ARMATUREN
free of cavities & maintenance

*engineered.*
*fast.*
*dynamic.*

# Type DBI

## Double Block & Bleed Inspection plug valves



**Product leaflet**

# Type DBI

## Double Block & Bleed Inspection plug valves



- **“double block & bleed” with only one valve**
- **inline bleed inspection**
- **reliable and tight**

**DN 15 - 600 / PN 10 - 100**
**NPS ½ - 24 / Class 150 - 600**
**Range of application:**
**-60 < T < 230/320°C**
**vacuum-capable**

### Design characteristics

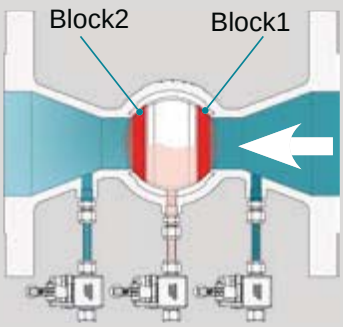
- functionality DIB (double isolation and bleed) acc. to API 6D
- with bleed connection
- suitable for critical service
- adjustable plug in case of leakage
- simple and favourable automation
- Fire-Safe - API 607 / ISO 10497 (externally)
- low fugitive emission in line with TA LUFT, ISO 15848 & API 641 requirements
- long durability

### Options

- vented plug
- customer-specific positioning of the test connections
- automatic thermal relief
- inspection valves

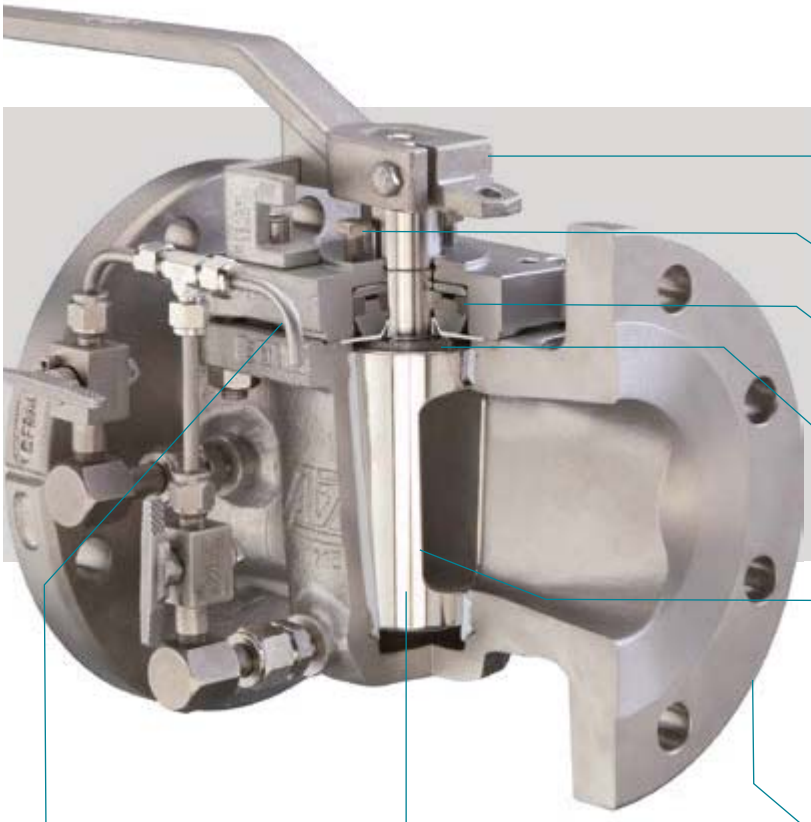
### Functionality

- AZ plug valve with two self-sealing elements block 1 & 2
- closing of the valve, sealing of block 1 & 2
- opening of the bleed valve for tightness-testing
- if necessary, actuation of the inspection valves




PT diagram, plug types, sealing systems, material selection: see catalogue part ENGINEERING

# Complete system with compact dimensions



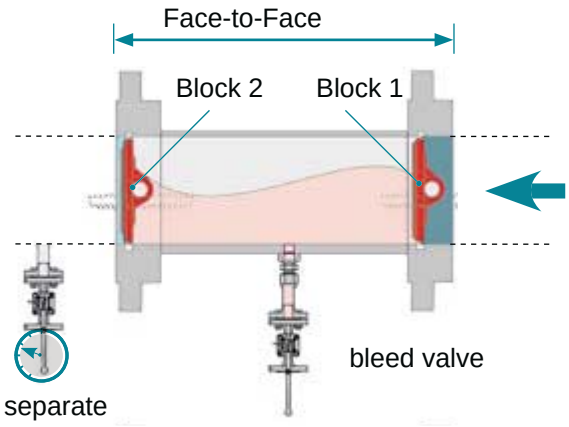
- easy operation with hand lever, gearbox or quarterturn actuator
- Plug adjustment
- Fire-Safe sealing design and other sealing systems
- no media underneath the cover
- plug valve with full bore design (option)



- Bleed inspection without loss of media due to goose neck pipe
- Vented plug prevents pressure build-up due to thermal expansion underneath the plug (optional)
- Compact installation space
  - no double-valve-system required
  - face to face acc. to EN and ASME
  - top-entry access
  - easy accessibility for service

**Technical Comparison type DBI vs butterfly valve with bleed function**

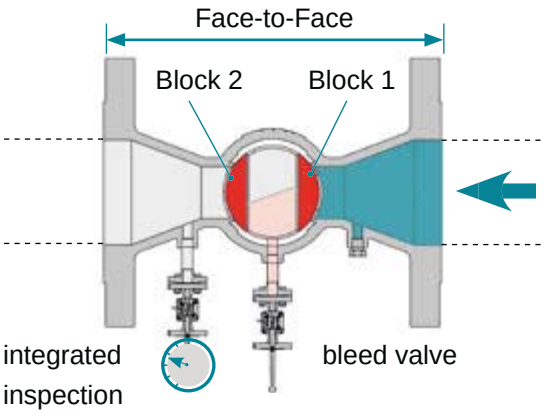
## Installation: butterfly valve unit




**Disadvantages**

- 2 butterfly valves
- 2 separate actuators required
- gauge and bleed valve not integrated in valve body

## Installation: AZ plug valve, type DBI



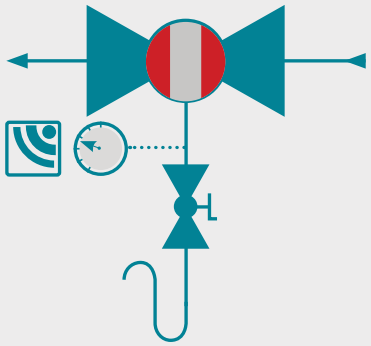

**Advantages**

- compact solution with 1 valve only
- gauge and bleed valve integrated in valve body
- 1 actuator
- easy replacemant of butterfly valve unit

# Type DBI
## Type overview



**Type DBI-B**

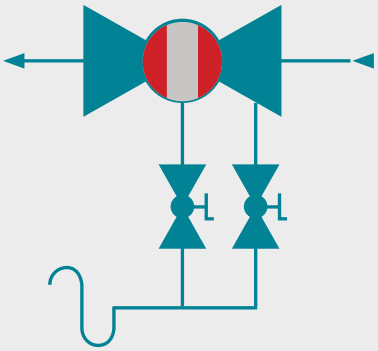


- bleed valve to check tightness when main valve is closed
- bleed outlet standard with “goose neck” pipe

- Accessories
  - manometer/ pressure gauge
  - pressure transmitter
  - valve automation
  - locking device



**Type DBI-B&I**

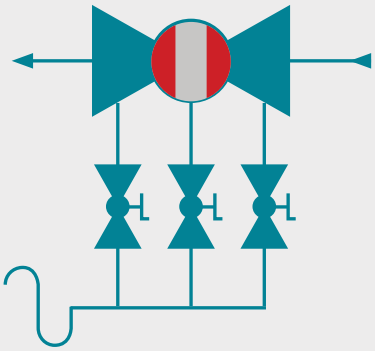


- bleed valve to check tightness when main valve is closed
- inspection valve for inspection and revision services

- Accessories
  - manometer/pressure gauge
  - pressure transmitter
  - valve automation
  - locking device



**Type DBI-B&2I**



- bleed valve to check tightness when main valve is closed
- inspection valve I and II (upstream / downstream) for inspection- and revision services

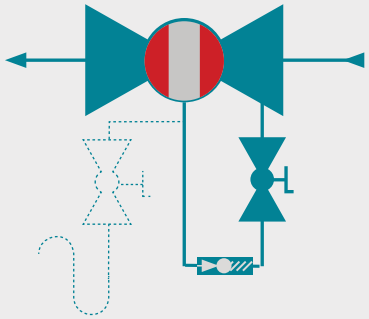
- Accessories
  - manometer/pressure gauge
  - pressure transmitter
  - valve automation
  - locking device

# Type DBI

## Type overview with thermal relief



**Type DBI-TR1**

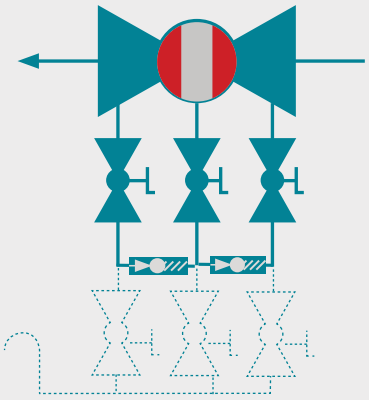


- thermal relief system to prevent pressure build-up due to thermal expansion in the plug
- isolation valve in case of service

- Accessories
  - bleed valve
  - manometer/pressure gauge
  - pressure transmitter
  - valve automation
  - locking device

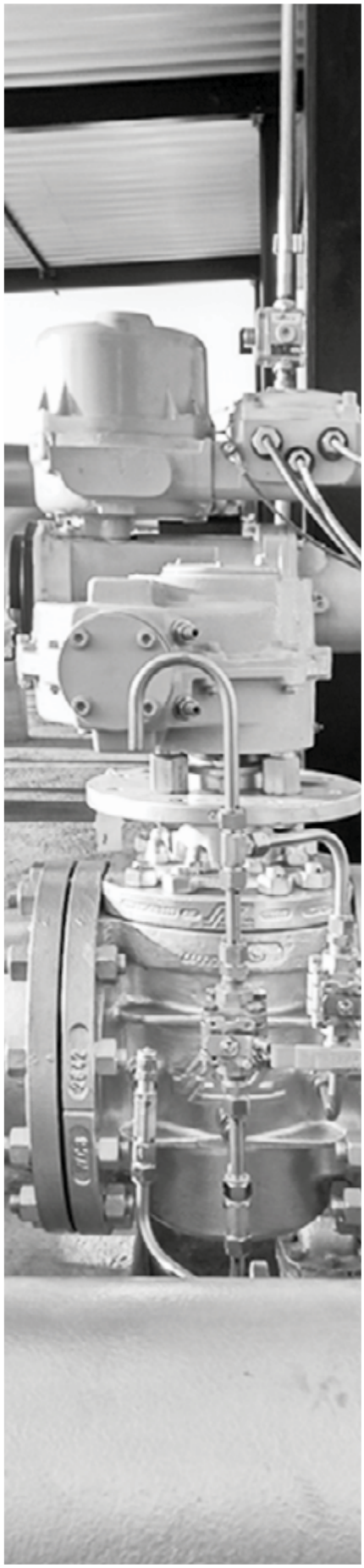


**Type DBI-TR2**



- thermal relief system to prevent pressure build-up due to thermal expansion in the plug and downstream pipeline
- isloation valves in case of service

- Accessories
  - bleed valves
  - inspection valves
  - manometer/pressure gauge
  - pressure transmitter
  - valve automation
  - locking device



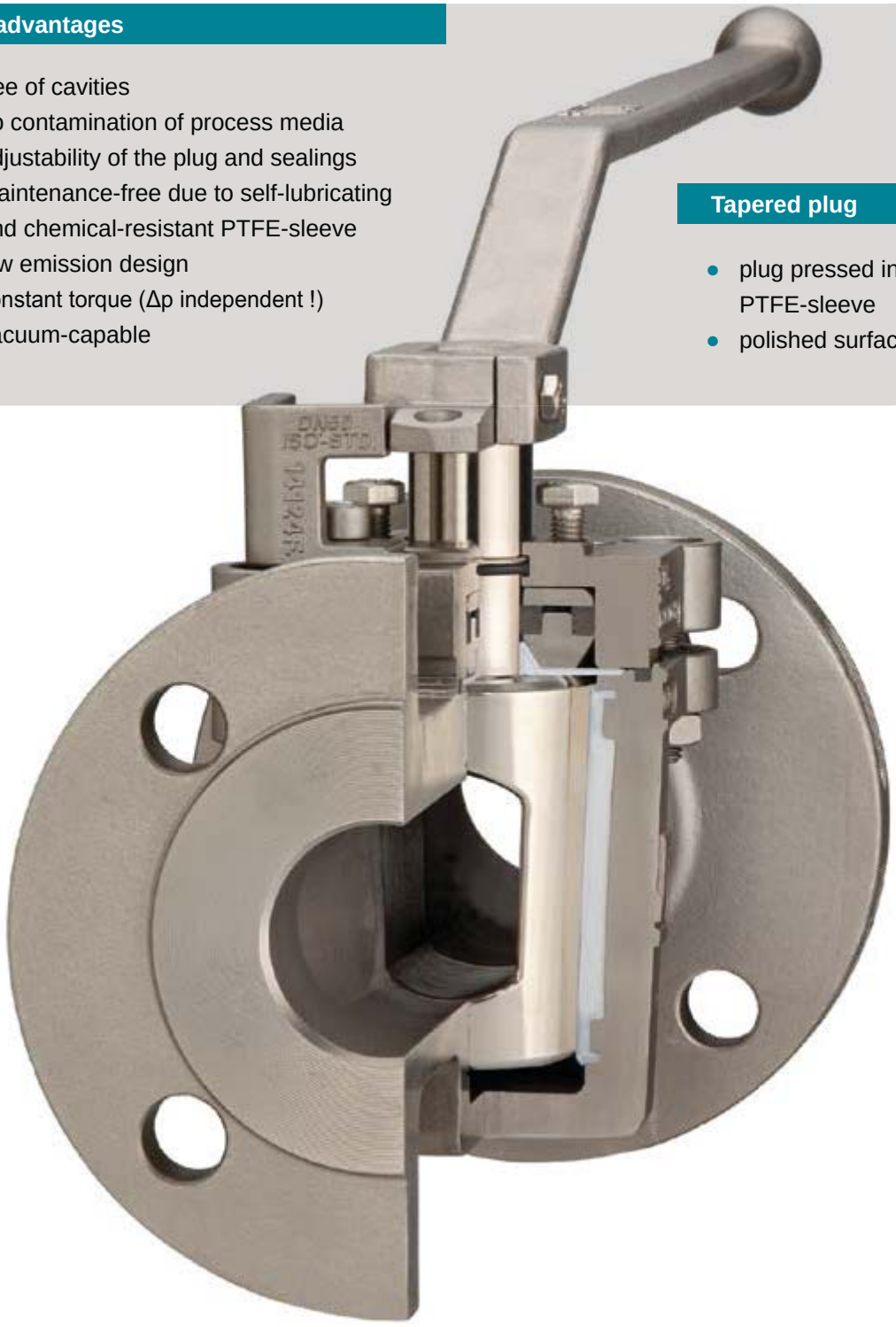
# AZ-plug valve: the design principle

## 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 (Δp independent !)
- vacuum-capable

## Tapered plug

- plug pressed into the PTFE-sleeve
- polished surface



## Body

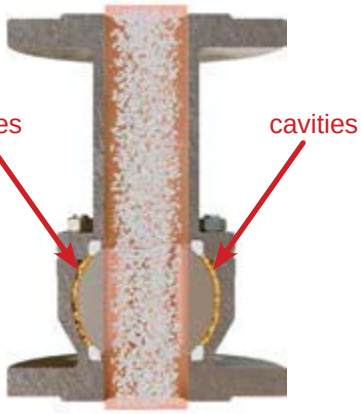
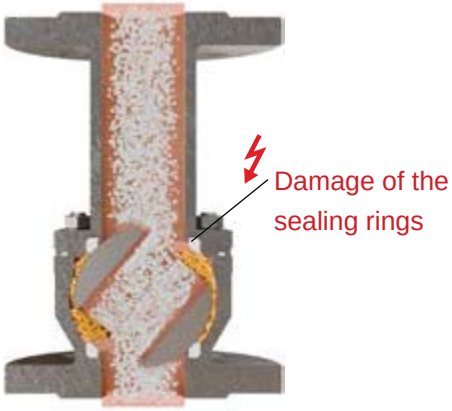
- tapered body interior
- integrated supporting ribs avoid rotation and coldflow of the sleeve
- large sealing surface

## 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 |
|---|---|
| **Soft seated plug valve with PTFE-sleeve**<br><br>**Main sealing components**<br>• metallic plug<br>• sleeve<br><br> | **Soft seated ball valve with PTFE sealing rings, floating ball**<br><br>**Main sealing components**<br>• metallic ball<br>• sealing rings<br><br> |
| **OPEN position** | |
| • suitable for all media due to cavity-free design<br>• sealing surfaces are completely protected<br><br>free of cavities<br> | • critical for the following media due to design with cavities<br>○ corrosives: crevice corrosion<br>○ polymerizing: clogging<br>○ crystallizing: abrasion / clogging<br><br><br>cavities cavities<br> |
| **During operation** | |
| • free of cavities, media cannot settle or be trapped<br>• solids are pushed away<br>• no contamination with old media<br><br> | • with cavities, media can settle or be trapped<br>• solids cause abrasion of the sealing rings<br>• contamination of process media<br><br><br>Damage of the sealing rings |

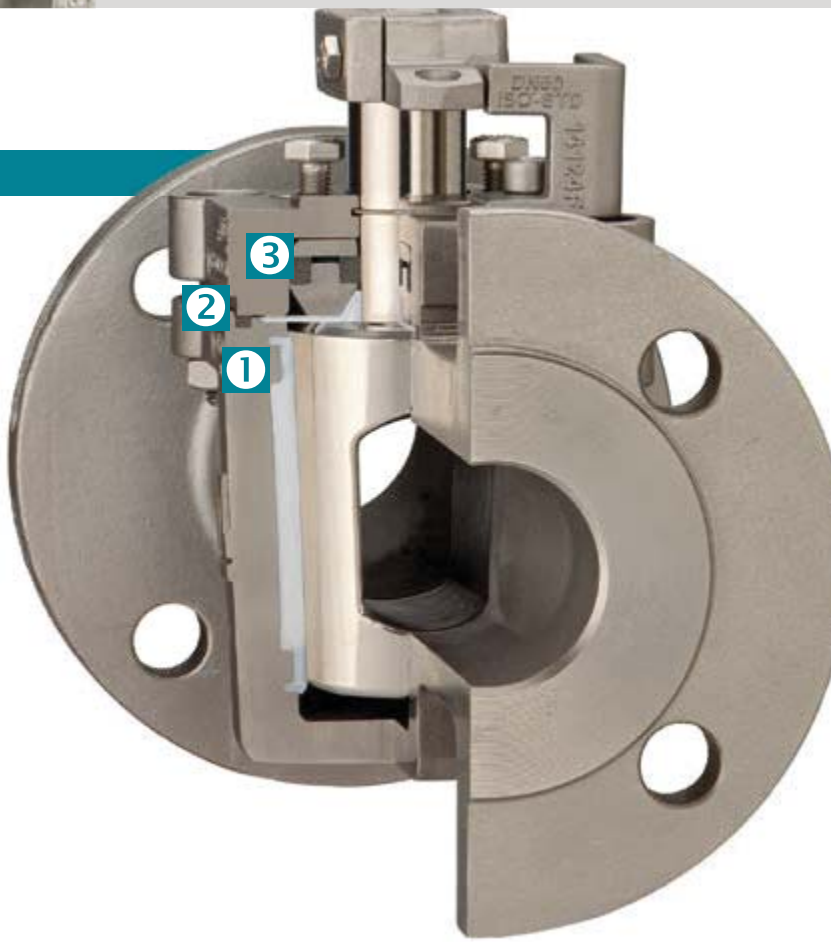
# Safe and reliable tightness for years

## Adjustable



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

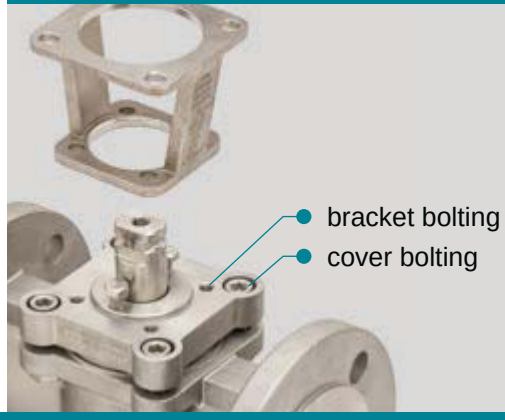
## Several sealings to atmosphere




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



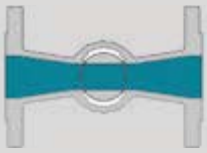

- pressure containing cover bolts separated from bracket boltings
- cover and bracket acc. to ISO 5211 for efficient actuator / gearbox assembly

# Reduced and full bore design

## Execution

**Reduced bore**
**Type STANDARD**

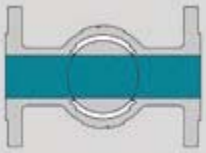
- compact valve (FF / weight)
- optimal torques for economic automation





**Full round bore**
**Type EXTRA**

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



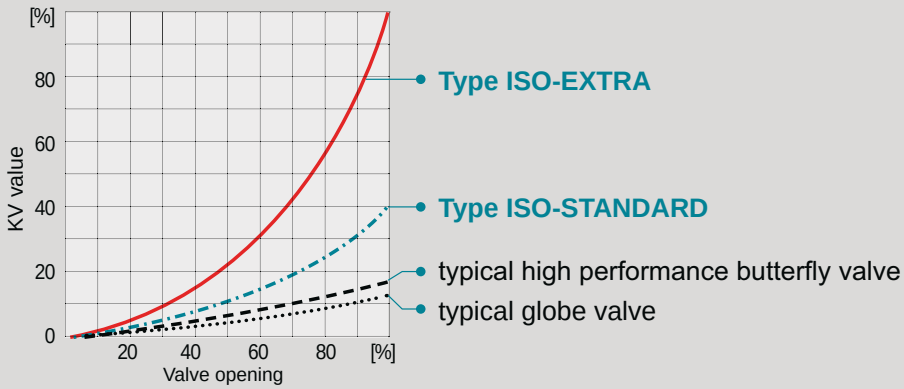


## Type ISO-EXTRA

- 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



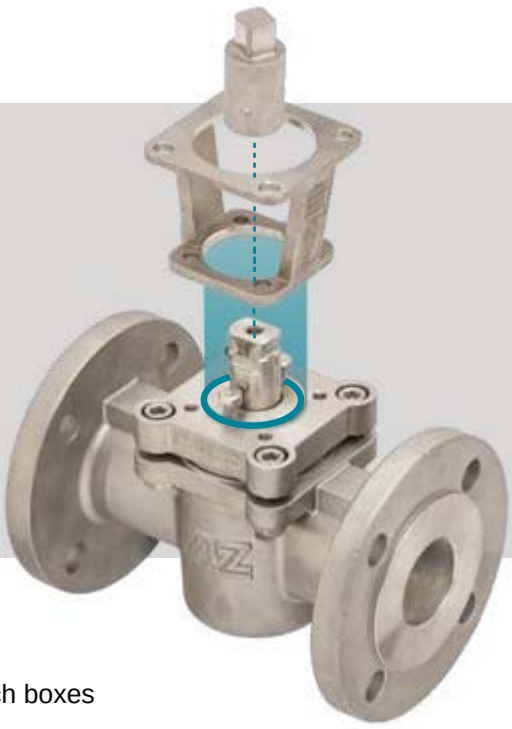
## High and low temperature

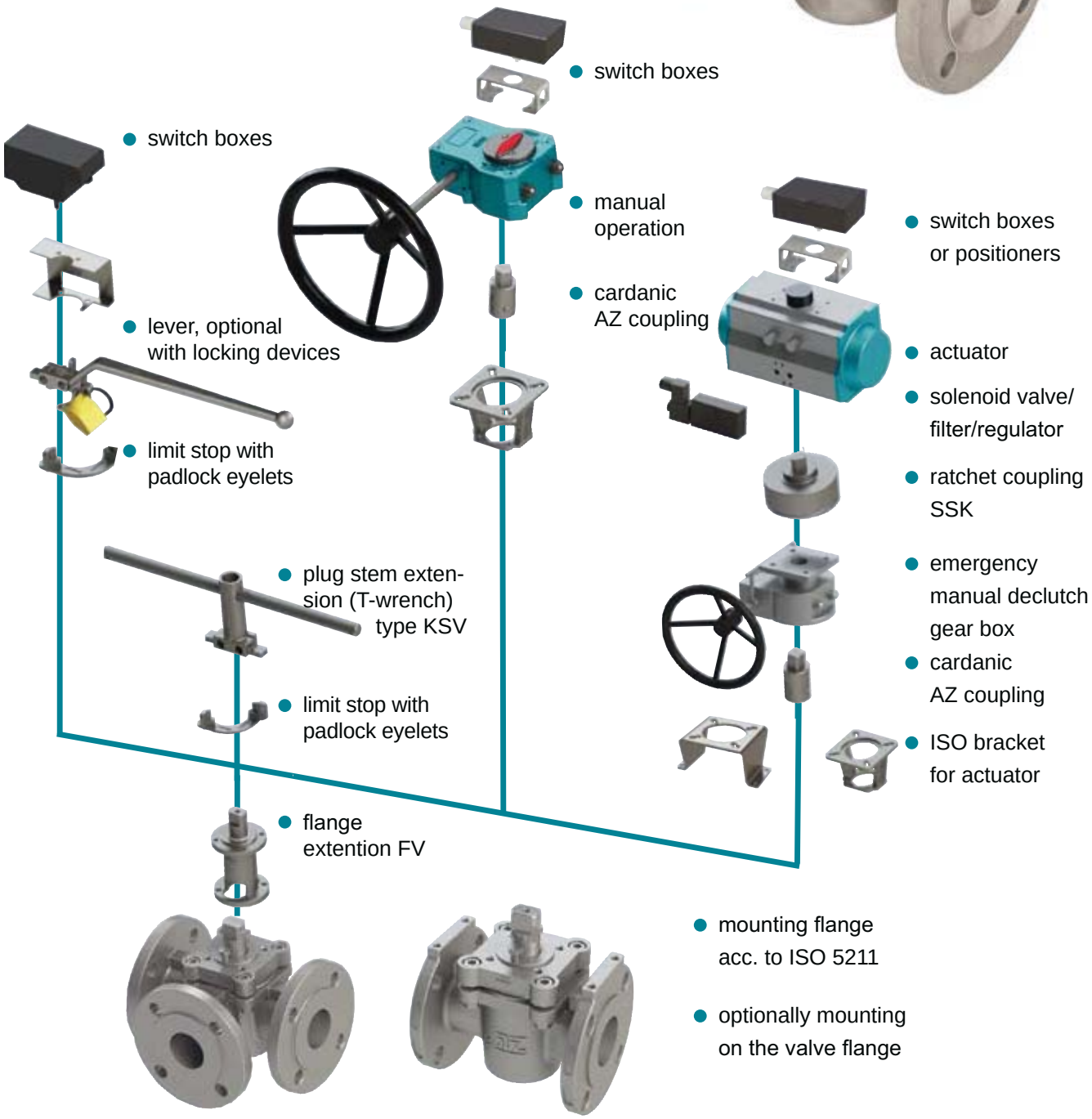
- extended bonnet with sealing at the top
- stem extension for insulated valves

# 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





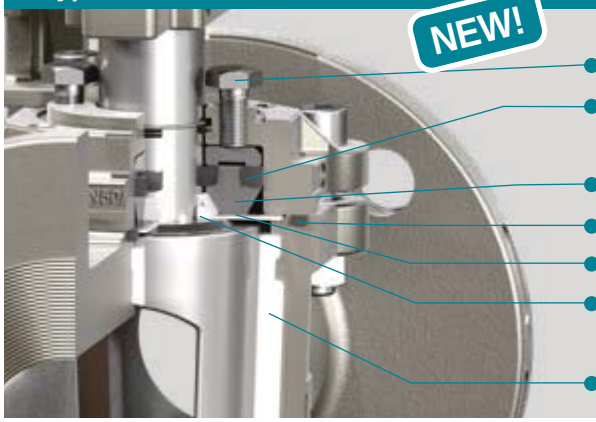
# Cover and stem sealing systems suitable for general applications

## 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)




- 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




- 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

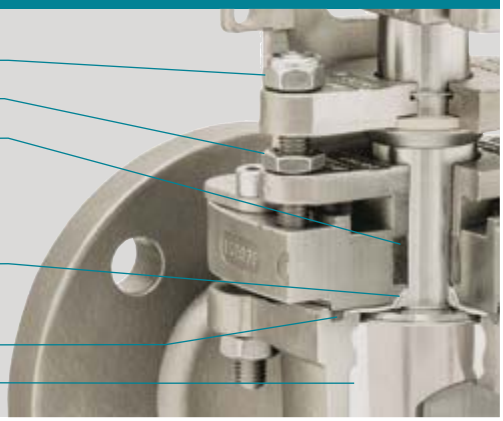
engineered.
fast.
dynamic.

## Type FSN — Fire-Safe-sealing (API 607)

plug adjustment
triple safety stem packing adjustment
**Tertiary sealing**: triple safety stem packing (graphite)

**Secondary sealing**:
V-diaphragm (PTFE) and delta thrust collar (PTFE)

cover sealing (graphite)
**Primary sealing**: sleeve*



## Type FSN-EF — Fire-Safe-sealing (API 607)

NEW!

Emission Free

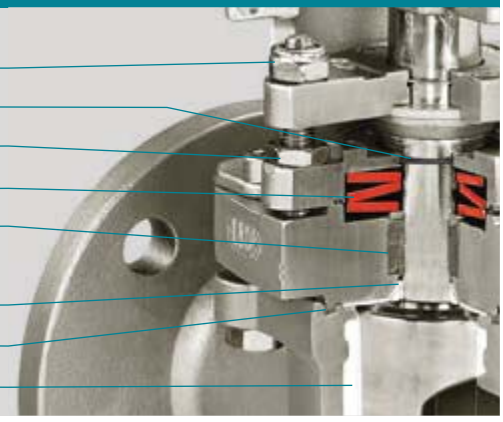
plug adjustment
triple safety stem packing adjustment
**Quaternary sealing:** three o-rings at the stem
**Tertiary sealing**:
triple safety stem packing
**Secondary sealing**:
V-diaphragm (PTFE) and delta thrust collar (PTFE)
cover sealing (graphite)
**Primary sealing**: sleeve*



## Type FSN-SL — Fire-Safe-sealing (API 607)

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 (graphite)
**Secondary sealing**:
V-diaphragm (PTFE) and delta thrust collar (PTFE)
cover sealing (graphite)
**Primary sealing**: sleeve*



*) 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



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

NEW!



# 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** |
| **Carbon Steel / Ductile Iron** | | | | | | | |
| 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 |
| **Stainless Steel** | | | | | | | |
| 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 |
| **Nickel Alloy** | | | | | | | |
| | 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 |
| **Other Material Groups** | | | | | | | |
| 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.

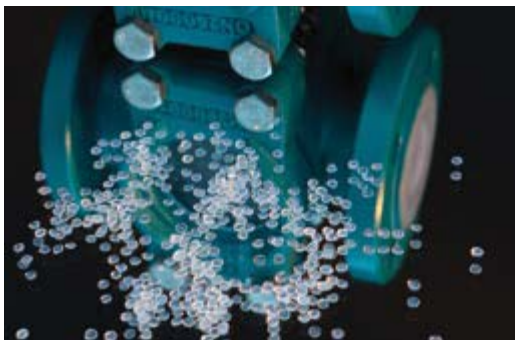
Other materials on request.

# Sleeve materials / Lining materials



| Type | UHMW-PE | PFA | PTFE, virgin | PTFE, glass | PTFE, graphite | TFM | PTFE-P |
|---|---|---|---|---|---|---|---|
| $T_{max}$ | 80°C / 176°F | 200°C / 392°F | 230°C / 446°F | 230°C / 446°F | 250°C / 482°F | 250°C / 482°F | 320°C / 608°F |

| Category | Sleeve Material | Characteristics | Typical applications | $T_{MAX}$ |
|---|---|---|---|---|
| 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 resistent, abrasive application | 80°C / 176°F |



| Combination of linings | | |
|---|---|---|
| body lining | plug lining | $T_{max}$ |
| PFA | PTFE [1]) or special materials | 210°C / 410°F |
| PFA | PFA | 200°C / 392°F |
| PFA conductive | PFA conductive | 125°C / 256°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 200°C / 392°F (sleeved valve) respectively 150°C / 302°F (lined valve), valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of material and sealing system.

# Torques: Factors for different material combinations and sealing systems

## Torque for actuator sizing

- Torque values for actuator sizing can be found in the tables of each valve model. These values apply for the sealing systems STANDARD, CA2 as well as FS2 and are based on virgin PTFE sleeve material.
- For other sealing systems, sleeve materials and material combinations, different factors apply as per charts below.
- The given torque values are based on long term records and experimental results. Please consult manufacturer for process media with degreasing effect.

| | Sealing system | | | |
|---|---|---|---|---|
| sleeve materials for plug valves | STANDARD, FS2, CA2 | STANDARD, FS2, CA2 oil and grease-free | CASN, FSN, -SL, -EF | CASN, FSN, -SL, -EF oil and grease-free |
| PTFE, virgin | 1,0 | 1,3 | 1,3 | 1,6 |
| TFM / NXT / M111 | 1,1 | 1,4 | 1,4 | 1,7 |
| PTFE-"P" / NFCE / NCS | 1,5 | 1,8 | 1,8 | 2,1 |
| PTFE-Glass | 1,7 | 2,0 | 2,0 | 2,3 |
| PTFE-Graphite | 1,7 | 2,0 | 2,0 | 2,3 |
| PFA | 2,0 | 2,3 | 2,3 | 2,6 |
| UHMW-PE | 2,5 | 2,8 | 2,8 | 3,1 |

| material combinations for linded plug valves | | Sealing system | |
|---|---|---|---|
| Body | plug | CA2A / SAFE-LINED / -SL | CA2A / SAFE-LINED / -SL oil and grease-free |
| PFA | PTFE | according product table ($M_{BT}$ / $M_{1,3}$ / $M_{1,5}$) | 1,3 |
| PFA | PFA | | 1,3 |
| PFA-conductive | PFA-conductive | on request | on request |
| PFA | special material | on request | on request |

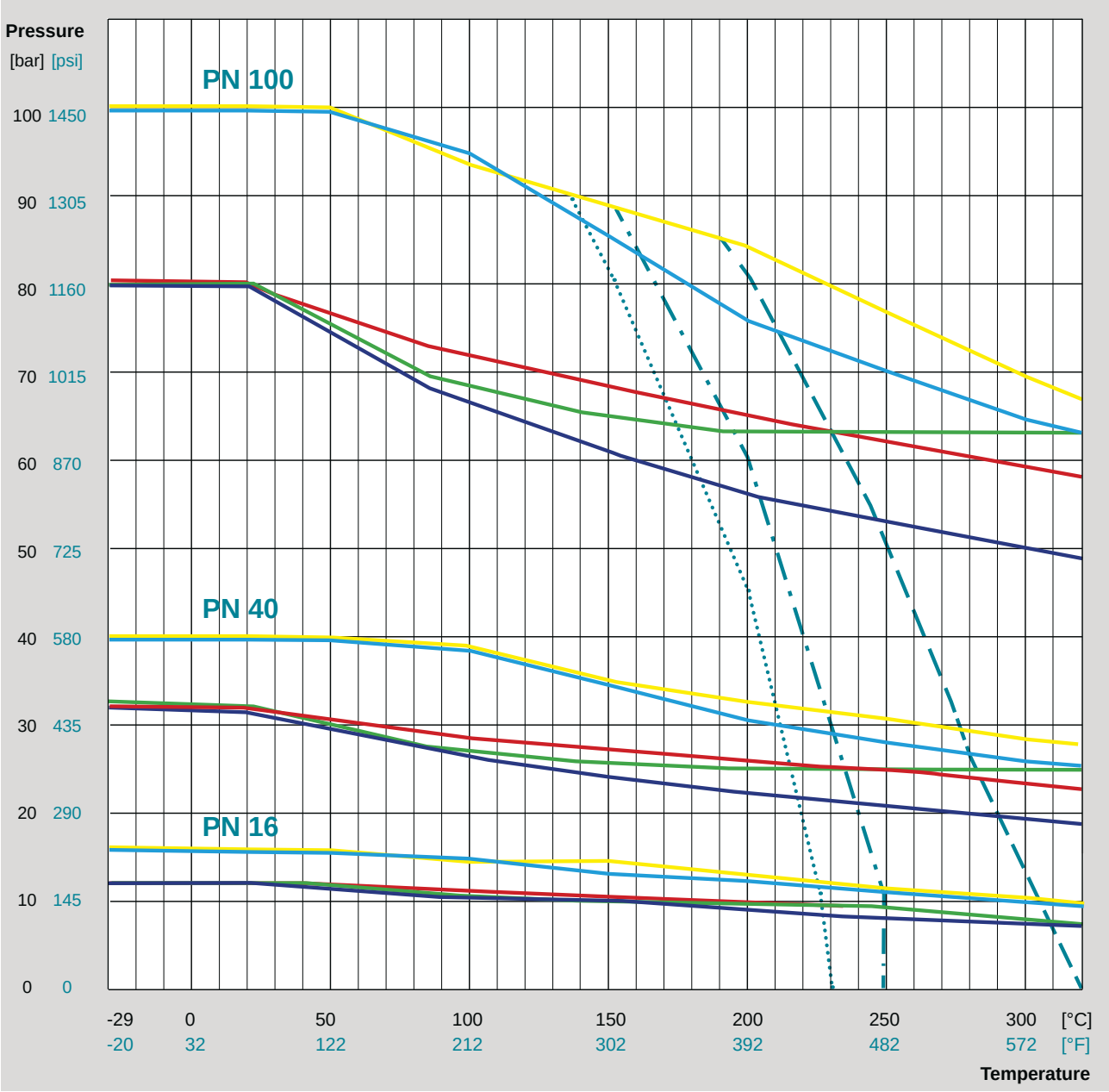
## Sample calculation

**Model F-2 ISO-FS2 - DN50**

- breakaway torque (table column $M_{1,3}$ with 30 % safety on breakaway torque)
- cover and stem sealing system FS2
- sleeve material PTFE-Glass

| | |
|---|---|
| Torque table column $M_{1,3}$ | 137 Nm |
| Factor as per table above | 1,7 |
| **Torque for actuator sizing** | 137 * 1,7 = **233 Nm** |

# 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

Subject to technical change without notice.

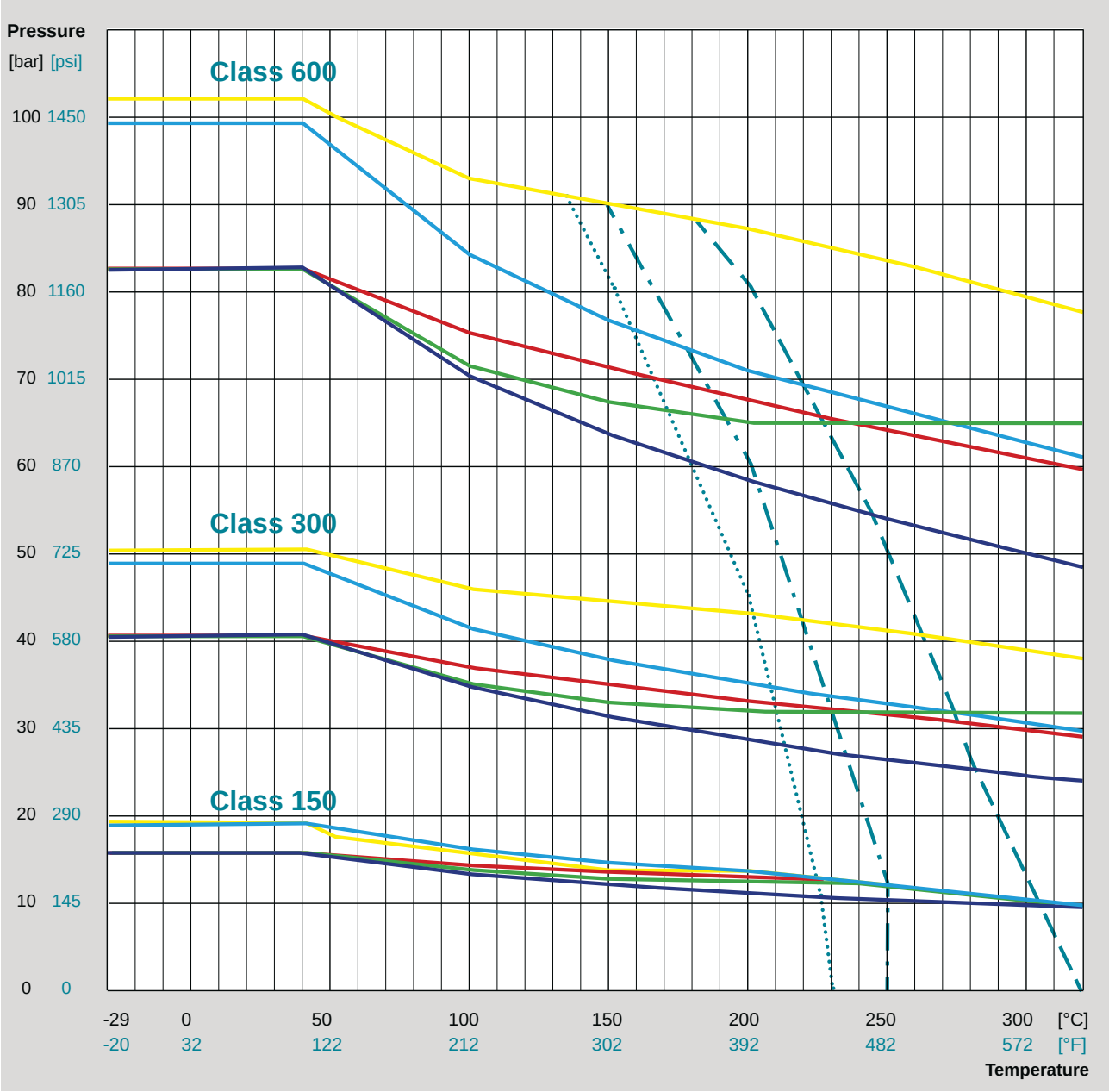
The data given are max. values according to EN 12516-1 and EN 1092-1.

**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.

# 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.

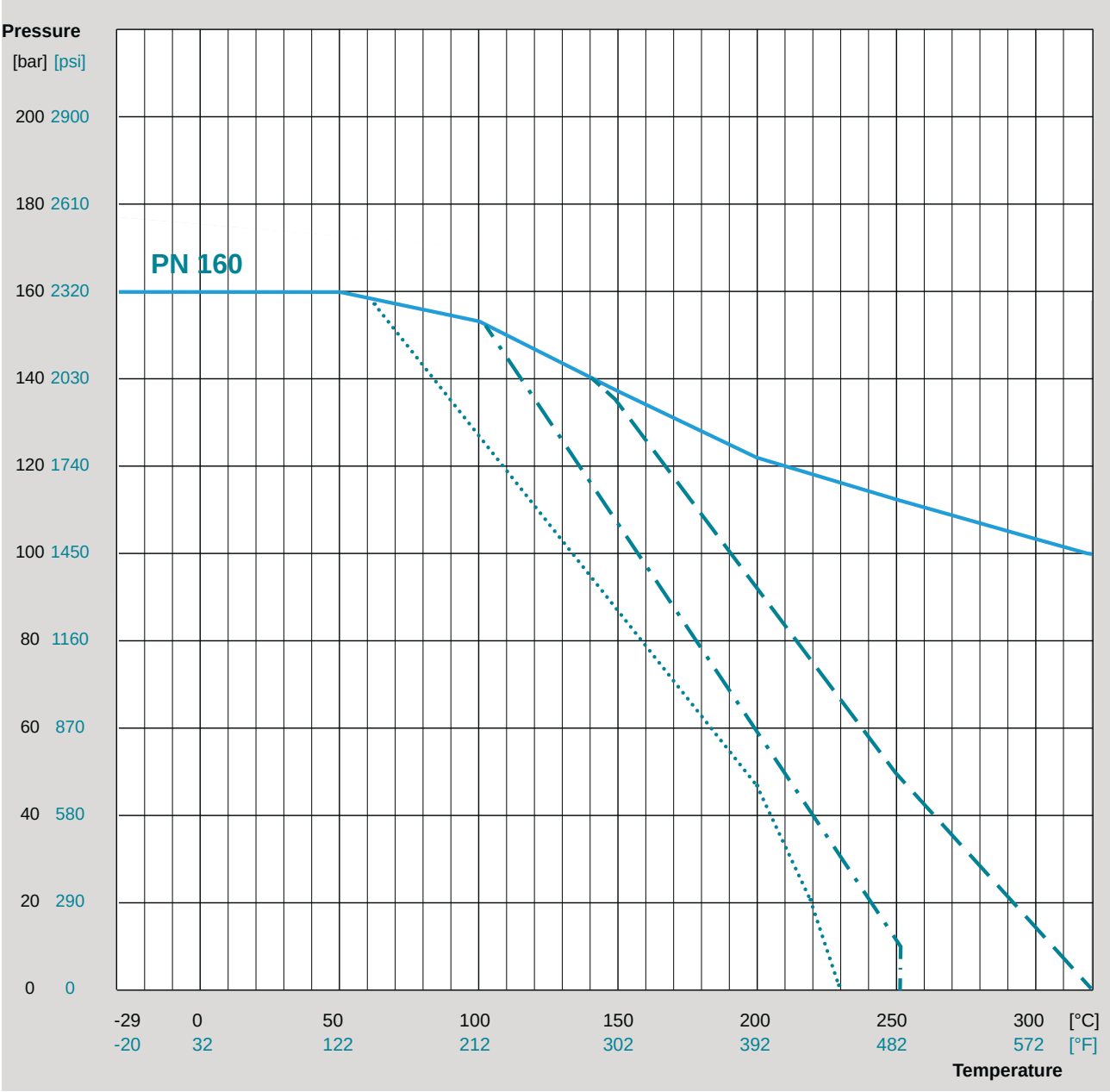
The data given are max. values according to ASME B16.34.

**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

Subject to technical change without notice.

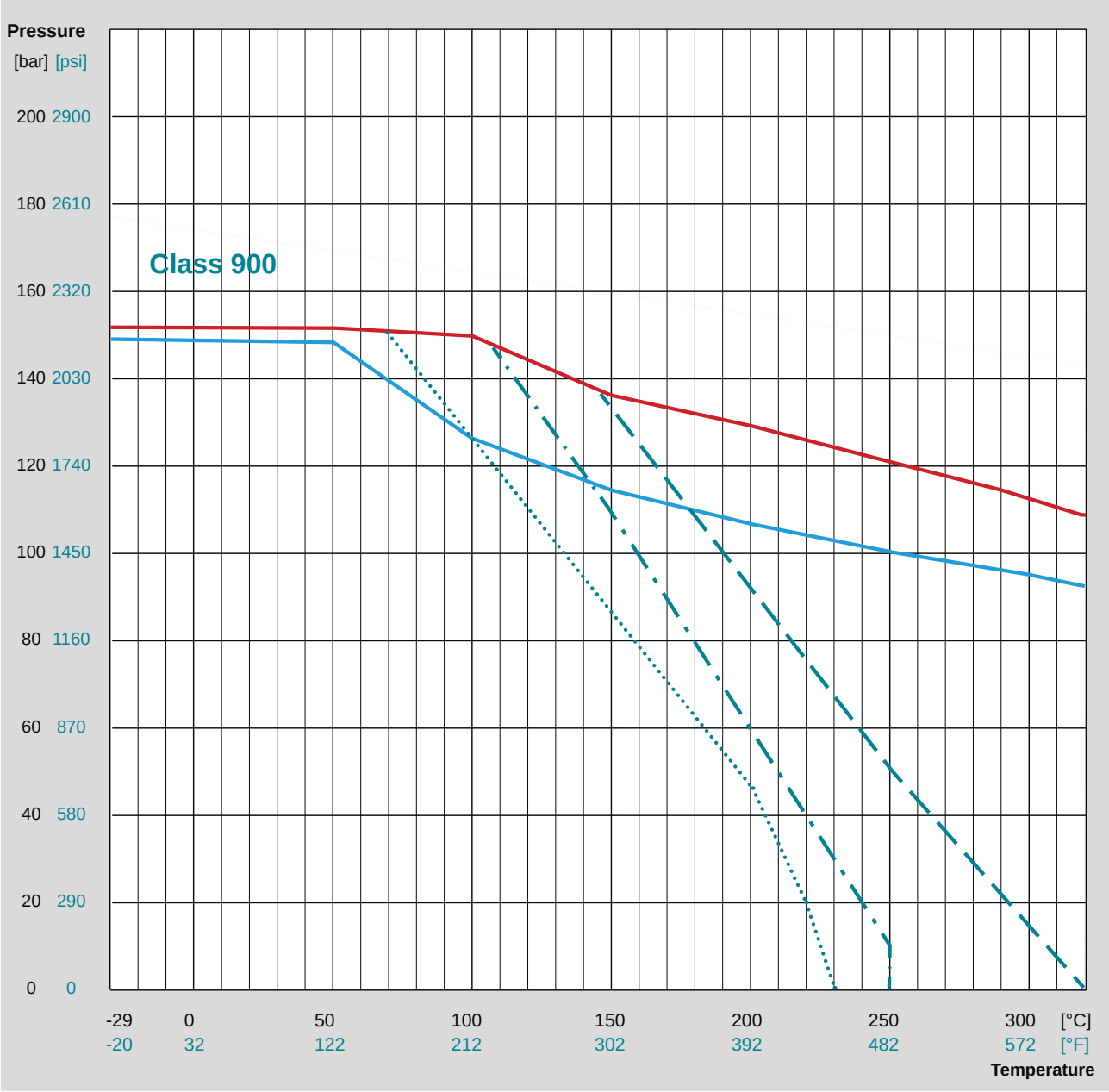
The data given are max. values according to EN 12516-1 and EN 1092-1.

**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.

# 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

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.

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



| Design | STANDARD | EXTRA (full bore) | multiway |
|---|---|---|---|
| Plug type | two-way | two-way | e.g. T4 |

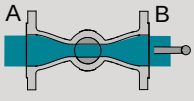
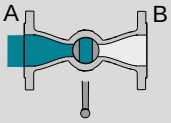
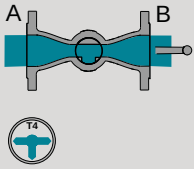
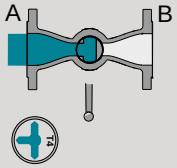
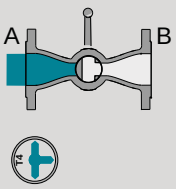


- position indicator for all multi-way valves welded on lever or stem extension
- Lined plug valves: multi-way plugs only with PFA plug lining or made of special materials. Two-way plugs with PTFE lining up to DN 100 / NPS 4 available

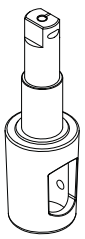
Recommendation for three-way valves type F-3-S with vertical outlet (longer life-time compared to type F-3-W with horizontal outlet)

## Options

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

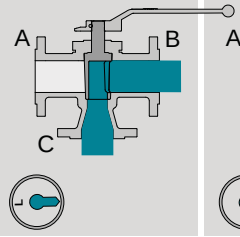
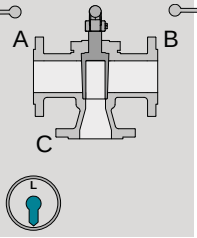
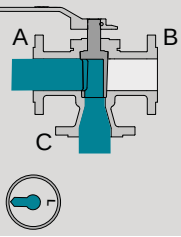
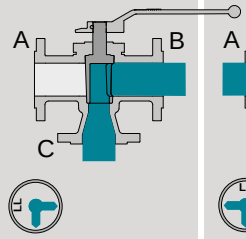
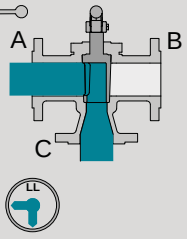
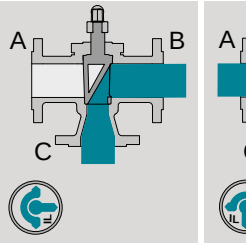
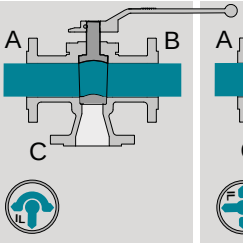
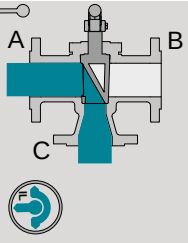
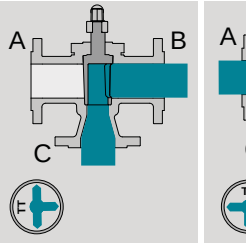
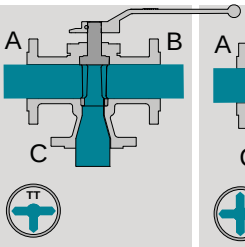
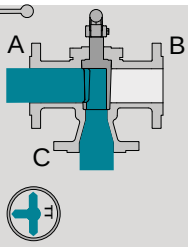
| 2-way | Plug type | Pos. I = 0° | Pos. II = 90° | Pos. III = 180° | Pos. IV = 270° |
|---|---|---|---|---|---|
|  Type F-2-ISO-STANDARD | D  |   |   | | |
|  Type F-2-ISO-STANDARD-A | T4 *  |   |   | |   |

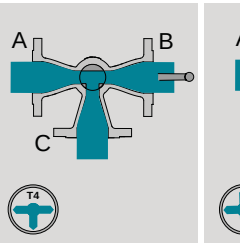
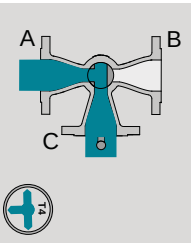
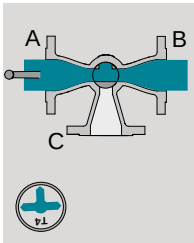
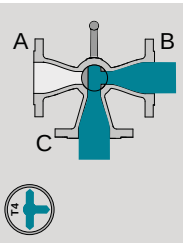
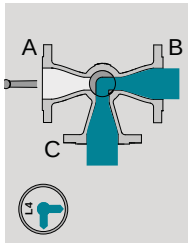
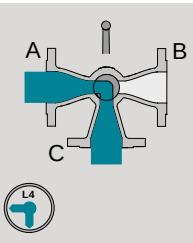
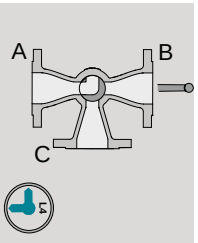
*) For highly expanding media AZ recommends the "i-plug" (relief hole and open plug buttom)



"i-plug"

# 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) |
|---|---|---|---|---|---|
| L |  |  |  | |  Type F-3-S-ISO-STANDARD |
| LL |  |  | | | |
| IL* |  |  |  | |  Type F-3-S-ISO-STANDARD-A |
| TT |  |  |  | | |

| Plug type | Pos. I = 0° | Pos. II = 90° | Pos. III = 180° | Pos. IV = 270° | 3-way (horizontal) |
|---|---|---|---|---|---|
| T4 |  |  |  |  |  Type **F-3-W-ISO-STANDARD** |
| L4 |  |  |  | |  Type **F-3-W-ISO-STANDARD-A** |

*) 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

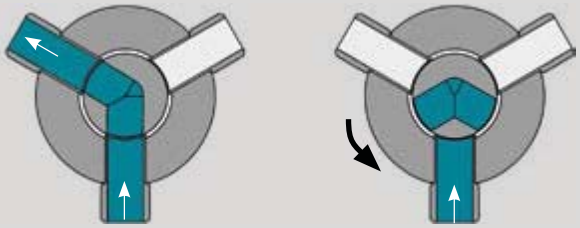
transflow design

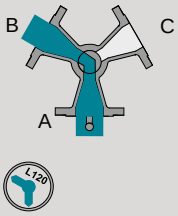
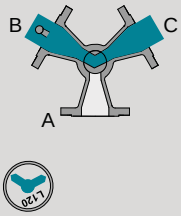
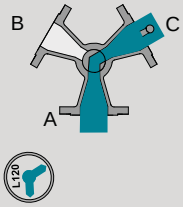


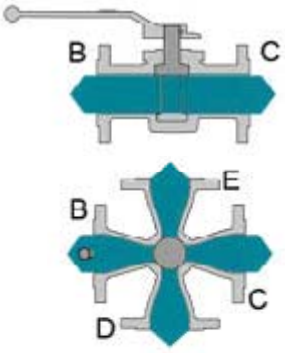
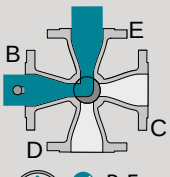
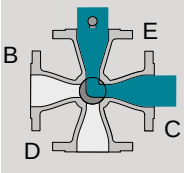
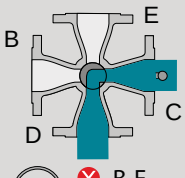
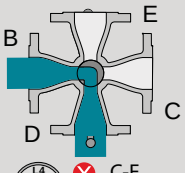
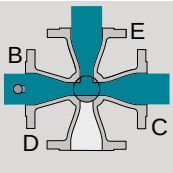
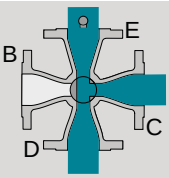
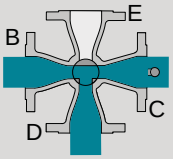
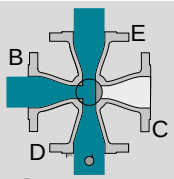
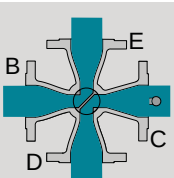
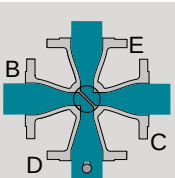
### 3-way (120°) type 3-WP-120

- with positive overlap
- flow interruption / isolation

positive overlap



| 3-way (120°) | Plug type | Pos. I = 0° | Pos. II = 120° | Pos. III = 240° | |
|---|---|---|---|---|---|
|  | L120  |  |  |  | |

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

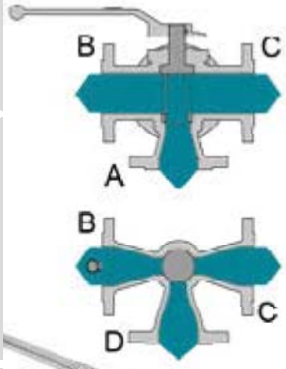
open
closed

# 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 |
|---|---|---|---|---|---|
| L | ✗ C-D-E ✓ A-B | ✗ B-C-D ✓ A-E | ✗ B-D-E ✓ A-C | ✗ B-C-E ✓ A-D | |
| LL | ✗ C-D ✓ A-B-E | ✗ B-D ✓ A-C-E | ✗ B-E ✓ A-C-D | ✗ C-E ✓ A-B-D | |
| IL | ✗ D ✓ A-E + B-C | ✗ B ✓ A-C + D-E | ✗ E ✓ A-D + B-C | ✗ C ✓ A-B + D-E | |
| T | ✗ D-E ✓ A-B-C | ✗ B-C ✓ A-D-E | ✗ D-E ✓ A-B-C | ✗ B-C ✓ A-D-E | |
| TT | ✗ E ✓ A-B-C-D | ✗ C ✓ A-B-D-E | ✗ D ✓ A-B-C-E | ✗ B ✓ A-C-D-E | |

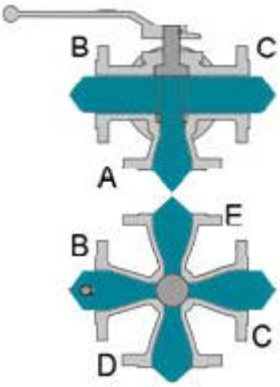


Type F-4-Special-ISO-STANDARD






Type F-5-ISO-STANDARD




✓ open
✗ closed

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