



Water Works Butterfly Valve



100% Bi-directional tight shut off at full rated pressure.

Figure Number Abbreviation

- SW-WWW Eccentric Butterfly valves - WAFER type
- SW-WWF Eccentric Butterfly valve - FLANGE type

Standard Compliance

- The face to face dimension shall be in accordance with BS5155, AWWA, C504 or other STANDARDS are available upon request.
- Valve body & disc lined by rubber are available to manufacture according to customer's request.

Production Range

- SIZE : DN 50 to DN 4000 (4 inch ~ 160 inch)
- Working Pressure : upto 25 bar for DN 80 ~ DN 600
(Standard) upto 16 bar for DN 650 ~ DN 1000
 upto 10 bar for DN 1200 ~ DN 4000
- Working Temperature : -20°C ~ +160°C

Connection Flange

- BS4504 PN10, PN16 / DIN2501 PN10, PN16 / ANSI B 16.1 CL. 125LB & B16.5 CL. 150LB
- MSS SP44 CL. 150LB
- AWWA C207 Class D & E
- ISO 2531 PN10 PN16 / KS/JIS 10K, 16K and 20K

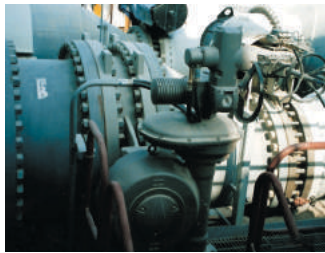
Face to Face Dimensions

- Conform to BS5155, ISO 5752, AWWA C504

Application

- | | |
|----------------------|---------------------------|
| • Water works | • Power Plant |
| • Sewage plant | • Heating and Ventilation |
| • Desulination plant | • Chemical Industry etc. |
| • Air conditioning | • Shipbuilding Industry |
| • Irrugation | • Gas Plant |

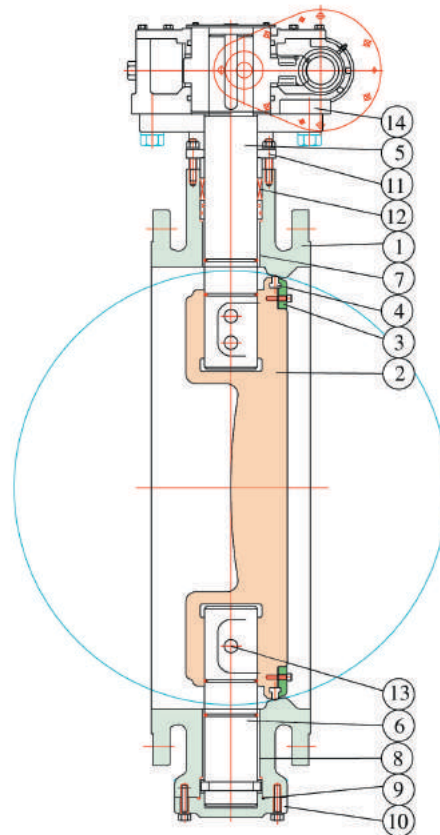
Water Works Butterfly Valve



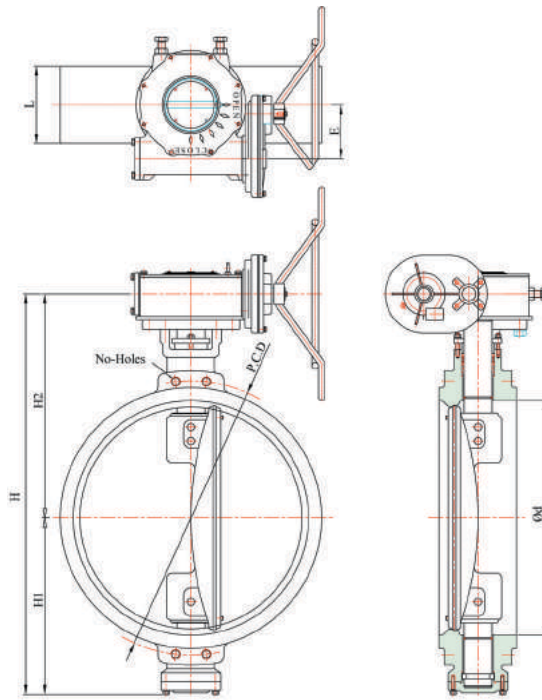
Schema of Eccentric type

- Basic Design : AWWA C-504 or BS 5155
- Employs an advanced lining procedure, this valves be designed and manufactured in accordance with AWWA C-504 or BS 5155 for use in corrosive service, that is, circulating water service, condenser partiton and condenser isolation for the Electric Utilities, Seawater Applications, Desalination plants, Chemical Processes, and so on. Operation is easy and suited for heavy duty services.
- The valve shall be capable of bi-directional sealing
- Valves are constructed with rugged shaft and bearing with self lubrication, and operate with low torque.
- Wide variety of body materials available.

No	PART NAME	METERIAL
1	BODY	Ductile iron / Cast steel Stainless steel / Ni-AL Bronze
2	DISC	Stainless steel / Ductile iron Ni-AL Bronze
3	RETAINER	Cast steel Stainless steel / Ni-AL Bronze
4	SEAT	NBR. EPDM. VITON
5	UPPER-STEM	Stainless steel (304, 316, 316L, 630(17-4PH), Super duplex, monel)
6	LOWER-STEM	Stainless steel (304, 316, 316L, 630(17-4PH), Super duplex, monel)
7	BEARING	Oilless Bearing
8	BEARING	Oilless Bearing
9	GASKET	Non ASBESTOS / O-RING
10	BOTTOM COVER	Ductile iron / Cast steel Stainless steel / Ni-AL Bronze
11	PACKING GLAND	Ductile iron / Cast steel Stainless steel / Ni-AL Bronze
12	PACKING	PTFE, GRAPHITE, Rubber
13	DISC PIN	Stainless steel
14	GEAR BOX	ASS'Y



WWW Series Water Works Butterfly valve / Wafer Type Dimension



VALVE DIMENSIONS

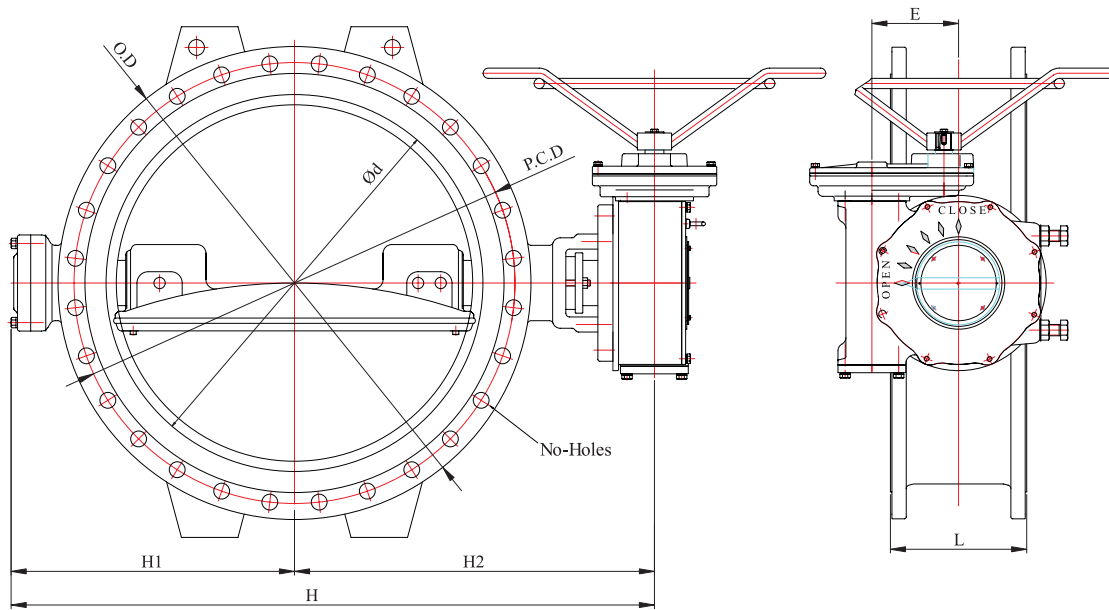
unit : mm

SIZE		ø d	L	FLANGE (150LB)			H	H1	H2	E	WEIGHT (APPROX) (kg)
inch	mm			OD	PCD	No-Hole					
2"	50	50	43	152	120.5	4-19	325	115	210	66	7.2
3"	80	80	64	190	152.5	4-19	395	145	250	66	10
4"	100	100	64	229	190.5	8-19	427	162	265	66	39
6"	150	150	76	279	241.5	8-22	492	192	300	66	46
8"	200	200	89	343	298.5	8-22	526	209	317	80	50
10"	250	250	114	406	362	12-25	619	254	365	80	72
12"	300	300	114	483	432	12-25	692	278	414	120	81
14"	350	350	127	533	476	12-29	789	324	465	120	102
16"	400	400	140	597	539.5	16-29	844	349	495	120	128
18"	450	450	152	635	578	16-32	942	402	540	120	170
20"	500	500	152	698	635	20-32	1035	427	608	120	198
22"	550	550	170	749	692.2	20-35	1090	470	620	120	222
24"	600	600	178	813	749.5	20-35	1165	502	663	203	308
28"	700	700	229	927	863.5	28-35	1240	537	703	203	380
30"	750	750	230	984.5	914.5	28-35	1325	575	750	203	570
32"	800	800	241	1060.5	978	28-41	1370	605	765	203	730
36"	900	900	300	1168	1086	32-41	1512	682	830	203	880
40"	1000	1000	300	1289	1200	36-41	1710	752	958	203	1040
44"	1100	1100	350	1403	1314	40-41	1800	800	1000	203	1195
48"	1200	1200	350	1511	1422	44-41	1945	865	1080	203	1410
52"	1300	1300	350	1625	1537	44-47	2060	920	1140	270	1780
54"	1350	1350	350	1683	1594	44-48	2140	940	1200	270	2100
56"	1400	1400	390	1746	1651	48-48	2217	956	1261	270	2400
60"	1500	1500	390	1854	1759	52-48	2360	1050	1310	270	2800
64"	1600	1600	440	-	-	-	2500	1120	1380	270	3500
66"	1650	1650	440	2032	1930.4	52-48	2630	1180	1450	270	3900
72"	1800	1800	490	2197	2095.5	60-48	2740	1230	1510	550	4450
80"	2000	2000	540	2325	2230	48-48	2890	1290	1600	550	5830
84"	2100	2100	540	2534	2425.7	64-57	2950	1330	1620	550	6560
96"	2400	2400	650	2876.5	2756	68-70	4155	1980	2175	550	10600
112"	2800	2800	650	NOTE For 2800A and large It is available upon request			4650	2145	2495	700	18500
120"	3000	3000	800				5600	2695	2985	700	23800
140"	3500	3500	850				6600	3145	3440	700	28800
160"	4000	4000	900				7450	3590	3800	700	34900

Specification and design are subject to change without notice

WWF Series

Water Works Butterfly valve / Flanged Type Dimension



VALVE DIMENSIONS

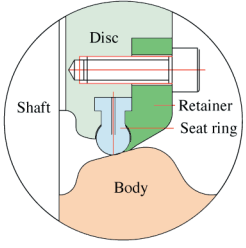
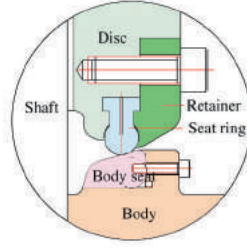
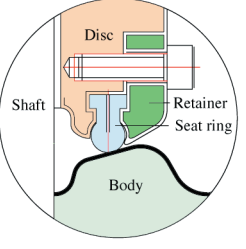
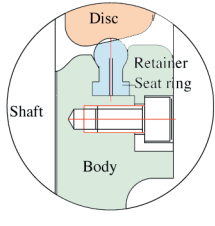
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10"	250	250	203	406	362	12-25	619	254	365	80	99
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66"	1650	1650	457	2032	1930.4	52-48	2630	1180	1450	270	5200
72"	1800	1800	457	2197	2095.5	60-48	2740	1230	1510	550	5960
80"	2000	2000	457	2325	2230	48-48	2890	1290	1600	550	7780
84"	2100	2100	457	2534	2425.7	64-57	2950	1330	1620	550	8750
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112"	2800	2800	650	NOTE For 2800A and large It is available upon request			4650	2145	2495	700	25800
120"	3000	3000	800				5600	2695	2985	700	32000
140"	3500	3500	850				6600	3145	3440	700	39800
160"	4000	4000	900				7450	3590	3800	700	47680

Specification and design are subject to change without notice

Water Works Butterfly Valve

Design Features

Disc Seat Design	Disc Seat Body Seat Design
	
<ul style="list-style-type: none"> - It is designed rubber seat to be inserted in the disc. - More suitable rubber seat can be adopted in accordance with characteristics of fluids. - Rubber seat can be exchanged without dismantling of pipeline 	<ul style="list-style-type: none"> - It is designed rubber seat to be inserted in the disc. - More suitable rubber seat can be adopted in accordance with characteristics of fluids. - Rubber seat can be exchanged without dismantling of pipeline - An additional ring is inserted in the body to replace seat ring on the contacting area between body seat and disc seat. - The respective maintenance work is possible for seat and disc seat.
Rubber Lined Design	Body Seat Design
	
<ul style="list-style-type: none"> - It is designed rubber seat to be inserted in the disc. - More suitable rubber seat can be adopted in accordance with characteristics of fluids. - Rubber seat can be exchanged without dismantling of pipeline - No corrosion prevention is available with special coating on the body and disc. 	<ul style="list-style-type: none"> - It is designed rubber seat to be inserted in the body - It is more effective design for the disc material of stainless steel. - More suitable rubber seat can be adopted in accordance with characteristics of fluids. - No sealing provision is required on the disc.

Operations

The following operation of the valves are possible, the choice is depending upon the valve location and the type of work and service for which the valve is used.

- Bare stem type valve only
- valve with 10position lever operated
- valve with gear operated
- valve with electric actuator
- valve with pneumatic actuator
- valve with hydraulic actuator

Torques Required to Operate Water Works Butterfly Valve

TORQUE TABLE

unit : kg.m/Nm/in-lb

Size		Working Pressure (bar)											
		3 bar			5 bar			10 bar			20 bar		
mm	inch	kg-m	Nm	in-lb	kg-m	Nm	in-lb	kg-m	Nm	in-lb	kg-m	Nm	in-lb
100A	4	1.00	9.80	86.74	1.50	14.70	130.11	3.50	34.30	303.58	5.20	50.96	451.03
125A	5	2.20	21.56	190.82	3.00	29.40	260.21	7.00	68.60	607.16	8.40	82.32	728.59
150A	6	3.00	29.40	260.21	4.00	39.20	346.95	10.50	102.90	910.74	14.00	137.20	1214.32
200A	8	5.50	53.90	477.06	9.00	88.20	780.64	20.00	196.00	1734.75	28.00	274.40	2428.65
250A	10	13.00	127.40	1127.59	18.00	176.40	1561.27	48.00	470.40	4163.39	65.00	637.00	5637.93
300A	12	18.50	181.30	1604.64	32.00	313.60	2775.60	65.00	637.00	5637.93	88.00	862.40	7632.89
350A	14	27.50	269.50	2385.28	45.00	441.00	3903.18	88.00	862.40	7632.89	135.00	1323.00	11709.54
400A	16	44.00	431.20	3816.44	80.00	784.00	6938.99	115.00	1127.00	9974.80	182.00	1783.60	15786.20
450A	18	62.00	607.60	5377.72	100.00	980.00	8673.74	165.00	1617.00	14311.66	232.00	2273.60	20123.07
500A	20	75.00	735.00	6505.30	132.00	1293.60	11449.33	202.00	1979.60	17520.94	305.00	2989.00	26454.89
550A	22	130.00	1274.00	11275.86	182.00	1783.60	15786.20	240.00	2352.00	20816.96	408.00	3998.40	35388.84
600A	24	142.00	1391.60	12316.70	220.00	2156.00	19082.22	305.00	2989.00	26454.89	495.00	4851.00	42934.99
650A	26	160.00	1568.00	13877.98	285.00	2793.00	24720.14	408.00	3998.40	35388.84	602.00	5899.60	52215.88
700A	28	225.00	2205.00	19515.90	340.00	3332.00	29490.70	515.00	5047.00	44669.74	805.00	7889.00	69823.57
750A	30	260.00	2548.00	22551.71	415.00	4067.00	35996.00	601.00	5889.80	52129.15	910.00	8918.00	78930.99
800A	32	305.00	2989.00	26454.89	470.00	4606.00	40766.55	695.00	6811.00	60282.46	1005.00	9849.00	87171.04
850A	34	348.00	3410.40	30184.60	530.00	5194.00	45970.80	875.00	8575.00	75895.18	1310.00	12838.00	113625.93
900A	36	388.00	3802.40	33654.09	635.00	6223.00	55078.22	980.00	9604.00	85002.60	1450.00	14210.00	125769.16
1000A	40	420.00	4116.00	36429.69	690.00	6762.00	59848.77	1195.00	11711.00	103651.13	1625.00	15925.00	140948.19
1200A	48	1113.20	10909.36	96556.02	1391.50	13636.70	120695.02	2112.00	20697.60	183189.28	2917.20	28588.56	253030.20
1350A	54	1305.25	12791.45	113213.93	1652.00	16189.60	143290.10	2428.80	23802.24	210667.68	2918.52	28601.50	253144.69
1800A	72	2265.50	22201.90	196503.47	2666.80	26134.64	231311.16	3336.00	32692.80	289355.80	5033.16	49324.97	436562.96
3000A	120	12075.00	118335.00	1047353.50	14593.06	143011.99	1265763.35	25020.00	245196.00	2170168.50	37791.60	370357.68	3277943.24
4000A	160	45770.00	448546.00	3969968.51	48970.00	479906.00	4247528.03	58620.00	574476.00	5084543.46	88836.00	870592.80	7705399.22

- The operating speed of the actuator must be considered in order to avoid water hammer when the valve is closed in junction with Liquid.
- The factors affect the torque required to operate Butterfly valves.
 - Valve Diameter
 - Shaft Diameter
 - Bearing Friction Coefficient
 - Type of Seat Material
 - Shut off Pressure
 - Velocity
 - Shape of Disc
 - System Head Characteristics
 - Piping Arrangement
- Actuator torques can be calculated using the following formulas.

$$T_a = T_b + T_s + T_h = 1.2T_b \pm T_d$$

$$T_s = C_s D^2$$

$$T_b = 4.17D^2 d f P$$

$$T_d = C_t D^3 P$$

$$T_h = 3.06D^4$$

$$V = C_f \sqrt{P} = \frac{Q}{0.785D^2}$$

T_a : The required actuator torque(lb-ft)

T_s : Seating or unseating torque(lb-ft)

T_d : Dynamic torque(lb-ft)

T_h : Hydrostatic torque(lb-ft)

Q : Flow(cubic for per second)

V : Velocity(feet per second)

D : Diameter of valve(feet)

d : Diameter of Shaft(inch)

P : Pressure drop across valve(psi)

C_s : Coefficient of Seating or unseating torque

C_t : Coefficient of dynamic torque

C_f : Coefficient of flow

f : Bearing friction coefficient

Hydro Test Specifications

Series	ISO Series	AWWA Series
"Hydrostatic Shell test"	1.5 x maximum service pressure	2.0 x maximum service pressure
"Hydrostatic Seat test"	1.1 x working service pressure	working service pressure

WW Series Basic Formulas for obtaining Cv-Value

Cv is in imperial units, the water flow in U.S. gallons per minute which passes through the valve giving a pressure drop of 1 PSI at a temperature of 68° F

In metric units the same coefficient is called Kv and correspond to the flow rate in m3/h passing through the valve giving a pressure drop of 1bar at a temperature of 20° C

The approximate corresponding formulas are :

$$Q = C_v \cdot \sqrt{\frac{\Delta P \cdot 62.4}{D}}$$

$$Q = C_v \cdot \sqrt{\frac{\Delta P \cdot 1000}{D}}$$

Where :

- Q = valve flow rate in gpm (USGPM)
- ΔP = pounds per square inch (psi)
pressure drop through the valve
- 62.4 = conversion factor for fluids
computed in relation to water
- D = is pounds per cu.ft (pct) fluid density

Where :

- Q = valve flow rate in m3/h
- ΔP = pressure drop through the valve in bar
- 1000 = conversion factor for fluids
computed in relation to water
- D = kg/m3 fluid density

The relation between Cv and Kv, expressed in the above mentioned unit of measure is as follows :

$$C_v = 1.16 k_v$$

Flow coefficient for Water Works Butterfly Valves

VALVE SIZE		DISC OPENING																	
		10°		20°		30°		40°		50°		60°		70°		80°		90°	
mm	inch	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv
2	50	1.7	2	9.5	11	12.9	15	27.6	32	41.4	48	50.9	59	56.0	65	61.2	71	71.6	83
2	65	3.4	4	11.2	13	18.1	21	29.3	34	45.7	53	69.0	80	95.7	111	120.7	140	131.9	153
3	80	6.0	7	15.5	18	30.2	35	50.0	58	77.6	90	118.1	137	155.2	180	203.4	236	225.0	261
4	100	12	14	30	35	54	63	95	110	145	168	191	222	254	295	341	395	397	460
5	125	19	22	50	58	91	105	151	175	227	263	345	400	461	535	569	660	647	750
6	150	28	32	95	110	155	180	241	280	353	410	500	580	690	800	875	1015	948	1100
8	200	50	58	138	160	250	290	379	440	603	700	858	995	1207	1400	1595	1850	1810	2100
10	250	73	85	198	230	379	440	578	670	905	1050	1293	1500	1879	2180	2457	2850	2802	3250
12	300	103	120	276	320	500	580	819	950	1293	1500	1897	2200	2629	3050	3466	4020	3879	4500
14	350	161	187	414	480	845	980	1155	1340	1983	2300	2543	2950	3724	4320	4397	5100	5216	6050
16	400	207	240	534	620	1138	1320	1569	1820	2491	2890	3586	4160	5198	6030	6991	8110	8190	9500
18	450	260	302	690	800	1345	1560	2060	2390	3259	3780	4603	5340	6681	7750	8603	9980	10328	11980
20	500	328	380	849	985	1722	1997	2505	2906	3966	4600	5626	6526	8326	9658	11276	13080	13879	16100
24	600	457	530	1207	1400	2310	2680	3569	4140	5759	6680	8293	9620	11121	12900	15862	18400	18819	21830
28	700	672	780	1853	2150	3362	3900	5440	6310	8608	9985	12069	14000	17250	20010	22586	26200	25862	30000
30	750	724	840	1931	2240	3897	4520	5862	6800	9401	10905	14526	16850	18996	22035	25147	29170	29741	34500
32	800	905	1050	2759	3200	4888	5670	7707	8940	11940	13850	17707	20540	24224	28100	29483	34200	34483	40000
36	900	1103	1280	2948	3420	5905	6850	9914	11500	15500	18000	21552	25000	31034	36000	38578	44750	46720	54195
40	1000	1629	1890	3879	4500	8319	9650	13750	15950	22900	27931	32400	39698	46050	50690	58800	59526	69050	

Water Works Valve Installation Procedures

- 1) Install the valve at the designed Place, position and method.
- 2) Prepare sufficient room for valve operation after checking working condition and any obstacles in work place.
- 3) Check if the flow indicating arrow(→) of valve body is conforming to the pipe required direction and check the valve according to the pipe installation specification.
- 4) Deattach the protection cover of the valve flange and remove any foreign particles.
- 5) Clearing any dust and deposited outside debris of connection parts of the pipe.
- 6) Prepare more sufficient room when use the new pipeline.
- 7) Don't disassemble any parts of the valve like actuator or gear box. If the disassemble work of the valve parts is needed, please contact with our technical department.
- 8) - Preparing enough room for installation,
 - Leave a space between pipe flange,
 - Attaching the flange gasket,
 - Lifting the valve by the center of the valve,
 - Keeping the valve vertical,
 - Tightening the flange bolt as vertical and horizontal to flange.
- 9) Tightening the flange bolt regarding the below.
Tightening the bolt with adequate torque to prevent leakage.
- 10) After installation, check the leakage in the connection parts of flange and packing seal at the full open position and then check the same parts at the full close position.
- 11) If there is any leakage at the connection parts, please tighten the flange bolt with adequate torque. If there is leakage in the packing seal, tighten the gland bolt.
- 12) Should you have any kind of further questions, please kindly contact with our company

