

Type HM / TM

Plug valves with heating jacket



Type HM

Heating jacketed plug valves (cast design)



- fully jacketed design for complete heating of the valve
- suitable for all AZ valves
- massive cast heating jackets
- massive cast heating medium connections, for threads and weld-ends

Design characteristics

- fully jacketed or partially jacketed design with massive cast connection for heating medium
- enough thread lengths
- no cracking caused by vibration
- different jacket connection types possible
- face to face dimensions acc. to EN and ASME

Standard material (jacket)

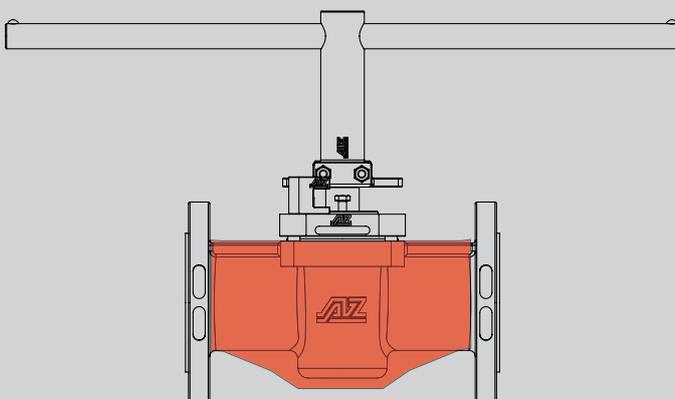
- Stainless Steel 1.4408, ASTM A351 CF8M
- Carbon Steel 1.0619, ASTM A216 WCB
- special material on request

Options

- oversize flange
- drain of steam condensate
- customized connection
- multiport

Type HM (fully heating design)

heating from flange to flange, up to the cover seat

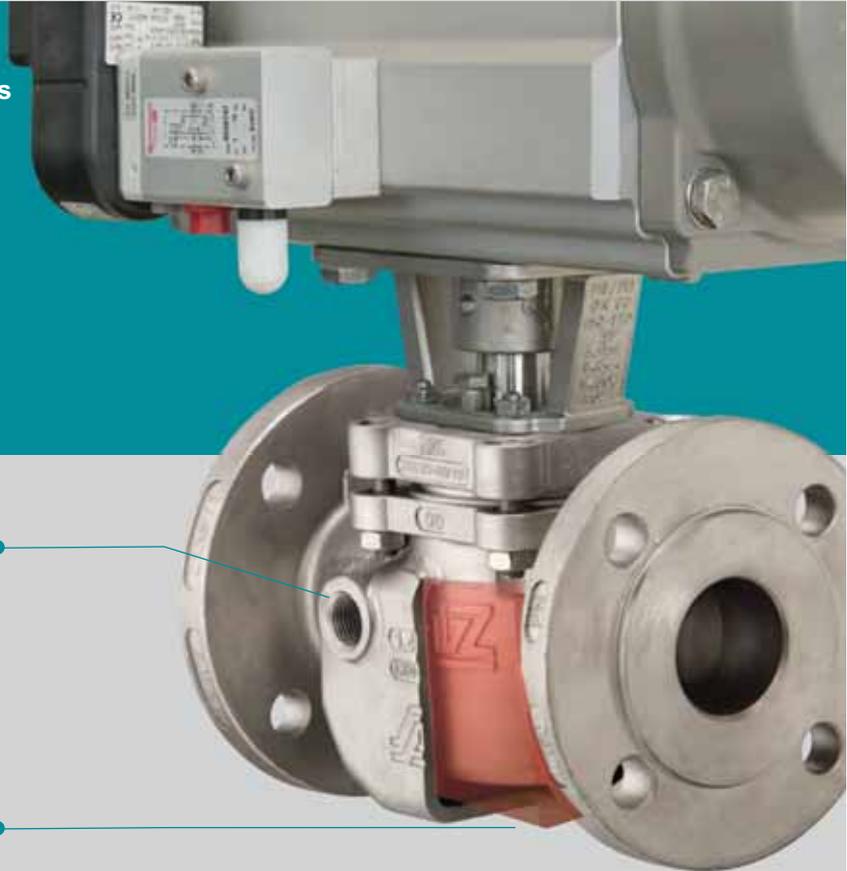


PT diagram, plug types, sealing systems, material selection: see catalogue part ENGINEERING

Type TM

with partial jacket

- partial heating of the valve
- holes in standard flange drillings always accessible
- cast, thick-walled version



Various connections for heating medium

- thread with sufficient threads in the heating jacket
- weld-ends
- flange

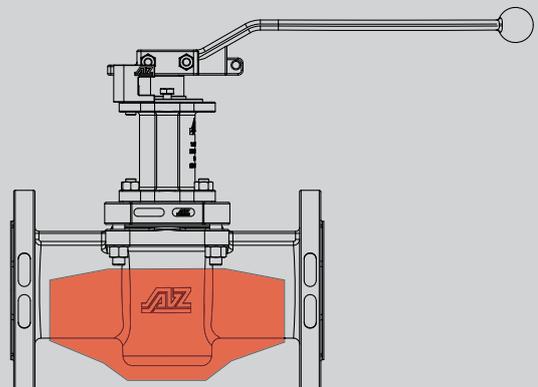
Drain of steam condensate (optional)

Operation

- lever
- actuator
- stem extension with sliding T-lever for isolated valves and pipes
- flange extension

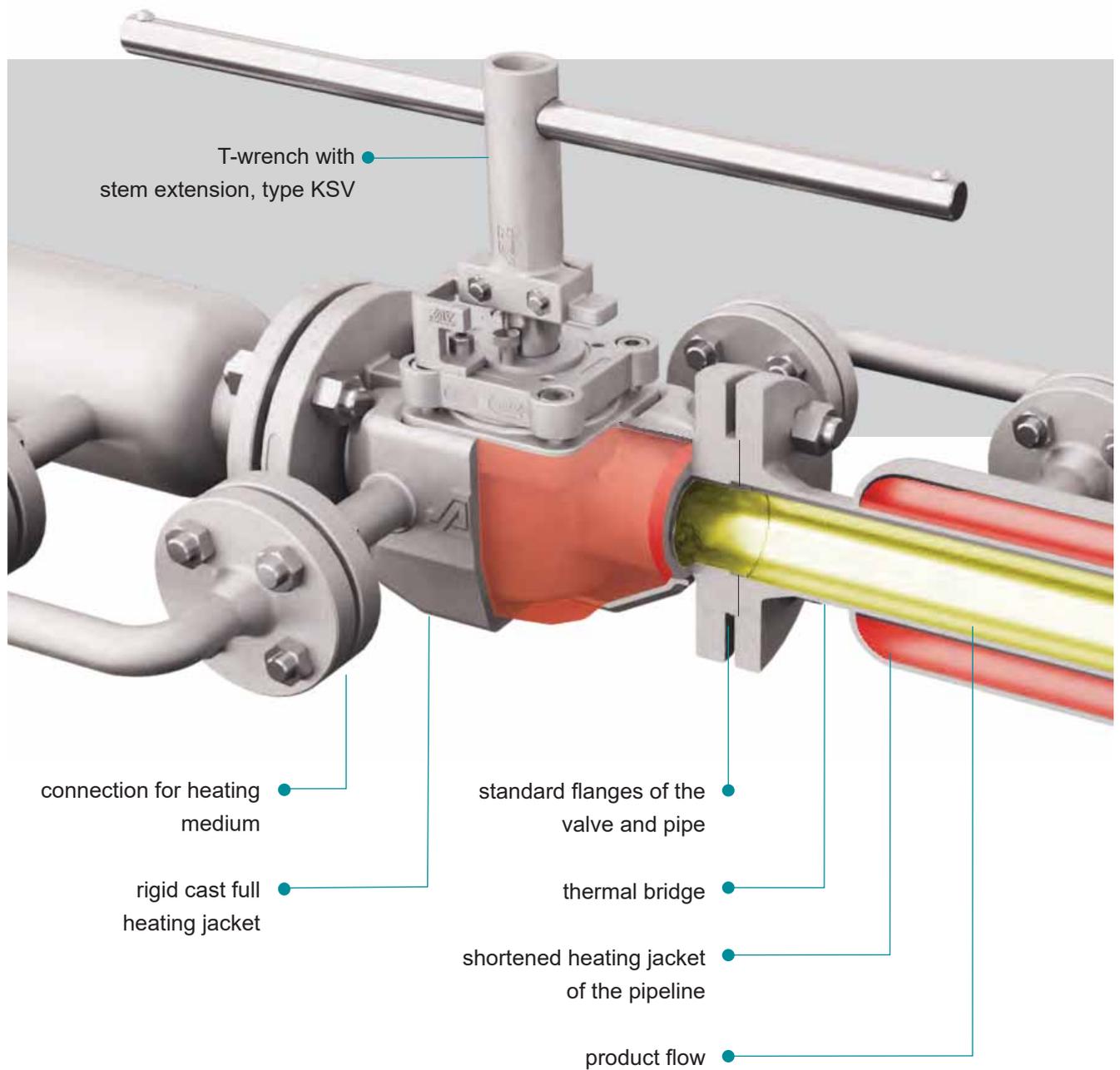
Type TM (partially heating design)

heating of the valve body
(cost saving option)

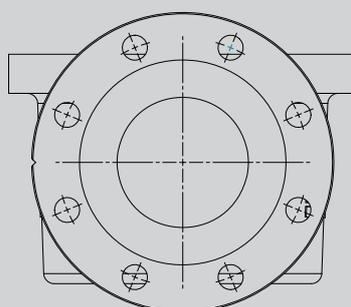


Type HM

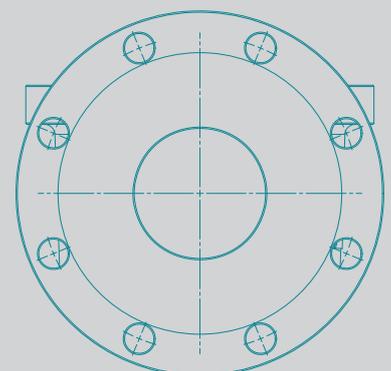
Heating jacket plug valve with standard flanges



Standard flange

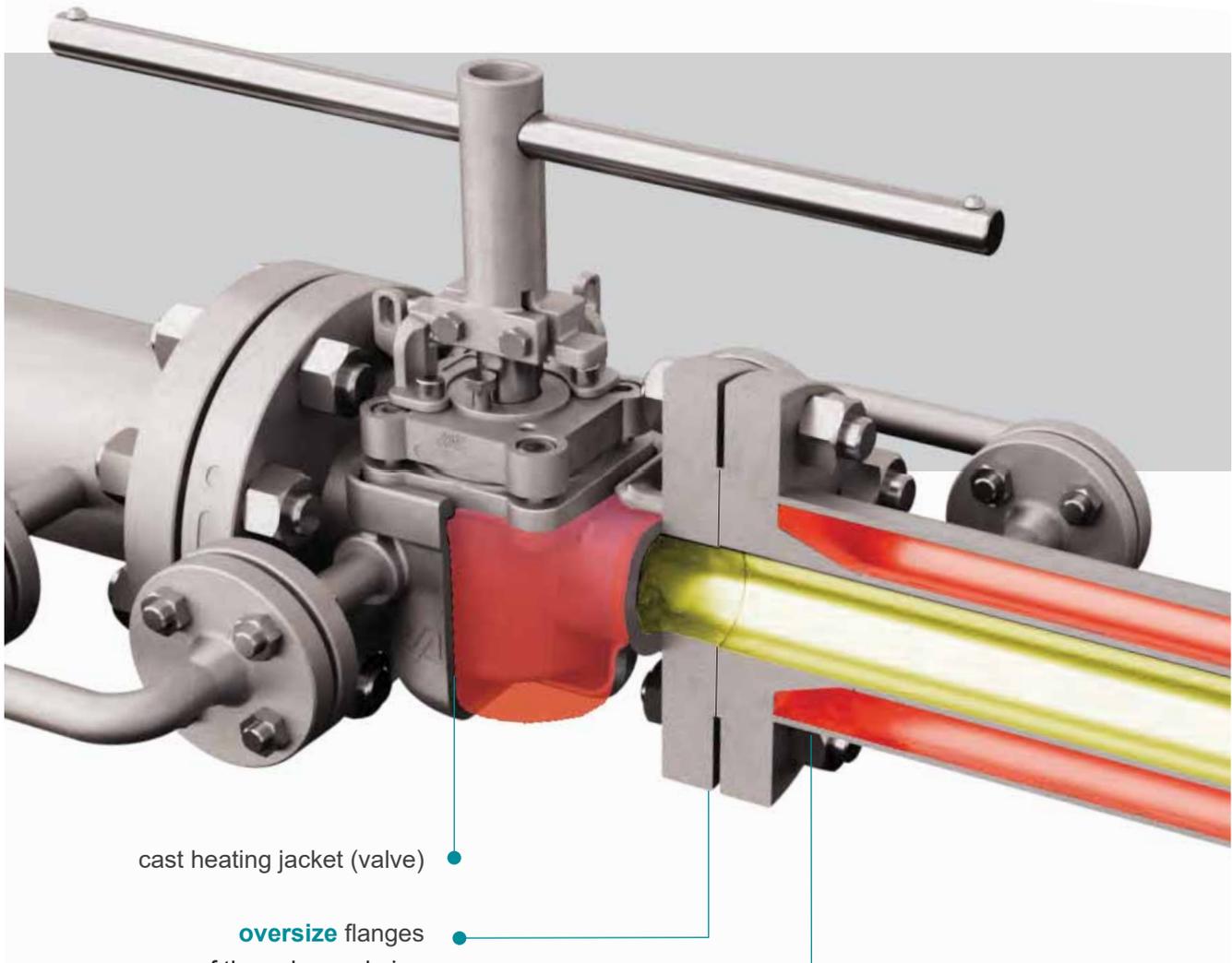


Oversize flange



Type HM-OS

Heating jacket plug valve with **Upsize Flanges**



cast heating jacket (valve)

upsized flanges
of the valve and pipe

heating jacket of the pipeline
goes up to the pipeline flange
(without thermal bridge)

Type ISO-EXTRA-HM-OS 18"/24"
with oversized flange and
jacket connection #1A

Benefits of oversized flanges

- uninterrupted heating of pipeline and valve up to the flanges, without thermal bridge



Examples of heating jacket executions and accessories



OS + plug stem extension

Type F-2-ISO-STD-OS-HM-FV

- Oversize flange
- fully jacketed design
- connection type #3 (thread)
- locking option outside the insulation



3-way plug valve

Type F-3-S-ISO-STD-TM

- plug valve F-3-S vertical
- fully jacketed design
- connection type #1 (thread)



Plug valve AF/BWF

Type AF-2-BWF-HM

- valve with weld and flange ends
- heating jacketed and T-wrench
- fully jacketed design
- connection type #3 (thread)



with weld-ends

Type BW-2-ISO-STD-HM

- fully jacketed design
- special heating connection directly to the pipeline



Sampling systems

Type CONTIFLOW-HM

- fully jacketed design
- connection type #1A (flange)

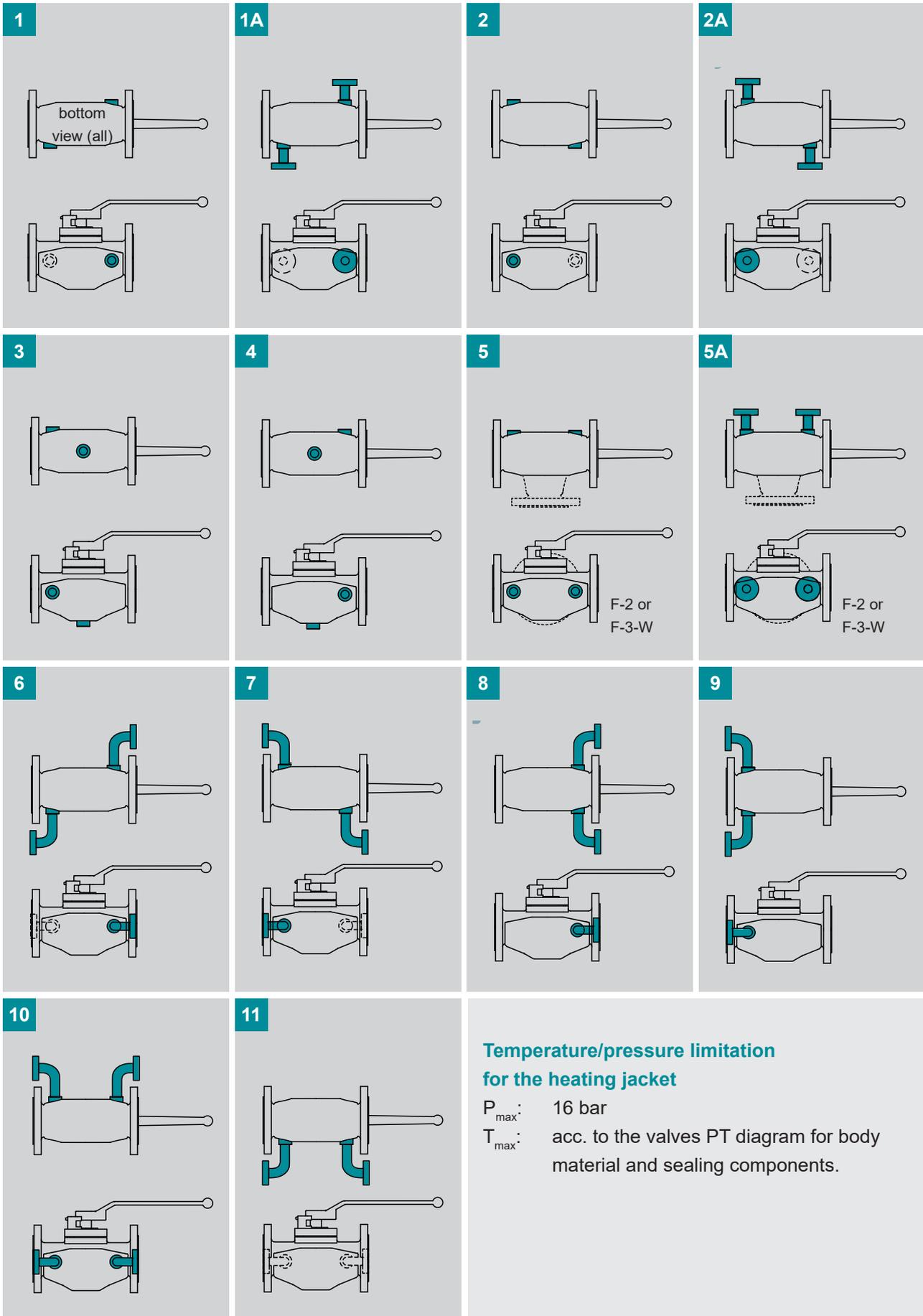


Plug valve with lining

Type F-2-SAFE-LINED-HM

- fully jacketed design
- connection type #1A (flange)

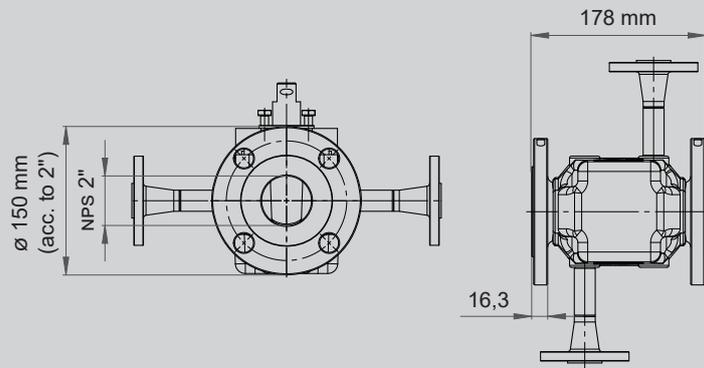
Standard heating connections



Examples for flange and Face to Face options 2" CL 150 with and without oversize flanges

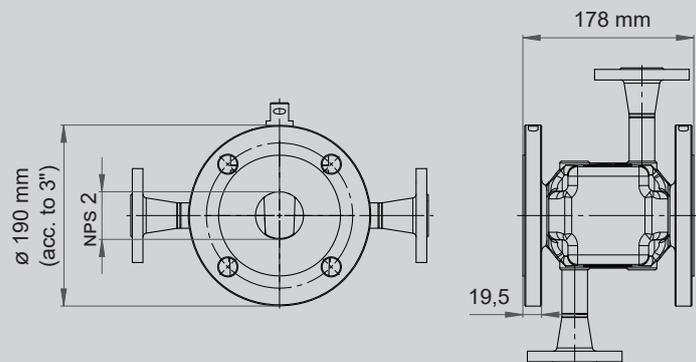
Option 1

- type HM
- nominal size: **2"**
- flange size acc. to **2"**
- oversize: **no**
- Face to Face acc. to **2"**



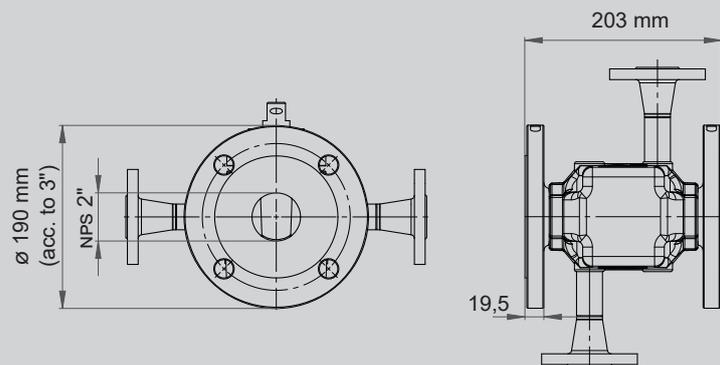
Option 2

- type HM-OS
- nominal size: **2"**
- flange size acc. to **3"**
- oversize: **yes**
- Face to Face acc. to **2"**



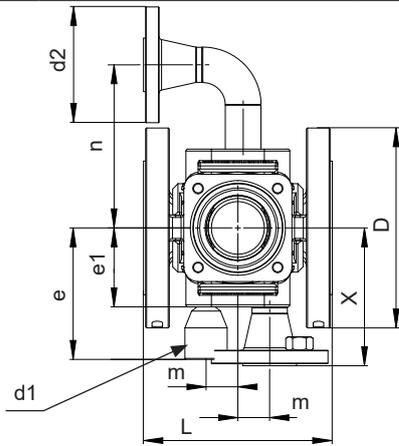
Option 3

- type HM-OS
- nominal size: **2"**
- flange size acc. to **3"**
- oversize: **yes**
- Face to Face acc. to **3"**



Type HM / HM-OS

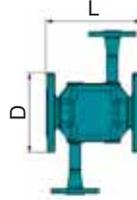
Technical information ISO-STANDARD-HM



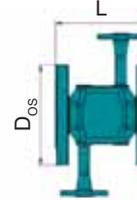
Important note:

For heating jacket valves with oversize flanges two face to face options are available.

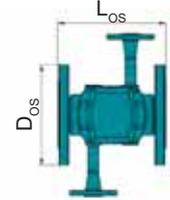
Type HM
Option 1



Type HM-OS
Option 2 "L"



Type HM-OS
Option 3 "L_{OS}"



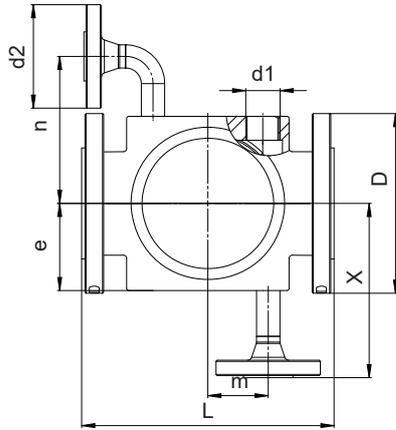
		Option 1							Option 2		Option 3					
ISO-STANDARD: EN 1092-1	DN	PN	m [mm]	X [mm]	e/e1 [mm]	d1 [Zoll]	d2** [mm]	L [mm]	D [mm]	Type HM-OS (Oversize)						
	OS [DN]	X [mm]	n [mm]	e/e1 [mm]	D _{OS} [mm]	L [mm]	L _{OS} [mm]									
	15	10-40	0	100	90/-	G 3/8	95 (DN15)	130	95	*	*	*	*	*	*	*
	20	10-40	0	100	90/-	G 3/8	95 (DN15)	150	105	OS 40	110	128	90/-	165	150	*
	25	10-40	0	100	90/-	G 3/8	95 (DN15)	160	115	OS 50	120	135	90/-	165	160	*
	32	10-40	*	*	*	G 1/2	95 (DN15)	180	140	*	*	*	*	*	*	*
	40	10-40	45	120	-50	G 1/2	95 (DN15)	200	150	OS 65	145	145	-100	185	200	290
	50	10-40	50	125	-62	G 1/2	95 (DN15)	230	165	OS 80	155	153	-112	200	230	310
	65	10-40	*	*	*	G 1/2	95 (DN15)	290	185	*	*	*	*	*	*	*
	80	10-40	90	150	-75	G 3/4	95 (DN15)	310	200	OS 100	165	170	-125	220	310	*
	100	10-40	110	165	127/-	G 3/4	95 (DN15)	350	220	OS 150	180	195	127/-	290	350	*
	125	10-40	*	*	*	G 1	95 (DN15)	325	290	*	*	*	*	*	*	*
	150	10-40	90	200	-163	G 1	95 (DN15)	350	300	*	*	*	*	*	*	*
	200	10-40	90	244	-206	G 1	95 (DN15)	400	375	*	*	*	*	*	*	*
	250	10-40	*	*	*	G 1	95 (DN15)	450	*	*	*	*	*	*	*	*
	300	10-40	90	256	-218	G 1	95 (DN15)	500	515	*	*	*	*	*	*	*
		Option 1							Option 2		Option 3					
ISO-STANDARD: ASME B16.5	NPS	Class	m [mm]	X [mm]	e / e1 [mm]	d1 [Zoll]	d2** [mm]	L [mm]	D [mm]	Type HM-OS (Oversize)						
	OS [NPS]	X [mm]	n [mm]	e/e1 [mm]	D _{OS} [mm]	L [mm]	L _{OS} [mm]									
	1/2	150	0	100	100/-	G 3/8	90 (NPS 1/2)	108	90	OS 1 1/2	100	*	100/-	127	108	165
		300	0	90	90/-	G 3/8	90 (NPS 1/2)	140	95	OS 1 1/2	120	128	90/-	165	140	190
	3/4	150	0	100	90/-	G 3/8	90 (NPS 1/2)	117	100	OS 1 1/2	120	113	90/-	127	117	165
		300	0	90	90/-	G 3/8	90 (NPS 1/2)	152	115	OS 1 1/2	120	128	90/-	155	152	190
	1	150	0	95	95/-	G 3/8	90 (NPS 1/2)	127	110	OS 2	125	125	95/-	150	127	178
		300	0	120	90/-	G 3/8	90 (NPS 1/2)	165	125	OS 2	125	133	90/-	165	165	216
	1 1/2	150	30	100	105/-	G 3/8	90 (NPS 1/2)	165	125	OS 3	150	145	105/-	190	165	203
		300	30	130	53	G 3/8	90 (NPS 1/2)	190	155	OS 3	150	155	105/-	210	190	283
	2	150	35	150	107/-	G 1/2	90 (NPS 1/2)	178	150	OS 3	150	145	107/-	190	178	203
		300	40	150	110/-	G 1/2	90 (NPS 1/2)	216	165	OS 3	150	155	-110	210	216	283
	3	150	40	150	-125	G 1/2	90 (NPS 1/2)	203	190	OS 4	160	165	-125	230	203	229
		300	50	160	-130	G 1/2	90 (NPS 1/2)	283	210	OS 4	160	178	-130	254	283	305
	4	150	45	160	-122	G 1/2	90 (NPS 1/2)	229	230	OS 6	180	190	-122	280	229	267
		300	70	180	-142	G 1/2	90 (NPS 1/2)	305	255	OS 6	200	210	-142	320	305	403
	6	150	50	207	-50	G 1	90 (NPS 1/2)	267	280	OS 8	*	*	*	345	267	292
		300	50	210	-50	G 1	90 (NPS 1/2)	403	320	OS 8	*	*	*	380	403	419
	8	150	45	226	-45	G 1	90 (NPS 1/2)	292	345	OS 10	*	*	*	405	292	330
		300	45	225	-45	G 1	90 (NPS 1/2)	419	380	OS 10	*	*	*	445	419	457
	10	150	65	165	-65	G 1	90 (NPS 1/2)	330	405	OS 12	*	*	*	485	330	356
		300	65	256	-65	G 1	90 (NPS 1/2)	457	445	OS 12	*	*	*	520	457	502
	12	150	90	266	-90	G 1	90 (NPS 1/2)	356	485	OS 14	*	*	*	535	356	686
		300	90	400	-90	G 1	90 (NPS 1/2)	502	520	OS 14	*	*	*	585	502	762

*) on request

**) other nominal size and pressure rating on request

Type HM / HM OS

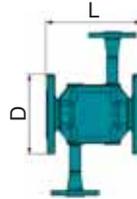
Technical information ISO-EXTRA-HM, full bore



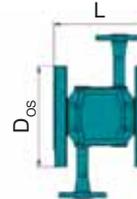
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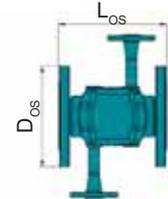
Type HM
Option 1



Type HM-OS
Option 2 "L"



Type HM-OS
Option 3 "L_{OS}"



ISO-EXTRA: EN 1092-1											Option 1		Option 2		Option 3
	DN	PN	X [mm]	m [mm]	e [mm]	d1 [Zoll]	d2 ** [mm]	L [mm]	D [mm]	Type HM-OS Oversize					
	OS [DN]	D _{OS} [mm]	L [mm]	L _{OS} [mm]											
15	10-40	140	0	90	G 3/8	95 (DN15)	130	95	*	*	*	*			
20	10-40	130	0	90	G 3/8	95 (DN15)	150	105	OS 50	165	150	230			
25	10-40	128	0	90	G 3/8	95 (DN15)	160	115	OS 50	165	150	230			
32	10-40	*	*	*	G 1/2	95 (DN15)	*	*	*	*	*	*			
40	10-40	140	30	100	G 1/2	95 (DN15)	200	150	OS 65	185	200	290			
50	10-40	150	50	112	G 1/2	95 (DN15)	230	165	OS 80	200	230	310			
65	10-40	165	87	127	G 1/2	95 (DN15)	290	185	*	*	*	*			
80	10-40	162	90	124	G 3/4	95 (DN15)	310	200	OS 100	220	310	350			
100	10-40	165	110	127	G 3/4	95 (DN15)	350	220	*	*	*	*			
125	10-40	*	*	*	G 1	95 (DN15)	*	*	*	*	*	*			
150	10-40	200	90	163	G 1	95 (DN15)	480	285	*	*	*	*			
200	10-40	244	90	206	G 1	95 (DN15)	600	375	*	*	*	*			
250	10-40	*	*	*	G 1	95 (DN15)	730	450	*	*	*	*			
300	10-40	256	90	218	G 1	95 (DN15)	850	450	*	*	*	*			

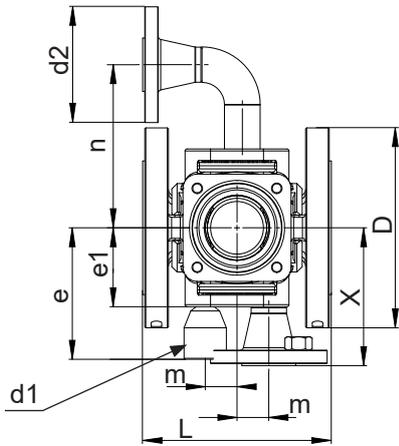
ISO-EXTRA: ASME B16.5											Option 1		Option 2		Option 3
	NPS	Class	X [mm]	m [mm]	e [mm]	d1 [Zoll]	d2 [mm]	L [mm]	D [mm]	Type HM-OS Oversize					
	OS [NPS]	D _{OS} [mm]	L [mm]	L _{OS} [mm]											
1/2	150	100	0	100	G 3/8	90 (NPS 1/2)	108	90	OS 1 1/2	127	108	140			
	300	100	0	100	G 3/8	90 (NPS 1/2)	140	95							
3/4	150	100	0	100	G 3/8	90 (NPS 1/2)	117	100	OS 1 1/2	125	117	165			
	300	*	0	100	G 3/8	90 (NPS 1/2)	152	115		155	152	191			
1	150	93	0	100	G 3/8	90 (NPS 1/2)	160	110	OS 2	150	160	165			
	300	138	0	100	G 3/8	90 (NPS 1/2)	230	125		165	230	260			
1 1/2	150	100	30	53	G 3/8	90 (NPS 1/2)	200	125	OS 3	190	200	310			
	300	*	30	53	G 3/8	90 (NPS 1/2)	260	155		210	260	310			
2	150	155	35	107	G 1/2	90 (NPS 1/2)	230	150	OS 3	190	200	310			
	300	160	35	107	G 1/2	90 (NPS 1/2)	300	165		210	260	310			
3	150	172	40	125	G 1/2	90 (NPS 1/2)	310	190	OS 4	230	310	350			
	300	176	40	125	G 1/2	90 (NPS 1/2)	310	210		255	310	430			
4	150	170	45	45	G 1/2	90 (NPS 1/2)	350	230	OS 6	280	350	480			
	300	170	45	45	G 1/2	90 (NPS 1/2)	430	255		320	430	550			
6	150	207	50	50	G 1	90 (NPS 1/2)	480	280	OS 8	345	480	600			
	300	210	50	50	G 1	90 (NPS 1/2)	550	320		380	550	650			
8	150	226	45	45	G 1	90 (NPS 1/2)	600	345	OS 10	405	600	730			
	300	225	45	45	G 1	90 (NPS 1/2)	650	380		445	650	775			
10	150	165	65	65	G 1	90 (NPS 1/2)	730	405	OS 12	485	730	850			
	300	256	65	65	G 1	90 (NPS 1/2)	775	445		520	775	850			
12	150	266	90	90	G 1	90 (NPS 1/2)	850	485	OS 14	535	850	980			
	300	400	90	90	G 1	90 (NPS 1/2)	850	520		585	850	980			

*) on request

***) other nominal size and pressure rating on request

Type TM / TM-OS

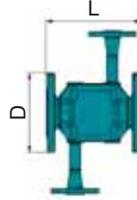
Technical information for ISO-STANDARD-TM



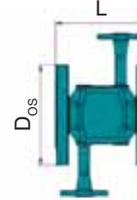
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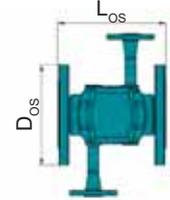
Type TM
Version 1



Type TM-OS
Version 2 "L"



Type TM-OS
Version 3 "L_{OS}"



ISO-STANDARD: EN 1092-1		Option 1							Option 2	Option 3					
		DN	PN	m [mm]	X [mm]	e/e1 [mm]	d1 [Zoll]	d2** [mm]	L [mm]	D [mm]	Type TM-OS Oversize				
		OS [DN]	X [mm]	n [mm]	e/e1 [mm]	D _{OS} [mm]	L [mm]	L _{OS} [mm]							
15	10-40	0	100	90/-	G 3/8	95 (DN15)	130	95	*	*	*	*	*	*	
20***	10-40	0	100	90/-	G 3/8	95 (DN15)	150	105	OS 40	110	128	90/-	165	150	*
25	10-40	0	100	90/-	G 3/8	95 (DN15)	160	115	OS 50	120	135	90/-	165	160	*
40	10-40	45	120	-/50	G 1/2	95 (DN15)	200	150	OS 65	145	145	-/100	185	200	290
50	10-40	50	125	-/62	G 1/2	95 (DN15)	230	165	OS 80	155	153	-/112	200	230	310
65	10-40	*	*	*	G 1/2	95 (DN15)	290	185	*	*	*	*	*	*	*
80	10-40	90	150	-/75	G 3/4	95 (DN15)	310	200	OS 100	165	170	-/125	220	310	350
100	10-40	110	165	127/-	G 3/4	95 (DN15)	350	220	OS 150	180	195	127/-	290	350	325
150	10-40	90	200	-/163	G 1	95 (DN15)	350	300	*	*	*	*	*	*	*
200	10-40	90	244	-/206	G 1	95 (DN15)	400	375	*	*	*	*	*	*	*
300	10-40	90	256	-/218	G 1	95 (DN15)	500	515	*	*	*	*	*	*	*

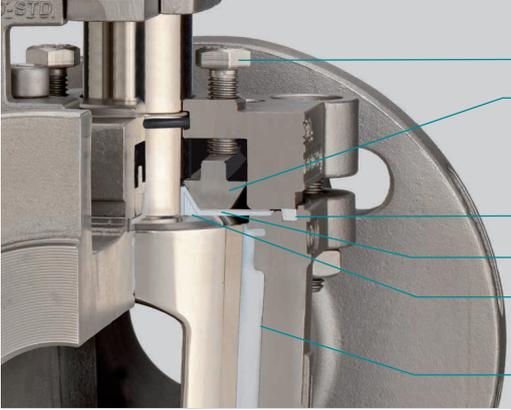
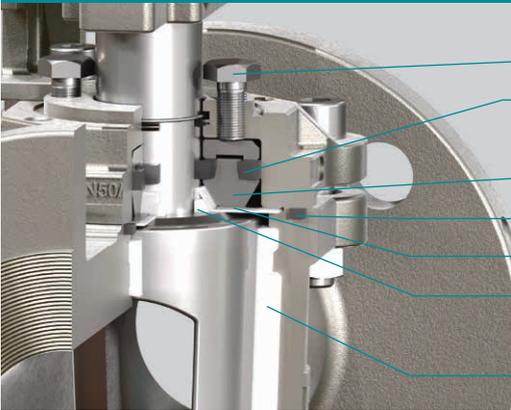
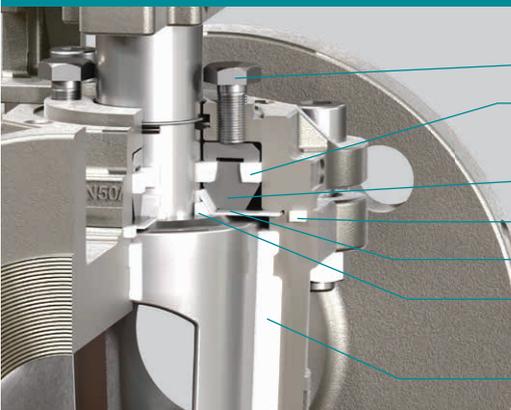
ISO-STANDARD: ASME B16.5		Option 1							Option 2	Option 3					
		NPS	Class	m [mm]	X [mm]	e / e1 [mm]	d1 [Zoll]	d2** [mm]	L [mm]	D [mm]	Type TM-OS Oversize				
		OS [NPS]	X [mm]	n [mm]	e/e1 [mm]	D _{OS} [mm]	L [mm]	L _{OS} [mm]							
1/2	150	0	100	100/-	G 3/8	90 (NPS 1/2)	108	90	OS 1 1/2	100	*	100/-	127	108	165
	300	0	90	90/-	G 3/8	90 (NPS 1/2)	140	95		120	128	90/-	165	140	190
3/4	150	0	100	90/-	G 3/8	90 (NPS 1/2)	117	100	OS 1 1/2	120	113	90/-	127	117	165
	300	0	90	90/-	G 3/8	90 (NPS 1/2)	152	115		120	128	90/-	155	152	190
1***	150	0	95	95/-	G 3/8	90 (NPS 1/2)	127	110	OS 2	125	125	95/-	150	127	178
	300	0	120	90/-	G 3/8	90 (NPS 1/2)	165	125		125	133	90/-	165	165	216
1 1/2	150	30	100	105/-	G 3/8	90 (NPS 1/2)	165	125	OS 3	150	145	105/-	190	165	203
	300	30	130	53	G 3/8	90 (NPS 1/2)	190	155		150	155	105/-	210	190	283
2	150	35	150	107/-	G 1/2	90 (NPS 1/2)	178	150	OS 3	150	145	107/-	190	178	203
	300	40	150	110/-	G 1/2	90 (NPS 1/2)	216	165		150	155	-/110	210	216	283
3	150	40	150	-/125	G 1/2	90 (NPS 1/2)	203	190	OS 4	160	165	-/125	230	203	229
	300	50	160	-/130	G 1/2	90 (NPS 1/2)	283	210		160	178	-/130	254	283	305
4	150	45	160	-/122	G 1/2	90 (NPS 1/2)	229	230	OS 6	180	190	-/122	280	229	267
	300	70	180	-/142	G 1/2	90 (NPS 1/2)	305	255		200	210	-/142	320	305	403
6	150	50	207	-/50	G 1	90 (NPS 1/2)	267	280	OS 8	*	*	*	345	267	292
	300	50	210	-/50	G 1	90 (NPS 1/2)	403	320					380	403	419
8	150	45	226	-/45	G 1	90 (NPS 1/2)	292	345	OS 10	*	*	*	405	292	330
	300	45	225	-/45	G 1	90 (NPS 1/2)	419	380					445	419	457
10	150	65	165	-/65	G 1	90 (NPS 1/2)	330	405	OS 12	*	*	*	485	330	356
	300	65	256	-/65	G 1	90 (NPS 1/2)	457	445					520	457	502

*) on request

***) other nominal size and pressure rating on request

****) jacket connection EN / ANSI 10 mm / 18 mm below valve centre line

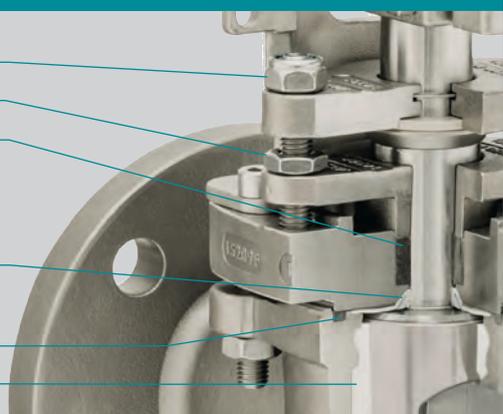
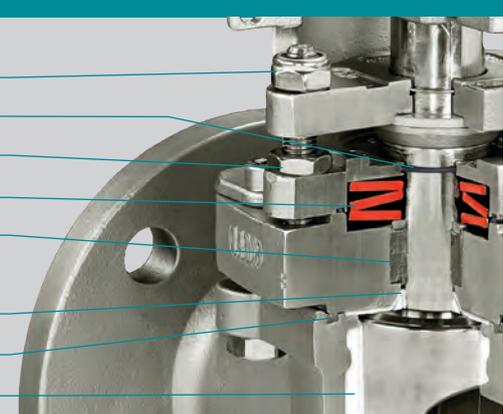
Cover and stem sealing systems suitable for general applications

	<p>Type STANDARD</p> <ul style="list-style-type: none"> ● plug adjustment ● thrust collar ● cover sealing (PTFE) ● stainless steel diaphragm ● Secondary sealing: V-diaphragm (PTFE), delta thrust collar (PTFE) ● Primary sealing: sleeve*
	<p>Type FS2 Fire-Safe-sealing (API 607)</p> <ul style="list-style-type: none"> ● 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*
	<p>Type CA2 Chemistry sealing</p> <ul style="list-style-type: none"> ● 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>Tertiary sealing: triple safety stem packing (graphite)</p> <p>Secondary sealing: V-diaphragm (PTFE) and delta thrust collar (PTFE)</p> <p>cover sealing (graphite)</p> <p>Primary sealing: sleeve*</p>	
<p>Type FSN-EF</p> <p>Emission Free</p> <p>plug adjustment</p> <p>triple safety stem packing adjustment</p> <p>Quaternary sealing: three o-rings at the stem</p> <p>Tertiary sealing: triple safety stem packing</p> <p>Secondary sealing: V-diaphragm (PTFE) and delta thrust collar (PTFE)</p> <p>cover sealing (graphite)</p> <p>Primary sealing: sleeve*</p>	<p>NEW!</p> 
<p>Type FSN-SL</p> <p>live-loaded</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>Tertiary sealing: triple safety stem packing (graphite)</p> <p>Secondary sealing: V-diaphragm (PTFE) and delta thrust collar (PTFE)</p> <p>cover sealing (graphite)</p> <p>Primary sealing: 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

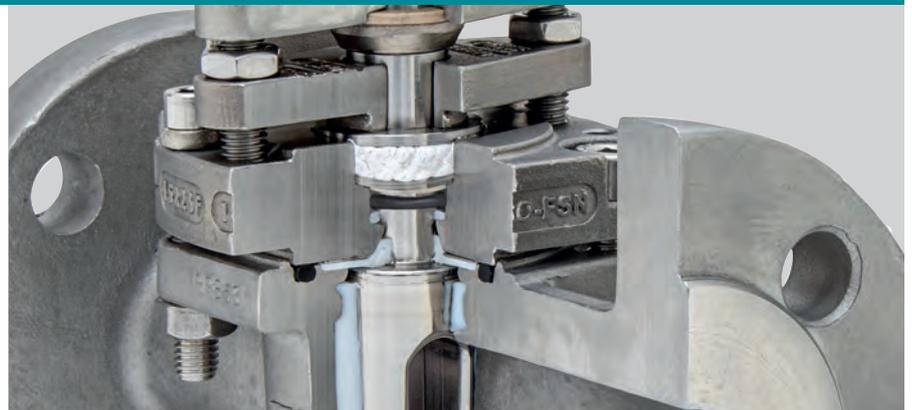
Chevron packing

- 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	Chemistry sealing
<p>lined cover</p>	<p>plug & packing adjustment</p> <p>Tertiary sealing: Packing to atmosphere (PTFE) thrust collar stainless steel diaphragm</p> <p>Secondary sealing: V-diaphragm & delta thrust collar (PTFE)</p> <p>Primary sealing: lined body</p>
	<p>plug adjustment</p> <p>triple safety stem packing adjustment</p> <p>Tertiary sealing: triple safety stem packing (PTFE) to atmosphere</p> <p>Secondary sealing: V-diaphragm (PTFE), delta thrust collar (PTFE)</p> <p>lined cover</p> <p>Primary sealing: lined body*</p>
	<p>live-loaded</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>Tertiary sealing: triple safety stem packing (PTFE) to atmosphere</p> <p>Secondary sealing: V-diaphragm (PTFE), delta thrust collar (PTFE)</p> <p>lined cover</p> <p>Primary sealing: lined body*</p>
	<p>Type SAFE-LINED</p> <p>Chemistry sealing</p>
	<p>Type SAFE-LINED-SL</p> <p>Chemistry sealing</p>

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

Casting materials



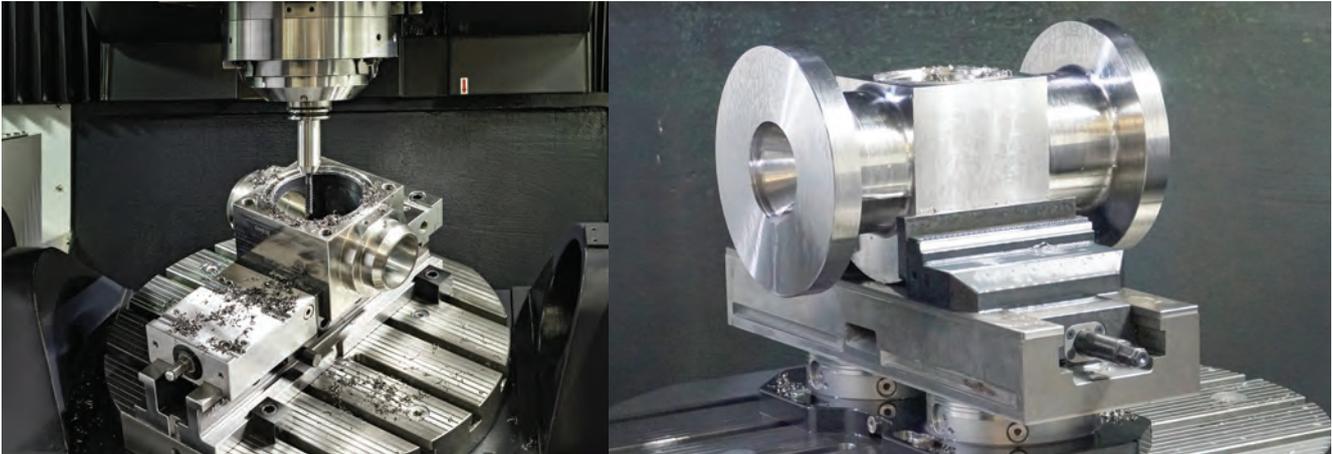
Material Group	Common Name	Casting Material					
		EN / DIN	Short name	Material-No.	ASTM	Grade	UNS
Carbon Steel / Ductile Iron							
Ductile Iron	SG Iron	EN 1563	EN-GJS-400-18-LT	5.3103	A395	-	F32800
Carbon Steel	CS	EN 10213	GP240GH	1.0619	A216	WCB	J03002
Low Temp. Carbon Steel	LTCS	EN 10213	G17Mn5	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



Common Name	Mat.Nr.	Grade	Similar Forged Material						Bar Material	
			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 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



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* 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 resistant, abrasive application	80°C / 176°F

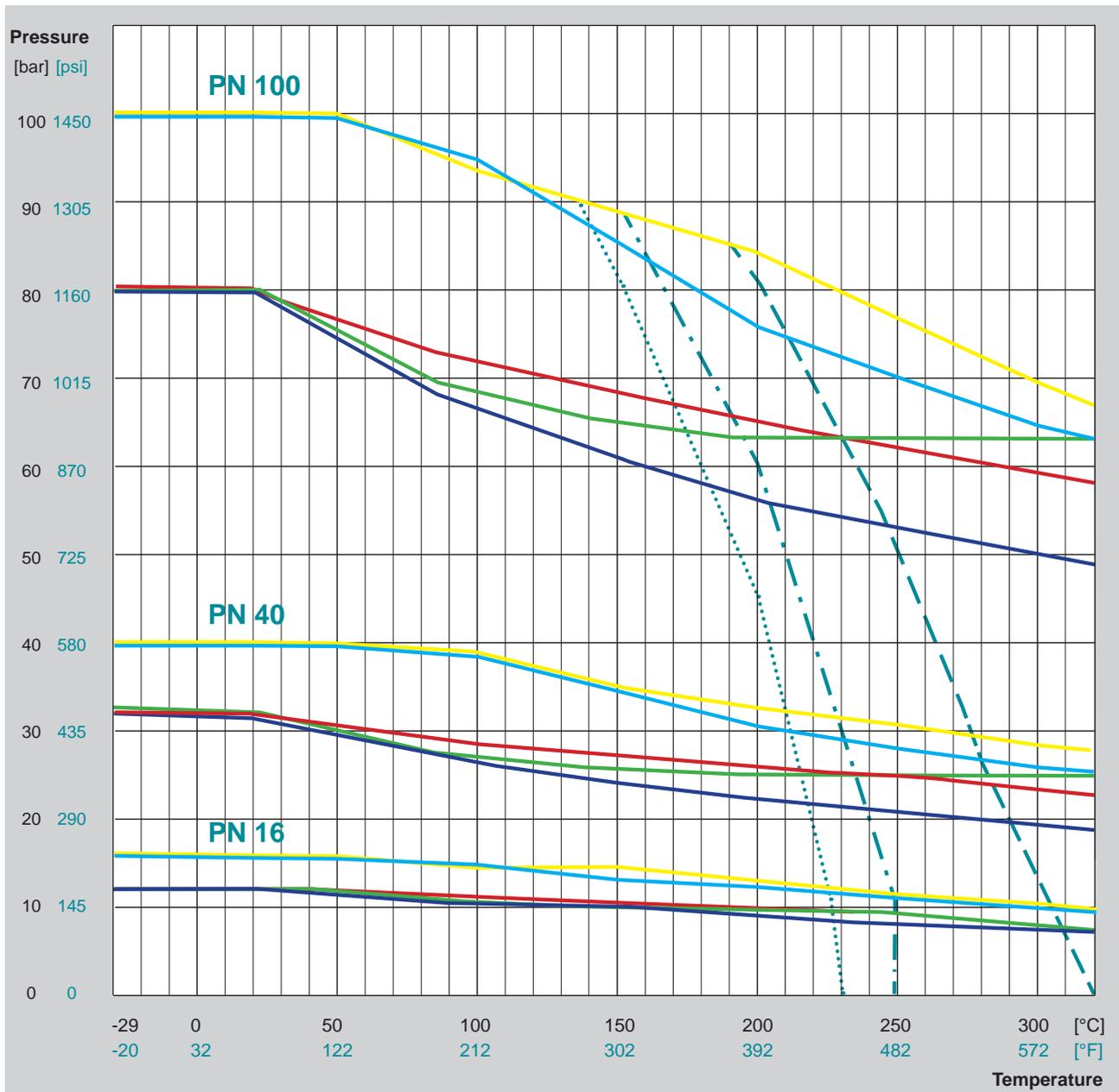
*) sleeve material selection depending on availability at AZ manufacturing site

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

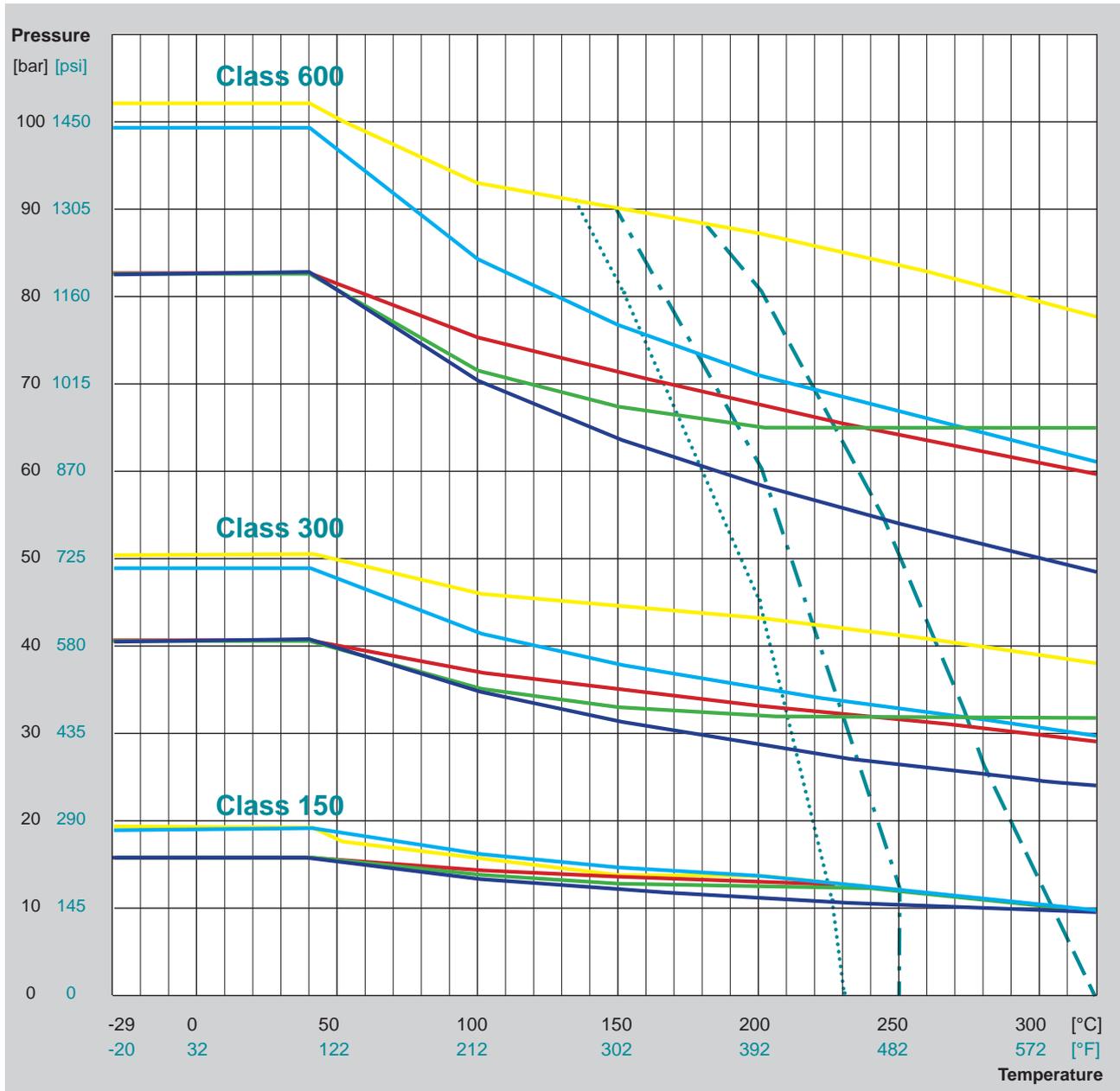
for demanding conditions, such as process temperatures exceeding 200°C / 392°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of sleeve material, cover sealing type and special features.

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

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

IMPORTANT NOTE

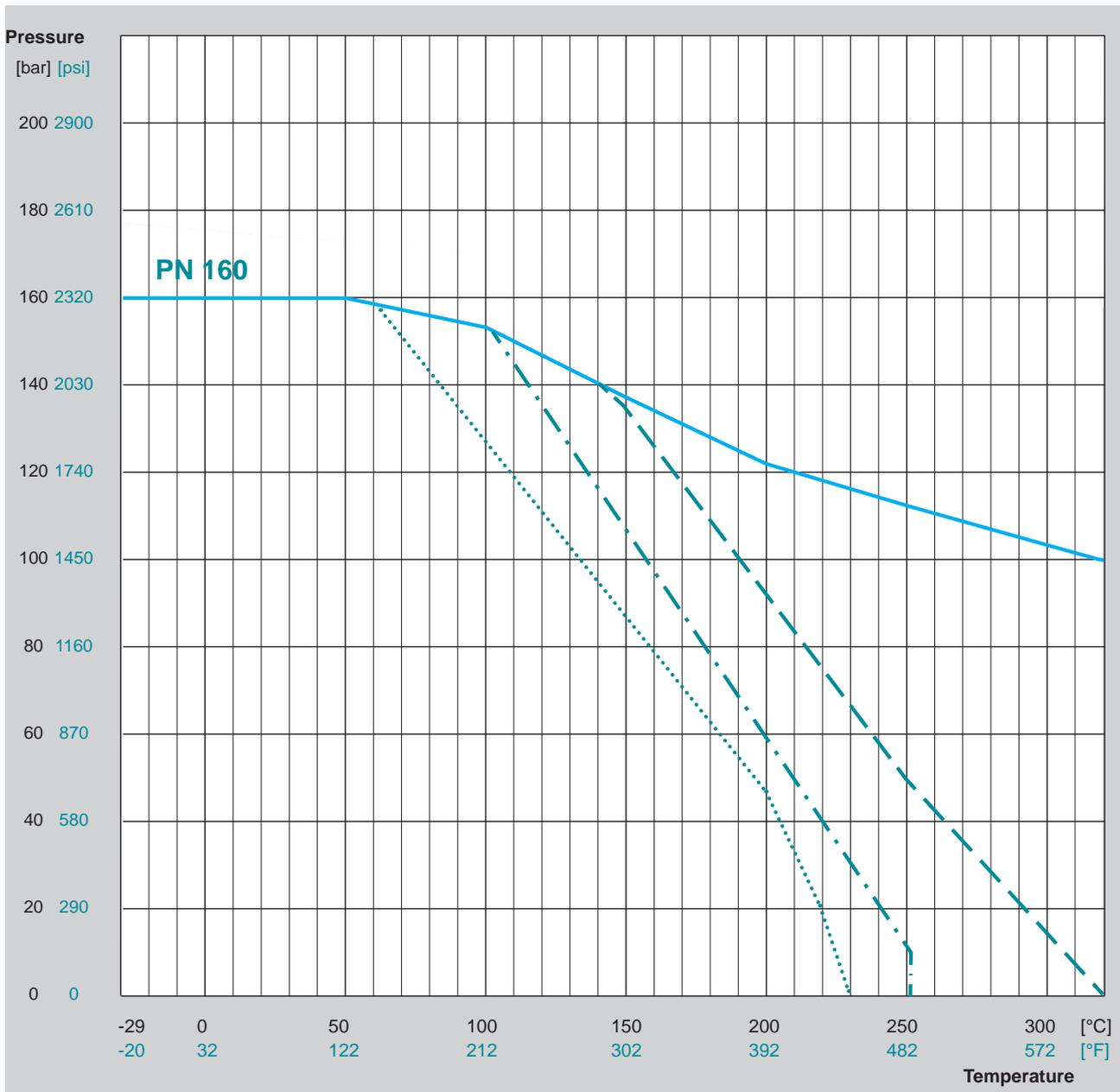
for demanding conditions, such as process temperatures exceeding 200°C / 392°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of sleeve material, cover sealing type and special features.

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

Subject to technical change without notice.

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

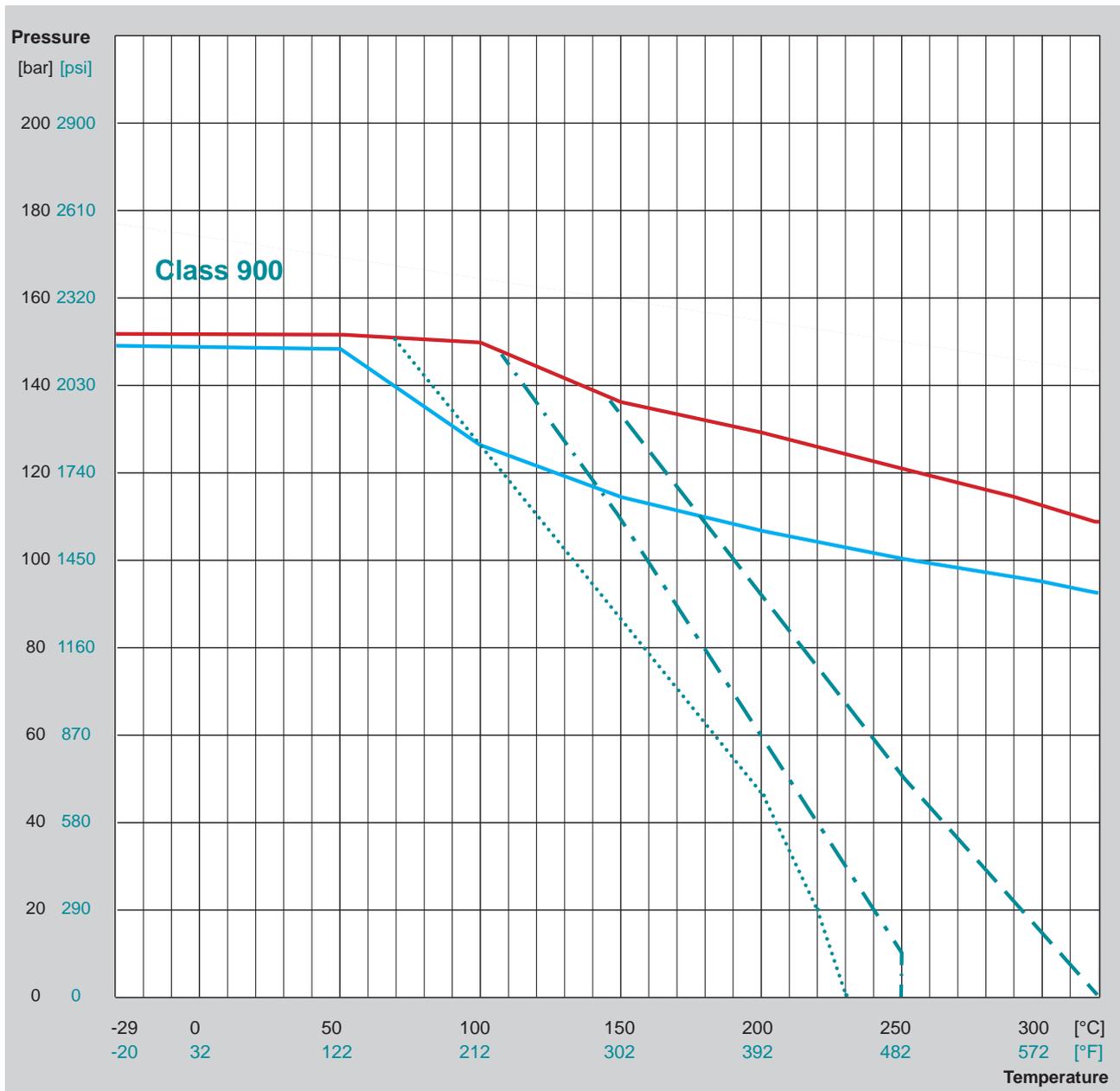
for demanding conditions, such as process temperatures exceeding 200°C / 392°F: Valve size, media phase, plug position & temperature (constant or fluctuating) may have an impact on the lifetime. Consult factory for proper selection of sleeve material, cover sealing type and special features.

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.

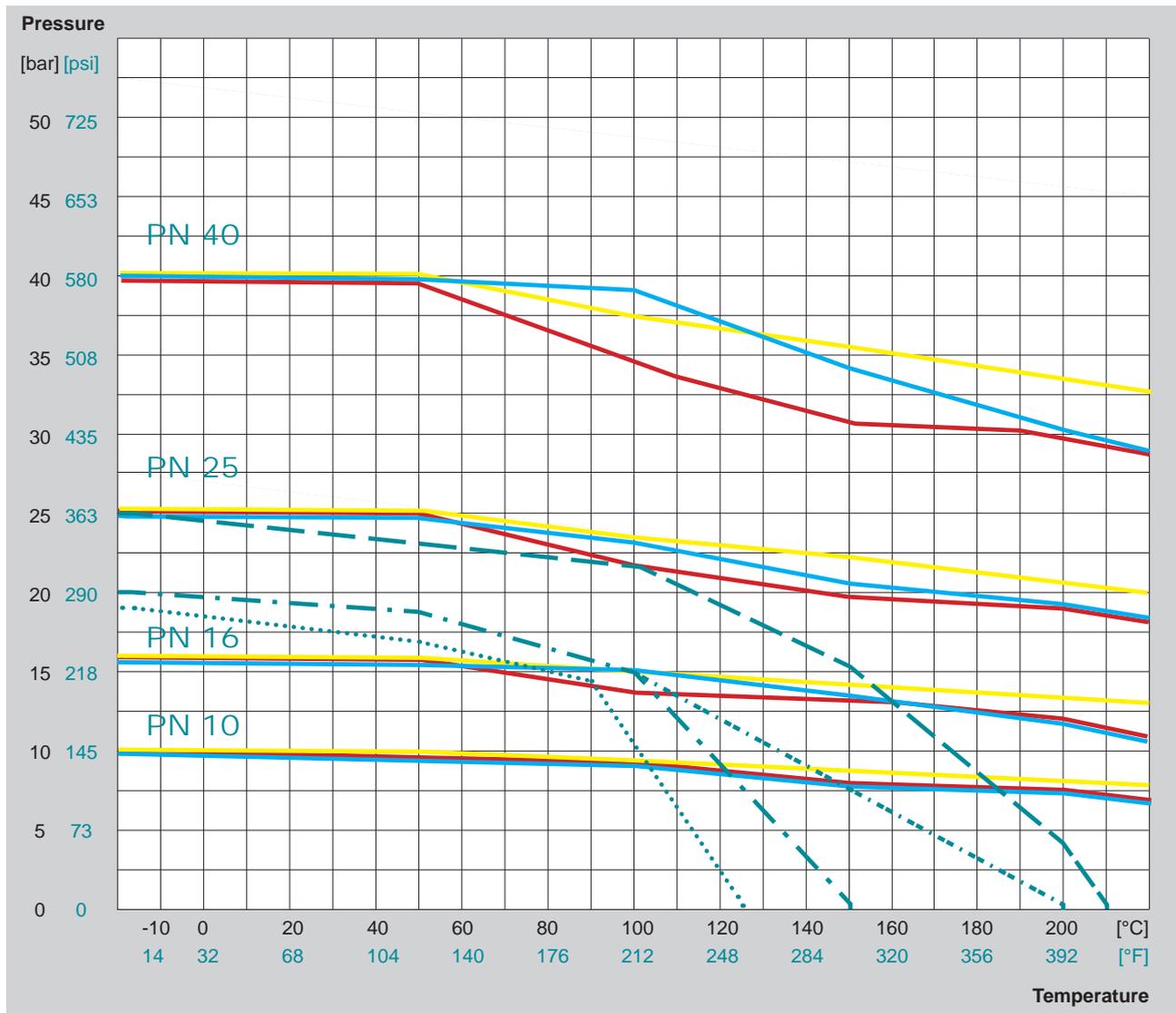
IMPORTANT NOTE

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

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

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

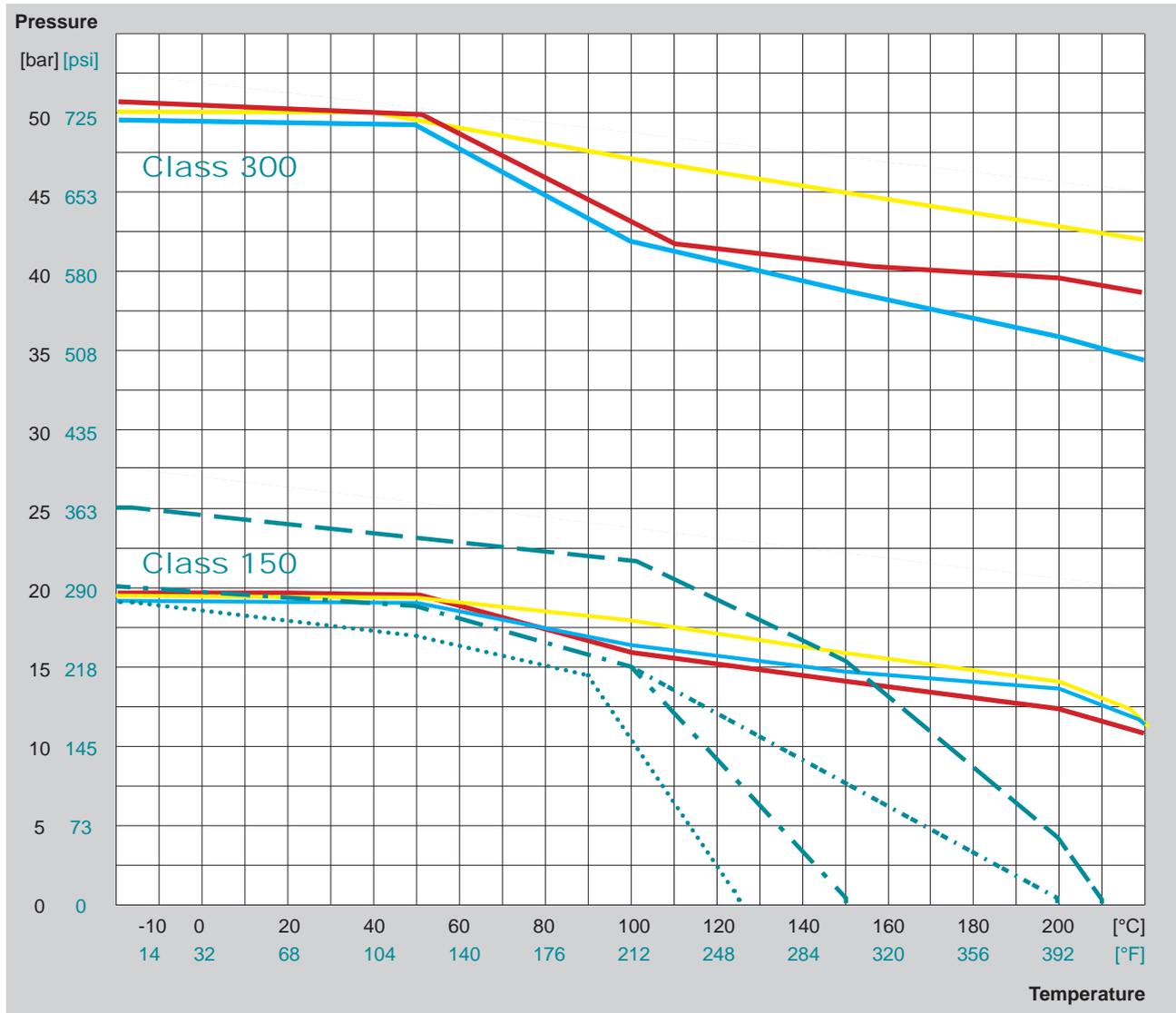
IMPORTANT NOTE

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.

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 _{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

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.

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

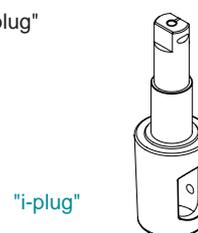
Plugs made of special materials or special designs, e.g. with flushing devices, vent holes in plug bottom or plug upstream / downstream side

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

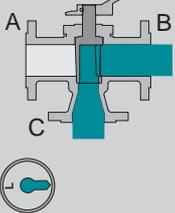
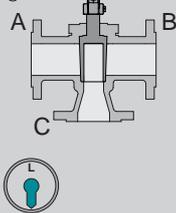
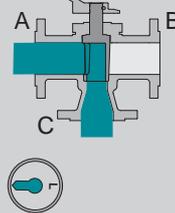
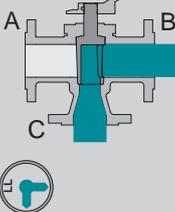
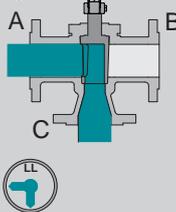
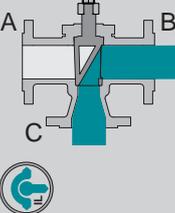
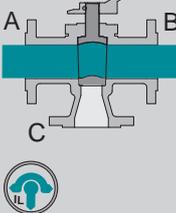
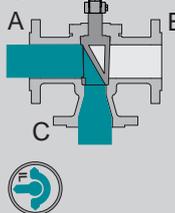
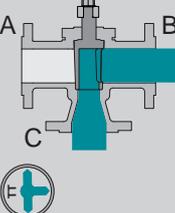
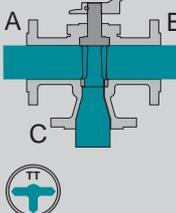
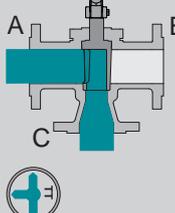


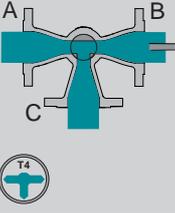
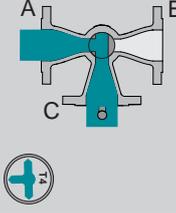
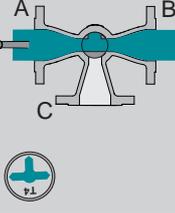
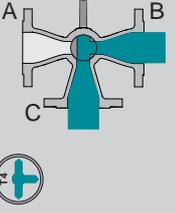
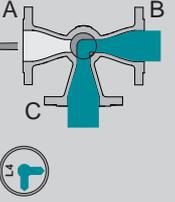
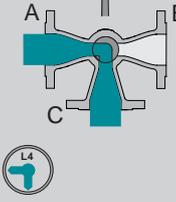
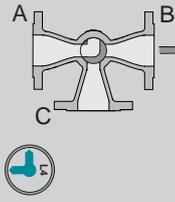
Type F-2-ISO-STANDARD-A

*) 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)
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

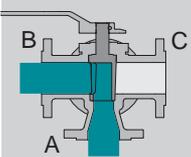
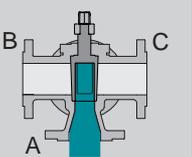
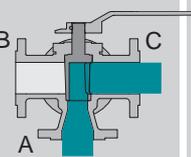
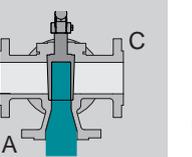
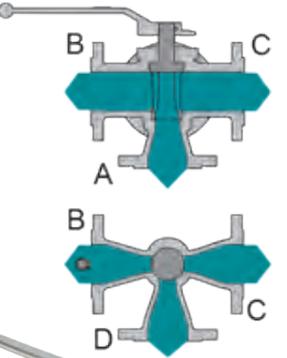
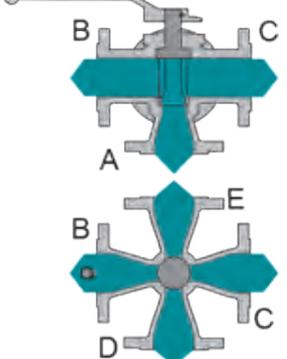
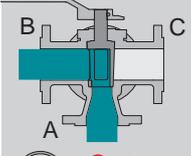
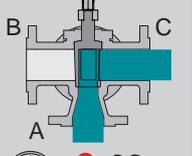
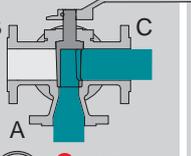
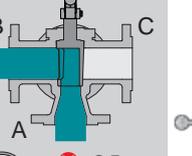
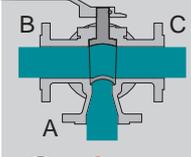
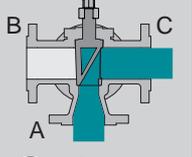
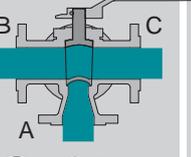
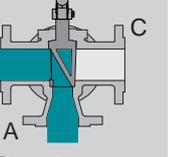
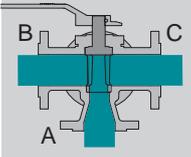
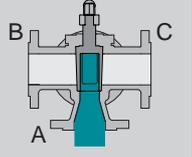
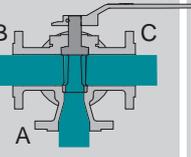
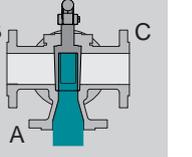
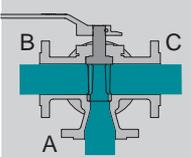
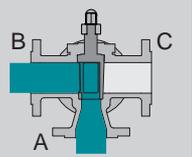
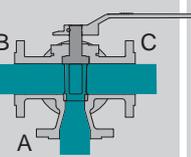
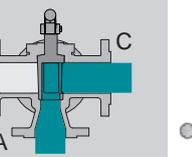
positive overlap

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 				
	T4 				
	LL4 				

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 	 A B C ✓ A-B ✗ C-D-E	 A B C ✓ A-E ✗ B-C-D	 A B C ✓ A-C ✗ B-D-E	 A B C ✓ A-D ✗ B-C-E	 Type F-4-Special-ISO-STANDARD   Type F-5-ISO-STANDARD 
LL 	 A B C ✓ A-B-E ✗ C-D	 A B C ✓ A-C-E ✗ B-D	 A B C ✓ A-C-D ✗ B-E	 A B C ✓ A-B-D ✗ C-E	
IL 	 A B C ✓ A-E + B-C ✗ D	 A B C ✓ A-C + D-E ✗ B	 A B C ✓ A-D + B-C ✗ E	 A B C ✓ A-B + D-E ✗ C	
T 	 A B C ✓ A-B-C ✗ D-E	 A B C ✓ A-D-E ✗ B-C	 A B C ✓ A-B-C ✗ D-E	 A B C ✓ A-D-E ✗ B-C	
TT 	 A B C ✓ A-B-C-D ✗ E	 A B C ✓ A-B-D-E ✗ C	 A B C ✓ A-B-C-E ✗ D	 A B C ✓ A-C-D-E ✗ B	

 open
 closed



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 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 / 397 3665
sales@az-armaturen.co.za
www.az-armaturen.co.za

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

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www.az-armaturen.com