VALVES
free of cavities & maintenance

engineered.
fast.
dynamic.

Type F-2 / F-3 ISO-EXTRA

Plug valves with full bore design

Product leaflet

Type ISO-EXTRA
Full bore plug valves

- **Flange connections**
- **2-way up to 3-way**

DN 15 - 600 / PN 10 - 100
NPS ½ - 24 / Class 150 - 600
(higher pressure: type HDS)
Range of application:
-76 < T < 446°F / 608°F
vacuum-capable

EXTRA design

- minimal pressure drop: K_{Vs}-value similar to straight pipe
- body suitable for abrasive media
- no clogging of crystallizing or polymerizing media

Design characteristics

- easy accessible adjustment of the plug
- PED 2014/68/EU
- low fugitive emission in line with TA LUFT, ISO 15848 & API 641 requirements
- mounting-flange for actuators acc. to ISO 5211
- Fire-Safe - API 607 / ISO 10497
- SIL 3 certified

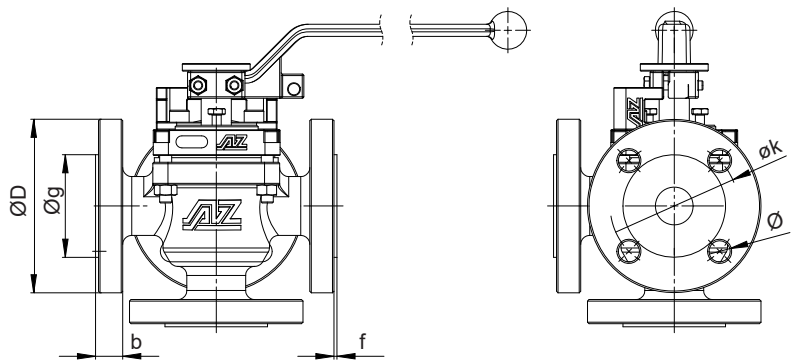
Options

- multiport valves
- heating jacket
- oversize design
- flushing device
- FDA compliant
- painting
- oil and grease-free assembly
- piggable (type ISO-EXTRA-M)

Recommendation for high torques:
AZ actuator **Type AIR-GEAR**

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

Flange dimensions acc. to ASME



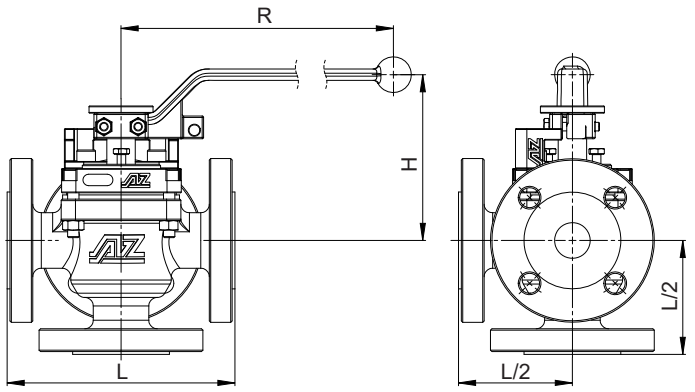
ASME B16.5

NPS	Class	flange bore øD [mm] [Inch]	øk [mm] [Inch]	no.	ø [mm] [Inch]	øg [mm] [Inch]	b [mm] [Inch]	f [mm] [Inch]
½	150	90 3.54	60,3 2.37	4	15,7 5/8	34,9 1.37	10,0 0.39	2 0.079
	300	95 4.60	66,7 2.63				14,7 0,58	
¾	150	100 3.94	69,9 2.75	4	15,7 5/8	42,9 1.69	10,9 0,43	2 0.079
	300	115 7.10	82,6 3.25		19,1 3/4		16,3 0,64	
1	150	110 7.90	79,4 3.13	4	15,7 5/8	50,8 2.00	11,6 0.46	2 0.079
	300	125 4.92	88,9 3.50		19,1 3/4		17,9 0.52	
1¼	150	115 4.53	88,9 3.50	4	15,7 5/8	63,5 2.50	13,2 0.52	2 0.079
	300	135 5.31	98,4 3.87		19,1 3/4	63,5 2.50	19,5 0.77	
1½	150	125 4.92	98,4 3.87	4	15,7 5/8	73,0 2,87	14,7 0.58	2 0.079
	300	155 6.10	114,3 4.50		22,3 7/8	73,0 2,87	21,1 0.89	
2	150	150 5.91	120,7 4.75	4	19,1 3/4	92,1 3.63	16,3 0.64	2 0.079
	300	165 6.50	127,0 5.00	8	19,1 3/4	92,1 3.63	22,7 0.89	
2½	150	180 7.09	139,7 5.50	4	19,1 3/4	104,8 4.13	17,9 0.70	2 0.079
	300	190 7.48	149,3 5.88	8	22,3 7/8	104,8 4.13	25,9 1.02	
3	150	190 7.48	152,4 6.00	4	19,1 3/4	127,0 5.00	19,5 0.77	2 0.079
	300	210 8.27	168,3 6.63	8	22,3 7/8	127,0 5.00	29,0 1.14	
4	150	230 9.06	190,5 7.50	8	19,1 3/4	157,2 6.19	24,3 0.96	2 0.079
	300	255 10.04	200,0 7.87		22,3 7/8	157,2 6.19	32,2 1.27	

NPS	Class	flange bore øD [mm] [Inch]	øk [mm] [Inch]	no.	ø [mm] [Inch]	øg [mm] [Inch]	b [mm] [Inch]	f [mm] [Inch]
5	150	255 10.04	215,9 8.50	8	22.3 7/8	185,7 7.31	24,3 0.96	2 0.079
	300	280 11.02	235,0 9.25				35,4 1.39	
6	150	280 11.04	241,3 9.50	8	22.3 7/8	215,9 8.50	25,9 1.02	2 0.079
	300	320 12.06	269,9 10.63	12			37,0 1.46	
8	150	345 13.58	298,5 11.75	8	22.3 7/8	269,9 10,63	29,0 1.14	2 0.079
	300	380 14.96	330,2 13.00	12	25,4 1		41,7 1.64	
10	150	405 15.94	362,0 14.25	12	25.4 1	323,8 12.75	30,6 1.20	2 0.079
	300	445 17.52	387,4 15.25	16	28,4 1 1/8		48,1 1.89	
12	150	485 19.09	431,8 17.00	12	25.4 1	381,0 15.00	32,2 1.27	2 0.079
	300	520 20.47	450,8 17.75	16	31,7 1 1/4		51,3 2.02	
14	150	535 21.06	476,3 18.75	12	28,4 1 1/8	412,8 16.25	35,4 1.39	2 0.079
	300	585 23.03	514,4 20.25	20	31,7 1 1/4		54,4 2.14	
16	150	595 23.43	539,8 21.25	16	28,4 1 1/8	469,9 18.50	37,0 1.46	2 0.079
	300	650 25.59	571,5 22.75	20	35,0 1.38		57,6 2.27	
18	150	635 25.00	577,9 22.75	16	31,8 1 1/4	533,4 21.00	40,1 1.58	2 0.079
	300	710 27.95	628,6 24.75	24	35,0 1 3/8		60,8 2.39	
20	150	700 27.56	635 25.00	20	31,8 1 1/4	584,2 23.00	43,3 1.70	2 0.079
	300	775 30.51	685,8 29.50	24	35,0 1 3/8		64 2.52	
24	150	815 32.09	749,3 29.50	20	35,0 1 3/8	692,2 27.25	48,1 1.89	2 0.079
	300	915 36.02	812,8 32.00	24	41,1 1 5/8		70,3 2.77	

Type F-2 / F-3 ISO-EXTRA

Technical information NPS ½ - 1½



	NPS	Class	L [mm] [Inch]	L/2 [mm] [Inch]	R [mm] [Inch]	H [mm] [Inch]	AZ flange type	SW [mm] [Inch]	torque** [Nm] [ft lb]	weight [kg] [ib]	F-2 K_{VS} [m³/h]	F-2 C_V [US.gal/min]	F-3-S (L) K_{VS} [m³/h]	F-3-S (L) C_V [US.gal/min]	F-3-W (L4) K_{VS} [m³/h]	F-3-W (L4) C_V [US.gal/min]
ASME B16.10 / ISO 5211	½	150	108 4.25	54 2.13	200 7.87	102,5 4.04	F05	11 0.433	30 22	4,5 10	20	23	*	*	*	*
		300	140 5.51	70 2.76						6,7 15	18	21	*	*	*	*
	¾	150	117 4.60	58,5 2.30	200 7.87	102,5 4.04	F05	11 0.433	30 22	5,2 12	41	48	*	*	*	*
		300	152 5.98	76 2.99						6,7 15	36	42	*	*	*	*
	1	150	160/176 6.30/6.93	80 3.15	320 12.60	119 4.69	F07	14 0.551	80 59	7,3 16	70	81	20	24	22	25
		300	230/190 9.05/7.48	115 4.43						8,2 18	53	62	20	23	21	24
	1¼	150	180/222 7.09/8.74	90 3.54	420 16.54	137 5.39	F07	19 0.748	140 103	* *	113	130	34	39	36	42
		300	260/241 10.24/9.49	130 5.12						* *	95	110	33	38	35	41
	1½	150	200 7.87	100 3.94	420 16.54	145 5.71	F10	22 0.866	240 177	17,5 39	193	223	58	61	57	66
		300	260 10.24	130 5.12						18,2 40	170	196	52	60	57	66

*) on request

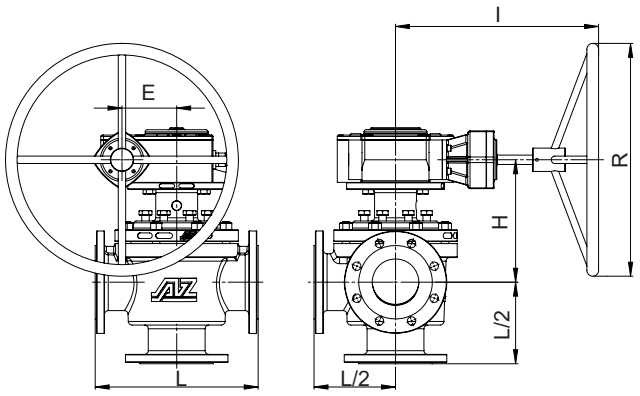
**) manufacturer recommended sizing torque (incl. 100% safety)

K_{VS} [m³/h] / C_V [US.gal/min] values determined by flow simulation (VDO/VDE 2173, (medium = water 20°C, pressure loss Δp = 1 bar)

Some designs, sizes and/or configurations may be fitted with threaded flange holes.

Type F-2 / F-3 ISO-EXTRA

Technical information NPS 2 - 14



	NPS	Class	L [mm] [Inch]	L/2 [mm] [Inch]	E [mm] [Inch]	R [mm] [Inch]	H [mm] [Inch]	I [mm] [Inch]	gear (pro-Gear)	AZ flange type	SW [mm] [Inch]	torque ** [Nm] [ft lb]	weight [kg] [ib]	F-2 K_{VS} [m³/h]	F-2 C_V [US.gal /min]	F-3-S (L) K_{VS} [m³/h]	F-3-S (L) C_V [US.gal /min]	F-3-W (L4) K_{VS} [m³/h]	F-3-W (L4) C_V [US.gal /min]
ASME B16.10 / ISO 5211	2	150	230 / 222 9.06/8.74	115 4.53	*	300 11.81	195 7.68	240 9.45	Q400-S	F10	22	350 258	34 75	323	374	85	98	90	105
		300	300 / 241 11.81/9.49	150 5.91									37 82	282	327	83	96	89	102
	2½	150	290 / 298 11.42/11.73	145 5.71	*	400 15.75	243 9.57	265 10.43	Q800-S	F12	22	500 369	40 88	569	658	143	166	154	179
		300	290 / 330 11.42/12.99										43 95						
	3	150	310 / 343 12.20/12.50	155 6.10	*	400 15.75	243 9.57	265 10.43	Q800-S	F14	27	600 443	56 123	947	1095	222	257	233	269
		300	310/397 12.20/15.63										60 123						
	4“	150	350 / 432 13.78/17.00	175 6.89	137.5 5.41	600 23.62	270 10.63	365 14.37	Q6500-S	F16	55	2000 1,475	* *	1446	1672	338	391	360	416
		300	430 /457 16.93/18.00	215 8.46									* *	1317	1522	335	384	358	414
	6	150	480/546 18.90/21.50	240 9.45	137.5 5.41	600 23.62	315 12.40	365 14.37	Q6500-S	F25	□55	4000 2,950	191 421	3338	3859	781	903	820	948
		300	550 / 559 21.65/22.00	275 10.83									210 463	3155	3647	768	888	815	943
	8	150	600 / 622 23.62/24.50	300 11.81	180 7.09	700 27.56	355 13.98	520 20.47	Q12000-S	F25	□55	6500 4,794	314 692	6362	7356	1385	1601	1470	1699
		300	650 / 686 25.60/27.00										* *	6108	7062	1388	1605	1466	1695
	10	150	730 / 660 28.74/28.98	365 14.37	180 7.09	700 27.56	385 15.16	520 20.47	Q12000-S	F30	□75	8500 6,269	* *	10344	11959	1934	2235	2299	2658
		300	775 / 826 30.51/32.52										544 1199	9933	11483	1941	2244	2327	2690
	12	150	850 / 762 33.46/30.00	425 16.73	252,5 9.94	700 27.56	460 18.11	600 23.62	Q24000-S	F30	□75	19500 14,382	924 2037	15317	17708	3064	3543	3308	3825
		300	850 / 965 33.46/39.00										963 2123						
	14	150	980 38.58	490 19.29	252,5 9.94	700 27.56	495 19.49	600 23.62	Q32000-S	F30	□75	25000 221,000	* *	21194	24503	4285	4954	4545	5255
		300																	

*) on request

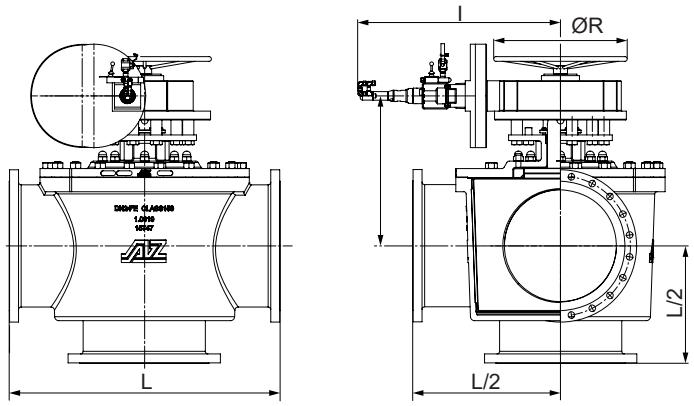
**) manufacturer recommended sizing torque (incl. 100% safety)

K_{VS} [m³/h] / C_V [US.gal/min] values determined by flow simulation (VDO/VDE 2173, (medium = water 20°C, pressure loss Δp = 1 bar)

Some designs, sizes and/or configurations may be fitted with threaded flange holes.

Type F-2 / F-3-EXTRA - FSN

Technical information NPS 16 - 24



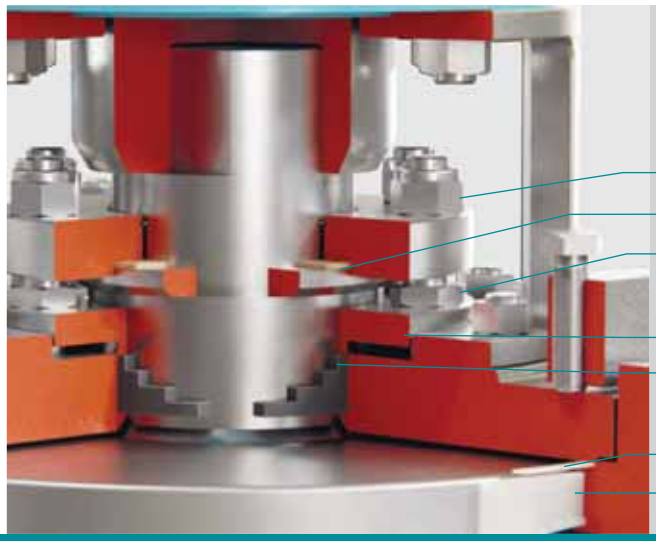
ASME B16.10 / ISO 5211	NPS	Class	L [mm] [Inch]	L/2 [mm] [Inch]	R [mm] [Inch]	H [mm] [Inch]	I [mm] [Inch]	gear type	AZ flange	torque ** [Nm] [ft lb]	weight [kg] [lb]	F-2 K_{VS} [m³/h]	F-2 C_V [US.gal/ min]	F-3-S (L) K_{VS} [m³/h]	F-3-S (L) C_V [US.gal/ min]	F-3-W (L4) K_{VS} [m³/h]	F-3-W (L4) C_V [US.gal/ min]
	16	150/300	838 33.00	550 21.65	700 27.56	535 21.06	600 23.62	Q 32000-S	F35	29000 21,379	1438 3,170	32823	37947	5638	6518	5991	6927
	18	150/300	1200 47.24	600 23.62	700 27.56	620 24.41	600 23.62	Q 50000-S	F40	31000 22,864	2242 4,943	37078	42866	7067	8170	7667	8864
	20	150/300	991 39.00	625 24.60	700 27.56	640 25.20	740 29.13	Q 50000-S	F40	33000 24,340	2382 5,251	54544	63058	8996	10400	9495	10977
	24	150/300	1450 57.09	725 28.54	**	**	**	**	F48	**	**	71301	82431	12489	14439	13439	15537

*) on request

**) manufacturer recommended sizing torque (incl. 100% safety)

K_{VS} [m³/h] / C_V [US.gal/min] values determined by flow simulation (VDO/VDE 2173, (medium = water 20°C, pressure loss Δp = 1 bar)

Some designs, sizes and/or configurations may be fitted with threaded flange holes.



Safety sealing type FSN (Fire-Safe Design API 607) from NPS 16 in series !

- plug adjustment
- adjusting ring
- stuffing box adjustment
- thrust collar
- graphite packing
- cover sealing
- PTFE-sleeve

Engineering

Design
- free of cavities, adjustability, modular concept options

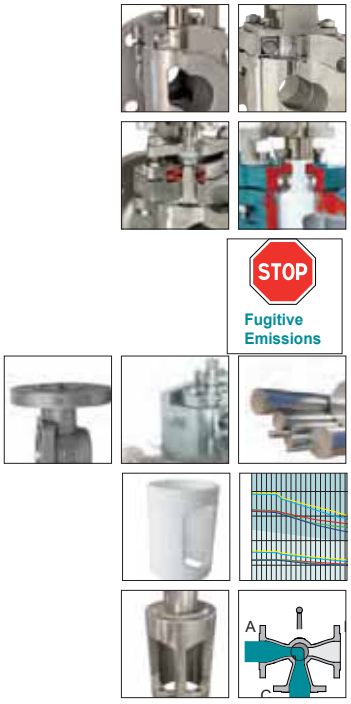
Sealing systems
- STD, FS, CA, FSN (-SL), CASN (-SL), SAFE-LINED, special

Fugitive emission
- Low-Emission Valves acc. to TA-Luft, ISO 15848 & API 641

Materials
- casting materials, forged and bar material, lining materials

PT-diagrams
- pressure, temperature, materials

Plug types
- for two-way and multi-way valves



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

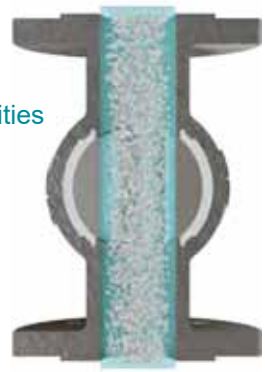
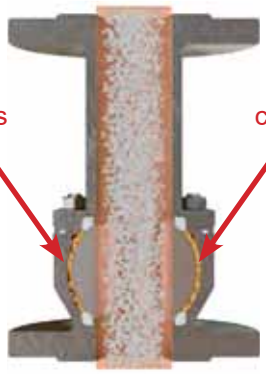
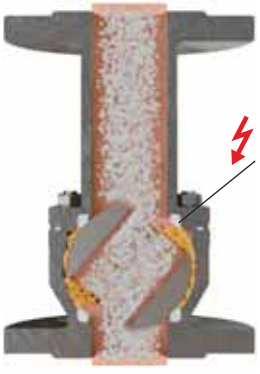
Body

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

Safe and reliable tightness for years

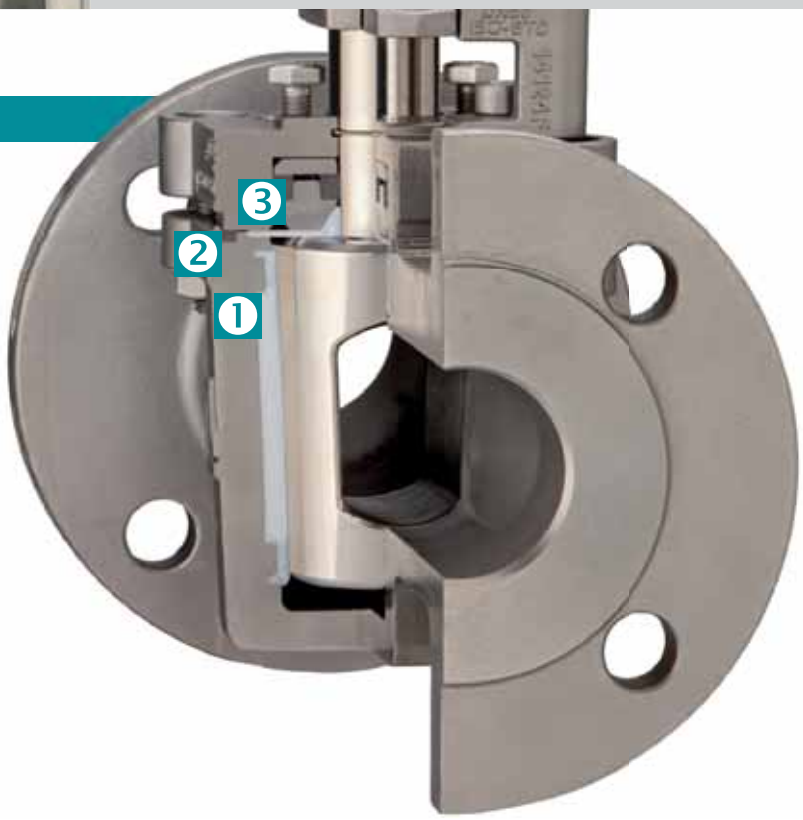
Adjustable

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

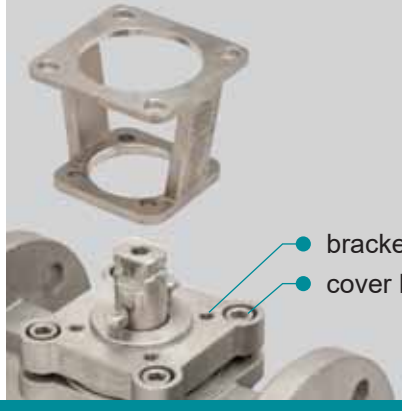
Several sealing steps to atmosphere

① Primary: sleeve
② Secondary: 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

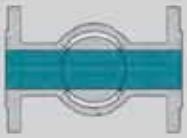
Execution

Reduced bore
Type STANDARD

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

Full round bore
Type EXTRA

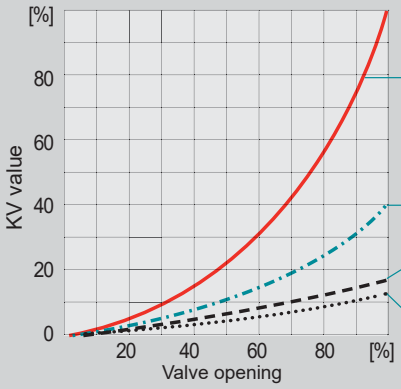
- maximum flow rate
- minimal pressure drop
- piggable (optional)



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



Type ISO-EXTRA

Type ISO-STANDARD

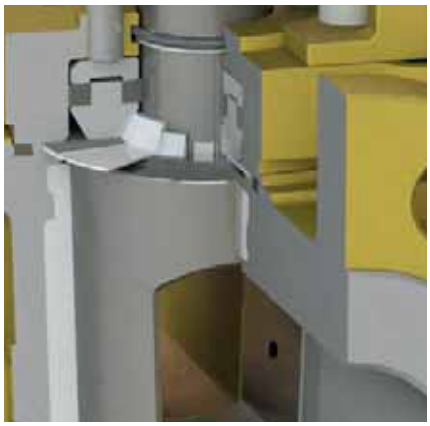
typical high performance butterfly valve

typical globe valve

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

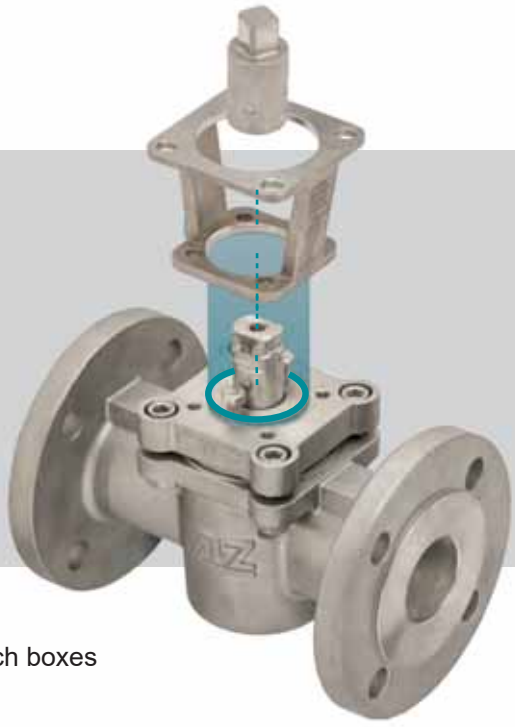
All connections possible

- flanges acc. to 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

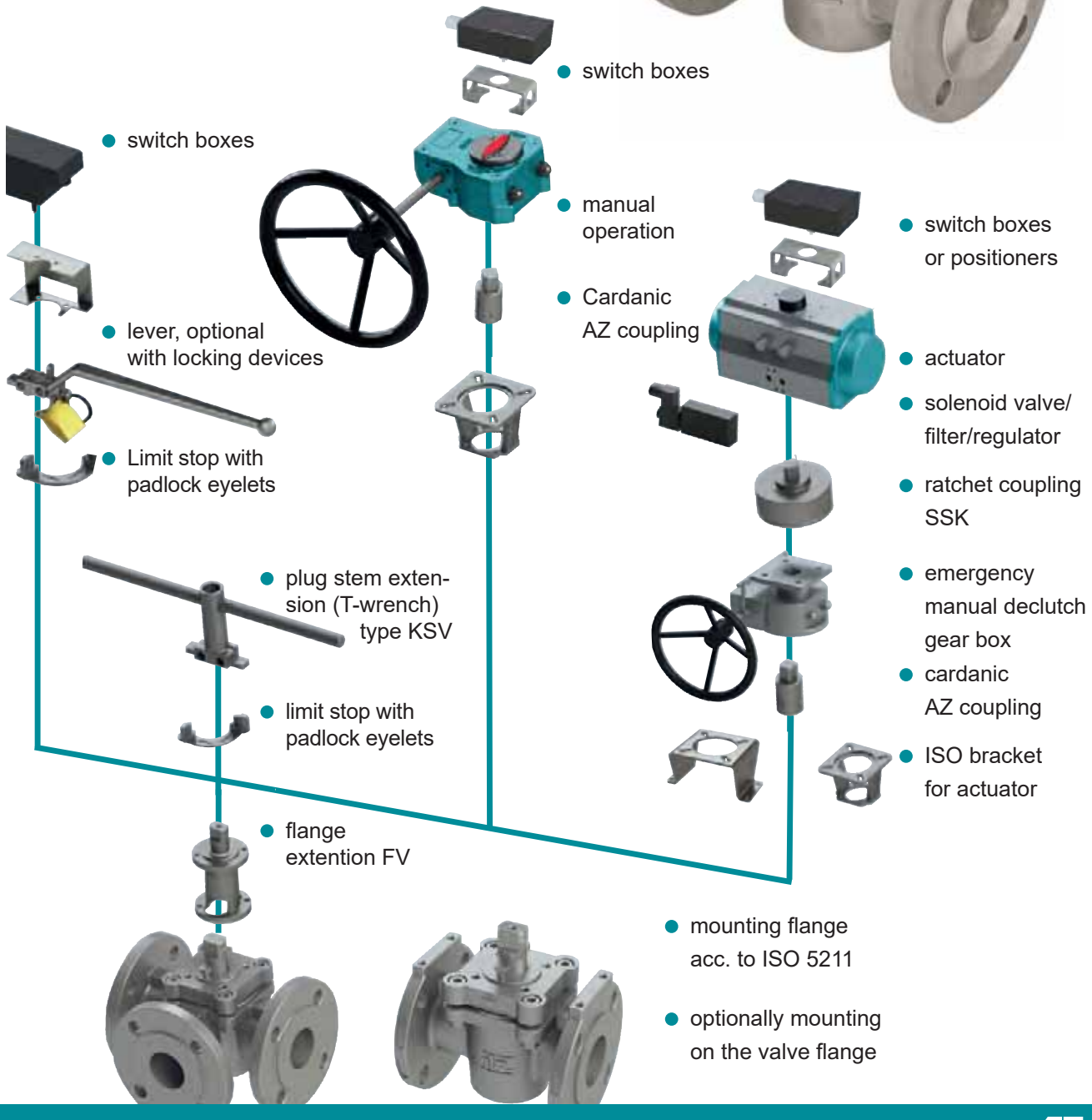
- extended bonnet with sealing at the top
- stem extension for insulated valves

Modular operation concept



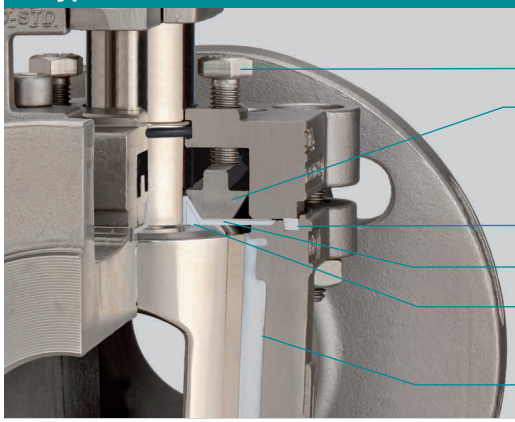
Bracket according to ISO 5211

- 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



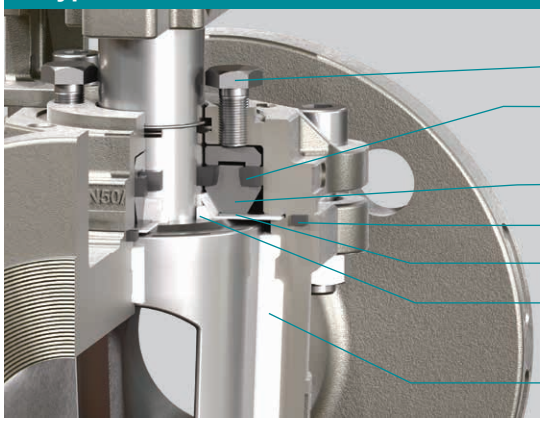
Cover and stem sealing systems suitable for general applications

Type STANDARD



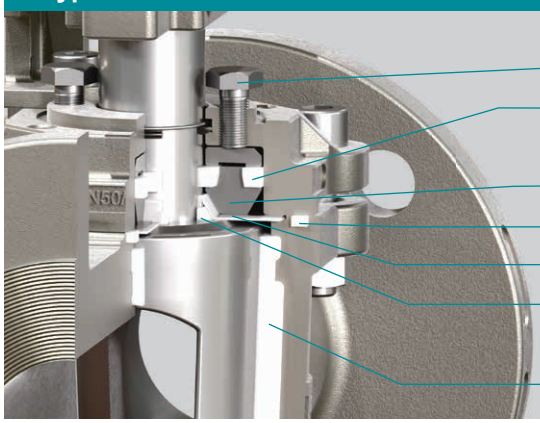
- plug adjustment
- thrust collar
- cover sealing (PTFE)
- stainless steel diaphragm
- **Secondary sealing**:
  V-diaphragm (PTFE), delta thrust collar (PTFE)
- **Primary sealing**: sleeve*

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

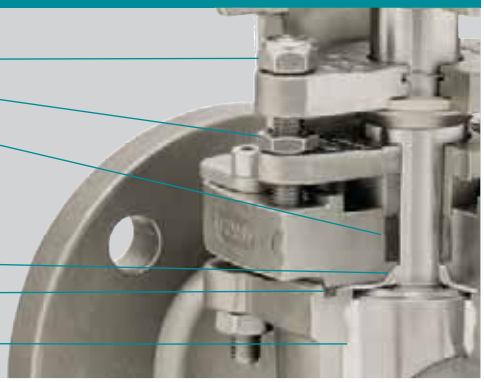
More safety
for severe applications

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!

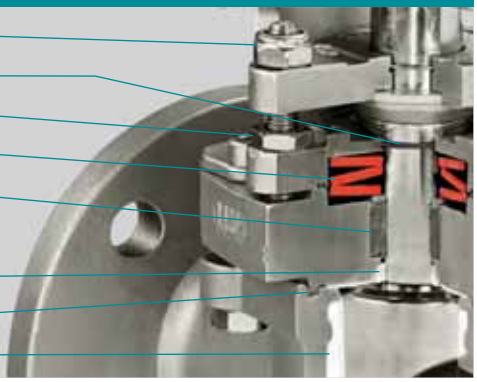
Emission Free

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

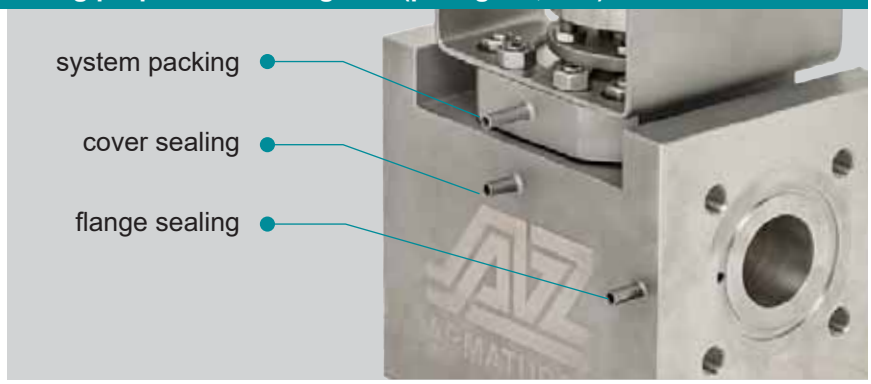
- increases the contact pressure (when pressure builds up on the safety stem packing towards stem)
- for toxic and fugitive media
- high wear resistance

Type CL Chlorine / gas applications

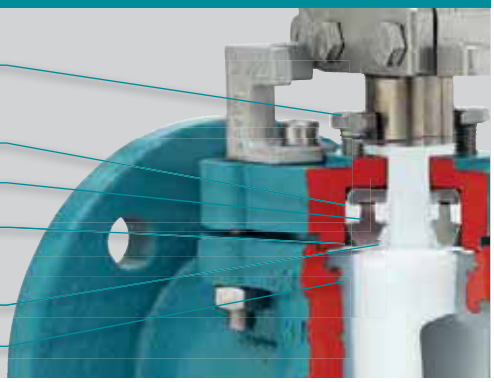
- approved for chlorine applications
- ideal for media with changing state of aggregate (e.g. liquid to gas, vice versa)
- vacuum capable

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

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



Type CA — Chemistry sealing



plug & packing adjustment

Tertiary sealing: Packing to atmosphere (PTFE)

thrust collar

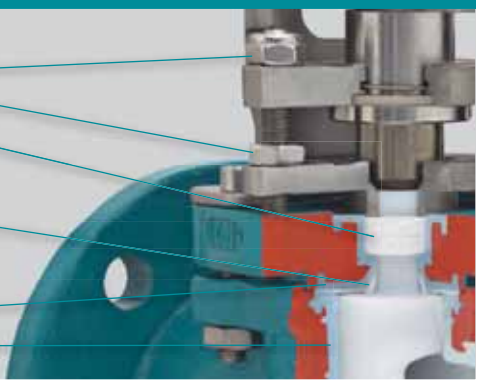
stainless steel diaphragm

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

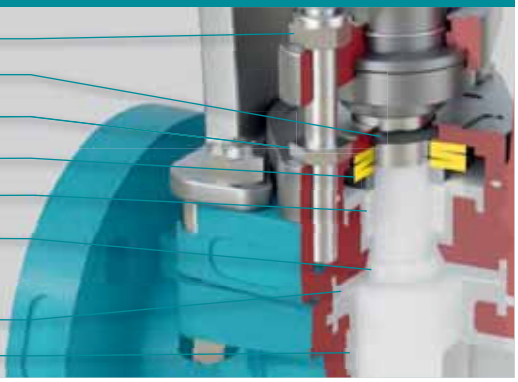
Secondary sealing:

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)

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!

STOP **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**
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							
Tantanlum	Tantalum	-	-	-	-	-	-
Titanium	Ti 2	DIN 17865	G-Ti 2	3.7031	B367	C-2	R52550
Zirconium	Zirconium 702	-	-	-	B752	702C	-
Zirconium	Zirconium 705	-	-	-		705C	-

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

Other materials on request.

Similar forged and bar 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

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

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	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

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

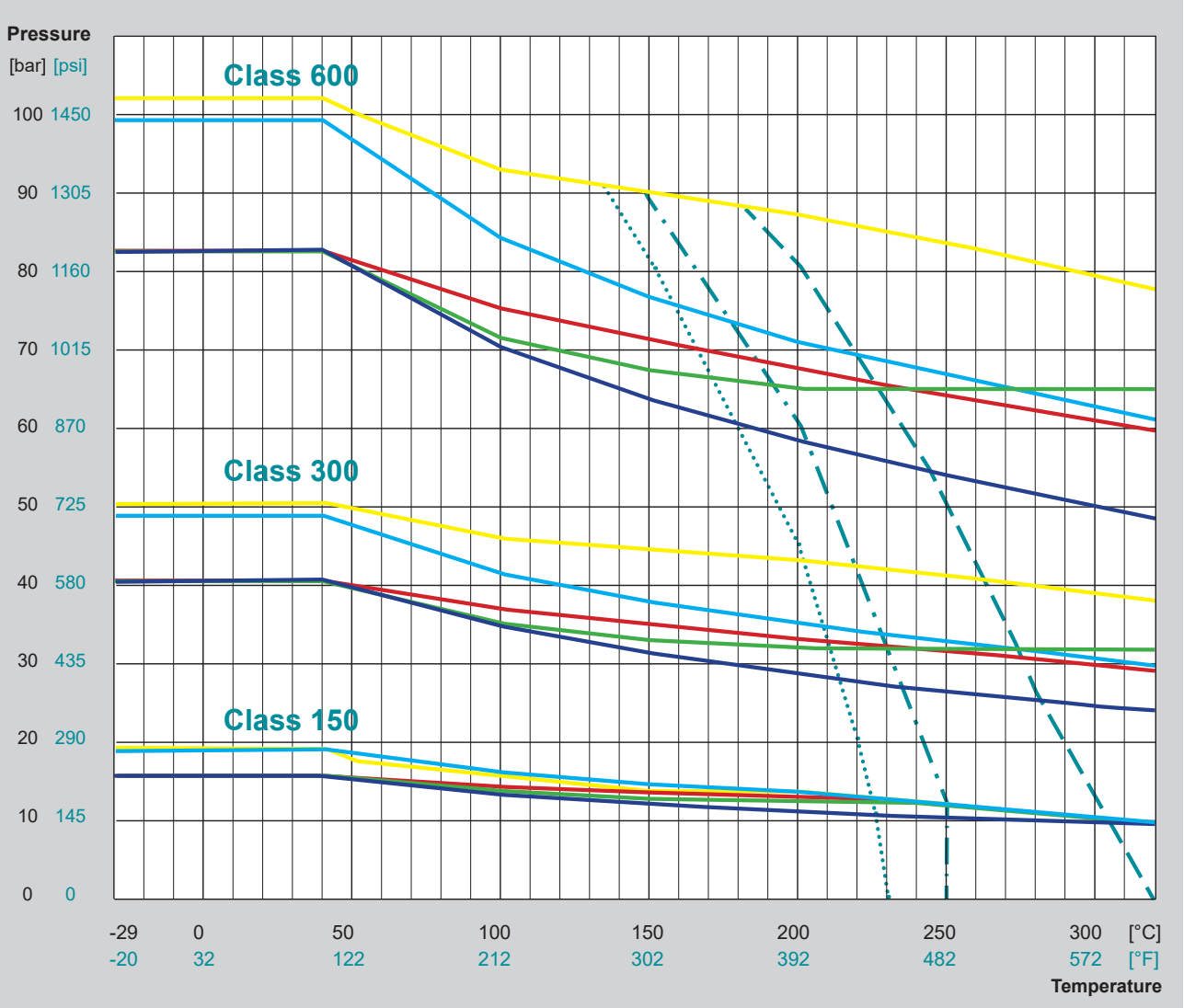
Category	Sleev Material	Characteristics	Typical applications	T_{MAX}
PTFE	PTFE, virgin	low friction, very good sealing characteristic	standard sleeve material for most applications	230°C / 446°F
RPTFE	PTFE-Glass	reinforced PTFE	additional stability for multiway valves with horizontal ports	230°C / 446°F
	PTFE-Graphite	reinforced PTFE	high temperature applications	250°C / 482°F
modified PTFE	TFM 1600* NXT 75* 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* NFCE* NCS*	high performance sleeve materials	severe service 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

*) 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 - Class 150 - Class 600
for 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.

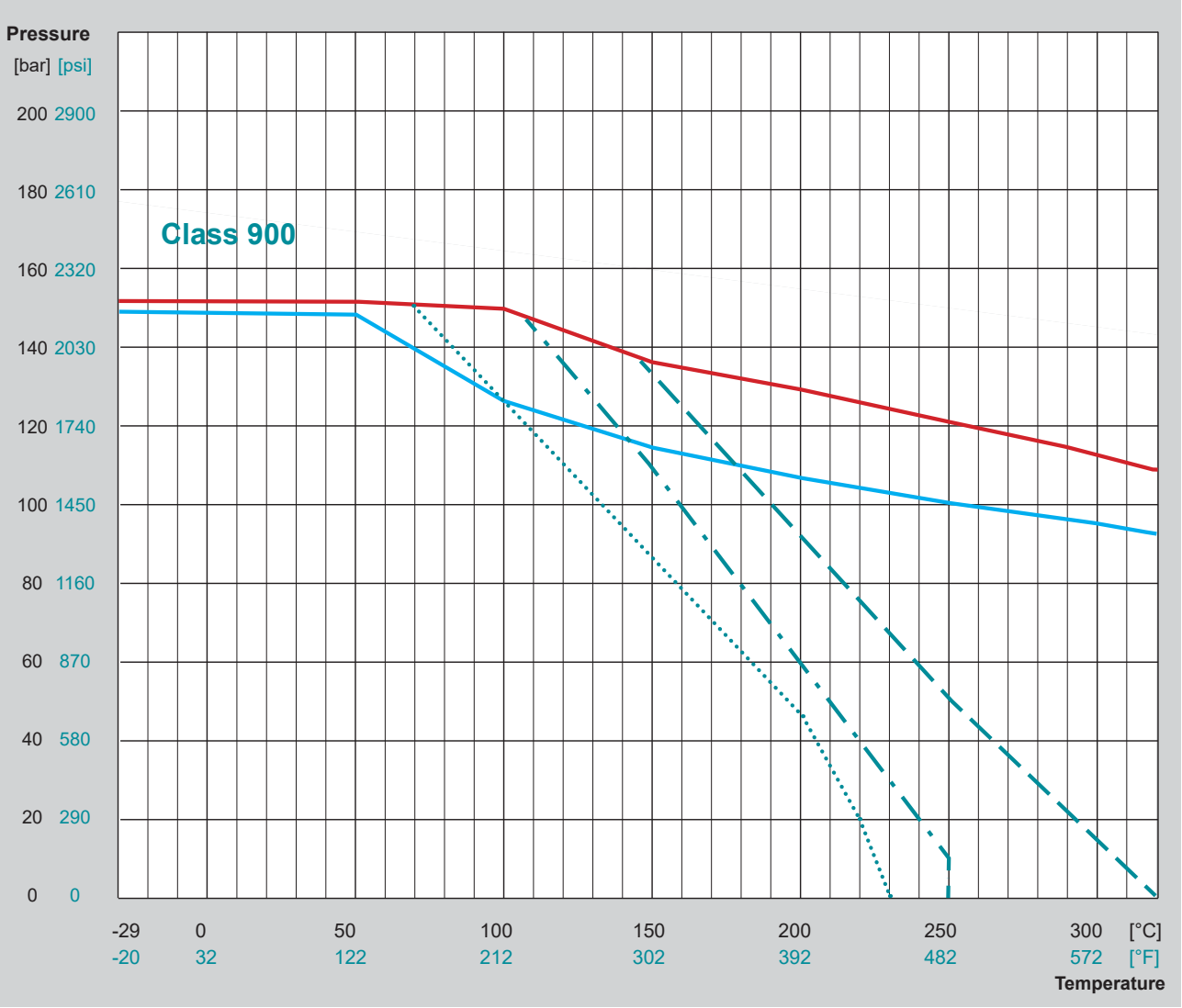
The data given are max. values according to ASME B16.34.

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 - 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.

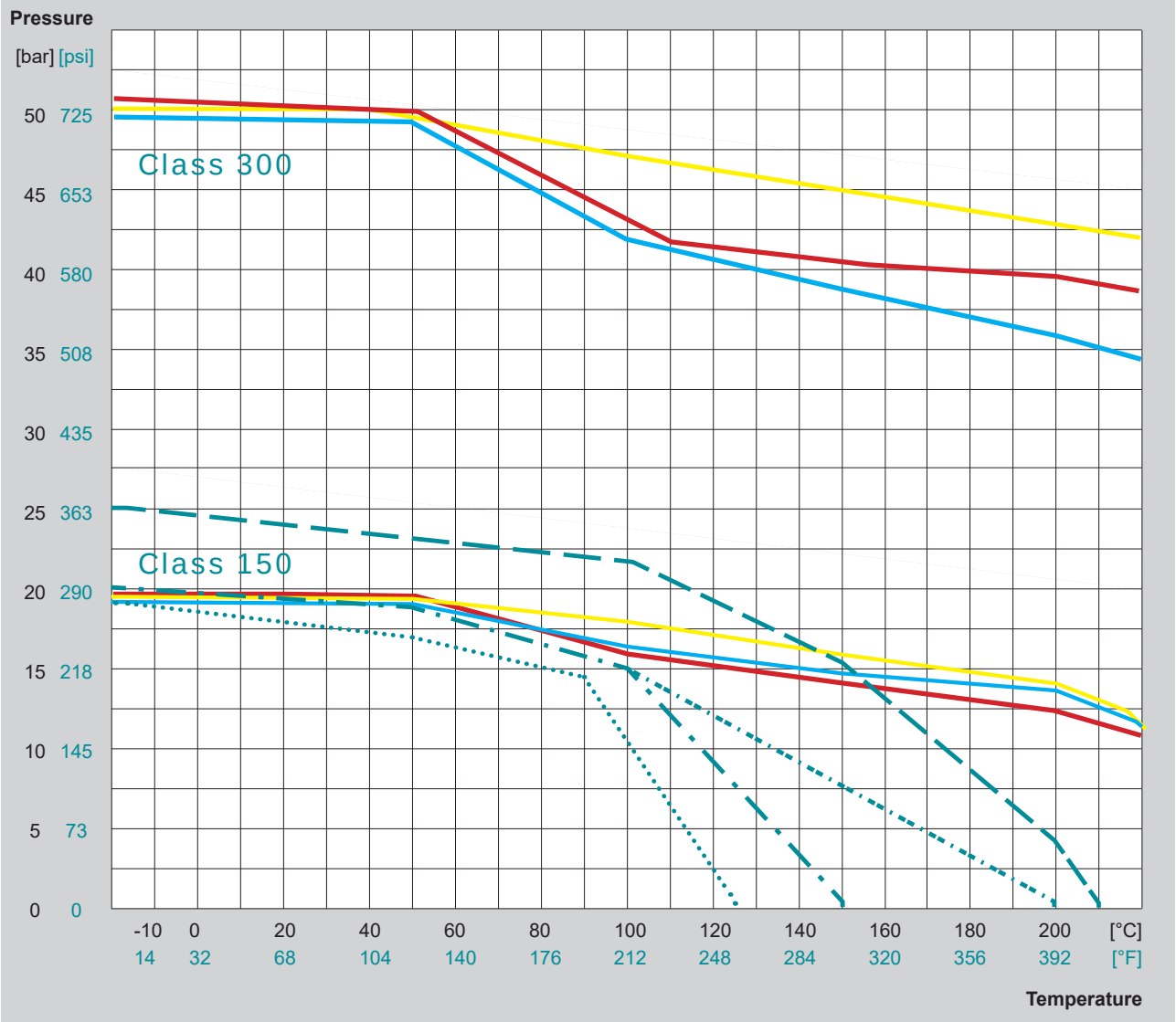
The data given are max. values according to ASME B16.34.

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.

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_{MAX}
– –	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

Maximum breakaway torque depending on material combinations according to the technical data sheets of the plug valve.
Subject to technical change without notice.

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

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.

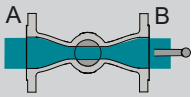
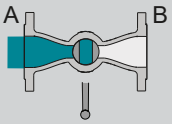
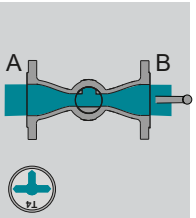
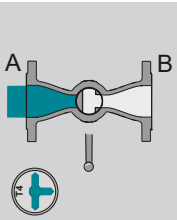
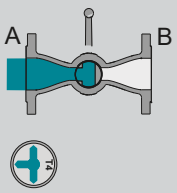
Plug types: two-way and multi-way for standard reduced and full bore design

- 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)

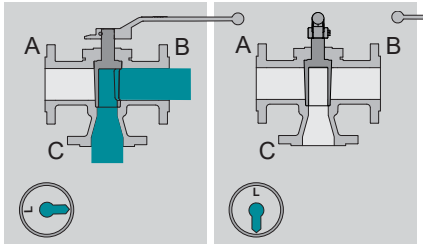
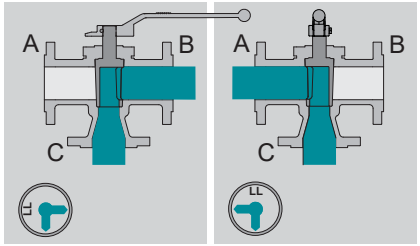
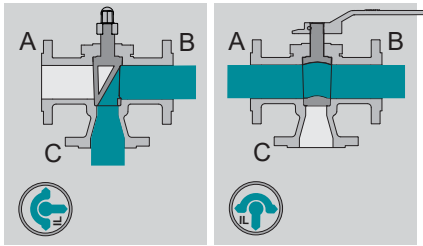
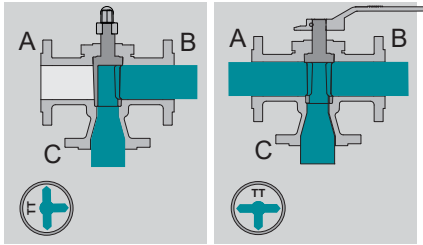
Options

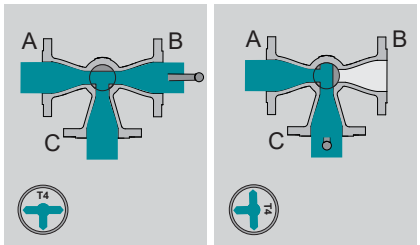
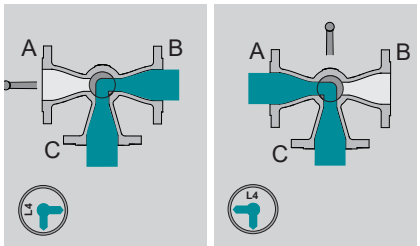
Plugs made of special materials or special designs, e.g. with flushing devices, vent holes in plug bottom or plug upstream / downstream side

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

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					 Type F-3-S-ISO-STANDARD-A
IL*					
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:

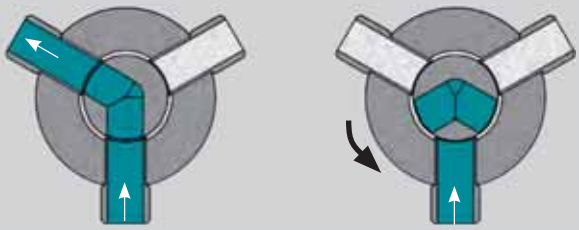
- min. cross section guaranteed (switching phase)
- piggable execution on request
- minimum flow guaranteed

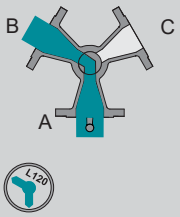
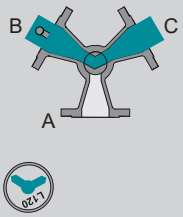
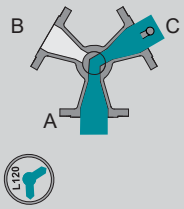
transflow design

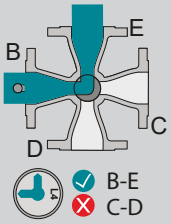
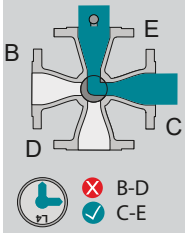
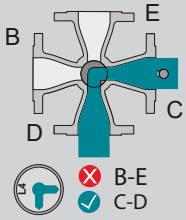
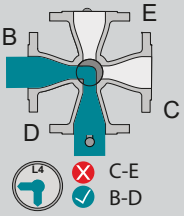
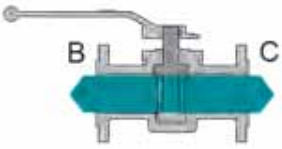
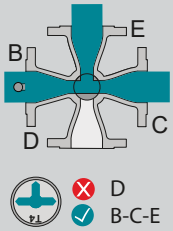
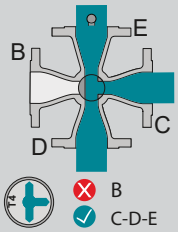
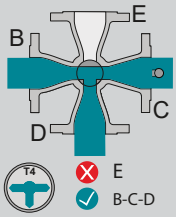
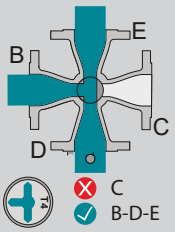
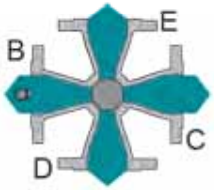
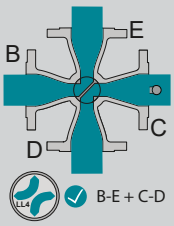
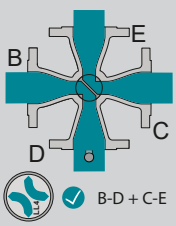
3-way (120°) type 3-WP-120

- with positive overlap
- flow interruption / isolation

positive overlap



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

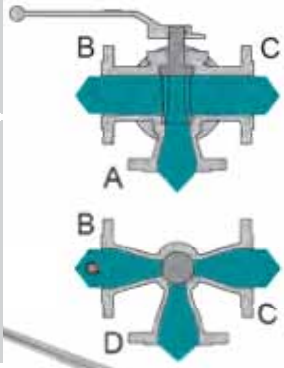
4-way	Plug type	Pos. I = 0°	Pos. II = 90°	Pos. III = 180°	Pos. IV = 270°
 Type F-4-ISO-STANDARD	L4 	 B-E C-D	 B-D C-E	 B-E C-D	 C-E B-D
	T4 	 D B-C-E	 B C-D-E	 E B-C-D	 C B-D-E
	LL4 	 B-E + C-D	 B-D + C-E		

opened
closed

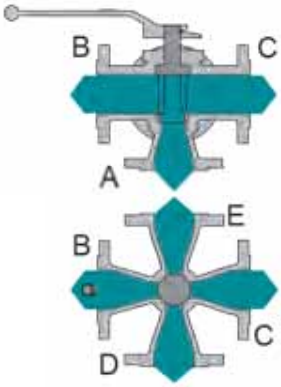
Plug types 4-way (special) and 5-way valves for STANDARD and EXTRA design

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



✓ opened
✗ closed

VALVES
free of cavities & maintenance

Your partner for highest demands!

Complete Catalog
Edition 2025

AZ plants

Headquarters Germany
AZ Armaturen GmbH
Waldstrasse 7
D-78087 Moenchweiler
Phone: +49 / 7721 / 7504-0
sales@az-armaturen.com
www.az-armaturen.com

Plant USA
AZ VALVES North America L.P.
18702 Intercontinental Crossing Drive
Houston, TX 77073
Phone: +1 / 832 / 827 2163
sales@azvalves.com
www.azvalves.com

Plant Brazil
AZ Armaturen do Brasil LTDA.
Av. Osvaldo Berto, 600
CEP 13255-405 Itatiba - SP
Phone: +55 / 11 / 452499-50 / -51
az@az-armaturen.com.br
www.az-armaturen.com.br

Plant China
AZ Armaturen (Taicang) Co., Ltd.
No. 1 Zhengzhou Road
215400 Taicang City
Phone: +86 / 512 / 53667600
info@az-armaturen.cn
www.az-armaturen.cn

Plant South Africa
AZ Armaturen South Africa PTY LTD.
28 Derick Coetzee Street
Boksburg 1459
Phone: +27 / 11 / 3973665
sales@az-armaturen.co.za
www.az-armaturen.co.za

AZ services

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

Europe
- Germany (Moenchweiler & Rhineland)
- France (Lyon/ Bourg-lès-Valence)
- Great Britain (York/Roecliffe)
- Italy (Milan/Caltignaga)
- Poland (Warsaw/Opoczno)
- The Netherlands (Amsterdam)

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

Africa
- South Africa (Johannesburg)

Detailed addresses on our website
www.azvalves.com

Rev 1 - 11.2024- 0,5 - US - Subject to technical change without notice