

## KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

A heavy duty industrial resilient seated butterfly valve

GRW - Wafer body design

GRL - Lugged body design



### FEATURES

- Wafer and lugged body design with face-to-face dimension, according to EN 558 Series 20 and API 609.
- Designed according to EN 593 and API 609.
- The seat is field replaceable and fully isolates the body and shaft from the flow.
- Primary shaft sealing exceeds the pressure rating of the valve and prevents leakage through shaft area to atmosphere.
- A secondary shaft sealing provides back-up safety.
- A molded-in O-ring in the seat for flange sealing eliminates the need for gaskets.
- Shaft seals prevent moisture penetrating into the shaft area.
- The two piece shaft allows for a thin disc and provides minimal obstruction to flow (up to DN 300).
- Rounded polished disc edge gives full concentric sealing, lower torques, longer seat life and drop-tight shut-off.
- Body locating holes allow ease of installation and centering between the flanges.
- Extended body neck allows for pipe insulation.
- Top and bottom shaft bearings for optimized support and minimum friction and decreased torque.
- Top bushing absorbs actuator side thrust loads.
- All valves comply to Pressure Equipment Directive (97/23/EU) Module B1 + D, CE Marking.
- Available approvals: NSF/ASME Std 61, ACS, KIWA, WRAS, DVGW-G, ABS, CU-TR.

### GENERAL APPLICATION

Water, air, dry bulk conveying etc. These valves are for any service where a drop-tight shut-off with maximum flow area is required.

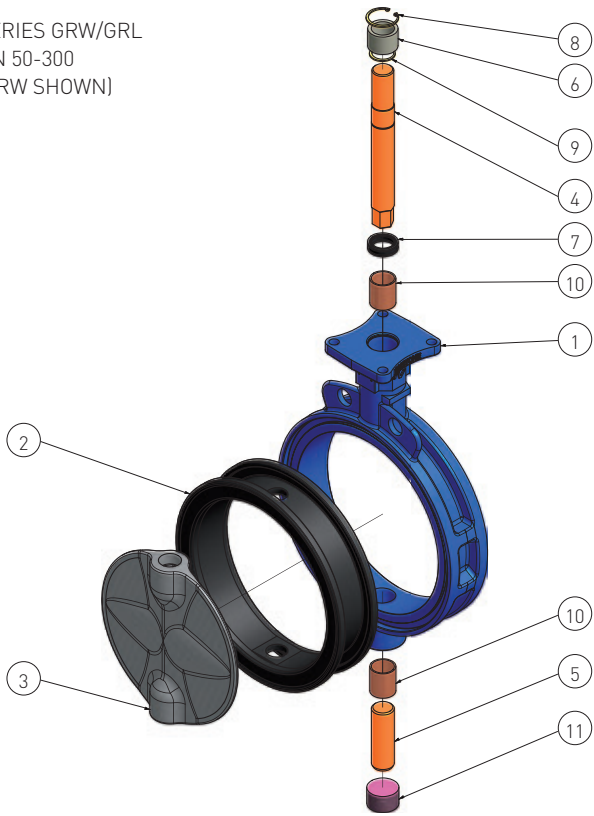
### TECHNICAL DATA

Sizes:	DN 50-900
Pressure:	16 bar DN 50-300 10 bar DN 350-900
Temperature:	-40°C to +160°C
End of line:	10 bar DN 50-300 6 bar DN 350-900
Vacuum service:	0.4 bar
Flange accommodation:	PN 6/10/16 ASME 125/150 JIS 10K BS Table E AS4087 PN 16 AS2129 Table E

# KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

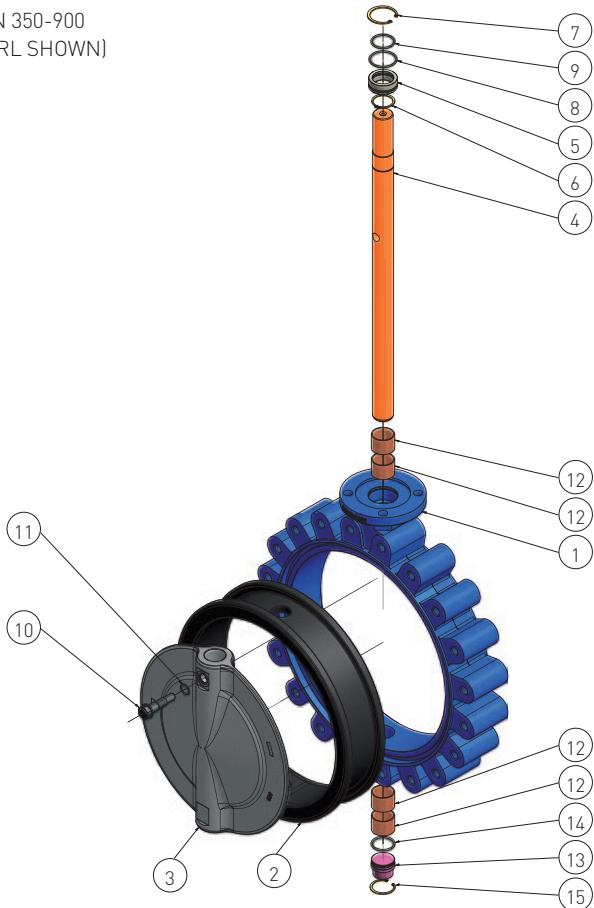
SERIES GRW/GRL  
DN 50-300  
(GRW SHOWN)



## PARTS LIST

Item	Qty	Description
1	1	Body
2	1	Seat
3	1	Disc
4	1	Upper shaft
5	1	Lower shaft
6	1	Upper bushing
7	1	Packing
8	1	Body circlip
9	1	Shaft circlip
10	2	Upper and lower bearing
11	1	Plug

DN 350-900  
(GRL SHOWN)



## PARTS LIST

Item	Qty	Description
1	1	Body
2	1	Seat
3	1	Disc
4	1	Shaft
5	1	Bushing
6	1	Shaft circlip
7	1	Body circlip
8	1	Body O-ring
9	1	Shaft O-ring
10	1	Disc screw
11	1	Disc screw O-ring
12	4	Upper and lower bearing
13	1	Plug
14	1	Plug O-ring
15	1	Plug circlip

# KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

## MATERIAL SPECIFICATION

Part name	Material	Material specification	Remark
<b>DN 50-300</b>			
Body	Ductile iron	ASTM A536 Gr 65-45-12	
Disc	Super duplex	ASTM A890 Gr 5A	
	316 stainless steel	ASTM A351 Gr CF8M	
	304 stainless steel	ASTM A351 Gr CF8	
	Aluminium bronze	ASTM B148 UNS C95200	
	Nickel aluminium bronze	ASTM B148 UNS C95800	
	Ductile iron NYL	ASTM A536 Gr 65-45-12	NYL = Nylon coating, max. temp. 60°C
	Ductile iron CTD	ASTM A536 Gr 65-45-12	CTD = Nickel plating
Shaft	316 stainless steel	ASTM A276 Gr 316	
	431 stainless steel	ASTM A276 Gr 431	
	Super duplex	ASTM A276 UNS S32750	
	Monel® K500	ASTM B865 UNS N05500	
Seat	EPDM		Food grade, NSF61, ACS
	EPDM E1		KIWA, WRAS, ACS
	NBR		Food grade
	NBR N1		DVGW-G
	HNBR		
	White NBR		Food grade
	Fluoroelastomer (FKM)		
Bushing	Polyester		
Packing	NBR		
Bearing	PTFE/steel		
Circlip	Stainless steel		
Plug	Carbon steel		
<b>DN 350-900</b>			
Body	Ductile iron	ASTM A536 Gr 65-45-12	
Disc	Super duplex	ASTM A890 Gr 5A	
	Duplex	ASTM A890 Gr 4A	
	316 stainless steel	ASTM A351 Gr CF8M	
	304 stainless steel	ASTM A351 Gr CF8	
	Aluminium bronze	ASTM B148 UNS C95200	
	Nickel aluminium bronze	ASTM B148 UNS C95800	
	Ductile iron NYL	ASTM A536 Gr 65-45-12	NYL = Nylon coating, max. temp. 60°C
	Ductile iron CTD	ASTM A536 Gr 65-45-12	CTD = Epoxy coated, max. temp. 120°C
Shaft	431 stainless steel	ASTM A276 Gr 431 S43100	
	Duplex	ASTM A276 UNS S31803	
	Super duplex	ASTM A276 UNS S32750	
	Monel® K500	ASTM B865 UNS N05500	
Seat	EPDM		Food grade, NSF61, ACS
	EPDM E1		KIWA, WRAS, ACS
	NBR		Food grade
	NBR N1		DVGW-G
	HNBR		
	White NBR		Food grade
	Fluoroelastomer (FKM)		
Disc screw	Super duplex	ASTM A276 UNS S32750	
	Duplex	ASTM A276 UNS S31803	
Disc screw O-ring	EPDM		
	NBR		
	FKM		
Plug	Carbon steel		
Plug O-ring	NBR		
Plug circlip	Stainless steel		
Bushing	Polyester		
Shaft/Body O-ring	NBR		
Bearing	PTFE/steel		
Shaft/Body circlip	Stainless steel		

### NOTES:

Valves with super duplex disc will have super duplex disc screw. All other discs will have a duplex disc screw.

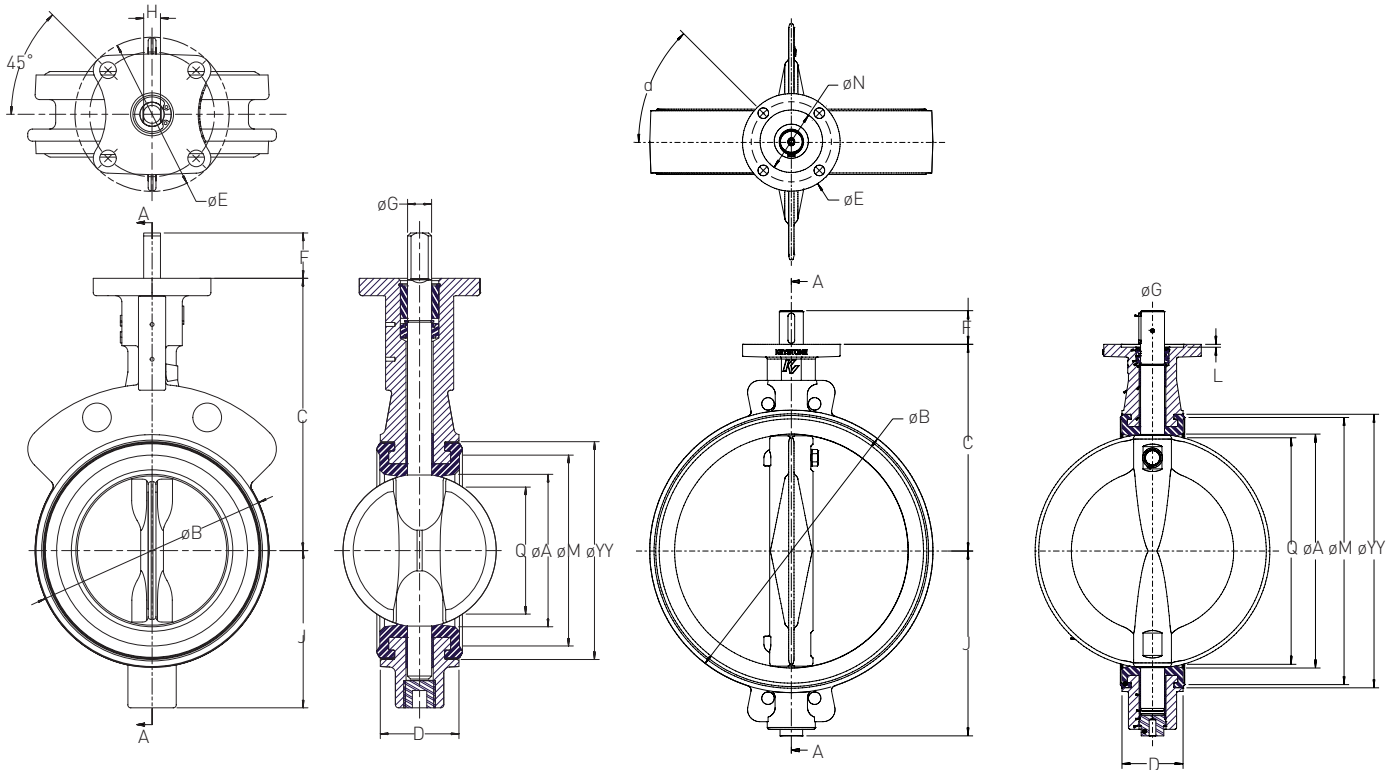
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# KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

SERIES GRW (WAFER)  
DN 50-300

DN 350-900



## VALVE DIMENSIONS (mm)

Size (DN)													Shaft			Top plate drilling			Adapt. code <sup>(4)</sup>	Weight <sup>(3)</sup> (kg)	
	A	B	C	D	E	F	J	L	M	N	Q <sup>(1)</sup>	YY	G	H <sup>(2)</sup>	Key	Bolt circle	No. holes	a			Hole dia.
50	50	91	135	43	100	25	60	-	66	-	28	80	15.88	11.11	-	82.5	4	45°	11.0	BAC	2.0
65	62	105	150	46	100	30	76	-	78	-	43	93	14.29	9.53	-	82.5	4	45°	11.0	BAB	2.7
80	77	123	160	46	100	30	82	-	97	-	65	112	14.29	9.53	-	82.5	4	45°	11.0	BAB	3.2
100	99	154	180	52	100	30	104	-	129	-	87	144	15.88	11.11	-	82.5	4	45°	11.0	BAC	4.3
125	124	187	195	56	100	30	120	-	160	-	113	175	19.05	12.70	-	82.5	4	45°	11.0	BAD	5.9
150	150	208	210	56	100	30	131	-	181	-	142	196	19.05	12.70	-	82.5	4	45°	11.0	BAD	6.8
200	195	265	240	60	150	32	162	-	233	-	188	248	22.23	15.88	-	127.0	4	45°	13.5	CAE	11.8
250	245	320	275	68	150	50	198	-	290	-	237	305	28.58	-	6.4 x 6.4	127.0	4	45°	13.5	CAF	19.1
300	291	372	310	78	150	50	230	-	340	-	283	355	28.58	-	6.4 x 6.4	127.0	4	45°	13.5	CAF	26.8
350	325	416	325	78	150	76	260	-	378	-	318	398	35.00	-	8 x 8	127.0	4	45°	13.5	CAG	40.0
400	380	474	360	102	150	76	298	-	435	-	368	455	35.00	-	8 x 8	127.0	4	45°	13.5	CAG	61.0
450	434	534	395	114	200	76	334	6	495	130	421	515	41.35	-	9.5 x 9.5	165.0	4	45°	22.0	DAH	86.0
500	486	589	430	127	200	108	385	6	549	130	471	569	47.60	-	12.7 x 9.5	165.0	4	45°	22.0	DAJ	106.0
600	585	691	500	154	200	108	456	6	650	130	568	670	47.60	-	12.7 x 9.5	165.0	4	45°	22.0	DAJ	158.0
700	685	800	570	165	200	108	518	6	755	130	668	775	57.20	-	12.7 x 9.5	165.0	4	45°	22.0	DAK	231.0
750	735	862	605	165	200	108	551	6	816	130	719	835	57.20	-	12.7 x 9.5	165.0	4	45°	22.0	DAK	271.0
800	785	907	640	190	300	140	583	6	860	200	765	880	73.00	-	19 x 12.7	254.0	8	22.5°	17.5	KAV	326.0
900	885	1007	715	203	300	140	659	6	960	200	864	980	73.00	-	19 x 12.7	254.0	8	22.5°	17.5	KAV	419.0

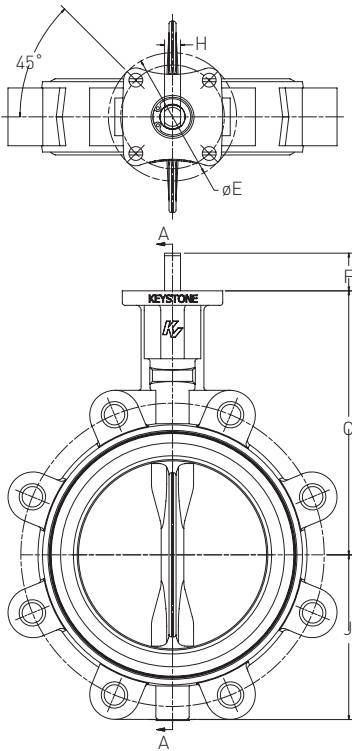
### NOTES:

1. 'Q' dimension is the minimum allowable pipe or flange inside diameter at the centered body face to protect the disc sealing edge against damage when opening the valve.
2. 'H' dimension refers to flat on shaft.
3. Weight may vary depending on trim materials used.
4. DN 50 - actual shaft dimension is 12 mm x 8 mm A/F and is fitted with an adaptor to produce a BAC connection.

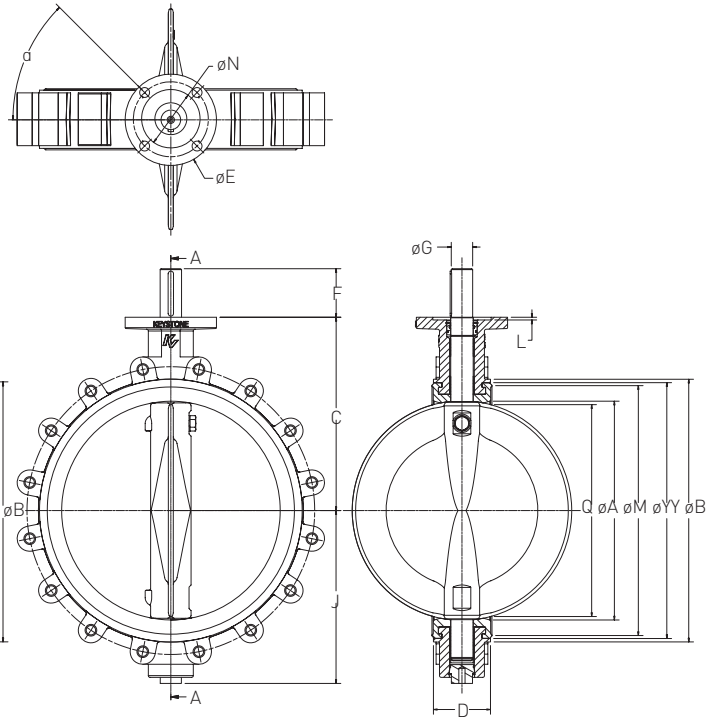
# KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

SERIES GRL (LUG)  
DN 50-300



DN 350-900



## VALVE DIMENSIONS (mm)

Size (DN)													Shaft			Top plate drilling				Adapt. code <sup>(4)</sup>	Weight <sup>(3)</sup> (kg)
	A	B	C	D	E	F	J	L	M	N	Q <sup>(1)</sup>	YY	G	H <sup>(2)</sup>	Key	Bolt circle	No. holes	a	Hole dia.		
50	50	92	135	43	100	25	60	-	66	-	28	80	15.88	11.11	-	82.5	4	45°	11.0	BAC	3.0
65	62	105	150	46	100	30	76	-	78	-	43	93	14.29	9.53	-	82.5	4	45°	11.0	BAB	4.0
80	77	126	160	46	100	30	82	-	97	-	65	112	14.29	9.53	-	82.5	4	45°	11.0	BAB	4.5
100	99	156	180	52	100	30	104	-	129	-	87	144	15.88	11.11	-	82.5	4	45°	11.0	BAC	7.0
125	124	190	195	56	100	30	120	-	160	-	113	175	19.05	12.70	-	82.5	4	45°	11.0	BAD	10.0
150	150	214	210	56	100	30	131	-	181	-	142	196	19.05	12.70	-	82.5	4	45°	11.0	BAD	11.0
200	195	268	240	60	150	32	162	-	233	-	188	248	22.23	15.88	-	127.0	4	45°	13.5	CAE	17.0
250	245	321	275	68	150	50	198	-	290	-	237	305	28.58	-	6.4 x 6.4	127.0	4	45°	13.5	CAF	29.5
300	291	375	310	78	150	50	230	-	340	-	283	355	28.58	-	6.4 x 6.4	127.0	4	45°	13.5	CAF	41.0
350	325	416	325	78	150	76	260	-	378	-	318	398	35.00	-	8 x 8	127.0	4	45°	13.5	CAG	52.0
400	380	474	360	102	150	76	298	-	435	-	368	455	35.00	-	8 x 8	127.0	4	45°	13.5	CAG	88.0
450	434	534	395	114	200	76	334	6	495	130	421	515	41.35	-	9.5 x 9.5	165.0	4	45°	22.0	DAH	107.0
500	486	589	430	127	200	108	385	6	549	130	471	569	47.60	-	12.7 x 9.5	165.0	4	45°	22.0	DAJ	161.0
600	585	691	500	154	200	108	456	6	650	130	568	670	47.60	-	12.7 x 9.5	165.0	4	45°	22.0	DAJ	235.0
700	685	800	570	165	200	108	518	6	755	130	668	775	57.20	-	12.7 x 9.5	165.0	4	45°	22.0	DAK	315.0
750	735	862	605	165	200	108	551	6	816	130	719	835	57.20	-	12.7 x 9.5	165.0	4	45°	22.0	DAK	378.0
800	785	907	640	190	300	140	583	6	860	200	765	880	73.00	-	19 x 12.7	254.0	8	22.5°	17.5	KAV	438.0
900 <sup>(5)</sup>	885	1007	715	203	300	140	659	6	960	200	864	980	73.00	-	19 x 12.7	254.0	8	22.5°	17.5	KAV	559.0

## NOTES:

- 'Q' dimension is the minimum allowable pipe or flange inside diameter at the centered body face to protect the disc sealing edge against damage when opening the valve.
- 'H' dimension refers to flat on shaft.
- Weight may vary depending on trim materials used.
- DN 50 - actual shaft dimension is 12 mm x 8 mm A/F and is fitted with an adaptor to produce a BAC connection.
- Valve size DN 900 is tapped flange design and has no separate lugs.

# KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

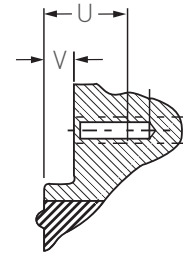
## DIMENSIONS OF TAPPED FLANGE LOCATING HOLES (mm)

Size (DN)	Series GRW		Series GRL	
	U	V	U	V
700	45.5	5.5	45.5	5.5
750	52.5	12.5	45.5	5.5
800	60.0	20.0	45.5	5.5
900	54.5	6.5	54.5	6.5

### NOTE:

All holes in lugged version are through threaded, except the holes closest to top and bottom shaft.

SERIES GRW AND GRL



## PRESSURE-TEMPERATURE DIAGRAM

Seat material *	Disc material	Body material	Size range (DN)	Valve function Standard / End of Line	Temperature [°C]															
					-28	-20	-15	0	50	100	120	130	150	160						
EPDM	all	DI	50-300	Std / EOL																
NBR and white NBR	all	DI	50-300	Std / EOL																
HNBR	all	DI	50-300	Std / EOL																
FKM	all	DI	50-300	Std / EOL																
EPDM	all	DI	350-900	Std / EOL																
NBR	all	DI	350-900	Std / EOL																
HNBR	all	DI	350-900	Std / EOL																
FKM	all	DI	350-900	Std / EOL																

### NOTES:

\* all seat materials drop tight

For non-PED requirements with EPDM seats, valves can be rated to a minimum temperature of -40°C.

Maximum temperature for ductile iron disc/epoxy ctd. (DN 350-900) is 120°C.

Maximum temperature for ductile iron disc/nylon ctd. is 60°C.

## FLOWRATE CO-EFFICIENTS - K<sub>v</sub> VALUES

Valve size (DN)	Disc opening (degrees)									
	10°	20°	30°	40°	50°	60°	70°	80°	90°	
50	0	0.9	4.8	14	30	47	72	99	108	
65	0	2.4	11.0	27	50	78	123	172	217	
80	0	6.0	28.0	55	91	141	215	304	409	
100	0	14.0	57.0	109	177	265	407	600	807	
125	0	28.0	85.0	158	250	389	630	964	1251	
150	7	52.0	130.0	226	367	578	987	1551	1946	
200	22	115.0	231.0	405	646	1029	1773	2910	3516	
250	34	173.0	339.0	641	980	1546	2677	4449	5806	
300	49	253.0	495.0	935	1430	2255	3905	6710	8910	
350	119	304.0	637.0	1142	1936	3110	5010	8969	10407	
400	155	397.0	832.0	1492	2529	4062	6544	11714	13592	
450	196	503.0	1053.0	1888	3200	5141	8288	14826	17203	
500	242	621.0	1300.0	2331	3951	6347	10224	18303	21238	
600	349	894.0	1871.0	3357	5689	9140	14723	26357	30583	
700	475	1216.0	2547.0	4569	7744	12440	20040	35875	41626	
750	545	1396.0	2924.0	5245	8890	14281	23005	41183	47785	
800	620	1589.0	3327.0	5968	10114	16248	26174	46857	54369	
900	785	2011.0	4211.0	7553	12801	20564	33127	59303	68811	

### NOTE:

K<sub>v</sub> = The volume of water in m<sup>3</sup>/hr that will pass through a valve with a pressure drop of 1 bar at 20°C.

## MAXIMUM ALLOWABLE SHAFT TORQUES (Nm)

Shaft material	Valve size (DN)																		
	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	750	800	900	
316SS	65	110	110	160	260	260	380	762	762										
431SS	90	155	155	230	365	365	650	1307	1307	1542	1824	2977	3219	5086	6312	7128	7088	14740	
Duplex										1156	1368	2233	2414	3815	4734	5346	5316	11055	
Super duplex	85	142	142	210	340	340	600	1200	1200	1413	1672	2729	2951	4366	5418	6118	6084	12652	
Monel® K500	76	129	129	190	306	306	540	1080	1080	1284	1520	2481	2682	4239	5260	5907	5907	12283	

# KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

## VALVE SEATING AND UNSEATING TORQUES (Nm)

Application ΔP (bar)	Valve size (DN)																	
	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	750	800	900
<b>I</b>																		
3.5	13	19	26	37	58	81	148	241	345	467	639	845	1089	1700	2494	2967	3495	4422
7	13	20	27	40	63	88	164	271	387	520	719	960	1248	1979	2943	3521	4169	5275
10	14	21	30	44	70	99	188	315	451	595	832	1123	1473	2373	3575	4302	5120	6479
14	15	23	33	49	80	113	219	374	536									
16	15	25	36	51	85	120	235	403	578									
3.5 (U/C)	8	11	16	22	35	49	89	145	207	280	383	507	653	1020	1497	1780	2097	2653
<b>II</b>																		
3,5	14	21	29	42	66	93	169	274	392	528	718	945	1212	1877	2736	3245	3811	4822
7	14	22	31	45	71	100	185	303	434	580	796	1058	1369	2153	3180	3793	4479	5667
10	15	23	33	49	78	111	208	347	498	652	906	1217	1590	2542	3804	4565	5419 <sup>(1)</sup>	6858
14	16	26	36	54	88	125	240	406	583									
16	17	27	38	56	93	132	255	436	626									
3.5 (U/C)	8	13	17	25	40	56	101	164	235	317	431	567	727	1126	1642	1947	2287	2893
<b>III</b>																		
3.5	15	23	32	48	74	105	190	306	439	588	797	1045	1336	2055	2978	3523	4127	5222
7	16	24	34	50	79	112	206	336	481	639	874	1156	1490	2328	3417	4065	4788	6059
10	16	26	36	54	86	122	229	380	545	709	981	1312	1707	2710	4034	4828	5719 <sup>(1)</sup>	7237
14	17	28	40	59	96	136	261	439	629									
16	18	29	41	61	101	143	276	468	672									
3.5 (U/C)	9	14	19	29	44	63	114	184	263	353	478	627	801	1233	1787	2114	2476	3133
<b>IV</b>																		
3.5	17	26	37	55	86	122	221	355	509	679	915	1195	1521	2322	3341	3940	4601	5822
7	18	27	39	58	91	129	237	384	551	728	990	1303	1671	2589	3772	4473	5252	6646
10	18	29	41	62	99	140	260	428	615	795	1094	1454	1883	2963	4378	5223	6168 <sup>(1)</sup>	7805
14	19	31	45	67	108	154	292	487	700									
16	20	32	46	69	113	161	307	517	742									
3.5 (U/C)	10	16	22	33	52	73	133	213	305	408	549	717	913	1393	2005	2364	2761	3493

### NOTES:

3.5 U/C refers to reduced diameter disc option.

1. Duplex shaft not suitable for these conditions, use only 431 stainless steel or super duplex.

## TORQUE APPLICATION FACTOR CATEGORIES

### Application I

Clean liquid lubricating media (water, clean oils, lube oil, mineral oil, etc.); and with no deposit or chemical attack, valve operated at least once a week. Temperature range from 0°C to maximum temperature rating of the elastomer seat.

### Application II

Other liquid media and lubricating gases (aqueous liquids, such as food & beverage, water, etc.); and with minor deposit or chemical attack, valve operated at least once a month.

Temperature range from 0°C to maximum temperature rating of the elastomer seat.

### Application III

- Dry non-abrasive media or gases (non-abrasive powders and dry gas); or
- Fluids with moderate deposit or chemical attack; or
- Valves operated less than once a month.

Temperature range from 0°C to maximum temperature rating of the elastomer seat.

### Application IV

- Dry abrasive media and degreasing applications (sand, cement, silicone free, oxygen cleaned); or
- Liquids with severe deposit; or
- Valves not frequently operated (once a year).

All above with temperature range from -10°C to maximum temperature rating of the elastomer seat.

### NOTES

- For applications with temperatures above or below the guidelines above, please consult factory.
- For dry service valves it is suggested to use U/C discs (reduced diameter) when service conditions are less than 3.5 bar.

# KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

## ORDERING INFORMATION

Example:	GR	L	100	D	1	2	E	A1	K	B0	UC		
<b>Series</b>	GR												
<b>Body style</b>	L												
<b>L</b>	Lug												
<b>W</b>	Wafer												
<b>Size (DN)</b>	100												
<b>050</b>	100	200	350	500	750								
<b>065</b>	125	250	400	600	800								
<b>080</b>	150	300	450	700	900								
<b>Body material</b>	D												
<b>D</b>	Ductile iron												
<b>Disc material</b>	1												
<b>1</b>	316 stainless steel			<b>6</b>		Duplex							
<b>2</b>	304 stainless steel			<b>7</b>		Super duplex							
<b>3</b>	Aluminum bronze			<b>N</b>		Nickel aluminium bronze							
<b>4</b>	Ductile iron/ENP (DN 50-300)			<b>W</b>		Ductile iron/nylon ctd.							
<b>5</b>	Ductile iron/epoxy ctd. (DN 350-900)												
<b>Shaft <sup>(1,2)</sup></b>	1												
<b>1</b>	316 stainless steel			<b>6</b>		Duplex		<b>L</b>				Monel® K500	
<b>2</b>	431 stainless steel			<b>7</b>		Super duplex							
<b>Notes:</b>	1. The standard material is 431 stainless steel. 316 stainless steel shaft is available as an option in DN 50-300.												
	2. DN 350-900 valves with a super duplex disc will have a super duplex disc screw. All other disc materials will have a duplex disc screw.												
<b>Seat</b>	E												
<b>E</b>	EPDM (Food grade, ACS)			<b>N</b>		NBR (Food grade)							
<b>E1</b>	EPDM (KIWA, WRAS, ACS)			<b>N1</b>		NBR (DVGW-G)							
<b>F</b>	Fluoroelastomer (FKM)			<b>W</b>		White NBR (Food grade)							
<b>H1</b>	HNBR												
<b>Flange drilling</b>	A1												
<b>A1</b>	ASME 125/150		<b>AE</b>		AS2129 Table E		<b>D1</b>		DIN PN 6		<b>D3</b>	DIN PN 16	
<b>AD</b>	AS4087 PN 16		<b>B1</b>		BS Table E		<b>D2</b>		DIN PN 10		<b>J1</b>	JIS 5K	
											<b>J2</b>	JIS 10K	
	Multidrilled (Wafer only)												
<b>J3</b>	JIS 5K 10K												
<b>M3</b>	ASME 125/150, AS2129 Table E (DN 50-600) (Standard)												
<b>Mounting</b>	K												
<b>K</b>	Keystone actuator mount												
<b>Actuation</b>	B0												
<b>B0</b>	Bare shaft		<b>G1</b>		Gear		<b>P1</b>		Pneumatic DA		<b>E</b>	Electric	
<b>H1</b>	10 pos handle		<b>C1</b>		Chainwheel		<b>P2</b>		Pneumatic SR				
<b>Special (If none leave blank)</b>	UC												
<b>UC</b>	Under cut disc for 3.5 bar or less pressure				<b>P</b>		Special body coating		<b>MTR</b>				Material certifications
<b>SF</b>	Silicone free				<b>DOC</b>		Special documentation						