

Angles of rotation

EN

Technical information



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1 Optimized draining of valves

In specialist literature and documents from valve manufacturers and plant designers, the term "self-draining" is often used in conjunction with valves and plants or plant sections. This term is used to describe the residue-free and automatic draining of containers and piping with the valve opened. This draining depends on various factors. Even vertical piping with open ends does not guarantee complete and residue-free draining.

The terms "free/unhindered outlet" or "optimized draining" are therefore closer to reality.

Optimal draining of a valve depends on several factors:

- Design of the inner geometry of the valve body
- Nominal pipe size
- Pipe standard (DIN, ISO, ASME BPE, etc.), as they have different inside diameters at the same nominal size
- Surface quality (topography, morphology and adhesive quality of the media-wetted surfaces)
- Angle of rotation of piping and valves to the horizontal line
- Angle of rotation of the valves
- Viscosity and adhesive qualities of the medium/media (to be drained)

Correctly rotating or positioning diaphragm valve 2/2-way bodies results in the low points of the valve body internal contour lying on one plane and therefore is a prerequisite for optimized draining in horizontal piping.

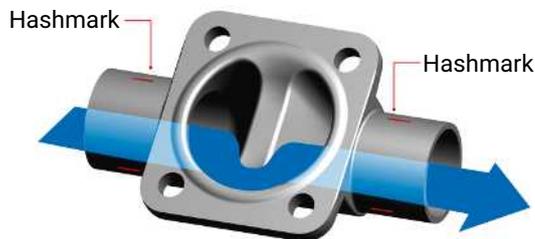


Fig. 1: Optimized draining of valves

2 Calculated angles of rotation for installation in horizontal pipelines

GEMÜ has calculated theoretical angles of rotation for the various nominal sizes and pipe standards in order to facilitate installation of valves in horizontal pipe systems for optimized draining. Exact adherence is difficult to achieve when installing valves. A tolerance range of $\pm 2^\circ$ can be assumed as a rule of thumb for optimized draining of the valves.

The residue-free drainability and draining of a system and its components is nevertheless the responsibility of the plant designer, constructor and operator and is essentially dependent on the design and layout of the system.

The angles of rotation for forged and investment cast bodies made of stainless steel are listed in section 4. The angles of rotation for block material bodies (e.g. special materials) can be taken from the relevant body drawing or are available on request.

Figure 2 must be referred to for use of the angles of rotation. The horizontal line shall form the reference line for the angles of rotation specified by GEMÜ (please note: Other manufacturers sometimes use the vertical line as the reference line).

3 Angle of rotation engraving/hash mark

Engravings of four angles of rotation, designated as hash marks, are made on each of the 2/2-way valve bodies made of forged and block materials with connections in accordance with ASME BPE (connection codes 59, 80, 88, 89) and JIS (connection codes 32, 35, 36, 8F, 8H). These enable simpler installation of the valve bodies in the system.

The valve bodies have been positioned in a manner which is optimized for draining if one of the hash marks points vertically upwards, as shown in Figure 2. The vertical line shall therefore form the reference line for the hash mark.

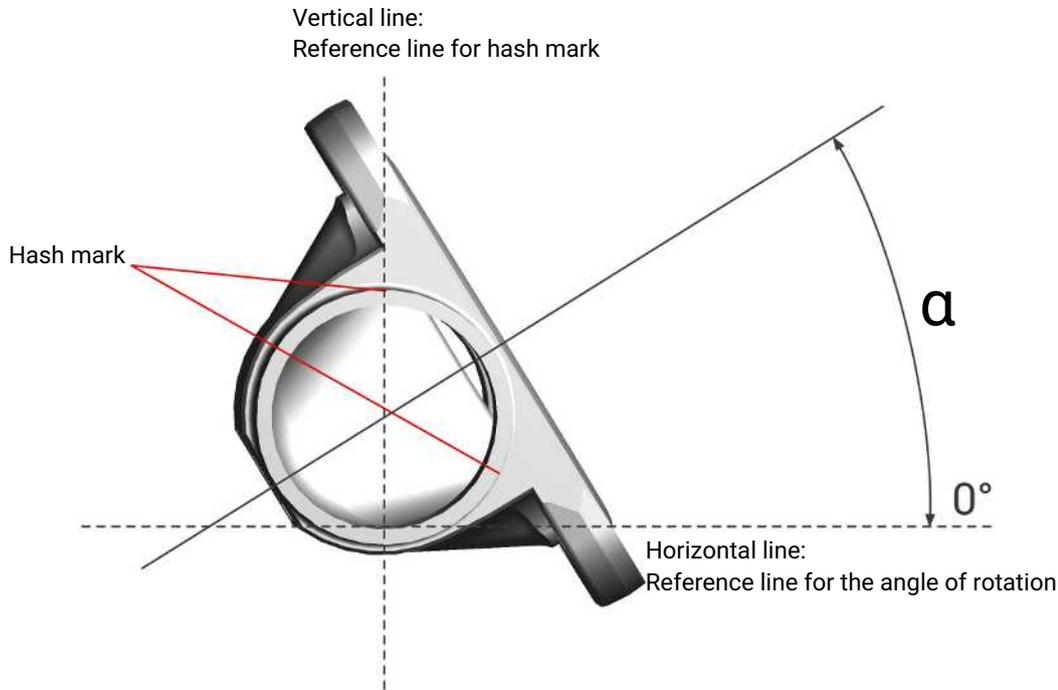


Fig. 2: Angle of rotation engraving/hash mark

4 Angle of rotation tables

4.1 Spigot DIN (connection code 0)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	4	35	35
10	15	-	14
25	15	-	34
	20	-	30
	25	-	23
40	32	-	25
	40	-	20
50	50	-	19

1) **Valve body material**

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.2 Spigot EN 10357 series B (connection code 16)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	10	-	19
10	10	-	24
	15	-	12
25	15	-	33
	20	-	28
	25	-	21
40	32	-	25
	40	-	19
50	50	-	18

1) **Valve body material**

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.3 Spigot EN 10357 series A/DIN 11866 series A (connection code 17)

The specified angles of rotation also apply to the following connections:

- Clamp DIN 32676 (connection code 8A, 86)
- Clamp DIN 11864-3 (connection code E1, E2, E3)
- Flange DIN 11864-2 (connection code A1, A2, A3)
- Union DIN 11864-1 (connection code C1, C2, C3)
- Union DIN 11851 (connection code 6, 6K, 62)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	6	30	30
	8	25	25
	10	19	19
10	10	28	24
	15	17	12
25	15	43	33
	20	34	28
	25	24	21
40	32	28	25
	40	21	19
50	50	21	18
80	65	-	18
	80	-	12
100	100	-	14

1) Valve body material

- Code 40: 1.4435 (F316L), forged body
 Code C3: 1.4435, investment casting
 Code F4: 1.4539, forged body

4.4 Spigot DIN 11850 series 3 (connection code 18)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	10	-	19
10	10	-	24
	15	-	12
25	15	-	33
	20	-	28
	25	-	21
40	32	-	25
	40	-	19
50	50	-	18

1) Valve body material

- Code 40: 1.4435 (F316L), forged body
 Code C3: 1.4435, investment casting
 Code F4: 1.4539, forged body

4.5 Spigot JIS-G 3459 Schedule 5s (connection code 32)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	6	-	24
	8	-	15
10	8	-	21
	10	-	14
	15	-	7
25	15	-	30
	20	-	24
	25	-	16
40	32	-	18
	40	-	13
50	50	-	13
80	65	-	16
	80	-	10
100	100	-	11

1) Valve body material

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.6 Spigot JIS-G 3447 (connection code 35)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
25	25	-	25
40	32	-	27
	40	-	21
50	50	-	20
	65	-	10
80	65	-	21
	80	-	16
100	100	-	15

1) Valve body material

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.7 Spigot JIS-G 3459 Schedule 10s (connection code 36)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	6	-	25
	8	-	18
10	10	-	16
	15	-	9
25	15	-	31
	20	-	25
	25	-	18
40	32	-	20
	40	-	15
50	50	-	14
80	65	-	17
	80	-	11
100	100	-	12

1) Valve body material

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.8 Spigot SMS 3008 (connection code 37)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
25	25	27	25
40	32	-	25
	40	23	21
50	50	22	19
	65	-	10
80	65	-	21
	80	-	16
100	100	-	15

1) Valve body material

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.9 Spigot BS 4825, Part 1 (connection code 55)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	8	-	35
	10	-	27
	15	-	19
10	10	-	29
	15	-	23
	20	-	11
25	15	-	39
	20	-	32

1) Valve body material

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.10 Spigot ASME BPE / DIN 11866 series C (connection code 59)

The specified angles of rotation also apply to the following connections:

- Clamp ASME BPE (connection code 80, 88)
- Clamp DIN 11864-3 (connection code E7, E8, E9)
- Flange DIN 11864-2 (connection code A7, A8, A9)
- Union DIN 11864-1 (connection code C7, C8, C9)

MG	DN	Valve body material ¹⁾		
		Investment cast body code C3	Forged body codes 40, F4	Block material codes 41, 43
		Draining angle α		
8	8	34	34	-
	10	26	26	-
	15	21	21	-
10	10	-	28	-
	15	-	25	-
	20	17	13	-
25	15	-	40	-
	20	39	33	-
	25	28	26	-
40	40	24	22	-
50	50	22	20	-
50	65	-	10	-
80	65	-	21	-
	80	-	16	-
100	100	-	15	-
150	150	-	-	19

1) Valve body material

Code 40: 1.4435 (F316L), forged body

Code 41: 1.4435 (316L), block material

Code 43: 1.4435 (BN2), block material, $\Delta Fe < 0.5\%$

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.11 Spigot ISO 1127/EN 10357 series C/DIN 11866 series B (connection code 60)

The specified angles of rotation also apply to the following connections:

- Clamp DIN 32676 (connection code 82)
- Clamp DIN 11864-3 (connection code E4, E5, E6)
- Flange DIN 11864-2 (connection code A4, A5, A6)
- Union DIN 11864-1 (connection code C4, C5, C6)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	6	-	28
	8	19	19
10	10	20	16
	15	12	7
25	15	40	31
	20	29	24
	25	19	17
40	32	22	19
	40	16	14
50	50	16	14
80	65	-	16
	80	-	11
100	100	-	11

1) **Valve body material**

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.12 Spigot ANSI/ASME B36.19M Schedule 10s (connection code 63)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	6	-	25
	8	-	18
10	10	-	17
	15	-	10
25	15	-	32
	20	-	26
	25	-	19
40	32	-	21
	40	-	15
50	50	-	15
80	65	-	18
	80	-	11
100	100	-	12

1) Valve body material

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

4.13 Spigot ANSI/ASME B36.19M Schedule 40s (connection code 65)

MG	DN	Valve body material ¹⁾	
		Investment cast body code C3	Forged body codes 40, F4
		Draining angle α	
8	6	-	28
	8	-	22
10	10	-	19
	15	-	12
25	15	-	33
	20	-	27
	25	-	21
40	32	-	22
	40	-	17
50	50	-	16
80	65	-	20
	80	-	13
100	100	-	14

1) Valve body material

Code 40: 1.4435 (F316L), forged body

Code C3: 1.4435, investment casting

Code F4: 1.4539, forged body

5 Angle gauge

For the optimized emptying of the valves GEMÜ offers angle gauges for different diaphragm sizes:

Diaphragm size (MG)	Designation	Item number
MG 8	WG600 8Z	88278996
MG 10	WG600 10Z	88277372
MG 25	WG600 25Z	88277373
MG 40	WG600 40Z	88277374
MG 50	WG600 50Z	88277375
MG 80	WG600 80Z	88277376
MG 100	WG600100Z	88379424

