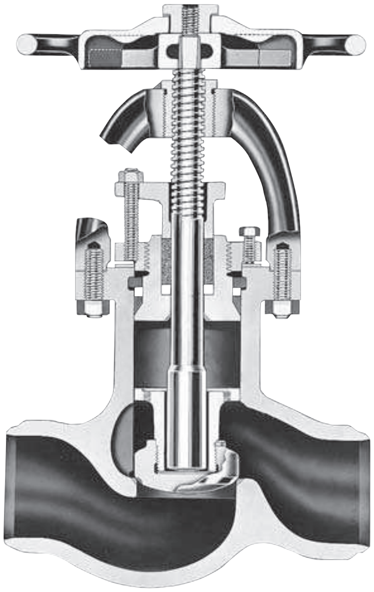
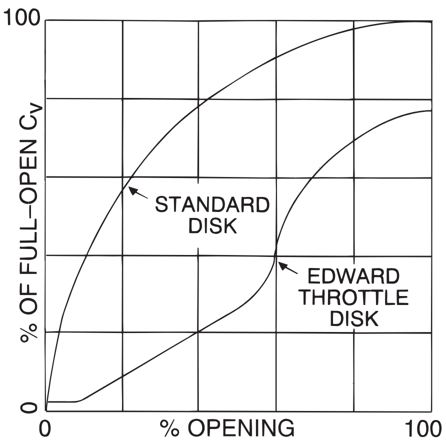
Special Application Valves



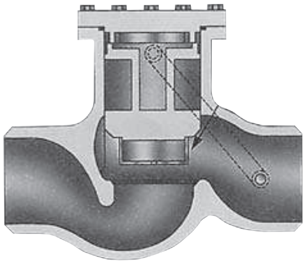
Edward Throttle Valves

Edward standard cast steel valves with the body-guided feature have excellent ability to handle flow at high pressure differentials. However, for improved accuracy, cast globe and angle stop valves can be equipped with a special throttle disk. Disk shape provides good regulation over wide ranges of flow. When required, valves equipped with a throttle disk may also be ordered with a motor operator. Edward cast stop valves equipped with a throttle disk are identified by adding the suffix "K" to the standard valve figure number.



Comparison Curves Of Typical Standard Disk With Throttle Disk

The standard stop valve disk gives rapid increases in flow for each increment of lift at low lifts and small increases in flow at higher lifts. This is not desirable in many applications where the valve is used for controlling flow rate. The conical projection on the throttle disk gives straight line control at the lower lifts as long as it remains in the seat. Once the cone lifts entirely out of the seat it permits high capacity at high lifts with only moderate pressure drop penalty.

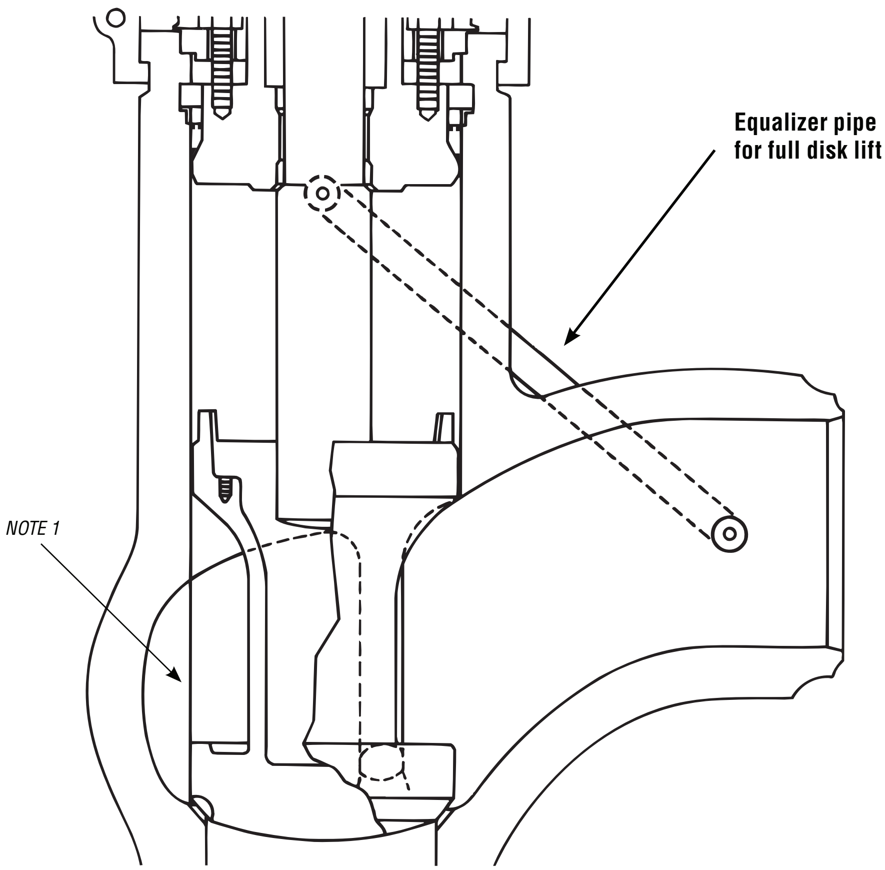


Edward Skirted Check Valves

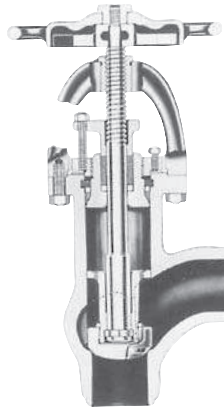
For check or stop-check applications with a broad range of flow conditions, a "skirted" disk, identified by adding the suffix "K" to the valve figure number may provide the required minimum lift at low flow while providing acceptable pressure drop at maximum flow. Specifically, the illustrated disk with a Mini-Skirt provides good low-flow performance while reducing C_v by only 10%. See the Flowserve Edward Valves Technical Article EVAWP3019 for assistance on high turndown applications.

Features and Description of Edward Stop-Check (Non-Return) Valves

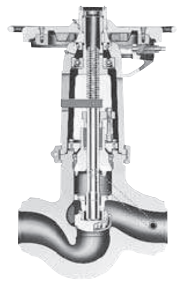
Edward stop-check (non-return) valves offer the same tight-sealing performance as Edward stop valves, and at the same time, give check valve protection in the event of fluid back flow. Edward stop-check valves are commonly used to prevent back flow from a header fed from two or more sources when there is a loss of pressure in one of the sources — for example, the boiler outlet to a common header or at the feedwater heater outlets.



Flite-Flow®



Angle



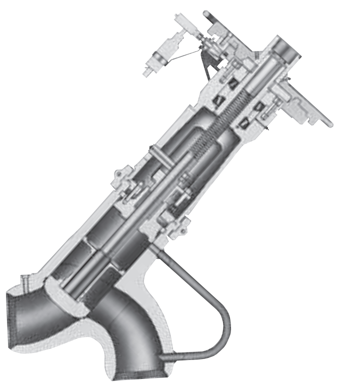
Globe

Equalizer

All Edward cast steel stop-check valves are equipped with an Equalizer pipe. Acting as an external pressure balancing pipeline, the Equalizer connects the zone above the disk with the lower pressure area in the valve outlet (see drawing above). This reduces pressure above the disk, and as a result, causes the higher pressure below the disk to raise the disk to full lift. The Equalizer helps reduce pressure drop and disk-piston movement and wear.

All other features are the same as those defined on page 17 for stop valves.

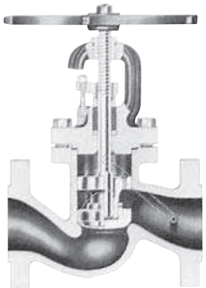
NOTE 1: Guide ribs are hardfaced on Flite-Flow and some angle pattern valves.

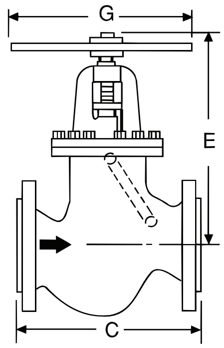


Elbow Down

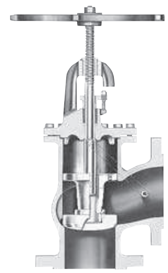
FLOWSERVE

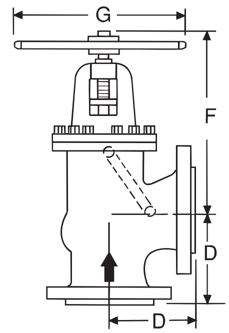
Stop-Check (Non-Return) Valves Class 300 740 PSI @ 100°F (51.1 BAR @ 38°C)



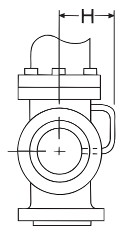


304





303



Standard Features

- Bodies and bonnets are cast steel (WCB & WC6).
- Bolted Bonnet, OS & Y.
- Globe & angle design.
- Integral Stellite seat, disk and backseat.
- Body-guided disk piston.
- 13% chromium stainless steel stem.
- Asbestos-free graphitic packing.
- Gasket:
  - Size 2½ – asbestos-free, spiral wound.
  - All others – Long Terne# steel.
- Equipped with equalizer.

Pressure Class 300 (PN 50)

Fig. No.	Type	Ends	NPS (DN)
304	Globe	Flanged	3 (80) thru 12 (300)
304Y	Globe	Buttwelding	
303	Angle	Flanged	2½ (65) thru 12 (300)
303Y	Angle	Buttwelding	

Dimensions – Globe & Angle

Black numerals are in inches and pounds
Colored numerals are in millimeters and kilograms

Figure No. 303/303Y, 304/304Y	NPS	2½	3	4	5	6	8	10	12
	DN	65	80	100	125	150	250	250	300
C - Face to Face, Globe•		—	12.5	14	15.76	17.5	22	24.5	28
			318	356	400	445	559	622	711
D - Center to Face, Angle•		5.75	6.25	7	7.88	8.75	11	12.25	14
		146	159	178	200	222	279	310	356
E - Center to Top, Globe		—	16.2	16.7	20.1	24.8	28.4	34.3	39.7
			411	424	510	630	721	871	1008
F - Center to Top, Angle		13.6	14.4	14.6	17.7	21.4	24.2	28.8	32.9
		345	366	371	450	544	615	731	836
G - Handwheel/Handle Diameter*		11	11.5	11.5	15	18	22	22	26
		279	292	292	381	457	559	559	660
H - Clearance for Equalizer		5.9	8.7	8.5	10	9.6	11	13.7	15
		150	221	216	254	244	279	348	381
Weight, Globe (Flanged)		—	100	110	230	370	525	920	1525
			45	50	104	168	238	417	692
Weight, Globe (Welding)		—	75	95	175	295	400	765	1365
			34	43	79	134	181	327	619
Weight, Angle (Flanged)		66	100	130	200	300	450	700	1250
		29	45	59	91	136	204	318	567
Weight, Angle (Welding)		51	70	90	152	215	325	560	970
		23	32	41	69	98	147	254	440

** Regular handwheel standard on all sizes except size 12 has an impactor handwheel and size 2½ has an impactor handle.*
• Center to end or end to end dimensions for welding end valves same as center to contact face or contact face to contact face dimensions for flanged end valves.
 # Long Terne Steel is a product coated by immersion in molten terne metal. Terne Metal is an alloy of lead and a small amount (about 3%) of tin.

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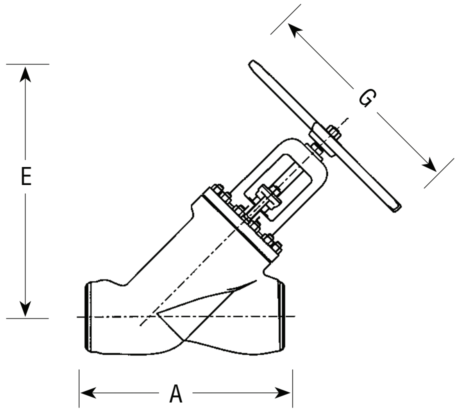
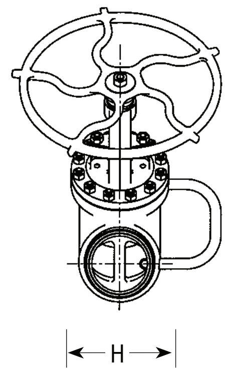
Stop-Check (Non-Return) Valves Class 300 740 PSI @ 100°F (51.1 BAR @ 38°C)





Standard Features

- Bodies and bonnets are cast steel (WCB, WC6).
- Bolted bonnet, OS & Y.
- Y-Pattern.
- Integral Stellite seat, disk and backseat.
- Body-guided disk piston.
- 13% chromium stainless steel stem.
- Asbestos-free graphitic packing.
- Gasket:
  - Size 2½ – 6 – asbestos-free, spiral wound.
  - All others – Long Terne# steel.
- Equipped with equalizer.

Pressure Class 300 (PN 50)*

Fig. No.	Type	Ends	NPS (DN)
1302	Flite-Flow	Flanged	2½ (65) thru 16 (400)
1302Y	Flite-Flow	Buttwelding	

Size 3&4 Buttweld End Valves are Class 400. See page 32.

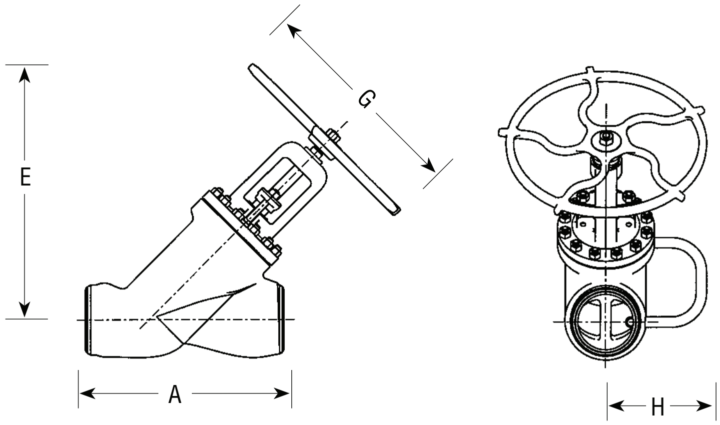
Dimensions – Flite-Flow®

Black numerals are in inches and pounds
Colored numerals are in millimeters and kilograms

Figure No. 1302/1302Y		2½	3	4	6	8	10	12	14	16
	NPS	2½	3	4	6	8	10	12	14	16
	DN	65	80	100	150	200	250	300	350	400
A_1- End to End (Welding)		11.5	13	15.5	20	26.5	31	40	40	42
		292	330	394	508	673	787	1016	1016	1067
A_2- Face to Face (Flanged)		11.5	16	20.25	23.75	29	34.75	43	43.25	44
		292	406	514	603	737	885	1092	1099	1118
E - Center to Top (Open)		16	17.2	22	29	35	41	47.8	47.8	47.8
		406	437	559	737	889	1041	1213	1213	1213
G - Handwheel Diameter**		11	11.5	15	22	22	26	30	30	30
		279	292	381	559	559	660	762	762	762
Weight (Welding)		56	100	150	300	575	1030	1500	1525	1575
		25	45	68	136	261	468	682	693	716
Weight (Flanged)		70	130	200	380	700	1200	1750	1850	1950
		32	59	91	173	318	545	795	841	886

 # Long Terne Steel is a product coated by immersion in molten terne metal. Terne Metal is an alloy of lead and a small amount (about 3%) of tin.
*** Impactor handwheel standard on 10 NPS & larger Flite-Flow Valves. 2½ NPS has impactor handle.*

Stop-Check (Non-Return) Valves
Class 400 985 PSI @ 100°F (68.1 BAR @ 38°C)



Standard Features

- Bodies and bonnets are cast steel (WCB, WC6).
- Bolted or pressure-seal bonnet, OS & Y.
- Y-Pattern.
- Integral Stellite seat, disk and backseat.
- Body-guided disk piston.
- 13% chromium stainless steel stem.
- Asbestos-free graphitic packing.
- Asbestos-free spiral wound gasket.
- Equipped with equalizer.

Pressure Class 400 (PN 68)

FIG. NO.	TYPE	ENDS	NPS (DN)
1302Y	Flite-Flow	Buttwelding	3 (80) thru 4 (100)

Dimensions – Flite-Flow®

Black numerals are in inches and pounds
Colored numerals are in millimeters and kilograms

Figure No. 1302Y			
	NPS	3	4
	DN	80	100
A - End to End (Welding)		13	15.5
		356	394
E - Center to Top (Open)		16	22
		406	559
G - Handwheel Diameter		11.5	16
		292	406
H - Equalizer Clearance		8.0	9.5
		203	241
Weight (Welding)		100	150
		45	68

 # Long Terne Steel is a product coated by immersion in molten terne metal. Terne Metal is an alloy of lead and a small amount (about 3%) of tin.

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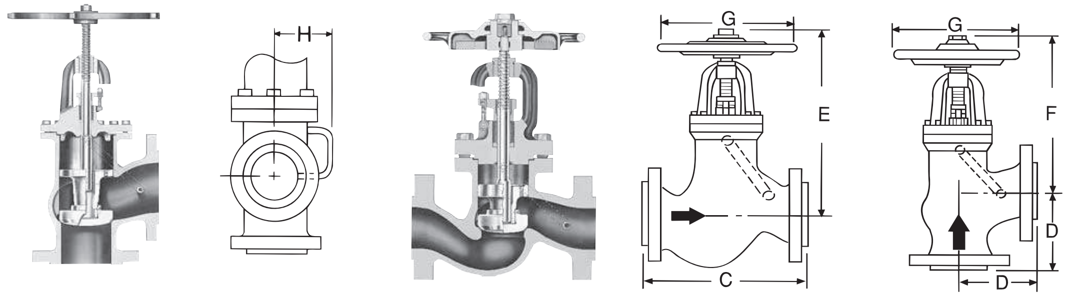
Stop-Check (Non-Return) Valves
Class 600   1480 PSI @ 100°F (102.1 BAR @ 38°C)



604
605

Standard Features

- Bodies and bonnets are cast steel (WCB, WC6, WC9 C12A).
- Bolted or pressure-seal bonnet OS & Y.
- Globe or angle.
- Integral Stellite seat, disk and backseat.
- Body-guided disk piston.
- 13% chromium stainless steel stem.
- Asbestos-free graphitic packing.
- Long terne# steel or composite pressure seal gasket.
- Equipped with equalizer.

Pressure Class 600 (PN 110)

FIG. NO.		TYPE	ENDS	BONNET	NPS (DN)
STD CL	SPL CL				
604	—	Globe	Flanged	Bolted	2½ (65) thru 6 (150)
604Y	—	Globe	Buttwelding	Bolted	
605	—	Angle	Flanged	Bolted	
605Y	—	Angle	Buttwelding	Bolted	
606	—	Globe	Flanged	Pressure-Seal	8 (200) thru 14 (350)
606Y	706Y	Globe	Buttwelding	Pressure-Seal	
607	—	Angle	Flanged	Pressure-Seal	8 (200) thru 14 (350), 24 (600), 28 (700) & 30 (750)
607Y	707Y	Angle	Buttwelding	Pressure-Seal	

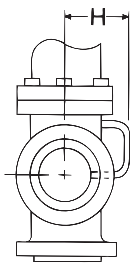
Dimensions – Globe & Angle*

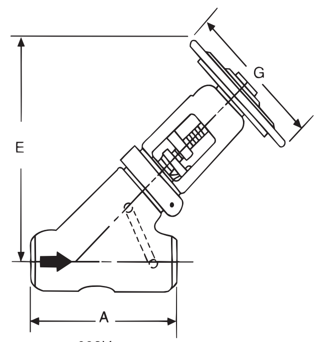
Black numerals are in inches and pounds
Colored numerals are in millimeters and kilograms

Figure No. 604/604Y, 605/605Y, 606/606Y, 607/607Y, 706Y, 707Y	NPS	2½	3	4	5	6	8	10	12	14
	DN	65	80	100	125	150	200	250	300	350
C - Face to Face, Globe**		13	14	17	20	22	26	31	33	35
		330	356	432	508	559	660	787	838	889
D - Center to Face, Angle**		6.5	7	8.5	10	11	13	15.5	16.5	17.5
		165	178	216	254	279	330	394	419	445
E - Center to Top, Globe		16.2	16.7	20.1	24.8	28.4	34.3	39.7	43.6	47
		411	424	511	630	721	871	1008	1107	1194
F - Center to Top, Angle		14.4	14.6	17.7	21.4	24.2	28.8	32.9	36.1	38.8
		366	371	450	544	615	731	836	917	986
G - Handwheel Diameter#		12	12	14	16	16	20	26	30	30
		305	305	356	406	406	508	660	762	762
H - Clearance for Equalizer		8.7	8.5	10	9.6	11	11.8	13	13.7	15.7
		221	216	254	244	279	300	330	348	399
Weight, Globe (Flanged)		110	135	220	425	540	960	1540	2200	2680
		50	61	112	193	245	435	699	998	1216
Weight, Globe (Welding)		84	110	185	335	410	750	1270	1850	2250
		38	50	84	152	186	340	596	839	1021
Weight, Angle (Flanged)		105	125	225	325	460	750	1200	1790	2150
		48	57	102	147	209	340	544	812	975
Weight, Angle (Welding)		80	90	168	245	350	560	950	1450	1760
		36	41	76	111	159	254	431	667	798

** Angle valves only, are also available in Sizes 24, 28, and 30. Dimensions available upon request.*
*** Center to end or end to end dimensions for welding and valves same as center to contact face or contact face to contact face dimensions for flanged end valves.*
 # Impactor handwheel is standard on all size valves.

Stop-Check (Non-Return) Valves
Class 600   1480 PSI @ 100°F (102.1 BAR @ 38°C)





602Y

Standard Features

- Bodies and bonnets are cast steel (WCB, WC6, WC9, C12A).
- Bolted or pressure-seal bonnet, OS & Y.
- Y-Pattern.
- Integral Stellite seat, disk and backseat.
- Body-guided disk piston.
- 13% chromium stainless steel stem.
- Asbestos-free graphitic packing.
- Spiral wound or composite pressure seal gasket.
- Equipped with equalizer.

Pressure Class 600 (PN 110)*

Fig. No.		Type	Ends	Bonnet	NPS (DN)
STD CL	SPL CL				
***602	—	Flite-Flow	Flanged	Pressure-Seal*	3 (80) thru 32 (800)
602Y	702Y	Flite-Flow	Buttwelding	Pressure-Seal*	

** Size 3 & 4 - Bolted bonnet with asbestos-free spiral wound gasket.*
** Size 3 & 4 Buttweld Valves are Class 700. See page 44.*

Dimensions – Flite-Flow®

Black numerals are in inches and pounds
Colored numerals are in millimeters and kilograms

Figure No. 602Y/702Y, ***602	NPS	3	4	6	8	10	12	14	16	20	24	26	28	32
	DN	80	100	150	200	250	300	250	400	500	600	650	700	800
A1 - End to End, (Welding)		13	15.5	20	26	31	38	38	41	60	66	70	81.5	90
		330	394	508	660	787	965	965	1041	1524	1676	1778	2070	2286
A2 - Face to Face, (Flanged)		16.75	21.25	29	33	39	43	43	52	*	*	*	*	*
		425	540	737	838	991	1092	1092	1321					
E - Center to Top, (Open)		17.5	21.5	28.5	34	42	49	49	74	71	*	*	*	*
		445	546	724	864	1067	1245	1245	1880	1803				
G - Handwheel Diameter		12	14	16	20	26	30	30	48	48	*	*	*	*
		305	356	406	508	660	762	762	1219	1219				
H - Equalizer Clearance		7	9	10	12	13	14	14	22	24	*	*	*	*
		178	229	254	305	330	356	356	559	610				
Weight, (Welding)		110	150	450	850	1400	2050	2050	5500	9200	*	*	*	*
		50	68	204	385	635	930	930	2495	4173				
Weight, (Flanged)		150	240	570	1000	1800	2850	3100	6500	*	*	*	*	*
		68	109	259	454	816	1293	1406	2948					

** E, G, and other dimensions and information supplied upon request.*
*** Impactor handwheel standard on all Flite-Flow Valves.*
**** Flanged valves available in sizes 3 thru 16.*

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• Operation at less than full lift may have to be considered.

(3) Operation at less than full lift – "High Turndown" applications sometimes exist on boilers and other process systems that must swing through periodic flow changes from start-up, to standby, to maximum, and back again. In such cases, calculations may not reveal any single valve that will offer a satisfactory compromise assuring full lift and an acceptable pressure drop at both minimum and maximum flow conditions.

It may be acceptable to permit a check valve to operate at less than fully open at the minimum flow condition if such operation is infrequent or not expected to be sustained continuously for long periods. A valve may be sized by following the methods above using the lowest expected normal sustained flow rate in the sizing parameter (SP) calculation. Pressure drop at normal and maximum flow rates should then be calculated and evaluated.

The acceptability of valve operation at the minimum flow condition should be evaluated as follows:

• Calculate the sizing parameter (SP) at the minimum flow rate and the flow-rate ratio R_F from equation (17). The valve operating position (% open) should be determined from the proper performance curve (Figures 16-19).

Caution: *Check valve operation at less than 25% opening is not recommended. Any check valve that operates for sustained periods at partial openings should be monitored or inspected periodically for evidence of instability or wear.*

• If the minimum operating position is considered satisfactory, the pressure drop at the minimum flow condition may be calculated from equation (18), using the pressure-drop ratio (R_p) determined from the proper performance curve.

(4) Alternatives for high turndown applications – If the preceding steps show that the range of flow rates is too large for any single standard check valve, consult Flowserve. Several alternatives may be considered:

• Either 90°-bonnet or angle-type stop-check or piston-lift check valves may be furnished with a special disk with an extended "skirt" as illustrated in Figure 15A. This skirt increases flow resistance at low flow rates, producing additional lifting force to help prevent operation at small openings. Of course, the skirt also reduces the C_V of the valve somewhat when it is fully open and increases pressure drop at maximum flow. Nevertheless, a special disk sometimes solves difficult high turndown problems. A special disk also permits solution of some problems with existing valves that are "oversized."

• A stop-check valve may be used with the stem lifted just enough to provide a positive stop for the disk at very low flows (e.g., short-term start-up conditions). The stem should be lifted with increasing flow rate to maintain the disk-stopping action while preventing excessive pressure drop. At normal flow rates, the stem can be lifted to its fully open position, permitting normal check valve function. The stem may be actuated manually for infrequent start-up operations, or a motor actuator may be furnished for convenience if large flow rate variations are expected to be frequent.

Caution: *This arrangement could produce cavitation or flow-choking problems if the flow rate is increased substantially without lifting the valve stem to compensate.*

• A small check or stop-check valve may be installed in parallel with a larger stop-check valve. The smaller valve may be sized for the minimum flow condition, and the larger stop-check may be held closed with the stem until the flow is sufficient to ensurev adequate lift. If necessary, the stem on the larger valve may be opened gradually with increasing flow to maintain disk-stopping action as in the example above. The smaller valve may be allowed to remain open at higher flow rates or, if a stop-check type is used, it may be closed if preferred. Either or both valves may be manually actuated or furnished with a motor actuator for convenience.

2.5 Pipe Reducer Coefficient

The equations in the Flow Performance section of this catalog use a piping geometry factor, F_p, to account for the effect of pipe reducers attached directly to the valve. This permits the valve and pipe reducers to be treated as an assembly, i.e., F_pC_V is the flow coefficient of the valve/pipe reducer combination. Then, the pressure drop in the flow equations is the pressure drop of the assembly.

This method is also applicable when valves are furnished with oversized ends to fit larger diameter pipe. It should also be used to evaluate line-size valves used in pipe with a lower pressure rating than the valve, because such pipe may have less wall thickness and a larger inside diameter than the valve inlet diameter given in the valve data tabulations.

This section provides equations for calculation of the piping geometry factor, F_p, which should be used even in Basic Calculations when there is a significant difference between the pipe diameter and valve inlet diameter (d).

In addition, other coefficients (K_1, F_L, x_T) are affected by the presence of pipe reducers. Equations are also provided for correction of these terms, which are required only when evaluating significant valve-to-pipe diameter mismatch.

Note: These equations apply only where the valve diameter is less than the connecting pipe diameter.

Figure 15A