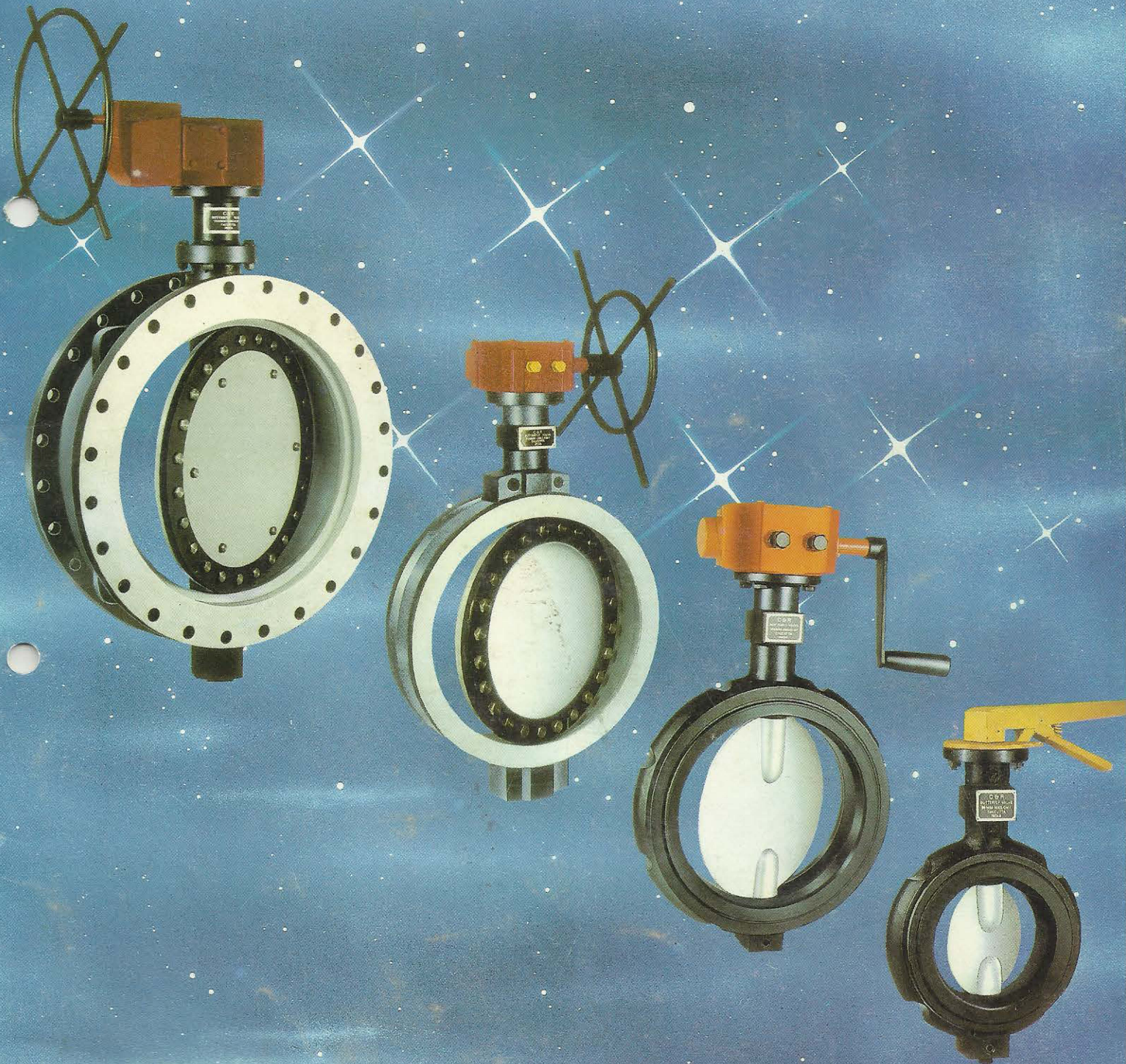


BUTTERFLY VALVES



CRAWLEY & RAY



DESIGN FEATURES

Resilient Seated :

Rubber moulded in situ on a Bakelite backing ring forms the seats and **integral pressure responsive flange seals (gaskets)** in sizes 40 through 300 mm.

In sizes 350 through 1000 mm, rubber moulded in situ on a one piece metallic ring; providing for total encapsulation, forms the seat of the valve. Both these designs incorporate a thinner film of rubber contributing to lower requirement of operating torques. The rubber seats are not subjected to flexing as in valves with insert fit seats or those with clamped seats.

Shaft Sealing Arrangement :

A unique feature comprising rubber O rings and hub face sealing design ensures total isolation of shafts from the flowing media.

Flow Characteristics :

C&R Butterfly valves have streamlined discs and stub shafts to minimise resistance to flow. The discs can be locked in any intermediate position with the help of the clutch plate in hand lever actuated valves and by worm gearing in gear actuated valves.

Lower torque Factor :

Thinner film of rubber, practicable on account of composite design of seats, results in lower operating torque. This is an important factor for operational ease for manual operation. When the valves are to be electrically or pneumatically actuated, actuators with lower torque capabilities are required contributing significantly to economy. Nylon 6/Leaded Bronze bushes with extremely low coefficient of friction and suitably retained by S. S. retainers and specially designed interior of the valve neck, provide the bearing to the shaft and ensure zero frictional wear and tear.

Fastener Free Shaft to Disc Connections :

C&R Butterfly valves employ stub (two piece) shafts. Accurately broached top hub of disc engages with squared end of top shaft while the lower shaft serves as the pivot. This provides for zero play operation.

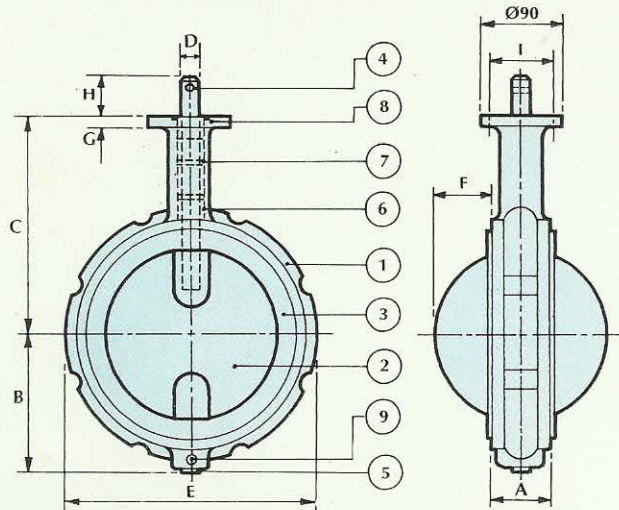
Surface Finishing of Discs :

All valve discs after being machined undergo seven stage pretreatment before being epoxy powder coated or electroless nickel plated.

The result of this is a coating/plating that displays excellent chemical and physical properties which in turn entails a long service life for the valves.

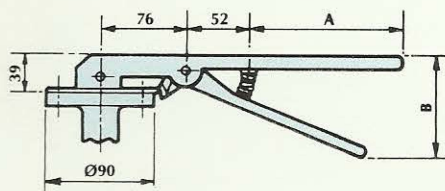
WAFER TYPE BUTTERFLY VALVES (LINER MOUNTED ON BODY)

40-300 mm VALVES



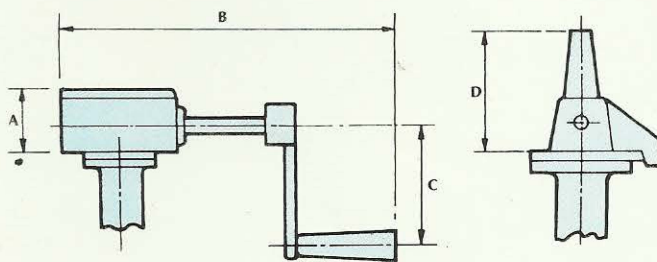
Size mm	A	B	C	D	E	F	G	H	I	Wt (kg)
40	33	54	110	10	86	04	10	41	70	1.5
50	44	71	143	13	114	06	11	41	70	2.5
65	47	79	155	13	137	10	11	41	70	3
80	47	86	162	13	143	17	11	41	70	3.5
100	54	100	181	16	174	23	11	41	70	5
125	57	116	197	16	208	35	11	41	70	8
150	57	125	210	20	222	46	11	41	70	8
200	64	156	240	20	280	65	11	41	70	12.5
250	70	189	286	25	340	87	14	41	70	19
300	82	238	309	25	399	105	14	41	70	31

HAND LEVER OPERATED ACTUATOR



VALVE SIZE (mm)										
Size	40	50	65	80	100	125	150	200	250	300
A	132	132	132	132	132	232	232	232	232	232
B	94	94	94	94	94	130	130	130	130	130
Wt (kg)	1	1	1	1	1	1.5	1.5	1.5	1.5	1.5

T KEY AND GEAR OPERATED ACTUATOR



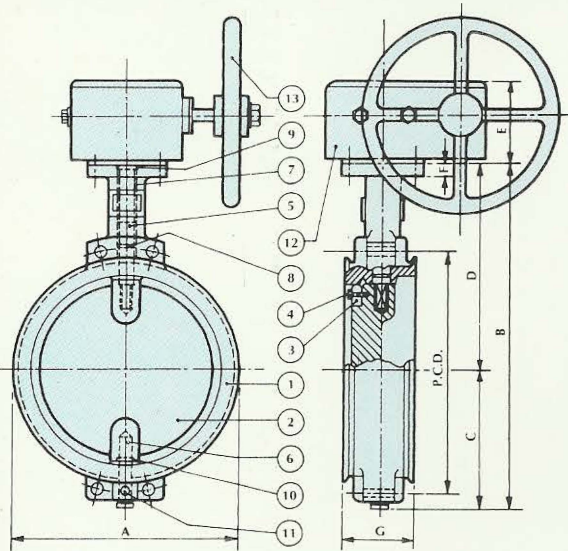
VALVE SIZE (mm)										
Size	40	50	65	80	100	125	150	200	250	300
A	50	50	50	50	58	58	75	75	90	90
B	210	210	210	210	245	245	285	285	325	325
C	85	85	85	85	90	90	110	110	150	150
D	114	114	114	114	114	114	114	114	114	114
Wt (kg)	2	2	2	2	3	3	5	5	9.0	9.0

LIST OF PARTS & MATERIALS

Sl.No.	Descriptions	Qty	Material (Standard)	Other Executions
1	Body	1	IS : 210 FG : 220	IS : 1865 SG 450/10, C.S, IS : 2856 Gr 1 or Gr 2
2	Disc.	1	IS : 210 FG 220 with Epoxy Powder Coated	IS : 1865 SG 450/10, C.S, IS : 2856 Gr 1 or Gr 2 with Epoxy Powder Coated, S.S, IS : 3444 Gr 6 or Gr 7 Aluminium Bronze IS : 305 Gr 2
3	Seat	1	Nitrile Rubber	Neoprene, EPDM.
4	Top Shaft	1	C.S, IS : 1570 Gr. 40 C8	S.S, IS : 6603 04 Cr18 Ni 10, 04 Cr 17 Ni 12 Mo 2.
5	Bottom Shaft	1	C.S, IS : 1570 Gr. 40 C8	S.S, IS : 6603 04 Cr18 Ni 10, 04 Cr 17 Ni 12 Mo 2.
6	Bush	2	Nylon-6	Gun Metal IS : 778
7	Retainer	2	S.S, IS : 6603 04 Cr 18 Ni 10	
8	'O' Ring	3	Nitrile Rubber	
9	Spring dowel Sleeve	1	IS : 5988	

GEAR OPERATED BUTTERFLY VALVES WAFER TYPE (LINER MOUNTED ON DISC)

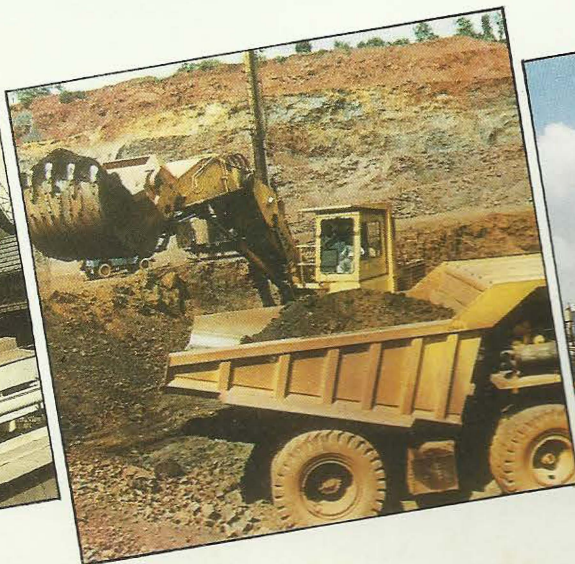
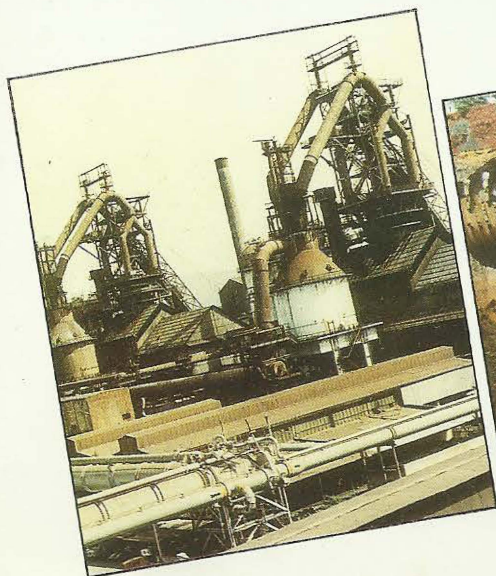
350-600 mm VALVES



Size (mm)	A	B	C	D	E	F	G	PCD	Wt. Kg
350	411	660	270	390	105	20	127	460	107
400	477	750	316	434	105	20	140	515	127
450	527	818	356	462	105	20	152	565	162
500	582	871	381	490	195	20	152	620	220
600	682	1004	439	565	215	22	178	725	284

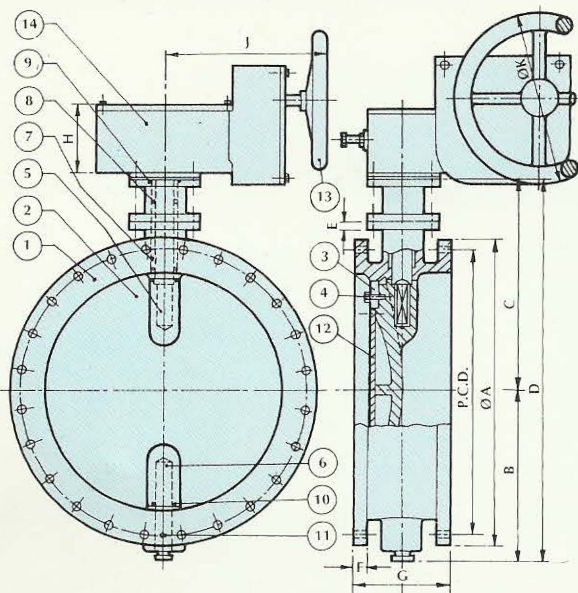
LIST OF PARTS & MATERIALS

Sl.No.	Descriptions	Qty	Material (Standard)	Other Executions
1	Body	1	IS : 210 FG 220	IS : 1865 SG 450/10, C.S, IS : 2856 Gr 1 or Gr 2
2	Disc.	1	IS : 210 FG 220 with Epoxy Powder Coated	IS : 1865 SG 450/10, C.S, IS : 2856 Gr 1 or Gr 2, with Epoxy Powder Coated, S.S, IS : 3444 Gr 6 or Gr 7, Aluminium Bronze IS : 305 Gr 2
3	Seat	1	Nitrile Rubber	Neoprene, EPDM.
4	Seat Fastener	Set	S.S, IS : 6603 04 Cr 18 Ni 10	
5	Top Shaft	1	C.S, IS : 1570 Gr. 40 C8	S.S, IS : 6603 04 Cr18 Ni10, 04 Cr17 Ni12 Mo2.
6	Bottom Shaft	1	C.S, IS : 1570 Gr. 40 C8	S.S, IS : 6603 04 Cr18 Ni10, 04 Cr17 Ni12 Mo2.
7	Bush	2	Gun Metal IS : 778	Leaded Tin Bronze - IS : 318.
8	Retainer	2	S.S, IS : 6603 04 Cr 18 Ni 10	
9	'O' Ring (Body)	3	Nitrile Rubber	
10	'O' Ring (Disc)	2	Nitrile Rubber	
11	Set Screw	1	C.S, IS : 1570 Gr. 40 C8	
12	Gear Actuator	1	Sub Assy	
13	Hand Wheel	1	C.S, IS : 1570 Gr. 40 C8	



GEAR OPERATED BUTTERFLY VALVES FLANGE TYPE (LINER MOUNTED ON DISC)

350-1000 mm VALVES



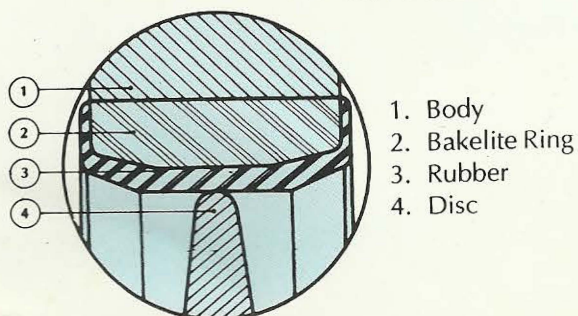
Size (mm)	ØA	B	C	D	E	F	G	H	J	OK	PCD	Wt. Kg.
350	505	270	352	622	20	29	190	75	250	500	460	135
400	565	316	402	718	20	30	216	75	250	500	515	170
450	615	356	442	798	20	31.5	222	75	250	500	565	210
500	670	381	480	861	20	33	229	90	267	500	620	294
600	780	439	550	989	20	36	267	90	267	500	725	366
700	895	472.5	650	1122.5	25	38.5	292	95	280	600	840	522
750	960	505.5	685	1190.5	25	40	305	95	280	600	900	633
800	1015	536.5	742.5	1279	25	41.5	318	130	320	750	950	742
900	1115	593.5	802.5	1396	25	44	330	130	320	750	1050	1067
1000	1230	650	870	1520	25	47	410	130	320	750	1160	1270

LIST OF PARTS & MATERIALS

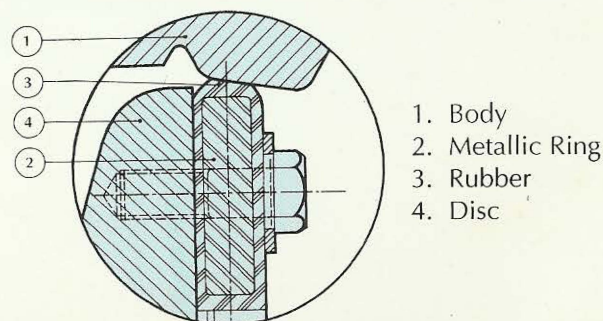
Sl. No.	Descriptions	Qty	Material (Standard)	Other Executions
1	Body	1	IS : 210 FG 220	IS : 1865 SG 450/10, C.S, IS : 2856 Gr1 or Gr2, IS : 2062
2	Disc.	1	IS : 210 FG 220 with Epoxy Powder Coated	IS : 1865 SG 450/10, C.S, IS : 2856 Gr1 or Gr2, with Epoxy Powder Coated, S.S, IS : 3444 Gr6 or Gr7, IS : 226, IS : 2062, Aluminium Bronze IS : 305 Gr 2.
3	Seat	1	Nitrile Rubber	Neoprene, EPDM.
4	Seat Fastener	Set	S.S, IS : 6603 04 Cr 18 Ni 10	
5	Top Shaft	1	C.S, IS : 1570 Gr. 40 C8	S.S, IS : 6603 04 Cr 18 Ni 10, 04 Cr17 Ni9 Mo2.
6	Bottom Shaft	1	C.S, IS : 1570 Gr. 40 C8	S.S, IS : 6603 04 Cr 18 Ni 10, 04 Cr17 Ni9 Mo2.
7	Bush	2	Gun Metal IS : 778	Leaded Tin Bronze - IS : 318.
8	Retainer	2	S.S, IS : 6603 04 Cr 18 Ni 10	
9	'O' Ring (Body)	3	Nitrile Rubber	
10	'O' Ring (Disc)	2	Nitrile Rubber	
11	Set Screw	1	C.S, IS : 1570 Gr. 40 C8	
12	Cover Plate	1	C.S, IS : 226 with Epoxy Powder Coated	
13	Hand Wheel	1	C.S, IS : 1570 Gr. 40 C8	
14	Gear Actuator	1	Sub Assy	

DETAIL OF LINER MOUNTING

LINER MOUNTED ON BODY



LINER MOUNTED ON DISC



BUTTERFLY VALVE SIZING

FLOW RATE

Kv Values : [Kv = m³/hour flow at same standard condition (20° C, 1 bar)]

Valve Size (mm)	DEGREE OPEN								
	90°	80°	70°	60°	50°	40°	30°	20°	10°
40	86	67	47	34	17	10	6	3	2
50	111	90	60	45	23	15	8	5	3
65	170	140	130	70	36	22	13	9	4
80	260	205	150	105	55	35	20	10	5
100	470	400	260	200	100	65	36	25	8
125	960	860	536	420	215	135	75	40	12
150	1670	1414	880	680	350	215	125	55	18
200	2780	2335	1500	1115	600	360	215	120	40
250	4285	3685	2360	1840	985	575	330	200	65
300	6430	5185	3470	2660	1370	860	470	250	95
350	8570	6950	4370	3510	1885	1115	640	345	112
400	10700	9250	5570	4370	2270	1460	770	475	150
450	15000	12000	7885	6085	3170	1970	1070	600	200
500	18850	15000	9850	7460	3940	2400	1370	770	325
600	24000	20570	14140	10070	5230	3260	1885	1160	385
700	32570	27000	18860	12860	6860	4285	2570	1715	560
750	40285	32570	21860	15430	8315	5140	3000	1885	625
800	52285	43700	26100	18860	11570	7030	4115	2230	770
900	60000	51430	33860	24000	12860	7885	4550	2740	900
1000	68570	62570	42860	34285	17140	10285	5740	3430	1030

Kv Values, given may be calculated for actual discharge in the formula.

$$Q = Kv \sqrt{\frac{\Delta P \times 1000}{D}}$$

Where

Q = Actual discharge in cubic meter per hour.

ΔP = Pressure drop across the valve in bar.

D = Density of fluid in Kgs per cubic meter.

Also, pressure drop is Calculated by the formula.

$$\Delta P = \frac{Q^2 \times D}{Kv^2 \times 1000}$$

(Density of water at 20° C is 1000 Kg/m³)

Problem

What is the discharge of water at standard temperature through a 12" (300 mm) butterfly valve when 60° open and line pressure drop is 0.8 bar.

Solution

According to the formula

$$Q = Kv \sqrt{\frac{\Delta P \times 1000}{D}}$$

Given-

Kv = 2660 m³/hour

ΔP = 0.8 bar

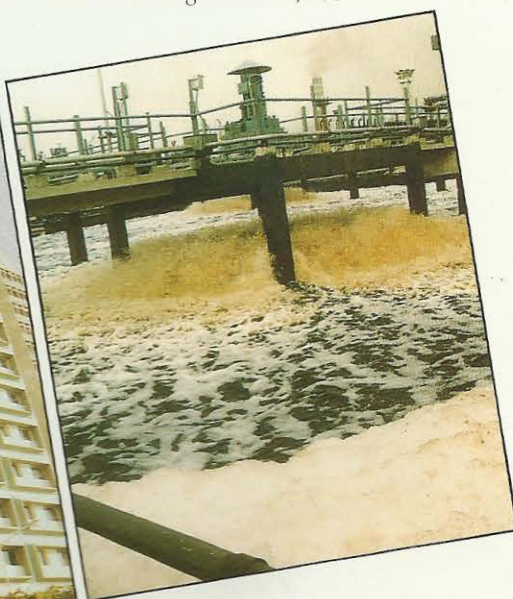
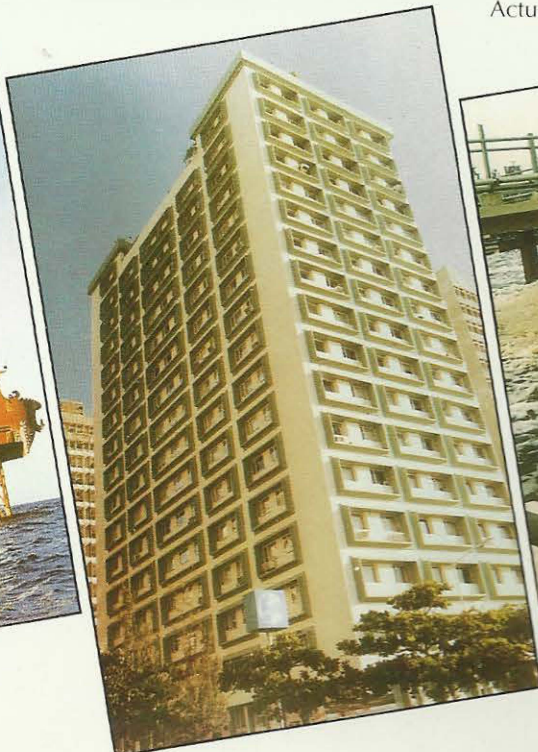
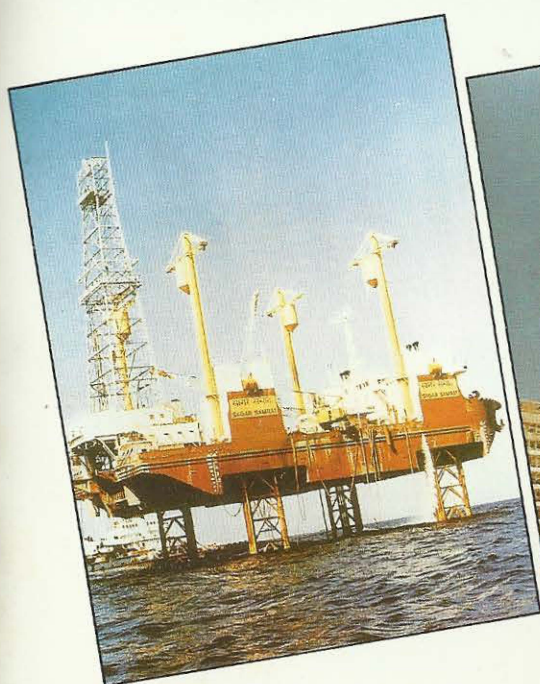
D = 1000 Kg/m³

$$Q = 2660 \times \sqrt{\frac{0.8 \times 1000}{1000}}$$

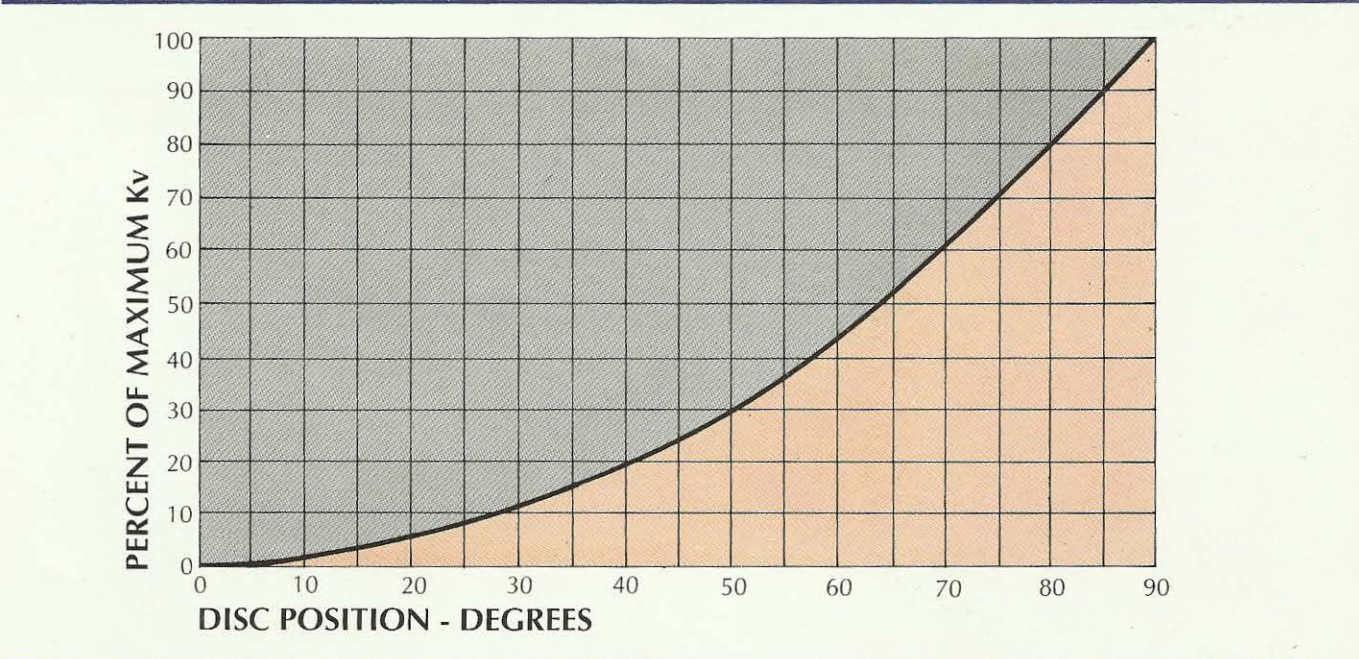
$$= 2660 \times 0.8944$$

$$= 2379 \text{ m}^3/\text{hour}$$

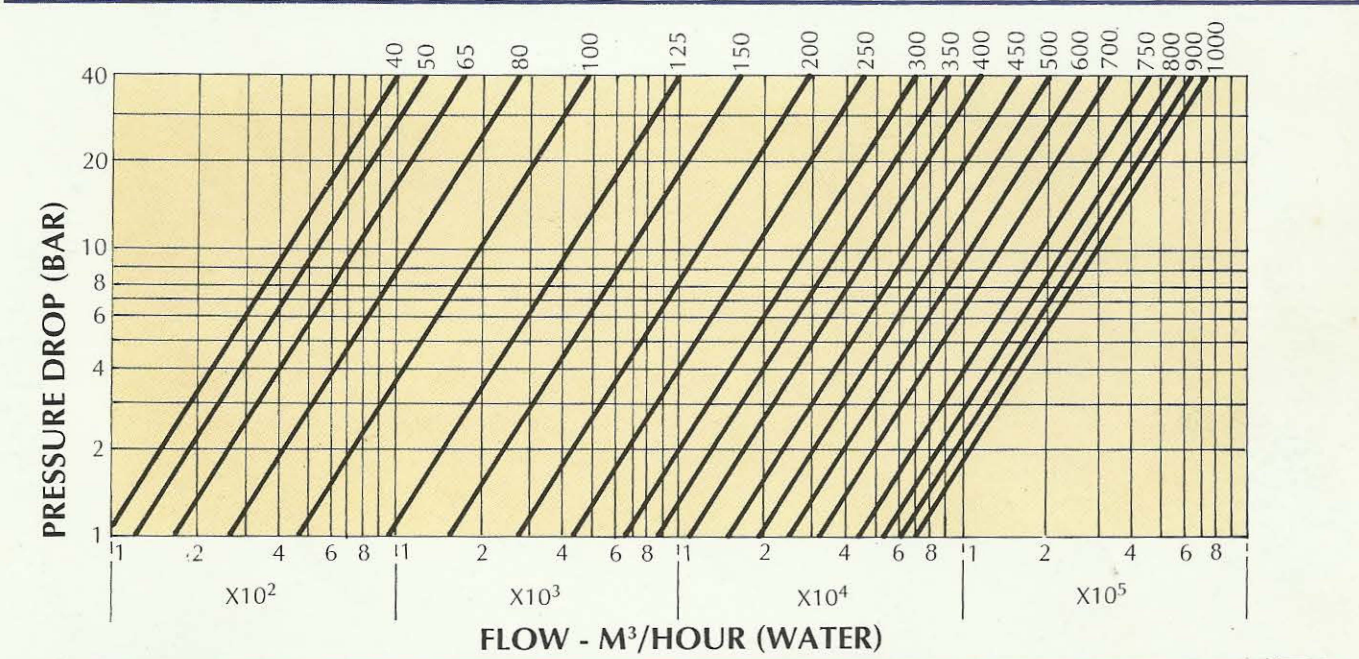
Actual discharge 2379m³/hour.



FLOW CHARACTERISTICS



PRESSURE DROP VERSUS FLOW



SPECIFICATION

FACE TO FACE
Face to Face dimensions
Conforming to :
IS 13095 : 1991
ISO/DIS 5752
BS 5155 : 1984
DIN 3202
MSS-SP-67
ANSI/AWWA C 504-87

FLANGE STANDARDS
IS 7181/1538
ISS 1951
ISO 2084
BS 10 Table-E
ANSI B 16.5 Class-150
DIN-2501

Size (mm)	Rating
40 to 100	2.5 PN (25 Kg _f /Cm ²)
125 to 200	2.0 PN (20 Kg _f /Cm ²)
250 to 400	1.6 PN (16 Kg _f /Cm ²)
450 to 1000	1.0 PN (10 Kg _f /Cm ²)

Size (mm)	Rating
40 to 100	2.5 PN (25 Kgf/Cm ²)
125 to 200	2.0 PN (20 Kgf/Cm ²)
250 to 400	1.6 PN (16 Kgf/Cm ²)
450 to 1000	1.0 PN (10 Kgf/Cm ²)

Neoprene	-17° to 82° C.
Nitrile	-17° to 82° C.
EPDM	0° to 135° C.

Neoprene	-17° to 82° C.
Nitrile	-17° to 82° C.
EPDM	0° to 135° C.

WETTED PART SUITABILITY

TYPES OF FLUIDS	SUITABLE SEAT			SUITABLE DISC.		
	EPDM	NITRILE (NBR)	NEOPRENE	IRON + EPOXY COATED	IRON + NICKEL PLATED	S.S., IS : 3444 Gr 6
COLD WATER						
HOT WATER MAX 120° C						
DEMINERALIZED WATER						
SEA WATER						
AIR HEATING HVAC						
FOODSTUFF						
MINERAL OIL						

ACTUATOR SELECTION

Kgf/ Cm ² Pressure	Size (mm)	40 To 100	125 To 200	250 To 300	350 To 600	700 To 1000
25						
20						
16			GEAR			
10		HAND LEVER				
5						

Specifications are subject to change
in course of product development

APPLICATIONS



General utilities



Water and waste treatment



Cement plants



Mechanical engineering



Mines industries



Steel and aluminium plants



Sugar refineries



Shipbuilding and
offshore industries



Pulp and paper mills



Chemical - Petrochemical



Power generation



Heating Ventilating and
Air conditioning



Gas process



Fire protection systems



Agriculture - Irrigation

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