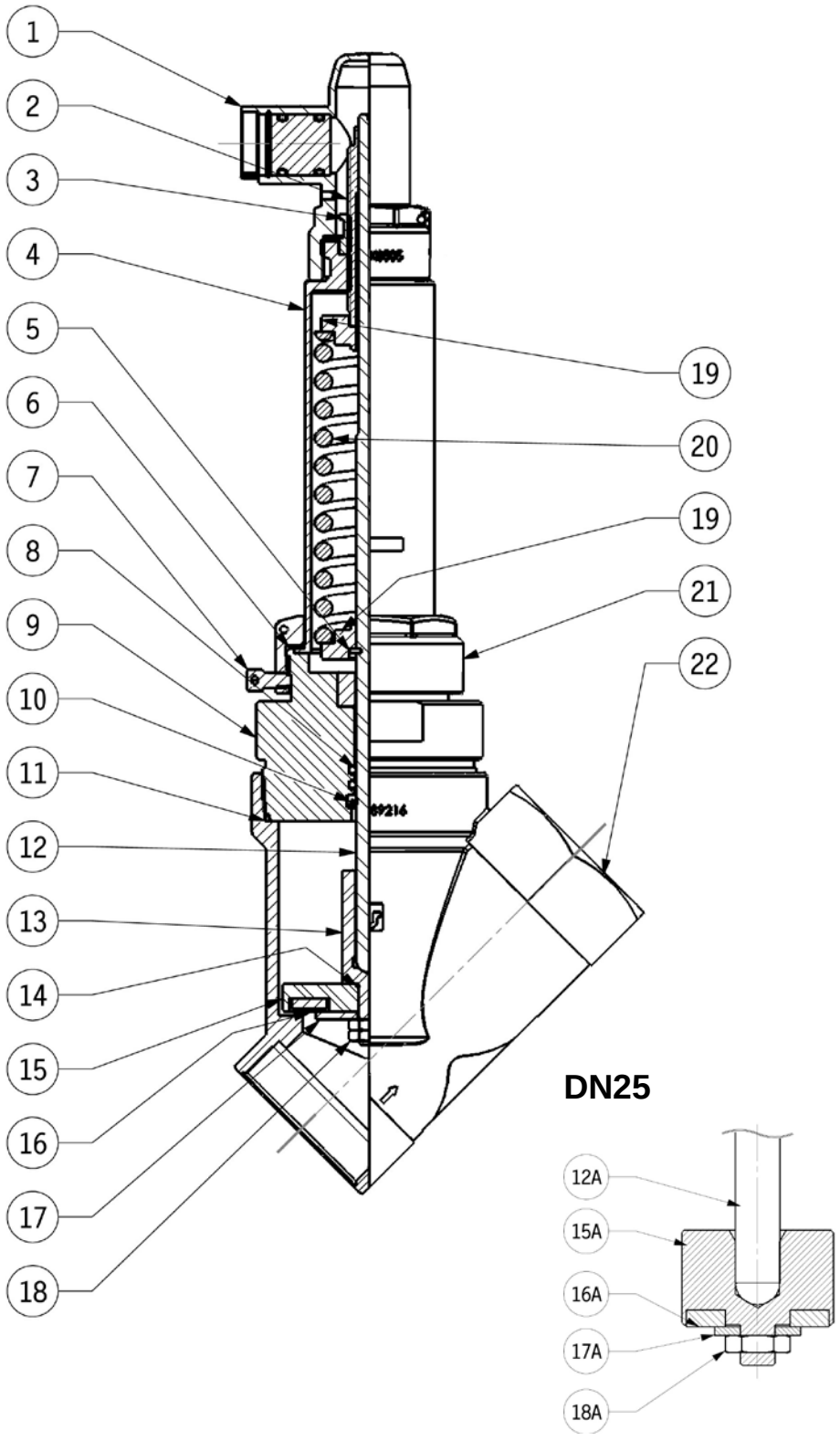
## 4.7.1 Disassembly

1) Lock the valve body (22) in the vice.
2) Unscrew the intermediate (9) from the valve body (22).
3) Remove the cap holder (For DN32÷DN65: 13-14-15-16-17-18) (Only for DN25: 15A-16A-17A- 18A) from the valve body seat (22).
4) Withdraw the body gasket (11) from the valve body (22).
5) Unscrew the MBM cup (1) from the Spring holder piston (4)
6) Unscrew the locking nut (3) .
7) Unscrew the regulation screw (2) in order to put down the spring load. **Caution! Inside the cylinder there is a compressed spring.** Please, use a suitable tool to avoid that the spring holder piston (4) quickly pulls away from the intermediate nut (9), when the ring nut (21) which joins them is no longer holding.
8) Unscrew the locking screw (7) and the cylinder ring nut (21)
9) Remove the spring (20) and the spring holder plates (19).
10) Remove the split washer (5).
11) Remove the shaft (12) from the seat of the intermediate nut (9).
12) Remove the DI gasket (10) and the OR gaskets (8) from the intermediate nut (9).
13) Unscrew the hexagonal nuts (18-18A).
14) Only for DN32÷DN65: Disassembly the cap Holder (15) from the coupling (13)
15) Only for DN32÷DN65: Remove OR gasket (14)
16) Remove the cap (16-16A) from the cap holder (15-15A).
17) Now the valve is fully disassembled and it is possible to remove the selected parts.

## 4.7.2 Assembly

1) Carefully clean all the parts, especially the threads.
2) Insert the cap (16-16A) in the cap holder (15-15A).
3) Only for DN32÷DN65: Fit the OR gasket (14), the cup holder (15), the cup holder washer (17) on the coupling (13).
4) Use the thread stopper, tighten to the required torque (see table 3) the hexagonal nuts (18-18A) and punch.
5) Fit the OR gaskets(8) and the DI gasket ( 10) in the intermediate nut (9).
6) Fit the shaft (12) in the seat of the intermediate nut (9).
7) Fit the split washer (5), the spring holding plates (19) and the spring (20) on the shaft (12).
8) Fit the holder piston (4) and the regulation screw (2) on the shaft (12).
9) Screw the cylinder ring nut (21) on the intermediate nut (9).
10) Screw the locking screw (7) on the cylinder ring nut (21)
11) Screw the locking nut (3) and the MBM cup (1) on the spring holder piston (4)
12) Insert the body gasket (11) in the valve body (22).
13) Lock the valve body (22) in the vice.
14) Fit the cap holder group (For DN32÷DN65: 13-14-15-16-17-18) (Only for DN25: 15A-16A-17A- 18A) in the valve body (22) and rest it on the seat.
15) Screw to the required torque (see table 3) the intermediate nut assemblyed (9) on the valve body (22) until beat. **Caution! Verify that the stem which protrudes from the body enters the cap holding seat.**

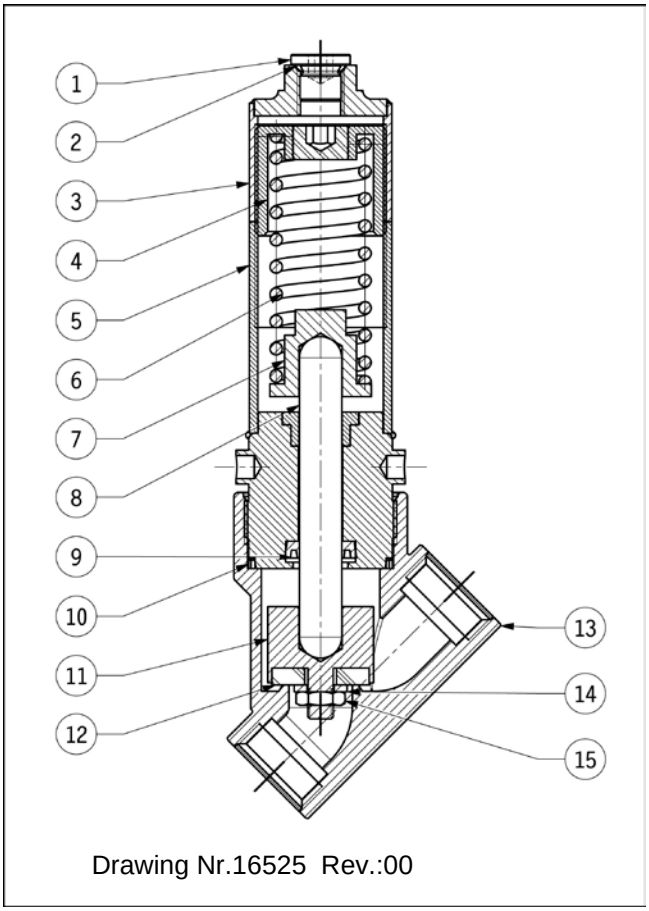
### 4.7.3 Exploded View Back Pressure Valve ND 25 ÷ 65




Drawing Nr.11472 Rev.:00

## 4.8 Components and Spare Parts for Back Pressure Valves ND11 ÷ ND20

| ITEM Nr. | Qt. | DESCRIPTION | MATERIAL |
|---|---|---|---|
| 1 | 1 | Male cap | S316000/1.4401 |
| 2 | 1 | O-Ring gasket | FPM |
| 3 | 1 | Regulation block cap | 1.4301-1.4401 |
| 4 | 1 | Spring regulation bell | S316000/1.4401 |
| 5 | 1 | Contropressure intermediate | S316000/1.4401 CuAll11Fe4Ni |
| 6 | 1 | Spring | S316000/1.4401 |
| 7 | 1 | Spring holder | S316000/1.4401 |
| 8 | 1 | Shaft | S316000/1.4401 |
| 9 | 1 | DI gasket | FPM |
| 10 | 1 | Body gasket | PTFE |
| 11 | 1 | Cap holder | S316000/1.4401 |
| 12 | 1 | Cap | EPDM rivestito PTFE |
| | | | PTFE |
| 13 | 1 | Valve body | CF8M/1.4408 |
| 14 | 1 | Cap lock washer | S316000/1.4401 |
| 15 | 1 | Hexagonal nut | S316000/1.4401 |



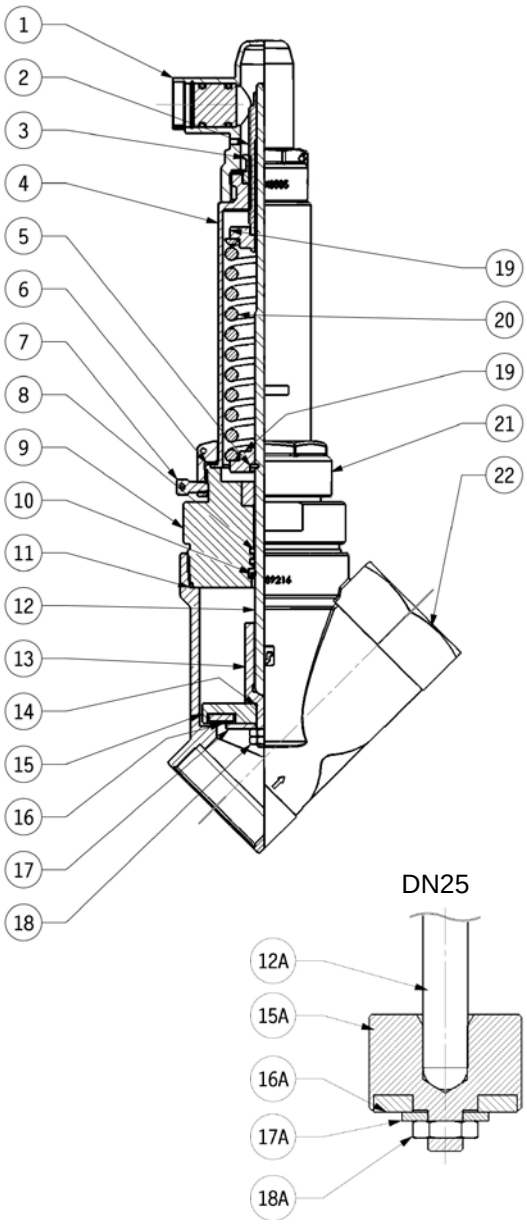

Drawing Nr.16525 Rev.:00

Spare parts table

| ND | Spare part code (Part. N°2-9-10-12) | |
|---|---|---|
| | PTFE | EPDM - coated PTFE |
| ND11 (3/8") | | |
| ND15 (1/2") | 15073 | 7635 |
| ND20 (3/4") | | 7894 |

## 4.9 Components and Spare Parts for Back Pressure Valves ND25 ÷ ND65

| ITEM Nr. | Qt. | DESCRIPTION | MATERIAL |
|---|---|---|---|
| 1 | 1 | MBM Cap | CF8/1.4308 |
| 2 | 1 | Regulation screw | OT 58 PB |
| 3 | 1 | Locking nut | S31600/1.4401 |
| 4 | 1 | Spring holder piston | CF8M/1.4408 |
| 5 | 1 | Split washer | S31600/1.4401 |
| 6 | 1 | Gasket | PTFE |
| 7 | 1 | Locking nut | S30400/1.4403 |
| 8 | 2 | OR gasket | FPM |
| 9 | 1 | Intermediate Nut | S31600 – 14401<br>S42000/1.4028+1X |
| 10 | 1 | DI gasket | FPM |
| 11 | 1 | Body gasket | PTFE |
| 12/12A | 1 | Shaft | S31600/1.4401 |
| 13 | 1 | Cap holder coupling | S31600/1.4401 |
| 14 | 1 | OR gasket | FPM |
| 15/15A | 1 | Cap holder | S31600/1.4401 |
| 16/16A | 1 | Cap | EPDM coated PTFE |
| | | | PTFE |
| 17/17A | 1 | Cap holder whaser | S31600/1.4401 |
| 18/18A | 2 | Hexagonal nut | S31600/1.4401 |
| 19 | 2 | Spring holder plate | S30400/1.4301 |
| 20 | 1 | Spring | AISI302 / 14310 |
| 21 | 1 | Cylinder ring nut | S31600/1.4401 |
| 22 | 1 | Body valve | CF8M/1.4408 |




Drawing Nr.11472 Rev.:00

# 5 Table 3: Tightening Torques

| Combination of components | Tightening torque for Back Pressure Valves threaded couplings [ N·m ] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ND11 3/8" | ND15 1/2" | ND20 3/4" | ND25 1" | ND32 1" ¼ | ND40 1" ½ | ND50 2" | ND65 2" ½ |
| P. 5 with P. 13 | 165 | | 270 | | | | | |
| P. 9 with P. 22 | | | | 350 | 490 | | | |
| P. 11 with P. 15 | 5.5 | 9 | | | | | | |
| P. 13 with P. 18<br>P. 15A with P. 18A | | | | 19 | | | | 32 |
| System connections | 26 | 40 | 65 | 120 | 195 | 255 | 500 | 800 |

# 6 Disposal

After use, for the valve disposal, it is necessary to disassemble the valve and separate the different materials the valve is composed of, according to the tables annexed to the valve working drawings, then dispose of the different materials in compliance with the laws in force.

Assembly and disassembly operations shall be carried out by qualified personnel only, equipped with all the work and safety tools. **WARNING! Compressed springs are included inside the valve's intermediate corp**. Thus, during valve disassembly, components are disposed of by using all safety equipment necessary to prevent sudden separation of upper seat spring from intermediate nut.

# 7 Warranty

Each valve is tested before leaving the factory. Following a request by the customer we can issue the testing certificate. The customer may inspect and test in person the material at our site, before shipping. This inspection is considered as final. All the charges associated with special testing or requests by the customer shall be paid by the customer himself.

Our responsability (for damage to person or/and properties during installation and/or maintenance) lapses when the valve is removed from its original packaging.

Our responsibility is limited to the replacement or repair of any components that should turn out to have any material or manufacturing defects, within 12 months of shipping and used under normal operating conditions. This use excludes any other obligation.

All the transport and accessory expenses, anyway, shall be paid by the customer. ITALVALVOLE® s.a.s. reserves the right to stop or change or modify the characteristics and the manufacturing of any of its products without incurring any obligation to replace or install on the already supplied products the modified parts.

**WARNINGS:**

- The safety conditions shall not be guaranteed and malfunctions shall not be subjected to valves in case:
  - disassembly, re-assembly, maintenance operations are not carried out in compliance with the use and maintenance manual.
  - original spare parts are not used.
- It is forbidden to remove pages from this document or to make any correction.
- In case of doubt, make reference to Italian version of the manual.
- ITALVALVOLE® s.a.s. reserves the right to change its products and the relevant documentation without prior notice.
- The use of the handbook does not exempt from the observance of the laws in force.
- We inform you that some components may come from countries other than Italy.