KEYSTONE FIGURE 638 SERIES E / SERIES 2

SLURRY CONTROL VALVE

The Figure 638 (F638) is an extreme heavy duty slurry control valve, with an extended body style and replaceable body sleeve.
- Series E (SE) for heavy duty service
- Series 2 (S2) for arduous duty service

GENERAL APPLICATION

- Bauxite slurries
- Coal washeries
- Tailing dispersal
- Cement
- Caustic
- Sugar industry and tailings
- Mud and sand dispersal
- Mineral sands

TECHNICAL DATA

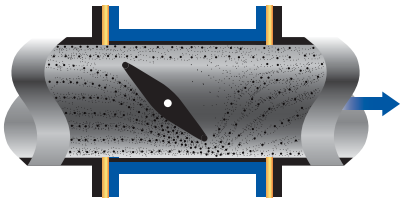
Size range:	DN 40 - 600
Temperature rating:	Up to 230°C
Pressure rating:	ASME B16.34 Class 150, 300 and 600
Max ΔP:	1400 kPa
Standard flange drilling:	ASME B16.5 Class 150, 300 or 600

FEATURES

- Heavy robust construction.
- Full repairability with replaceable internals for significantly extending valve life.
- Extended body for protection of down stream piping.
- Chrome Iron internals on the Series 2 coated with tungsten carbide.
- Tungsten carbide disc end spacers.
- Swing through disc for minimal leakage at elevated temperatures.
- Wing-style disc for optimum flow and wear resistance.
- Venturi liner for improved flow control and thicker liner for wear resistance.
- Improved mechanical seal to prevent the ingress of media to the bearing journals.
- KTFE stem seals for ultimate resistance against caustic and acid applications.
- Superior multiple stem seals.
- Standardized mounting and drive adaptor connection allowing direct mounting of Keystone actuators and also allows for in-line actuator removal.
- Manufactured under quality system ISO 9001:2015, Certificate No. 10109459.
- Available with PED approval. Cert No. 0038/PED/MUM/2010002/1.

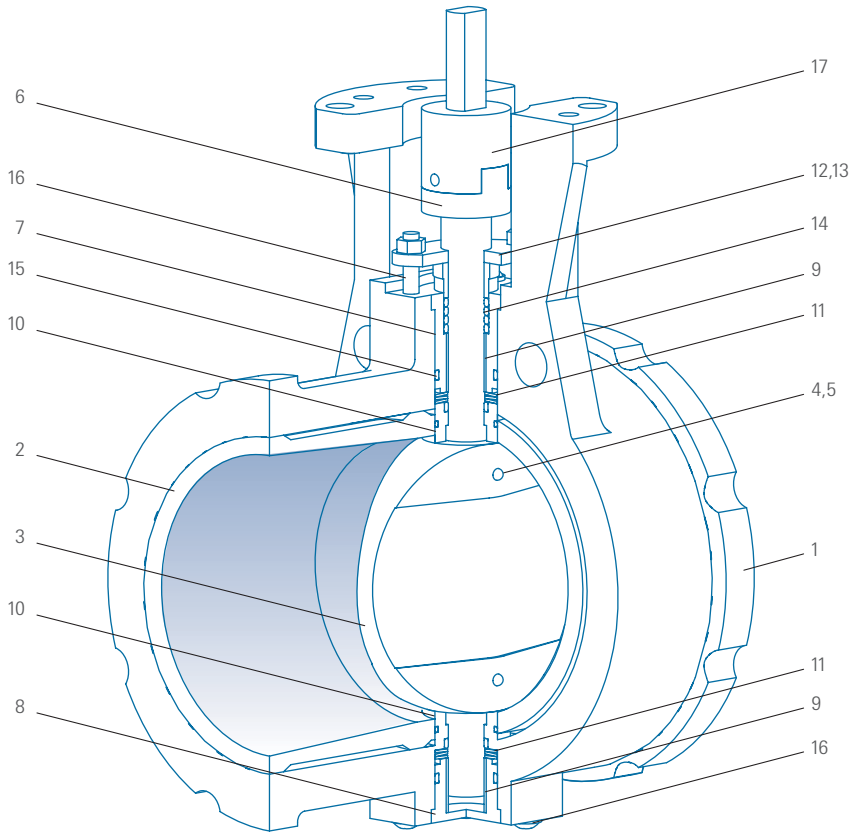
Flow diagram

The extended body design of the F638 valve protects downstream piping from wear when used on high velocity control applications.



KEYSTONE FIGURE 638 SERIES E / SERIES 2

SLURRY CONTROL VALVE



TECHNICAL DATA

Size range:	DN 40 - 200
Temperature rating:	Up to 230°C
Pressure rating:	ASME B16.34 Class 150
Working pressure:	1960 kPa at 38°C
Max ΔP:	1400 kPa
Standard flange drilling:	ASME B16.5 Class 150 F.F
Body color:	
Series E:	Blue
Series 2:	Federation green

PARTS LIST

No.	Description	Material	Specification
1	Body	Carbon steel	ASTM A216 WCB
2	Liner	Chrome iron (tungsten coated)	AS2027 Cr27 (HPHVOF WCNi)
3	Disc	Chromeiron (tungsten coated)	AS2027 Cr27 (HPHVOF WCNi)
4	Disc pin	Spring alloy steel	Commercial
5	Disc drive screw	431 S/S	ASTM A276 431 condition A
6	Shaft	431 S/S	ASTM A276 431 condition A
7	Upper insert	431 S/S	ASTM A276 431 condition A
8	Lower insert	431 S/S	ASTM A276 431 condition A
9	Bearings	PTFE/Glacier DU	Commercial
10	Disc end spacers	Tungsten carbide	WCNi
11	Disc springs	Spring alloy steel	Commercial
12	Gland plate	Carbon steel	AS3678 grade 250
13	Gland collar	431 S/S	ASTM A276 431 condition A
14	Gland packing	PTFE braid	PTFE
15	O-rings	KTFE	KTFE (Keystone)
16	Fasteners	Alloy steel	Commercial
17	Drive dog	431 S/S	ASTM A276 431 condition A

OPTIONS

- Keystone Figure 89U hard anodized, rack and pinion style aluminum pneumatic actuators, double acting and spring return options available.
- Biffi Morin "S" Series, scotch yoke style, stainless steel pneumatic actuators, double acting and spring return options available.
- Biffi Morin "B" Series, scotch yoke style, ductile iron pneumatic actuators with stainless steel cylinder barrel material as standard, double acting and spring return options available.
- Biffi ICON3000 electric actuators
- Keystone Figure 427 manual gear operators
- Solenoids, positioners and position monitoring devices are readily available - consult your local Emerson representative

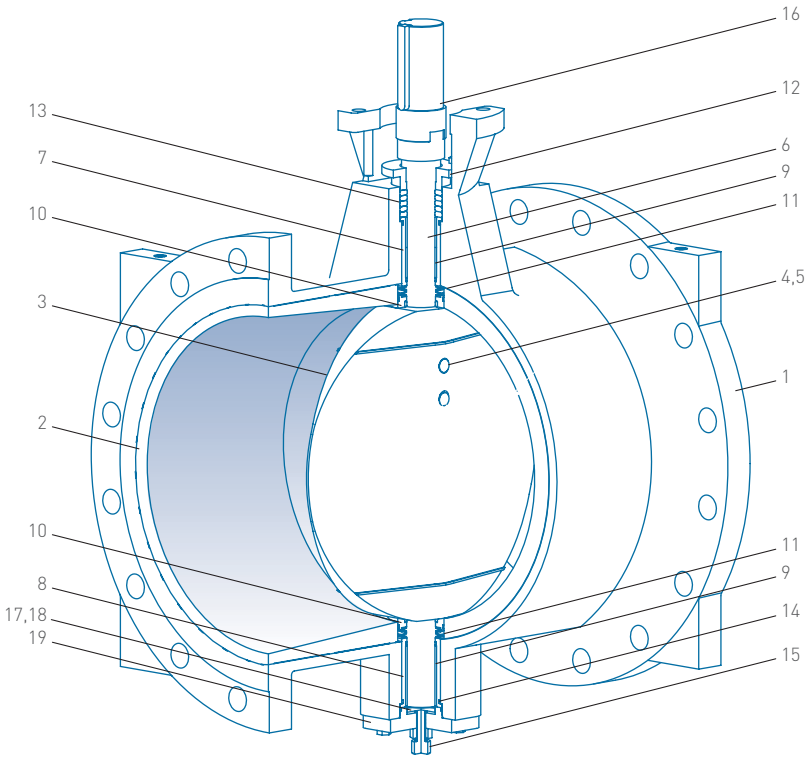
NOTES

Materials and specifications shown in (brackets refer to Series 2 only).

Other materials are available upon request. e.g. ceramic internals for extremely aggressive slurries etc.

KEYSTONE FIGURE 638 SERIES E / SERIES 2

SLURRY CONTROL VALVE



TECHNICAL DATA

Size range:	DN 250 - 600
Temperature rating:	Up to 230°C
Pressure rating:	ASME B16.34 Class 150
Working pressure:	1960 kPa at 38°C
Max ΔP:	1400 kPa
Standard flange drilling:	DN 250 ASME B16.5 Class 150 F.F DN 300 - 600 ASME B16.5 Class 150 R.F
Body color:	
Series E:	Blue
Series 2:	Federation green

PARTS LIST

No.	Description	Material	Specification
1	Body	Carbon steel	ASTM A216 WCB
2	Liner	Chrome iron (tungsten coated)	AS2027 Cr27 (HPHVOF WCNi)
3	Disc	Chrome iron (tungsten coated)	AS2027 Cr27 (HPHVOF WCNi)
4	Disc pin	Spring alloy steel	Commercial
5	Disc drive screw	431 S/S	ASTM A276 431 condition A
6	Shaft	431 S/S	ASTM A276 431 condition A
7	Upper insert	431 S/S	ASTM A276 431 condition A
8	Lower insert	431 S/S	ASTM A276 431 condition A
9	Bearings	PTFE/Glacier DU	Commercial
10	Disc end spacers	Tungsten carbide	WCNi
11	Disc springs	Spring alloy steel	Commercial
12	Gland follower	Carbon steel	AS3678 grade 250
13	Gland packing	PTFE braid	PTFE
14	O-rings	KTFE	KTFE (Keystone)
15	Fasteners	Alloy steel	Commercial
16	Drive dog	431 S/S	ASTM A276 431 condition A
17	Thrust washer	PTFE	PTFE
18	Backing disc	316 S/S	ASTM A276 316 condition A
19	End cover	Carbon steel	AS3678 Grade 250

OPTIONS

- Keystone Figure 89U hard anodized, rack and pinion style aluminum pneumatic actuators, double acting and spring return options available.
- Biffi Morin "S" Series, scotch yoke style, stainless steel pneumatic actuators, double acting and spring return options available.
- Biffi Morin "B" Series, scotch yoke style, ductile iron pneumatic actuators with stainless steel cylinder barrel material as standard, double acting and spring return options available.
- Biffi ICON3000 electric actuators
- Keystone Figure 427 manual gear operators
- Solenoids, positioners and position monitoring devices are readily available - consult your local Emerson representative

NOTES

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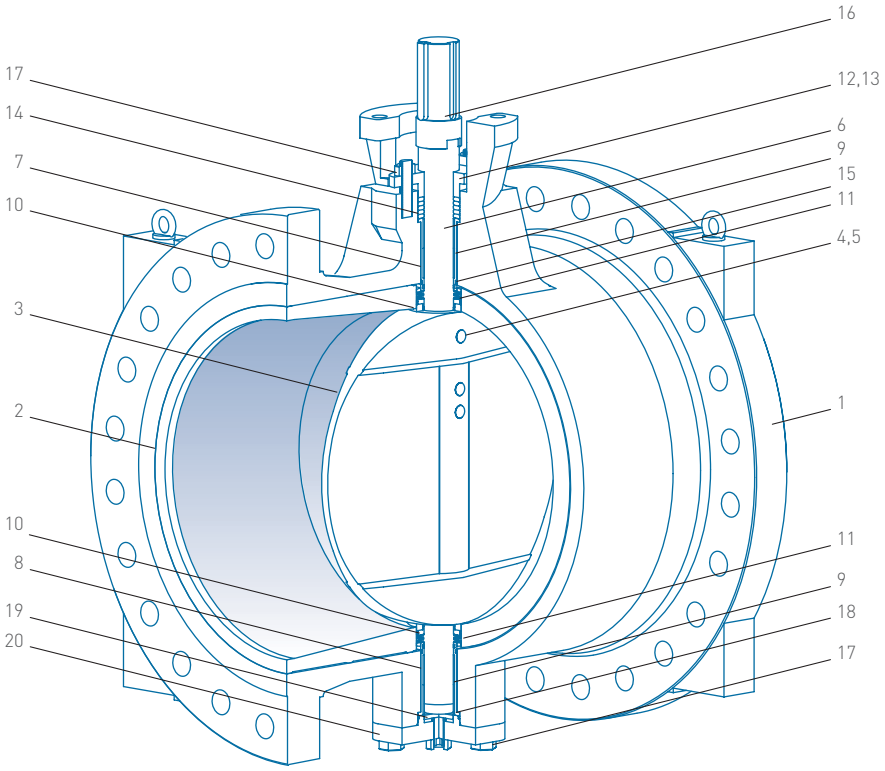
KEYSTONE FIGURE 638 SERIES E / SERIES 2

SLURRY CONTROL VALVE



TECHNICAL DATA

Size range:	DN 50 - 600
Temperature rating:	Up to 230°C
Pressure rating:	ASME B16.34 Class 300
Working pressure:	5110 kPa at 38°C
Max ΔP:	1400 kPa
Standard flange: drilling:	ASME B16.5 Class 300 R.F
Body color:	
Series E:	Blue
Series 2:	Federation green

PARTS LIST

No.	Description	Material	Specification
1	Body	Carbon steel	ASTM A216 WCB
2	Liner	Chrome iron (tungsten coated)	AS2027 Cr27 (HPHVOF WCNi)
3	Disc	Chrome iron (tungsten coated)	AS2027 Cr27 (HPHVOF WCNi)
4	Disc pin	Spring alloy steel	Commercial
5	Disc drive screw	431 S/S	ASTM A276 431 condition A
6	Shaft	431 S/S	ASTM A276 431 condition A
7	Upper insert	431 S/S	ASTM A276 431 condition A
8	Lower insert	431 S/S	ASTM A276 431 condition A
9	Bearings	PTFE/Glacier DU	Commercial
10	Disc end spacers	Tungsten carbide	WCNi
11	Disc springs	Spring alloy steel	Commercial
12	Gland plate	Carbon steel	AS3678 Grade 250
13	Gland collar	431 S/S	ASTM A276 431 condition A
14	Gland packing	Graphite	Commercial
15	O-rings	KTFE	KTFE (Keystone)
16	Drive dog	431 S/S	ASTM A276 431 condition A
17	Fasteners	Alloy steel	Commercial
18	Thrust washer	PTFE	PTFE
19	Backing disc	316 S/S	ASTM A276 316 condition A
20	End cover	Carbon steel	AS3678 Grade 250

OPTIONS

- Keystone Figure 89U hard anodized, rack and pinion style aluminum pneumatic actuators, double acting and spring return options available.
- Biffi Morin "S" Series, scotch yoke style, stainless steel pneumatic actuators, double acting and spring return options available.
- Biffi Morin "B" Series, scotch yoke style, ductile iron pneumatic actuators with stainless steel cylinder barrel material as standard, double acting and spring return options available.
- Biffi ICON3000 electric actuators
- Keystone Figure 427 manual gear operators
- Solenoids, positioners and position monitoring devices are readily available - consult your local Emerson representative

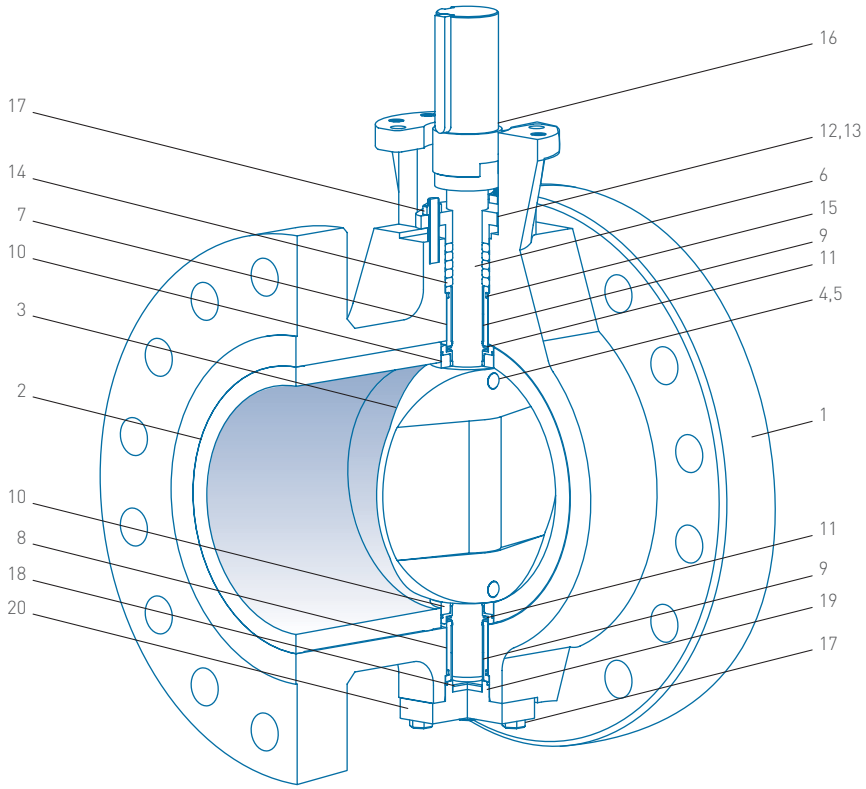
NOTES

Materials and specifications shown in (brackets refer to Series 2 only).

Other materials are available upon request. e.g. ceramic internals for extremely aggressive slurries etc.

KEYSTONE FIGURE 638 SERIES E / SERIES 2

SLURRY CONTROL VALVE



TECHNICAL DATA

Size range:	DN 50 - 600
Temperature rating:	Up to 230°C
Pressure rating:	ASME B16.34 Class 600
Working pressure:	10,210 kPa at 38°C
Max ΔP:	1400 kPa
Standard flange:	ASME B16.5
Drilling:	Class 600 R.F
Body color:	
Series E:	Blue
Series 2:	Federation green

PARTS LIST

No.	Description	Material	Specification
1	Body	Carbon steel	ASTM A216 WCB
2	Liner	Chrome iron (tungsten coated)	AS2027 Cr27 (HPHVOF WCNi)
3	Disc	Chrome iron (tungsten coated)	AS2027 Cr27 (HPHVOF WCNi)
4	Disc pin	Spring alloy steel	Commercial
5	Disc drive screw	431 S/S	ASTM A276 431 condition A
6	Shaft	431 S/S	ASTM A276 431 condition A
7	Upper insert	431 S/S	ASTM A276 431 condition A
8	Lower insert	431 S/S	ASTM A276 431 condition A
9	Bearings	PTFE/Glacier DU	Commercial
10	Disc end spacers	Tungsten carbide	WCNi
11	Disc springs	Spring alloy steel	Commercial
12	Gland plate	Carbon steel	AS3678 Grade 250
13	Gland collar	431 S/S	ASTM A276 431 condition A
14	Gland packing	Graphite	Commercial
15	O-rings	KTFE	KTFE (Keystone)
16	Drive dog	431 S/S	ASTM A276 431 condition A
17	Fasteners	Alloy steel	Commercial
18	Thrust washer	PTFE	PTFE
19	Backing disc	316 S/S	ASTM A276 316 condition A
20	End cover	Carbon steel	AS3678 Grade 250

OPTIONS

- Keystone Figure 89U hard anodized, rack and pinion style aluminum pneumatic actuators, double acting and spring return options available.
- Biffi Morin "S" Series, scotch yoke style, stainless steel pneumatic actuators, double acting and spring return options available.
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- Biffi ICON3000 electric actuators
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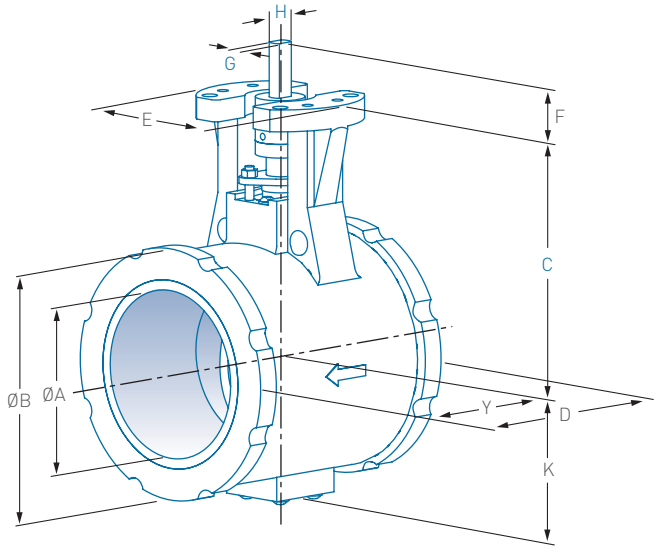
NOTES

Materials and specifications shown in (brackets refer to Series 2 only).

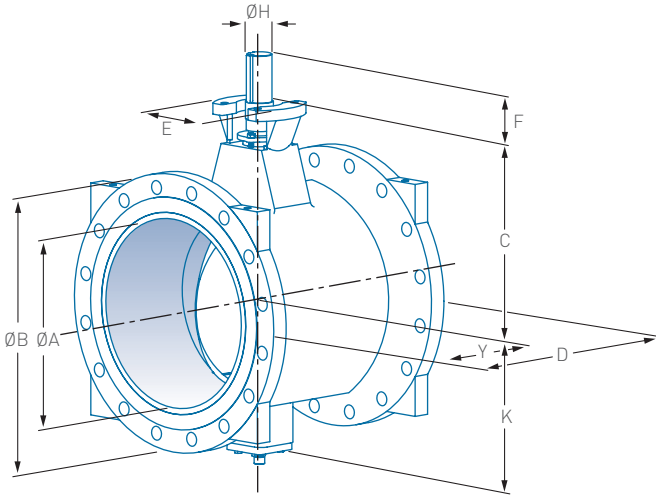
Other materials are available upon request. e.g. ceramic internals for extremely aggressive slurries etc.

KEYSTONE FIGURE 638 SERIES E / SERIES 2

SLURRY CONTROL VALVE



Note: DN 150 valve illustrated



Note: DN 600 valve illustrated

DIMENSIONS (mm)

Valve size DN	Stem code	Shaft dia inches	ØA	ØB	C	D	E	F	K	Y	Stem conn. H x G / ØH inches	Keyway inches	Top plate PCD mm	Top plate No. holes	Top plate Hole dia mm	Mass (kg)	K_v at full open
40	BAD	9/16	43	117	162	80	110	31	60	50	¾ x ½	-	83	4	11	7	25
50	BAD	9/16	50	117	162	80	110	31	60	50	¾ x ½	-	83	4	11	7	52
80	BAD	¾	82	145	196	120	115	31	84	75	¾ x ½	-	83	4	11	13	186
100	BAD	1	100	175	208	150	140	31	102	90	¾ x ½	-	83	4	11	22	303
150	CAF	1	153	235	238	230	152	51	131	140	1⅛	¼ x ¼	127	4	14	44	1097
200	CAF	1¼	203	343	295	305	182	51	167	190	1⅛	¼ x ¼	127	4	14	88	2086
250	CAK	1½	253	406	329	385	182	108	230	242	2¼	½ x ⅜	127	4	14	130	3563
300	CAK	1½	300	483	374	455	182	108	275	290	2¼	½ x ⅜	127	4	14	220	6035
350	CAK	1¾	332	533	390	476	182	108	292	238	2¼	½ x ⅜	127	4	14	280	7432
400	CAK	1¾	382	597	427	500	182	108	330	250	2¼	½ x ⅜	127	4	14	320	10695
450	DAK	2	432	635	457	550	200	108	359	275	2¼	½ x ⅜	165	4	21	370	13426
500	DAK	2¼	482	700	492	600	220	108	390	300	2¼	½ x ⅜	165	4	21	470	17719
600	DAK	2½	582	815	569	700	250	108	456	350	2¼	½ x ⅜	165	4	21	620	26535

NOTES

H = The dimension of the stem connection.

ØH = Drive dog connection changes to a round shaft on valve sizes DN 150 - 600.

G = The dimension across stem flats.

Mass determined on materials used.

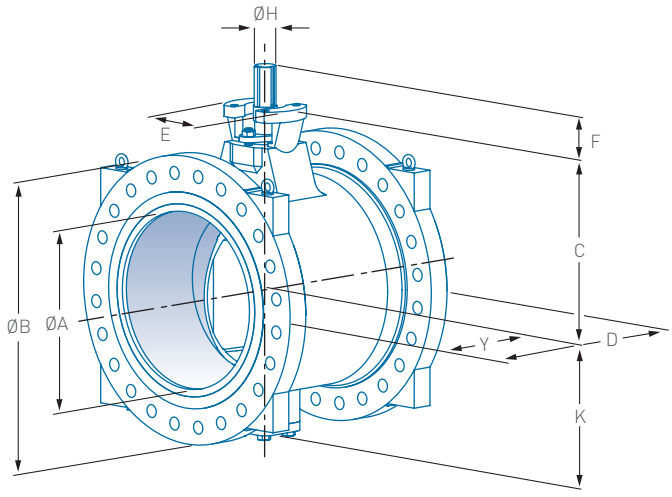
K_v = The flow rate of water in m^3/hr that will pass through a valve with a different pressure drop of 1 bar (100 kPa) at 20°C.

C_v = 1.155 K_v

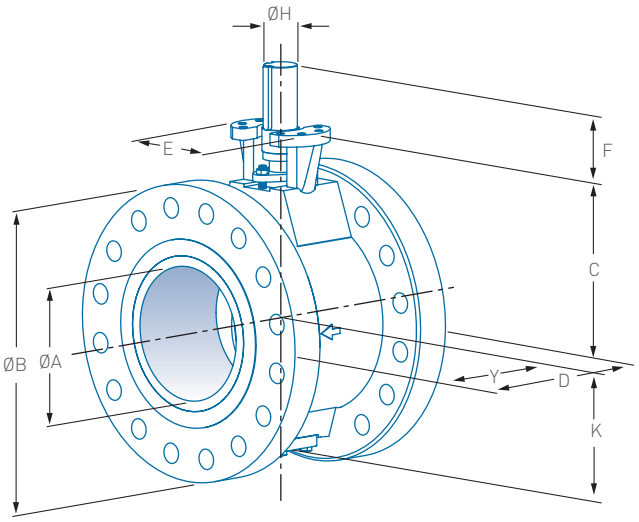
Dimensions are nominal to ±1 mm.

KEYSTONE FIGURE 638 SERIES E / SERIES 2

SLURRY CONTROL VALVE



Note: DN 600 Class 300 valve illustrated



Note: DN 250 Class 600 valve illustrated

DIMENSIONS (mm)

Valve size DN	Stem code	Shaft dia. inches	ØA Class 300	ØA Class 600	ØB Class 300	ØB Class 600	C	D	E	F	K	Y	Stem conn. ØH x G / ØH inches	Keyway inches	Top plate PCD mm	Top plate No. holes	Top plate Hole dia	K_v at full open
50	BAD	¾	51	49	165	165	162	80	110	31	60	50	¾ x ½	-	83	4	11	45
80	BAD	¾	82	74	210	212	196	120	115	31	84	75	¾ x ½	-	83	4	11	186
100	BAD	1	100	97	254	275	208	150	140	31	102	90	¾ x ½	-	83	4	11	302
150	CAF	1	153	146	321	358	238	230	152	51	131	140	1⅛	¼ x ¼	127	4	14	1096
200	CAF	1¼	203	194	381	422	295	305	182	51	167	190	1⅛	¼ x ¼	127	4	14	1783
250	CAK	1½	253	243	445	511	329	385	182	108	230	242	2¼	½ x ⅜	127	4	14	3047
300	CAK	1½	300	289	523	560	374	455	182	108	275	290	2¼	½ x ⅜	127	4	14	5165
350	CAK	1¾	332	318	588	606	390	476	182	108	292	238	2¼	½ x ⅜	127	4	14	6361
400	CAK	1¾	382	364	648	687	427	500	182	108	330	250	2¼	½ x ⅜	127	4	14	9219
450	DAK	2	435	410	715	747	457	550	200	108	359	275	2¼	½ x ⅜	165	4	21	11573
500	DAK	2¼	480	456	780	815	492	600	220	108	390	300	2¼	½ x ⅜	165	4	21	15273
600	DAK	2½	566	548	918	944	569	700	250	108	456	350	2¼	½ x ⅜	165	4	21	22872

NOTES

ØH = The dimension of the stem connection.

G = The dimension across the stem flats.

K_v = The flow rate of water in m^3/hr that will pass through a valve with a different pressure drop of 1 bar (100 kPa) at 20°C

C_v = 1.155 K_v

Dimensions are nominal to ±1 mm.

KEYSTONE FIGURE 638 SERIES E / SERIES 2

SLURRY CONTROL VALVE

ANTICIPATED SEATING AND UNSEATING TORQUE VALUES - ASME CLASS 150 (Nm)

Valve size	Shut-off pressure - kPa									
	Normal service					Severe service				
DN	0	350	700	1000	1400	0	350	700	1000	1400
40	20	21	22	23	24	30	31	32	33	34
50	25	26	27	28	29	37	38	40	41	42
80	36	38	41	43	45	54	56	59	61	63
100	54	58	61	64	68	81	85	88	92	95
150	102	113	124	136	147	152	164	175	186	198
200	169	192	215	237	260	254	277	299	322	345
200	169	192	215	237	260	254	277	299	322	345
250	260	294	328	362	395	390	424	458	492	525
300	350	407	463	520	576	525	582	638	695	751
350	486	576	667	757	847	729	819	910	1000	1090
400	621	757	893	1028	1164	932	1068	1203	1339	1475
450	780	983	1186	1390	1593	1170	1373	1576	1780	1977
500	960	1243	1525	1808	2090	1441	1723	2006	2288	2570
600	1152	1429	1754	2079	2466	1701	2033	2387	2746	3085

GUIDELINES

Operating torques for these valves are generated from bearing/packing friction, component weight, hydro-dynamic and contaminant forces etc.

There are no hard and fast rules which can accurately and practically determine the sum total of all these forces. (Refer to Emerson valve manual for further information).

The following guidelines are considered to be conservative and can confidently be used for routine duties. If you have any doubts consult a Emerson sales representative.

ANTICIPATED SEATING AND UNSEATING TORQUE VALUES - ASME CLASS 300 AND 600 (Nm)

Valve size	Shut-off pressure - kPa									
	Normal service					Severe service				
DN	0	350	700	1000	1400	0	350	700	1000	1400
50	28	29	30	31	32	41	42	44	45	46
80	40	42	45	47	50	59	62	65	67	69
100	59	64	67	70	75	89	94	97	101	105
150	112	124	136	150	162	167	180	193	205	218
200	186	211	237	261	286	279	305	329	354	380
250	286	323	361	398	435	429	466	504	541	578
300	385	448	509	572	634	578	640	702	765	826
350	535	634	734	833	932	802	901	1001	1100	1199
400	683	833	982	1131	1280	1015	1175	1323	1473	1623
450	858	1081	1305	1529	1752	1287	1510	1734	1958	2175
500	1056	1367	1678	1989	2299	1585	1895	2207	2517	2827
600	1267	1572	1929	2287	2713	1871	2236	2626	3021	3394

DUTY DEFINITIONS

Normal
Liquid service to 3 m/s
Light to medium slurries
Pneumatic conveying

Severe
Hi-velocity liquids to 9 m/s
Medium to heavy slurries
Crystallising media

TYPICAL SPECIFYING SEQUENCE

100	F638	S2	ASME 150
Valve size	Figure number	Trim code	End connections

Trim code	Body	Disc	Shaft	Seat	Disc end spacer
SE	Carbon steel	Chrome iron	431 S/S	Chrome iron	Tungsten carbide
S2	Carbon steel	Chrome iron/WCNi	431 S/S	Chrome iron/WCNi	Tungsten carbide
S2 34	Carbon steel	Chrome iron/WCNi	431 S/S	PSZ ceramic	Tungsten carbide
026	Carbon steel	PSZ ceramic	SAF 2507	PSZ ceramic	PSZ ceramic