



**Sleeve & Damper Butterfly Valve**

### **Butterfly Valve**

**Sleeve / Resilient - Model 9400**  
**Damper / Clearance - Model 9300**

API 609, AWWA C 504  
Size - 2" to 160" ( 50mm to 4000mm)  
Rating - Class 150 to Class 600  
Class 900 & above on request  
Wafer Design  
Lug Design  
Flange Design

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# Sleeve or Resilient Butterfly Valve - Model 9400

# Damper or Clearance Butterfly Valve - Model 9300



“INVACO” (Industrial Valve Company) founded and promoted by the technocrats having experience of 18 years in National and International valve industry. INVACO PRIVATE LIMITED (Industrial Valve Company) is registered experience company in Design, Development, Fabrication & Manufacturing of Industrial Valves. Our mission is to produce high quality and reliable Valves to our national & international clients / customers. Our proactive approach to technical issues enables to understand and implement cost-effective solutions to our valuable customers.

“INVACO” (Industrial Valve Company) committed to excellence by manufacturing top quality valves to exceed customer’s needs with low cost, on-time delivery & providing finest service in industry. “INVACO” manufacture Ball valves (Floating & Trunnion Mounted), Butterfly Valves (Damper, Sleeved, Double offset & Triple Offset), Gate Valves, Globe Valves , Check Valves, Strainers, Flap Valves, Dismantling Joints, Flange Adaptor, Flange Couplings & Sluice Gate/Penstock for Oil & Gas, Petrochemicals, Refineries, Power Plants, Water Treatment Plants, Chemical, Paper & Pulp, Sugar, Steel, Pharma, Pipeline Transmission and other process industries.

“INVACO” (Industrial Valve Company) is specialized in design, manufacturing & testing of CAST Steel Butterfly Valves. All valves are designed as per API 609, ASME B16.34, AWWA C504, AWWA C207 and follow ISO 9001:2015 Quality Management Systems. INVACO manufacture butterfly valve size from 2” to 160” (50mm to 4000mm) with pressure range from Class 150 to Class 600 (Customized or Class 900 & above valves manufactured on request) and equivalent EN pressure ratings. Butterfly valves produced from CASTING materials like Cast Iron, Ductile Iron, WCB, WCC, WC6, LCB, LCC, CA15, CF8, CF8M, CF3M, A890 (4A, 5A, 6A), Aluminum Bronze, Alloy20, Hast Alloy, Inconel, Monel and other special materials.

INVACO (Industrial Valve Company) aims to produced a zero defect valves for long life and reliable services. Making continual improvements aims towards to minimize the Total Ownership Cost for valued customers. Also aims to established sales and services of valves & actuators worldwide.

This catalog provides basic information of Sleeved or Resilient & Damper or Clearance Butterfly valves. Every effort has been made to maintain technical accuracies however INVACO has reserve rights to make any change in design and materials without prior notice.



At “INVACO”, we established this comprehensive Quality Management System to implement a strategy of continual improvement and compliance with the requirements of the ISO 9001:2015 Quality Assurance standard and other industrial valves standards by:

**Customer Focused:**

- Make commitments we fully understand and believe we can meet and deliver.
- Meet all commitments to customers on time.
- Satisfy our customer’s needs and exceed their expectations.

**Performance Driven:**

- Verify that our products and services meet customer requirements.
- Monitor benchmark and continuously improve our business, products, and services, organization and employee’s performance.

Entire “INVACO” stick to the spirit and intent of this policy to ensure customer satisfaction is achieved at all respects and times.





## Quality Standards for Butterfly Valve

### American Petroleum Institute (API)

API 609	API Spec Q1
API 598	API 6FA
API 607	

### American Society of Mechanical Engineers (ASME)

ASME B16.34	ASME B16.5
ASME B16.47	ASME B16.10
ASME B16.25	

### British / European Standards

BS 5155	BS 6755
BS 4504	BS EN 558
BS EN 1092	BS EN 12266
BS EN 10204	BS EN 6364

### International Organization for Standardization (ISO)

ISO 9001:2015	ISO 5208
ISO 5211	ISO 14723

### Manufacturers Standardization Society (MSS - SP)

MSS SP-6	MSS SP-25
MSS SP 44	MSS SP 61
MSS SP 67	MSS SP 68

### National Association of Corrosion Engineers (NACE)

NACE MR 01-75	NACE TM 01-77
NACE TM 02-84	NACE MR 01-03

### Materials and Equipment Standards and Code (MESC)

MESC SPE 77/106	MESC SPE 77/134	MESC SPE 77/211	MESC SPE 77/200
MESC SPE 77/300	MESC SPE 77/302	MESC SPE 77/312	

### American Water Work Association (AWWA)

AWWA C504	AWWA C207	AWWA M49
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## Testing & Inspection for Butterfly Valve

Test	Applicable Standards	Extent of Test
Visual Inspection	MSS SP - 55	100%
Marking Inspection	MSS SP - 25	100%
Chemical, Physical & Heat Treatment	Relevant ASTM Standards	100%
Alloy Verification / Positive Material Identification(PMI)	INVACO Procedure	Upon Customer Request
Hardness Requirement	NACE MR 01 - 75	Upon Customer Request
Radiographic Testing (RT) ( X-Ray & Gamma Ray)	ASME B16.34 (Annex B) , ASTM E94 , E142 , E446 , E186 , E280, BPVC Sec V-Art 7 & 22, ASME Sec VIII - Div-1	Upon Customer Request
Ultrasonic Testing (UT)	ASME B16.34 , ASTM A388 , A609 , A578 , BPVC Sec V - Art 4 & 23, ASME VIII Div-1	Upon Customer Request
Magnetic Particle Inspection(MPI)- (Dry & Wet)	ASME B16.34 Annex C , ASTM E709 , ASTM A275 , E1444, ASME Sec VIII Div-2, BPVC Sec V - Art 7 & 23	Upon Customer Request
Liquid / Dye Penetrant Inspection ( LP / DP )	ASME B16.34 Annex D ,ASTM E 165 , E1417 , ASME Sec VIII Div 1,BPVC Sec V - Art 6 & 24.	Upon Customer Request
Impact Test	ASTM A 370	Upon Customer Request
Microstructural & Ferrite Content measurement	ASTM E 562	Upon Customer Request



Microscopic / inclusion Count Test	ASTM E 45	Upon Customer Request
Pitting Corrosion	ASTM G 48	Upon Customer Request
Crevice Corrosion	ASTM G 48	Upon Customer Request
Hydrogen Induced Cracking Test (HIC)	NACE TM 02 - 84	Upon Customer Request
Ferric Chloride Corrosion Test	ASTM A 923	Upon Customer Request
Hardness Test	ASTM E 18 , ASTM E 92, NACE MR 01 - 75	Upon Customer Request
Intergranular Corrosion Cracking (IGC)	ASTM A 262	Upon Customer Request
Chloride Stress Corrosion Cracking Test (CSCC)	NACE TM 01 - 75	Upon Customer Request
Size / Dimension Check	INVACO Approved Drawings	100%
Functional Check	INVACO Approved Drawings	100%
Shell Test ( Hydro Test)	API 598, API6D, Approved GA Drawings	100%
Seat Test ( Hydro Test)	API 598, API6D, Approved GA Drawings	100%
Backseat Test ( Hydro Test)	API 598, API6D, Approved GA Drawings	100%
Seat Test (Air/Pneumatic Test)	API 598, API6D, Approved GA Drawings	100%
Helium Leak / Fugitive Emission Test	ISO 15848, MESC 77 / 312	Upon Customer Request
Torque Test	API 6D , INVACO Procedure	10% or Upon Customer Request
Blasting Report	INVACO Procedure	10% or Upon Customer Request
Surface Finish Report	INVACO Procedure	10% or Upon Customer Request
Painting / Dry Film Thickness Report	INVACO Procedure	10% or Upon Customer Request
Tag No, Serial No, Name Plate	INVACO Procedure	100%
<p>Note: - 1) Backseat test is applicable to Gate &amp; Globe Valve.                  2) Above Test available upon customer request with extra cost.                  3) For more information kindly contact "INVACO".</p>		

### Manufacturing Range for Butterfly Valve

Design	ASME CLASS / Size - in ( mm)					
	150	300	600	900	1500	2500
Triple Off-Set	3" - 56" (80 - 1400 )	3" - 56" (80 - 1400 )	3" - 40" (80 - 1000 )	On Request	On Request	On Request
Double Off-Set	2" - 160" (50 - 4000 )	2" - 64" (50 - 1600 )	2" - 40" (50 - 1000 )	On Request	On Request	-----
Sleeve	2" - 48" (50 -1200 )	----	----	----	----	----
Damper	2" - 160" (50 - 4000 )	2" - 64" (50 - 1600 )	2" - 40" (50 - 1000 )	----	----	----



## Design Features for Butterfly Valve (Model – 9400)

### \*\*Smooth Operation for Longer Life:-

All INVACO Butterfly valve sealing parts i.e. disc, seat etc. are precisely machined and polished. This ensures that seat does not get deformed and torn away by the disc during the valve operations. The properties to minimize the friction are results in smooth operation leads to longer service life.

### \*\*Perfect Sealing:-

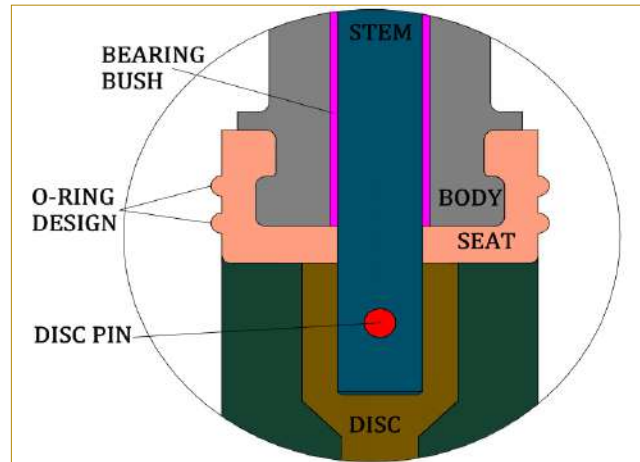
INVACO sleeved butterfly seats are designed as flat surface at top and bottom stem point and also two o-ring designed incorporate on each side of raised face diameter. Seat and disc are perfectly matched to assured bi-directional tight shut-off valve with low torque. Also because of seat designed on raised face, O-ring and Gasket are not required at the time of valve installation in pipe line.

### \*\*Blow-out Proof Stem:-

Stem is designed to ensure dependability and positive disc positioning. Taper Pin assembled within disc and stem to ensure blow out proof stem. Also to ensure positive vibration proof, stem to disc connection and field replacement.

### \*\*Bearing Bush:-

Two full length bearing bush with self lubricating properties are press fitted in body. These stem bushing reduces torque and isolate the stem from valve body. Bearing Bush are also help to prevent seizure of the stem due to corrosion in stem journal bearing.



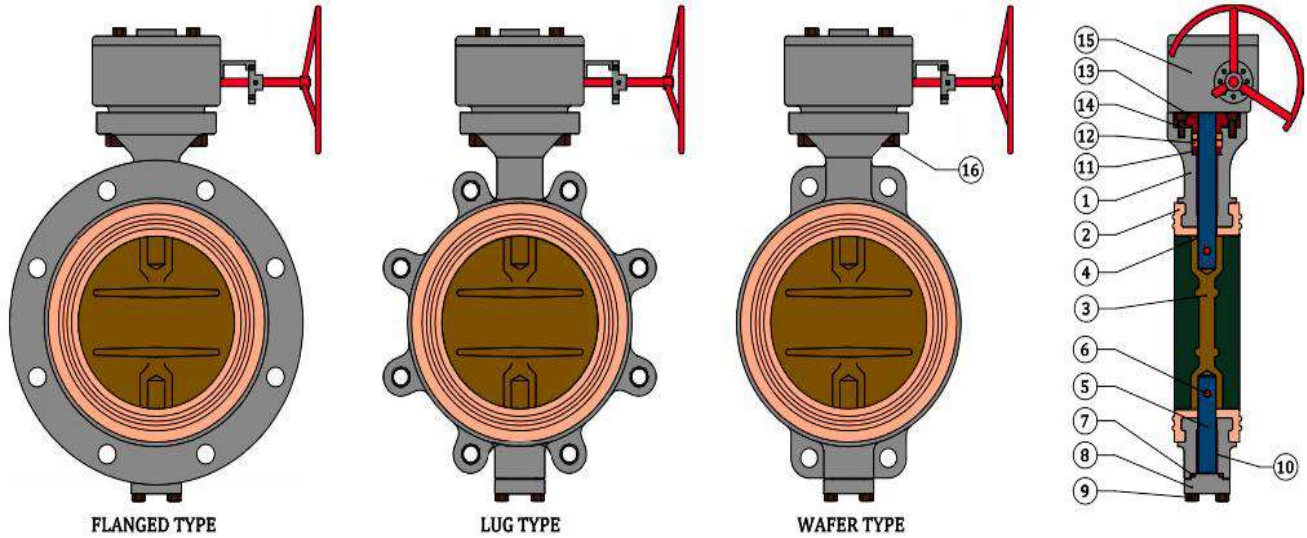
### \*\*ISO Flange Mountings:-

ISO flanged mounting arrangements are always incorporated in INVACO valve designed with locking arrangements. ISO mounting facilitates direct mounting of gear box and actuators on valves.



**GA Drawing for Resilient Butterfly Valve (Model – 9400)**

**Sleeve Butterfly Valve**



SR NO	PART	SR NO	PART	SR NO	PART	SR NO	PART
1	BODY	5	LOWER STEM	9	END COVER BOLT	13	GLAND BUSH
2	SLEEVE	6	DISC PIN	10	BEARING BUSH	14	GLAND BOLT
3	DISC	7	GASKET	11	SPREADER	15	GEAR OPERATER
4	UPPER STEM	8	END COVER	12	GLAND PACKING	16	GEAR OPERATOR BOLT

**Quality Standards:-**

- Design Standards** - API 609 / ASME B16.34 / AWWA C 504/ MESC SPE 77-106,134,211, 300, 302,312.
- Testing Standards** - API 598 / EN 12266 / ISO 5208 / BS 6755
- End to End Standards** - API 609 / ASME B 16.10 / EN 558
- Flange Drilling Standards** - ASME B16.5 / ASME B 16.47 / BS EN 1092/ AWWA C 207
- Actuator Mounting** - ISO 5211
- Fugitive Emission Test** - MESC SPE 77 - 312 / ISO 15848
- Valve Marking** - MSS SP 25 / ASME B 16.34
- Visual Inspection** - MSS SP 55
- Material Testing** - NDE / NACE MR 01- 75 / NACE MR 01- 03 Compliance available.

**Key Features:-**

- Size :-2" to 48" (50mm to 1200mm)
- Rating:- 150# & Equiv. DIN Rating
- Vulcanized / Molded seat Options
- Blow Out Proof Stem
- Extended Bonnet & Stem
- Bi-direction Tight Shut Off
- Wafer, Lug & Flange End
- Bare Stem, Manual & Actuation.

**Materials** - Carbon Steel, Low Temperature Carbon Steel, Stainless Steel, Duplex, Super Duplex, Incoloy, Inconel, Monel, Aluminum Bronze, Hastalloy, Titanium and other materials.

**Applications** - Offshore / Onshore Oil & Gas, Chemical, Petrochemical & Allied Process, Water Treatment Plant, Piping & Process Industries & other.

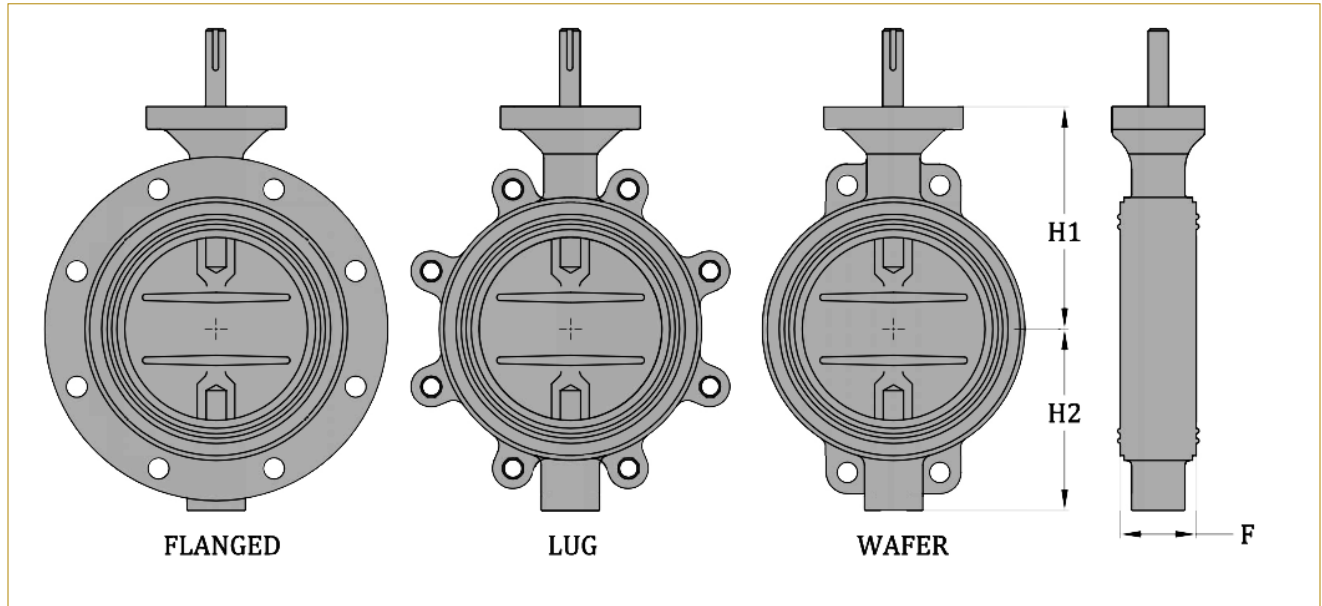


### Material of Construction for Butterfly Valve (Model – 9400)

<b>Material of Constructions for Sleeve or Resilient Butterfly Valves</b>					
Sr. No.	Part	Cast Iron / Ductile Iron	Carbon Steel	Low Temp. Steel	Stainless Steel
1	Body	A126-Gr B/ (A536 65-45-12), (A395 60-40-18)	A216 Gr. WCB	A352 Gr.LCB, LCC	A351 Gr. CF8 , CF8M
2	Seat	NBR, EPDM			
3	Disc	CF8M, Aluminum Bronze	A351 Gr. CF8M, CF8, Aluminum Bronze		
4	Upper Stem	F304, F316, 17-4PH, Duplex Steel, Monel			
5	Lower Stem				
6	Disc Pin				
7	Gasket	SPW( SS304, SS316) + GRAPHOIL / PTFE			
8	End Cover	A126-Gr B/ (A536 65-45-12), (A395 60-40-18)	A216 Gr. WCB	A352 Gr.LCB, LCC	A351 Gr. CF8 , CF8M
9	End Cover Bolt	A 193 Gr. B7 , B7M	A 193 Gr. B7 , B7M	A 320 L7 , L7M	A194 Gr. 8, 8M
10	Bearing Bush	SS 304, SS 316, Brass + PTFE			
11	Spreader	SS 304, SS 316, Brass , PTFE			
12	Gland Packing	PTFE			
13	Gland Bush	F304, F316, 17-4PH, Duplex Steel, Monel			
14	Gland Bolt	A 193 Gr. B7	A 193 Gr. B7 , B7M	A 320 L7 , L7M	A194 Gr. 8, 8M
15	Gear Operator	Standard			
16	Bolt (GO)	A 193 Gr. B7	A 193 Gr. B7	A 320 L7 , L7M	A194 Gr. 8, 8M

\*\* INVACO reserves the rights to change the material, design & any information without prior notice.

**Dimensions for Sleeve Butterfly Valve (Model – 9400)**



ASME CLASS 150							
Size		Face to Face ( mm )			H1	H2	ISO Pad
in	mm	Wafer	Lug	Flange	mm	mm	
2	50	43	43	108	108	54	F07
2½	65	46	46	112	121	59	F07
3	80	46	46	114	131	74	F07
4	100	52	52	127	155	89	F07
5	125	56	56	140	169	98	F07
6	150	56	56	140	192	117	F10
8	200	60	60	152	213	157	F10
10	250	68	68	165	264	169	F12
12	300	78	78	178	306	192	F12
14	350	78	78	190	326	221	F14
16	400	102	102	216	363	247	F14
18	450	114	114	222	398	301	F14
20	500	127	127	229	414	355	F16
24	600	154	154	267	489	423	F16
28	700	165	165	292	677	509	F25
30	750	165	165	318	702	534	F25
36	900	200	200	330	803	604	F30
40	1000	216	216	410	886	668	F30
42	1050	216	216	410	903	698	F30
48	1200	276	276	470	1030	795	F30

**Note:** - \*\* “INVACO” reserve the right to change the information anytime without prior notice.

## Damper or Clearance Butterfly Valve (Model – 9300)

Model 9300 Butterfly Valves are designed without seat ring and retainer i.e. seat-less designed therefore called as Damper or Clearance Type Butterfly Valve. Because of a set-less & retainer-less design, torque required to operate a Damper Valves are comparatively low and very popular in control application.

The Damper or Clearance Butterfly Valves are typically used where the leakage is acceptable. Damper Valves are best suited for Low Pressure and High Temperature applications. Disc of the Damper Valves are specially designed considering the thermal expansion to prevent seizure. These valves are suitable for up to +900°C temperature.

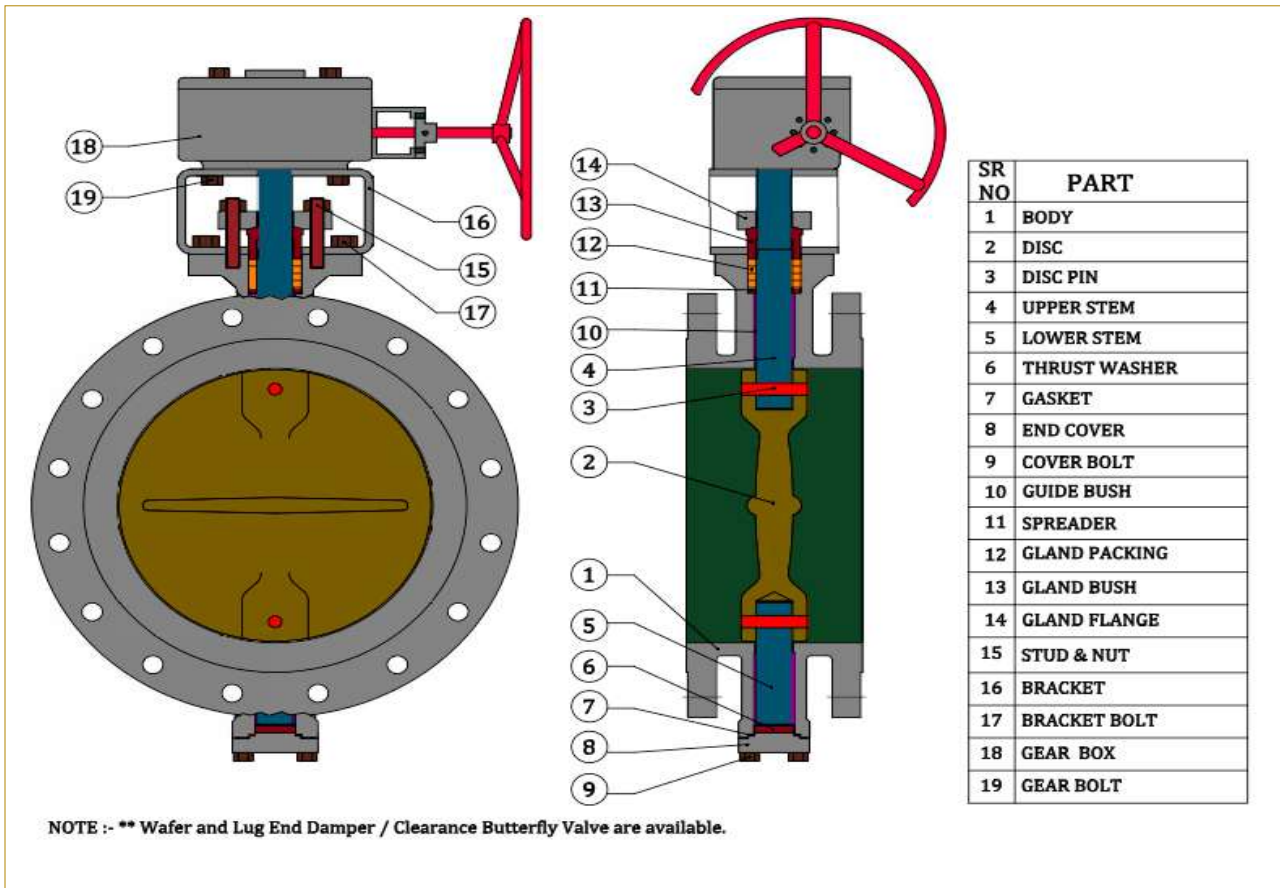
### Material of Construction for Damper Butterfly Valve (Model – 9300)

<b>Material of Constructions for Butterfly Valves ( Damper or Clearance)</b>				
Sr. No.	Part	Carbon Steel	Low Temp. Steel	Stainless Steel
1	Body	A216 Gr. WCB	A 352 Gr.LCB, LCC	A351 Gr. CF8 , CF8M
2	Disc	A351 Gr. CF8 , CF8M	A351 Gr. CF8M	A351 Gr. CF8 , CF8M
3	Disc Pin	F304, F316	F 316	F304 , F316, 17-4 PH
4	Upper Stem	F304, F316, F6a, 17-4PH, AISI410	F 316	F304 , F316, 17-4 PH
5	Lower Stem	F304, F316, F6a, 17-4PH, AISI410	F 316	F304 , F316, 17-4 PH
6	Thrust Washer	F304, F316 , Brass		
7	Gasket	SPWG + (SS304, SS316)		
8	End Cover	A216 Gr. WCB	A352 Gr.LCB, LCC	A351 Gr. CF8 , CF8M
9	Cover Bolt	A193 Gr. B7 , B7M	A320 L7,L7M	A193 Gr. B8, B8M
10	Guide Bush	F304, F316, Brass + PTFE		
11	Spreader	F304, F316, F6a, 17-4PH, AISI410	F 316	F304 , F316, 17-4 PH
12	Gland Packing	PTFE , RPTFE, Graphite		
13	Gland Bush	F304, F316, F6a, 17-4PH, AISI410	F 316	F304 , F316
14	Gland Flange	F304, F316, F6a, 17-4PH, AISI410	F 316	F304 , F316
15	Stud & Nut	A193 Gr. B7, B7M & A194 Gr. 2H, 2HM	A320 L7,L7M & A194 Gr. 4L, 7M, 4	A193 Gr. B8, B8M & A194 Gr. 8, 8M
16	Bracket	Carbon Steel	Carbon Steel	Stainless Steel
17	Bracket Bolt	A193 Gr. B7, B7M	A320 L7,L7M	A193 Gr. B8, B8M
18	Gear Box	Standard	Standard	Standard
19	Gear Bolt	A193 Gr. B7, B7M	A320 L7,L7M	A193 Gr. B8, B8M

**Note:-** \*\* Other materials are available on request, kindly contact “INVACO”.  
 \*\* “INVACO” reserve the right to change the information anytime without prior notice.



**GA Drawing for Damper Butterfly Valve (Model – 9300)**



**Quality Standards:-**

<b>Design Standards</b>	- API 609 / ASME B16.34
<b>Testing Standards</b>	- API 598 / EN 12266 / ISO 5208 / BS 6755
<b>End to End Face Standards</b>	- API 609 / ASME B 16.10 / EN 558
<b>Flange Drilling Standards</b>	- ASME B16.5 / ASME B 16.47 / BS EN 1092/ AWWA C 207
<b>Actuator Mounting</b>	- ISO 5211
<b>Valve Marking</b>	- MSS SP 25 / ASME B 16.34
<b>Visual Inspection</b>	- MSS SP 55
<b>Material Testing</b>	- NDE / NACE MR 01- 75 / NACE MR 01- 03 Compliance available.

**Key Features:-**

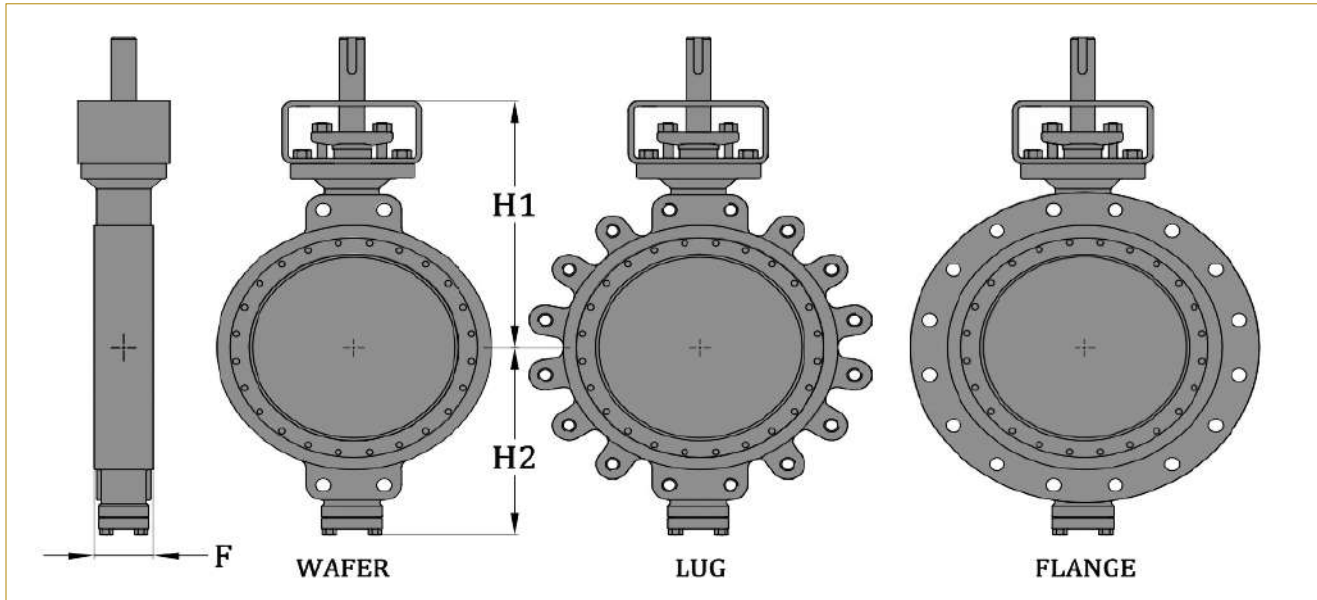
- Size :-2" to 160" (50mm to 4000mm)
- Rating:- 150# to 600# & Equiv. DIN Rating
- Consideration of Heat Expansion
- Blow Out Proof Stem
- Extended Bonnet & Stem
- Bare Stem, Manual & Actuation

**Materials** - Carbon Steel, Low Temperature Carbon Steel, Stainless Steel, Duplex, Super Duplex, Incoloy, Inconel, Monel, Aluminum Bronze, Hastalloy, Titanium and other materials.

**Applications** - Steel, Mining, Piping & Process Industries



**Dimensions for Damper Butterfly Valve (Model – 9300)**



ASME CLASS 150							
Size		Face to Face ( mm )			H1	H2	ISO Pad
in	mm	Wafer	Lug	Flange	mm	mm	
2	50	43	43	108	168	74	F05
2½	65	46	46	112	184	79	F05
3	80	48	48	114	205	95	F05
4	100	54	54	127	230	118	F07
6	150	57	57	140	245	151	F07
8	200	64	64	152	290	218	F10
10	250	71	71	165	356	253	F12
12	300	81	81	178	407	295	F14
14	350	92	92	190	435	323	F14
16	400	102	102	216	474	368	F16
18	450	114	114	222	513	395	F16
20	500	127	127	229	582	439	F16
22	550	127	127	229	612	458	F16
24	600	154	154	267	632	745	F25
26	650	154	154	292	658	484	F25
28	700	165	165	292	677	509	F25
30	750	165	165	318	702	534	F25
32	800	190	190	318	762	584	F25
36	900	200	200	330	803	604	F30
40	1000	216	216	410	868	668	F30
42	1050	251	251	410	903	698	F30

ASME CLASS 150							
Size		Face to Face ( mm )			H1	H2	ISO Pad
in	mm	Wafer	Lug	Flange	mm	mm	
44	1100	251	251	410	938	728	F30
48	1200	276	276	470	1030	795	F35
52	1300	276	276	470	1083	858	F35
56	1400	279	279	530	1175	900	F35
60	1500	279	279	530	1245	964	F40
64	1600	318	318	600	1315	1025	F40
72	1800	356	356	670	1429	1138	F48
78	2000	406	406	760	1538	1253	F48
88	2200	---	---	790	1674	1386	F48
96	2400	---	---	910	1749	1459	F48
104	2600	---	---	990	1922	1576	F48
112	2800	---	---	1070	2213	1691	F48
120	3000	---	---	1150	2454	1845	F48
140	3500	---	---	1350	2750	2685	F60
160	4000	---	---	1350	3195	3004	F60

**Note:-**

\*\*All dimensions are in "mm" unless & otherwise specified.

\*\* For Rating or Class 300 to Class 600, kindly contact INVACO

\*\* "INVACO" reserve the right to change the information anytime without prior notice.



## Body & Trim Material for Butterfly Valve

<b>Body &amp; Trim Material:-</b>		
<b>Material Group / Type</b>	<b>Casting</b>	<b>Forging</b>
<b>Carbon Steel</b>	A216 Gr WCB , WCA	A105 / A 106
	A216 Gr WCC	A105N
<b>Low Temperature Carbon Steel</b>	A352 Gr LCB	A350 Gr LF2 CL.1
	A352 Gr LCC	
	A352 Gr LC1 / LC2	
	A352 Gr LC3	A350 Gr LF3 CL.1
<b>Alloy Steel</b>	A217 Gr WC1	A182 Gr F1
	A217 Gr WC5	
	A217 Gr WC6	A182 Gr F11 CL.2
	A217 Gr WC9	A182 Gr F22 CL.3
	A217 Gr C5	A182 Gr F5a
	A217 Gr C12	A182 Gr F9
	A217 Gr C12A	A182 Gr F91
<b>Stainless Steel</b>	A217 Gr CA15	A182 Gr F6A / ANSI 410
	A351 Gr CF10M	A182 Gr F304H
	A351 Gr CF8A	A182 Gr F347H
	A351 Gr CF8	A182 Gr F304
	A351 Gr CF3	A182 Gr F304L
	A351 Gr CF8M	A182 Gr F316
	A351 Gr CF3M	A182 Gr F316L
	A351 Gr CF8C	A182 Gr F347
<b>Duplex / Super Duplex</b>	A890 Gr CD4MCuN (1B )	
	A890 Gr CD3MCuN (1C )	
	A890 Gr CE8MN (2A )	
	A890 Gr CD3MN (4A )	A182 Gr F51
	A890 Gr CE3MN (5A )	A182 Gr F53
	A890 Gr CD3MWCuN (6A )	A182 Gr F55
<b>Nickel / Super Nickel Alloys</b>	A494 Gr CY40	Inconel 600
	A494 Gr CZ100	
	A494 Gr CW6MC	Inconel 625
	A494 Gr M 35 -1	Monel 400
		Monel K-500
	A494 Gr CW6M / CW12MW	Hastalloy C / C-276
<b>Aluminum Bronze</b>	B148 Gr C95200	
	B148 Gr C95400	
	B148 Gr C95500	
	B148 Gr C95800	
<b>Titanium</b>	B367 Gr C2	B381 Gr F2
	B367 Gr C3	B381 Gr F3
<b>Special Materials</b>	A351 Gr CN7M	Alloy 20
	A351 Gr CN2MCuN	904L
	A351 Gr CK3MCuN	SMO 254 / A182 Gr F44
	CB7CU -1	17 - 4 PH

**Note:** - Wrought names are given as a reference for commonly accepted equivalent material. "INVACO" cannot hold any liability for any damages incurred due to this table. For more information kindly contact "INVACO".



**Material Specification for Fastener's:-**

Bolting Material	Nut Materials	Temperature Range	Body Material
ASTM A193 Gr. B7	ASTM A194 Gr. 2H	-40°C to +538°C	Carbon Steel
ASTM A193 Gr B7M	ASTM A194 Gr. 2HM	-50°C to +538°C	Low Alloy Steel
ASTM A320 Gr. L7	ASTM A194 Gr. 7/4	-100°C to +371°C	Low Temp. Carbon Steel
ASTM A320 Gr. L7M	ASTM A194 Gr. 7M	-75°C to +538°C	Low Temp. Carbon Steel
ASTM A193 Gr. B8	ASTM A194 Gr. 8	-200°C to +538°C	Stainless Steel
ASTM A193 Gr. B8M	ASTM A194 Gr. 8M / 8MA	-200°C to +538°C	Stainless Steel/Nickel Alloys /
A453 Gr 660 CL A	A453 Gr 660 CL A	-30°C to +538°C	Duplex

**NOTE:-**

- Above temperature range is for BOLTING, not body materials.
- Welding repair on Bolting is strictly not allowed.
- Temperature range & use may vary with requirement like NACE, Impact Test.
- For more information refer ASME B31.3, B16.34, A193, A194, A320 & A453.
- Other Bolt & Nut material available on request.
- INVACO cannot hold any liability for any damages incurred to this table.

**Coating for Fastener's**

- ENP
- Hot Deep Galvanized
- Hot Zinc
- Red Xylem
- PTFE Coating
- Cadmium
- Cadmium with PTFE

**Seat Insert & Seal Material:-**

Materials	Temperature Range °C		Pressure Class		Size	
	Min.	Max.	Seat Rings	Seal	Seat Rings	Seal
PTFE ( Glass Filled)	- 100	+200	600#	----	24"(600mm)	----
PTFE ( Carbon Filled)	- 100	+180	600#	----	24"(600mm)	----
Nylon6 ( Devlon)	- 60	+140	2500#	----	60"(1500mm)	----
Nylon	- 60	+120	2500#	----	60"(1500mm)	----
Peek	- 100	+240	2500#	----	24"(600mm)	----
Derlin	- 45	+90	1500#	----	24"(600mm)	----
Viton B	- 29	+180	600#	2500#	160"(4000mm)	60"(1500mm)
Viton AED	- 40	+200	600#	2500#	160"(4000mm)	60"(1500mm)
Buna N / NBR	- 30	+120	600#	2500#	160"(4000mm)	60"(1500mm)
HNBR	- 40	+150	600#	2500#	160"(4000mm)	60"(1500mm)
Graphite	- 240	+560	----	2500#	24"(600mm)	60"(1500mm)

**NOTE: -** \*\*Above table is for reference, information may differ, INVACO cannot hold any liability for any damages incurred due to this table.  
 \*\* Temperature & Pressure range may vary with different brands manufacturer.

**Static and Dynamic Seals (Gaskets & Packing):-**

- Graphite Packing / Gasket.
- PTFE, R-PTFE Packing / Rings.
- Spiral Wound Gasket ( Soft + Metal filled )
- Metal Gasket (RTJ, BX, T type seal ring).
- Lip Seal (U/O type, radial or face seal).



## How to Order Butterfly Valves

Valve Type	Size	Pr. Rating	End. Conn	Body Material	Disc Material	Stem Material	Seat Ring	Gland Packing	Operation	Spec.
A	B	C	D	E	F	G	H	I	J	K

### A- Valve Type

Code	Valve Type	Series	Code	Valve Type	Series
1	Triple Offset Butterfly Valve	9000	4	Damper or Clearance Butterfly Valve	9300
2	Double Offset Butterfly Valve	9900	5	Weld End Butterfly Valve	9200
3	Sleeve or Resilient Butterfly Valve	9400	6	Other	

### B - Size

NPS	2"	2.1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"
DN	50	65	80	100	125	150	200	250	300	350	400	450	500
<b>Code</b>	<b>02</b>	<b>025</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>06</b>	<b>08</b>	<b>10</b>	<b>12</b>	<b>14</b>	<b>16</b>	<b>18</b>	<b>20</b>
NPS	22"	24"	26"	28"	30"	32"	34"	36"	40"				
DN	550	600	650	700	750	800	850	900	1000				
<b>Code</b>	<b>22</b>	<b>24</b>	<b>26</b>	<b>28</b>	<b>30</b>	<b>32</b>	<b>34</b>	<b>36</b>	<b>40</b>				

Note:- For higher size code use respective NPS (inch) as Code

### C - Rating

Class	125	150	300	400	600	800	900	1500	2500	PN 2.5	PN6	PN10	PN16
<b>Code</b>	<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>06</b>	<b>07</b>	<b>08</b>	<b>09</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
Class	PN 25	PN 40	PN 63	PN 100	PN 160	PN 320							
<b>Code</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>							

### D - End Connection

Class	Type	Class	Type	Class	Type
A	Wafer	D	Flange-Long Pattern	G	INVACO Std.
B	Lug	E	But Weld	H	Other
C	Flange (Short Pattern)	F	Customized		

### E - Body/ End Cover Material

Code	Material	Code	Material	Code	Material	Code	Material	Code	Material
01	WCB	06	WC9	11	CF3M	16	6A	21	C95800
02	WCC	07	CA15	12	CK3MCuN	17	M35-1	22	C62300
03	LCB	08	CF8	13	CN7M	18	CW6MC	23	Ductile Iron
04	LCC	09	CF8M	14	4A	19	CW12MW	24	Cast Iron
05	WC6	10	CF3	15	5A	20	C95500	25	Other





**F – Disc Material**

Code	Material	Code	Material	Code	Material	Code	Material
01	CF8	05	CK3MCuN	09	6A	13	C95500
02	CF8M	06	CN7M	10	M35-1	14	C95800
03	CF3	07	4A	11	CW6MC	15	C62300
04	CF3M	08	5A	12	CW12MW	16	Other

**G – Stem Material**

Code	Material	Code	Material
A	A105N	I	F53
B	410	J	F55
C	F6A	K	F44
D	F304/F304L	L	Incoloy 825
E	F316/F316L	M	Inconel 625
F	17-4PH	N	Monel
G	F11	O	904L
H	F51	P	Other

**H – Seat Ring**

Code	Material
A	PTFE
B	RPTFE
C	EPDM
D	NBR / BUNA N
E	NYLON
F	HNBR
G	Other
H	

**I – Gland Packing**

Code	Material
A	PTFE
B	RPTFE
C	Graphite
D	NBR / BUNA N
E	HNBR
F	Other

**J – Operations**

Code	Operations
A	Bare Stem
B	Lever
C	Gear
D	Electrical Act'r
E	Pneumatic Act'r

**K - Special**

Code	Special Req.
A	Extended Bonnet
B	Extended Stem
C	Cryogenic
D	Other
E	

**Example:** - 8" x 150#, resilient seat, Wafer Design Butterfly Valve, Body/ End cover – WCB, Disc- CF8M & Stem – F316, Seat Ring – EPDM, Packing – PTFE, Gear Operated.

**CODE:** - 3 08 02 A 01 02 E C A C





Sleeve & Damper Butterfly Valve

Sleeve or Resilient Butterfly Valve - Model 9400  
Damper or Clearance Butterfly Valve - Model 9300

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