

Ball Valves for Low Temperature and Cryogenic Services

KTM ball valves have been widely used in low temperature and cryogenic applications, including LNG (Liquefied Natural Gas) which is fast becoming a better alternative source of energy. With a proven design and after many successful references, the KTM brand name continues to be preferred by end-users as the process quality ball valve of choice.

Features

- Extension bonnet protects the gland packing. Two types of extension bonnet (short and long) are available to better locate the "Gland Packing" at ambient temperature zone. This will protect it from freeze-damage caused by low temperature fluid.
- Cavity pressure relief
- Excellent seat & seal design minimises leakage
- Low operating torque for smoother operations
- Fire safe design
- Fugitive emission compliance
- Rigid body construction minimises thermal shrinkage

Standards

- ASME B16.34, B16.5
- BS 6755, BS 6364 (Valves for cryogenic service)
- Shell MESC 77/306
- CE marking (PED) 97/23/EC

Special tests

- Liquid penetrant test
- PMI test
- X-ray test
- Pressure test at low temperature



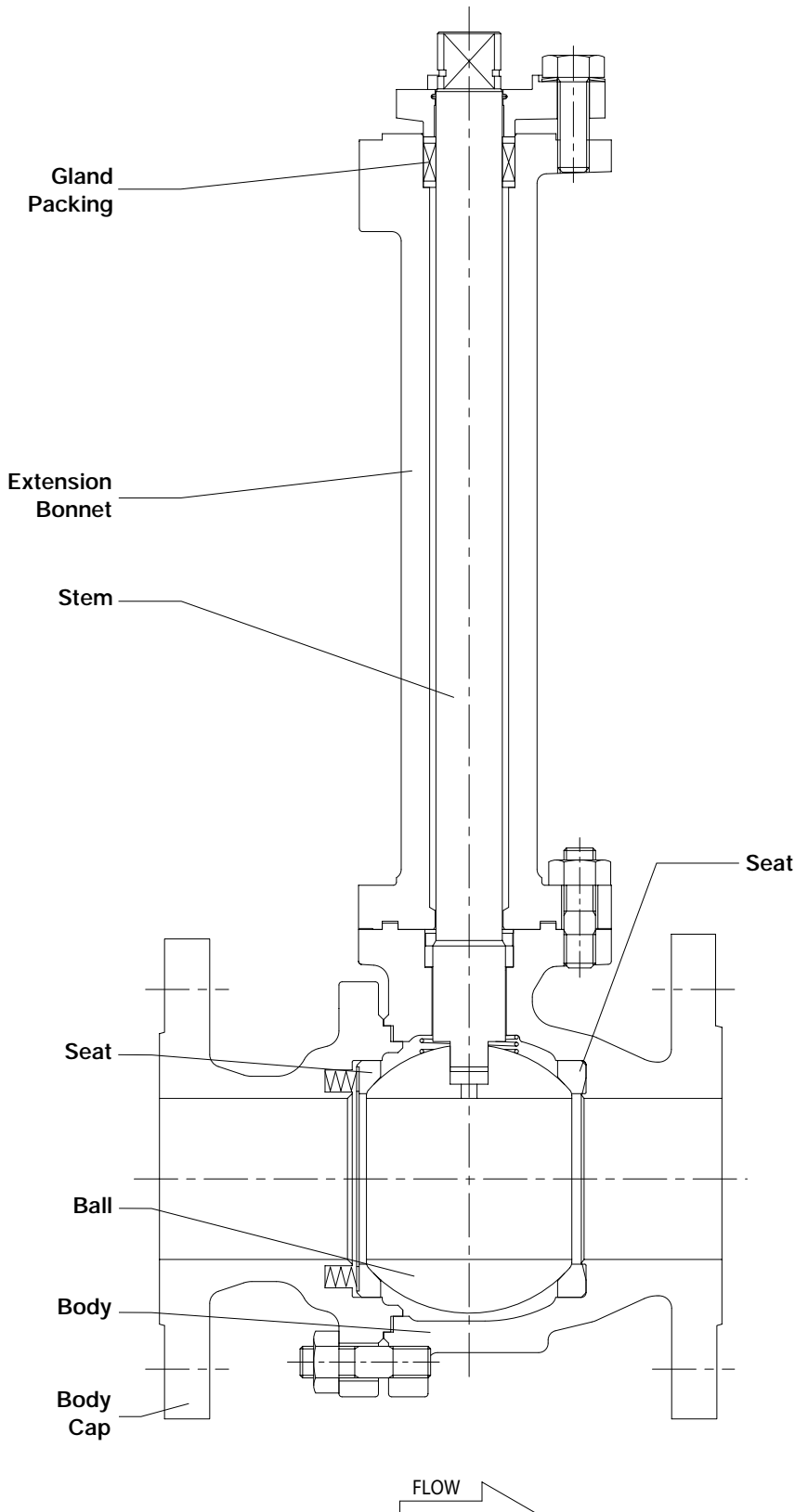
General applications

- | | |
|-------------------------------|--------|
| • Propane | -42°C |
| • Ethane | -89°C |
| • Ethylene | -104°C |
| • Methane | -162°C |
| • Liquefied Natural Gas (LNG) | -162°C |
| • Oxygen | -183°C |
| • Nitrogen | -196°C |

Technical data

- | | |
|-----------------|--|
| Design type | : Floating, Trunnion |
| Sizes | : 15mm to 300mm |
| Pressure rating | : ASME Class 150, 300 and 600 |
| Temperature | : Room temperature to -196°C |
| Body material | : A352 Gr. LCC / LCB (-46°C)
: A351 Gr. CF8 / CF8M (-196°C) |

Floating Type Ball Valve Structure (Long Bonnet)



Notes

ASME Class 150 and 300
 Sizes 15mm to 200mm

ASME Class 600
 Sizes 15mm to 40mm

Materials of Construction

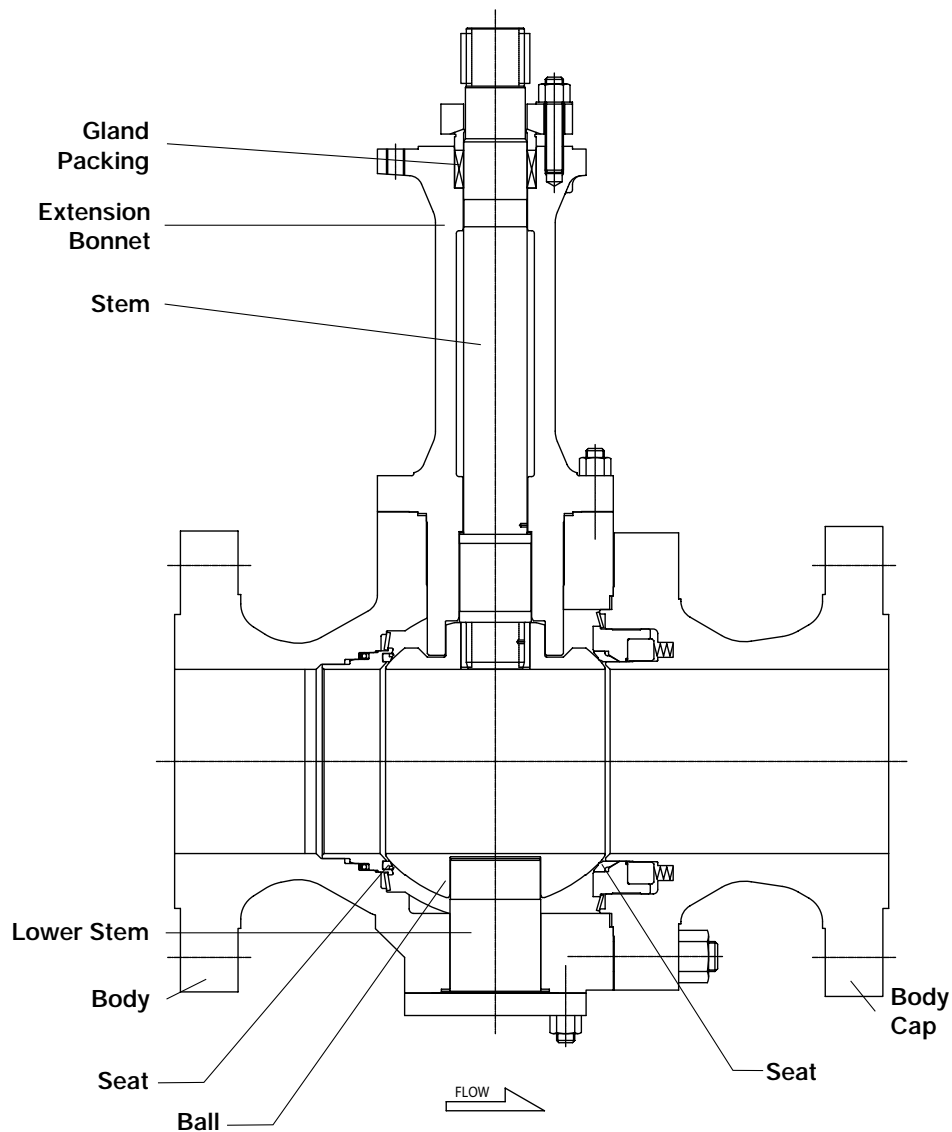
Body	: Carbon steel (LCB, LCC) Stainless steel (CF8, CF8M)
Ball	: Carbon steel (LCB, LCC) Stainless steel (CF8, CF8M)
Stem	: Stainless steel (304SS, 316SS)
Seat	: PTFE
Packing	: PTFE, Graphite

Notes

ASME Class 150 and 300
 Sizes 150mm to 750mm

ASME Class 600
 Sizes 50mm to 750mm

Trunnion Type Ball Valve Structure (Short Bonnet)

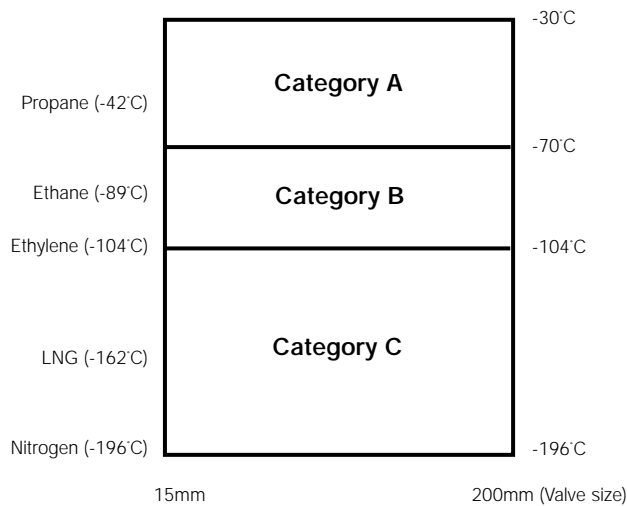


Materials of Construction

Body	: Carbon steel (LCB, LCC) Stainless steel (CF8, CF8M)
Ball	: Carbon steel (LCB, LCC) Stainless steel (CF8, CF8M)
Stem	: Stainless steel (304SS, 316SS)
Seat	: Reinforced PTFE
Packing	: O-ring, PTFE, Graphite

Pressure -Temperature Classification (Floating type)

Category	Working Temperature (°C)	Valve Size (mm)	ASME Class	Extension Bonnet Length	Seat Design	Maximum Allowable Seat Leakage ³ at Cryogenic Temperatures (cc/min/inch ⁴)	Flow Direction
A	-30 to -50	15 to 200	150 and 300	Short ¹	standard	0	Bi-direction (Gas) Uni-direction (Liquid)
	-51 to -70			Long ²			
B	-71 to -104				Up stream spring	25 ⁵	Uni-direction
C	-105 to -196			50 ⁶			

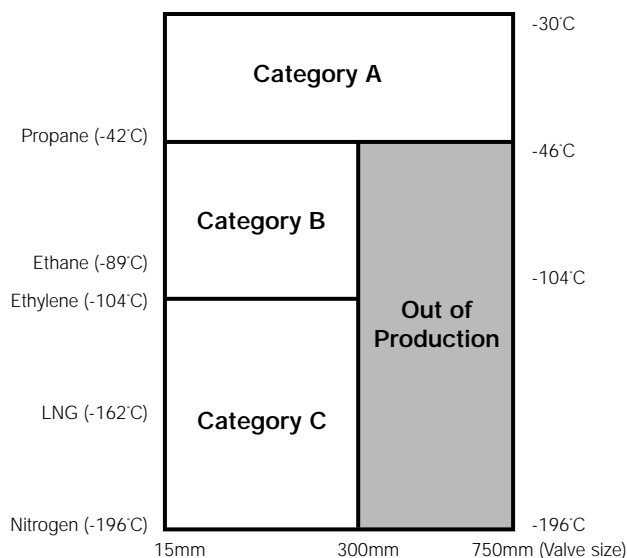


Remarks

- ¹ +100mm to +200mm (Valve dimensions and sizes are in accordance with Shell MESC.)
- ² +200mm to +400mm (Valve dimensions and sizes are in accordance with Shell MESC.)
- ³ Under test pressure of max. ΔP by Nitrogen or Helium gas
- ⁴ Leakage(cc) per valve size (inch) under room temperature at 1 atm for 1 minute
Example :
Category B valve
100mm (4"), ASME Class 150
Max. allowable seat leakage
=25x4
=100cc/minute
- ⁵ 25cc/min for sizes up to 25mm
- ⁶ 50cc/min for sizes up to 25mm

Pressure -Temperature Classification (Trunnion type)

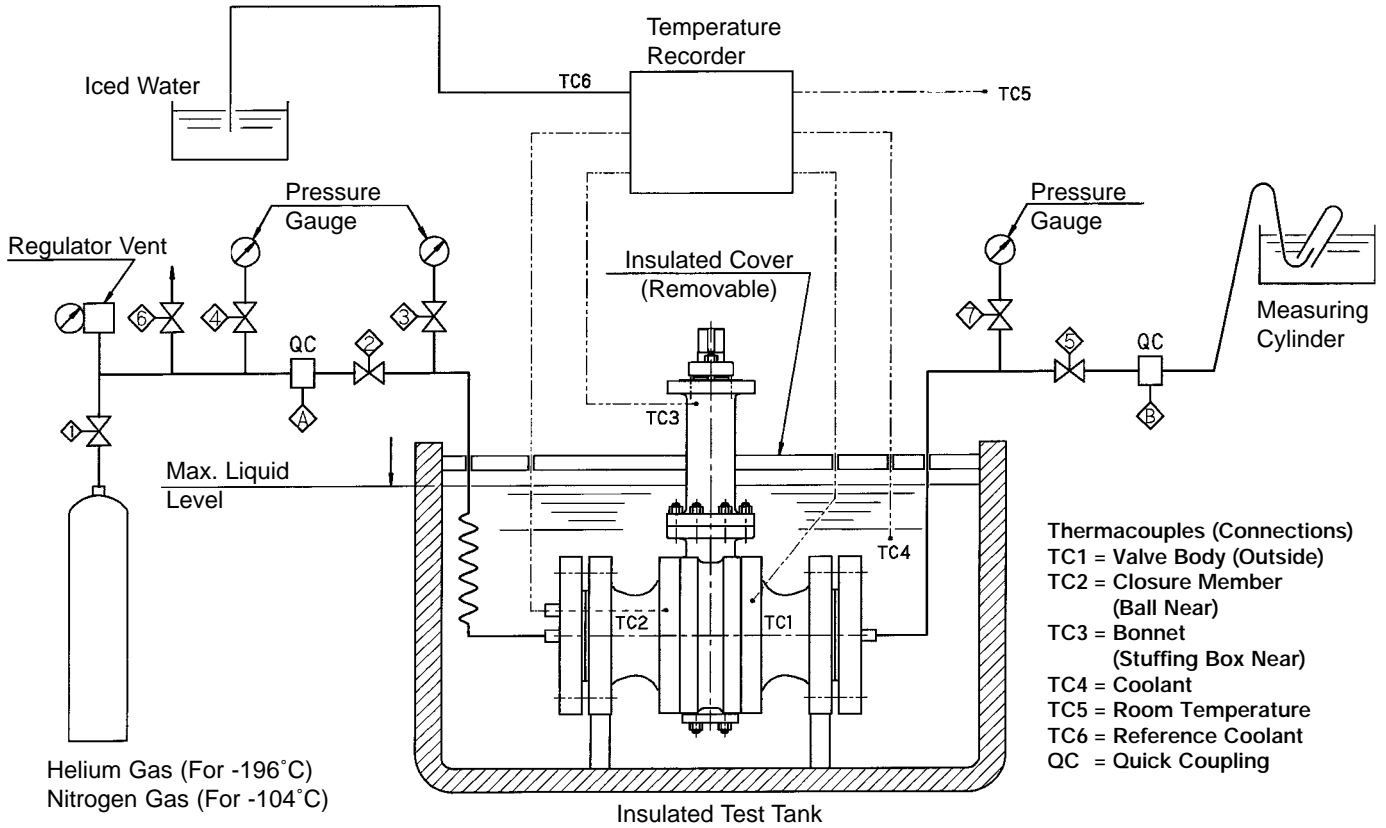
Category	Working Temperature (°C)	Valve Size (mm)	ASME Class	Extension Bonnet Length	Seat & Seals	Maximum Allowable Seat Leakage ³ at Cryogenic Temperatures (cc/min/inch ⁴)	Flow Direction
A	-30 to -46	150 to 750 15 to 750 ⁷	150 and 300 600	Short ¹	Reinforced PTFE & O-ring	5	Bi-direction
B	-47 to -104	150 to 300 15 to 300 ⁷	150 and 300 600	Long ²	Reinforced PTFE & PTFE U-ring	25 ⁵	
C	-105 to -196	150 to 300 15 to 300 ⁷	150 and 300 600		Reinforced PTFE & Special seal	50 ⁶	Uni-direction

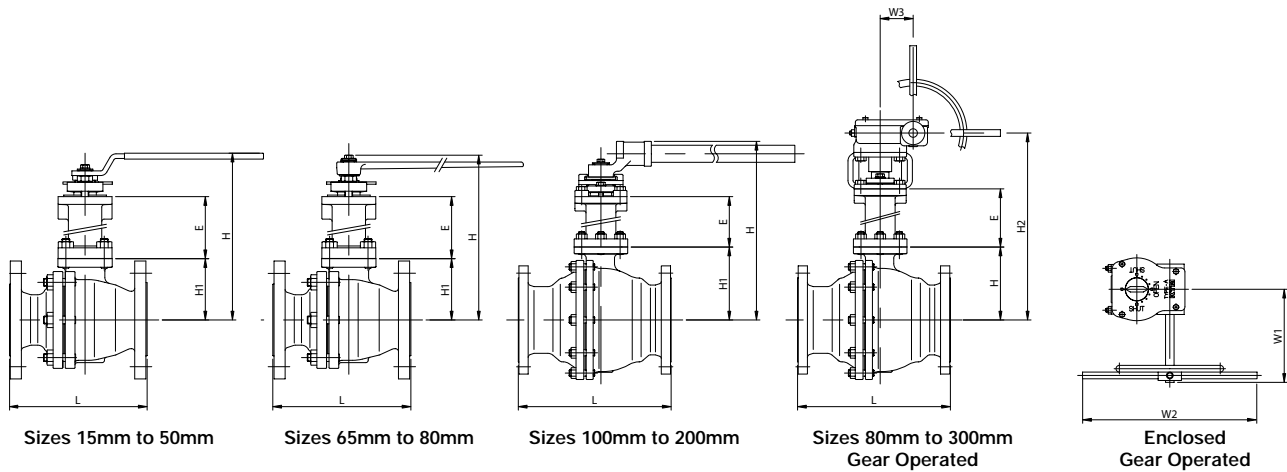


Remarks

- ¹ +100mm to +200mm (Valve dimensions and sizes are in accordance with Shell MESC.)
- ² +200mm to +400mm (Valve dimensions and sizes are in accordance with Shell MESC.)
- ³ Under test pressure of max. ΔP by Nitrogen or Helium gas
- ⁴ Leakage(cc) per valve size (inch) under room temperature at 1 atm for 1 minute
Example :
Category C valve
250mm (10"), ASME Class150
Max. allowable seat leakage
=50x10
=500cc/minute
- ⁵ 25cc/min for sizes up to 25mm
- ⁶ 50cc/min for sizes up to 25mm
- ⁷ Floating type for sizes 15mm to 40mm

Test Rig for Low Temperature / Cryogenic Pressure Test





ASME Class 150 Dimensions (mm) Full Bore

	Valve Size (mm)	Bore (d)	L	H		H1		H2		E		W	W1	W2	W3	Gear type		
				Short	Long *1	Short	Long *1	Short	Long *1	Short	Long *1							
				Floating	15	13	108	181	281	37	37						-	-
	20	19	117	185	285	41	41	-	-	100	200	130	-	-	-	-		
	25	25	127	198	298	49	49	-	-	100	200	160	-	-	-	-		
	40	38	165	249	374	69	69	-	-	125	250	230	-	-	-	-		
	50	51	178	263	388	79	79	-	-	125	250	230	-	-	-	-		
	65	64	190	315	465	104	104	386	536	150	300	400	180	300	55	FO		
	80	76	203	324	474	113	113	395	545	150	300	400	180	300	55	FO		
	100	102	229	390	540	138	138	420	570	150	300	715	180	300	55	FO		
	150	152	394	505	680	188	188	507	682	175	350	1,140	240	450	85	FA		
	200	203	457	580	755	248	248	590	765	175	350	1,510	350	600	116	B		
Trunnion	150	152	394	531	706	214	214	533	708	175	350	1,140	240	450	85	FA		
	200	203	457	635	810	303	303	645	820	175	350	1,510	350	600	116	B		
	250	254	533	-	-	-	-	338/330 *2	-	603/697 *2	-	200	-	-	350	600	116	B
	250	254	533	-	-	-	-	330	-	923	-	400	-	420	800	171	C	
	300	305	610	-	-	-	-	392/390 *2	390	654/783 *2	983	200	400	-	420	800	171	C

Note: *1 Only Stainless steel body applicable
*2 Carbon steel body/Stainless steel body

ASME Class 300 Dimensions (mm) Full Bore

	Valve Size (mm)	Bore (d)	L	H		H1		H2		E		W	W1	W2	W3	Gear type		
				Short	Long *1	Short	Long *1	Short	Long *1	Short	Long *1							
				Floating	15	13	140	181	281	37	37						-	-
	20	19	152	185	285	41	41	-	-	100	200	130	-	-	-	-		
	25	25	165	198	298	49	49	-	-	100	200	160	-	-	-	-		
	40	38	190	249	374	69	69	-	-	125	250	230	-	-	-	-		
	50	51	216	263	388	79	79	-	-	125	250	230	-	-	-	-		
	65	64	241	315	465	104	104	386	536	150	300	400	180	300	55	FO		
	80	76	283	324	474	113	113	395	545	150	300	400	180	300	55	FO		
	100	102	305	390	540	138	138	420	570	150	300	715	180	300	55	FO		
	150	152	403	505	680	188	188	507	682	175	350	1,140	240	450	85	FA		
	200	203	502	580	755	248	248	590	765	175	350	1,510	350	600	116	B		
Trunnion	150	152	403	531	706	214	214	533	708	175	350	1,140	240	450	85	FA		
	200	203	502	635	810	303	303	645	820	175	350	1,510	350	600	116	B		
	250	254	568	-	-	-	-	338/330 *2	-	603/697 *2	-	200	-	-	350	600	116	B
	250	254	568	-	-	-	-	330	-	923	-	400	-	420	800	171	C	
	300	305	648	-	-	-	-	392/390 *2	390	654/783 *2	983	200	400	-	420	800	171	C

Note: *1 Only Stainless steel body applicable
*2 Carbon steel body/Stainless steel body

ASME Class 150 Dimensions (mm) Reduced Bore

	Valve Size (mm)	Bore dxd1 ^{*2}	L	H		H1		H2		E		W	W ₁	W ₂	W ₃	Gear type
				Short	Long ^{*1}	Short	Long ^{*1}	Short	Long ^{*1}	Short	Long ^{*1}					
Floating	15	13 x 10	108	166	266	21.5	21.5	-	-	100	200	130	-	-	-	-
	20	19 x 13	117	176	276	32.0	32.0	-	-	100	200	130	-	-	-	-
	25	25 x 19	127	180	280	36.0	36.0	-	-	100	200	130	-	-	-	-
	40	38 x 30	165	227	352	52.5	52.5	-	-	125	250	160	-	-	-	-
	50	51 x 38	178	250	375	69.5	69.5	-	-	125	250	230	-	-	-	-
	80	76 x 59	203	314	464	101.0	101.0	-	-	150	300	400	180	300	55	FO
	100	102 x 76	229	326	476	113.0	113.0	-	-	150	300	400	180	300	55	FO
	150	152 x 115	267	-	-	158.5	158.5	478	653	175	350	1,140	240	450	85	FA
200	203 x 144	292	-	-	183.0	183.0	502	677	175	350	1,140	240	450	85	FA	
Trunnion	150	152 x 102	394	462	637	-	144.0	492	667	175	350	1,140	180	300	55	FO
	200	203 x 152	457	531	706	214.0	214.0	533	708	175	350	1,140	240	450	85	FA
	250	254 x 203	533	635	810	303.0	-	645	-	175	-	-	350	600	116	B
	250	254 x 203	533	635	810	-	303.0	-	820	-	350	-	420	800	171	C
	300	305 x 252	610	-	-	338/330 ^{*3}	-	603/697 ^{*3}	-	200	-	-	350	600	116	B
	300	305 x 252	610	-	-	-	330.0	-	923	-	400	-	420	800	171	C

Note: * 1 Only Stainless steel body applicable
 * 2 d: Inlet bore. d1: Ball bore
 * 3 Carbon steel body/Stainless steel body
 * 4 Reduced bore. Floating type is "One piece Body" design.

ASME Class 300 Dimensions (mm) Reduced Bore

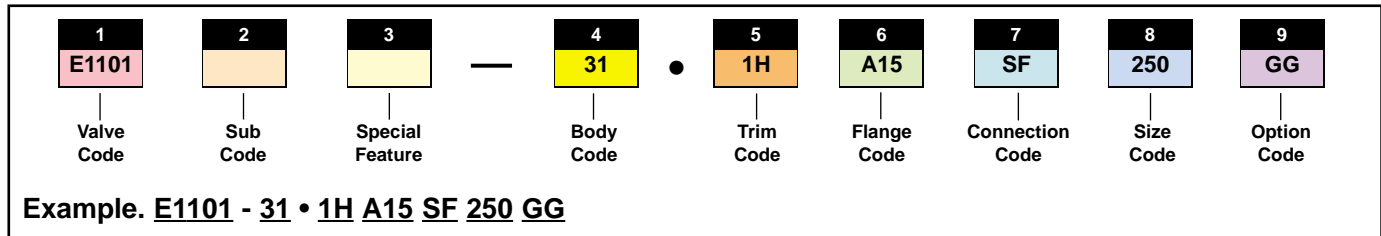
	Valve Size (mm)	Bore dxd1 ^{*2}	L	H		H1		H2		E		W	W ₁	W ₂	W ₃	Gear type
				Short	Long ^{*1}	Short	Long ^{*1}	Short	Long ^{*1}	Short	Long ^{*1}					
Floating	15	13 x 10	140	166	266	21.5	21.5	-	-	100	200	130	-	-	-	-
	20	19 x 13	152	176	276	32.0	32.0	-	-	100	200	130	-	-	-	-
	25	25 x 19	165	180	280	36.0	36.0	-	-	100	200	130	-	-	-	-
	40	38 x 30	190	227	352	52.5	52.5	-	-	125	250	160	-	-	-	-
	50	51 x 38	216	250	375	69.5	69.5	-	-	125	250	230	-	-	-	-
	80	76 x 59	283	314	464	101.0	101.0	-	-	150	300	400	180	300	55	FO
	100	102 x 76	305	326	476	113.0	113.0	-	-	150	300	400	180	300	55	FO
	150	152 x 115	403	-	-	158.5	158.5	478	653	175	350	1,140	240	450	85	FA
200	203 x 152	419	-	-	188.0	188.0	507	682	175	350	1,140	240	450	85	FA	
Trunnion	150	152 x 102	403	462	637	144.0	144.0	492	667	175	350	1,140	180	300	55	FO
	200	203 x 152	419 ^{*3}	531	706	214.0	214.0	533	708	175	350	1,140	240	450	85	FA
	250	254 x 203	457 ^{*3}	635	810	303.0	-	645	-	175	-	-	350	600	116	B
	250	254 x 203	457 ^{*3}	635	810	-	303.0	-	820	-	350	-	420	800	171	C
	300	305 x 252	648	-	-	338/330 ^{*4}	-	603/697 ^{*4}	-	200	-	-	350	600	116	B
	300	305 x 252	648	-	-	-	330.0	-	923	-	400	-	420	800	171	C

Note: * 1 Only Stainless steel body applicable
 * 2 d: Inlet bore. d1: Ball bore
 * 3 Short pattern
 * 4 Carbon steel body/Stainless steel body
 * 5 Reduced bore. Floating type is "One piece Body" design.

Cv Values

Valve Size (mm)	Full bore	Reduced bore
10	26	-
20	50	-
25	94	-
40	260	-
50	480	-
65	750	-
80	1,300	420
100	2,300	770
150	5,400	1,800
200	10,000	2,500
250	16,000	4,500
300	24,000	8,000

New KTM Model Coding System



1 Valve Code	Class	Description	
	ASME	JIS	
EB11	150	10K	Full bore, Floating type 15mm to 200mm
EB12	300	20K	Full bore, Floating type 15mm to 200mm
E1101	150	10K	Full bore, Trunnion 250mm to 300mm
E1102	300	20K	Full bore, Trunnion 250mm to 300mm
E0108	600	-	Full bore, 15mm to 300mm
E1804	600	-	Reduce bore, 80mm to 300mm

6 Flange Code	Description
ASME	
A15	ASME Class 150
A30	ASME Class 300
A60	ASME Class 600
JIS	
J10	JIS 10K
J20	JIS 20K

2 Sub Code	Description
Blank	Soft Seat

7 Connection Code	Description
Blank	Raised Face
SF	Smooth Finish 125 to 250 AARH

3 Special Features	Description
Blank	No Special Feature
E	Extension Bonnet (For Valve Code "EB" only)

8 Size Code	mm	inch
15	15	1/2
20	20	3/4
25	25	1
40	40	1 1/2
50	50	2
65	65	2 1/2
80	80	3
100	100	4
125	125	5
150	150	6
200	200	8
250	250	10
300	300	12

4 Body Code	Material
	JIS ASTM
31	SCS13A (304) CF8 (304)
32	SCS14A (316) CF8M (316)

5 Trim Code	Ball	Seat	Packing	Stem
	JIS	ASTM		
1E	SCS13A ¹ or SCS14A ²	CF8 ¹ or CF8M ²	PTFE/PFA Copolymer	PTFE 304 ¹ or 316 ²
5E	SCS14A	CF8M	PTFE/PFA Copolymer	PTFE 316
1H ³	SCS13A ¹ or SCS14A ²	CF8 ¹ or CF8M ²	R-PTFE	PTFE 304 ¹ or 316 ²
5H ³	SCS14A	CF8M	R-PTFE	PTFE 316

¹ For Body Code 31 and 62 only
² For Body Code 32 only
³ For Valve E1101, E1102, E1108 and E1804 only

9 Option Code	Description
Blank	No additional option
GG	Packing/Gasket-Graphite
E1	For -30°C to -50°C Extension Bonnet
E2	For -51°C to -70°C Extension Bonnet
E3	For -71°C to -104°C Extension Bonnet
E5	For -105°C to -196°C Extension Bonnet