

## Type VINTAGE

### Fuel plug valve for vintage motor bikes

- valve position:  
OPEN, CLOSE and RESERVE
- stainless steel design

Connection G  $\frac{1}{4}$ , other Sizes  
on request

Range of application:  
-60 < T < 230/°C



**Type VINTAGE**  
oil plug valve



**Type VINTAGE**  
fuel plug valve  
with reserve option

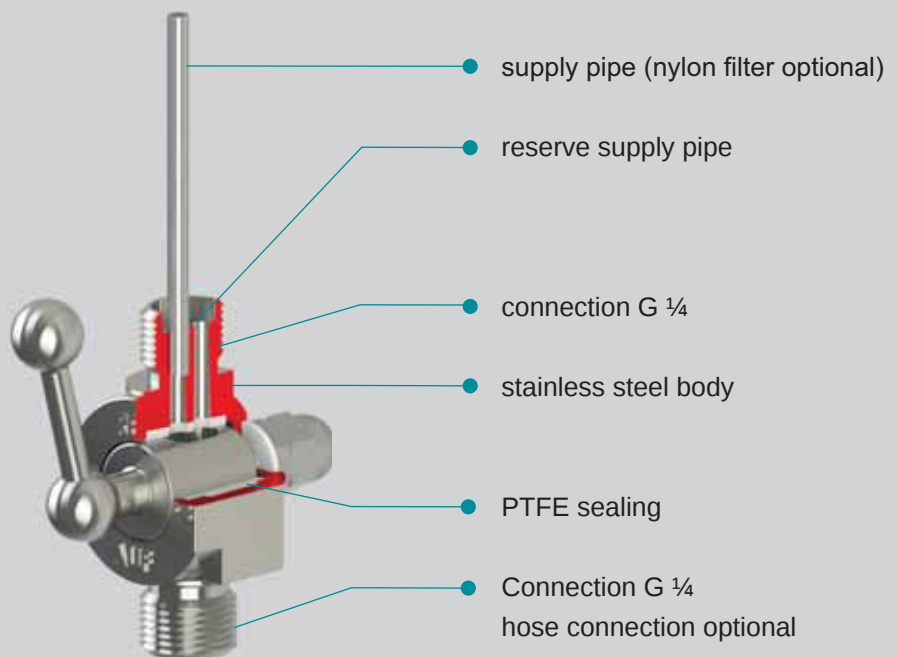
#### Design characteristics

- cavity-free
- PTFE sealing
- maintenance-free, self-lubricating
- no drying-out or sticking of the seal

#### Option

- nylon filter
- hose connection
- special connection

*Old motorbikes are often stored in "dry" condition: No fuel in the tank. Hence the sealing of the fuel valve remains dry for a long period of time. In case of re-use, traditional fuel valves tend to leak. The self-lubricating and cavity free AZ-Vintage plug valve is the solution for a reliable and safe motorbike trip.*



# AZ-plug valve: the design principle

## Key advantages

- free of cavities
- no contamination of process media
- adjustability of the plug and sealings
- maintenance-free due to self-lubricating and chemical-resistant PTFE-sleeve
- low emission design
- constant torque ( $\Delta p$  independent !)
- vacuum-capable

## Tapered plug

- plug pressed into the PTFE-sleeve
- polished surface



## Body

- tapered body interior
- integrated supporting ribs avoid rotation and coldflow of the sleeve
- large sealing surface

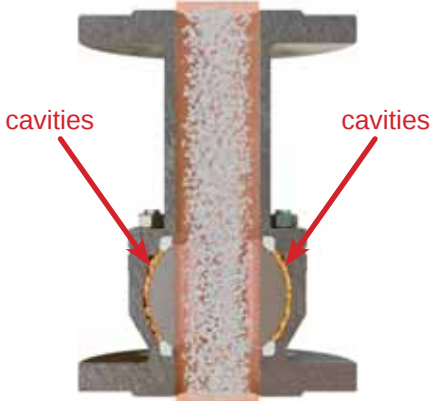
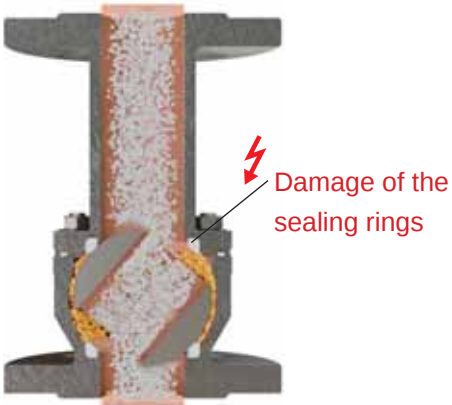
## PTFE-sleeve

- mechanically locked into the valve body
- complete PTFE chambering
- robust, one-piece sleeve covers and protects the entire plug



# Cavity-free: suitable for all media

## Technical comparison

| AZ-plug valve                                                                                                                                                                                                                                                            | Ball valve                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Soft seated plug valve with PTFE-sleeve</b></p>  <p><b>Main sealing components</b></p> <ul style="list-style-type: none"> <li>• metallic plug</li> <li>• sleeve</li> </ul>        | <p><b>Soft seated ball valve with PTFE sealing rings, floating ball</b></p>  <p><b>Main sealing components</b></p> <ul style="list-style-type: none"> <li>• metallic ball</li> <li>• sealing rings</li> </ul>                                                                                         |
| OPEN position                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>• suitable for all media due to cavity-free design</li> <li>• sealing surfaces are completely protected</li> </ul>  <p>free of cavities</p>    | <ul style="list-style-type: none"> <li>• critical for the following media due to design with cavities <ul style="list-style-type: none"> <li>○ corrosives: crevice corrosion</li> <li>○ polymerizing: clogging</li> <li>○ crystallizing: abrasion / clogging</li> </ul> </li> </ul>  <p>cavities</p> |
| During operation                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>• free of cavities, media cannot settle or be trapped</li> <li>• solids are pushed away</li> <li>• no contamination with old media</li> </ul>  | <ul style="list-style-type: none"> <li>• with cavities, media can settle or be trapped</li> <li>• solids cause abrasion of the sealing rings</li> <li>• contamination of process media</li> </ul>  <p>Damage of the sealing rings</p>                                                                |

# Safe and reliable tightness for years

## Adjustable



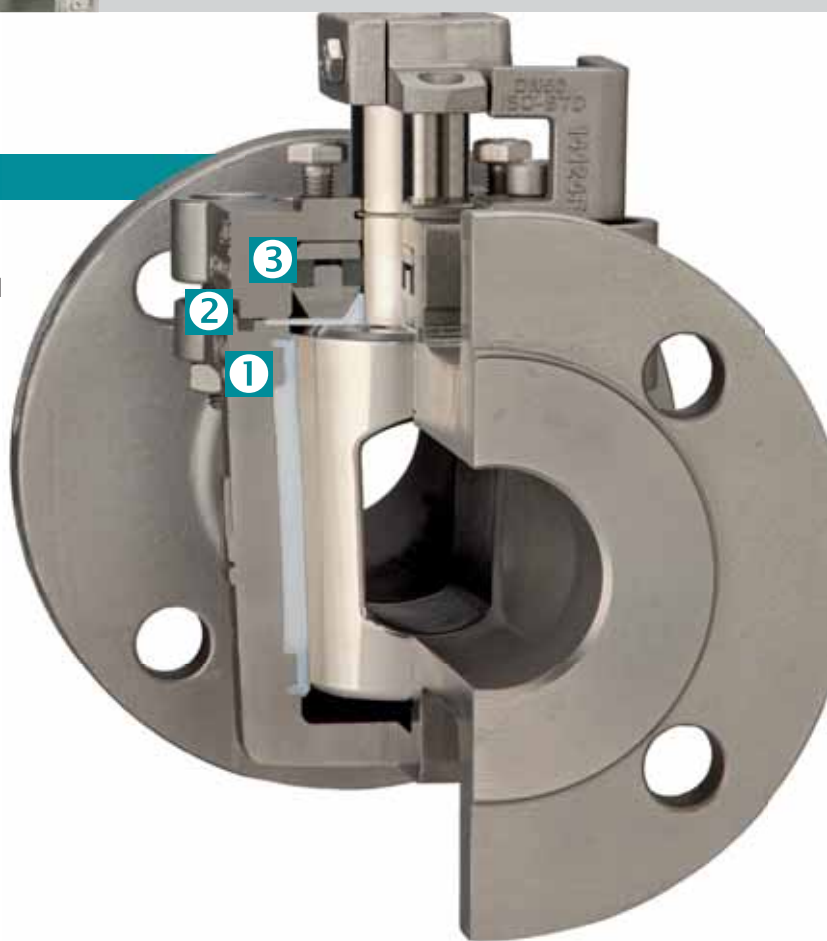
- tapered plug design allows retightening of the sealing on site - if needed
- adjusting bolt even accessible with mounted actuator / gearbox

## Several sealings to atmosphere

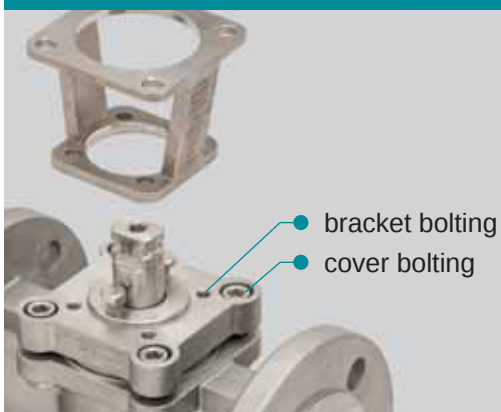
- 1 Primary: sleeve
- 2 Secondary: V-diaphragm/cover seal
- 3 Tertiary: stem packing (optional)



Detailed information about all certified AZ cover & stem sealing systems see chapter  
**SEALING SYSTEMS**



## ISO cover



- pressure containing cover bolts separated from bracket boltings
- cover and bracket acc. to ISO 5211 for efficient actuator / gearbox assembly

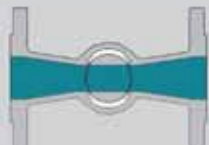
# Reduced and full bore design

## Execution

### Reduced bore

#### Type STANDARD

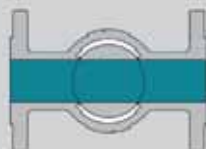
- compact valve (FF / weight)
- optimal torques for economic automation



### Full round bore

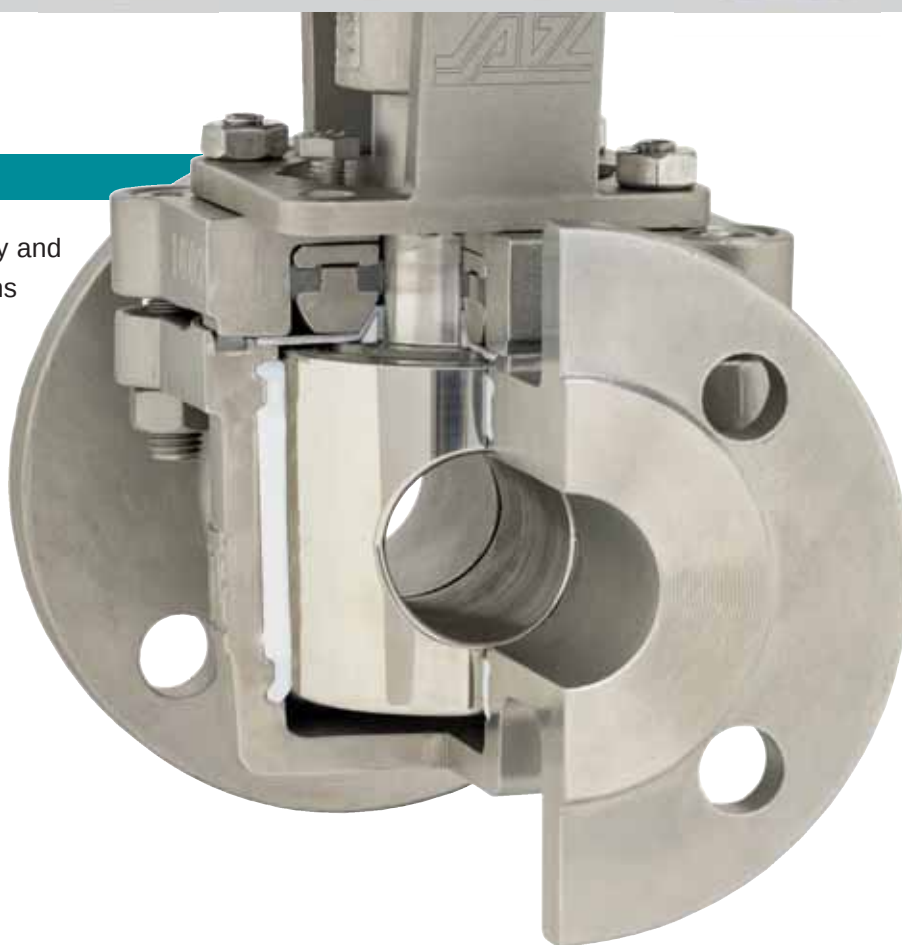
#### Type EXTRA

- maximum flow rate
- minimal pressure drop
- piggable (optional)

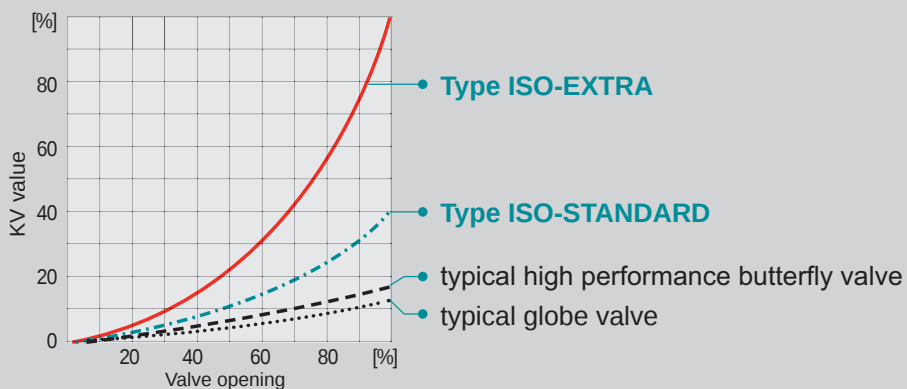


## Type ISO-EXTRA

- excellent for abrasive, slurry and solid-containing applications
- maximum flow rate compared to other valve types with the same nominal size



## Maximum flow rate



# Options



## Multi-port

- whole range of multi-port plugs for all configurations (up to 7-way)
- horizontal and vertical installation



## Vented options

- plug bottom
- plug upstream / downstream automatic pressure balance in case of thermal media expansion



## System requirements

- **FDA** = Food and Drug Administration certifications and compliant materials
- **GMP** = Good-Manufacturing-Practice
- **CIP** = Clean-in-Place
- Polished internal surfaces, surface finish <0.8 Ra µm (<32 Ra µin)
- oil and grease free
- water-free



## All connections possible

- flanges acc. to DIN, ASME, JIS etc.
- welded ends
- screwed and threaded ends
- combinations of connections
- oversize flanges
- compression fittings and ferrule ring couplings
- special connections



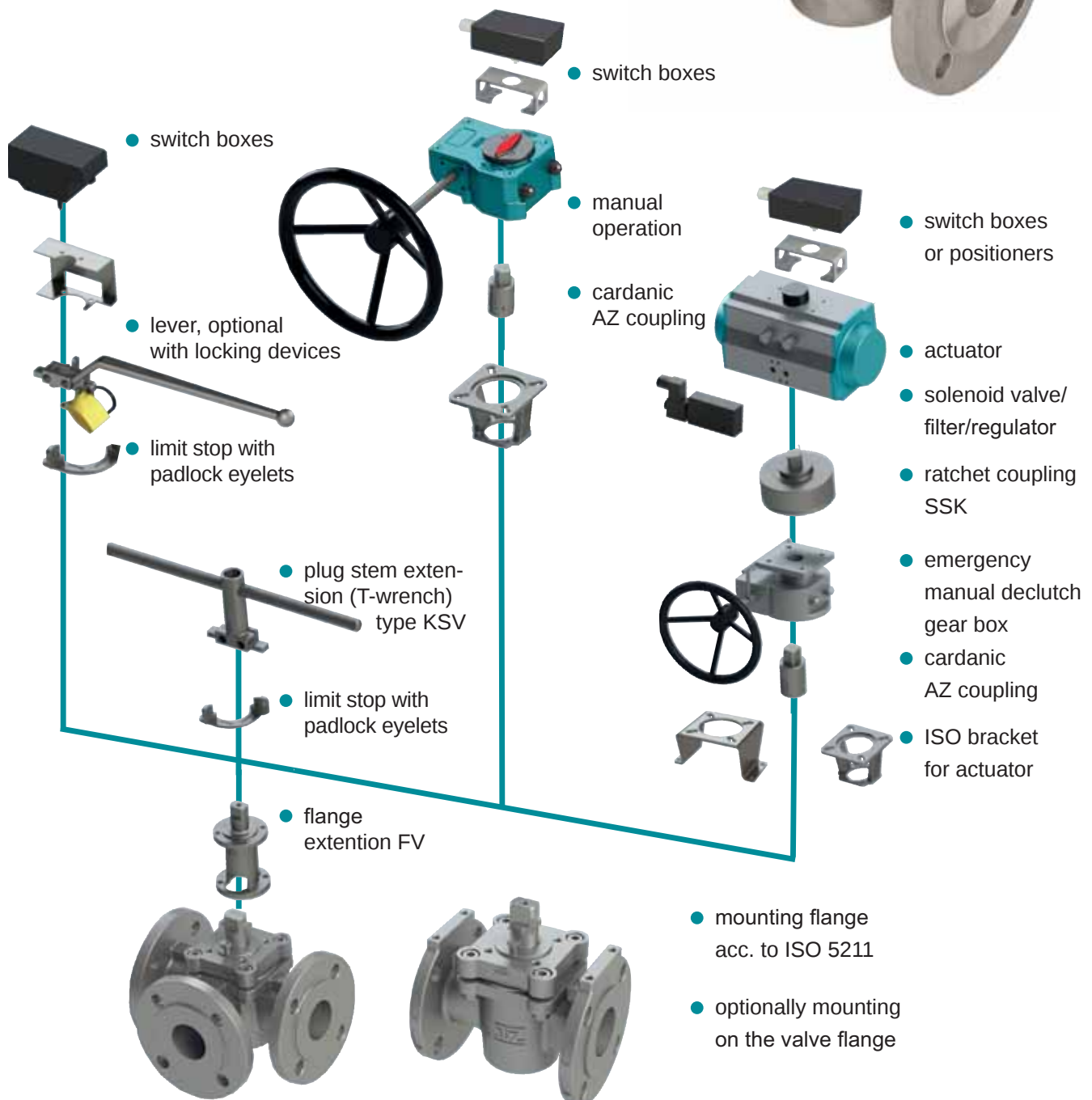
## High and low temperature

- extended bonnet with sealing at the top
- stem extension for insulated valves

# Modular operation concept

## Bracket according to ISO 5211

- standard installation of gearbox and actuator
- safe due to independent mounting of cover and bracket
- covering bonnet bolts to prevent opening of valve in service
- precise centering of the bracket to the plug stem due to adjusting ring
- easy inline plug adjustment during the process, screws are always accessible



# Cover and stem sealing systems suitable for general applications

## Type STANDARD



- plug adjustment
- thrust collar
- cover sealing (PTFE)
- stainless steel diaphragm
- **Secondary sealing:** V-diaphragm (PTFE), delta thrust collar (PTFE)
- **Primary sealing:** sleeve\*

## Type FS2

## Fire-Safe-sealing (API 607)

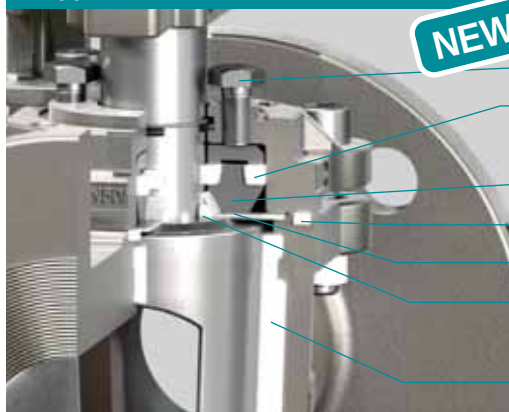


**NEW!**

- plug & packing adjustment
- **Tertiary sealing:** Packing to atmosphere (graphite)
- thrust collar
- cover sealing (graphite)
- stainless steel diaphragm
- **Secondary sealing:** V-diaphragm (PTFE) and delta thrust collar (PTFE)
- **Primary sealing:** sleeve\*

## Type CA2

## Chemistry sealing



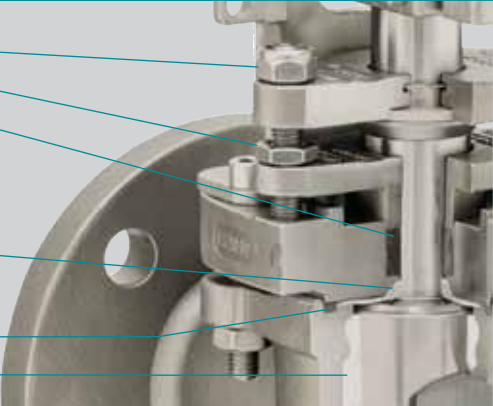
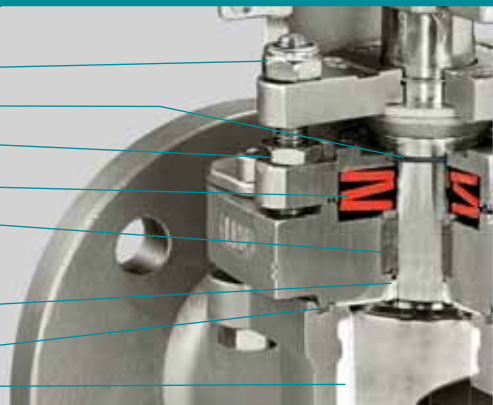
**NEW!**

- plug & packing adjustment
- **Tertiary sealing:** Packing to atmosphere (PTFE)
- thrust collar
- cover sealing (PTFE)
- stainless steel diaphragm
- **Secondary sealing:** V-diaphragm, delta thrust collar (PTFE)
- **Primary sealing:** sleeve\*

\*) The sleeve material has a decisive influence on the maximum operating temperature  
Material selection acc. to PT-diagram

# More safety for severe applications

*engineered.  
fast.  
dynamic.*

| Type FSN                                                                                                                                                                                                                                                                                                                                                                                                                                | Fire-Safe-sealing (API 607)                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <p>plug adjustment</p> <p>triple safety stem packing adjustment</p> <p><b>Tertiary sealing:</b> triple safety stem packing (graphite)</p> <p><b>Secondary sealing:</b><br/>V-diaphragm (PTFE) and delta thrust collar (PTFE)</p> <p>cover sealing (graphite)</p> <p><b>Primary sealing:</b> sleeve*</p>                                                                                                                                 |                      |
| Type FSN-EF                                                                                                                                                                                                                                                                                                                                                                                                                             | Fire-Safe-sealing (API 607)                                                                            |
| <p><b>Emission Free</b></p> <p>plug adjustment</p> <p>triple safety stem packing adjustment</p> <p><b>Quaternary sealing:</b> three o-rings at the stem</p> <p><b>Tertiary sealing:</b><br/>triple safety stem packing</p> <p><b>Secondary sealing:</b><br/>V-diaphragm (PTFE) and delta thrust collar (PTFE)</p> <p>cover sealing (graphite)</p> <p><b>Primary sealing:</b> sleeve*</p>                                                | <p><b>NEW!</b></p>  |
| Type FSN-SL                                                                                                                                                                                                                                                                                                                                                                                                                             | Fire-Safe-sealing (API 607)                                                                            |
| <p><b>live-loaded</b></p> <p>plug adjustment</p> <p>o-rings protect the springs against corrosion</p> <p>triple safety stem packing adjustment</p> <p>disk springs (optionally made of Inconel)</p> <p><b>Tertiary sealing:</b> triple safety stem packing (graphite)</p> <p><b>Secondary sealing:</b><br/>V-diaphragm (PTFE) and delta thrust collar (PTFE)</p> <p>cover sealing (graphite)</p> <p><b>Primary sealing:</b> sleeve*</p> |                    |

\*) The sleeve material has a decisive influence on the maximum operating temperature  
Material selection acc. to PT-diagram

Material for **type CASN** and **CASN-SL** chemistry safety sealing: packing and cover sealing in PTFE

# Special sealing systems

## Chevron packing

- increases the contact pressure (when pressure builds up on the safety stem packing towards plug stem)
- for toxic and fugitive media
- high wear resistance



## Type CL Chlorine / gas applications

- approved for chlorine applications and other toxic gases
- ideal for media with changing state of aggregate (e.g. liquid to gas, vice versa)
- vacuum capable



## Detection ports for monitoring purpose of lethal gases (phosgene, etc.)

- detection ports for early recognition of potential leakages
- sniffing at sealing surfaces to atmosphere

stem packing

cover sealing

flange sealing



# Cover and stem sealing systems for lined plug valves

*engineered.  
fast.  
dynamic.*

## Type CA 2A

### Chemistry sealing

**NEW!**

- plug & packing adjustment
- stem O-ring
- Tertiary sealing:** O-ring (FKM / FFKM)
- thrust collar
- stainless steel diaphragm
- Secondary sealing:**  
V-diaphragm & delta thrust collar (PTFE)
- Primary sealing:** lined body



## Type SAFE-LINED

### Chemistry sealing

**lined cover**

- plug adjustment
- triple safety stem packing adjustment
- Tertiary sealing:**  
triple safety stem packing (PTFE) to atmosphere
- Secondary sealing:**  
V-diaphragm (PTFE), delta thrust collar (PTFE)
- lined cover
- Primary sealing:** lined body\*

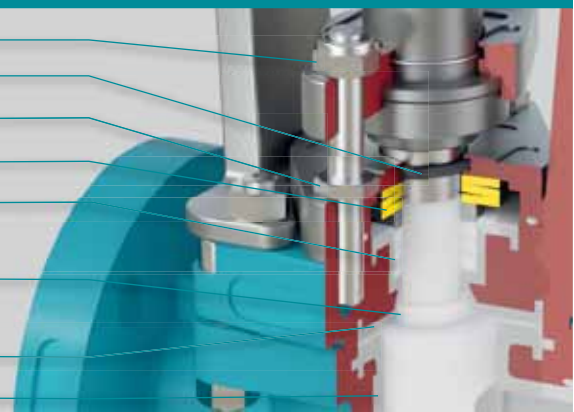


## Type SAFE-LINED-SL

### Chemistry sealing

**live-loaded**

- plug adjustment
- o-rings protect the springs against corrosion
- triple safety stem packing adjustment
- disk springs (optionally made of Inconel)
- Tertiary sealing:**  
triple safety stem packing (PTFE) to atmosphere
- Secondary sealing:**  
V-diaphragm (PTFE), delta thrust collar (PTFE)
- lined cover
- Primary sealing:** lined body\*



\*) Lining and plug material have a decisive influence on the maximum operating temperature  
Material selection according to PT-diagram.

**WORLD'S FIRST EMISSION FREE**  
plug valve certified acc. to **ISO 15848-1 / AH**  
**Type FSN-EF**

**NEW!**



Fugitive  
Emissions



# Low-Emission according ISO 15848, TA-Luft & API 641



For all important information about ISO 15848, TA-Luft & API 641, as well as the current certificates, please refer to the "AZ Fugitive Emission" brochure



Latest information about  
ISO 15848 / API 641 /  
TA Luft see AZ Fugitive  
Emissions leaflet



# Casting materials



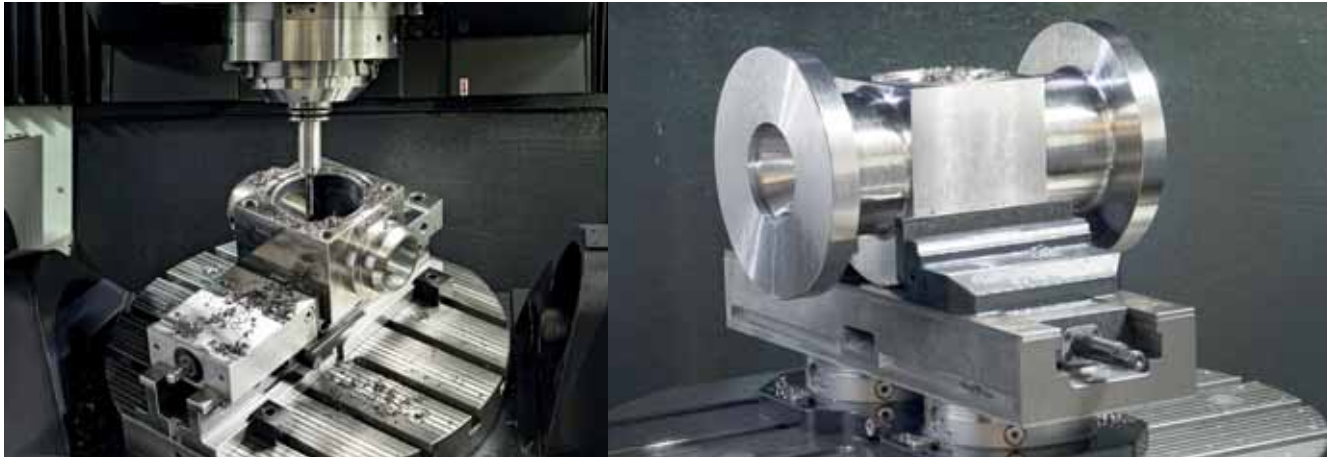
|                                    |                  | Casting Material |                      |              |       |            |        |
|------------------------------------|------------------|------------------|----------------------|--------------|-------|------------|--------|
| Material Group                     | Common Name      | EN / DIN         | Short name           | Material-No. | ASTM  | Grade      | UNS    |
| <b>Carbon Steel / Ductile Iron</b> |                  |                  |                      |              |       |            |        |
| Ductile Iron                       | SG Iron          | EN 1563          | EN-GJS-400-18-LT     | 5.3103       | A395  | -          | F32800 |
| Carbon Steel                       | CS               | EN 10213         | GP240GH              | 1.0619       | A216  | WCB        | J03002 |
| Low Temp. Carbon Steel             | LTCS             | EN 10213         | G17Mn5               | 1.1131       | A352  | LCB        | J03003 |
| Low Temp. Carbon Steel             | LTCS             | EN 10213         | G21Mn5               | 1.1138       | A352  | LCC        | J02505 |
| <b>Stainless Steel</b>             |                  |                  |                      |              |       |            |        |
| Stainless Steel                    | Duplex 2205      | EN 10213         | GX2CrNiMoN22-5-3(4A) | 1.4470       | A995  | 4A-CD3MN   | J92205 |
| Stainless Steel                    | Duplex 1B        | EN 10213         | GX3NiCrMoCuN26-6-3-3 | 1.4517       | A995  | 1B-CD4MCuN | J93372 |
| Austenitic                         | SS               | EN 10213         | GX5CrNi19-10         | 1.4308       | A351  | CF8        | J92600 |
| Austenitic                         | SS               | EN 10213         | GX2CrNi19-11         | 1.4309       | A351L | CF3        | J92700 |
| Austenitic                         | SS               | EN 10213         | GX5CrNiMo19-11-2     | 1.4408       | A351  | CF8M       | J92900 |
| Austenitic                         | SS               | EN 10213         | GX2CrNiMo19-11-2     | 1.4409       | A351  | CF3M       | J92800 |
| Super Austenitic                   | Alloy 20         | EN 10213         | NiC420CuMo           | 1.4500       | A351  | CN7M       | N08007 |
| Super Austenitic                   | Alloy 20 mod.    | EN 10213         | GX2NiCrMoCuN25-20    | 1.4536       | A743  | CN7MS      | J94650 |
| Super Austenitic                   | AL6XN            | -                | -                    | -            | A351  | CN3MN      | J94651 |
| Superduplex                        | Superduplex 5A   | EN 10213         | 25Cr-7Ni-Mo-N        | 1.4469       | A995  | CE3MN      | J93404 |
| <b>Nickel Alloy</b>                |                  |                  |                      |              |       |            |        |
|                                    | Monel/Alloy400   | DIN 17730        | G-NiCu30 Nb          | 2.4365       | A494  | M35-1      | N24135 |
|                                    | Hastelloy C mod. | -                | -                    | -            | A494  | CW6M       | N30107 |
|                                    | Hastelloy C      | -                | -                    | 2.4537       | A494  | CW12MW     | N30002 |
|                                    | Hastelloy C-276  | -                | -                    | 2.4883       | -     | -          | -      |
|                                    | Hastelloy B-3    | -                | -                    | -            | -     | -          | -      |
|                                    | Inconel 600      | -                | -                    | -            | A494  | CY40       | N06040 |
|                                    | Inconel 625      | -                | -                    | -            | A494  | CW6MC      | N26625 |
|                                    | Inconel 825      | -                | -                    | -            | A494  | CU5MCuC    | N08826 |
|                                    | Nickel           | DIN 17730        | G-Ni 95              | 2.4170       | A494  | CZ100      | N02100 |
| <b>Other Material Groups</b>       |                  |                  |                      |              |       |            |        |
| Tantalum                           | Tantalum         | -                | -                    | -            | -     | -          | -      |
| Titanium                           | Ti 2             | DIN 17865        | G-Ti 2               | 3.7031       | B367  | C-2        | R52550 |
| Zirconium                          | Zirconium 702    | -                | -                    | -            | B752  | 702C       | -      |
| Zirconium                          | Zirconium 705    | -                | -                    | -            | -     | 705C       | -      |

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The use of these equivalents has to be evaluated on a case-by-case basis.

Other materials on request.

# Equivalent forged and bar-stock materials



|                             |         |            | Similar Forged Material |                    |         |         |            |        |      | Bar Material |  |
|-----------------------------|---------|------------|-------------------------|--------------------|---------|---------|------------|--------|------|--------------|--|
| Common Name                 | Mat.Nr. | Grade      | EN / DIN                | Short Name         | Mat.Nr. | ASTM    | Grade      | UNS    | ASTM | Short        |  |
| Carbon Steel / Ductile Iron |         |            |                         |                    |         |         |            |        |      |              |  |
| SG Iron                     | 5.3103  | -          | EN 1563                 | EN-GJS-400-18-LT   | 5.3103  | A395-99 | 60-40-18   | -      | -    | -            |  |
| CS                          | 1.0619  | WCB        | EN 10213                | GP240GH            | 1.0619  | A105    | A105       | -      | -    | -            |  |
| LTCS                        | 1.1131  | LCB        | -                       | -                  | -       | A350    | LF2-Class1 | G10300 | -    | -            |  |
| LTCS                        | 1.1138  | LCC        | -                       | -                  | 1.0566  | A350    | LF2-Class1 | G10250 | -    | -            |  |
| Stainless Steel             |         |            |                         |                    |         |         |            |        |      |              |  |
| Duplex 2205                 | 1.4470  | 4A-CD3MN   | EN 10028-7              | X2CrNiMoN22-5-3    | 1.4462  | A182    | F51        | S32205 | A479 | S31803       |  |
| Duplex 1B                   | 1.4517  | 1B-CD4MCuN | EN 10028-7              | X2CrNiMoCuN25-5-3  | 1.4507  | A182    | F59        | S32520 | A479 | S32550       |  |
| SS                          | 1.4308  | CF8        | EN 10028-7              | X5CrNi18-10        | 1.4301  | A182    | F304       | S30400 | A276 | 304          |  |
| SS                          | 1.4309  | CF3        | EN 10028-7              | X2CrNi19-11        | 1.4306  | A182    | F304L      | S30403 | A276 | 304L         |  |
| SS                          | 1.4408  | CF8M       | EN 10028-7              | X5C4NiMo17-12-2    | 1.4401  | A182    | F316       | S31600 | A276 | 316          |  |
| SS                          | 1.4409  | CF3M       | EN 10028-7              | X2CrNiMo 17-12     | 1.4404  | A182    | 316L       | S31603 | A276 | 316L         |  |
| Alloy 20                    | 1.4500  | CN7M       | -                       | -                  | 2.4660  | B462    | N08020     | N08020 | B473 | N08020       |  |
| Alloy 20 mod.               | 1.4536  | CN7MS      | -                       | -                  | -       | -       | -          | -      | -    | -            |  |
| AL6XN                       | -       | CN3MN      | EN 10028-7              | X1NiCrMoCuN25-20-7 | 1.4529  | A182    | F62        | N08367 | B462 | N08367       |  |
| Superduplex 5A              | 1.4469  | CE3MN      | EN 10028-7              | X2CrNiMoN25-7-4    | 1.4410  | A182    | F63        | S32615 | -    | -            |  |
| Nickel Alloy                |         |            |                         |                    |         |         |            |        |      |              |  |
| Monel/Alloy400              | 2.4365  | M35-1      | DN 17744                | NiCu30Fe           | 2.4360  | B165    | Alloy 400  | N04400 | B164 | N04400       |  |
| Hastelloy C mod.            | -       | CW6M       | -                       | -                  | -       | A494    | -          | -      | -    | -            |  |
| Hastelloy C                 | -       | CW12MW     | -                       | NiMo16CrW          | -       | A494    | -          | -      | -    | -            |  |
| Hastelloy C-276             | -       | -          | DIN 17744               | NiMo16Cr15W        | 2.4819  | B565    | N10675     | N10276 | B574 | N10276       |  |
| Hastelloy B-3               | -       | -          | DIN 17744               | NiMo29Cr           | 2.4600  | B565    | N10675     | N10675 | B335 | N10675       |  |
| Inconel 600                 | -       | CY40       | DIN 17742               | NiCr15Fe           | 2.4816  | B565    | N06600     | N06600 | B166 | N06600       |  |
| Inconel 625                 | -       | CW6MC      | DIN 17744               | NiCr22Mo9Nb        | 2.4856  | B565    | N06625     | N06625 | B446 | N06625       |  |
| Inconel 825                 | -       | CU5MCuC    | DIN 17744               | NiCr21Mo           | 2.4858  | B564    | N08825     | N08825 | B425 | N08825       |  |
| Nickel                      | 2.4170  | CZ100      | -                       | -                  | -       | -       | -          | -      | B160 | N02200       |  |
| Other Material Groups       |         |            |                         |                    |         |         |            |        |      |              |  |
| Tantalum                    | -       | -          | -                       | -                  | -       | B365    | TaW2,5     | R05252 | -    | -            |  |
| Ti 2                        | 3.7031  | C-2        | DIN 17864               | Grade 2            | 3.7035  | B381    | F2         | R50400 | B348 | Grade 2      |  |
| Zirconium 702               | -       | 702C       | -                       | -                  | 6.0702  | B493    | R60702     | R60702 | B550 | R60702       |  |
| Zirconium 705               | -       | 705C       | -                       | -                  | -       | B493    | R60705     | R60705 | B550 | R60705       |  |

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The use of these equivalents has to be evaluated on a case-by-case basis.

Other materials on request.

# Lining materials



## Lining materials

The high density, extremely resistant lining is at least 3 mm thick. New granulate is used exclusively, no refurbished regenerates or similar materials.

## Fluoropolymer lining materials

- Body: PFA, PFA conductive and FEP
- Plug: PTFE, PFA, PFA conductive and FEP

| body lining    | Combination of linings<br>plug lining   | T <sub>max</sub> |
|----------------|-----------------------------------------|------------------|
| PFA            | PTFE <sup>1)</sup> or special materials | 210°C / 410°F    |
| PFA            | PFA                                     | 200°C / 392°F    |
| PFA            | FEP                                     | 150°C / 302°F    |
| PFA conductive | PFA conductive                          | 125°C / 257°F    |
| FEP            | FEP                                     | 150°C / 302°F    |
| FEP            | PFA                                     | 150°C / 302°F    |

- 1) Plugs with PTFE lining only for two-way valves up to DN 100.  
Plugs for multi-way valves not with PTFE lining available.

## IMPORTANT NOTE

For demanding conditions, such as process temperatures exceeding 150°C / 302°F:  
Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of lining material, cover sealing type and special features.

# Sleeve materials



| Category        | Sleeve Material                | Characteristics                                            | Typical applications                                                          | T <sub>MAX</sub> |
|-----------------|--------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------|------------------|
| PTFE            | PTFE, virgin                   | low friction, very good sealing characteristic             | standard sleeve material for most applications                                | 230°C / 446°F    |
| RPTFE           | PTFE-Glass                     | reinforced PTFE                                            | additional stability for multiway valves with horizontal ports                | 230°C / 446°F    |
|                 | PTFE-Graphite                  | reinforced PTFE                                            | high temperature applications                                                 | 250°C / 482°F    |
| modified PTFE   | TFM 1600*<br>NXT 75*<br>M 111* | chemically modified PTFE, reduced permeation, low friction | chemical applications where reduced permeability compared to PTFE is required | 250°C / 482°F    |
| Special Sleeves | PTFE-P*<br>NFCE*<br>NCS*       | high performance sleeve materials                          | severe service<br>highest temperatures, high pressure, abrasive applications  | 320°C / 608°F    |
| PFA             | PFA                            | reduced permeation                                         | chemical applications where reduced permeability compared to PTFE is required | 200°C / 392°F    |
| UHMW-PE         | UHMW-PE                        | Ultra High Molecular Weight Polyethylene                   | radiation resistant, abrasive application                                     | 80°C / 176°F     |

\*) sleeve material selection depending on availability at AZ manufacturing site

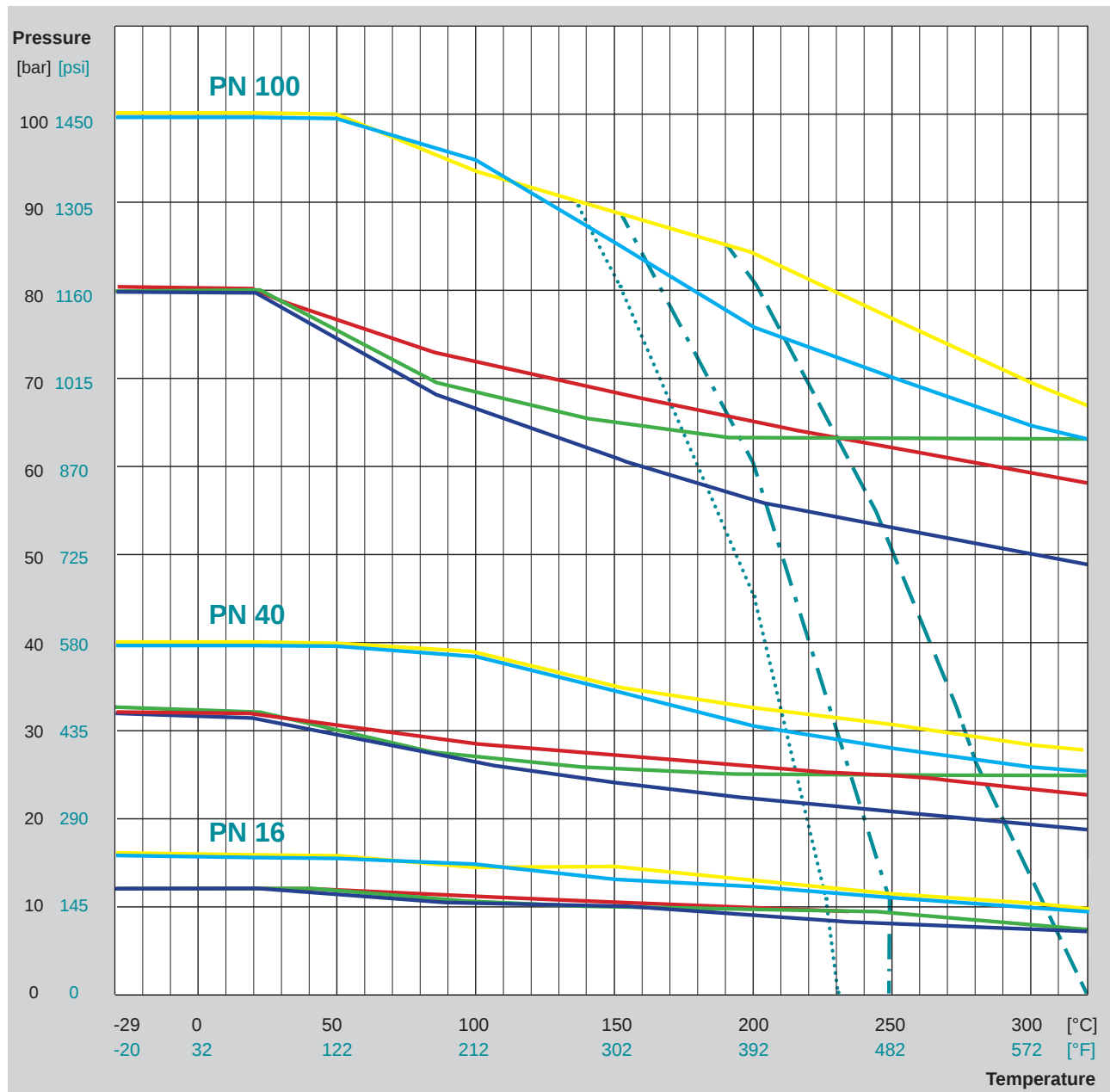
## IMPORTANT NOTE

for demanding conditions, such as process temperatures exceeding 200°C / 392°F:

Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of sleeve material, cover sealing type and special features. For other sleeve materials not listed above: please contact your AZ sales representative.

# PT Diagram, PN 16 - PN 100

## PTFE sleeved plug valves



### Body material

- EN 10213 - 1.0619 / Carbon Steel
  - EN 10213 - 1.4408 / Stainless Steel
  - EN 17744 - 2.4819 / Hastelloy
  - EN 17730 - 2.4365 / Monel 400
  - UNS N08007 - 1.4500 / Alloy 20
- other body materials on request

### Sleeve material

- ..... PTFE (virgin) / PTFE (glass)  $T_{max}$  230°C / 446°F
  - TFM / NXT / M111 / PTFE graphite  $T_{max}$  250°C / 482°F
  - PTFE-P / NFCE / NCS  $T_{max}$  320°C / 608°F
- other sleeve materials on request

The data given are max. values according to EN 12516-1 and EN 1092-1.

### IMPORTANT NOTE

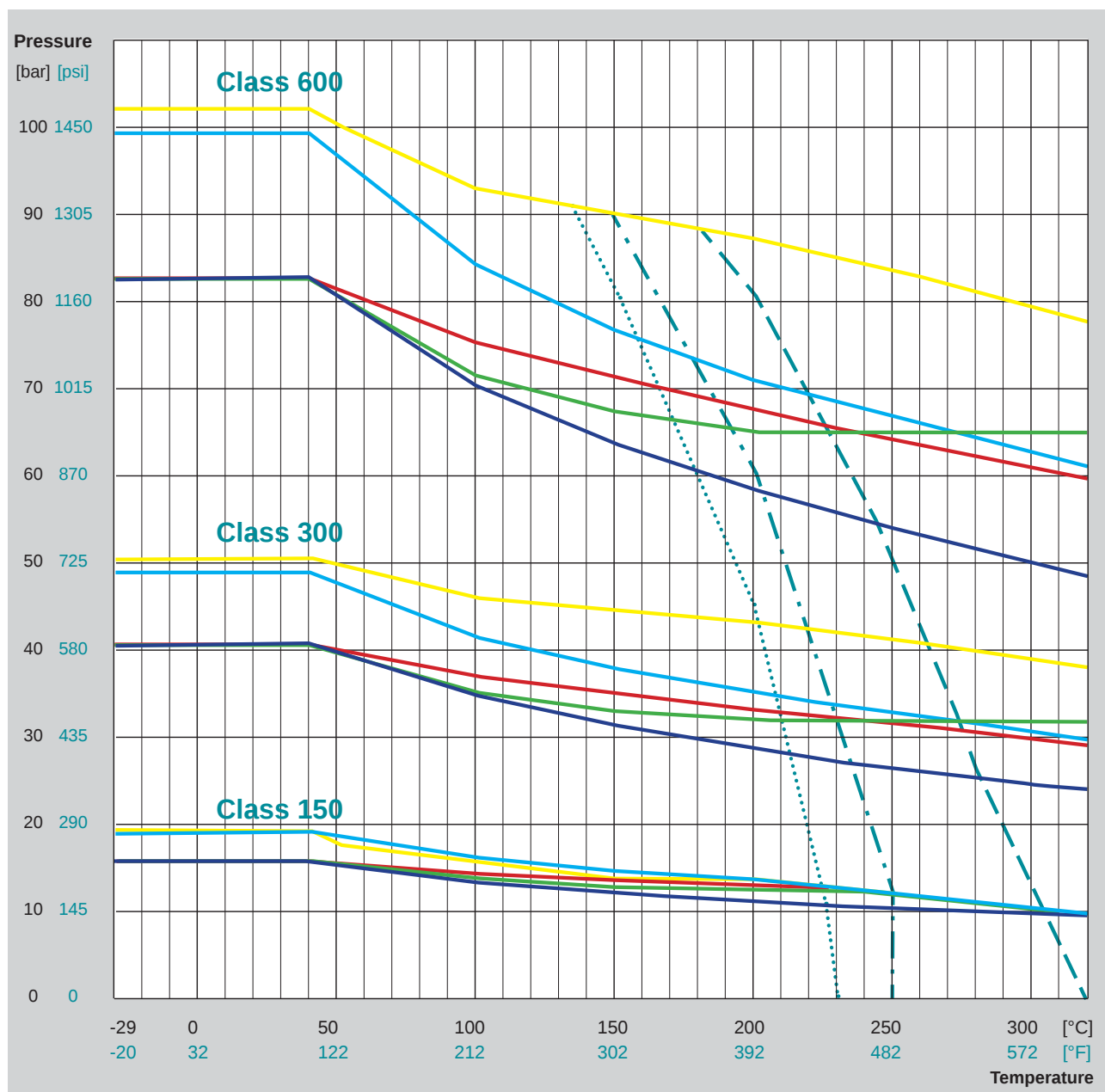
for demanding conditions, such as process temperatures exceeding 200°C / 392°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of sleeve material, cover sealing type and special features.

For temperatures < -29°C / -20°F, ( $T_{limit}$  = -60°C / -76°F) operating temperature, low-temperature carbon steel or austenitic stainless steels are required.

Subject to technical change without notice.

# PT Diagram, Class 150 - Class 600

## PTFE sleeved plug valves



### Body material

- ASTM A216 - WCB
- ASTM A351 - CF8M
- ASTM A494 - CW12MW / Hastelloy
- ASTM A494 - M35.1 / Monel 400
- ASTM A351 - CN7M Alloy 20
- other body materials on request

### Sleeve material

- ..... PTFE (virgin) / PTFE (glass)  $T_{max}$  230°C / 446°F
- . - . TFM / NXT / M111 / PTFE graphite  $T_{max}$  250°C / 482°F
- - - PTFE-P / NFCE / NCS  $T_{max}$  320°C / 608°F
- other sleeve materials on request

Subject to technical change without notice.

The data given are max. values according to ASME B16.34.

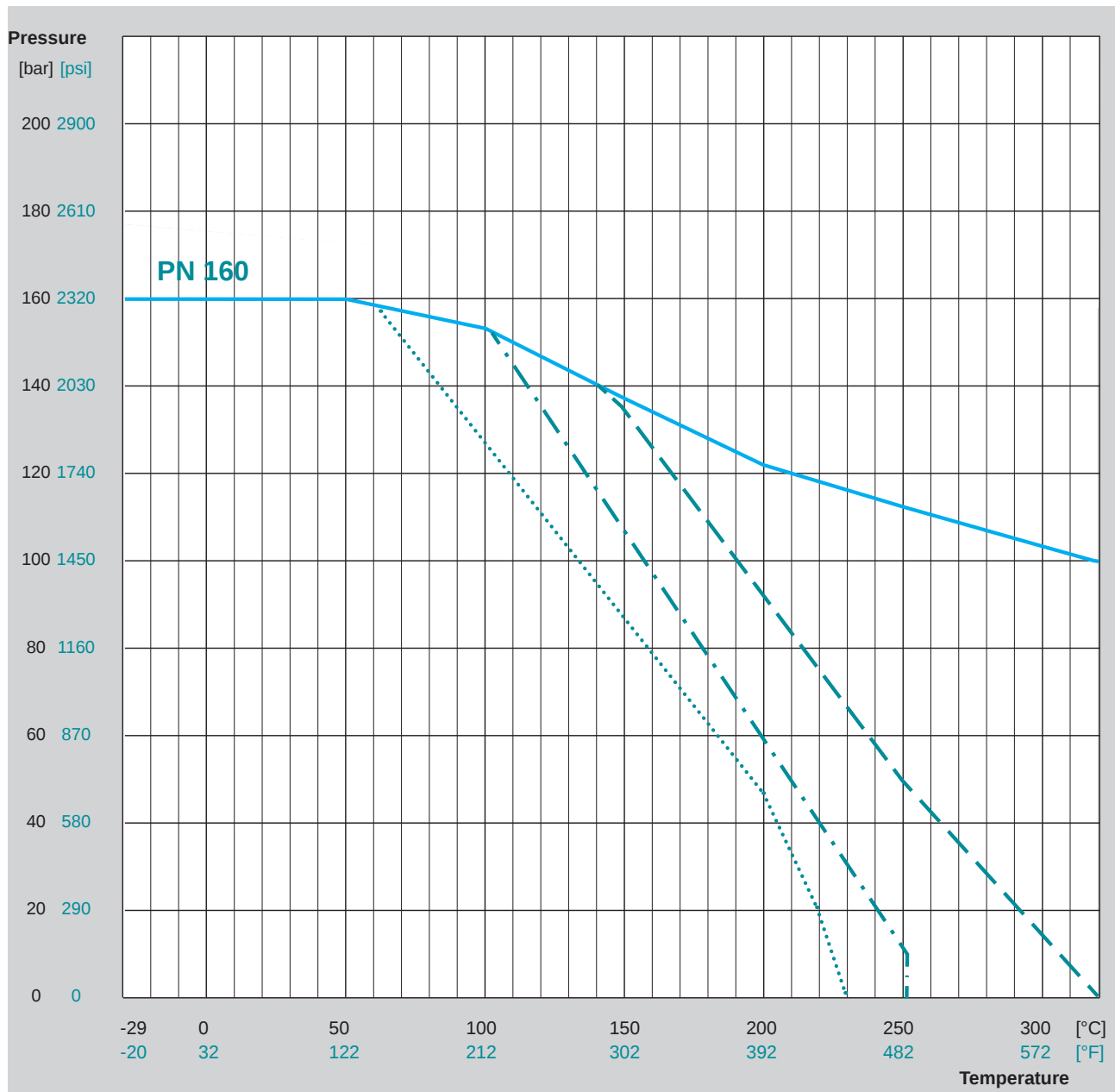
### IMPORTANT NOTE

for demanding conditions, such as process temperatures exceeding 200°C / 392°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of sleeve material, cover sealing type and special features.

For temperatures < -29°C / -20°F, ( $T_{limit}$  = -60°C / -76°F) operating temperature, low-temperature carbon steel or austenitic stainless steels are required.

# PT Diagram High Pressure, PN 160

## PTFE sleeved plug valves with trunnion mounted design



### Body material (in line with EN 12516-1 and EN 1092-1)

— EN 10213 - 1.4408 / Stainless Steel  
other body materials on request

### Sleeve material

..... PTFE (virgin) / PTFE (glass)  $T_{max}$  230°C / 446°F  
 - . - . TFM / NXT / M111 / PTFE graphite  $T_{max}$  250°C / 482°F  
 — PTFE-P / NFCE / NCS  $T_{max}$  320°C / 608°F  
 other sleeve materials on request

The data given are max. values according to EN 12516-1 and EN 1092-1.

### IMPORTANT NOTE

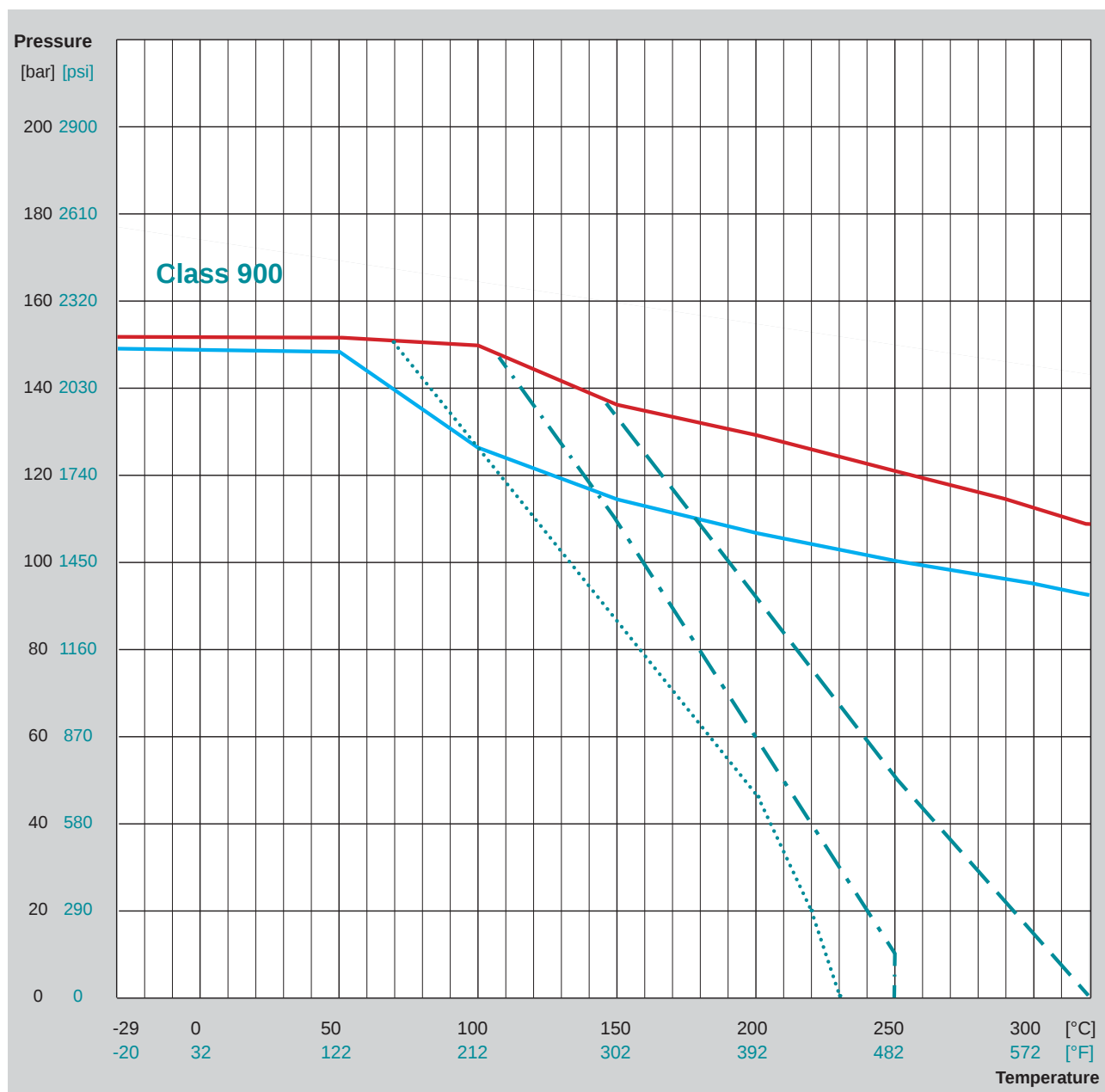
for demanding conditions, such as process temperatures exceeding 200°C / 392°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of sleeve material, cover sealing type and special features.

For temperatures < -29°C / -20°F, ( $T_{limit}$  = -60°C / -76°F) operating temperature, low-temperature carbon steel or austenitic stainless steels are required.

Subject to technical change without notice.

# PT Diagram High Pressure, Class 900

## PTFE sleeved plug valves with trunnion mounted design



### Body material (in line with ASME B16.34)

- ASTM A351 - CF8M / Stainless Steel
- ASTM A995 - CD3MN / Superduplex
- other body materials on request

### Sleeve material

- ..... PTFE (virgin) / PTFE (glass)  $T_{max}$  230°C / 446°F
- - - TFM / NXT / M111 / PTFE graphite  $T_{max}$  250°C / 482°F
- PTFE-P / NFCE / NCS  $T_{max}$  320°C / 608°F
- other sleeve materials on request

The data given are max. values according to ASME B16.34.

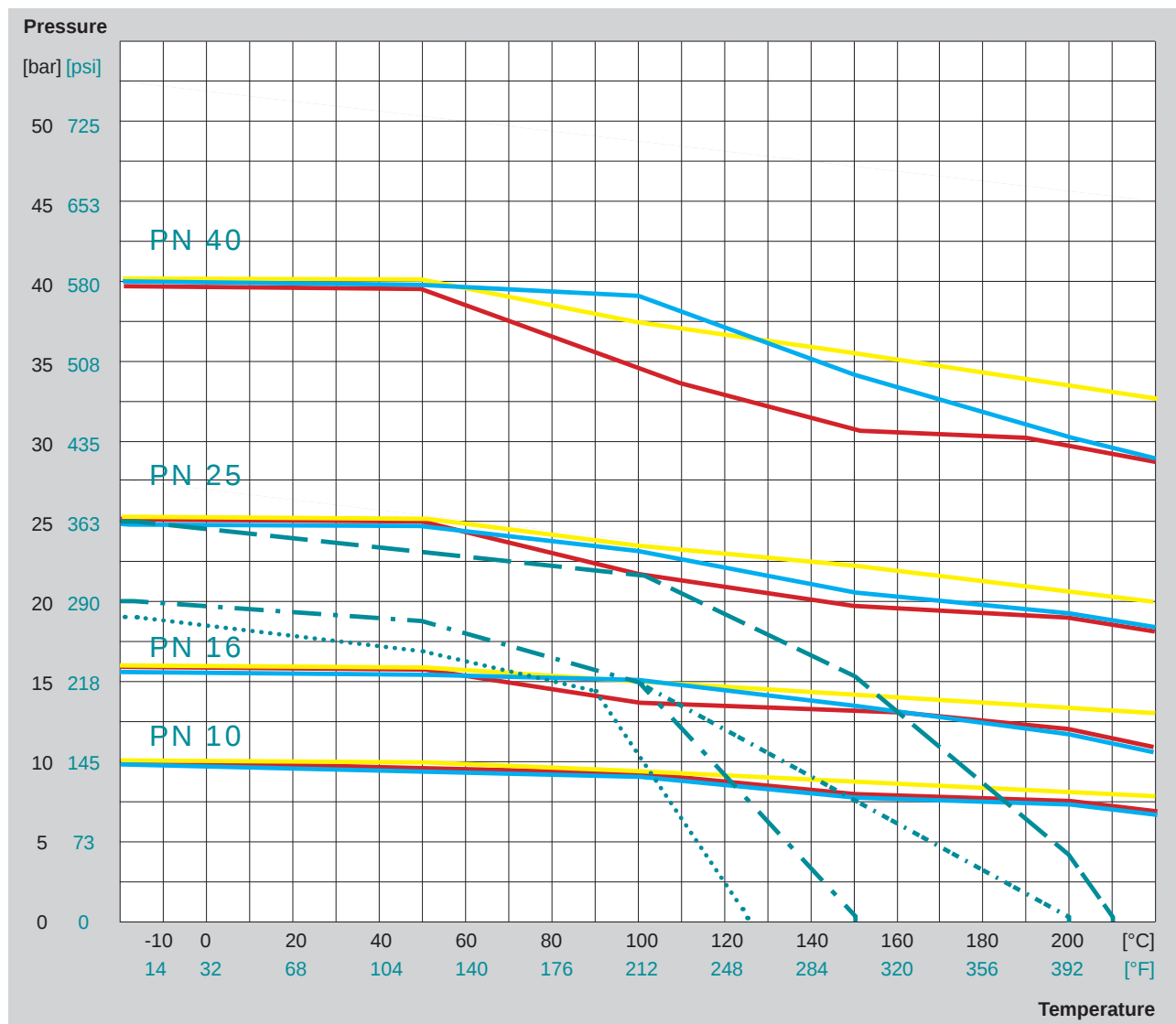
### IMPORTANT NOTE

for demanding conditions, such as process temperatures exceeding 200°C / 392°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of sleeve material, cover sealing type and special features.

Subject to technical change without notice.

For temperatures < -29°C / -20°F, ( $T_{limit}$  = -60°C / -76°F) operating temperature, low-temperature carbon steel or austenitic stainless steels are required.

# PT Diagram, PN 10 - PN 40 lined valves



## Body material

- EN 10213 - 1.0619 / Carbon Steel
  - EN 10213 - 1.4408 / Stainless Steel
  - EN 1563 - EN-GJS-400-18-LT / Ductile Iron
- other body materials on request

The data given are max. values according to EN 12516-4.

## Lining combination

|           | Body                              | Plug / Ball      | T <sub>MAX</sub> |
|-----------|-----------------------------------|------------------|------------------|
| — —       | PFA                               | PTFE or special* | 210°C / 410°F    |
| — . . .   | PFA                               | PFA              | 200°C / 392°F    |
| — — —     | all combinations with PFA and FEP |                  | 150°C / 302°F    |
| — . . . . | PFA conductive                    | PFA conductive** | 125°C / 257°F    |

\*) Special materials (metallic) for plugs without lining on request

\*\*) Material combination PFA / FEP possible

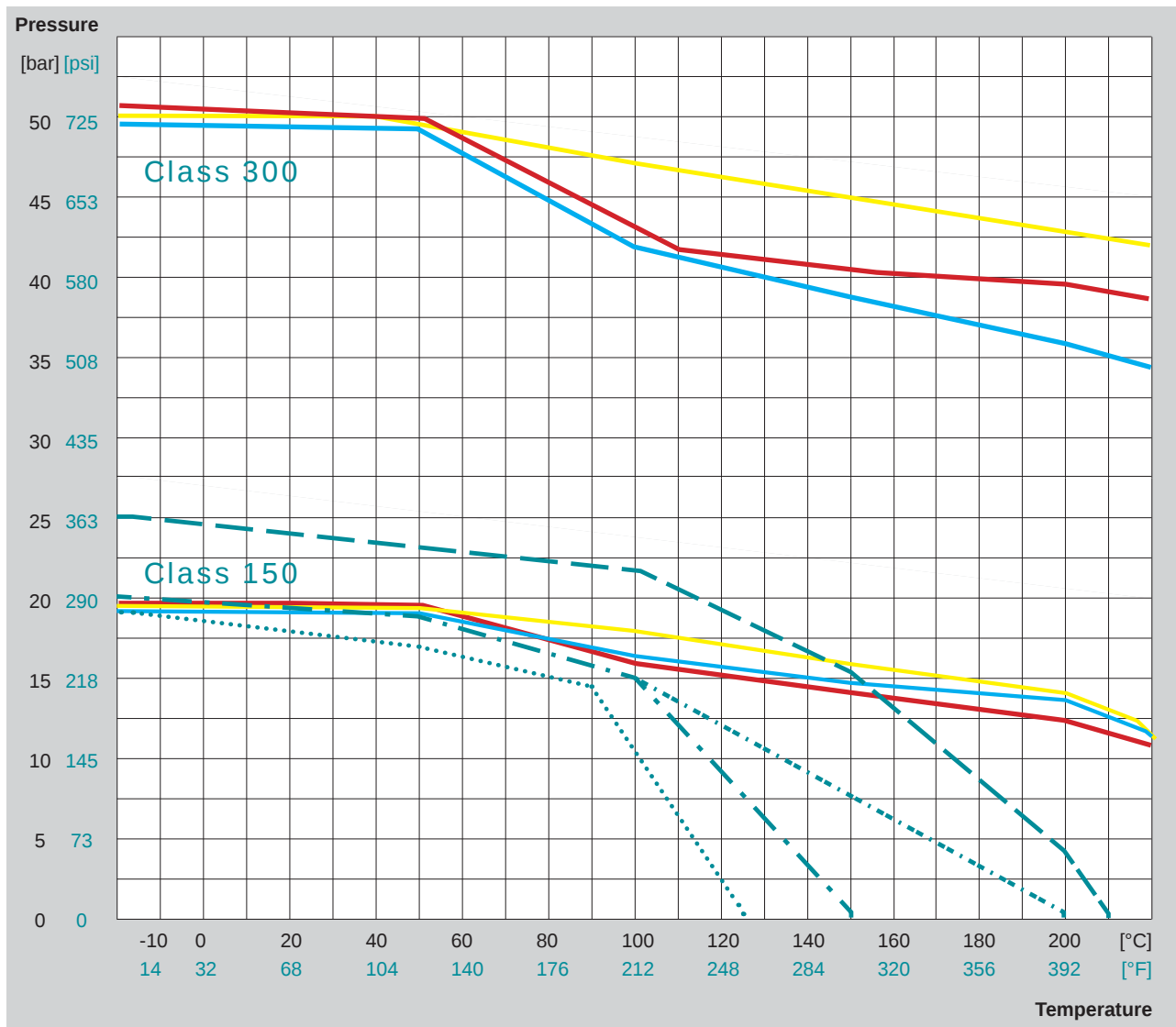
## IMPORTANT NOTE

for demanding conditions, such as process temperatures exceeding 150°C / 302°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of lining material, cover sealing type and special features.

Maximum breakaway torque depending on material combinations according to the technical data sheets of the plug valve.

Subject to technical change without notice.

# PT Diagramm, Class 150 - Class 300 lined valves



## Body material

- ASTM A216 - WCB
- ASTM A351 - CF8M / Stainless Steel
- ASTM A395 / Ductile Iron
- other body materials on request

## Lining combination

|       | Body                              | Plug / Ball      | T <sub>MAX</sub> |
|-------|-----------------------------------|------------------|------------------|
| —     | PFA                               | PTFE or special* | 210°C / 410°F    |
| ---   | PFA                               | PFA              | 200°C / 392°F    |
| ---   | all combinations with PFA and FEP |                  | 150°C / 302°F    |
| ..... | PFA conductive                    | PFA conductive** | 125°C / 257°F    |

\*) Special materials (metallic) for plugs without lining on request

\*\*) Material combination PFA / FEP possible

The data given are max. values according to ASME B16.34 / B16.42.

## IMPORTANT NOTE

for demanding conditions, such as process temperatures exceeding 150°C / 302°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of lining material, cover sealing type and special features.

Maximum breakaway torque depending on material combinations according to the technical data sheets of the plug valve.

Subject to technical change without notice.

# Plug types: two-way and multi-port for standard reduced and full bore design



- position indicator for all multi-way valves welded on lever or stem extension
- Lined plug valves: multi-way plugs only with PFA / FEP plug lining or made of special materials. Two-way plugs with PTFE lining up to DN 100 / NPS 4 available

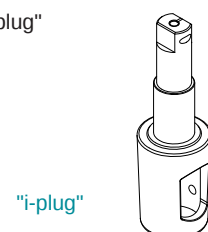
Recommendation for three-way valves type F-3-S with vertical outlet (longer life-time compared to type F-3-W with horizontal outlet)

## Options

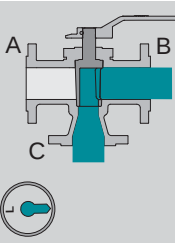
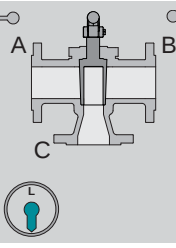
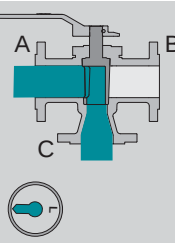
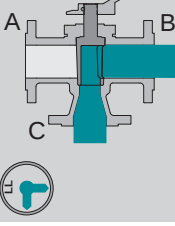
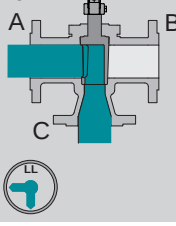
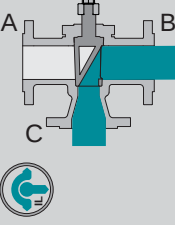
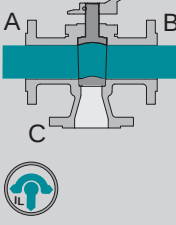
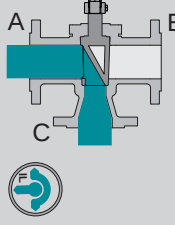
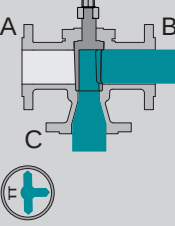
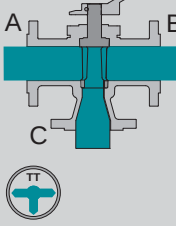
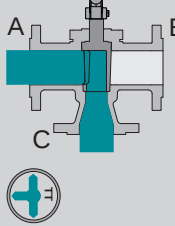
Plugs made of special materials or special designs, e.g. with flushing devices, vent holes in plug bottom or plug upstream / downstream side

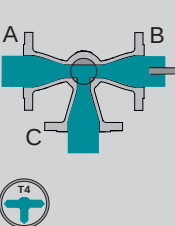
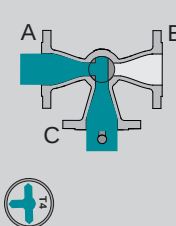
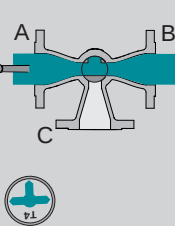
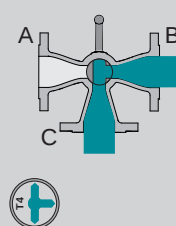
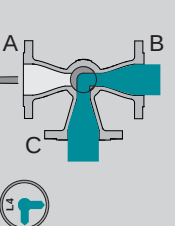
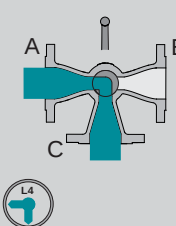
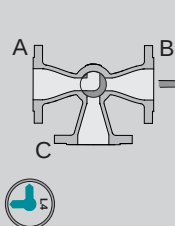
| 2-way | Plug type | Pos. I = 0° | Pos. II = 90° | Pos. III = 180° | Pos. IV = 270° |
|-------|-----------|-------------|---------------|-----------------|----------------|
|       |           |             |               |                 |                |
|       |           |             |               |                 |                |

\*) For highly expanding media AZ recommends the "i-plug" (relief hole and open plug bottom)



# Plug types: 3-way valve for STANDARD and EXTRA design

| Plug type                                                                                        | Pos. I = 0°                                                                         | Pos. II = 90°                                                                       | Pos. III = 180°                                                                     | Pos. IV = 270° | 3-way (vertical)                                                                     |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------|
| <b>L</b><br>    |    |    |    |                |   |
| <b>LL</b><br>   |    |    |                                                                                     |                |                                                                                      |
| <b>IL*</b><br> |   |   |   |                |  |
| <b>TT</b><br> |  |  |  |                |                                                                                      |

| Plug type                                                                                        | Pos. I = 0°                                                                         | Pos. II = 90°                                                                       | Pos. III = 180°                                                                     | Pos. IV = 270°                                                                       | 3-way (horizontal)                                                                    |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>T4</b><br> |  |  |  |  |  |
| <b>L4</b><br> |  |  |  |                                                                                      |  |

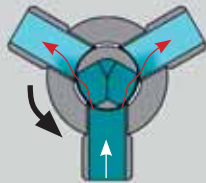
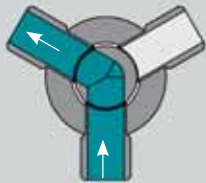
\*) for EXTRA valves with IL-plug, F-3-W-EXTRA with T4-plug is recommended (higher flowrate)  
Lined valves: the IL-plug is only available in special materials

# Plug types 3-way (120°) valves and 4-way valves for STANDARD and EXTRA design

## 3-way (120°) type 3-W-120:

- min. cross section guaranteed (switching phase)
- piggable execution on request
- minimum flow guaranteed

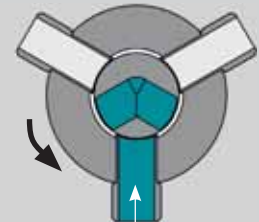
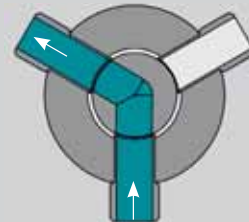
transflow design



## 3-way (120°) type 3-WP-120

- with positive overlap
- flow interruption / isolation

positive overlap

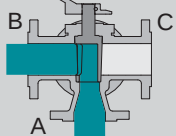
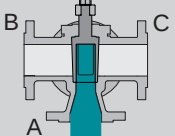
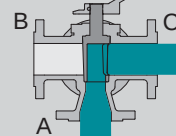
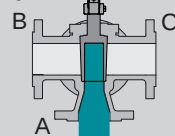
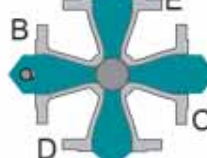
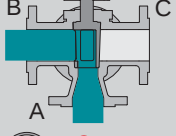
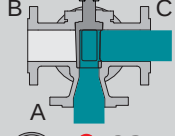
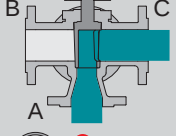
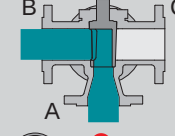
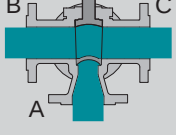
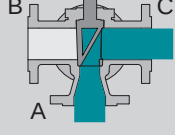
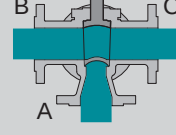
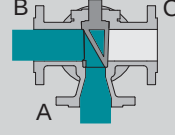
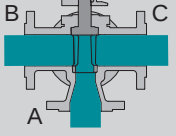
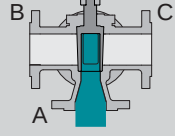
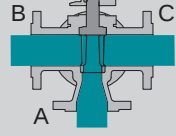
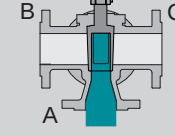
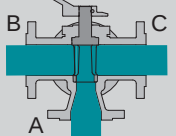
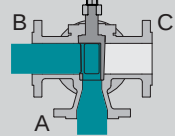
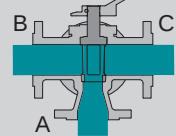
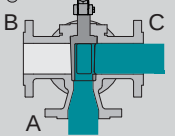


| 3-way (120°) | Plug type       | Pos. I = 0° | Pos. II = 120° | Pos. III = 240° |  |
|--------------|-----------------|-------------|----------------|-----------------|--|
|              | <b>L120</b><br> | <br>L120    | <br>L120       | <br>L120        |  |

| 4-way                             | Plug type      | Pos. I = 0°              | Pos. II = 90°            | Pos. III = 180°          | Pos. IV = 270°           |
|-----------------------------------|----------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <br>Type F-4-ISO-STANDARD<br><br> | <b>L4</b><br>  | <br>L4<br>✓ B-E<br>✗ C-D | <br>L4<br>✗ B-D<br>✓ C-E | <br>L4<br>✗ B-E<br>✓ C-D | <br>L4<br>✗ C-E<br>✓ B-D |
|                                   | <b>T4</b><br>  | <br>T4<br>✗ D<br>✓ B-C-E | <br>T4<br>✗ B<br>✓ C-D-E | <br>T4<br>✗ E<br>✓ B-C-D | <br>T4<br>✗ C<br>✓ B-D-E |
|                                   | <b>LL4</b><br> | <br>LL4<br>✓ B-E + C-D   | <br>LL4<br>✓ B-D + C-E   |                          |                          |

✓ open  
✗ closed

# Plug types 4-way (special) and 5-way valves for STANDARD and EXTRA design

| Plug type                                                                           | Pos. I = 0°                                                                                                                                                                                                                           | Pos. II = 90°                                                                                                                                                                                                                         | Pos. III = 180°                                                                                                                                                                                                                       | Pos. IV = 270°                                                                                                                                                                                                                         | 4-way (special) / 5-way                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <br><div>  <span>✗ C-D-E</span><br/> <span>✓ A-B</span> </div>      | <br><div>  <span>✗ B-C-D</span><br/> <span>✓ A-E</span> </div>      | <br><div>  <span>✗ B-D-E</span><br/> <span>✓ A-C</span> </div>      | <br><div>  <span>✗ B-C-E</span><br/> <span>✓ A-D</span> </div>      | <br>Type F-4-Special-ISO-STANDARD<br><br><br><br>Type F-5-ISO-STANDARD<br><br> |
|    | <br><div>  <span>✗ C-D</span><br/> <span>✓ A-B-E</span> </div>      | <br><div>  <span>✗ B-D</span><br/> <span>✓ A-C-E</span> </div>      | <br><div>  <span>✗ B-E</span><br/> <span>✓ A-C-D</span> </div>      | <br><div>  <span>✗ C-E</span><br/> <span>✓ A-B-D</span> </div>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|   | <br><div>  <span>✗ D</span><br/> <span>✓ A-E + B-C</span> </div> | <br><div>  <span>✗ B</span><br/> <span>✓ A-C + D-E</span> </div> | <br><div>  <span>✗ E</span><br/> <span>✓ A-D + B-C</span> </div> | <br><div>  <span>✗ C</span><br/> <span>✓ A-B + D-E</span> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|  | <br><div>  <span>✗ D-E</span><br/> <span>✓ A-B-C</span> </div>  | <br><div>  <span>✗ B-C</span><br/> <span>✓ A-D-E</span> </div>  | <br><div>  <span>✗ D-E</span><br/> <span>✓ A-B-C</span> </div>  | <br><div>  <span>✗ B-C</span><br/> <span>✓ A-D-E</span> </div>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|  | <br><div>  <span>✗ E</span><br/> <span>✓ A-B-C-D</span> </div>  | <br><div>  <span>✗ C</span><br/> <span>✓ A-B-D-E</span> </div>  | <br><div>  <span>✗ D</span><br/> <span>✓ A-B-C-E</span> </div>  | <br><div>  <span>✗ B</span><br/> <span>✓ A-C-D-E</span> </div>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

 open  
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- France (Lyon/ Bourg-lès-Valence)
- Great Britain (York/Roecliffe)
- Italy (Milan/Caltignaga)
- Poland (Warsaw/Opoczno)
- The Netherlands (Amsterdam)
- Russia (St. Petersburg)

### America

- USA (Houston/TX)
- Brazil (São Paulo, Itatiba & Belem)
- Chile (Santiago de Chile)
- Mexico (Mexico-City)
- Peru (Lima)

### Middle East

- Saudi Arabia (Dammam)

### Asia

- China (Taicang)
- South Korea
- Thailand (Rayong)
- Vietnam (Hanoi)

### Africa

- South Africa (Johannesburg)



Detailed addresses  
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