



## SEMPELL

**High pressure forged Sempell valves provide the ideal solution to solve any application problem connected with harsh service conditions, like elevated temperature and pressure ratings.**

### Features

- Sempell gate valves are manufactured by using exclusively high quality forged materials to guarantee a superior performance and to sensibly decrease operating costs and delivery times.
- Valve design in accordance with ASME B16.34, API 600, ISO, DIN, TRD, VGB, TRB, PED standards.
- Applicable for high pressure ratings (PN 720) and for temperature up to 650° C.
- Fully in compliance with the Health, Safety and Environment requirements to avoid any risk of fugitive emissions.
- Sempell valves are in conformity with the European Pressure Equipment Directive n°97/23/EC (CE mark 100% compliance).
- Extraordinary tightness obtained by a specific gasket design and packing in pure graphite.
- Technologically advanced pressure seal bonnet design is offered as standard to ensure a perfect body-bonnet tightness and to facilitate any maintenance operation.
- Standard configuration: flexible split wedge. The wedge guide is welding-free as integral to the valve body.
- Parallel slide configuration available upon request.
- Bolted bonnet design on request.
- Special constructions and materials available to suit any customers' request.



### General application

The Sempell high pressure forged gate valves have been purposely conceived to suit any application in power plants - including the "new generation" power plants which involve temperatures up to 650°C. Thanks to its excellent performance, Sempell valves are also recommended for applications requiring resistance to high pressures and elevated temperatures, such as in chemical, petrochemical and offshore plants.

### Technical data

Pressure ratings : ASME: from 900# to 4500#  
DIN: from PN 160 to PN 720

Body materials : forged carbon steels, alloys steels and stainless steels. All in compliance with ASME and DIN standards

Temperature (°C) : -46 to + 650

Sizes (mm) : 50 – 750 (2"-30")

### Connections standards

Flanges : ASME B16.5.  
Buttweld : ASME B16.25, DIN 2448  
Other connections on request.

# High Pressure Forged Gate Valves

Pressure temperature ratings to ASME

## Test pressure to API 598 and ASME B16.34 (bar)

Temp. °C	Hydrostatic shell test 233			Hydrostatic seat test 171			Pneumatic test >5,6			
	A105 / LF2 (LCB) C22.8 1.046	F11, F12 (WC6) 13CrMo44 1.7335	F22 (WC9) 10CrMo910 1.738	F91 X10CrMoVNb91 1.4903	F316 (CF8M) X6CrNiNb1810 1.455	A105 / LF2 (LCB) C22.8 1.046	F11, F12 (WC6) 13CrMo44 1.7335	F22 (WC9) 10CrMo910 1.738	F91 X10CrMoVNb91 1.4903	F316 (CF8M) X6CrNiNb1810 1.455
	STANDARD CLASS						SPECIAL CLASS			
	Working pressure (bar) ASME 900									
-29 - 38	153,2	155,1	155,1	155,03	148,9	155,2	155,2	155,2	155,03	155,1
50	150,2	153,4	153,6	155,03	144,4	155,2	155,2	155,2	155,03	152,1
100	139,1	146,3	147,1	155,03	126,6	155,2	155,2	155,2	155,03	139,2
150	135,7	139,1	139,9	150,55	115,5	155,2	155,2	155,2	155,03	125,8
200	131,5	136,4	134,5	145,72	107	155,2	155,2	155,2	155,03	118,8
250	125,2	133,4	132,7	137,46	100,2	155,2	155,2	153	155,03	111,4
300	116,2	127,3	127,3	125,05	94,9	149,6	155,2	152,5	155,03	105,8
350	110,9	120,7	120,7	121,61	91,3	144,4	147,5	152,3	151,58	101,5
400	103,5	109,8	109,8	109,9	87,3	129,4	137,2	150,7	150,55	97,5
425	86,3	105,3	105,3	105,07	86	107,8	131,6	149,1	148,82	96
450	60,1	101,4	101,4	100,59	84,2	75,1	126,8	141,5	139,87	94
500	26,4	83,4	83,4	93,02	80,5	33	104,2	107,1	124,02	89,8
525	15,5	60,8	65,8	79,92	78,9	19,4	76	82,2	97,49	88,8
550		38,3	49,1	75,1	74,9		47,9	61,4	86,81	88,8
600		17,6	22,9	62,35	64,3		22,1	28,6	77,86	80,4
650				29,63	42,4				37,21	53

## Test pressure to API 598 and ASME B16.34 (bar)

Temp. °C	Hydrostatic shell test 388			Hydrostatic seat test 285			Pneumatic test >5,6			
	ASME 1500									
	-29 - 38	255,3	258,6	258,6	258,37	248,1	258,6	258,6	258,6	258,37
50	250,4	255,7	256	258,37	240,6	258,6	258,6	258,6	258,37	251,8
100	231,9	243,8	245,2	250,80	211	258,6	258,6	258,6	258,37	224,6
150	226,1	231,9	233,2	243,22	192,5	258,6	258,6	258,6	258,37	202
200	219,1	227,4	224,2	229,09	178,4	258,6	258,6	258,6	258,37	182,1
250	208,6	222,3	221,1	208,42	166,9	258,6	258,6	255	258,37	170,3
300	193,7	212,1	212,1	202,57	158,1	249,3	258,6	254,2	258,37	162
350	184,8	201,2	201,2	195,68	152,1	240,6	245,8	253,8	252,52	156,3
400	172,5	182,9	182,9	183,27	145,6	215,6	228,7	251,1	251,14	153,2
425	143,8	175,5	175,5	175,01	143,3	179,7	219,3	248,3	248,04	150,9
450	100,2	169	169	167,77	140,4	125,2	211,3	235,9	233,23	149,5
500	44	139	139	154,68	134,1	55	173,7	178,5	206,7	144,9
525	25,9	101,3	109,6	132,98	131,5	32,4	126,7	137	162,60	141
550		63,8	81,8	125,40	124,8		79,8	102,3	145,03	136,3
600		29,4	38,2	104,04	107,2		36,8	47,7	129,88	104,5
650				49,61	70,6				62,01	65,7

## Test pressure to API 598 and ASME B16.34 (bar)

Temp. °C	Hydrostatic shell test 646			Hydrostatic seat test 474			Pneumatic test >5,6			
	ASME 2500									
	-29 - 38	425,5	431	431	430,62	413,6	431	431	431	430,62
50	417,3	426,2	426,7	430,62	401	431	431	431	430,62	422,4
100	386,5	406,4	408,7	418,22	351,7	431	431	431	430,62	386,6
150	376,9	386,4	388,6	405,13	320,9	431	431	431	430,62	349,4
200	365,2	379	373,7	381,71	297,3	431	431	431	430,62	330,1
250	347,7	370,6	368,5	347,26	278,2	431	431	425	430,62	309,4
300	322,8	353,5	353,5	337,95	263,6	415,5	431	423,6	430,62	293,9
350	308	335,3	335,3	325,90	253,8	401,1	409,7	423,1	420,98	282,1
400	287,5	304,9	304,9	305,23	242,6	359,4	381,5	418,5	418,22	270,8
425	239,6	292,5	292,5	291,45	238,9	299,6	365,6	414,1	413,4	266,6
450	166,9	281,7	281,7	279,73	234	208,7	352,1	393,1	388,94	261,2
500	73,3	231,6	231,6	258,03	223,6	91,6	289,6	297,5	344,5	249,5
525	43,2	168,9	182,7	221,86	219,1	53,9	211,1	228,4	270,78	224,5
550		106,4	136,4	208,77	208		133	170,4	241,49	224,5
600		49	63,6	173,28	178,6		61,3	79,5	216,69	223,3
650				82,68	117,1				103,35	197,1

# High Pressure Forged Gate Valves

Pressure temperature for ISO materials

Pressure rating									
	TT 5	1.0460 (GS-C25)	15Mo3 (GS 22Mo4)	13CrMo44 (GS 17CrMo55)	15NiCuMoNb5	10CrMo910 (GS18CrMo910)	X10CrMoVNB91	X6CrNiNb1810	
	1.0411		1.5415	1.7335	1.6368	1.7380	1.4903	1.455	
	LF2 (LCB)	A105 (WCB)	F1	F11, F12 (WC6)		F22 (WC9)	F91	F316 (CF8M)	
Temp. °C	Working pressure (bar)								
	Pressure rating 09 (PN 160)								
-50	200								166
-29 - 38	200	200	220		320				166
50	192	192	220		320				157
100	185	185	220		320				148
150	168	168	195		320				137
200	150	150	175		320				130
250	130	130	165	185	320				125
300	115	115	140	172	320				115
350	95	95	135	165	320				110
400	81	81	130	155	320				105
425	64	64	128	150	275				102
450	58	58	125	145	230	155	200		100
500			82	130		135	183		95
520			47	88		102	153		93
540			35	55		77	136		92
550				45		65	120		90
575						40	90		85
600							68		80
625							50		65
650							35		60
	Pressure rating 15 (PN 250)								
-50	290								275
-29 - 38	290	290	335		420				275
50	280	280	335		420				255
100	275	275	320		420				240
150	260	260	300		420				230
200	236	236	275		420				220
250	205	205	255	295	420				200
300	180	180	220	275	420				190
350	152	152	210	255	420				180
400	124	124	205	240	420				175
425	107	107	200	232	372				170
450	94	94	195	225	311	240	356		165
500			130	202		210	300		160
520			77	132		160	252		150
540				88		120	211		146
550				65		103	193		142
575						68	153		125
600							105		110
625							78		80
650							54		70
	Pressure rating 25 (PN 500)								
-50	455								455
-29 - 38	455	455	520		695				455
50	455	455	520		695				440
100	455	455	520		695				400
150	405	405	482		695				360
200	380	380	465		695				340
250	345	345	425	440	695				320
300	285	285	372	408	695				310
350	227	227	355	384	695				300
400	190	190	315	360	695				290
425	165	165	310	350	615				275
450	142	142	298	335	510	360	520		270
500				258		315	450		260
520				185		230	385		250
540				130		185	320		235
550				100		146	285		230
575						100	215		
600							150		220
625							108		170
650							65		150

# High Pressure Forged Gate Valves

## Materials to ASTM and ISO

### Materials to ASME

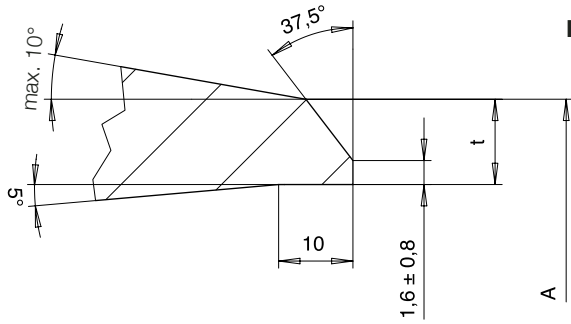
ASTM Standard	Chemical Requirements								Mechanical Properties			
	Composition %								R	S min	A min	C min
	C	Mn	P	S	Si	Cr	Mo	Ni	Mpa	Mpa	%	%
<b>Forged Body</b>												
A 105N	0,25	0,6-1,05	max 0,04	max 0,04	max 0,35	-	-	-	485 min	240	22	30
A 182 F1	max 0,25	0,6-0,9	max 0,045	max 0,045	max 0,35	-	-	0,44-0,65	485 min	270	20	30
A 182 F11 (F12)	0,1-0,2	0,3-0,8	max 0,04	max 0,04	0,15-0,6	0,8-1,25	0,44-0,65	-	485 min	300	20	30
A 182 F22	0,05-0,15	0,3-0,6	max 0,04	max 0,04	max 0,5	2,0-2,5	0,87-1,13	-	515 min	300	20	30
A 182 F5	max 0,15	0,3-0,6	max 0,03	max 0,03	max 0,5	4,0-6,0	0,44-0,65	max 0,5	485 min	275	20	35
A 182 F9	max 0,15	0,3-0,6	max 0,03	max 0,03	0,5-1,0	8,0-10,0	0,9-1,1	-	585 min	380	20	40
A 182 F91	0,08-0,12	0,3-0,6	max 0,02	max 0,01	0,2-0,5	8,0-9,5	0,85-1,05	max 0,4	585 min	415	20	40
A 182 F304	max 0,08	max 2,0	max 0,04	max 0,03	max 1,0	18,0-20,0	-	8,0-11,0	515 min	205	30	50
A 182 F316	max 0,08	max 2,0	max 0,04	max 0,03	max 1,0	16,0-18,0	2,0-3,0	10,0-14,0	515 min	205	30	50
A 182 F321	max 0,08	max 2,0	max 0,03	max 0,03	max 1,0	min 17,0	Ti 0,1-0,18	9,0-12,0	515 min	205	30	50
A 350 LF2	0,35	max 1,35	max 0,035	max 0,04	0,15-0,3	max 0,3	max 0,12	max 0,9	485 min	240	22	30
<b>Stem</b>												
A 182 F6 cl.2	max 0,15	max 1,0	max 0,04	max 0,03	max 1,0	11,5-13,5	-	max 0,5	585 min	380	18	35
A 182 F304	max 0,08	max 2,0	max 0,04	max 0,03	max 1,0	18,0-20,0	-	8,0-11,0	515 min	205	30	50
A 182 F316	max 0,08	max 2,0	max 0,04	max 0,03	max 1,0	16,0-18,0	2,0-3,0	10,0-14,0	515 min	205	30	50
A 182 F321	max 0,08	max 2,0	max 0,03	max 0,03	max 1,0	min 17,0	Ti 0,1-0,18	9,0-12,0	515 min	205	30	50
A 638 Gr.660	max 0,08	max 2,0	max 0,04	max 0,03	max 1,0	13,5-16,0	1,0-1,5	24,0-27,0	895 min	585	15	18
A 564 Type 630												
17.4 PH	max 0,07	max 1,6	max 0,04	max 0,03	max 1,0	15,0-17,5	Co 3,0-5,0	3,0-5,0	930 min	725	16	50
<b>Cast Body</b>												
A 216 WCB	max 0,3	max 1,0	max 0,04	max 0,045	max 0,6	-	-	-	485-655	250	22	35
A 352 LCB	max 0,3	max 1,0	max 0,04	max 0,045	max 0,6	-	-	-	450-620	240	24	35
A 217 WC6	max 0,2	0,5-0,8	max 0,04	max 0,045	max 0,6	1,0-1,5	0,45-0,65	-	485-655	275	20	35
A 217 WC9	max 0,18	0,4-0,7	max 0,04	max 0,045	max 0,6	2,0-2,75	0,9-1,2	-	485-655	275	20	35
A 217 C5	max 0,2	0,4-0,7	max 0,04	max 0,045	max 0,75	4,0-6,5	0,45-0,65	-	620-795	415	18	35
A 217 C12	max 0,2	0,35-0,65	max 0,04	max 0,045	max 1,0	8,0-10,0	0,9-1,2	-	620-795	415	18	35
A 217 CA15	max 0,15	max 1,0	max 0,04	max 0,04	max 1,5	11,5-14,0	max 0,5	max 1,0	620-795	450	18	30
A 351 CF3M	max 0,03	max 1,5	max 0,04	max 0,04	max 1,5	17,0-21,0	2,0-3,0	9,0-13,0	485 min	205	30	-
A 351 CF8M	max 0,08	max 1,5	max 0,04	max 0,04	max 1,5	18,0-21,0	2,0-3,0	9,0-12,0	485 min	205	30	-
<b>Bolts and Nuts</b>												
A 193 B7	0,37-0,49	0,65-1,1	max 0,035	max 0,04	0,15-0,35	0,75-1,2	0,15-0,25	-	-	720		
A 193 B16	0,36-0,47	0,45-0,7	max 0,035	max 0,04	0,15-0,35	0,8-1,15	0,5-0,65	V 0,25-0,35	860	725		
A 193 B8	max 0,08	max 2,0	max 0,045	max 0,03	max 1,0	18,0-20,0	-	8,0-10,5	205			
A 320 L7	0,38-0,48	0,75-1,0	max 0,035	max 0,04	0,15-0,35	0,8-1,1	0,15-0,25	-				
A 307 B	-	-	max 0,04	max 0,05	-	-	-	-				
A 194 2H	min 0,4	max 1,0	max 0,04	max 0,05	max 0,4	-	-	-				
A 194 4	0,4-0,5	0,7-0,9	max 0,035	max 0,04	0,15-0,35	-	0,2-0,3	-				
A 194 8	max 0,08	max 2,0	max 0,045	max 0,03	max 1,0	18,0-20,0	-	8,0-10,5				

### Materials to ISO

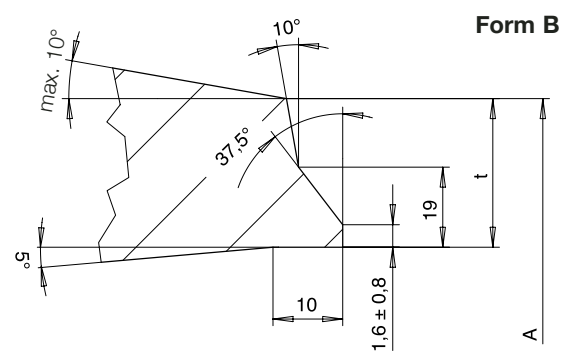
No.	DIN Type	Chemical Requirements									Mechanical Properties				
		Composition %									R Mpa	S min Mpa	A min %	C min %	
		C	Mn	P	S	Si	Cr	Mo	Nb	Ni					
<b>Forged Body</b>															
1.0460	C22.8	max 0,25	0,3-0,6	0,045	0,045	0,15-0,35	-	-	-	-	-	485-520	240	22	30
1.5415	15Mo3	0,12-0,2	0,5-0,7	0,04	0,04	0,15-0,35	-	0,25-0,35	-	-	-	485-530	270	22	30
1.7335	13CrMo44	0,1-0,18	0,4-0,7	0,04	0,04	0,15-0,35	0,7-1,0	0,4-0,5	-	-	-	min 490	300	20	30
1.7380	10CrMo910	max 0,15	max 0,5	0,04	0,04	max 0,5	2,3	1,0	-	-	Cu	min 520	300	20	35
1.6368	15NiCuMoNb5	max 0,17	0,8-1,2	0,035	0,035	max 0,5	max 0,3	max 0,4	max 0,8	1,0-1,3	max 0,8	620-760	430	16	-
1.4903	X10CrMoVNb91	max 0,15	0,3-0,6	0,03	0,03	0,5-1,0	8,0-10,0	0,9-1,1	max 0,5	-	Ti	750-900	560	20	30
1.4541	X10CrNiTi189	max 0,1	max 2,0	0,045	0,03	max 1,0	-	-	-	9,0-11,5	>5xC	min 485	295	30	50
1.4550	X10CrNiMo189	max 0,1	max 2,0	0,045	0,03	max 1,0	17,0-19,0	1,9-1,0	-	9,0-11,5	>5xC	min 485	295	30	50
1.4571	X10CrNiMoTi18.10	max 0,1	max 2,0	0,045	0,03	max 1,0	16,5-18,5	2,0-2,5	-	10,5-13,5	>5xC	min 485	205	30	50
1.0411	TT5	0,22-0,29	0,9-0,7	0,045	0,045	max 0,4	-	-	-	-	-	485-520	240	22	30
<b>Stem</b>															
1.4021	X20Cr13	0,17-0,22	max 1,0	0,045	0,03	max 1,0	12,0-14,0	-	-	-	-	600-900	450	12	-
1.4122	X35CrMo17	0,33-0,45	max 1,0	0,045	0,03	max 1,0	16,5	-	-	8,0-10,0	-	760-900	600	14	-
1.4057	X22CrNi17	0,17-0,25	max 1,0	0,045	0,03	max 1,0	16,0-18,0	1,15	-	max 1,0	-	760-900	600	9	-
1.4980	X5NiCrTi26,15	max 0,08	max 2,0	0,045	0,03	max 1,0	13,5-16,0	max 1,5	max 0,5	24,0-27,0	max 2,3	900-1100	650	30	50
<b>Cast Body</b>															
1.0614	GS-C25	0,18-0,23	0,5-0,8	0,05	0,05	0,3-0,5	max 0,3	-	-	-	-	450-600	290	22	35
1.5419	GS-22Mo4	0,18-0,23	0,5-0,8	0,04	0,04	0,3-0,5	max 0,3	-	-	-	-	450-600	270	24	35
1.7357	GS-17CrMo55	0,15-0,2	0,6-0,8	0,04	0,04	0,3-0,5	1,0-1,5	-	-	-	-	485-655	275	24	35
1.7379	GS-18CrMo910	0,12	0,6	0,04	0,04	0,4	2,25	-	-	-	-	485-655	275	20	35
1.4562	GX7CrNiMo189	max 0,08	max 1,5	0,045	0,03	max 1,5	17,5-20,0	-	-	9,0-10,0	-	min 485	205	30	-
<b>Bolts and Nuts</b>															
1.1181	CK35	0,32-0,4	0,4-0,7	0,035	0,035	0,15-0,35	max 0,5	-	-	-	-	500-600	280	22	-
1.7258	29CrMo55	0,20-0,29	0,5-0,8	0,035	0,035	0,15-0,35	0,9-1,2	0,2-0,3	-	max 0,6	-	600-750	450	18	-
1.7709	24CrMoV55	0,20-0,29	0,3-0,6	0,035	0,035	0,15-0,35	1,2-1,5	0,5-0,6	-	max 0,6	-	700-950	550	17	-
1.4301	X5CrNi189	max 0,07	max 2,0	0,045	0,03	max 1,0	17,0-20,0	-	-	9,0-11,5	-	500-700	320	45	-
1.4921	X19CrMo121	0,19	max 0,8	0,045	0,03	max 0,5	11-12,5	max 1,3	-	-	-	750-900	550	14	-
1.4923	X22CrMoV121	0,22	max 0,7	0,045	0,03	max 0,4	10,5-12,5	max 1,2	-	max 0,8	-	850-950	600	14	-

# High Pressure Forged Gate Valves

## Butt Welding Ends



Form A

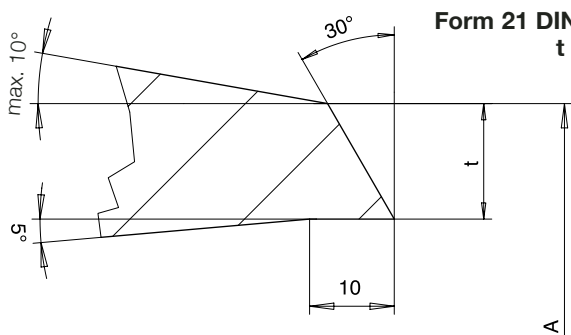


Form B

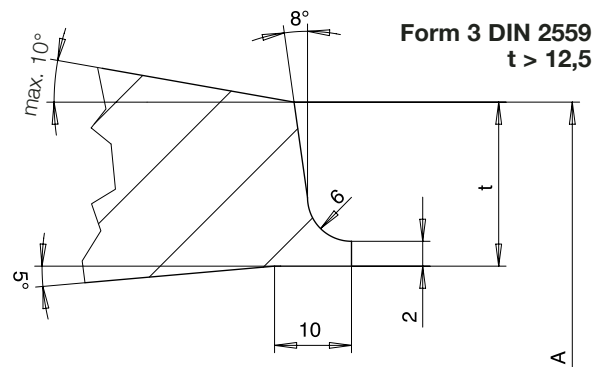
### Butt Welding Ends for Forged Steel Valves to ASME B16.25

ND	ND	A	t											
			sch.std	sch.XS	sch.40	sch.60	sch.80	sch.100	sch.120	sch.140		sch.160	sch.XXS	
50	2"	60,3	3,91	5,54	3,91		5,54				8,74	11,07		
65	2 1/2"	73	5,16	7,01	5,16		7,01				9,53	14,02	Form A	
80	3"	88,9	5,49	7,62	5,49		7,62				11,13	15,24		
100	4"	114,3	6,02	8,56	6,02		8,56		11,13		13,49	17,12		
125	5"	141,3	6,55	9,53	6,55		9,53		12,7		15,88	19,05		
150	6"	168,3	7,11	10,97	7,11		10,97		14,27		18,26	21,95		
200	8"	219,1	8,18	12,7	8,18	10,31	12,7	15,09	18,26	20,62	23,01	22,23		
250	10"	273,1	9,27	12,7	9,27	12,7	15,09	18,26	21,44	25,4	28,58	25,4		
300	12"	323,9	9,53	12,7	10,31	14,27	17,48	21,44	25,4	28,58	33,32	25,4		
350	14"	355,6	9,53	12,7	11,13	15,09	19,05	23,83	27,79	31,75	35,71		Form B	
400	16"	406,4	9,53	12,7	12,7	16,66	21,44	26,19	30,96	36,53	40,49			
450	18"	457	9,53	12,7	14,27	19,05	23,83	29,36	34,93	39,67	45,24			
500	20"	508	9,53	12,7	15,09	20,62	26,19	32,54	38,1	44,45	50,01			
550	22"	559	9,53	12,7		22,23	28,58	34,93	41,28	47,63	53,98			
600	24"	610	9,53	12,7	17,48	24,61	30,96	38,89	46,02	52,37	59,54			

Note: Dimensions in mm



Form 21 DIN 2559  
t ≤ 12,5



Form 3 DIN 2559  
t > 12,5

### Butt welding Ends for Forged Steel Valves to DIN 2448

ND	ND	PN 09 (160)		Pipe		PN 15 (250)		Pipe		PN 25 (500)		Pipe		DIN 2559
		ANSI 900	t	DIN 2448	t	ANSI 1500	t	DIN 2448	t	ANSI 2500	t	DIN 2448	t	
10		18	2,5	17,2	2	18	3	17,2	2,6	18	3	17,2	2,6	
15	1/2"	22	2,5	21,3	2	22	3	21,3	2,6	22	3,5	21,3	3,2	Form 21
25	1"	34	3,5	33,7	3,2	35	4	33,7	3,6	35	4,5	33,7	5	
40	1 1/2"	49	4	48,3	3,6	49	5,5	48,3	5	49	7	48,5	6,3	
50	2"	61	4,5	60,3	4	61	7	60,3	8	65	9	63,5	8	
65	2 1/2"	77	6	76,1	5,6	77	9	76,1	8,8	90	12,5	88,9	11	
80	3"	90	7	88,9	6,3	104	12,5	101,6	11	104	14	101,6	12,5	
100	4"	115	9	114,3	8	129	16	127	14,2	135	18	133	16	
125	5"	141	11,5	139,7	10	155	18	152,4	16	172	23	168,3	20	
150	6"	170	14,5	168,3	12,5	181	20	177,8	17,2	198	28,5	193,7	25	
175	7"	195	14,5	193,9	14,2	220	25	219	25	225	30	-	-	
200	8"	222	18,5	219,1	16	248	28,5	244,5	25	248	34	244,5	30	
250	10"	276	23	273	20	303	36	298,5	32	328	45	323,9	40	Form 3
300	12"	328	25,5	323,9	22,2	364	42			377	48,5			
350	14"	375	27,5			405	42,5			432	56			
400	16"	444	32			480	50			512	66			
450	18"	512	36			556	58			592	76			
500	20"	553	39			606	63							
600	24"	677	48,5											

t : minimum wall thickness A = outside pipe diameter

# High Pressure Forged Gate Valves

## Calculation of Pressure Drop I

The coefficient CV is the flow rate of water in gallons per minute at 60°F flowing through a valve with a pressure drop of 1 psi. We have determined from calculation and flow test the coefficients for different valve types and sizes. The results are shown in the table.

$$K_V = C_V \times 0.85$$

$K_V$  is the metric equivalent of  $C_V$

### For liquids

$$Q_L = C_V \sqrt{\frac{\Delta P}{G_L}}$$

Where:

$Q_L$  = Flow in U.S Gallons for minute

$\Delta P$  =  $(P_1 - P_2)$  Pressure Drop in psi

$G_L$  = Specific Gravity of Liquid

(Water= 1 at 60°F)

$$\Delta P = G_L \left( \frac{Q_L}{C_V} \right)^2$$

### For gases

$$Q_G = 1360 C_V \sqrt{\frac{\Delta P}{G_G T}} \sqrt{\frac{P_1 + P_2}{2}}$$

Where:

$Q_G$  = Volumetric Flow of gas (SCFH)

$G_G$  = Specific Gravity of Gas at Standard

Conditions (Air at atmosphere and

60°F=1)

$T$  = Absolute Temperature of Gas (°F +460)

$\Delta P$  =  $(P_1 - P_2)$  Pressure Drop in psi

$$\Delta P = P_1 - \sqrt{P_2^2 - 2G_G T \left( \frac{Q_G}{1360 C_V} \right)^2}$$

### For steam

$$W = \frac{2.1}{1 + 0.0007 T_S} C_V \sqrt{\Delta P (P_1 + P_2)}$$

Where:

$$K = \left( \frac{1 + 0.0007 T_S}{2.1 C_V} \right) W$$

and

$W$  = Pounds per hour of steam

$\Delta P$  =  $(P_1 - P_2)$  Pressure Drop in psi

$T_S$  = Degree of Superheat (°F)

$$\Delta P = P_1 - \sqrt{P_2^2 - K^2}$$

**Note:** For Saturated Steam  $T_S = 0$

### $C_V$ Flow Coefficient Table

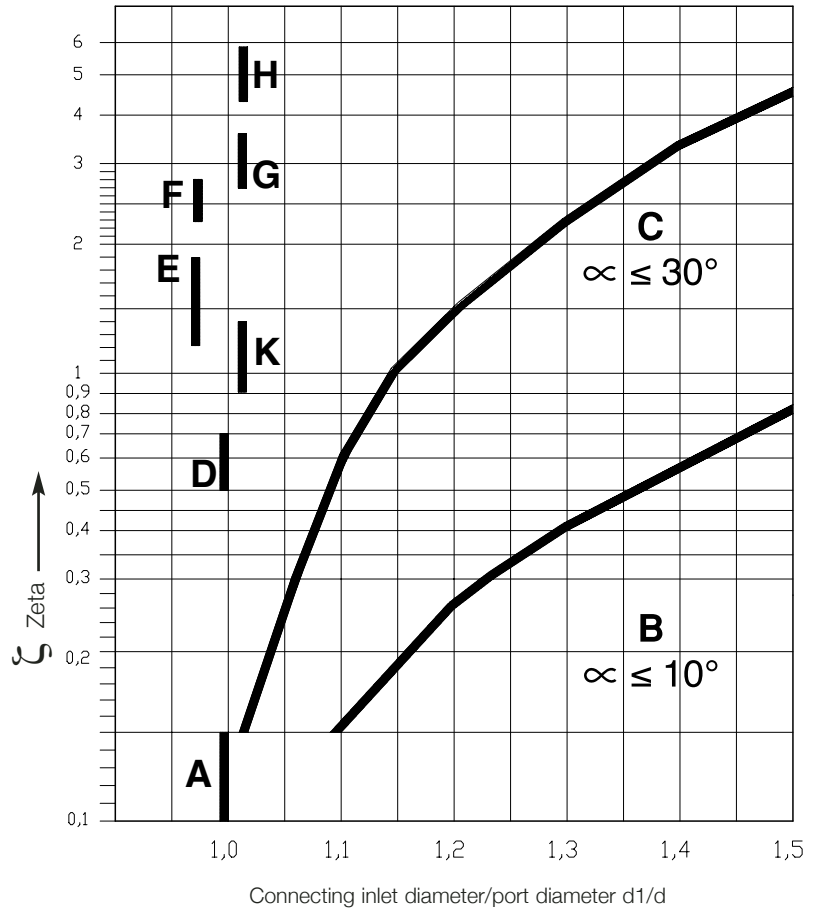
Type		Pressure Seal Gate			
Pressure	mm	ASME 900	ASME 1500	ASME 2500	ASME 4500
		DIN PN	DIN PN	DIN PN	DIN PN
Size	mm	09 (160)	15 (250)	25 (320)	45 (400)
2 1/2"	65	450	320	300	300
3"	80	520	480	410	410
4"	100	780	950	700	500
6"	150	2600	2200	2100	1900
8"	200	4400	3700	3000	2400
10"	250	6900	5600	4900	3200
12"	300	9500	8200	7600	6000
14"	350	12000	11000	9000	
16"	400	16000	12800	10800	
18"	450	18500	15500	11300	
20"	500	23500	20000	13000	

# High Pressure Forged Gate Valves

## Calculation of Pressure Drop II

### Notes

- A Gate Valve with connecting inlet  $d_1=d$   
Port Diameter
- B,C Gate Valve with connecting inlet  $d_1 > d$   
Port Diameter
- D Swing Check Valve
- E Angle Globe Valve Cast Steel
- F Angle Globe Valve Forged Steel
- G Straight Globe Valve Cast Steel
- H Straight Globe Valve Forged Steel
- K Y-Type Forged Steel



### Notes

- $\Delta p$  (bar) = Pressure Drop
- $W$  (m/s) = Velocity
- $\gamma$  (kg/m<sup>3</sup>) = Specific Gravity of liquid
- $\zeta$  (-) = Zeta, resistance value
- $v$  (m<sup>3</sup>/kg) = Specific Volume of steam
- $w$  (m/s) = Velocity
- $G$  (kg/s) = Flow
- $F$  (m<sup>2</sup>) = Flow area

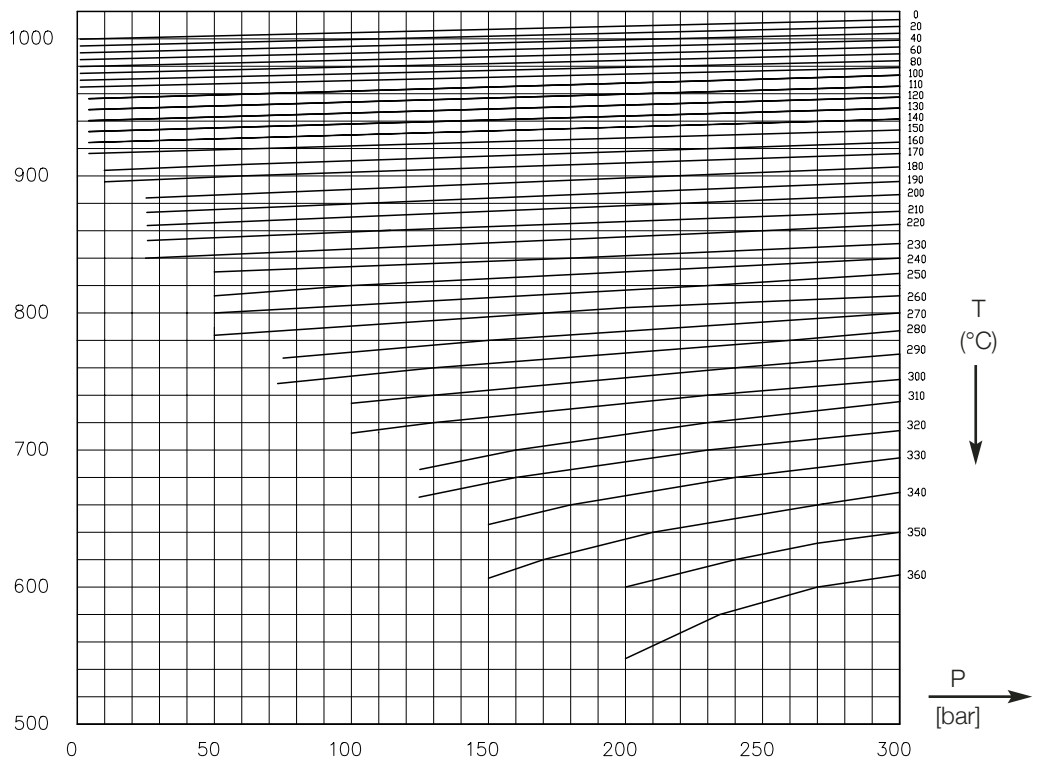
$$\text{Fluid } \Delta P = \zeta \times \frac{\gamma}{2} \times w^2 \times 10^{-5}$$

$$W = \frac{G}{F \times \gamma}$$

$$\text{Steam } \Delta P = \zeta \times \frac{1}{2v} \times w^2 \times 10^{-5}$$

$$W = \frac{G \times v}{F}$$

$$\gamma \left[ \frac{\text{Kg}}{\text{m}^3} \right]$$



# High Pressure Forged Gate Valves

## Details of the forged steel pressure seal construction

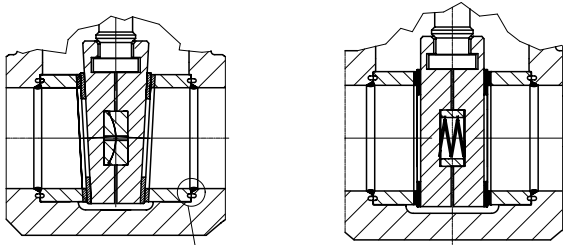
### Standard Characteristics

#### Wedge

We have designed a new tee-head connection of the wedge. The wedge is now closed around the stem. Flexible split wedge is standard on Forged Valves and wedge's guide is integral to the body without any welding. During the stroke, the contact area between wedge and seat rings is wide.

The design gives the following coefficients of friction for torque calculation:

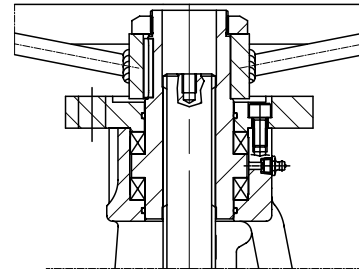
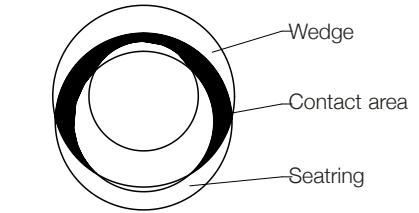
- $\mu = 0.4$  for wedge or parallel slides
- $\mu = 0.15$  for lubricated stem threads



Seatrings are welded in

#### Yoke

Standard Sempell materials for yoke nut are ductile iron Ni-Resist D2 or Bronze B148 Gr.B. All yoke nuts are provided with two needle bearings. Every yoke has a lubrication nipple. The yokes are equipped with a connecting flange on the top, ready to assemble gear, motor devices and other accessories.



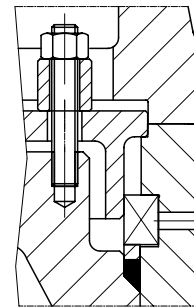
#### Bonnet

Advanced Pressure Seal design is such that the bonnet is easy to be dismantled.

Important : the bonnet must not be dropped into the body cavity

the segment ring is kept in the right position by the safety ring

High tightness is achieved with pure graphite gasket rings, covered with a layer of 18.8 on both sides.

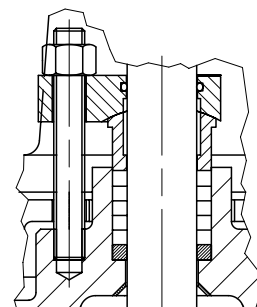


#### Packing

The new design of packing ensures high tightness with pure graphite pressed rings (min.density 1.8 g/cm<sup>3</sup>) with a ground ring for guiding.

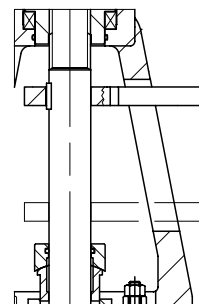
The packing chamber is shorter and narrower because the sealing effectiveness improves as overall packing dimensions decrease. The chamber wall surface roughness is  $Rz < 5 \mu\text{m}$  and the surface roughness of the stem running through the stuffing box is  $Rz < 1.6 \mu\text{m}$ .

The new design of pure graphite packing also allows vacuum service and protection against fugitive emissions.



#### Position Indicator

The mechanical indicator for open and closed position is standard on High Pressure Forged Valves.

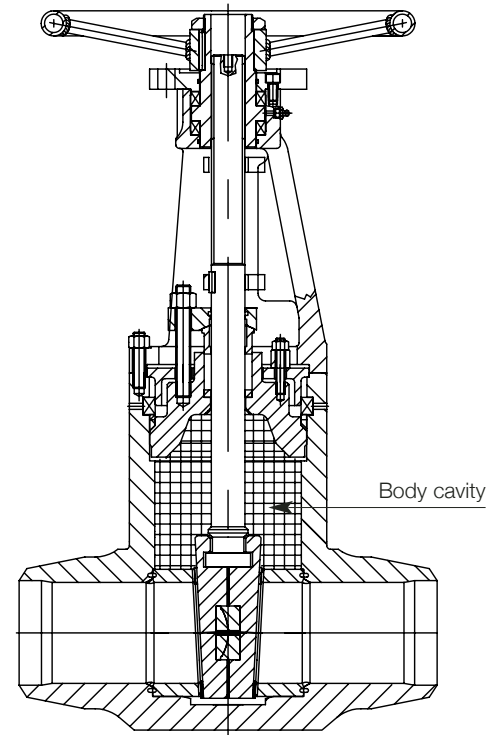
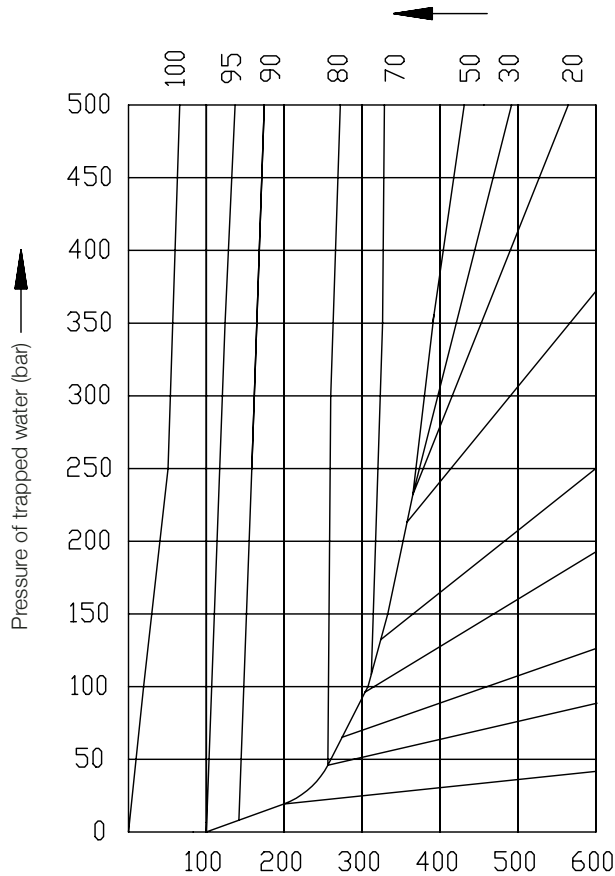




### Important note

Standard Sempell pressure seal valves will not be furnished with safety device, unless required by the user.

It is the responsibility of the purchaser to require to supply a safety device, depending on the function on the gate valve.

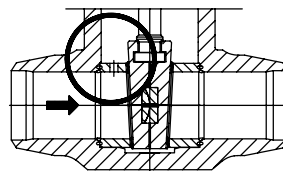


A gate valve in close position can retain a volume of water in the body cavity. An increase of the temperature will consequently increase the pressure in the body cavity with the risk of relevant damages of the body and the bonnet. To eliminate this risk, Sempell offers you 4 possible solutions.

### Accessories

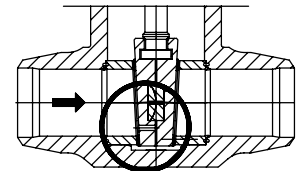
#### 1. Solution: Acc. 5

Hole in the seat ring



#### 2. Solution: Acc. 6

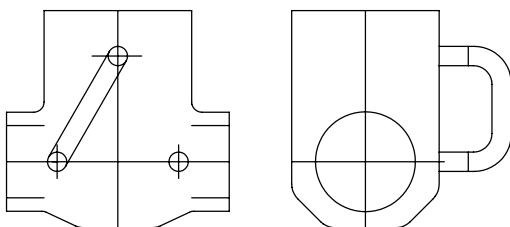
Hole in the wedge



#### 3. Solution: Acc. 7

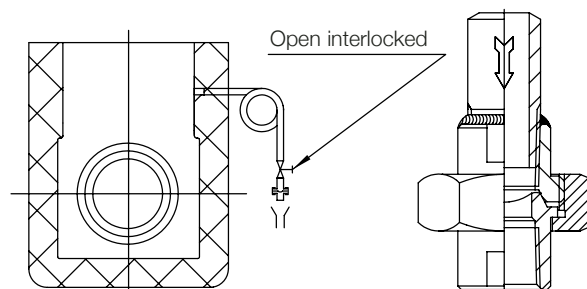
3 nozzles with caps

In the plant the client can connect 2 of them depending on the flow direction

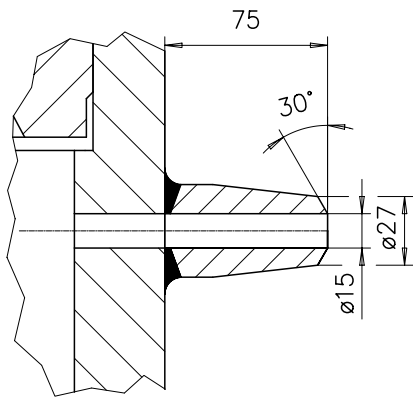


#### 4. Solution: Acc. 8

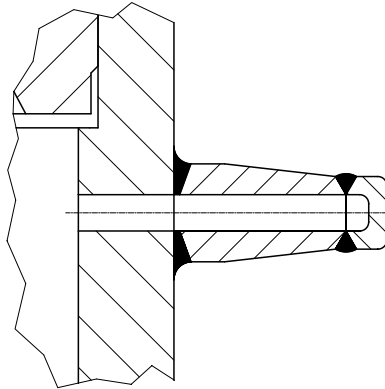
With over-pressure protection for two directions



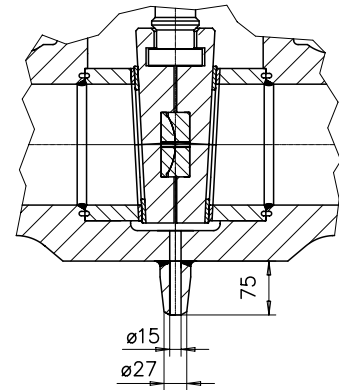
Acc. 9 - Nozzle



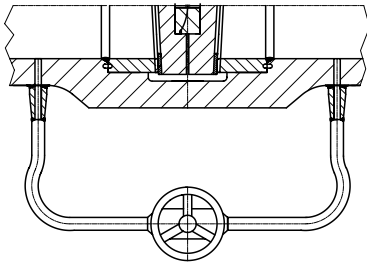
Acc. 10 - Nozzle with cap



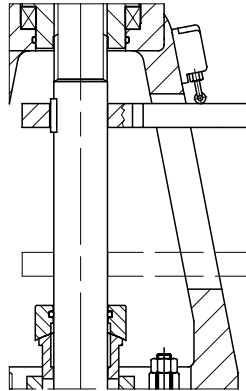
Acc. 11 - Nozzle/Connection of drain



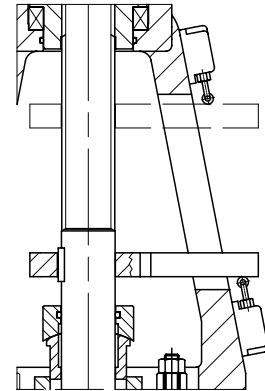
Acc. 12 - By-pass



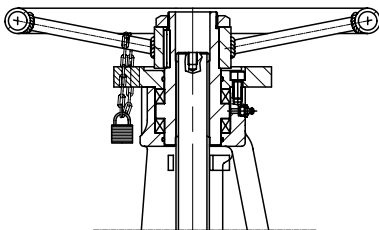
Acc. 13 - Limit switch for open or closed position



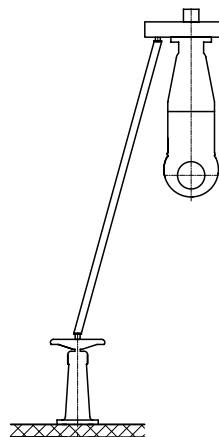
Acc. 14 - Limit switch for open and closed position



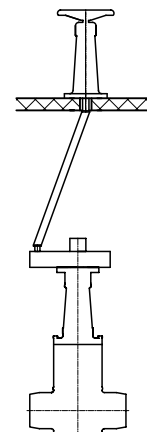
Acc. 15 - Locking device



Acc. 16 - Floor stands with extension stems below the valve



Acc. 17 - Floor stands with extension stems above the valve



# High Pressure Forged Gate Valves

## Material Specifications

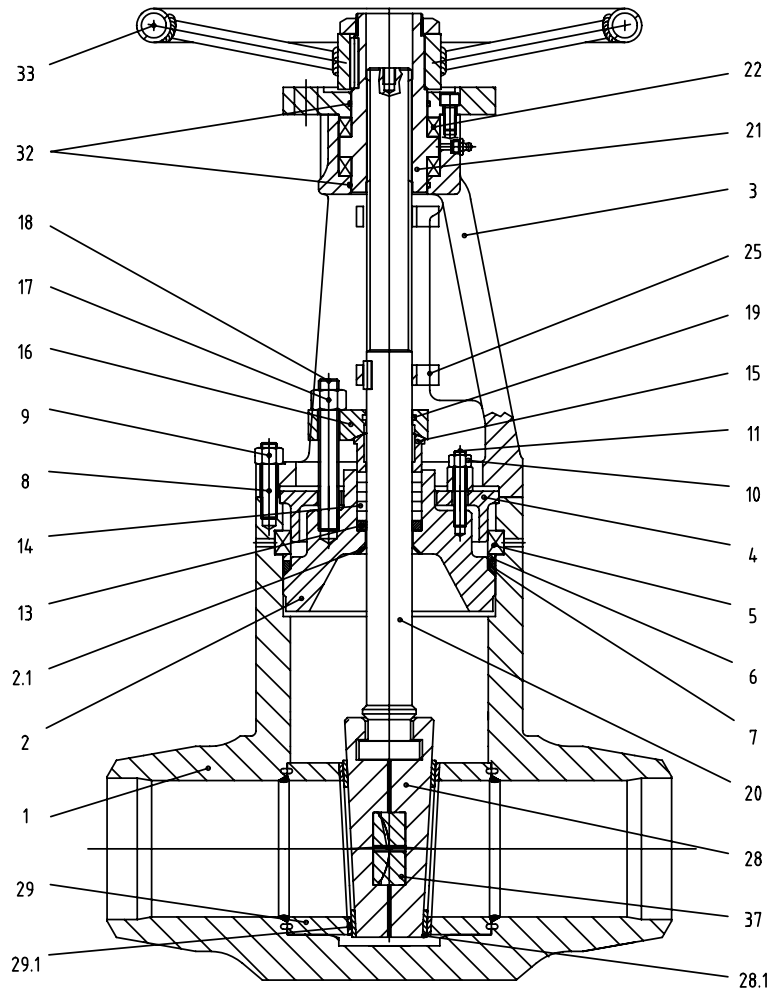
Figure GA251.6012 – GA251.6015

Fig.	Class	PN
6012	900	9(160)
6013	1500	15(250)
6014	2500	25(500)
6015	4500	45(720)

### Material to API 600

Trim no	Body seat surface part no 29.1	Wedge seating surface part no 28.1	Stem part no 20	Back seat part no 21
1	13%Cr	13 % Cr	13 % Cr	13% Cr
5	Stellite	Stellite	13% Cr 17% Cr*	13% Cr
8	Stellite	13 % Cr	13% Cr	13% Cr
12	F 316 / Stellite	F 316/ Stellite	F 316 or 17 4 PH below 450 °C	F 316

\* Over 450°C

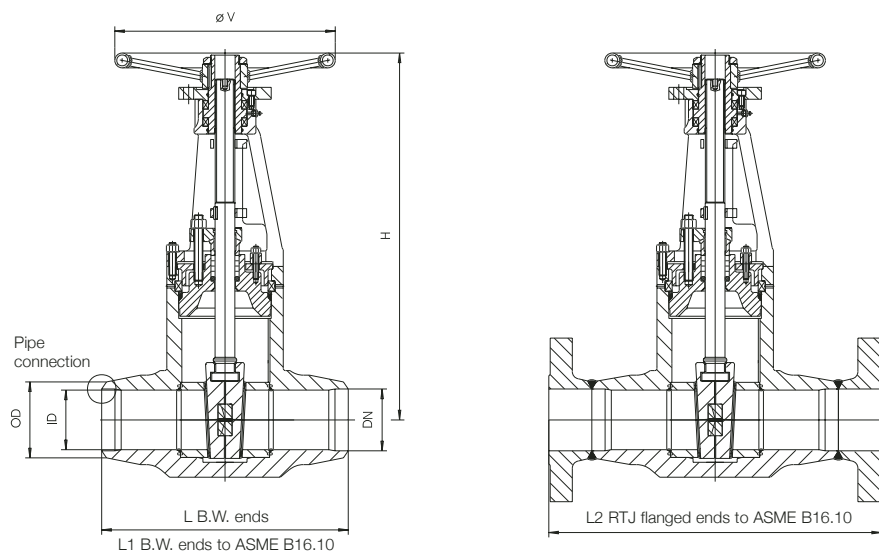


### Material Specifications

Item	11		12		13		14		15		16		17		18	
	-20°C - 425°C		-46°C - 425°C		200°C - 540°C		250°C - 550°C		400°C - 575°C		500°C - 650°C		38°C - 450°C		130°C - 650°C	
	A105	1.0460	LF2	TT5	F1	15Mo3	F12	13CrMo44	F22	10CrMo910	F91	P91	15CuNiMoNb5	F316	X6CrNiNb1810	1.4550
1 Body	A105	1.0460	LF2	TT5	F1	15Mo3	F12	13CrMo44	F22	10CrMo910	F91		15CuNiMoNb5	F316	X6CrNiNb1810	
2 Bonnet	A105	1.0460	LF2	TT5	F1	15Mo3	F12	13CrMo44	F22	10CrMo910	F91		15CuNiMoNb5	F316	X6CrNiNb1810	
3 Yoke	A105		A105		A105		A105		A105		A105		A105		A105	
4 Safety Ring	A105		A105		A105		A105		A105		A105		A105		A105	
5 Segment Ring	A105	1.0460	LF2	TT5	F1	15Mo3	F12	13CrMo44	F22	10CrMo910	F91		15CuNiMoNb5	F316	X6CrNiNb1810	
6 Ring	A105	1.0460	LF2	TT5	F1	15Mo3	F12	13CrMo44	F22	10CrMo910	F91		15CuNiMoNb5	F316	X6CrNiNb1810	
7 Gasket	Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite	
8 Bolts	A193 B7		A193 B7		A193 B7		A193 B7		A193 B7		A193 B7		A193 B7		A193 B7	
9 Nuts	A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194 2H	
10 Nuts	A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194 2H	
11 Bolts	A193 B7		A193 B7		A193 B7		A193 B7		A193 B7		A193 B7		A193 B7		A193 B7	
13 Ground Ring	17Cr 1.4122		17Cr 1.4122		17Cr 1.4122		17Cr 1.4122		17Cr 1.4122		17Cr 1.4122		17Cr 1.4122		17Cr 1.4122	
14 Packing	Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite	
15 Gland	F6		F6		F6		F6		F6		F6		F6		F6	
16 Gland Flange	A105		A105		A105		A105		A105		A105		A105		A105	
17 Gland Nuts	A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194 2H		A194.8	
18 Bolts	A193 B7		A193 B7		A193 B7		A193 B8		A193 B8		A193 B8		A193 B7		A193 B8	
19 Cut Ring	Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite		Pure Graphite	
21 Yoke Nut	Bronze B 148 gr.B or Ni-resist D2		Bronze B 148 gr.B or Ni-resist D2		Bronze B 148 gr.B or Ni-resist D2		Bronze B 148 gr.B or Ni-resist D2		Bronze B 148 gr.B or Ni-resist D2		Bronze B 148 gr.B or Ni-resist D2		Bronze B 148 gr.B or Ni-resist D2		Bronze B 148 gr.B or Ni-resist D2	
22 Bearings	Steel		Steel		Steel		Steel		Steel		Steel		Steel		Steel	
25 Indicator	A105		A105		A105		A105		A105		A105		A105		F316	
28 Wedge	A105	1.0460	LF2	TT5	F1	15Mo3	F12	13CrMo44	F22	10CrMo910	F91		15CuNiMoNb5	F316	X6CrNiNb1810	
29 Seat Ring	A105	1.0460	LF2	TT5	F1	15Mo3	F12	13CrMo44	F22	10CrMo910	F91		15CuNiMoNb5	F316	X6CrNiNb1810	
32 O-ring	Viton		Viton		Viton		Viton		Viton		Viton		Viton		Viton	
33 Handwheel	Steel		Steel		Steel		Steel		Steel		Steel		Steel		Steel	
37 Distance wedge	F6		F6		F6		F6		F6		F6		F6		F6	

# High Pressure Forged Gate Valves

## ASME Class 900

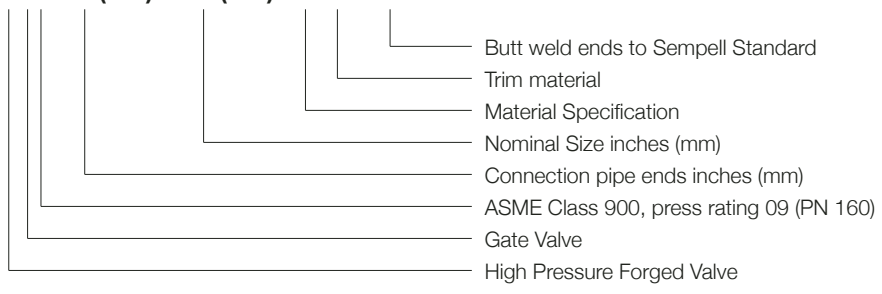


ASME Cl. 900/Pressure Rating 09 (PN 160) - fig. GA251.6012											
DN (mm)	DN (in.)	L	L <sub>1</sub>	L <sub>2</sub>	H	V	Pipe Conn.		Weight (kg)		
							OD max	ID min	BW	BW2	FL
50	2	<b>216</b>	<b>216</b>	-	515	300	95	55	45	45	65
65 x 50	2 1/2 x 2	<b>216</b>	254	384	515	300	95	55	45	45	65
80	3	<b>305</b>	<b>305</b>	384	590	400	135	72	70	70	85
100 x 80	4 x 3	325	<b>356</b>	460	700	500	170	96	105	100	145
125	5	375	<b>432</b>	R	770	450	190	121	162	R	R
150 x 125	6 x 5	450	<b>508</b>	613	850	450	225	146	220	235	275
200 x 150	8 x 6	525	<b>660</b>	R	950	500	280	167	320	R	420
250 x 200	10 x 8	575	<b>660</b>	740	1050	500	280	188	390	415	560
300 x 250	12 x 10	<b>650</b>	787	841	1460	750	332	236	695	735	810
350 x 300	14 x 12	<b>750</b>	914	968	1650	750	365	280	1000	1160	1200
400 x 350	16 x 14	850	991	1038	1880	850	420	306	1280	1280	1500
450 x 400	18 x 16	950	1092	1140	2100	850	475	342	1700	1700	1950
500 x 450	20 x 18	1050	R	R	2320	960	525	380	R	R	R
600 x 500	24 x 20	1100	R	R	R	R	580	425	R	R	R

### Notes

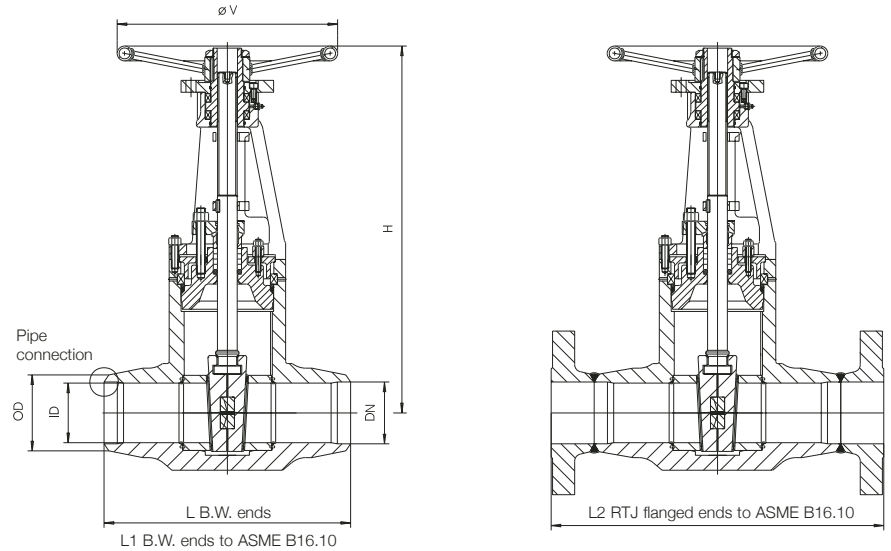
1. All dimensions are in mm.
2. BW: weight for buttweld ends type (Sempell standard).
3. BW2: weight for buttweld ASME ends type.
4. FL: weight for flanged ends type.
5. R: available on request.
6. The dimensions in **bold** correspond to our standard dimensions for 1-piece body.

GA251.6012 8"(200) 6"(150) 14 5 BWL



# High Pressure Forged Gate Valves

## ASME Class 1500



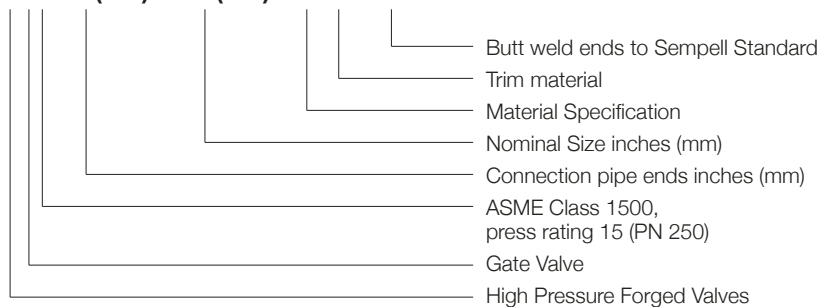
### Notes

- All dimensions are in mm.
- BW: weight for butt weld ends type (Sempell standard).
- BW2: weight for butt weld ASME ends type.
- FL: weight for flanged ends type.
- R: available on request.
- BGR: bevel gear on request.
- The dimensions in **bold** correspond to our standard dimensions for 1-piece body.

### ASME Cl. 1500/Pressure Rating 15 (PN 250) - fig. GA251.6013

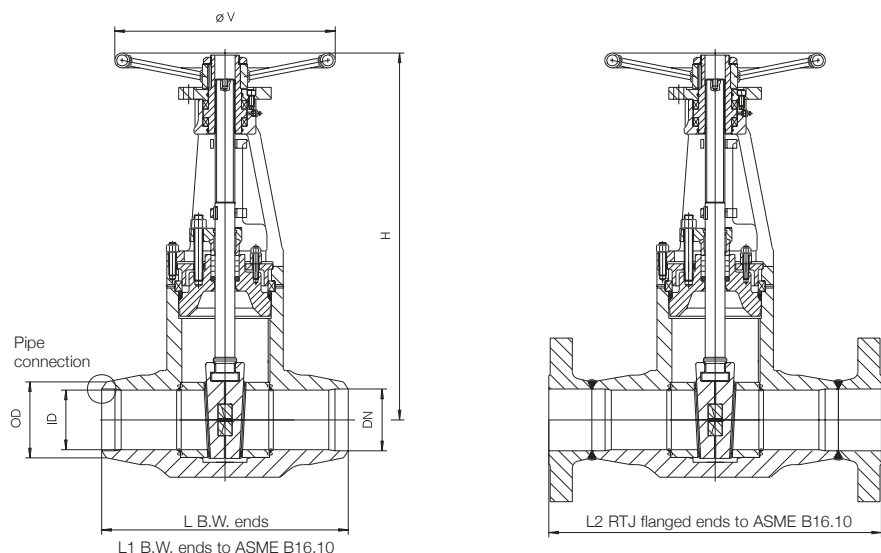
DN (mm) $d_{1N} \times d_N$	DN (in.) $d_{1N} \times d_N$	L	L <sub>1</sub>	L <sub>2</sub>	H	V	Pipe Conn.		Weight (kg)		
							OD max	ID min	BW	BW2	FL
50	2	<b>216</b>	<b>216</b>	371	515	300	95	52	45	45	60
65 x 50	2 1/2 x 2	<b>216</b>	254	422	515	300	95	52	45	45	82
80	3	<b>305</b>	<b>305</b>	473	590	400	135	68	70	70	115
100 x 80	4 x 3	350	<b>406</b>	549	700	500	170	92	135	150	170
125 x 100	5 x 4	400	<b>559</b>	R	770	500	190	118	220	R	R
150 x 125	6 x 5	475	<b>559</b>	711	850	750	225	135	250	280	400
175	7	600	<b>711</b>	R	950	750	280	155	380	420	630
200 x 175	8 x 7	625	<b>711</b>	841	1050	750	280	175	480	520	795
250 x 200	10 x 8	<b>725</b>	864	1000	1500	BGR	332	215	890	945	1200
300 x 250	12 x 10	<b>800</b>	991	1146	1680	BGR	365	255	1170	1298	1800
350 x 300	14 x 12	950	1067	1276	1900	BGR	420	280	1330	1420	2300
400 x 350	16 x 14	1000	1194	1407	2200	BGR	475	322	1850	1990	3250
450 x 400	18 x 16	1050	1346	1559	2500	BGR	525	352	R	R	R
500 x 450	20 x 18	1100	1473	R	R	R	580	380	R	R	R
600 x 500	24 x 20										

### GA251.6013 8"(200) 6"(150) 14 5 BWL



# High Pressure Forged Gate Valves

## ASME Class 2500



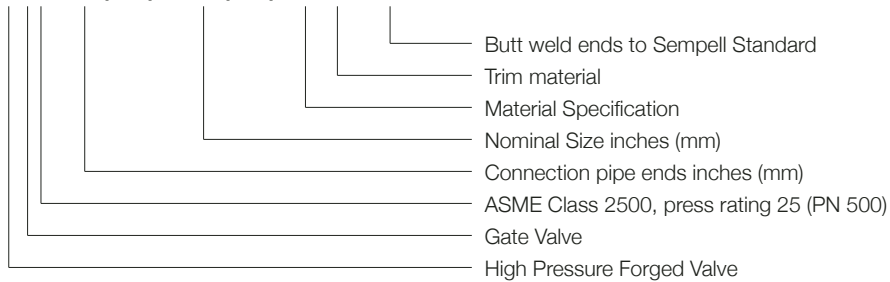
ASME Cl. 2500/Pressure Rating 25 (PN 500) - Fig. GA251.6014

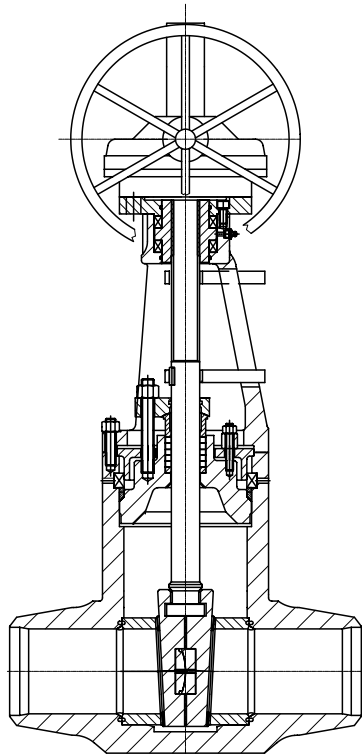
DN (mm)	DN (in.)	L	L <sub>1</sub>	L <sub>2</sub>	H	V	Pipe Conn.		Weight (kg)		
							OD max	ID min	BW	BW2	FL
50	2	<b>216</b>	279.4	454	515	300	95	48	45	45	80
65 x 50	2 1/2 x 2	<b>216</b>	330	514	515	300	95	48	45	45	160
80	3	350	<b>368</b>	584	590	400	135	65	110	125	168
100 x 80	4 x 3	425	<b>457</b>	683	700	500	170	85	170	185	260
125 x 100	5 x 4	450	<b>533</b>	R	770	500	190	102	280	R	R
150 x 125	6 x 5	<b>559</b>	<b>610</b>	927	850	750	225	122	370	405	670
175	7	<b>711</b>	762	R	970	750	280	144	450	550	890
200 x 175	8 x 7	<b>725</b>	762	1038	1070	750	280	160	750	795	1480
200	8	<b>800</b>	914	1292	1550	BGR	332	198	1120	1245	2000
250 x 200	10 x 8	900	1041	1445	1730	BGR	365	236	1500	1600	3000
250	10	1000	1118	R	1980	BGR	420	260	1850	1970	R
300 x 250	12 x 10	1100	1245	R	2230	BGR	475	310	2200	2450	R
300	12	R	R	R	2600	BGR	525	334	R	R	R
350 x 300	14 x 12	R	R	R	R	R	580	365	R	R	R
350	14										
400 x 350	16 x 14										
400	16										
450 x 400	18 x 16										
450	18										
500 x 450	20 x 18										
500	20										
600 x 500	24 x 20										

### Notes

1. All dimensions are in mm.
2. BW: weight for buttweld ends type (Sempell standard).
3. BW2: weight for buttweld ASME ends type.
4. FL: weight for flanged ends type.
5. R: available on request.
6. BGR: bevel gear on request.
7. The dimensions in **bold** correspond to our standard dimensions for 1-piece body.

GA251.6014 8"(200) 6"(150) 14 5 BWL

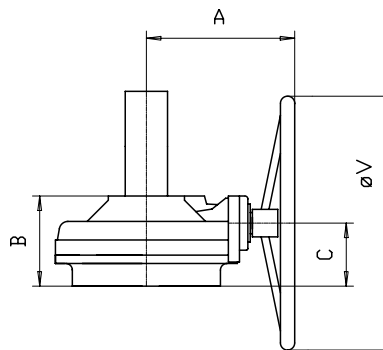




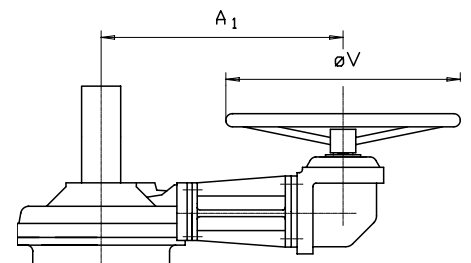
## Gear Operated Valves

Gear Type	300	600	1100	1101	2300	2301	3800	6000	9000	16000
Connection	F10	F14	F16	F25	F25	F25	F30	F35	F35	F40
Gear ratio	1:4,5	1:4,5	1:4,5	1:15,75	1:4,5	1:20,25	1:20,25	1:36	1:40	1:105
Fig. GA251.6012 DN	-	2"- 5"	6"	-	-	8"- 10"	12"	14"- 20"		
Fig. GA251.6013 DN	-	2"- 5"	6"	-	-	8"- 10"	12"	14"- 20"	24"	
Fig. GA251.6014 DN	-	2"- 4"	6"	-	-	7"- 8"	10"	12"	18"- 20"	
Fig. GA251.6015 DN	-	3"	-	-	6"	8"				
Dimensions in mm										
A	180	200	250	315	305	370	420	510	605	770
A1	216	253	258	258	338	338	338	374	419	470
B	87	114	141	141	164	164	178	238	243	303
C	56	74	92	92	102	102	115	150	155	215
V	300	500	800	800	800	500	800	800	800	800
Weight (Kg)	10	18	30	40	59	79	115	155	210	320

### Acc. 1 - Type Bevel Gear



### Acc. 2 - Type Spur Gear



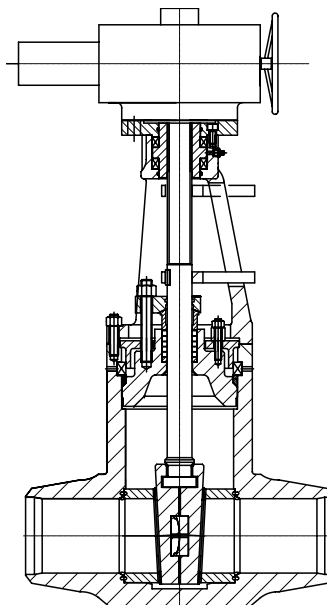
## Motor Operated Valves

### Accessories

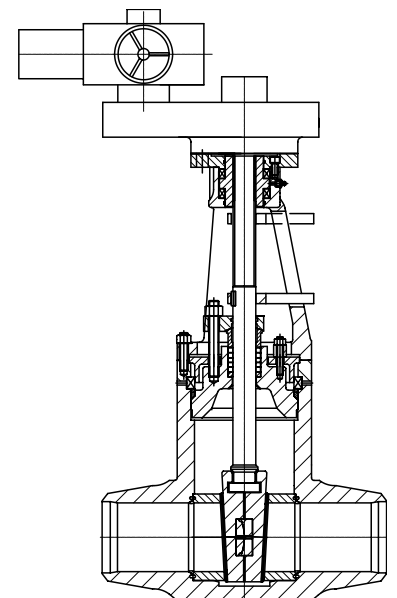
All Sempell "Pressure Seal" Valves can be equipped with electrical, pneumatic or hydraulic actuators. Customers are asked, when ordering, to specify the following requirements that may enable us to supply the correct actuators:

- 1 Medium
- 2 Working temperature
- 3 Working pressure
- 4 Differential pressure across the valve
- 5 Nominal diameter of the valve
- 6 Type of actuator
- 7 Voltage and frequency, pressure of operating fluid (air or hydraulic)
- 8 Closing time
- 9 Number and type of any auxiliary position indicators (Limit switch)
- 10 Special classes of insulation
- 11 Waterproof or explosion proof

### Acc. 3



### Acc. 4



### Accessories

1	- Bevel gear handwheel	page 15
2	- Spur gear handwheel	page 15
3	- Actuator	page 15
4	- Bevel gear and actuator	page 15
5	- Safety device, solution 1, hole in the seat ring	page 9
6	- Safety device, solution 2, hole in the wedge	page 9
7	- Safety device, solution 3, nozzles with caps	page 9
8	- Safety device, solution 4, over pressure protection for two directions	page 9
9	- Nozzle	page 10
10	- Nozzle with cap	page 10
11	- Nozzle, Connection of drain	page 10
12	- By-pass	page 10
13	- Limit switch for open or closed position	page 10
14	- Limit switch for open and closed position	page 10
15	- Locking device	page 10
16	- Floor stands with extension stems below the valve	page 10
17	- Floor stands with extension stems above the valve	page 10

### How to order

	I	II	III	IV	V	VI	VII	VIII	IX	X
<b>To ASME</b>		<b>GA251.6013</b>		<b>8"</b>	<b>6"</b>	<b>14</b>	<b>5</b>	<b>BW</b>	<b>L</b>	<b>5</b>
<b>To ISO</b>		<b>GA251.6013</b>		<b>200</b>	<b>150</b>	<b>14</b>	<b>5</b>	<b>BW</b>	<b>L</b>	<b>5</b>
<b>I</b>	<b>6 = High Pressure Forged Valve</b>									
<b>II</b>	<b>Type of Valve 01 Gate Valve</b>									
<b>III</b>	<b>Class</b>									
	2 900 - Pressure Rating 09 (PN 160)									
	3 1500 - Pressure Rating 15 (PN 250)									
	4 2500 - Pressure Rating 25 (PN 500)									
	5 4500 - Pressure Rating 45 (PN 720)									
<b>IV</b>	<b>Connection pipe ends inches (mm)</b>									
<b>V</b>	<b>Nominal size inches (mm)</b>									
<b>VI</b>	<b>Material specification, please refer to page 11</b>									
<b>VII</b>	<b>Type of trim, please refer to separate page for every valve type according to point VI</b>									
<b>VIII</b>	<b>BW Butt weld ends</b>									
	<b>FR Flanges RTJ</b>									
	<b>BWS Butt weld ends Special</b>									
<b>IX</b>	<b>L End to connections BW to Sempell standard</b>									
	<b>L1 End to connections BW to ASME B16.10</b>									
	<b>L2 End to connections Flanged RTJ to ASME B16.10</b>									
	<b>S1 Lengths of angle valves</b>									
<b>X</b>	<b>Accessories number, please refer above</b>									