

Trunnion Mounted Ball Valves





CONTENTS

Product Coding for KITZ Trunnion Mounted Ball Valves	2
Soft seated	2
Metal seated	2
Soft Seated 3-Piece Body Trunnion Mounted Ball Valves T60S Series⁽¹⁾	3
Component Drawing	4
Design Features	5
Construction and Materials	7
Valve Dimensions and Operators	9
Material Example	13
Metal Seated 3-Piece Body Trunnion Mounted Ball Valves T60M Series⁽¹⁾	14
Component Drawing	15
Design Features	16
Construction and Materials	17
Valve Dimensions and Operators	19
Pressure-Temperature Ratings	21
Engineering Data	22
Dimensions of Actuator Mounting Pads	24
Soft Seated 3-Piece Body Trunnion Mounted Ball Valves F18TK-T60 Series⁽²⁾	27
Design Features	30
Material Example/Pressure-Temperature Rating	32
Dimensions	33
Engineering Data	37
Cautions for Handling Ball Valves	39

Note: (1) Made in Japan
(2) Made in Spain

KITZ / KITZ CORPORATION are registered trademarks

Product Coding for KITZ Trunnion Mounted Ball Valves

Soft seated

Example **T60S / G-150 SF3TC S BL 8**
T60S / G-150 UF3TC S M 8

①
②
③
④
⑤
⑥
⑦

①	T60S	Series code for soft seated	
	- None	Lever operation	
②	- G	Gear operation	
	- B	KITZ Type B double acting pneumatic actuator	
	- BS	KITZ Type BS spring return pneumatic actuator	
③	Pressure class	150, 300, 600, 900 or 1500	
④	- SF3TC	Trunnion ball valve made in carbon and low alloy steel	
	- UF3TC	Trunnion ball valve made in stainless and high alloy steel	
⑤	- S	Full bore (fire safe)	
	- RS	Reduced bore (fire safe)	
⑥	Body & Trim material: Other materials are also available		
	- None	150-600	A105 Body/Cap/Ball, 316SS Stem
		900/1500	A105 Body/Cap, F60 Ball, 316SS Stem
	- BL	150-600	LF2 Body/Cap/Ball, 316SS Stem
		900/1500	LF2 Body/Cap, F60 Ball, 316SS Stem
	- M	150-600	F316 Body/Cap/Ball, 316SS Stem
900/1500		F316 Body/Cap, F51 or S31803 Ball, 316SS Stem	
⑦	Nominal size (NPS)	2 to 24	

Metal seated

Example **T60M / G-150 SF3TC 6H 10**
T60M / G-150 UF3TC 6H M 10

①
②
③
④
⑤
⑥
⑦
⑧

①	T60M	Series code for metal seated	
	- None	Lever operation	
②	- G	Gear operation	
	- B	KITZ Type B double acting pneumatic actuator	
	- BS	KITZ Type BS spring return pneumatic actuator	
③	Pressure Class	150, 300 or 600	
④	- SF3TC	Trunnion ball valve made in carbon steel	
	- UF3TC	Trunnion ball valve made in stainless steel	
⑤	- None	Full bore	
	- R	Reduced bore	
⑥	6H	Metal seated trunnion ball valve	
⑦	Body & Trim material: Other materials are also available		
	- None	A105 Body/Cap, 316SS Ball, 630SS Stem	
	- BL	LF2 Body/Cap, 316SS Ball, 630SS Stem	
	- M	316SS Body/Cap/Ball, 630SS Stem	
⑧	Nominal size (NPS)	2 to 24	

T60S Series

Soft Seated 3-Piece Body Trunnion Mounted Ball Valves



DESIGN STANDARDS

- Basic design: API 6D/ISO 14313
- F-F dimensions: API 6D/ASME B16.10
- End connection: ASME B16.5
- Bore diameter: API 6D/ISO 14313
- Wall thickness: ASME B16.34

CERTIFICATION

- Fugitive emission: ISO 15848-1 BH CO1
- Fire test: API 607/API 6FA/ISO 10497
- PED: 2014/68/EU
- ATEX: 2014/34/EU
- SIL: IEC 61508 (SIL 2)

PRODUCT RANGE

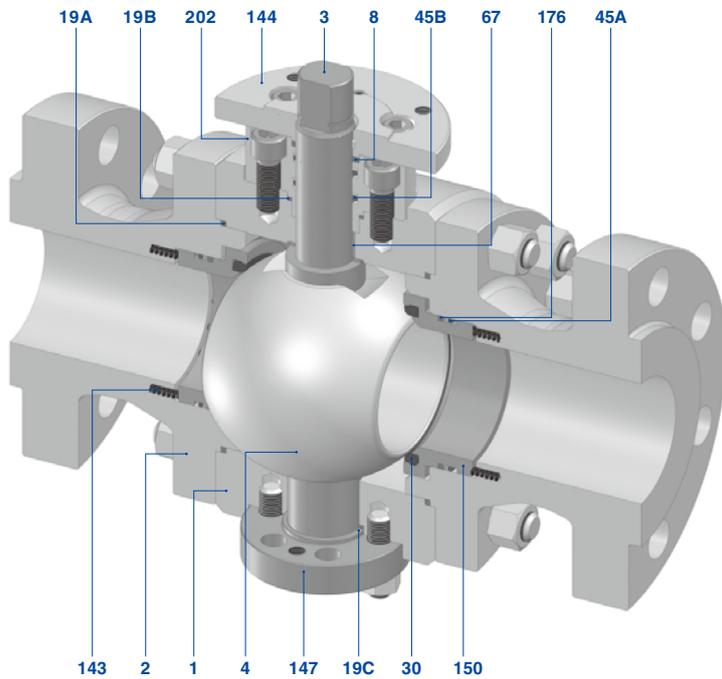
- Nominal pressure: ASME Class 150 to 1500
- Nominal size: NPS 2 to NPS 24 (DN 50 to DN 600)
- Shell materials:
 - Carbon steel, Alloy steel,
 - Austenitic stainless steel, Duplex stainless steel,
 - High alloy steel, Nickel based alloy
- Ball seat materials:
 - RPTFE (Reinforced PTFE), Modified PTFE,
 - RNylon (Reinforced Nylon), DEVLON V[®],
 - PEEK

DESIGN FEATURES

- Structure: 3-piece bolted body and cap
- Standard material: NACE MR0175, ASTM and others
- Tight shut-off sealing mechanism
- Low operating torque
- Triple stem sealing system with 2 O-rings & Packing
- Double Block and Bleed function
- Self-relief of excessive cavity pressure
- Fire safe tested
- Blowout-proof ball seat & stem construction
- Antistatic provision design
- Locking device for lever operation
- ISO 5211 actuator mounting pad
- Available for DPE (Double Piston Effect)/SPE (Single Piston Effect)

Component Drawing

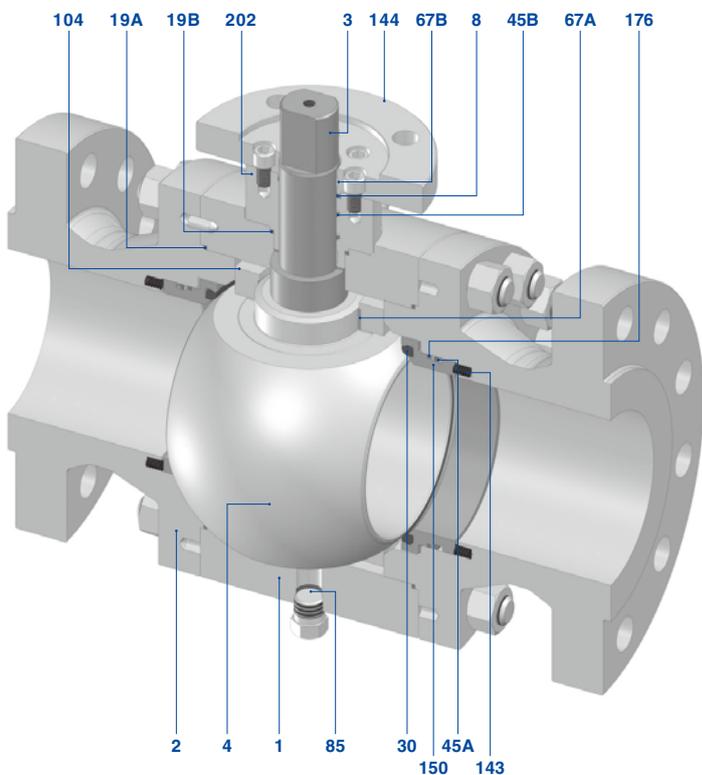
Up to size NPS 4



- 1 Body*
- 2 Cap*
- 3 Stem
- 4 Precision machined ball
- 8 Firesafe gland packing (Flexible graphite)
- 19A Gasket (Flexible graphite)
- 19B Gasket (Flexible graphite)
- 19C Gasket (Flexible graphite)
- 30 Ball seat
- 45A O-ring
- 45B O-ring
- 67 Stem bearing (Metal + RPTFE)
- 143 Seat spring
- 144 Gland plate
- 147 End plate
- 150 Seat retainer
- 176 Fire safe retainer packing (Flexible graphite)
- 202 Bonnet

*Note: Made of forged carbon steel, low alloy steel and high alloy steel. Made of forged or cast austenitic stainless steel, duplex stainless steel and other special alloy materials. Contact KITZ for current available materials.

Size NPS 6 and larger



- 1 Body*
- 2 Cap*
- 3 Stem
- 4 Precision machined ball
- 8 Fire safe gland packing (Flexible graphite)
- 19A Gasket (Flexible graphite)
- 19B Gasket (Flexible graphite)
- 30 Ball seat
- 45A O-ring
- 45B O-ring
- 67A Curl bearing (Metal + RPTFE)
- 67B Stem bearing (PTFE)
- 85 Plug
- 104 Trunnion plate
- 143 Seat spring
- 144 Gland plate
- 150 Seat retainer
- 176 Fire safe retainer packing (Flexible graphite)
- 202 Bonnet

The illustration shown in this catalog represents the typical structure of Class 600 valves.

The structure may differ depending on sizes and classes. Please consult KITZ for more details on the specifications and structure of the valve.

Design Features

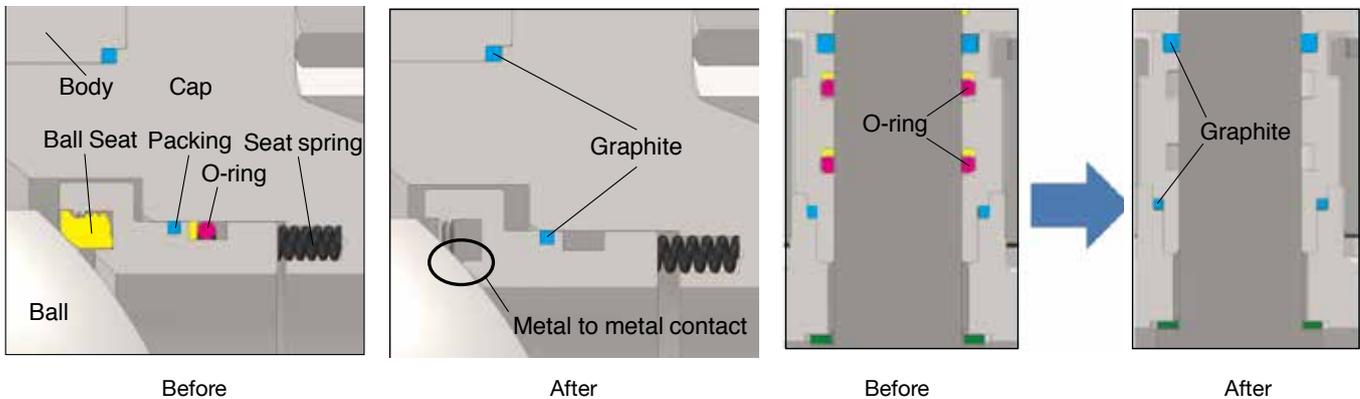
1. Fire Safe Design

(1) Internal Leakage Prevention

When resilient sealing materials are damaged or destroyed by a plant fire, edges of upstream and downstream metal seat retainers preloaded by seat springs come into contact with the ball to shut off line fluid to minimize internal leakage through the valve bore. And, flexible graphite seat retainer packing rings of KITZ original design prevent fluid leakage from between the valve caps and seat retainers during and after the plant fire.

(2) External Leakage Prevention

External leakage from the valve stem area is prevented by double sealing with O-rings and flexible graphite gland packing rings. Leakage through the valve body joint is protected by flexible graphite gaskets. Even after a fire has deteriorated O-rings, flexible graphite gland packing rings and gaskets remain intact to prevent external fluid leakage.

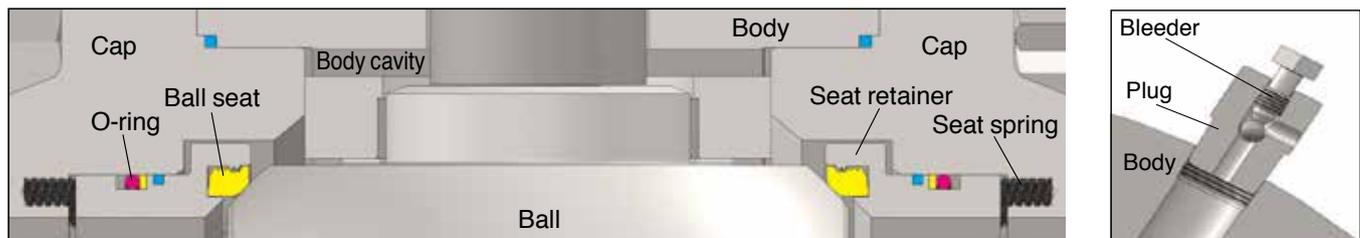


2. Tight Shut-off Sealing Mechanism

The resilient seat design adequately maintains each of the upstream and downstream ball seats in contact with the ball by means of repulsing force of seat springs inserted behind the seat retainers. Line fluid pressure also helps this contact method. This sealing mechanism features un failing thru-the-bore sealing performance of upstream and downstream side ball seats at the same time.

3. Double Block and Bleed Function

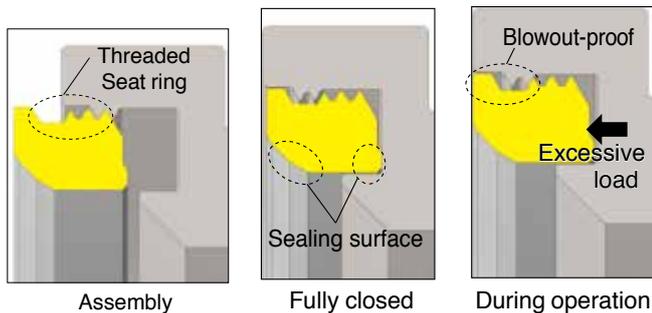
Ball seats independently shut off the line fluid on the upstream and downstream side of the ball. The valve bore and the body cavity are isolated from each other when the valve is fully open or closed. Under this condition, the cavity pressure can be discharged with a vent valve and a drain plug. The vent valve is equipped with a blowout-proof bleeder for safe discharge. Relieving the cavity pressure with a vent valve is recommended for safe draining.



Design Features

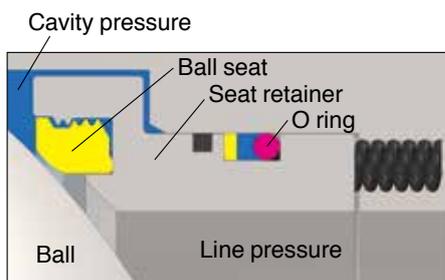
4. Blowout-proof Ball Seat Assembly

As illustrated below, ball seats are threaded into unthreaded back of seat retainers to finally reach to inner walls and lower shoulders of the seat retainers for tightly sealing surface-to-surface contact. This unique design provides easy maintenance and blowout-proof seat assembly when ball seats are excessively loaded by back pressure due to incidental cavity pressure rise.



6. Cavity Pressure Relief

In case of incidental rise of servicing or ambient temperature, liquefied gas or highly volatile liquid trapped within the body cavity may vaporize, and cause an excessive rise in the cavity pressure. For safety consideration, when the cavity pressure exceeds the line pressure, either one of the ball seats will move slightly away from the ball surface together with seat retainers to relieve the excessive cavity pressure into the valve bore.

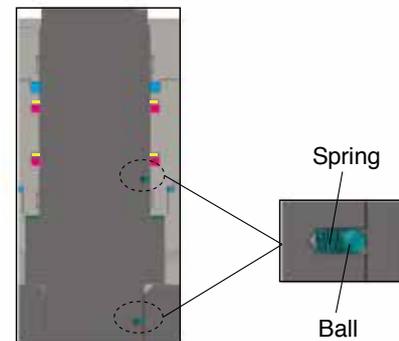


7. Low Emission Guaranteed Design

The fugitive emission suppressing design for both resilient and metal seated valves are certified to ISO 15848 tightness class "B" (Lower than $10^{-4} \text{ mg}\cdot\text{s}^{-1}\cdot\text{m}^{-1}$ for stem leakage and lower than 50 ppmv for body leakage). This verifies the outstanding low emission performance of the whole sealing mechanism of the valve.

5. Antistatic Design

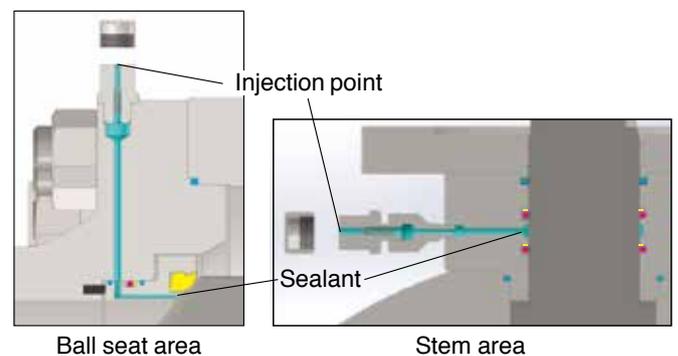
Spring loaded balls assembled between the stem and the bonnet and between the stem and the ball permits electric conductivity through all metallic valve components.



8. Options¹

(1) Emergency Seal Restoration²

For accidental leakage from ball seats or stem sealing area, a sealant supply mechanism may be provided as an option. Should sealing parts be damaged or decomposed by a fire or other accidental causes, leakage can be temporarily prevented or reduced by sealant injection into this mechanism.



(2) Special Shell and Trim Materials

(3) Special Sealing Component Materials

(4) Butt-weld Piping Connection

(5) Pipe Pups Welded to Valve Ends

(6) DIB: Double Isolation and Bleed (Double Seal)³

(7) Stem Extension

(8) Overlay for Bore and Cavity

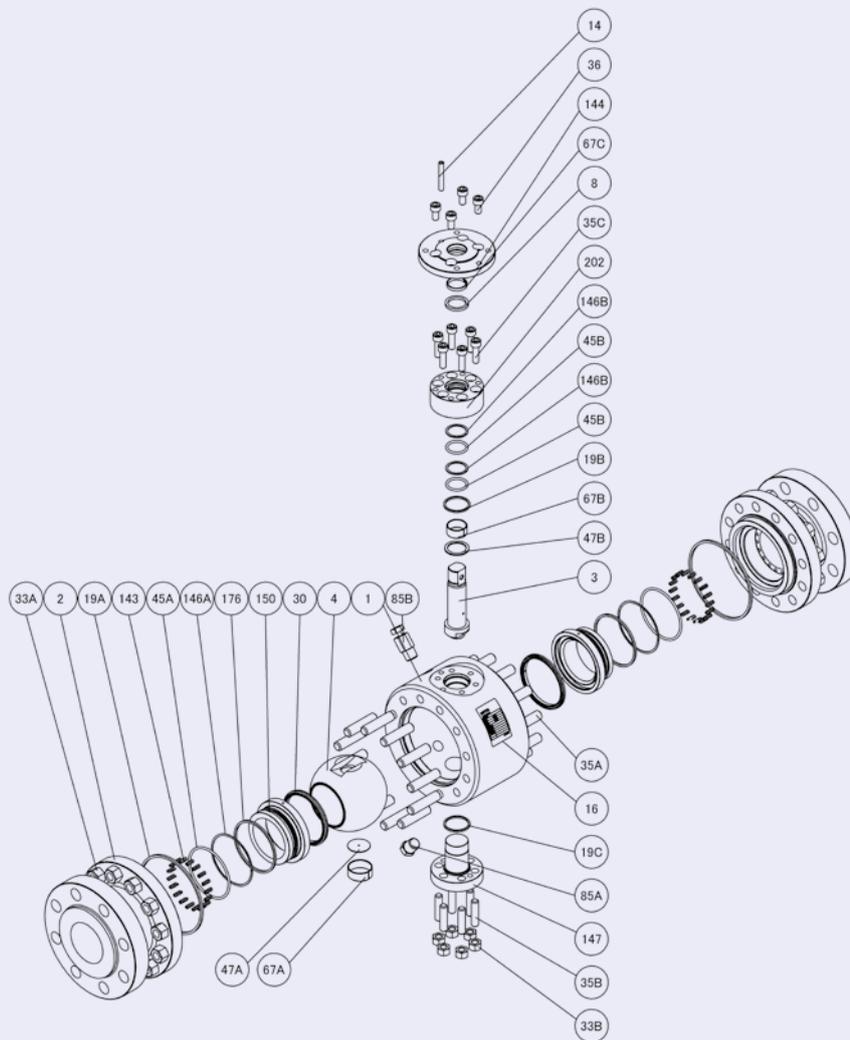
(9) Actuation (Pneumatic and Electric)

¹ For all optional provisions, please contact your local KITZ agents or distributors.

² Standard design for North America.

³ Any combination of DPE (Double Piston Effect)/SPE (Single Piston Effect) is available.

Construction and Materials



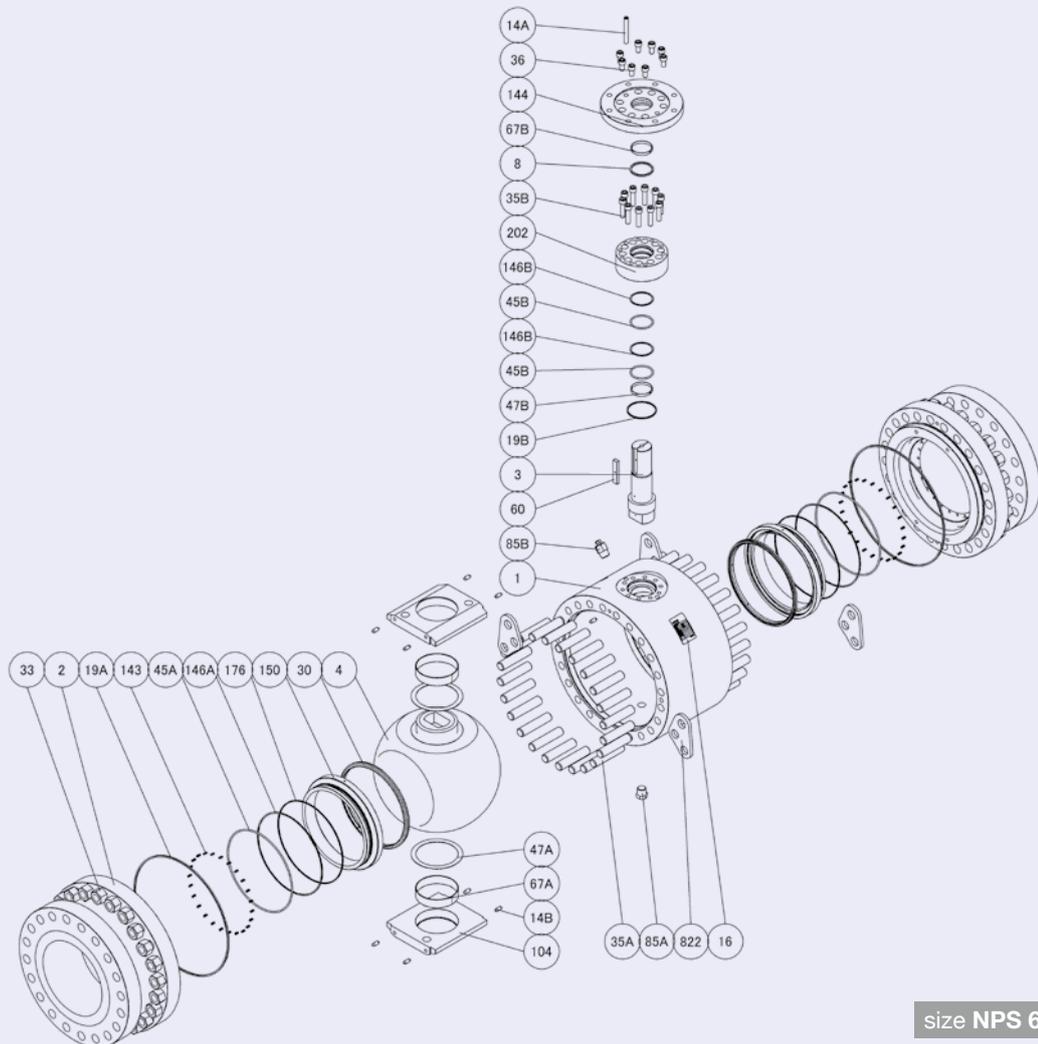
up to size NPS 4

NO	NAME OF PARTS	MATERIALS	NO	NAME OF PARTS	MATERIALS
1	BODY	A105	36	GLAND BOLT	A193 Gr. B7M
2	CAP	A105	45A	O-RING	HNBR
3	STEM	A479 TYPE 316 or A276 TYPE 316 or A182 Gr. F316	45B	O-RING	HNBR
4	BALL	A105 + ENP or A216 Gr. WCB + ENP F60+ENP (CLASS 900/1500)	47A	THRUST WASHER	RPTFE
8	GLAND PACKING	FLEXIBLE GRAPHITE	47B	THRUST WASHER	CS + RPTFE
14	SET PIN	A564 TYPE 630 H1150D	67A	CURL BEARING (BALL)	CS + RPTFE
16	NAME PLATE	STAINLESS STEEL	67C	STEM BEARING	PTFE
19A	GASKET	FLEXIBLE GRAPHITE	85A	PLUG	A350 Gr. LF2 cl.1
19B	GASKET	FLEXIBLE GRAPHITE	85B	VENT VALVE	A350 Gr. LF2 cl.1
19C	GASKET	FLEXIBLE GRAPHITE	143	SEAT SPRING	INCONEL® X750 NICKEL ALLOY
30	BALL SEAT	RPTFE	144	GLAND PLATE	A105
33A	CAP NUT	A194 Gr. 2HM	146A	BACK UP RING	PTFE
33B	COVER NUT	A194 Gr. 2HM	146B	BACK UP RING	PTFE
35A	CAP BOLT	A193 Gr. B7M	147	END PLATE	A105
35B	COVER BOLT	A193 Gr. B7M	150	SEAT RETAINER	A105 + ENP
35C	BONNET BOLT	A193 Gr. B7M	176	RETAINER PACKING	BRAIDED GRAPHITE
			202	BONNET	A105

The illustration shown in this catalog represents the typical structure of Class 600 valves.

The structure may differ depending on sizes and classes. Please consult KITZ for more details on the specifications and structure of the valve.

Construction and Materials



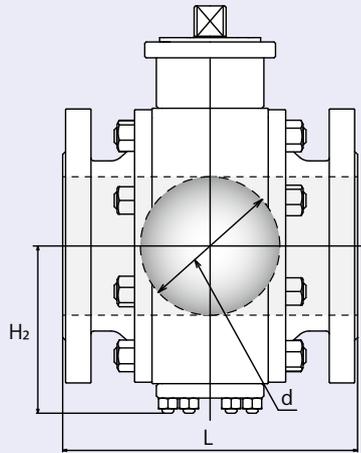
size NPS 6 and larger

NO	NAME OF PARTS	MATERIALS	NO	NAME OF PARTS	MATERIALS
1	BODY	A105	45B	O-RING	HNBR
2	CAP	A105	47A	THRUST WASHER	RPTFE
3	STEM	A479 TYPE 316 or A276 TYPE 316 or A182 Gr. F316	47B	THRUST WASHER	CS + RPTFE
4	BALL	A105 + ENP or A216 Gr. WCB + ENP F60+ENP (CLASS 900/1500)	60	KEY	CARBON STEEL
8	GLAND PACKING	FLEXIBLE GRAPHITE	67A	CURL BEARING (BALL)	CS + RPTFE
14A	SET PIN	A564 TYPE 630 H1150D	67B	STEM BEARING	PTFE
14B	SET PIN	A276 TYPE 316 or A479 TYPE 316	85A	PLUG	A350 Gr. LF2 cl.1
16	NAME PLATE	STAINLESS STEEL	85B	VENT VALVE	A350 Gr. LF2 cl.1
19A	GASKET	FLEXIBLE GRAPHITE	104	TRUNNION PLATE	A105 or A216 Gr. WCB
19B	GASKET	FLEXIBLE GRAPHITE	143	SEAT SPRING	INCONEL® X750 NICKEL ALLOY
30	BALL SEAT	RPTFE	144	GLAND PLATE	A105
33	CAP NUT	A194 Gr. 2HM	146A	BACK UP RING	PTFE
35A	CAP BOLT	A193 Gr. B7M	146B	BACK UP RING	PTFE
35B	BONNET BOLT	A193 Gr. B7M	150	SEAT RETAINER	A105 + ENP
36	GLAND BOLT	A193 Gr. B7M	176	RETAINER PACKING	BRAIDED GRAPHITE
45A	O-RING	HNBR	202	BONNET	A105
			822	LIFTING LUG	CARBON STEEL

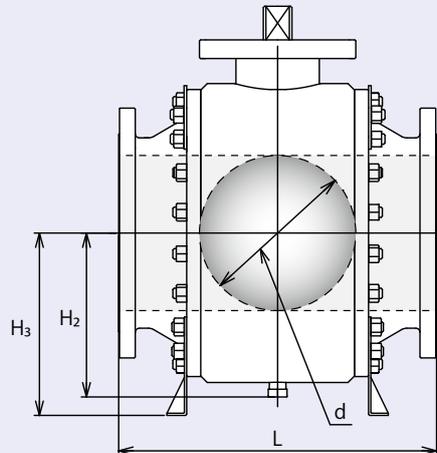
The illustration shown in this catalog represents the typical structure of Class 600 valves.

The structure may differ depending on sizes and classes. Please consult KITZ for more details on the specifications and structure of the valve.

Valve Dimensions and Operators



Up to Size NPS 4



Size NPS 6 and larger

Class 150

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24	
	DN	50	80	100	150	200	250	300	350	400	450	500	600	
Valve Operator		Lever					Gear							
d		49	74	100	150	201	252	303	334	385	436	487	589	
L		178	203	229	394	457	533	610	686	762	864	914	1067	
H1		159	201	260	275	316	372	407	441	511	551	613	687	
H2		96	117	148	183	221	275	-	-	-	-	-	-	
H3		-	-	-	-	-	-	427	445	499	526	619	698	
A		-	-	-	-	86	105	105	53	130	130	130	130	
B		-	-	-	-	305	396	396	396	567	567	567	567	
D		300	400	450	750	500	600	600	600	800	800	800	800	
Weight (kg)		20	35	60	160	300	510	750	930	1370	1730	2380	3680	

unit: mm

Class 300

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24	
	DN	50	80	100	150	200	250	300	350	400	450	500	600	
Valve Operator		Lever					Gear							
d		49	74	100	150	201	252	303	334	385	436	487	589	
L		216	283	305	403	502	568	648	762	838	914	991	1143	
H1		159	201	260	275	316	372	413	438	502	542	604	698	
H2		96	117	148	183	228	279	-	-	-	-	-	-	
H3		-	-	-	-	-	-	411	435	477	511	558	640	
A		-	-	-	-	86	105	53	53	130	130	130	140	
B		-	-	-	-	305	392	398	398	567	567	567	580	
D		300	400	450	749	500	600	600	600	800	800	800	800	
Weight (kg)		25	45	80	180	340	530	800	1100	1500	2100	2600	4300	

unit: mm

Class 600

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24	
	DN	50	80	100	150	200	250	300	350	400	450	500	600	
Valve Operator		Lever					Gear							
d		49	74	100	150	201	252	303	334	385	436	487	589	
L		292	356	432	559	660	787	838	889	991	1092	1194	1397	
H1		182	236	263	282	335	382	448	478	540	588	652	749	
H2		98	120	150	191	237	-	-	-	-	-	-	-	
H3		-	-	-	-	-	384	427	460	498	554	643	721	
A		-	-	-	86	105	53	130	130	130	140	140	182	
B		-	-	-	305	396	396	567	567	567	581	581	570	
D		400	450	780	500	600	600	800	800	800	800	800	800	
Weight (kg)		35	75	140	300	500	760	1100	1350	1970	2560	3580	5450	

unit: mm

Valve Dimensions and Operators

Class 900

unit: mm

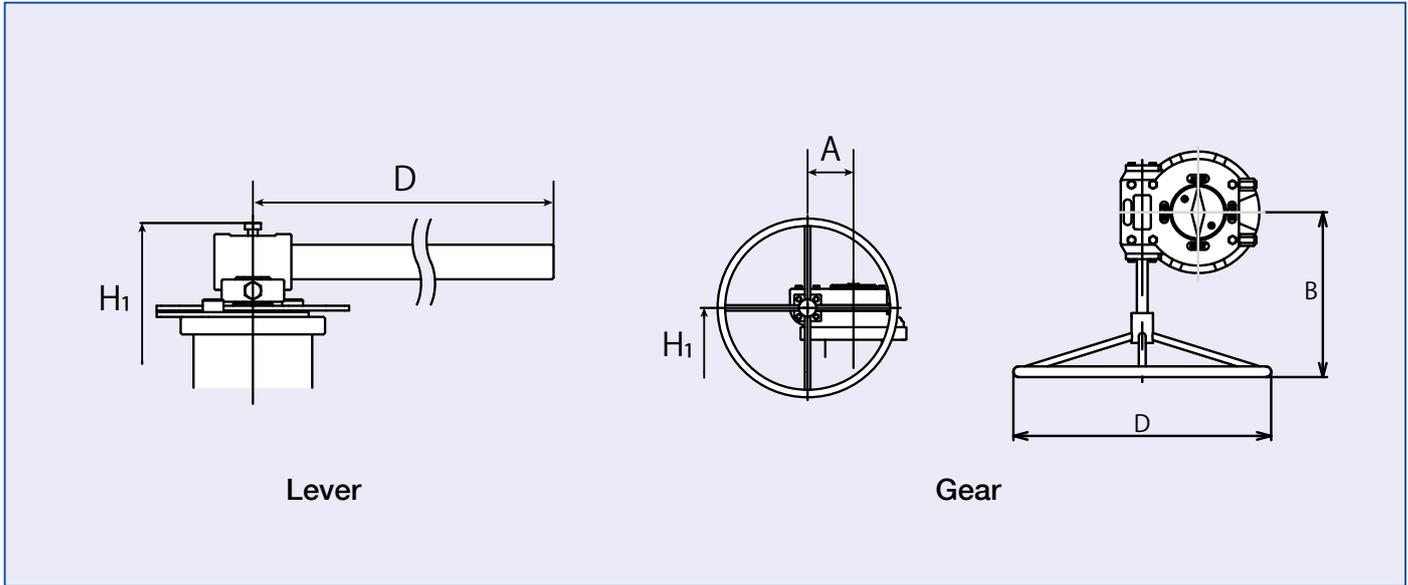
Nominal Size	NPS	2	3	4	6	8	10	12	
	DN	50	80	100	150	200	250	300	
Valve Operator		Lever				Gear			
d		49	74	100	150	201	252	303	
L		368	381	457	610	737	838	965	
H1		218	243	276	295	355	406	480	
H2		109	134	172	201	246	-	-	
H3		-	-	-	-	-	414	454	
A		-	-	-	86	53	130	130	
B		-	-	-	305	396	417	567	
D		700	700	900	600	600	600	800	
Weight (kg)		65	95	170	400	700	1110	1730	

Class 1500

unit: mm

Nominal Size	NPS	2	3	4	6	8	10	12	
	DN	50	80	100	150	200	250	300	
Valve Operator		Lever				Gear			
d		49	74	100	144	192	239	287	
L		368	470	546	705	832	991	1130	
H1		218	250	262	353	435	482	600	
H2		109	146	186	237	-	-	-	
H3		-	-	-	-	408	446	556	
A		-	-	86	53	130	130	182	
B		-	-	305	396	567	567	570	
D		700	900	500	600	600	800	800	
Weight (kg)		65	135	275	600	1130	1920	3330	

Valve Dimensions and Operators



Class 150

Nominal Size	NPS DN	unit: inch											
		2 50	3 80	4 100	6 150	8 200	10 250	12 300	14 350	16 400	18 450	20 500	24 600
Valve Operator		Lever						Gear					
d		1.94	2.94	3.94	5.94	7.94	9.94	11.94	13.19	15.19	17.19	19.19	23.19
L		7.00	8.00	9.00	15.50	18.00	21.00	24.00	27.00	30.00	34.00	36.00	42.00
H1		6.26	7.91	10.24	10.83	12.44	14.65	16.02	17.36	20.12	21.69	24.13	27.05
H2		3.78	4.61	5.83	7.20	8.70	10.83	-	-	-	-	-	-
H3		-	-	-	-	-	-	16.89	17.52	19.65	20.71	24.37	27.48
A		-	-	-	-	3.39	4.13	4.13	2.09	5.12	5.12	5.12	5.12
B		-	-	-	-	12.01	15.59	15.59	15.59	22.28	22.32	22.32	22.32
D		11.81	15.75	17.72	29.53	19.69	23.62	23.62	23.62	31.5	31.5	31.5	31.5
Weight (lb.)		44	88	132	331	617	992	1543	2094	2866	4189	5071	7937

Class 300

Nominal Size	NPS DN	unit: inch											
		2 50	3 80	4 100	6 150	8 200	10 250	12 300	14 350	16 400	18 450	20 500	24 600
Valve Operator		Lever						Gear					
d		1.94	2.94	3.94	5.94	7.94	9.94	11.94	13.19	15.19	17.19	19.19	23.19
L		8.50	11.13	12.00	15.88	19.75	22.38	25.50	30.00	33.00	36.00	39.00	45.00
H1		6.26	7.91	10.24	10.83	12.44	14.65	16.34	17.36	20.12	21.69	24.13	27.48
H2		3.78	4.61	5.83	7.20	8.70	10.83	-	-	-	-	-	-
H3		-	-	-	-	-	-	16.81	17.52	19.61	20.83	24.33	27.36
A		-	-	-	-	3.39	4.13	2.09	2.09	5.12	5.12	5.12	5.51
B		-	-	-	-	12.01	15.59	13.7	15.59	22.28	22.32	22.32	22.87
D		11.81	15.75	17.72	29.53	19.69	23.62	23.62	23.62	31.5	31.5	31.5	31.5
Weight (lb.)		49	110	176	441	750	1169	1764	2425	3307	4630	5732	9480

Class 600

Nominal Size	NPS DN	unit: inch											
		2 50	3 80	4 100	6 150	8 200	10 250	12 300	14 350	16 400	18 450	20 500	24 600
Valve Operator		Lever						Gear					
d		1.94	2.94	3.94	5.94	7.94	9.94	11.94	13.19	15.19	17.19	19.19	23.19
L		11.50	14.00	17.00	22.00	26.00	31.00	33.00	35.00	39.00	43.00	47.00	55.00
H1		7.17	9.29	10.35	11.1	13.19	15.04	17.64	18.82	21.26	23.15	25.67	29.49
H2		3.86	4.76	5.91	7.52	9.33	-	-	-	-	-	-	-
H3		-	-	-	-	-	15.12	16.81	18.11	19.61	21.81	25.31	28.39
A		-	-	-	3.39	4.13	2.09	5.12	5.12	5.12	5.51	5.55	7.17
B		-	-	-	12.01	15.59	15.59	22.32	22.32	22.32	22.87	22.87	22.44
D		15.75	17.72	31.5	19.69	23.62	23.62	31.5	31.5	31.5	31.5	31.5	31.5
Weight (lb.)		77	165	309	661	1191	1764	2425	3285	4630	6041	7716	11685

Valve Dimensions and Operators

Class 900

unit: inch

Nominal Size	NPS	2	3	4	6	8	10	12	
	DN	50	80	100	150	200	250	300	
Valve Operator		Lever				Gear			
d		1.93	2.91	3.94	5.91	7.91	9.92	11.93	
L		14.49	15.00	17.99	24.02	29.02	32.99	37.99	
H1		8.58	9.57	10.87	11.61	13.98	15.98	18.90	
H2		4.28	5.27	6.77	7.91	9.69	-	-	
H3		-	-	-	-	-	16.30	17.87	
A		-	-	-	3.39	2.09	5.12	5.12	
B		-	-	-	12.01	15.59	16.42	22.32	
D		27.56	27.56	35.43	23.62	23.62	23.62	31.50	
Weight (lb.)		143.3	209.4	374.8	881.8	1543	2447	3814	

Class 1500

unit: inch

Nominal Size	NPS	2	3	4	6	8	10	12	
	DN	50	80	100	150	200	250	300	
Valve Operator		Lever				Gear			
d		1.93	2.91	3.94	5.67	7.56	9.41	11.30	
L		14.49	18.50	21.50	27.76	32.76	39.02	44.49	
H1		8.58	9.84	10.31	13.90	17.13	18.98	23.62	
H2		4.28	5.74	7.32	9.33	-	-	-	
H3		-	-	-	-	16.06	17.56	21.89	
A		-	-	3.39	2.09	5.12	5.12	7.17	
B		-	-	12.01	15.59	22.32	22.32	22.44	
D		27.56	35.43	19.69	23.62	23.62	31.50	31.50	
Weight (lb.)		143.3	297.6	606.3	1323	2491	4233	7341	

Material Example

Service	Non-corrosive	Low Temp.	Corrosive	Sour	
Body/Cap	A105	LF2	F316	F51, S31803 or CD3MN	F55, S32760 or CD3MWCuN
Stem	316SS	316SS	316SS	F51 or S31803	F55 or S32760
Ball	A105+ENP	LF2+ENP F60+ENP (CLASS 900/1500)	316SS F51, S31803 or CD3MN (CLASS 900/1500)	F51, S31803 or CD3MN	F55, S32760 or CD3MWCuN
Seat Retainer	A105+ENP	LF2+ENP	316SS	F51, S31803 or CD3MN	F55, S32760 or CD3MWCuN
Ball Seat	CLASS 150 to 600: RPTFE CLASS 900 and over: RNYLON				
Spring	INCONEL® X750				
O-ring	HNBR	L-NBR	FKM	FKM	FKM
Bolt	B7M	L7M	B8M	B8M	B8M
Nut	2HM	7M	8M	8M	8M



T60M Series

Metal Seated 3-Piece Body Trunnion Mounted Ball Valves



GENERAL DESIGN STANDARD

- Design: API 6D/ISO 14313
- Face to face: API 6D/ASME B16.10
- End connection: ASME B16.5
- Bore diameter: API 6D/ISO 14313
- Wall thickness: ASME B16.34

PRODUCT RANGE

- Nominal pressure: Class 150 to 600
- Nominal size: NPS 2 to 24 (DN 50 to 600)
- Shell materials:
 - Carbon steel, Alloy steel,
 - Austenitic stainless steel, Duplex stainless steel,
 - High alloy steel, Nickel based alloy
- Seat materials:
 - 316SS + Ni- Cr alloy thermal spraying

CERTIFICATION

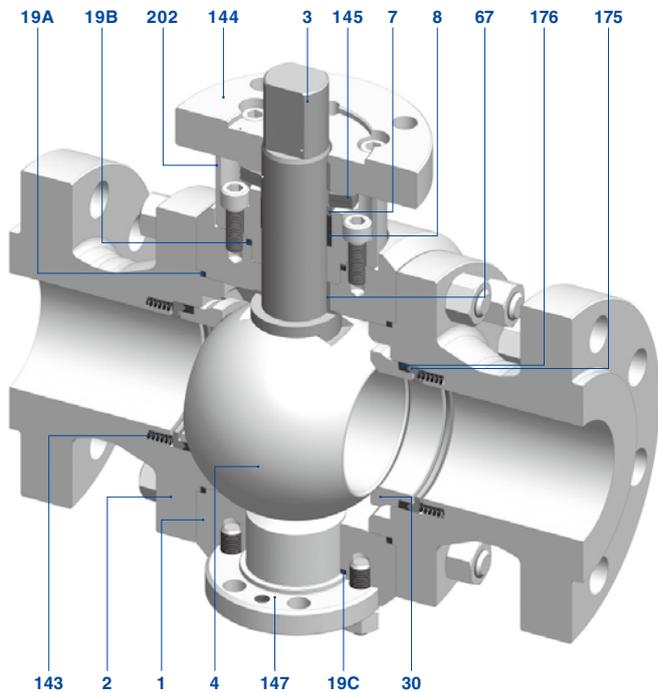
- Fugitive emission: ISO 15848-1 BH CO1
- Fire test: API 6FA
- PED: 2014/68/EU
- ATEX: 2014/34/EU
- SIL: IEC 61508 (SIL 2)

DESIGN FEATURE

- Structure: 3-piece bolted body and cap
- Standard material: NACE MR0175, ASTM and others
- High performance sealing mechanism
- Low operating torque
- Packing with live loaded sealing mechanism
- Double Block and Bleed function
- Self-relief of excessive cavity pressure
- Fire safe design
- Blowout-proof ball seat & stem construction
- Antistatic provision design
- Locking device for lever operation
- ISO 5211 actuator mounting pad

Component Drawing

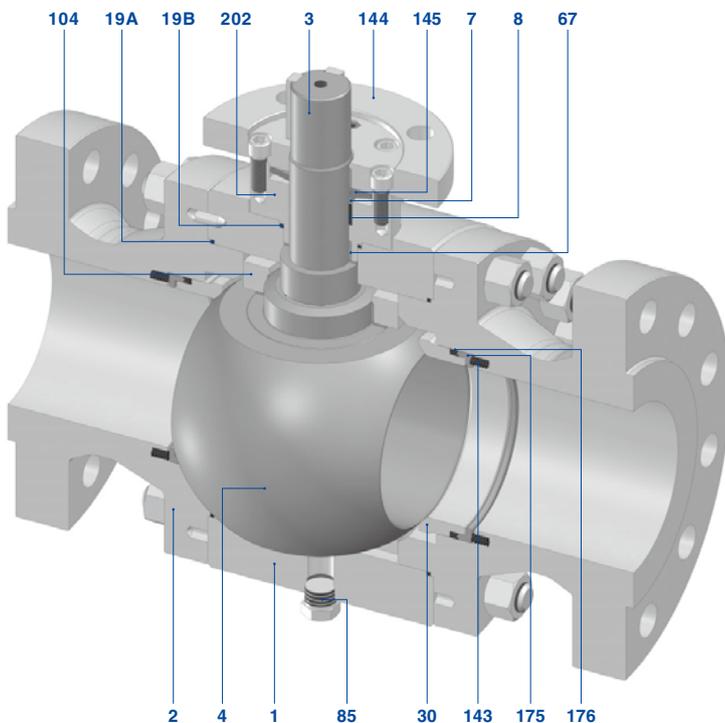
Up to Size NPS 4



- 1 Body*
- 2 Cap*
- 3 Stem
- 4 Precision machined ball
- 7 Gland
- 8 Gland packing (Flexible graphite)
- 19A Gasket (Flexible graphite)
- 19B Gasket (Flexible graphite)
- 19C Gasket (Flexible graphite)
- 30 Ball seat
- 67 Stem bearing
- 143 Seat spring
- 144 Gland plate
- 145 Coned disc spring
- 147 End plate
- 175 Retainer gland
- 176 Seat packing (Flexible graphite)
- 202 Bonnet

*Note: Made of forged carbon steel, low alloy steel and high alloy steel. Made of forged or cast austenitic stainless steel, duplex stainless steel and other special alloy materials. Contact KITZ for current available materials.

Size NPS 6 and larger



- 1 Body*
- 2 Cap*
- 3 Stem
- 4 Precision machined ball
- 7 Gland
- 8 Gland packing (Flexible graphite)
- 19A Gasket (Flexible graphite)
- 19B Gasket (Flexible graphite)
- 30 Ball seat
- 67 Stem bearing
- 85 Plug
- 104 Trunnion plate
- 143 Seat spring
- 144 Gland plate
- 145 Coned disc spring
- 175 Retainer gland
- 176 Seat packing (Flexible graphite)
- 202 Bonnet

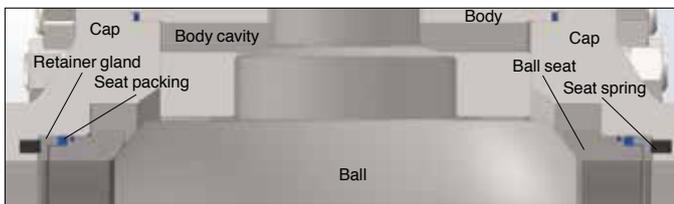
The illustration shown in this catalog represents the typical structure of Class 600 valves.

The structure may differ depending on sizes and classes. Please consult KITZ for more details on the specifications and structure of the valve.

Design Features

1. High Performance Sealing Mechanism

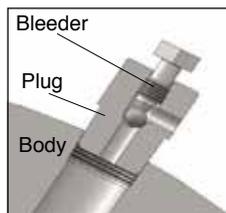
The metal seat design, as the resilient seat design does, adequately maintains each of the upstream and downstream ball seats in contact with the ball by means of repulsing force of seat springs inserted behind seat retainers. Line fluid pressure also helps this contact method. This sealing mechanism features unfailing thru-the-bore sealing performance of upstream and downstream side ball seats at the same time. And surfaces of the ball and ball seats in contact are thermally sprayed with high alloy material. This provides higher wear resistance and durability for high temperature and abrasive services.



2. Double Block and Bleed Function

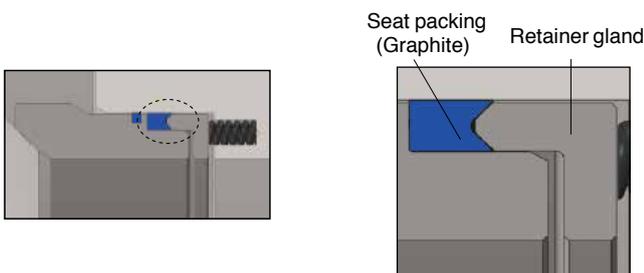
Ball seats independently shut off the line fluid on the upstream and downstream side of the ball. The valve bore and the body cavity are isolated from each other when the valve is fully open or closed. Under this condition, the cavity pressure can be discharged with a vent valve and a drain plug. The vent valve is equipped with a blowout-proof bleeder for safe discharge.

Relieving the cavity pressure with a vent valve is recommended for safe draining.



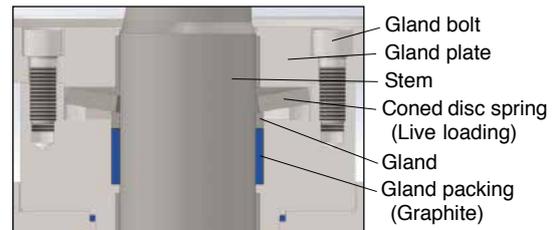
3. High Performance Seat Packing

The unique graphite seat packing rings with retainer glands provides reliable shut-off sealing performance during the entire service life.



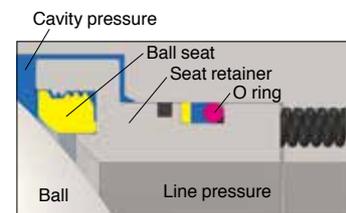
4. Live Loaded Packing Structure

The gland packing ring is compressed with a coned disc springs to prevent stress relaxation. This live loaded packing system provides highly durable sealing performance with no need of packing retightening.



5. Cavity Pressure Relief

In case of incidental rise of servicing or ambient temperature, liquefied gas or highly volatile liquid trapped within the body cavity may vaporize, and cause an excessive rise in the cavity pressure. For safety consideration, when the cavity pressure exceeds the line pressure, either one of the ball seats will move slightly away from the ball surface together with seat retainers to relieve the excessive cavity pressure into the valve bore.



6. Low Emission Guaranteed Design

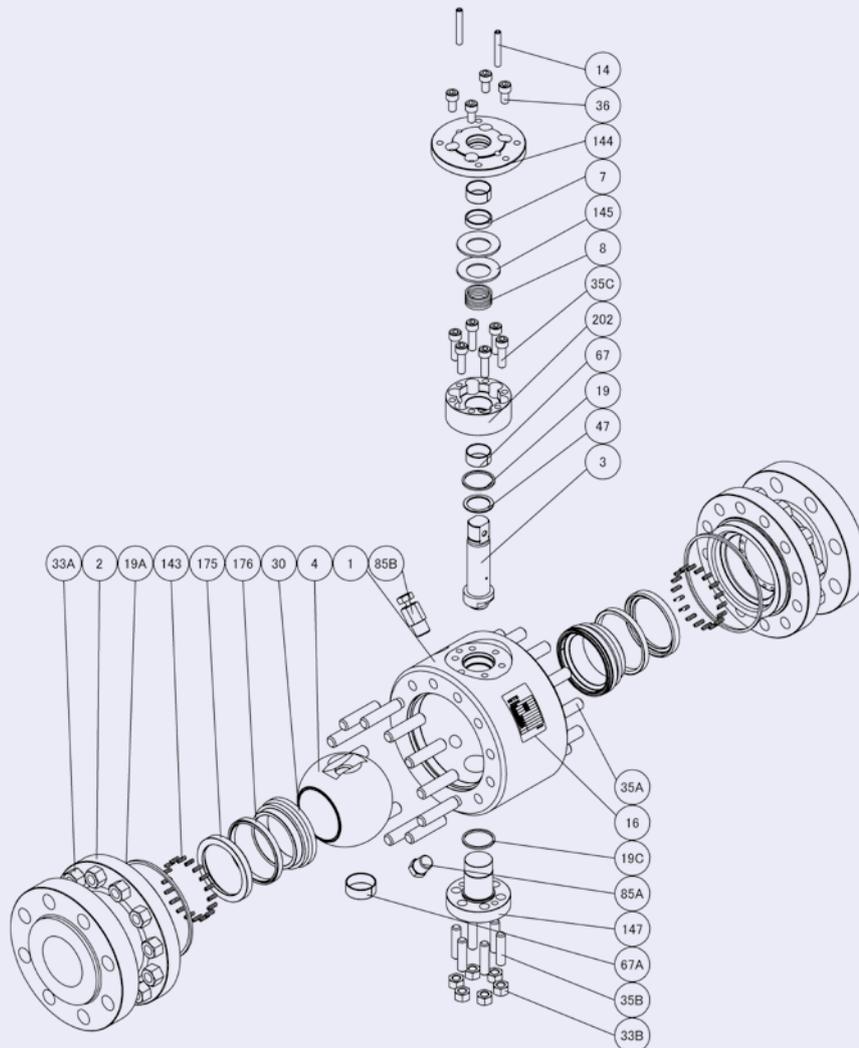
The fugitive emission suppressing design for both resilient and metal seated valves are certified to ISO 15848 tightness class "B" (Lower than 10^{-4} mg·s⁻¹·m⁻¹ for stem leakage and lower than 50 ppmv for body leakage). This verifies the outstanding low emission performance of the whole sealing mechanism of the valve.

7. Options*

- (1) Special Shell and Trim Materials
- (2) Special Sealing Component Materials
- (3) Butt-weld Piping Connection
- (4) Pipe Pups Welded on Valve Ends
- (5) Stem Extension
- (6) Overlay for Bore and Cavity
- (7) Actuation (Pneumatic and Electric)

*For all optional provisions, please contact your local KITZ agents or distributors

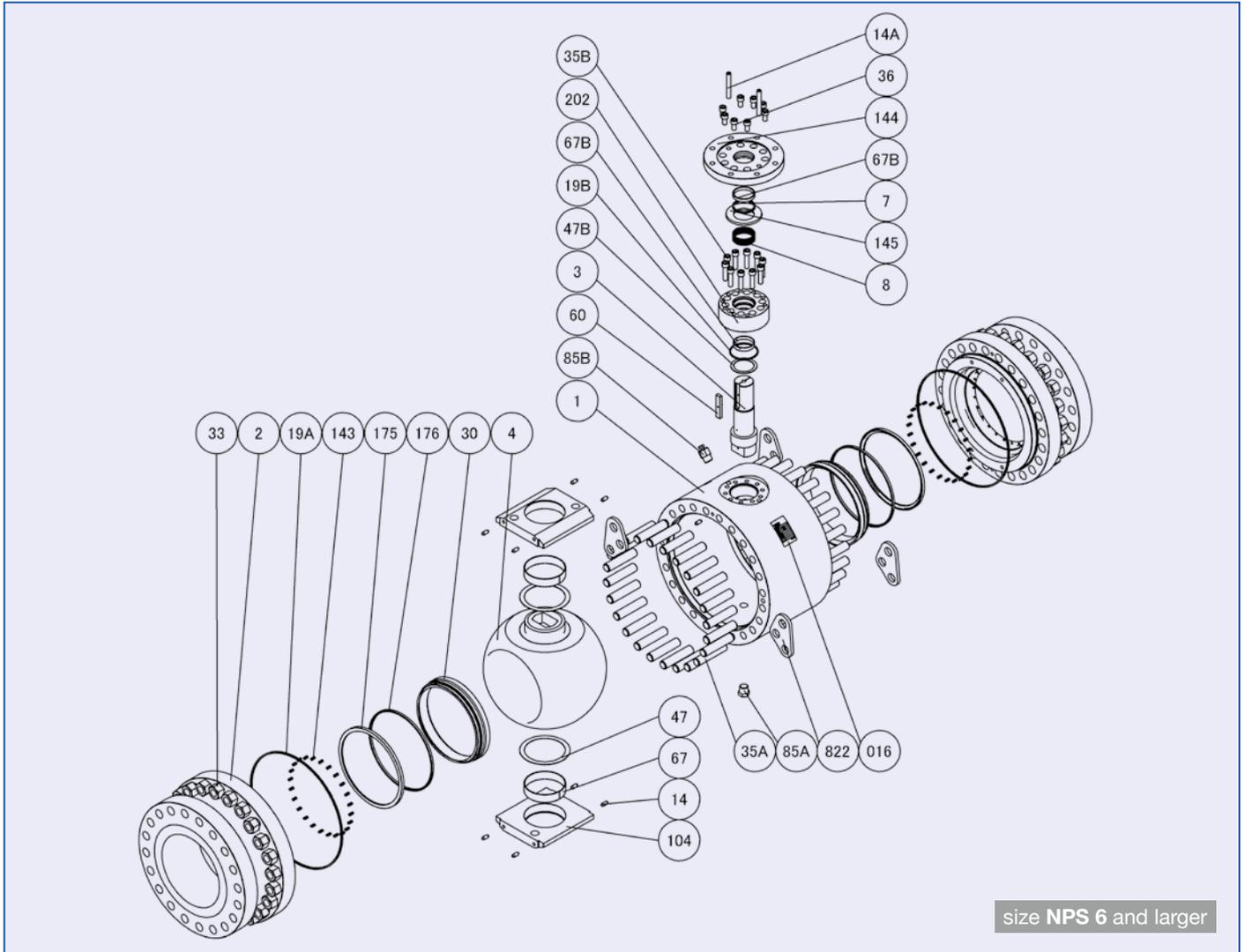
Construction and Materials



up to size NPS 4

NO	NAME OF PARTS	MATERIALS	NO	NAME OF PARTS	MATERIALS
1	BODY	A105	33B	COVER NUT	A194 Gr. 2HM
2	CAP	A105	35A	CAP BOLT	A193 Gr. B7M
3	STEM	A564 TYPE 630 H1150D	35B	COVER BOLT	A193 Gr. B7M
4	BALL	A182 Gr. F316 + SFNi or A479 TYPE 316 + SFNi or A276 TYPE 316 + SFNi	35C	BONNET BOLT	A193 Gr. B7M
			36	GLAND BOLT	A193 Gr. B7M
7	GLAND	A182 Gr. F316 or A479 TYPE 316 or A276 TYPE 316	47	THRUST WASHER	HT-625® NICKEL ALLOY + COATING
			67A	CURL BEARING (BALL)	HT-625® NICKEL ALLOY + COATING
8	GLAND PACKING	FLEXIBLE GRAPHITE	67B	STEM BEARING	HT-625® NICKEL ALLOY + COATING
14	SET PIN	A564 TYPE 630 H1150D	85A	PLUG	A350 Gr. LF2 cl.1
16	NAME PLATE	STAINLESS STEEL	85B	VENT VALVE	A350 Gr. LF2 cl.1
19A	GASKET	FLEXIBLE GRAPHITE	143	SEAT SPRING	INCONEL® X750 NICKEL ALLOY
19B	GASKET	FLEXIBLE GRAPHITE	144	GLAND PLATE	ASTM A105
19C	GASKET	FLEXIBLE GRAPHITE	145	CONED DISC SPRING	UNS N07718
30	BALL SEAT	A182 Gr. F316 + SFNi or A479 TYPE 316 + SFNi or A276 TYPE 316 + SFNi	147	END PLATE	A105
			175	RETAINER GLAND	A182 Gr. F316 or A479 TYPE 316 or A276 TYPE 316 or A240 TYPE 316
			176	SEAT PACKING	FLEXIBLE GRAPHITE
33A	CAP NUT	A194 Gr. 2HM	202	BONNET	A105

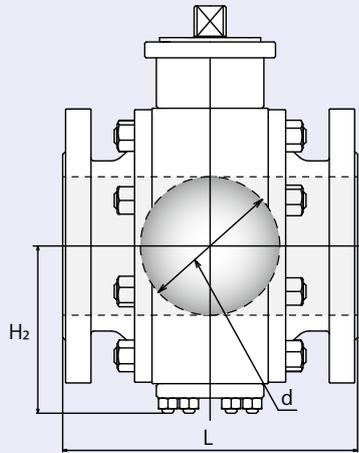
Construction and Materials



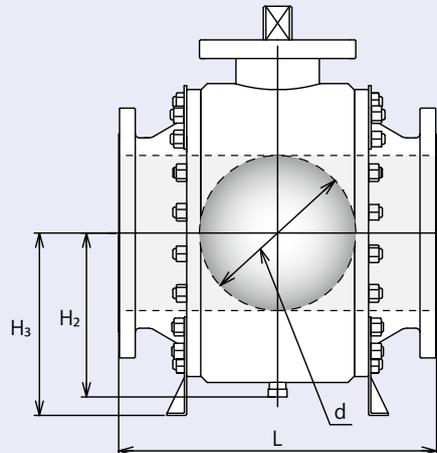
size NPS 6 and larger

NO	NAME OF PARTS	MATERIALS	NO	NAME OF PARTS	MATERIALS
1	BODY	A105	35B	BONNET BOLT	A193 Gr. B7M
2	CAP	A105	36	GLAND BOLT	A193 Gr. B7M
3	STEM	A564 TYPE 630 H1150D	47A	THRUST WASHER	HT-625 [®] NICKEL ALLOY + COATING
4	BALL	A182 Gr. F316 + SFNi or A479 TYPE 316 + SFNi or A276 TYPE 316 + SFNi	47B	THRUST WASHER	HT-625 [®] NICKEL ALLOY + COATING
			60	KEY	CARBON STEEL
			67A	CURL BEARING (BALL)	HT-625 [®] NICKEL ALLOY + COATING
7	GLAND	A182 Gr. F316 or A479 TYPE316 or A276 TYPE 316	67B	STEM BEARING	HT-625 [®] NICKEL ALLOY + COATING
8	GLAND PACKING	FLEXIBLE GRAPHITE	85A	PLUG	A350 Gr. LF2 cl.1
14A	SET PIN	A564 TYPE 630 H1150D	85B	VENT VALVE	A350 Gr. LF2 cl.1
14B	SET PIN	A276 TYPE 316 OR A479 TYPE 316	104	TRUNNION PLATE	A105 OR A216 Gr. WCB
16	NAME PLATE	STAINLESS STEEL	143	SEAT SPRING	INCONEL [®] X750 NICKEL ALLOY
19A	GASKET	FLEXIBLE GRAPHITE	144	GLAND PLATE	A105
19B	GASKET	FLEXIBLE GRAPHITE	145	CONED DISC SPRING	UNS N07718
30	BALL SEAT	A182 Gr. F316 + SFNi or A479 TYPE 316 + SFNi or A276 TYPE 316 + SFNi	175	RETAINER GLAND	A182 Gr. F316 or A479 TYPE 316 or A276 TYPE 316 or A240 TYPE 316
			176	SEAT PACKING	FLEXIBLE GRAPHITE
			202	BONNET	A105
33	CAP NUT	A194 Gr. 2HM	822	LIFTING LUG	CARBON STEEL
35A	CAP BOLT	A193 Gr. B7M			

Valve Dimensions and Operators



Up to Size NPS 4



Size NPS 6 and larger

Class 150

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Valve Operator	Lever	Gear											
Ball Bore		49	74	100	150	201	252	303	334	385	436	487	589
L		178	203	229	394	457	533	610	686	762	864	914	1067
H1		182	188	234	283	349	398	463	483	582	612	724	807
H2		100	123	151	191	237	284	-	-	-	-	-	-
H3		-	-	-	-	-	-	427	445	499	526	619	698
A		-	49	71	86	53	130	130	130	182	182	68	68
B		-	215	282	305	396	567	567	567	570	570	613	613
D		300	200	300	500	500	600	600	600	800	800	800	800
Weight (kg)		25	45	80	190	350	550	840	1030	1650	1970	2940	4310

unit: mm

Class 300

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Valve Operator	Lever	Gear											
Ball Bore		49	74	100	150	201	252	303	334	385	436	487	589
L		216	283	305	403	502	568	648	762	838	914	991	1143
H1		182	188	242	297	348	398	472	492	582	617	724	808
H2		100	123	151	191	237	284	-	-	-	-	-	-
H3		-	-	-	-	-	-	429	445	498	529	618	699
A		-	49	105	53	130	130	140	140	182	209	68	280
B		-	215	311	348	417	567	581	581	570	491	600	713
D		400	200	300	500	500	600	600	800	800	800	800	800
Weight (kg)		30	55	110	225	390	590	860	1110	1760	2130	3210	4780

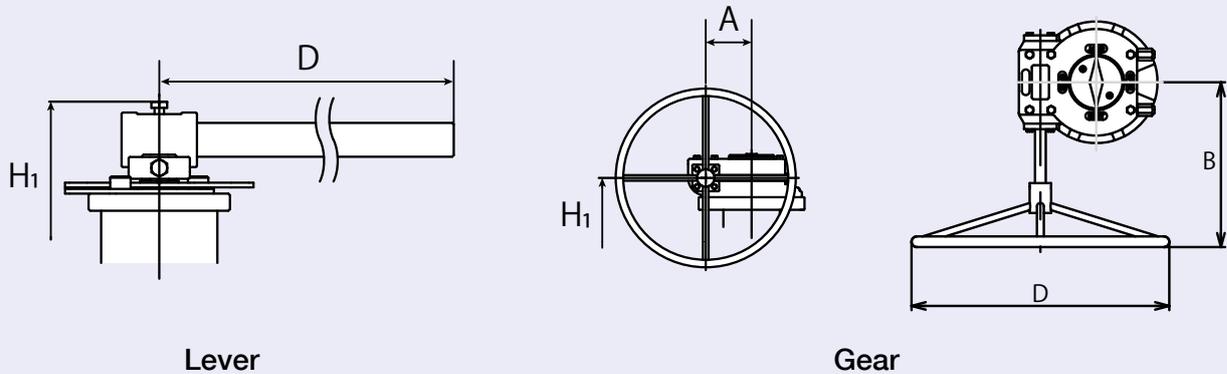
unit: mm

Class 600

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Valve Operator		Gear											
Ball Bore		49	74	100	150	201	252	303	334	385	436	487	589
L		292	356	432	559	660	787	838	889	991	1092	1194	1397
H1		168	221	263	296	364	402	467	546	601	685	725	818
H2		103	134	165	191	246	-	-	-	-	-	-	-
H3		-	-	-	-	-	384	427	460	498	554	643	721
A		49	105	53	130	140	182	182	209	426	280	280	343
B		215	311	313	398	531	571	571	491	613	701	701	727
D		200	300	300	500	600	600	800	800	800	800	800	800
Weight (kg)		45	100	175	300	560	850	1180	1560	2200	3100	3970	6150

unit: mm

Valve Dimensions and Operators



Class 150

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Valve Operator		Lever	Gear										
Ball Bore		1.94	2.94	3.94	5.94	7.94	9.94	11.94	13.19	15.19	17.19	19.19	23.19
L		7.00	8.00	9.00	15.50	18.00	21.00	24.00	27.00	30.00	34.00	36.00	42.00
H1		7.24	7.28	9.21	11.14	13.74	15.67	18.23	19.02	22.91	24.09	28.5	31.77
H2		3.94	4.84	5.94	7.52	9.33	11.18	-	-	-	-	-	-
H3		-	-	-	-	-	-	16.81	17.52	19.65	20.71	24.37	27.48
A		-	2.05	2.8	3.39	2.09	5.12	5.12	5.12	7.17	7.17	2.68	2.68
B		-	8.46	11.1	12.01	15.59	22.32	22.32	22.32	22.44	22.44	24.13	24.13
D		11.81	7.87	11.81	19.69	19.69	19.69	23.62	23.62	31.50	31.50	31.50	31.50
Weight (lb.)		44	88	154	353	661	1058	1631	2161	2976	4409	5291	8598

Class 300

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Valve Operator		Lever	Gear										
Ball Bore		1.94	2.94	3.94	5.94	7.94	9.94	11.94	13.19	15.19	17.19	19.19	23.19
L		8.50	11.13	12.00	15.88	19.75	22.38	25.50	30.00	33.00	36.00	39.00	45.00
H1		7.24	7.28	9.53	11.69	13.7	15.67	18.58	19.37	22.91	24.29	28.5	31.81
H2		3.94	4.84	5.94	7.52	9.33	11.18	-	-	-	-	-	-
H3		-	-	-	-	-	-	16.89	17.52	19.61	20.83	24.33	27.52
A		-	2.05	4.13	2.09	5.12	5.12	5.51	5.51	7.17	8.23	2.68	11.02
B		-	8.46	12.24	13.7	16.42	22.32	22.87	22.87	22.44	19.33	23.62	28.07
D		15.75	7.87	11.81	19.69	19.69	23.62	23.62	31.50	31.50	31.50	31.50	31.50
Weight (lb.)		55	121	198	485	794	1235	1874	2513	3483	4916	6063	10141

Class 600

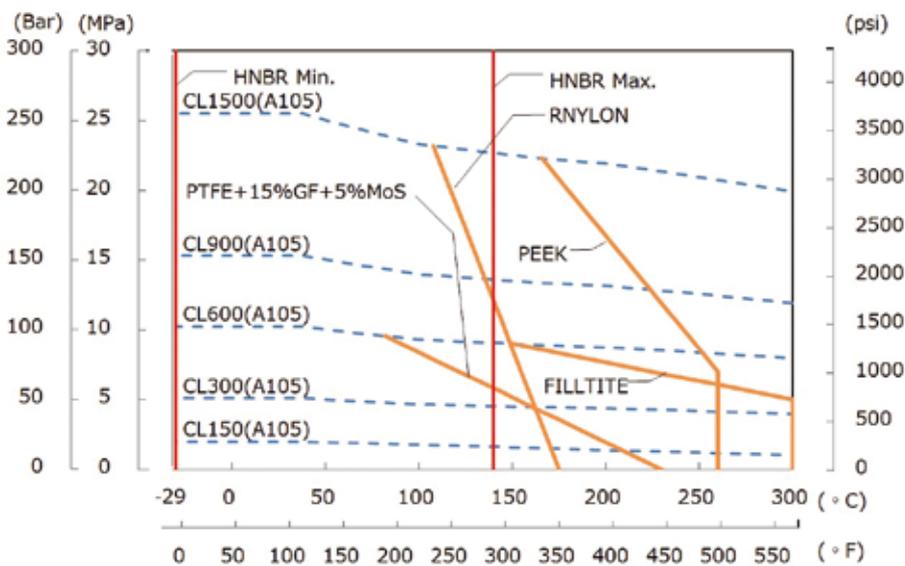
Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Valve Operator		Gear											
Ball Bore		1.94	2.94	3.94	5.94	7.94	9.94	11.94	13.19	15.19	17.19	19.19	23.19
L		11.50	14.00	17.00	22.00	26.00	31.00	33.00	35.00	39.00	43.00	47.00	55.00
H1		6.5	8.7	10.35	11.65	14.33	15.83	18.39	21.5	23.66	26.97	28.54	32.2
H2		4.06	5.28	6.50	7.52	9.69	-	-	-	-	-	-	-
H3		-	-	-	-	-	15.12	16.81	18.11	19.61	21.81	25.31	28.39
A		2.05	4.13	2.09	5.12	5.51	7.17	7.17	8.23	16.77	11.02	11.02	13.50
B		8.46	12.24	12.32	15.67	20.91	22.48	22.48	19.33	24.13	27.6	27.72	28.62
D		7.87	11.81	11.81	19.69	23.62	23.62	31.50	31.50	31.50	31.50	31.50	31.50
Weight (lb.)		88	176	353	706	1279	1874	2535	3527	4850	6614	8157	12566

Pressure-Temperature Ratings

The pressure-temperature rating of KITZ trunnion mounted ball valves are determined, not only by the valve shell materials, but also by the sealing materials used for ball seats, gland packings, O-rings, flange gaskets and bearings. In case of soft seated, sealing materials may be high molecule or rubber, but the choice is limited by characteristics of the service fluid, working pressures, fluid velocity, and operation frequency of valves.

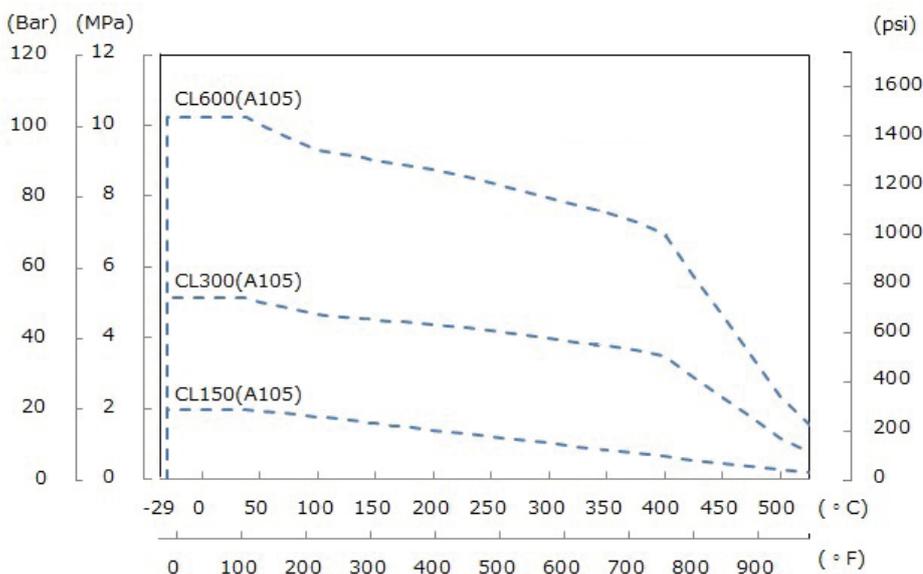
As it is very difficult to predetermine the exact pressure-temperature ratings for all kinds of fluid under all imaginable conditions, general rating charts have been provided for non-shock fluid service below, based on our past experiences both in the field and our own laboratory. Frequent need of maintenance is another factor to be kept in mind, if extremely high temperature operation is planned or expected.

T60S Pressure-Temperature Rating



O-Ring Material	Min.Temp. (°C/°F)	Max.Temp. (°C/°F)
NBR	-30/-22	80/176
HNBR	-30/-22	140/284
L-NBR	-50/-58	80/176
L-HNBR	-46/-50	140/284
FKM	-20/-4	200/392

T60M Pressure-Temperature Rating



NOTE : Please contact KITZ Corporation, if T60M valves are to be used for temperature greater than 400°C /752°F

Engineering Data

Flow Coefficient (Cv)

T60S and T60M Full bore

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Class	150	500	1200	2500	5200	10400	17300	26100	32000	44000	57000	74000	111000
	300	420	1050	2100	5200	9900	16800	25400	30100	41500	55000	70500	108000
	600	400	1000	1850	4400	8700	14500	22500	28000	38200	50300	64000	97000
	900	330	900	1750	4300	8400	14000	21000	-	-	-	-	-
	1500	330	810	1650	3800	7200	11500	17000	-	-	-	-	-

Valve Operating Torque

T60S Class 150 / 300

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Differential Pressure (MPa)	0.5	43	82	121	299	408	649	882	980	1326	1620	2139	3121
	1	45	86	129	337	496	778	1110	1253	1697	2169	2876	4362
	2	50	97	152	421	668	1032	1542	1763	2392	3175	4222	6594
	3	53	103	163	469	773	1186	1811	2084	2828	3815	5081	8033
	4	58	112	180	529	892	1363	2109	2434	3305	4500	5998	9546
5	60	117	191	571	978	1490	2325	2690	3652	5003	6671	10662	

T60S Class 600

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Differential Pressure (MPa)	0.5	67	101	153	299	524	650	973	1063	1477	1757	2543	3526
	2	70	114	182	423	764	1035	1621	1835	2517	3288	4557	6929
	4	74	127	209	532	974	1368	2179	2498	3411	4597	6281	9830
	6	85	149	249	665	1225	1748	2804	3231	4404	6010	8166	12923
	8	103	183	309	846	1565	2252	3627	4192	5707	7840	10622	16911
	10	120	216	368	1028	1905	2757	4450	5152	7010	9670	13078	20898

T60S Class 900

Nominal Size	NPS	2	3	4	6	8	10	12
	DN	50	80	100	150	200	250	300
Differential Pressure (MPa)	0.5	96	118	182	358	611	780	1163
	5	106	159	269	668	1193	1700	2709
	7.5	136	211	362	929	1667	2404	3854
	10	165	262	455	1190	2141	3108	5000
	12.5	185	298	521	1378	2485	3621	5838
	15	213	347	610	1626	2935	4290	6927

T60S Class 1500

Nominal Size	NPS	2	3	4	6	8	10	12
	DN	50	80	100	150	200	250	300
Differential Pressure (MPa)	0.5	96	155	246	488	739	1104	1912
	5	106	187	323	777	1423	2241	3662
	10	165	300	531	1338	2548	4050	6550
	15	213	392	701	1805	3489	5566	8966
	20	254	473	851	2215	4318	6900	11093
	25	295	551	997	2617	5129	8208	13177

T60S Class 150 / 300

Unit: in-lb

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Differential Pressure (PSIG)	100	406	777	1159	2915	4116	6503	9038	10115	13683	16953	22612	33624
	150	406	777	1169	3030	4474	7006	10025	11319	15320	19457	26049	39576
	300	456	877	1387	3805	6055	9348	13999	16014	21693	28543	38411	60062
	450	481	926	1501	4250	7025	10771	16479	18964	25698	34339	46310	73282
	600	524	1009	1662	4802	8122	12402	19213	22185	30068	40527	54722	87158
	740	547	1053	1754	5133	8809	13417	20947	24237	32853	44513	60147	96170

T60S Class 600

Unit: in-lb

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Differential Pressure (PSIG)	100	616	943	1456	2922	5146	6514	9855	10863	15031	18178	26219	37231
	300	631	1022	1657	3823	6905	9375	14698	16655	22804	29554	41380	63031
	600	674	1143	1921	4830	8846	12444	19838	22757	31015	41388	57248	89684
	900	775	1348	2308	6050	11149	15926	25565	29475	40095	54131	74514	118014
	1350	1018	1811	3152	8540	15813	22849	36865	42660	57951	78900	108236	172764
	1480	1088	1945	3395	9260	17160	24849	40130	46469	63110	86055	117978	188580

T60S Class 900

Unit: in-lb

Nominal Size	NPS	2	3	4	6	8	10	12
	DN	50	80	100	150	200	250	300
Differential Pressure (PSIG)	100	1109	1378	2136	4269	7312	9421	14131
	740	1234	1854	3139	7809	13950	19892	31709
	1000	1481	2283	3906	9962	17861	25700	41156
	1480	1917	3048	5297	13869	24958	36244	58319
	1800	2120	3414	5968	15778	28452	41453	66829
	2220	2490	4062	7144	19059	34406	50305	81240

T60S Class 1500

Unit: in-lb

Nominal Size	NPS	2	3	4	6	8	10	12
	DN	50	80	100	150	200	250	300
Differential Pressure (PSIG)	100	1109	1799	2868	5755	8835	13254	22848
	740	1234	2178	3765	9072	16638	26211	42815
	1480	1921	3495	6190	15615	29760	47313	76502
	2220	2480	4568	8172	21058	40730	64985	104665
	3000	2987	5565	10022	26119	50961	81453	130921
	3705	3446	6438	11655	30616	60033	96084	154233

NOTES :

- (1) All torque values include a 30% safety factor. Values are for clean, static water at ambient temperature.
- (2) Ball seat material: RPTFE (PTFE + 15% Glass filled + 5% MoS2)
- (3) In case of using higher safety factor than 30%, please confirm the maximum allowable stem strength (MAST).

T60S Weight

Unit: kg

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Class	150	20	35	60	160	300	510	750	930	1370	1730	2380	3680
	300	25	45	80	180	330	550	770	1020	1470	1890	2650	4060
	600	35	70	125	300	500	760	1100	1350	1970	2560	3580	5450
	900	65	95	170	400	700	1110	1730	*	*	*	*	*
	1500	65	135	275	600	1130	1920	3330	*	*	*	*	*

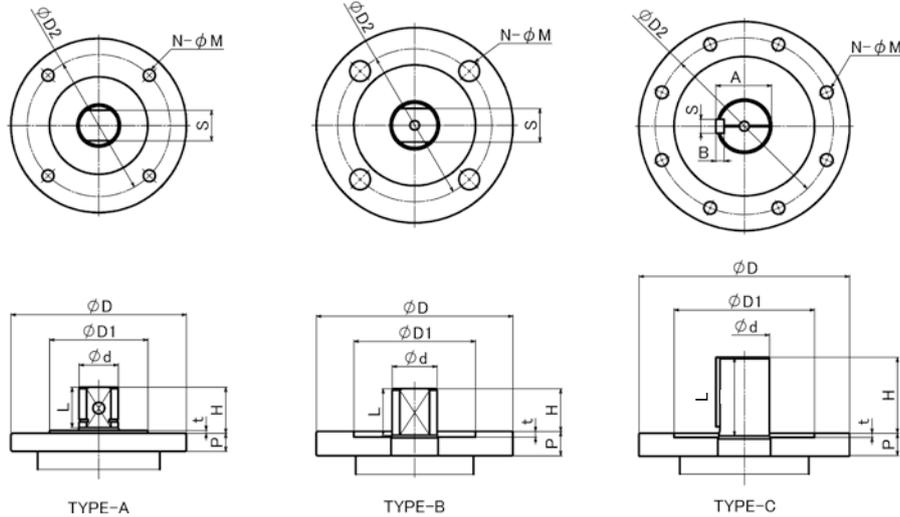
Unit: lbs

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
Class	150	45	78	133	353	662	1125	1654	2051	3021	3814	5248	8114
	300	56	100	177	397	728	1213	1698	2249	3241	4167	5843	8951
	600	78	155	276	662	1103	1676	2426	2977	4344	5644	7893	12016
	900	143	209	375	882	1543	2447	3814	*	*	*	*	*
	1500	143	298	606	1323	2491	4233	7341	*	*	*	*	*

*Please ask KITZ Corporation for corresponding information.

Dimensions of Actuator Mounting Pads

KITZ trunnion mounted ball valves are provided with integral actuator mounting pads designed in compliance with ISO 5211. This feature enables users to readily mount actuators on these valves.



T60S Class 150

Nominal Size	NPS DN	unit: mm											
		2	3	4	6	8	10	12	14	16	18	20	24
TYPE		A	A	A	A	B	B	B	C	C	C	C	C
φ d		18	22	28	48	48	60	60	60	72	72	80	80
φ D		65	90	125	175	210	300	300	300	300	300	300	300
φ D1		35	55	70	100	130	200	200	200	200	200	200	200
φ D2		50	70	102	140	165	254	254	254	254	254	254	254
t		3	3	3	3	6	6	6	6	6	6	6	6
L		19	21	26	44.5	54	64	64	89	113	113	112	112
H		23	25	30	49.5	50	60	60	85	109	109	109	109
S		14	17	22	36	36	46	46	18	20	20	22	22
A		-	-	-	-	-	-	-	64	76.5	76.5	85	85
B		-	-	-	-	-	-	-	11	12	12	14	14
N		4	4	4	4	4	8	8	8	8	8	8	8
M		M6	M8	M10	M16	22	18	18	18	18	18	18	18
P		9	11	13	17	26	28	28	28	33	33	38	38
ISO 5211 Flange Type		F05	F07	F10	F14	F16	F25	F25	F25	F25	F25	F25	F25

T60S Class 300

Nominal Size	NPS DN	unit: mm											
		2	3	4	6	8	10	12	14	16	18	20	24
TYPE		A	A	A	A	B	B	B	C	C	C	C	C
φ d		18	22	28	48	48	60	60	60	72	72	80	80
φ D		65	90	125	175	210	300	300	300	300	300	300	350
φ D1		35	55	70	100	130	200	200	200	200	200	200	230
φ D2		50	70	102	140	165	254	254	254	254	254	254	298
t		3	3	3	3	6	6	6	6	6	6	6	6
L		19	21	26	44.5	54	64	64	89	113	113	112	112
H		23	25	30	49.5	50	60	60	85	109	109	109	109
S		14	17	22	36	36	46	46	18	20	20	22	22
A		-	-	-	-	-	-	-	64	76.5	76.5	85	85
B		-	-	-	-	-	-	-	11	12	12	14	14
N		4	4	4	4	4	8	8	8	8	8	8	8
M		M6	M8	M10	M16	22	18	18	18	18	18	18	18
P		9	11	13	17	26	28	28	28	33	33	38	38
ISO 5211 Flange Type		F05	F07	F10	F14	F16	F25	F25	F25	F25	F25	F25	F30

T60S Class 600

unit: mm

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
TYPE		A	A	A	B	B	C	C	C	C	C	C	C
ϕ d		22	28	36	48	60	60	72	72	80	80	98	98
ϕ D		90	125	150	210	300	300	300	300	300	350	350	415
ϕ D1		55	70	85	130	200	200	200	200	200	230	230	260
ϕ D2		70	102	125	165	254	254	254	254	254	298	298	356
t		3	3	3	6	6	6	6	6	6	6	6	6
L		21	26	33	50	64	89	113	113	112	112	131	131
H		25	30	37	46	60	85	109	109	109	109	128	128
S		17	22	27	36	46	18	20	20	22	22	28	28
A		-	-	-	-	-	64	76.5	76.5	85	85	104	104
B		-	-	-	-	-	11	12	12	14	14	16	16
N		4	4	4	4	8	8	8	8	8	8	8	8
M		M8	M10	M12	22	18	18	18	18	18	22	22	32
P		11	13	13	26	28	28	33	33	38	38	41	41
ISO 5211 Flange Type		F07	F10	F12	F16	F25	F25	F25	F25	F25	F30	F30	F35

T60S Class 900

unit: mm

Nominal Size	NPS	2	3	4	6	8	10	12
	DN	50	80	100	150	200	250	300
TYPE		A	A	A	B	B	C	C
ϕ d		28	28	36	48	60	60	72
ϕ D		125	125	150	210	300	300	300
ϕ D1		70	70	85	130	200	200	200
ϕ D2		102	102	125	165	254	254	254
t		3	3	3	6	6	6	6
L		26	26	33	50	64	89	113
H		30	30	37	46	60	85	109
S		22	22	27	36	46	18	20
A		-	-	-	-	-	64	76.5
B		-	-	-	-	-	11	12
N		4	4	4	4	8	8	8
M		M10	M10	M12	22	18	18	18
P		13	13	13	26	28	28	33
ISO 5211 Flange Type		F10	F10	F12	F16	F25	F25	F25

T60S Class 1500

unit: mm

Nominal Size	NPS	2	3	4	6	8	10	12
	DN	50	80	100	150	200	250	300
TYPE		A	A	B	B	C	C	C
ϕ d		28	36	48	60	60	80	98
ϕ D		125	150	210	300	300	300	415
ϕ D1		70	85	130	200	200	200	260
ϕ D2		102	125	165	254	254	254	356
t		3	3	6	6	6	6	6
L		26	33	50	64	113	112	131
H		30	37	46	60	109	109	128
S		22	27	36	46	20	22	28
A		-	-	-	-	77	85	104
B		-	-	-	-	12	14	16
N		4	4	4	8	8	8	8
M		M10	M12	22	18	18	18	32
P		13	13	26	33	33	41	41
ISO 5211 Flange Type		F10	F12	F16	F25	F25	F25	F35

T60S Class 150

unit: inch

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
TYPE		A	A	A	A	B	B	B	C	C	C	C	C
ϕ d		0.71	0.87	1.10	1.89	1.89	2.36	2.36	2.36	2.83	2.83	3.15	3.15
ϕ D		2.56	3.54	4.92	6.89	8.27	11.81	11.81	11.81	11.81	11.81	11.81	11.81
ϕ D1		1.38	2.17	2.76	3.94	5.12	7.87	7.87	7.87	7.87	7.87	7.87	7.87
ϕ D2		1.97	2.76	4.02	5.51	6.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00
t		0.12	0.12	0.12	0.12	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
L		0.75	0.83	1.02	1.75	2.13	2.52	2.52	3.50	4.45	4.45	4.41	4.41
H		0.91	0.98	1.18	1.95	1.97	2.36	2.36	3.35	4.29	4.29	4.29	4.29
S		0.55	0.67	0.87	1.42	1.42	1.81	1.81	0.71	0.79	0.79	0.87	0.87
A		-	-	-	-	-	-	-	2.52	3.01	3.01	3.35	3.35
B		-	-	-	-	-	-	-	0.43	0.47	0.47	0.55	0.55
N		4	4	4	4	4	8	8	8	8	8	8	8
M		M6	M8	M10	M16	0.87	0.71	0.71	0.71	0.71	0.71	0.71	0.71
P		0.35	0.43	0.51	0.67	1.02	1.10	1.10	1.10	1.30	1.30	1.50	1.50
ISO 5211 Flange Type		F05	F07	F10	F14	F16	F25	F25	F25	F25	F25	F25	F25

T60S Class 300

unit: inch

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
TYPE		A	A	A	A	B	B	B	C	C	C	C	C
φ d		0.71	0.87	1.10	1.89	1.89	2.36	2.36	2.36	2.83	2.83	3.15	3.15
φ D		2.56	3.54	4.92	6.89	8.27	11.81	11.81	11.81	11.81	11.81	11.81	13.78
φ D1		1.38	2.17	2.76	3.94	5.12	7.87	7.87	7.87	7.87	7.87	7.87	9.06
φ D2		1.97	2.76	4.02	5.51	6.50	10.00	10.00	10.00	10.00	10.00	10.00	11.73
t		0.12	0.12	0.12	0.12	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
L		0.75	0.83	1.02	1.75	2.13	2.52	2.52	3.50	4.45	4.45	4.41	4.41
H		0.91	0.98	1.18	1.95	1.97	2.36	2.36	3.35	4.29	4.29	4.29	4.29
S		0.55	0.67	0.87	1.42	1.42	1.81	1.81	0.71	0.79	0.79	0.87	0.87
A		-	-	-	-	-	-	-	2.52	3.01	3.01	3.35	3.35
B		-	-	-	-	-	-	-	0.43	0.47	0.47	0.55	0.55
N		4	4	4	4	4	8	8	8	8	8	8	8
M		M6	M8	M10	M16	0.87	0.71	0.71	0.71	0.71	0.71	0.71	0.71
P		0.35	0.43	0.51	0.67	1.02	1.10	1.10	1.10	1.30	1.30	1.50	1.50
ISO 5211 Flange Type		F05	F07	F10	F14	F16	F25	F25	F25	F25	F25	F25	F30

T60S Class 600

unit: inch

Nominal Size	NPS	2	3	4	6	8	10	12	14	16	18	20	24
	DN	50	80	100	150	200	250	300	350	400	450	500	600
TYPE		A	A	A	B	B	C	C	C	C	C	C	C
φ d		0.87	1.10	1.42	1.89	2.36	2.36	2.83	2.83	3.15	3.15	3.86	3.86
φ D		3.54	4.92	5.91	8.27	11.81	11.81	11.81	11.81	11.81	13.78	13.78	16.34
φ D1		2.17	2.76	3.35	5.12	7.87	7.87	7.87	7.87	7.87	9.06	9.06	10.24
φ D2		2.76	4.02	4.92	6.50	10.00	10.00	10.00	10.00	10.00	11.73	11.73	14.02
t		0.12	0.12	0.12	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
L		0.83	1.02	1.30	1.97	2.52	3.50	4.45	4.45	4.41	4.41	5.16	5.16
H		0.98	1.18	1.46	1.81	2.36	3.35	4.29	4.29	4.29	4.29	5.04	5.04
S		0.67	0.87	1.06	1.42	1.81	0.71	0.79	0.79	0.87	0.87	1.10	1.10
A		-	-	-	-	-	2.52	3.01	3.01	3.35	3.35	4.09	4.09
B		-	-	-	-	-	0.43	0.47	0.47	0.55	0.55	0.63	0.63
N		4	4	4	4	8	8	8	8	8	8	8	8
M		M8	M10	M12	0.87	0.71	0.71	0.71	0.71	0.71	0.87	0.87	1.26
P		0.43	0.51	0.51	1.02	1.10	1.10	1.30	1.30	1.50	1.50	1.61	1.61
ISO 5211 Flange Type		F07	F10	F12	F16	F25	F25	F25	F25	F25	F30	F30	F35

T60S Class 900

unit: inch

Nominal Size	NPS	2	3	4	6	8	10	12
	DN	50	80	100	150	200	250	300
TYPE		A	A	A	B	B	C	C
φ d		1.10	1.10	1.42	1.89	2.36	2.36	2.83
φ D		4.92	4.92	5.91	8.27	11.81	11.81	11.81
φ D1		2.76	2.76	3.35	5.12	7.87	7.87	7.87
φ D2		4.02	4.02	4.92	6.50	10.00	10.00	10.00
t		0.12	0.12	0.12	0.24	0.24	0.24	0.24
L		1.02	1.02	1.30	1.97	2.52	3.50	4.45
H		1.18	1.18	1.46	1.81	2.36	3.35	4.29
S		0.87	0.87	1.06	1.42	1.81	0.71	0.79
A		-	-	-	-	-	2.52	3.01
B		-	-	-	-	-	0.43	0.47
N		4	4	4	4	8	8	8
M		M10	M10	M12	0.87	0.71	0.71	0.71
P		0.51	0.51	0.51	1.02	1.10	1.10	1.30
ISO 5211 Flange Type		F10	F10	F12	F16	F25	F25	F25

T60S Class 1500

unit: inch

Nominal Size	NPS	2	3	4	6	8	10	12
	DN	50	80	100	150	200	250	300
TYPE		A	A	B	B	C	C	C
φ d		1.10	1.42	1.89	2.36	2.36	3.15	3.86
φ D		4.92	5.91	8.27	11.81	11.81	11.81	16.34
φ D1		2.76	3.35	5.12	7.87	7.87	7.87	10.24
φ D2		4.02	4.92	6.50	10.00	10.00	10.00	14.02
t		0.12	0.12	0.24	0.24	0.24	0.24	0.24
L		1.02	1.30	1.97	2.52	4.45	4.41	5.16
H		1.18	1.46	1.81	2.36	4.29	4.29	5.04
S		0.87	1.06	1.42	1.81	0.79	0.87	1.10
A		-	-	-	-	3.03	3.35	4.09
B		-	-	-	-	0.47	0.55	0.63
N		4	4	4	8	8	8	8
M		M10	M12	0.87	0.71	0.71	0.71	1.26
P		0.51	0.51	1.02	1.30	1.30	1.61	1.61
ISO 5211 Flange Type		F10	F12	F16	F25	F25	F25	F35

F18TK-T60 Series

Soft Seated 3-Piece Body Trunnion Mounted Ball Valves

Trunnion mounted side entry steel ball valves are designed to meet API 6D/ISO 14313 and other referential international valve design standards, used for petroleum, petrochemical, oil, gas and any industrials.

General Design Standard

- Basic design: API 6D/ISO 14313
- F –F dimensions: API 6D/ASME B16.10
- End connection: ASME B16.5
- Bore diameter: API 6D/ISO 14313
- Wall thickness: ASME B16.34

Design Features

- Structure: 3-piece bolted body and cap
- Tight shut-off sealing mechanism
- Low operation torque
- Double block and bleed function
- Self-relief of excessive cavity pressure
- Fire safe tested
- Blowout-proof stem construction
- Antistatic provision design
- Locking device for lever operation
- ISO 5211 actuator mounting pad
- PN design can be available

Certification

- Fugitive emission: ISO 15848-1 BH CO1
- Fire test: ISO 10497/API 607
- PED 2014/68/EU
- ATEX 2014/34/EU



Product Range

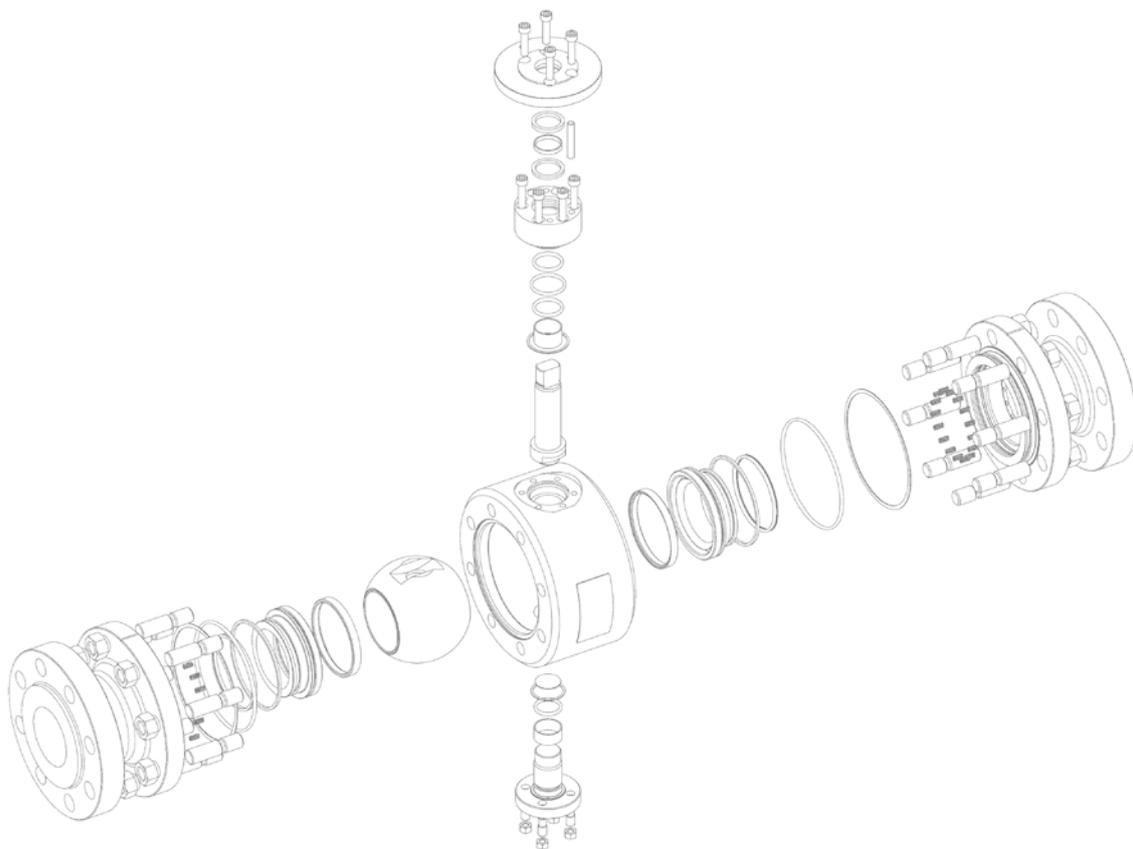
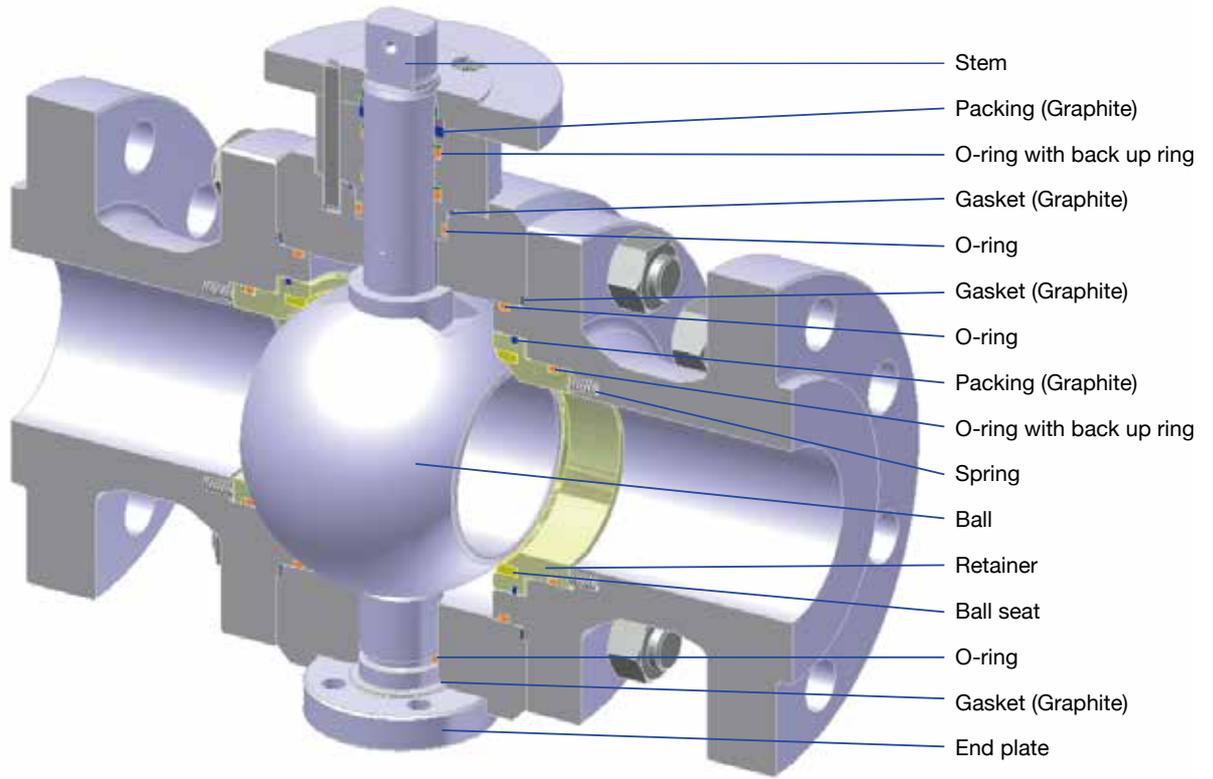
- Nominal pressure: ASME Class 150 to 2500
- Nominal size: NPS 1/2 to NPS 36
(DN 15 to 900)
- Shell materials:
Carbon and low alloy steel, Austenitic stainless steel, Duplex stainless steel, High alloy steel, Nickel based alloy
- Ball seat materials:
RPTFE (Reinforced PTFE), Modified PTFE, RNylon, DEVLON, PCTFE, PEEK

Option

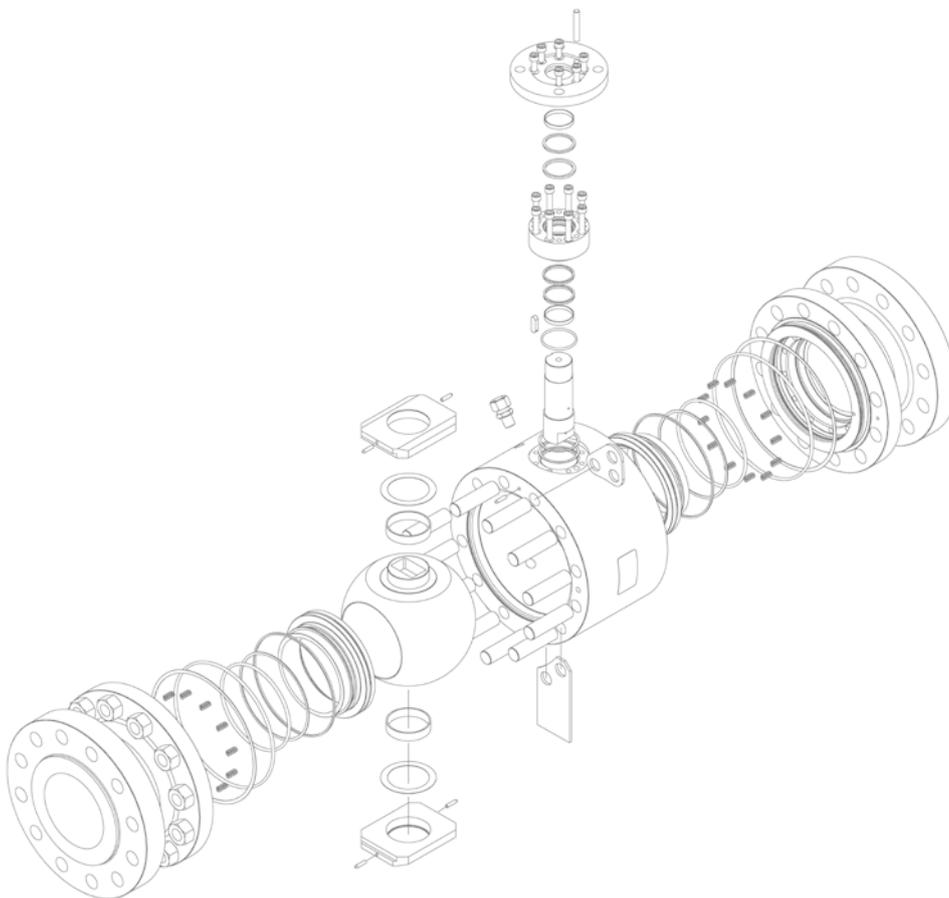
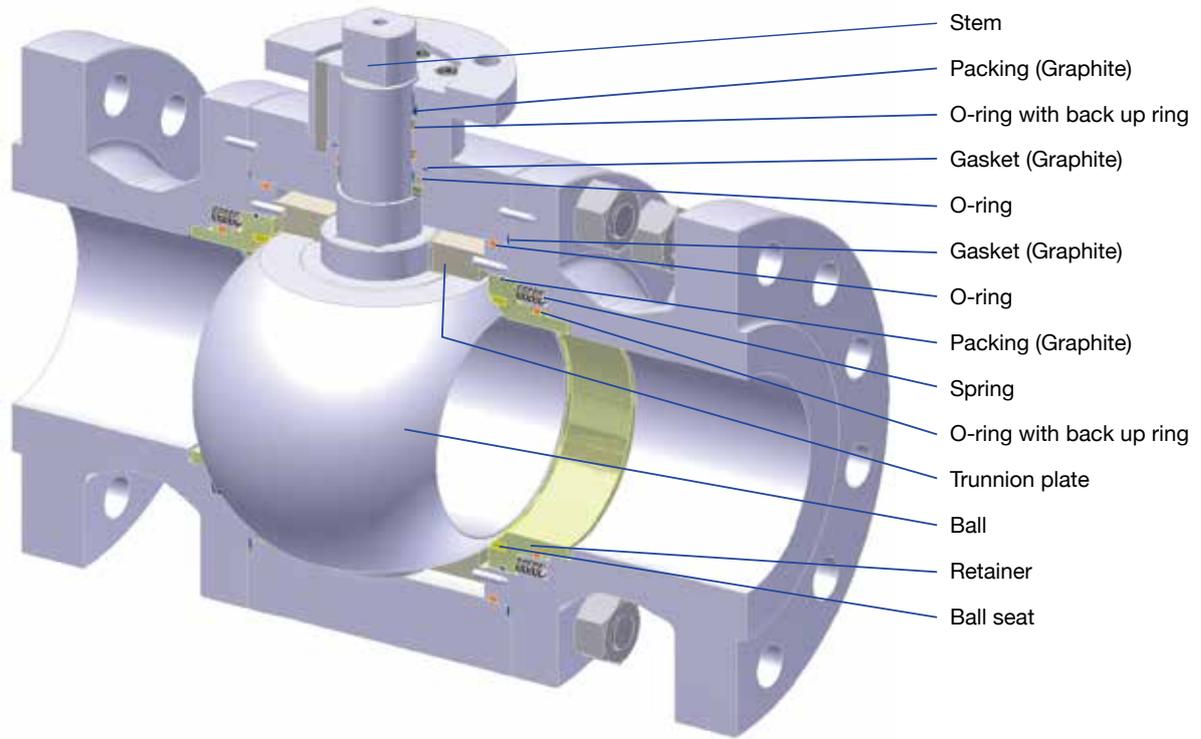
- NACE MR 0175 available
- Pneumatic and electric actuator
- Thru-conduit bore
- Grease injection point for seat and stem
- Stem extension



This illustration shows typical construction for size up to NPS 4



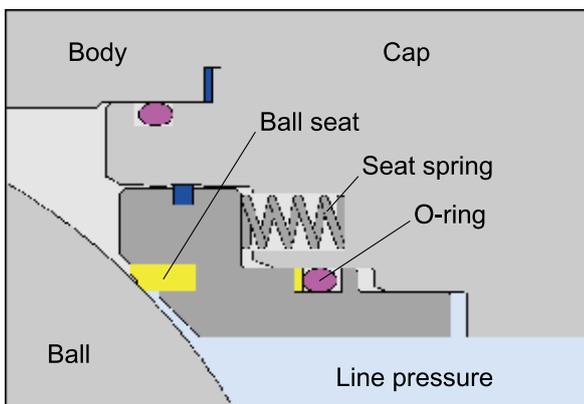
This illustration shows typical construction for size NPS 6 and larger



Design Features

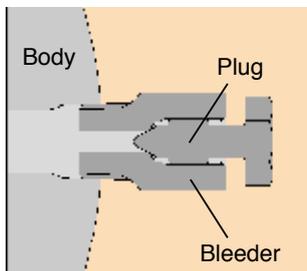
Tight Shut-off Sealing Mechanism

The resilient seat design adequately maintains each of the upstream and downstream ball seats in contact with the ball by means of repulsing force of seat springs inserted behind the seat retainers. Line fluid pressure also helps this contact method. This sealing mechanism features unfailing thru-the-bore sealing performance of upstream and downstream side ball seats at the same time.



Double Block and Bleed Function

Ball seats independently shut off the line fluid on the upstream and downstream side of the ball. The valve bore and the body cavity are isolated from each other when the valve is fully open or closed. Under this condition, the cavity pressure can be discharged with a vent valve and a drain plug. The vent valve is equipped with a blowout-proof bleeder for safe

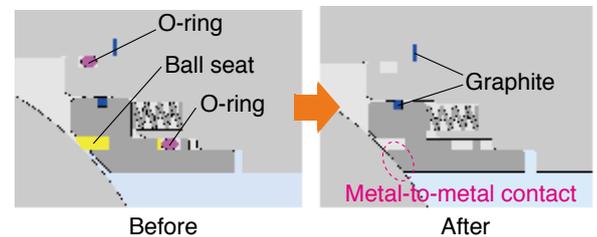


discharge. Relieving the cavity pressure with a vent valve is recommended for safe draining.

Fire Safe Design

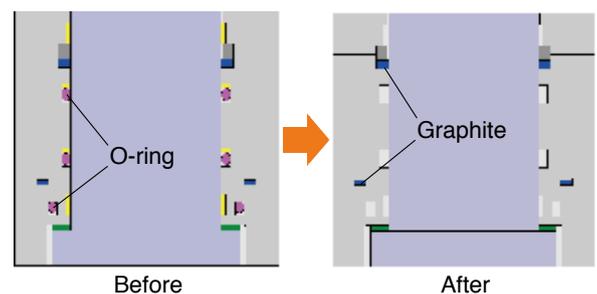
1) Internal leakage prevention

When resilient sealing materials are damaged or decomposed by a plant fire, edges of upstream and downstream metal seat retainers preloaded by seat springs come into contact with the ball to shut off line fluid to minimize internal leakage through the valve bore. Meanwhile, flexible graphite seat retainer packing rings of KITZ original design prevent fluid leakage from between the valve caps and seat retainers during and after the plant fire.



2) External leakage prevention

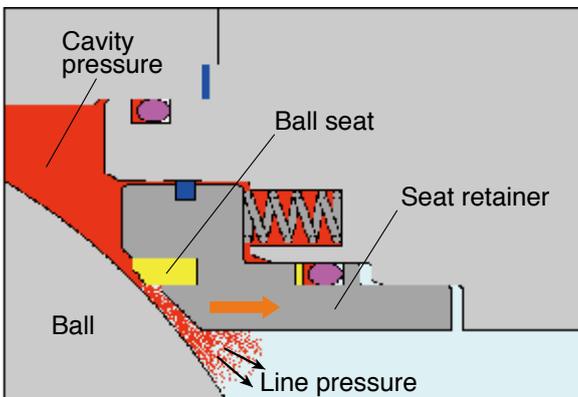
External leakage from the valve stem area is prevented by double sealing with O-ring and flexible graphite gland packing ring. Leakage through the valve body joint is protected by flexible graphite gaskets. Even after a fire has destroyed O-rings, flexible graphite gland packing ring and gaskets remain intact to prevent external fluid leakage.



Design Features

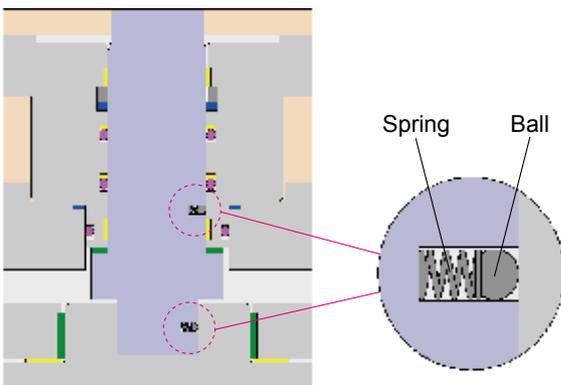
Self Cavity Pressure Relief

In case of incidental rise of servicing or ambient temperature, liquefied gas or highly volatile liquid trapped within the body cavity may vaporize, and cause an excessive rise in the cavity pressure. For safety consideration, when the cavity pressure exceeds the line pressure, either one of the ball seats will move slightly away from the ball surface together with seat retainers to relieve the excessive cavity pressure into the valve bore.



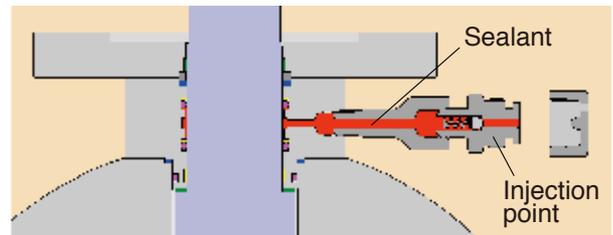
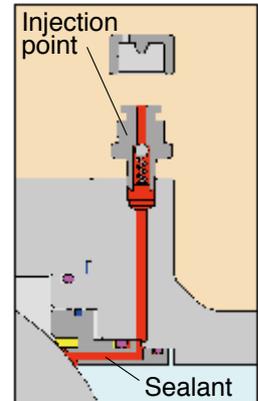
Anti Static Design

Spring loaded balls assembled between the stem and the bonnet and between the stem and the ball permits electric conductivity through all metallic valve components.



Emergency Grease Injection (option)*

For accidental leakage from the ball seat or stem sealing area, a sealant supply mechanism may be provided as an option. Should materials be damaged or decomposed by a fire or other accidental causes, leakage can be temporarily prevented or reduced by sealant injection into this mechanism.



Thru-Conduit Bore (option)

Besides the standard full bore, the custom sized thru-conduit bore is optionally available for use of pipeline scrapers or cleaning pigs.

Stem Extension

An optional stem extension design is available for underground or remote valve operation. Specify the dimension between the center of the valve bore and the center of the valve operator. Valve operating medium such as electric and pneumatic actuators are also optionally available.



*Standard Design for North America.

Material Example/Pressure-Temperature Rating

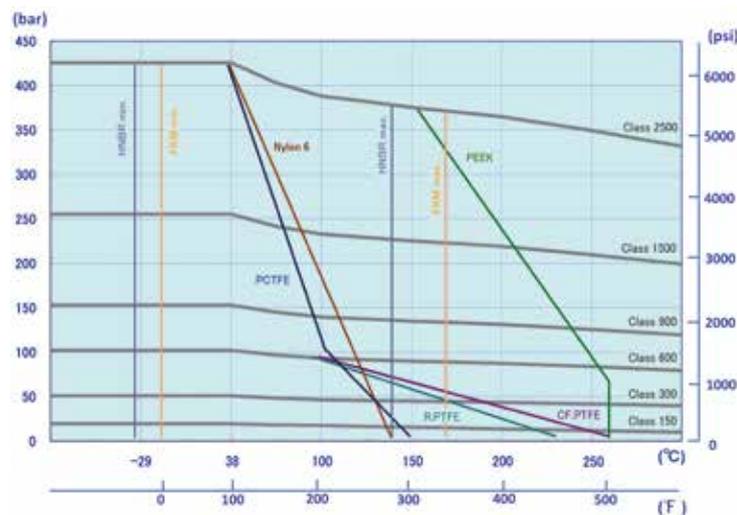
Material Example

Service	Non-corrosive	Low Temp.	Corrosive	Sour	
Body/Cap	A105	LF2	F316	F51 or S31803	F55 or S32760
Stem	13Cr or 630SS	316SS or 630SS	316SS or S31803	S31803	S32760
Ball	13Cr or A105+ENP	316SS or LF2+ENP	316SS	F51 or S31803	F55 or S32760
Seat Retainer	A105+ENP	LF2+ENP	316SS	S31803	S32760
Ball Seat	RPTFE (class up to 600) RNylon (class 900 and over)				
Spring	AISI 301	AISI 301	Inconel X750	Inconel X750	Inconel X750
O-ring	HNBR	L-NBR	FKM	FKM	FKM
Bolt	B7	L7	B8	B8	B8
Nut	2H	4	8	8	8

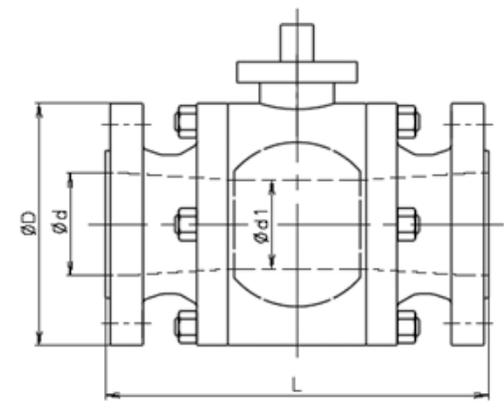
Pressure-Temperature Rating

The pressure-temperature rating of KITZ trunnion mounted ball valves are determined, not only by the valve shell materials, but also by the sealing materials used for ball seats, gland packings, O-rings, flange gaskets and bearings. In case of soft seated, sealing materials may be high molecule or rubber, but the choice is limited by characteristics of the service fluid, working pressures, fluid velocity, and operation frequency of valves.

As it is very difficult to predetermine the exact pressure-temperature ratings for all kinds of fluid under all imaginable conditions, general rating charts have been provided for non-shock fluid service below, based on our past experiences both in the field and our own laboratory. Frequent need of maintenance is another factor to be kept in mind, if extremely high temperature operation is planned or expected.



Dimensions



Class 150

unit: mm

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	13	13	90	165	165	163
3/4 x 1/2	19	13	100	165	165	165
3/4	19	19	100	165	165	165
1 x 3/4	25	19	110	165	165	165
1	25	25	110	165	165	165
1 1/2 x 1	38	25	125	165	190	178
1 1/2	38	38	125	165	190	178
2 x 1 1/2	49	38	150	178	216	191
2 to 24	Please refer to T60S (p. 9)					
26 x 20	633	487	870	1143	1245	-
26 x 22	633	538	870	1143	1245	-
26 x 24	633	589	870	1143	1245	-
26	633	633	870	1143	1245	-
28 x 22	684	538	925	1245	1346	-
28 x 24	684	589	925	1245	1346	-
28 x 26	684	633	925	1245	1346	-
28	684	684	925	1245	1346	-
30 x 24	735	589	985	1295	1397	-
30 x 26	735	633	985	1295	1397	-
30 x 28	735	684	985	1295	1397	-
30	735	735	985	1295	1397	-
32 x 26	779	633	1060	1372	1524	-
32 x 28	779	684	1060	1372	1524	-
32 x 30	779	735	1060	1372	1524	-
32	779	779	1060	1372	1524	-
34 x 28	830	684	1110	1473	1626	-
34 x 30	830	735	1110	1473	1626	-
34 x 32	830	779	1110	1473	1626	-
34	830	830	1110	1473	1626	-
36 x 30	874	735	1170	1524	1727	-
36 x 32	874	779	1170	1524	1727	-
36 x 34	874	830	1170	1524	1727	-
36	874	874	1170	1524	1727	-

Class 300

unit: mm

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	13	13	95	165	165	163
3/4 x 1/2	19	13	115	165	165	178
3/4	19	19	115	165	165	178
1 x 3/4	25	19	125	165	165	178
1	25	25	125	165	165	178
1 1/2 x 1	38	25	155	190	190	203
1 1/2	38	38	155	190	190	203
2 x 1 1/2	49	38	165	216	216	232
2 to 24	Please refer to T60S (p. 9)					
26 x 20	633	487	970	1245	1245	1270
26 x 22	633	538	970	1245	1245	1270
26 x 24	633	589	970	1245	1245	1270
26	633	633	970	1245	1245	1270
28 x 22	684	538	1035	1346	1346	1372
28 x 24	684	589	1035	1346	1346	1372
28 x 26	684	633	1035	1346	1346	1372
28	684	684	1035	1346	1346	1372
30 x 24	735	589	1090	1397	1397	1422
30 x 26	735	633	1090	1397	1397	1422
30 x 28	735	684	1090	1397	1397	1422
30	735	735	1090	1397	1397	1422
32 x 26	779	633	1150	1524	1524	1553
32 x 28	779	684	1150	1524	1524	1553
32 x 30	779	735	1150	1524	1524	1553
32	779	779	1150	1524	1524	1553
34 x 28	830	684	1205	1626	1626	1654
34 x 30	830	735	1205	1626	1626	1654
34 x 32	830	779	1205	1626	1626	1654
34	830	830	1205	1626	1626	1654
36 x 30	874	735	1270	1727	1727	1756
36 x 32	874	779	1270	1727	1727	1756
36 x 34	874	830	1270	1727	1727	1756
36	874	874	1270	1727	1727	1756

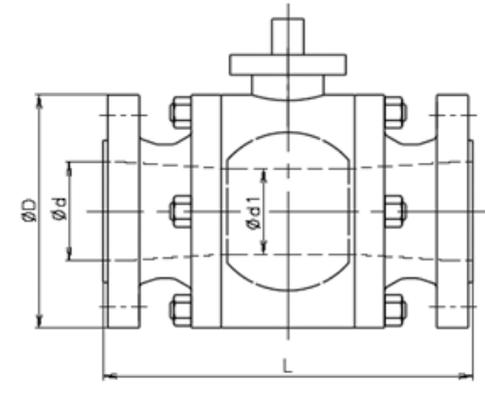
Class 600

unit: mm

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	13	13	95	165	165	163
3/4 x 1/2	19	13	115	190	190	190
3/4	19	19	115	190	190	190
1 x 3/4	25	19	125	216	216	216
1	25	25	125	216	216	216
1 1/2 x 1	38	25	155	241	241	241
1 1/2	38	38	155	241	241	241
2 x 1 1/2	49	38	165	292	292	295
2 to 24	Please refer to T60S (p. 9)					
26 x 20	633	487	1015	1448	1448	1461
26 x 22	633	538	1015	1448	1448	1461
26 x 24	633	589	1015	1448	1448	1461
26	633	633	1015	1448	1448	1461
28 x 22	684	538	1075	1549	1549	1562
28 x 24	684	589	1075	1549	1549	1562
28 x 26	684	633	1075	1549	1549	1562
28	684	684	1075	1549	1549	1562
30 x 24	735	589	1130	1651	1651	1664
30 x 26	735	633	1130	1651	1651	1664
30 x 28	735	684	1130	1651	1651	1664
30	735	735	1130	1651	1651	1664
32 x 26	779	633	1195	1778	1778	1794
32 x 28	779	684	1195	1778	1778	1794
32 x 30	779	735	1195	1778	1778	1794
32	779	779	1195	1778	1778	1794
34 x 28	830	684	1245	1930	1930	1946
34 x 30	830	735	1245	1930	1930	1946
34 x 32	830	779	1245	1930	1930	1946
34	830	830	1245	1930	1930	1946
36 x 30	874	735	1315	2083	2083	2099
36 x 32	874	779	1315	2083	2083	2099
36 x 34	874	830	1315	2083	2083	2099
36	874	874	1315	2083	2083	2099

NOTE: PN designed valves can be available. Please ask product range and dimensions.

Dimensions



Class 900

unit: mm

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	13	13	120	216	216	216
3/4 x 1/2	19	13	130	229	229	229
3/4	19	19	130	229	229	229
1 x 3/4	25	19	150	254	254	254
1	25	25	150	254	254	254
1 1/2 x 1	38	25	180	305	305	305
1 1/2	38	38	180	305	305	305
2 x 1 1/2	49	38	215	368	368	371
2 to 12	Please refer to T60S (p. 10)					
14 x 10	322	252	640	1029	1029	1038
14 x 12	322	303	640	1029	1029	1038
14	322	322	640	1029	1029	1038
16 x 12	373	303	705	1130	1130	1140
16 x 14	373	322	705	1130	1130	1140
16	373	373	705	1130	1130	1140
18 x 14	423	322	785	1219	1219	1232
18 x 16	423	373	785	1219	1219	1232
18	423	423	785	1219	1219	1232
20 x 16	471	373	855	1321	1321	1334
20 x 18	471	423	855	1321	1321	1334
20	471	471	855	1321	1321	1334
24 x 20	570	471	1040	1549	1549	1568
24	570	570	1040	1549	1549	1568

Class 1500

unit: mm

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	13	13	120	216	216	216
3/4 x 1/2	19	13	130	229	229	229
3/4	19	19	130	229	229	229
1 x 3/4	25	19	150	254	254	254
1	25	25	150	254	254	254
1 1/2 x 1	38	25	180	305	305	305
1 1/2	38	38	180	305	305	305
2 x 1 1/2	49	38	215	368	368	371
2 to 12	Please refer to T60S (p. 10)					
14 x 10	315	239	750	1257	1257	1276
14 x 12	315	287	750	1257	1257	1276
14	315	315	750	1257	1257	1276
16 x 12	360	287	825	1384	1384	1407
16 x 14	360	315	825	1384	1384	1407
16	360	360	825	1384	1384	1407
18 x 14	406	315	915	1537	-	1559
18 x 16	406	360	915	1537	-	1559
18	406	406	915	1537	-	1559
20 x 16	454	360	985	1664	-	1686
20 x 18	454	406	985	1664	-	1686
20	454	454	985	1664	-	1686
24 x 20	546	454	1170	1943	-	1972
24	546	546	1170	1943	-	1972

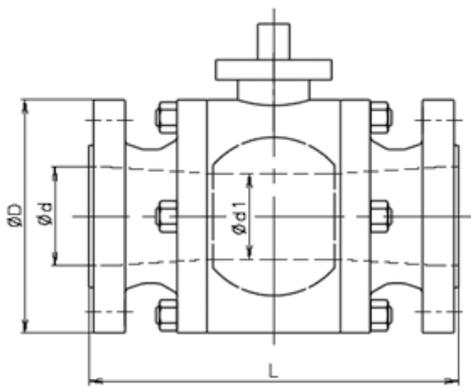
Class 2500

unit: mm

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	13	13	135	264	264	264
3/4 x 1/2	19	13	140	273	273	273
3/4	19	19	140	273	273	273
1 x 3/4	25	19	160	308	308	308
1	25	25	160	308	308	308
1 1/2 x 1	38	25	205	384	384	387
1 1/2	38	38	205	384	384	387
2 x 1 1/2	42	38	235	451	451	454
2	42	42	235	451	451	454
3 x 2	62	42	305	578	578	584
3	62	62	305	578	578	584
4 x 3	87	62	355	673	673	683
4	87	87	355	673	673	683
6 x 4	131	87	485	914	914	927
6	131	131	485	914	914	927
8 x 6	179	131	550	1022	1022	1038
8	179	179	550	1022	1022	1038

NOTE: PN designed valves can be available. Please ask product range and dimensions.

Dimensions



Class 150

unit: inch

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	0.50	0.50	3.50	6.50	6.50	6.44
3/4 x 1/2	0.75	0.5	3.88	6.50	6.50	6.50
3/4	0.75	0.75	3.88	6.50	6.50	6.50
1 x 3/4	1.00	0.75	4.25	6.50	6.50	6.50
1	1.00	1.00	4.25	6.50	6.50	6.50
1 1/2 x 1	1.50	1.00	5.00	6.50	7.50	7.00
1 1/2	1.50	1.50	5.00	6.50	7.50	7.00
2 x 1 1/2	1.94	1.50	6.00	7.00	8.50	7.50
2 to 24	Please refer to T60S (p. 11)					
26 x 20	24.94	19.19	34.25	45.00	49.00	-
26 x 22	24.94	21.19	34.25	45.00	49.00	-
26 x 24	24.94	23.19	34.25	45.00	49.00	-
26	24.94	24.19	34.25	45.00	49.00	-
28 x 22	26.94	21.19	36.50	49.00	53.00	-
28 x 24	26.94	23.19	36.50	49.00	53.00	-
28 x 26	26.94	24.19	36.50	49.00	53.00	-
28	26.94	26.94	36.50	49.00	53.00	-
30 x 24	28.94	23.19	38.75	51.00	55.00	-
30 x 26	28.94	24.19	38.75	51.00	55.00	-
30 x 28	28.94	26.94	38.75	51.00	55.00	-
30	28.94	28.94	38.75	51.00	55.00	-
32 x 26	30.69	24.19	41.75	54.00	60.00	-
32 x 28	30.69	26.94	41.75	54.00	60.00	-
32 x 30	30.69	28.94	41.75	54.00	60.00	-
32	30.69	30.69	41.75	54.00	60.00	-
34 x 28	32.69	26.94	43.75	58.00	64.00	-
34 x 30	32.69	28.94	43.75	58.00	64.00	-
34 x 32	32.69	30.69	43.75	58.00	64.00	-
34	32.69	32.69	43.75	58.00	64.00	-
36 x 30	34.44	28.94	46.00	60.00	68.00	-
36 x 32	34.44	30.69	46.00	60.00	68.00	-
36 x 34	34.44	32.69	46.00	60.00	68.00	-
36	34.44	34.44	46.00	60.00	68.00	-

Class 300

unit: inch

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	0.50	0.50	3.75	6.50	6.50	6.44
3/4 x 1/2	0.75	0.50	4.62	6.50	6.50	7.00
3/4	0.75	0.75	4.62	6.50	6.50	7.00
1 x 3/4	1.00	0.75	4.88	6.50	6.50	7.00
1	1.00	1.00	4.88	6.50	6.50	7.00
1 1/2 x 1	1.50	1.00	6.12	7.50	8.00	8.00
1 1/2	1.50	1.50	6.12	7.50	8.00	8.00
2 x 1 1/2	1.94	1.50	6.50	8.50	8.50	9.13
2 to 24	Please refer to T60S (p. 11)					
26 x 20	24.94	19.19	38.25	49.00	49.00	50.00
26 x 22	24.94	21.19	38.25	49.00	49.00	50.00
26 x 24	24.94	23.19	38.25	49.00	49.00	50.00
26	24.94	24.19	38.25	49.00	49.00	50.00
28 x 22	26.94	21.19	40.75	53.00	53.00	54.00
28 x 24	26.94	23.19	40.75	53.00	53.00	54.00
28 x 26	26.94	24.19	40.75	53.00	53.00	54.00
28	26.94	26.94	40.75	53.00	53.00	54.00
30 x 24	28.94	23.19	43.00	55.00	55.00	56.00
30 x 26	28.94	24.19	43.00	55.00	55.00	56.00
30 x 28	28.94	26.94	43.00	55.00	55.00	56.00
30	28.94	28.94	43.00	55.00	55.00	56.00
32 x 26	30.69	24.19	45.25	60.00	60.00	61.13
32 x 28	30.69	26.94	45.25	60.00	60.00	61.13
32 x 30	30.69	28.94	45.25	60.00	60.00	61.13
32	30.69	30.69	45.25	60.00	60.00	61.13
34 x 28	32.69	26.94	47.50	64.00	64.00	65.13
34 x 30	32.69	28.94	47.50	64.00	64.00	65.13
34 x 32	32.69	30.69	47.50	64.00	64.00	65.13
34	32.69	32.69	47.50	64.00	64.00	65.13
36 x 30	34.44	28.94	50.00	68.00	68.00	69.13
36 x 32	34.44	30.69	50.00	68.00	68.00	69.13
36 x 34	34.44	32.69	50.00	68.00	68.00	69.13
36	34.44	34.44	50.00	68.00	68.00	69.13

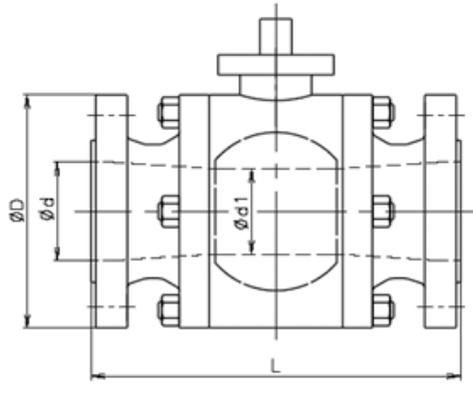
Class 600

unit: inch

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	0.50	0.50	3.75	6.50	6.50	6.44
3/4 x 1/2	0.75	0.5	4.62	7.50	7.50	7.50
3/4	0.75	0.75	4.62	7.50	7.50	7.50
1 x 3/4	1.00	0.75	4.88	8.50	8.50	8.50
1	1.00	1.00	4.88	8.50	8.50	8.50
1 1/2 x 1	1.50	1.00	6.12	9.50	9.50	9.50
1 1/2	1.50	1.50	6.12	9.50	9.50	9.50
2 x 1 1/2	1.94	1.50	6.50	11.50	11.50	11.50
2 to 24	Please refer to T60S (p. 11)					
26 x 20	24.94	19.19	40.00	57.00	57.00	57.50
26 x 22	24.94	21.19	40.00	57.00	57.00	57.50
26 x 24	24.94	23.19	40.00	57.00	57.00	57.50
26	24.94	24.19	40.00	57.00	57.00	57.50
28 x 22	26.94	21.19	42.25	61.00	61.00	61.50
28 x 24	26.94	23.19	42.25	61.00	61.00	61.50
28 x 26	26.94	24.19	42.25	61.00	61.00	61.50
28	26.94	26.94	42.25	61.00	61.00	61.50
30 x 24	28.94	23.19	44.50	65.00	65.00	65.50
30 x 26	28.94	24.19	44.50	65.00	65.00	65.50
30 x 28	28.94	26.94	44.50	65.00	65.00	65.50
30	28.94	28.94	44.50	65.00	65.00	65.50
32 x 26	30.69	24.19	47.00	70.00	70.00	70.63
32 x 28	30.69	26.94	47.00	70.00	70.00	70.63
32 x 30	30.69	28.94	47.00	70.00	70.00	70.63
32	30.69	30.69	47.00	70.00	70.00	70.63
34 x 28	32.69	26.94	49.00	76.00	76.00	76.63
34 x 30	32.69	28.94	49.00	76.00	76.00	76.63
34 x 32	32.69	30.69	49.00	76.00	76.00	76.63
34	32.69	32.69	49.00	76.00	76.00	76.63
36 x 30	34.44	28.94	51.75	82.00	82.00	82.63
36 x 32	34.44	30.69	51.75	82.00	82.00	82.63
36 x 34	34.44	32.69	51.75	82.00	82.00	82.63
36	34.44	34.44	51.75	82.00	82.00	82.63

NOTE: PN designed valves can be available. Please ask product range and dimensions.

Dimensions



Class 900

unit: inch

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	0.50	0.50	4.75	8.50	8.50	8.50
3/4 x 1/2	0.75	0.50	5.12	9.00	9.00	9.00
3/4	0.75	0.75	5.12	9.00	9.00	9.00
1 x 3/4	1.00	0.75	5.88	10.00	10.00	10.00
1	1.00	1.00	5.88	10.00	10.00	10.00
1 1/2 x 1	1.50	1.00	7.00	12.00	12.00	12.00
1 1/2	1.50	1.50	7.00	12.00	12.00	12.00
2 x 1 1/2	1.94	1.50	8.50	14.50	14.50	14.63
2 to 12	Please refer to T60S (p. 12)					
14 x 10	12.69	9.94	25.25	40.50	40.50	40.88
14 x 12	12.69	11.94	25.25	40.50	40.50	40.88
14	12.69	12.69	25.25	40.50	40.50	40.88
16 x 12	14.69	11.94	27.75	44.50	44.50	44.88
16 x 14	14.69	12.69	27.75	44.50	44.50	44.88
16	14.69	14.69	27.75	44.50	44.50	44.88
18 x 14	16.69	12.69	31.00	48.00	48.00	48.50
18 x 16	16.69	14.69	31.00	48.00	48.00	48.50
18	16.69	16.69	31.00	48.00	48.00	48.50
20 x 16	18.56	14.69	33.75	52.00	52.00	52.50
20 x 18	18.56	16.69	33.75	52.00	52.00	52.50
20	18.56	18.56	33.75	52.00	52.00	52.50
24 x 20	22.44	18.56	41.00	61.00	61.00	61.75
24	22.44	22.44	41.00	61.00	61.00	61.75

Class 1500

unit: inch

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	0.50	0.50	4.75	8.50	8.50	8.50
3/4 x 1/2	0.75	0.50	5.12	9.00	9.00	9.00
3/4	0.75	0.75	5.12	9.00	9.00	9.00
1 x 3/4	1.00	0.75	5.88	10.00	10.00	10.00
1	1.00	1.00	5.88	10.00	10.00	10.00
1 1/2 x 1	1.50	1.00	7.00	12.00	12.00	12.00
1 1/2	1.50	1.50	7.00	12.00	12.00	12.00
2 x 1 1/2	1.94	1.50	8.50	14.50	14.50	14.63
2 to 12	Please refer to T60S (p. 12)					
14 x 10	12.44	9.44	29.50	49.50	49.50	50.25
14 x 12	12.44	11.31	29.50	49.50	49.50	50.25
14	12.44	12.44	29.50	49.50	49.50	50.25
16 x 12	14.19	11.31	32.50	54.50	54.50	55.38
16 x 14	14.19	12.44	32.50	54.50	54.50	55.38
16	14.19	14.19	32.50	54.50	54.50	55.38
18 x 14	16.00	12.44	36.00	60.50	-	61.38
18 x 16	16.00	14.19	36.00	60.50	-	61.38
18	16.00	16.00	36.00	60.50	-	61.38
20 x 16	17.88	14.19	38.75	65.50	-	66.38
20 x 18	17.88	16.00	38.75	65.50	-	66.38
20	17.88	17.88	38.75	65.50	-	66.38
24 x 20	21.50	17.88	46.00	76.50	-	77.63
24	21.50	21.50	46.00	76.50	-	77.63

Class 2500

unit: inch

SIZE (NPS)	d	d1	D	L		
				RF	WE	RJ
1/2	0.50	0.50	5.25	10.38	10.38	10.38
3/4 x 1/2	0.75	0.50	5.50	10.75	10.75	10.75
3/4	0.75	0.75	5.50	10.75	10.75	10.75
1 x 3/4	1.00	0.75	6.25	12.12	12.12	12.12
1	1.00	1.00	6.25	12.12	12.12	12.12
1 1/2 x 1	1.50	1.00	8.00	15.12	15.12	15.24
1 1/2	1.50	1.50	8.00	15.12	15.12	15.24
2 x 1 1/2	1.69	1.50	9.25	17.75	17.75	17.88
2	1.69	1.69	9.25	17.75	17.75	17.88
3 x 2	2.44	1.69	12.00	22.75	22.75	23.00
3	2.44	2.44	12.00	22.75	22.75	23.00
4 x 3	3.44	2.44	14.00	26.50	26.50	26.88
4	3.44	3.44	14.00	26.50	26.50	26.88
6 x 4	5.19	3.44	19.00	36.00	36.00	36.50
6	5.19	5.19	19.00	36.00	36.00	36.50
8 x 6	7.06	5.19	21.75	40.25	40.25	40.88
8	7.06	7.06	21.75	40.25	40.25	40.88

NOTE: PN designed valves can be available. Please ask product range and dimensions.

Engineering Data

Operating Torque

Class 900

Unit: N·m

Nominal Size	NPS	1/2	3/4	1	11/2	2	3	4	6	8	10	12
	DN	15	20	25	40	50	80	100	150	200	250	300
Differential Pressure (MPa)	0.5	24	30	42	79	*	*	*	*	*	*	*
	5	24	31	44	86	*	*	*	*	*	*	*
	7.5	26	34	48	94	*	*	*	*	*	*	*
	10	32	42	60	117	*	*	*	*	*	*	*
	12.5	38	50	71	140	*	*	*	*	*	*	*
	15	41	55	78	155	*	*	*	*	*	*	*

Class 1500

Unit: N·m

Nominal Size	NPS	1/2	3/4	1	11/2	2	3	4	6	8	10	12
	DN	15	20	25	40	50	80	100	150	200	250	300
Differential Pressure (MPa)	0.5	24	31	44	86	*	*	*	*	*	*	*
	5	24	31	44	86	*	*	*	*	*	*	*
	10	32	42	60	117	*	*	*	*	*	*	*
	15	41	55	78	155	*	*	*	*	*	*	*
	20	49	66	95	188	*	*	*	*	*	*	*
	25	56	76	109	216	*	*	*	*	*	*	*

Class 2500

Unit: N·m

Nominal Size	NPS	1/2	3/4	1	11/2	2	3	4	6
	DN	15	20	25	40	50	80	100	150
Differential Pressure (MPa)	0.5	32	39	59	105	131	190	333	901
	10	32	39	59	105	131	190	333	901
	20	40	50	75	141	171	263	475	1337
	30	51	64	95	185	221	349	639	1826
	40	60	77	113	223	265	425	783	2258
	42.5	68	88	128	256	303	491	908	2630

Class 900

Unit: Inch·lbs

Nominal Size	NPS	1/2	3/4	1	11/2	2	3	4	6	8	10	12
	DN	15	20	25	40	50	80	100	150	200	250	300
Differential Pressure (PSIG)	100	217	278	392	757	*	*	*	*	*	*	*
	740	217	279	394	760	*	*	*	*	*	*	*
	1000	228	296	419	815	*	*	*	*	*	*	*
	1480	287	378	536	1053	*	*	*	*	*	*	*
	1800	332	439	625	1232	*	*	*	*	*	*	*
	2220	369	492	701	1385	*	*	*	*	*	*	*

Class 1500

Unit: Inch·lbs

Nominal Size	NPS	1/2	3/4	1	11/2	2	3	4	6	8	10	12
	DN	15	20	25	40	50	80	100	150	200	250	300
Differential Pressure (PSIG)	100	217	278	392	757	*	*	*	*	*	*	*
	740	218	280	395	763	*	*	*	*	*	*	*
	1480	286	377	535	1050	*	*	*	*	*	*	*
	2220	370	492	702	1387	*	*	*	*	*	*	*
	3000	446	598	854	1697	*	*	*	*	*	*	*
	3705	507	682	975	1942	*	*	*	*	*	*	*

Class 2500

Unit: Inch·lbs

Nominal Size	NPS	1/2	3/4	1	11/2	2	3	4	6
	DN	15	20	25	40	50	80	100	150
Differential Pressure (PSIG)	100	287	346	525	927	1160	1681	2950	7971
	1480	288	348	527	934	1167	1694	2976	8050
	3000	363	453	673	1273	1543	2380	4306	12126
	4300	447	566	834	1620	1941	3064	5607	16013
	5800	532	681	997	1974	2346	3762	6932	19979
	6170	604	778	1134	2272	2686	4351	8053	23336

NOTES

- (1) Please refer to p. 22-23 for Class 150 to 600 and * torque values.
- (2) All torque values include a 30% safety factor. Values are for clean, static water at ambient temperature.
- (3) Ball seat material: RNYlon
- (4) In case of using higher safety factor than 30%, please confirm the maximum allowable stem strength.

Engineering Data

Flow Coefficient (Cv)

Class	Nominal Size	NPS	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14
		DN	15	20	25	40	50	80	100	150	200	250	300	350
Class	150		20	40	85	260	*	*	*	*	*	*	*	*
	300		20	40	85	250	*	*	*	*	*	*	*	*
	600		20	38	65	230	*	*	*	*	*	*	*	*
	900		15	35	60	165	*	*	*	*	*	*	*	24000
	1500		15	35	60	165	*	*	*	*	*	*	*	21000
	2500		15	30	55	150	250	500	1050	2500	5200	-	-	-

Class	Nominal Size	NPS	16	18	20	22	24	26	28	30	32	34	36
		DN	400	450	500	550	600	650	700	750	800	850	900
Class	150		*	*	*	*	*	130000	152000	179000	202000	230000	258000
	300		*	*	*	*	*	124000	146000	172000	192000	219000	243000
	600		*	*	*	*	*	115000	135000	159000	177000	200000	220000
	900		34000	45000	56000	-	85000	-	-	-	-	-	-
	1500		27500	36500	46000	-	67500	-	-	-	-	-	-
	2500		-	-	-	-	-	-	-	-	-	-	-

NOTE:* Please refer to p. 22.

Weight

unit : kg													
Class	Nominal Size	NPS	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12
		DN	15	20	25	40	50	80	100	150	200	250	300
Class	900		14	17	20	38	*	*	*	*	*	*	*
	1500		14	17	20	38	*	*	*	*	*	*	*
	2500		-	-	-	67	110	220	405	1060	-	-	-

unit : lb													
Class	Nominal Size	NPS	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12
		DN	15	20	25	40	50	80	100	150	200	250	300
Class	900		31	38	44	84	*	*	*	*	*	*	*
	1500		31	38	44	84	*	*	*	*	*	*	*
	2500		-	-	-	148	243	485	893	2337	-	-	-

NOTE: These tables show raised face flanged and bare stem valves.

* Please refer to p. 23.

Cautions for Handling Ball Valves

Cautions for Product Selection

- The service range of each product is specified in accordance with the official standards, specifications and KITZ standards. Select appropriate valves by checking the product specifications and the service conditions of the fluid, temperature, pressure, etc.
- Select appropriate valves by checking the applicable regulations and standards when the valve is used under the environment regulated by the related laws or under the standards or provisions arbitrary established by the facility where the valve is used.
- Consult with KITZ and take sufficient safety measures when the valve is used for nuclear power facilities, railways, aircrafts, vehicles, ships, medical equipment, food manufacturing equipment, safety devices, amusement devices and facilities.
- The valves manufactured with fluororesin resin or rubbers are not designed for transplanting into a human body or for use for medical instruments which may touch body fluids or biological tissues.
- Each valve material shows different corrosion behavior. Select appropriate valves with the consideration of the corrosion resistance under the specified service conditions (fluids, temperature and pressure).
- The service pressure, temperature or fluid is restricted by the valve size or the material when the seat material or sealing material is made of polymeric resin or rubber. Please select appropriate valves after confirming the service conditions.
- Pressure-temperature rating of ball valves adopting polymeric resin seats or rubber seats is determined by the seat material and the valve size. Check the service conditions and select the appropriate seat materials.
- Consult with KITZ if the valve is used under the conditions close to the upper limit, or if the valve is used with the ball fully closed for a long period, or if the frequency of opening and closing the valve is high, even if the valve is used within the allowable pressure-temperature rating range.
- Consult with KITZ for reinforcement of the ball seat, etc. if the valve is used at high temperature or under high pressure for a long period, or if the valve is used with the ball fully closed for a long period.
- Standard, painting is applied to the valve body and the parts such as a handle lever. Contact KITZ for details in the case the product is used in a corrosive environment.
- For the purpose of rust prevention and lubrication, grease is applied to the inner and outer surfaces, sliding parts and fluid-contact surfaces of valve. Take appropriate measures such as cleaning if discharge of grease affects the safety, sanitation or function of the facilities in which the valve is installed.
- Impurity removal measures are not applied to the valves. In the case valves are used for food or drink manufacturing facilities, take any required measures to eliminate impurities.
- When purchasing valves with "no oil/water treatment" specifications, make sure to obtain "No Oil/Water Treatment Procedures" from KITZ before purchasing. As "no oil/water treatment" cannot be applied to a certain type of the products, consult with KITZ for details.
- Abrasion powder from sliding sections such as ball seats and gland packing may be mixed into the service fluid. Install a filter to the outlet side of the ball valve if required.
- Ball valves shall be used in the fully open position or in the fully closed position. Use of valve in the partially open position may damage the ball or the ball seat. Or the ball may turn to the closing direction depending on the fluid.
- When the service fluid is in a gaseous form, a rapid drop in pressure in the disc section may damage the O-rings.
- For export of the KITZ products, permission in accordance with the regulations in Export Trade Control Order on Foreign Exchange and Foreign Trade Control Law shall be obtained from Ministry of Economy, Trade and Industry in Japan. Contact KITZ for details.
- Illustrations of the representative size are shown in the catalog. See KITZ homepage or contact with KITZ when detailed drawings of selected products are required. (KITZ homepage address: www.kitz.co.jp)

Cautions for Transportation and Storage

- Do not carry the valve by holding the valve operating section. The valve operating section may come off and drop.
- Do not give any excessive load to the valves by dropping or shaking during transportation and storage.
- Do not store the valves in the corrosive environment.
- Store the valves in a dust-free, dry and well-ventilated indoor place.
- Measures such as rust and dust prevention treatment, lubrication treatment and plastic covering are applied to the valves to keep the quality. Maintain the valves protected until they are installed.
- Do not remove the dust preventive cover from the valve until just before installation. Especially, the valves with "no oil treatment" specifications need preventive measures against rust and dust.
- Keep the ball valve fully open during storage. The ball seat may deform if the valve is stored in the partially open position.

Cautions for Installation

- Allow sufficient space for valve operation and maintenance work.
- Install the valve with the stem in the upright position on the horizontal pipeline.
- Clean the connecting pipes and remove foreign objects such as cutting oil and machining dust before installation.
- The upstream pipe should be aligned with the downstream pipe to prevent excessive pipe stress. Use support stands if necessary.
- Take care not to damage the connecting sections (flange surfaces, weld sections, solder sections, threaded sections, etc.).
- Keep the ball valve in the fully open position to protect the ball surface during installation.
- Install the valve in the correct direction by checking the flow direction (arrow) indicated on the body or the nameplate.
- Desiccant (anticorrosive) agent such as silica gel is put in the valve if requested. Make sure to remove the desiccant (anticorrosive) agent before installation.

Cautions for Handling Ball Valves

Flanged Type

- Make sure to remove the dust preventive covers from the flange surfaces before installation.
- Make sure that the pipe flanges are in parallel with each other and the bolt holes are symmetrically arranged against the vertical center line of the pipe.
- Tighten the bolts evenly and alternately in a star pattern. Bolt tightening shall be performed more than once.
- Use new gaskets for installation of valve.

Cautions for Operation

- After installation, fully open the valve on the pipeline and flush the pipe interior to remove foreign objects. Never operate the valve while flushing the pipeline.
- Make sure to reduce the fluid pressure to the atmospheric level and tighten the gland nuts evenly so that the gland is horizontally placed.
- When the valve is used at high temperature (approx. 200°C or above), retighten the bolts and the union section (hot bolting) after the temperature has risen.
- Open/Close direction of the manual valves shall match up with "O" (open) or "S" (shut) shown on the handle section.
- Open or close the lever handle type valve or the gear type valve by hand according to the indication "Open" and "Shut" shown on the lever handle.
- When the valve is handling a liquid, open or close the valve slowly to prevent a water hammer phenomenon.
- Excessive pressure rise may occur due to the rise of the fluid temperature or the ambient temperature when the fluid, in the form of liquid, is sealed in the closed line (at the end of pipeline closed with a shutoff valve). This type of excessive pressure rise can be prevented with a pressure-relief valve or a predetermined piping design.
- When a pipe contraction due to the change in temperature may occur, take appropriate preventive measures.
- Do not perform a pressure test or a leak test with the valve fully closed.
- Do not loosen any bolts or nuts during operation.
- Do not remove the valve operating device while the valve is under pressure.
- Ball valves shall be operated either in the fully open position or in the fully closed position.

Freeze Prevention Measures

- Valves may be damaged due to the freezing of residual water in the pipe or valve. Drain the residual water or take appropriate freeze prevention measures when freezing is expected.

Cautions for Disassembly and Reassembly

- Make sure to read and understand all items in the applicable operation manuals and the operation manuals supplied with the product before removing, disassembling or reassembling the valve.
- Wear protective gear such as goggles, gloves and safety shoes.
- Make sure to replace the removed packing and seats with new ones when reassembling the valve. Perform the predetermined valve inspection after reassembly is completed and make sure that there is no abnormality before using the valve.
- Before removing the valve from the pipe, thoroughly release the line fluid from the valve interior and reduce the pipe pressure to the atmospheric level. Take every possible measure against hazardous fluids (toxic, flammable, vaporizing fluids, etc.)
- Trapped fluid may remain in the cavity even if the valve is fully opened and removed from the pipe. Drain the trapped fluid thoroughly from the cavity with the valve halfway open before removing the valve from the pipe.

Maintenance and Inspection

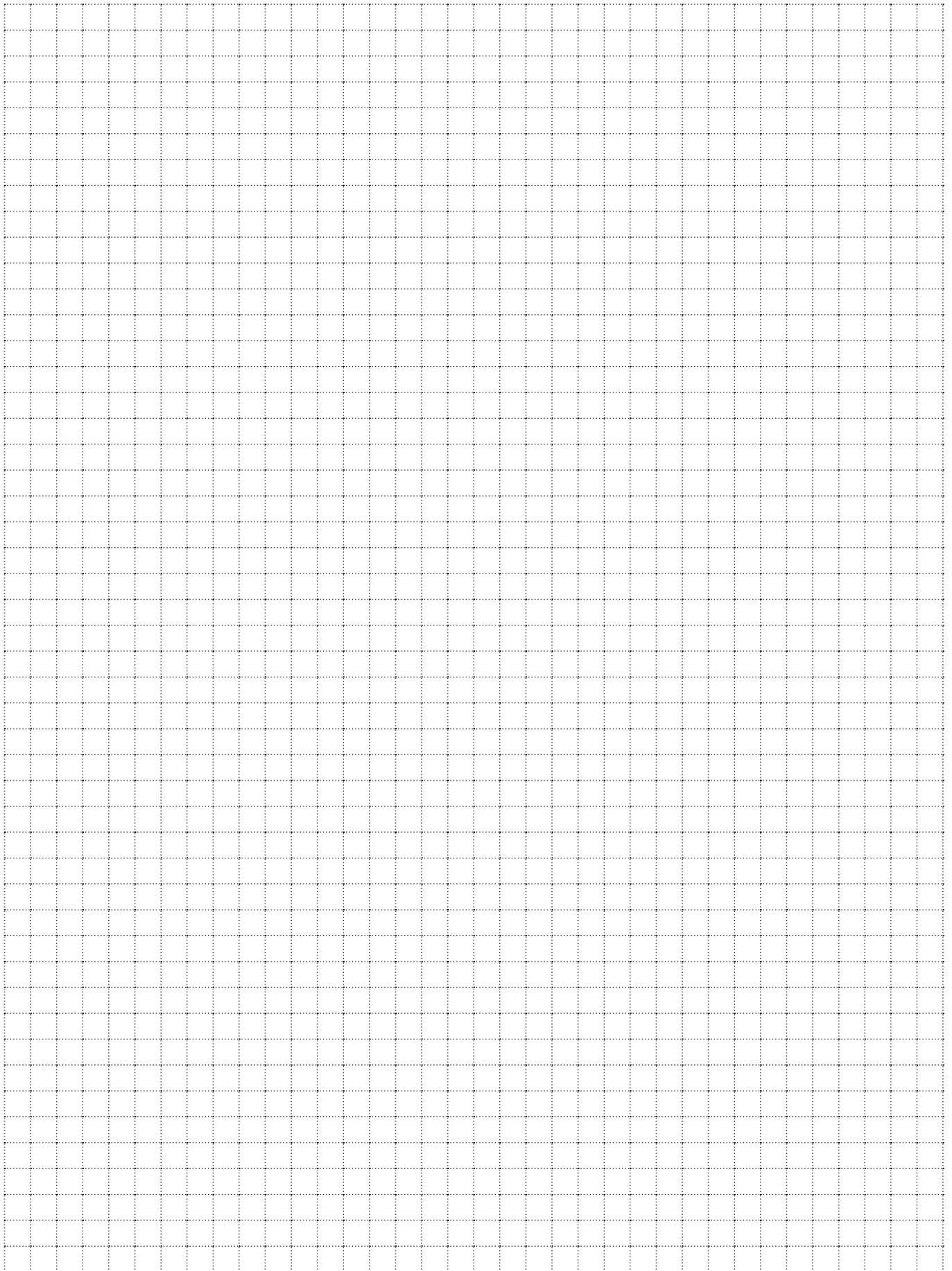
- Perform daily and periodical inspections for early detection of any abnormality and take appropriate measures for efficient and safe usage of the product. Read through the applicable operation manuals and the operation manuals supplied with the product. Even if the valve is properly used, the lifetime varies depending on the service conditions and the properties of each valve. Replacement of the parts or valve, or a change to the valve which is appropriate for the service conditions may be required.
- Do not remove the "Warning" or "Caution" labels from the valve. Instructions and cautions on the labels shall be strictly observed.

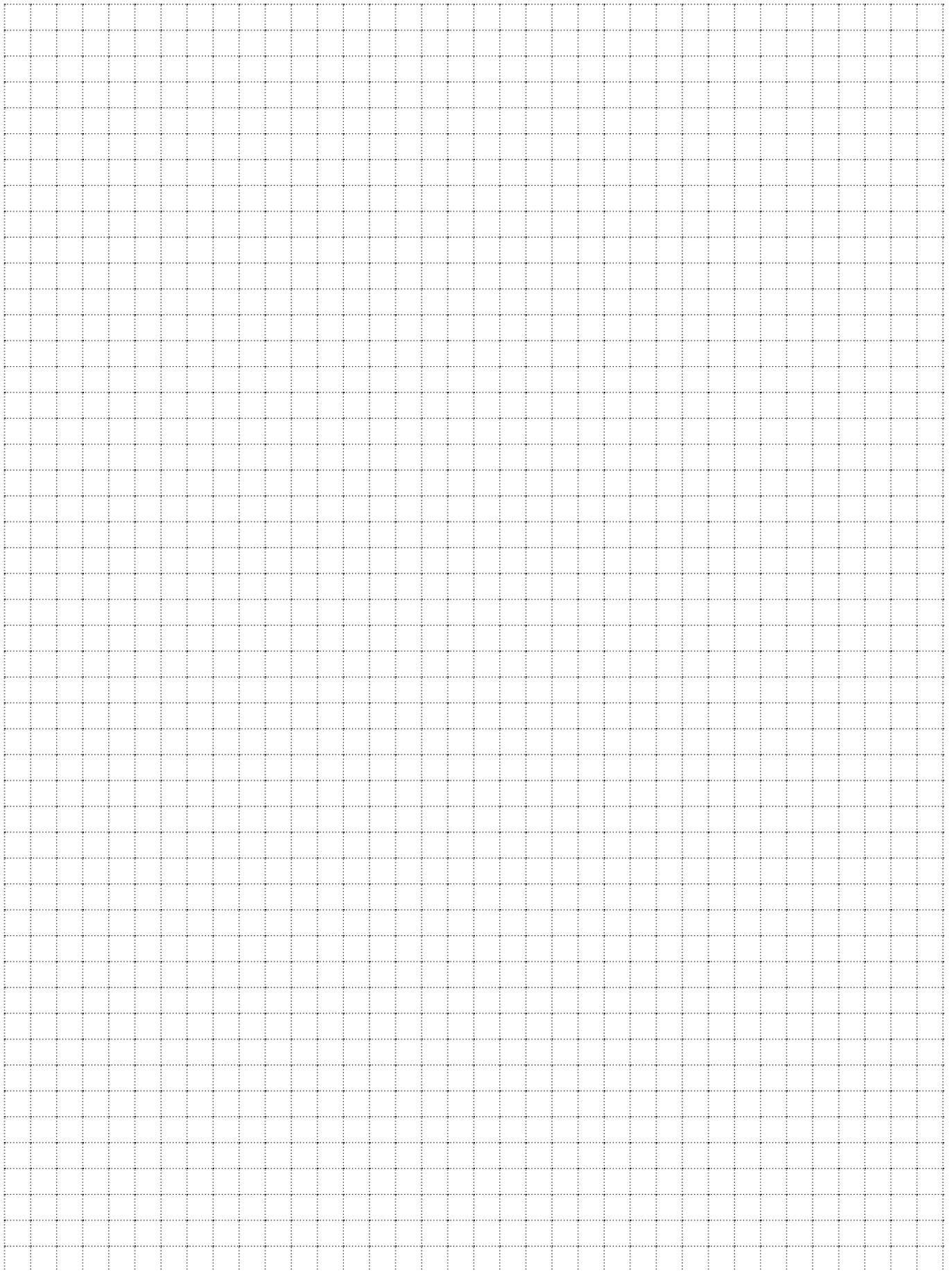
Cautions for Handling Products

- The cautions in this catalog do not cover the whole scope of conceivable usage of the product. Obtain the applicable operation manuals and read through the warnings and cautions given in the operation manuals for the safe use of the product.

Disclaimer

- KITZ does not take any responsibilities for damages arising from a result of natural disasters, accidents or fire which KITZ is not liable for, conduct of a third party, intentional act, misuse or use under abnormal conditions by a customer.
- KITZ does not take any responsibilities for damages arising from negligence of the prohibitions and cautions given in the catalogs and operation manuals, or installation and usage beyond the specification range.
- KITZ does not take any responsibilities for damages arising from product modification not entrusted to KITZ or usage under the load applied from other devices.





CAUTION

Pressure-temperature ratings and other performance data published in this catalog have been developed from our design calculation, in-house testing, field reports provided by our customers, and/or published official standards or specifications. They are good only to cover typical applications as a general guideline to users of KITZ products introduced in this catalog.

KITZ Carbon Steel Paintings are suitable for general service conditions. For painting used in severe atmospheres or at elevated temperatures. Please contact us for recommendations based on your service environment.

For any specific application, users are kindly requested to contact KITZ Corporation for technical advice, or to carry out their own study and evaluation for proving the suitability of these products to such an application. Failure to follow this request could result in property damage and / or personal injury, for which we shall not be liable.

While this catalog has been compiled with the utmost care, we assume no responsibility for errors, impropriety, or inadequacy. Any information provided in this catalog is subject to from-time-to-time change without notice for error rectification, product discontinuation, design modification, new product introduction, or any other cause that KITZ Corporation considers necessary. This edition cancels all previous issues.

Read the instruction manual carefully before use.

NOTICE

If any products designated as strategic material in the Foreign Exchange and Foreign Trade Law, Cabinet Order Concerning Control of Export Trade, Cabinet order Concerning Control of Foreign Exchange, and other related laws and ordinances ("Foreign Exchange Laws") are exported to any foreign country or countries, an export license issued by the Japanese Government will be required under the Foreign Exchange Laws.

Further, there may be cases where an export license issued by the government of the United States or other country will be required under the applicable export-related laws and ordinances in such relevant countries.

The contract shall become effective subject to the fact that a relevant export license is obtained from the Japanese Government.



*A chrysanthemum-handle is a symbol of KITZ,
the brand of valve reliability*

ISO 9001 certified since 1989

KITZ
KITZ CORPORATION

1-10-1 Nakase, Mihama-ku, Chiba 261-8577, Japan
International Sales Dept.
Phone : 81-43-299-1730, 1732, and 1733
Fax : 81-43-299-0121

— Distributed by —

