



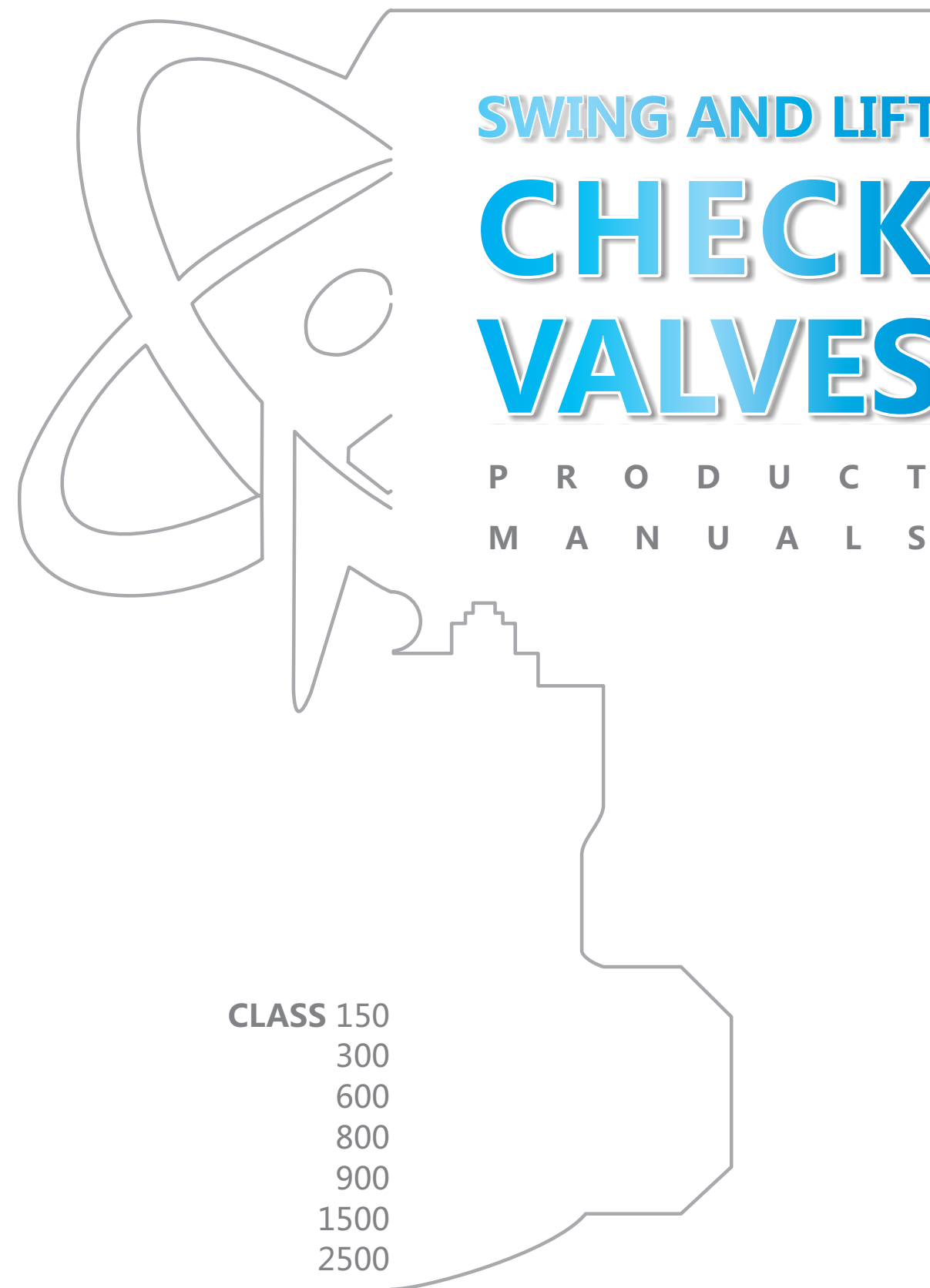
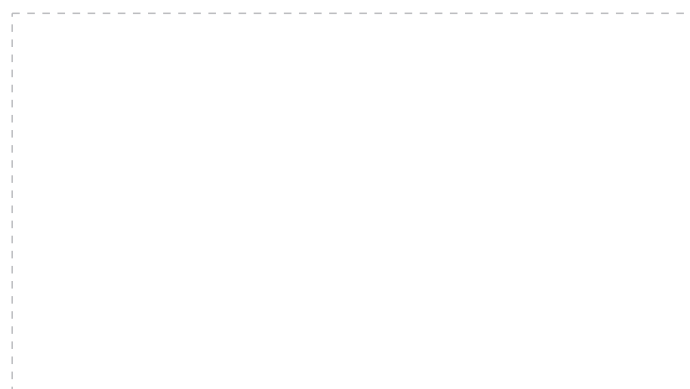
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SWING AND LIFT CHECK VALVES

P R O D U C T
M A N U A L S

CLASS 150
300
600
800
900
1500
2500

ENTERPRISE · PRODUCT · MARKET

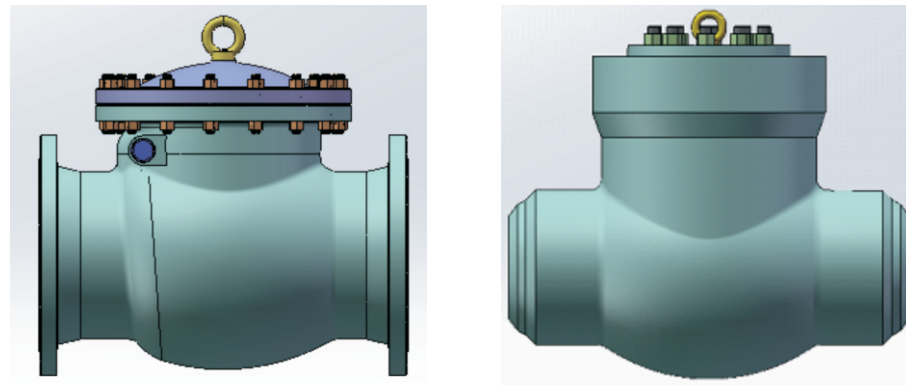
CONTENTS

INTRODUCTION	2
SWING CHECK VALVES INTRODUCTION	3
MAJOR FEATURE / FINITE ELEMENT ANALYSIS/DIMENSIONS AND WEIGHTS	
BOLTED BONNET CAST STEEL SWING CHECK VALVES (CLASS 150-600)	4
PRESSURE SEAL CAST STEEL SWING CHECK VALVES (CLASS 900-2500)	9
LIFT CHECK VALVES INTRODUCTION	14
MAJOR FEATURE / DIMENSIONS AND WEIGHTS	
BOLTED BONNET FORGED STEEL LIFT CHECK VALVES (CLASS 150-800)	15
BOLTED BONNET CAST STEEL LIFT CHECK VALVES (CLASS 150-600)	17
PRESSURE SEAL FORGED STEEL LIFT CHECK VALVES (CLASS 900-2500)	19
PRESSURE SEAL CAST STEEL LIFT CHECK VALVES (CLASS 900-2500)	21
TYPE OF CONSTRUCTION	
BODY-TO-BONNET JOIN	23
END CONNECTIONS	23
SEAT RING	23
SPECIAL REQUIREMENTS	23
SPECIAL SERVICE	
NACE VALVES	24
HYDROGENATION VALVES	25
TESTING AND INSPECTION	
TESTING	26
INSPECTION	27

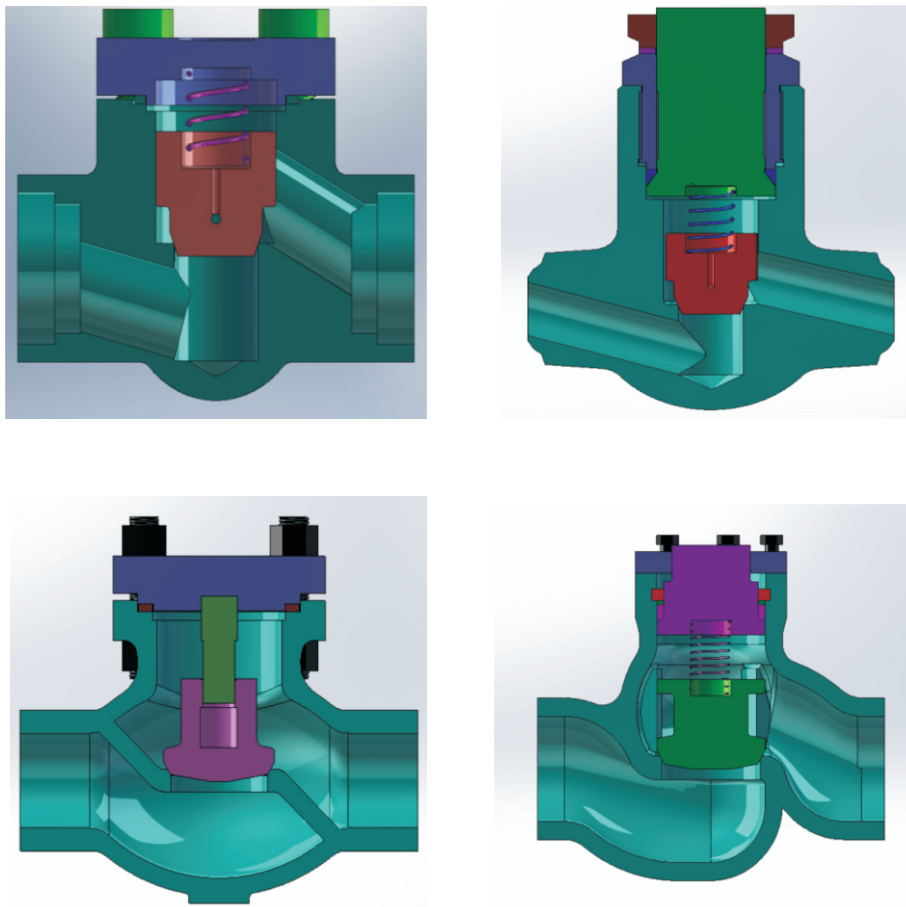
INTRODUCTION

The sample includes two types of check valve: swing check valve and lift check valve. The Swing check valve NPS is 2"-48" ; the lift check valve NPS is 2"-12". The Check valve pressure rating is 150lb-2500lb.

Swing check valve



Lift check valve:



SWING CHECK VALVES INTRODUCTION

The swing check valve is designed for use in a system where protection against reversal of flow in the line is desired. The force of the upstream fluid swings the disc out of the waterway, allowing the fluid to pass through the valve with minimal pressure drop. However, should the direction of flow completely reverse, the disc weight will

cause the disc to swing into the waterway and, along with the force of the reversed flow, force it to seal against the seat.

Swing check valve includes bolted bonnet cast steel swing check valves (as shown figure 1) and pressure seal cast steel swing check valve (as shown figure 2).

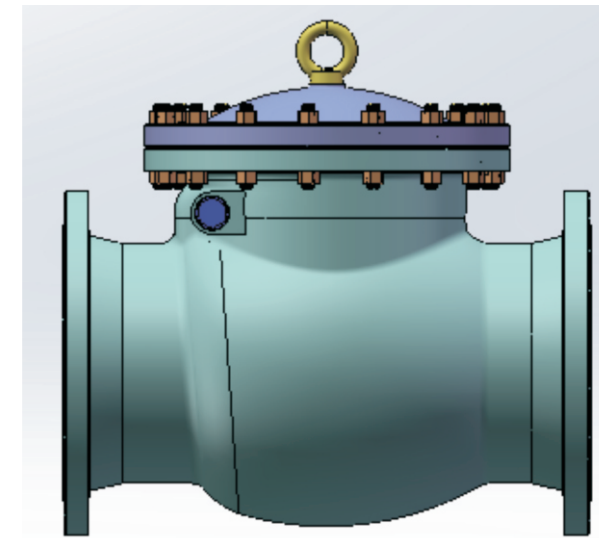


figure 1

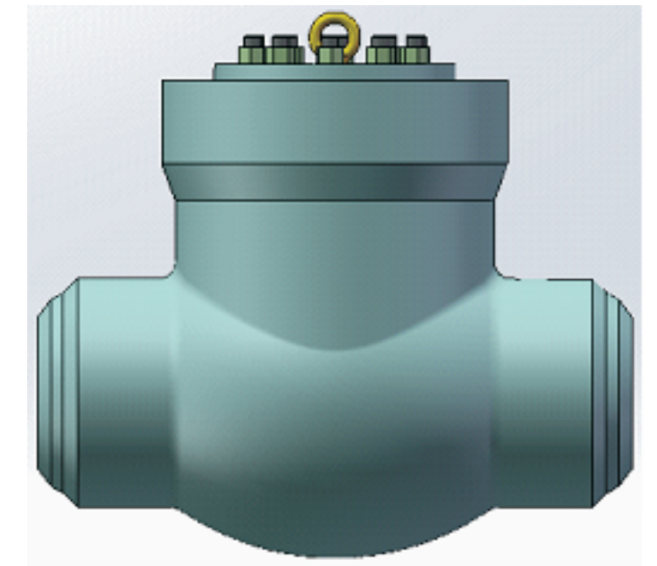


figure 1

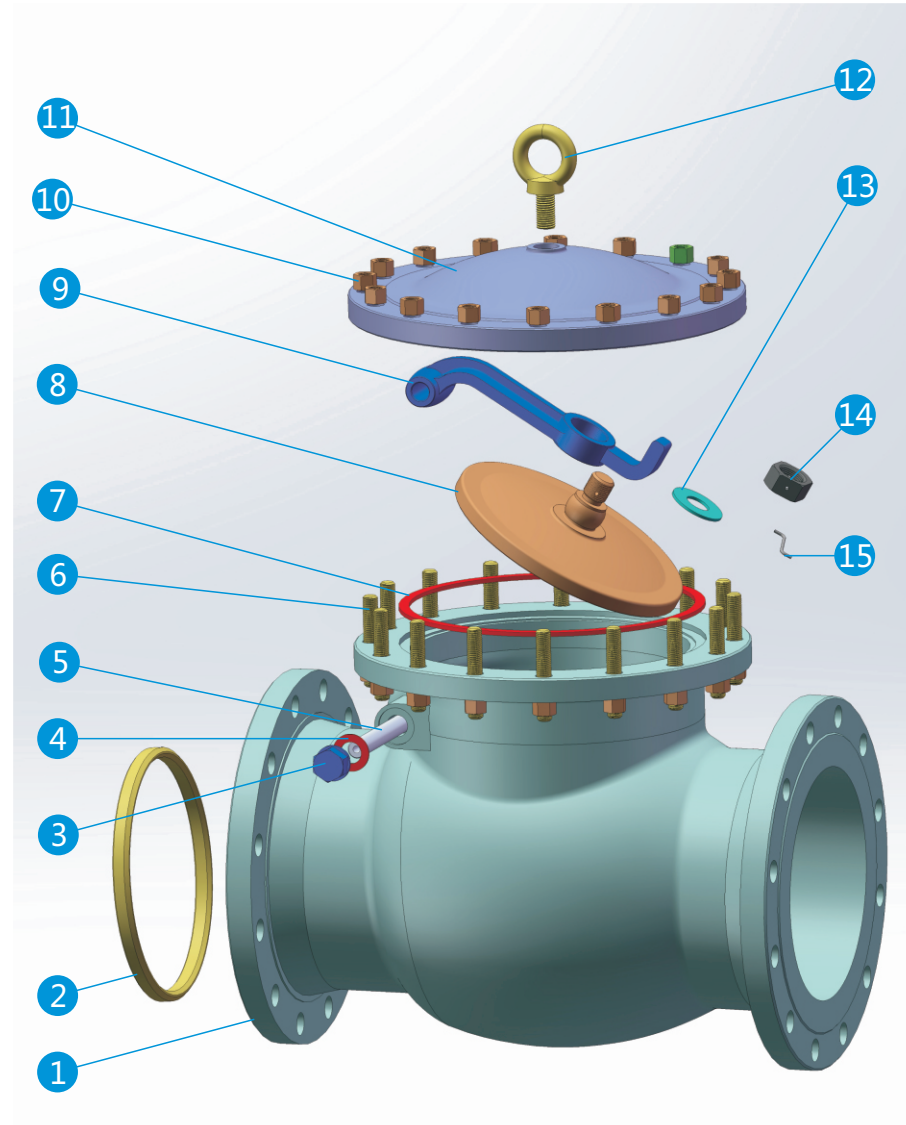
INDUSTRY STANDARDS

Pressure/Temperature Ratings	ASME B16.34
Basic Design	BS1868 /API 594
Face-to-Face/End- to- End	ASME B16.10
Flange Dimensions	ASME B16.5 /ASME B16.47
Butt-Welding End	ASME B16.25
Socket Welding End	ASME B16.11
Threaded End	ASME B1.20.1
Testing	API 598

MAJOR FEATURE

BOLTED BONNET CAST STEEL SWING CHECK VALVES

NO.	Name
1	Body
2	Seat Ring
3	Plug
4	Washer
5	Hinge Pin
6	Stud
7	Washer
8	Disc
9	Hinge
10	Nut
11	Bonnet
12	Hook Screw
13	Lock Washer
14	Cage Nut
15	Steel Wire



PRODUCT RANGE

CLASS 150	2" -48"
CLASS 300	2" -48"
CLASS 600	2" -36"

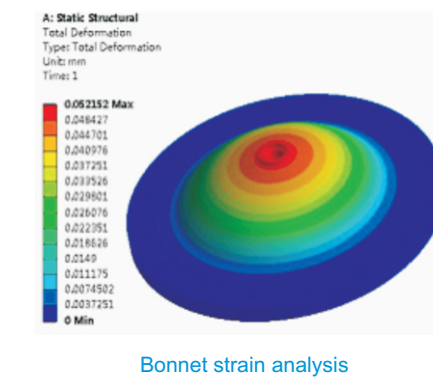
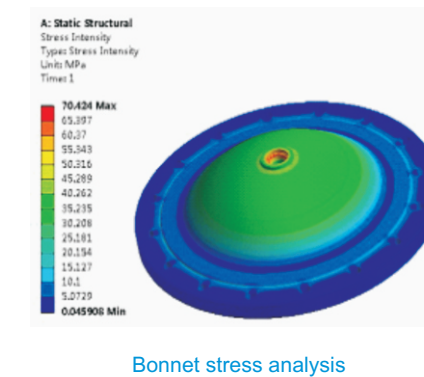
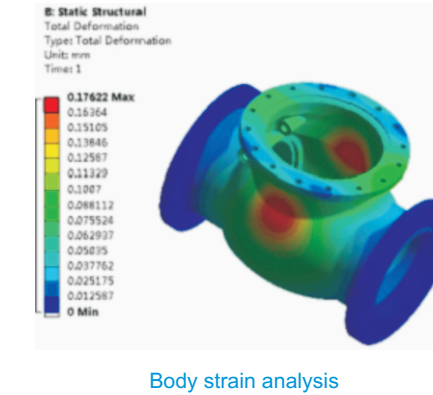
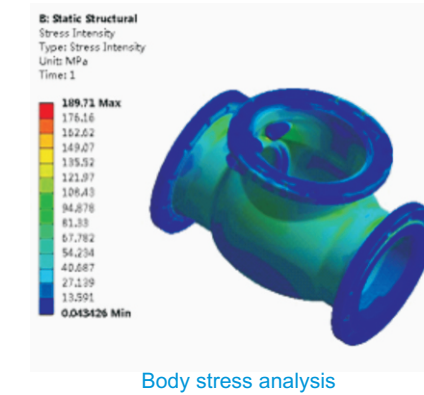
DESIGN STANDARDS

BS 1868 /API 594
ASME B16.34

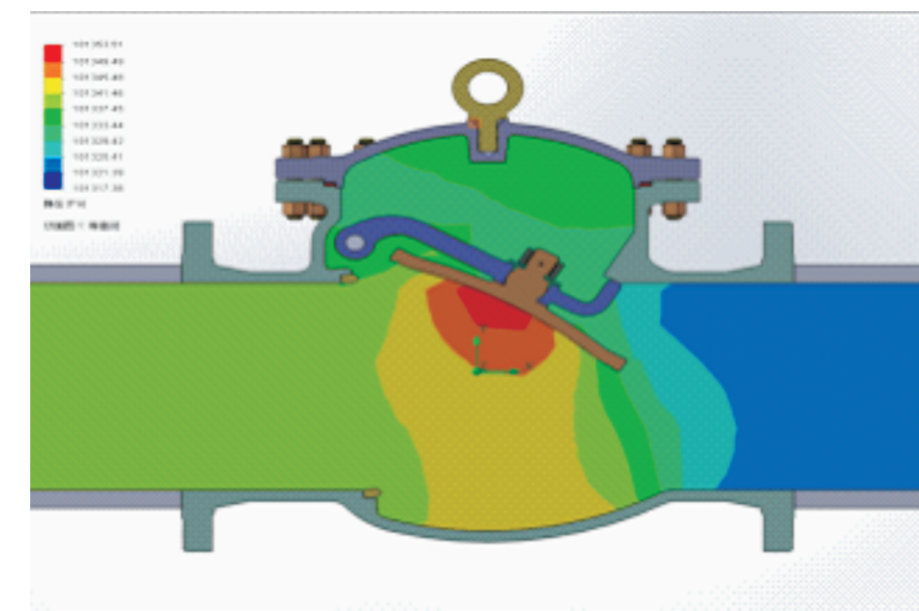
DESIGN FEATURES

Full Port
Bolted Bonnet
Swing Disc

FINITE ELEMENT ANALYSIS



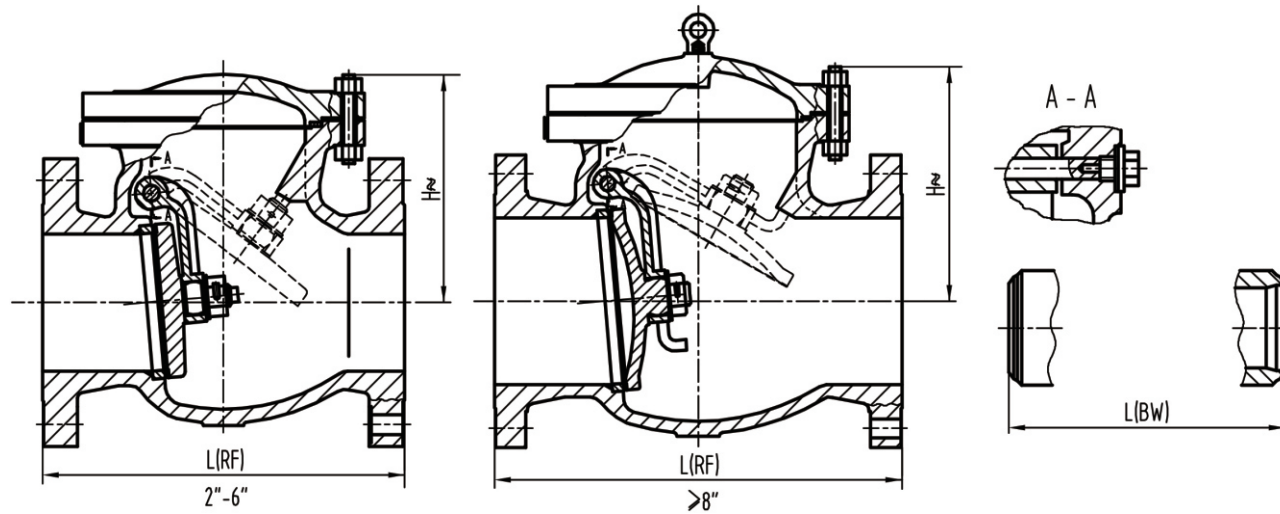
Analyze stress and strain of body and bonnet; observe the position and value of the maximum stress and strain, in order to get the most appropriate design.



Flow analysis is to get the valve's flow resistance coefficient a C.V values, which is to achieve the purpose of optimizing the valve design

DIMENSIONS AND WEIGHTS

BOLTED BONNET CAST STEEL SWING CHECK VALVES CLASS 150



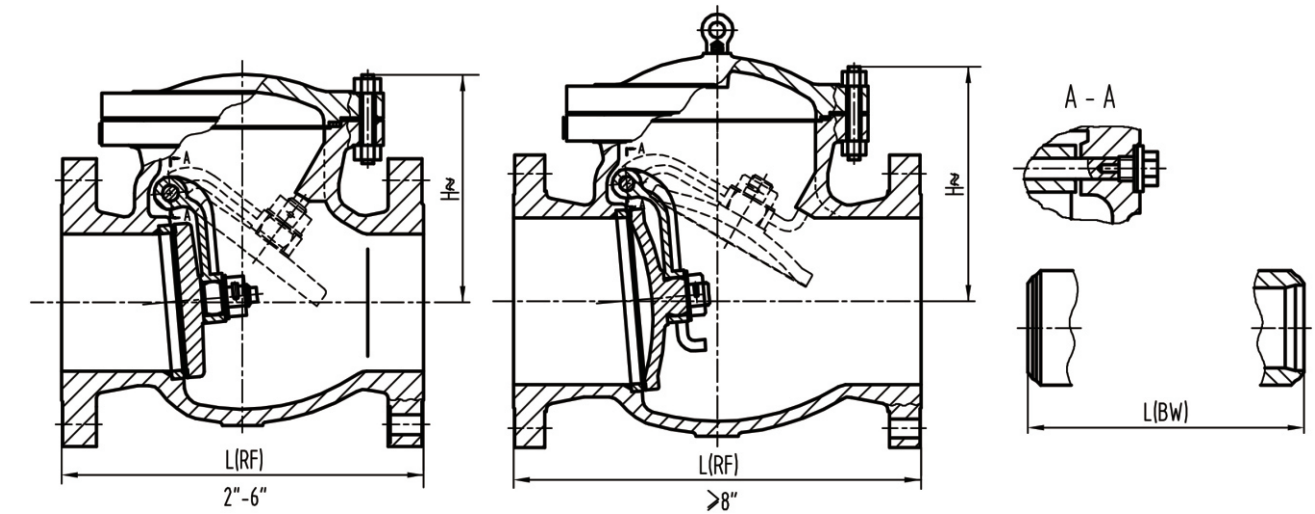
CLASS 150

NPS	In	2	2-1/2	3	4	5	6	8	10	12	14	16
DN	mm	50	65	80	100	125	150	200	250	300	350	400
L(RF/BW)	mm	203	216	241	292	330	356	495	622	698	787	864
H \approx	mm	143	165	172	196	215	231	266	304	350	380	426
WT(RF)	Kg	12	18.5	23	36.5	48	59	97	148	215	278	376
WT(BW)	Kg	8.5	13.5	16.5	26	36	44	74	117	168	214	294
C.V		156	221	282	515	856	1233	2257	3534	5247	6435	8529

NPS	In	18	20	24	26	28	30	32	36	40	42	48
DN	mm	450	500	600	650	700	750	800	900	1000	1050	1200
L(RF/BW)	mm	978	978	1295	1295	1448	1524	1727	1956	2159	2159	2540
H \approx	mm	446	483	556	612.5	883	889	1016	1092	1168	1219	1320
WT(RF)	Kg	457	560	851	1230	1795	2550	2750	3150	4020	4310	5100
WT(BW)	Kg	375	454	700	1006	1480	2065	2245	2570	3260	3590	4170
C.V		11385	14157	20656	24913	29218	33571	42699	60954	82105	111830	171270

DIMENSIONS AND WEIGHTS

BOLTED BONNET CAST STEEL SWING CHECK VALVES CLASS 300



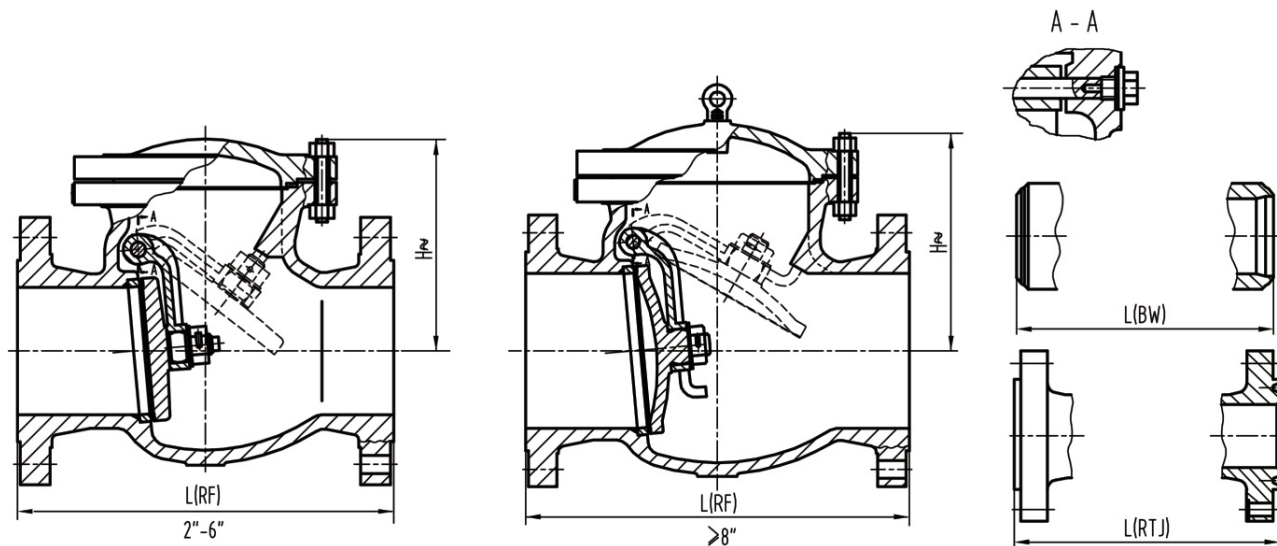
CLASS 300

NPS	In	2	2-1/2	3	4	5	6	8	10	12	14	16	18
DN	mm	50	65	80	100	125	150	200	250	300	350	400	450
L(RF/BW)	mm	267	292	318	356	400	444	533	622	711	838	864	978
H \approx	mm	158	172	190	214	231	257	302	356	399	442	461	540
WT(RF)	Kg	17.5	24.5	33	50	70	98	158	243	343	463	606	795
WT(BW)	Kg	12	17	22	32	48	69	114	181	254	340	449	602
C.V		154	218	282	510	837	1233	2262	3539	5292	6445	8534	11043

NPS	In	20	24	26	28	30	32	36	40	42	48
DN	mm	500	600	650	700	750	800	900	1000	1050	1200
L(RF/BW)	mm	1016	1346	1346	1499	1594	1727	2083	2159	2159	2667
H \approx	mm	604	694	762	798	865	1016	1143	1244	1270	1422
WT(RF)	Kg	1029	1558	1910	2523	3372	3650	4210	5685	6810	7950
WT(BW)	Kg	793	1213	1492	1963	2650	2960	3380	4605	5390	6380
C.V		13796	20216	24750	28463	33571	41808	60954	81388	110237	169785

DIMENSIONS AND WEIGHTS

BOLTED BONNET CAST STEEL SWING CHECK VALVES CLASS 600



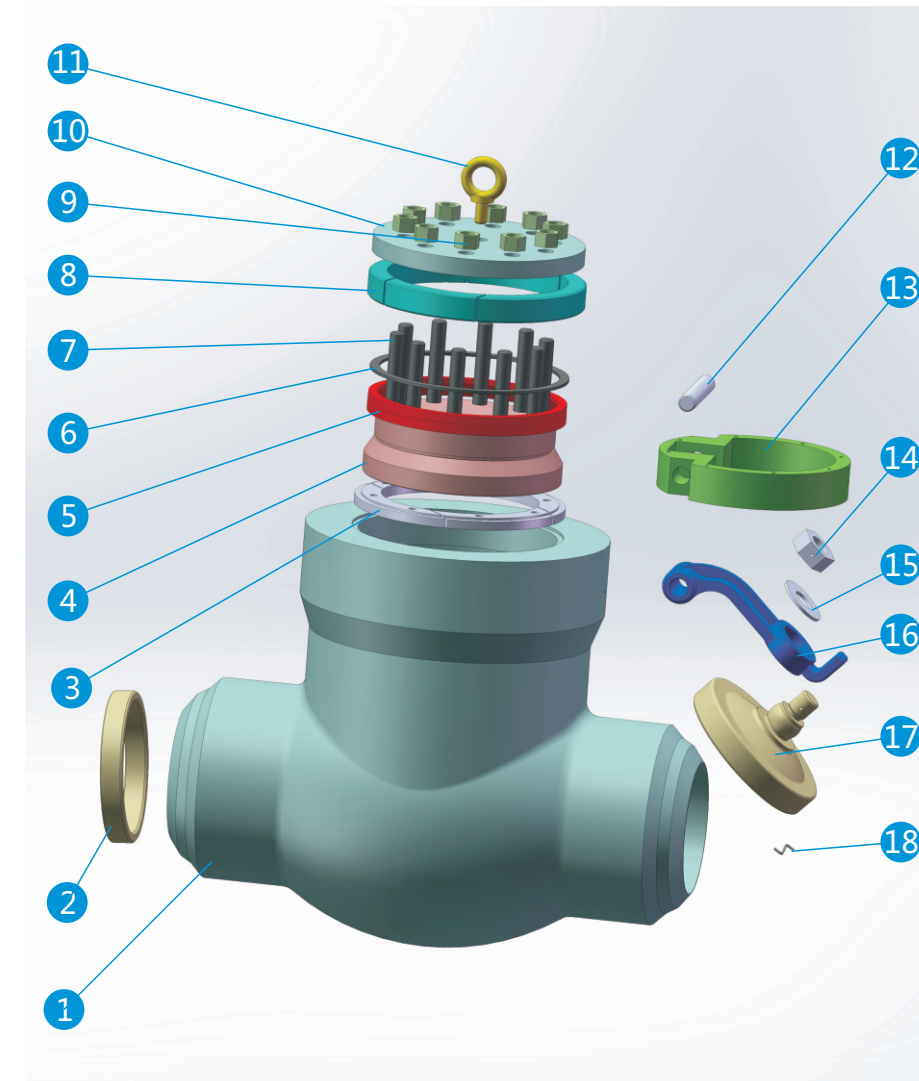
CLASS 600

NPS	In	2	2-1/2	3	4	5	6	8	10	12
DN	mm	50	65	80	100	125	150	200	250	300
L(RF/BW)	mm	292	330	356	432	508	559	660	787	838
L(RTJ)	mm	295	333	359	435	511	562	663	790	841
H≈	Kg	171	189	207	249	295	320	367	433	485
WT(RF/RTJ)	Kg	21	29	40	71	117	155	265	426	595
WT(BW)		15	20	28	47	75	106	193	308	460
C.V		154	218	282	515	842	1233	2188	3564	5069

NPS	In	14	16	18	20	24	26	28	30	36
DN	mm	350	400	450	500	600	650	700	750	900
L(RF/BW)	mm	889	991	1092	1194	1397	1448	1600	1651	2083
L(RTJ)	mm	892	994	1095	1200	1407	1435	1587	1638	2067
H≈	Kg	522	580	627	674	777	1016	1066	1168	1320
WT(RF/RTJ)	Kg	750	1030	1318	1688	2787	3750	4540	5400	7650
WT(BW)		590	800	1040	1326	2283	2980	3610	4270	6180
C.V		6089	7989	10405	12726	18493	24354	29651	34333	44855

MAJOR FEATURE

PRESSURE SEAL CAST STEEL SWING CHECK VALVES



NO. Name

1	Body
2	Seat Ring
3	Ring
4	Bonnet
5	Sealing Ring
6	Washer
7	Stud
8	Segment Ring
9	Nut
10	Cover
11	Screw
12	Hinge Pin
13	Hinge Seat
14	Cage Nut
15	Lock Washer
16	Hinge
17	Disc
18	Steel Wire

PRODUCT RANGE

CLASS 900	2" -30"
CLASS 1500	2" -30"
CLASS 2500	2" -24"

DESIGN STANDARDS

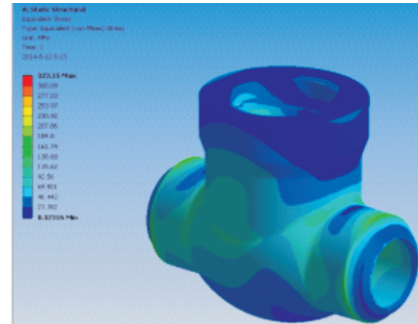
BS 1868
ASME B16.34

DESIGN FEATURES

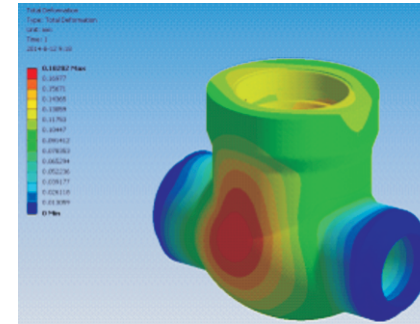
Full Port
Pressure Seal
Swing Disc

FINITE ELEMENT ANALYSIS

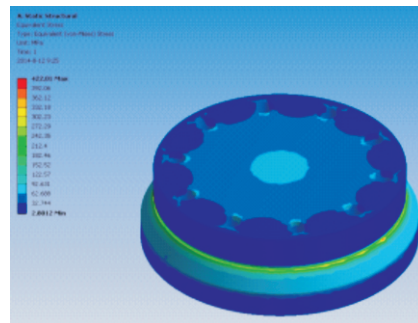
Analyze body and bonnet stress and strain, observe the position and value of the maximum stress and strain, in order to get the most appropriate design.



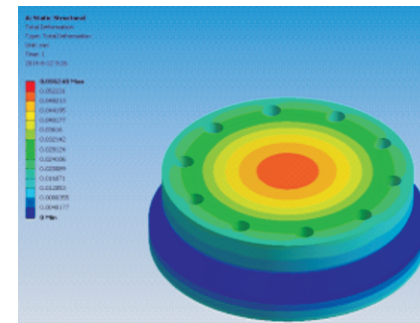
Body stress analysis



Body strain analysis

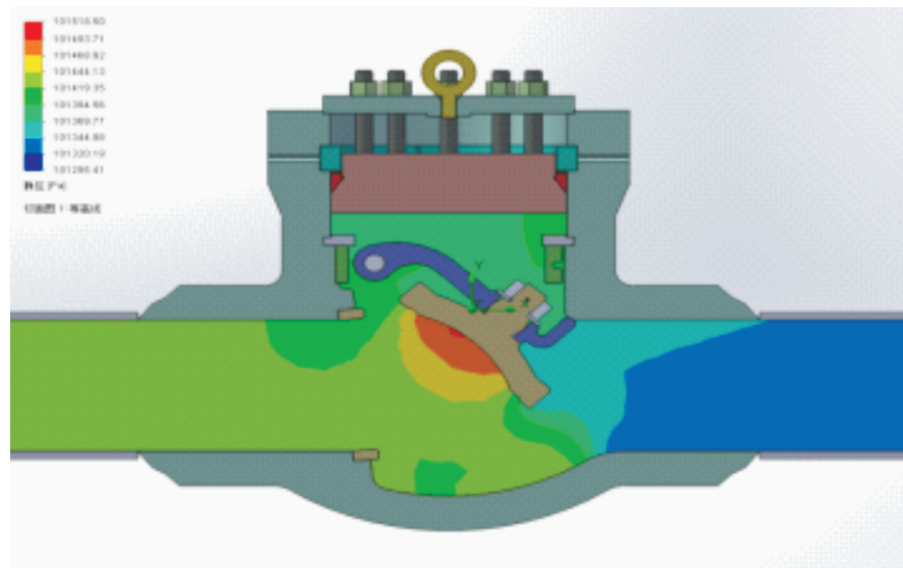


Bonnet stress analysis



Bonnet strain analysis

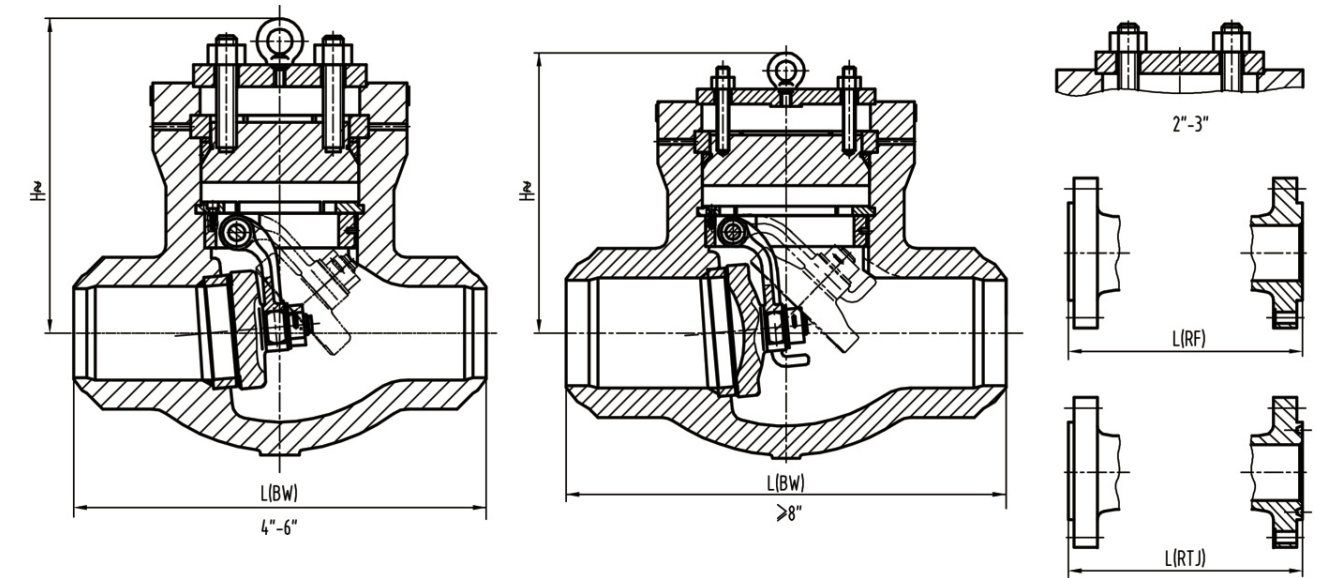
Flow analysis is to get the valve's flow resistance coefficient a C.V values, which is to achieve the purpose of optimizing the valve design.



Flow analysis

DIMENSIONS AND WEIGHTS

PRESSURE SEAL CAST STEEL SWING CHECK VALVES CLASS 900



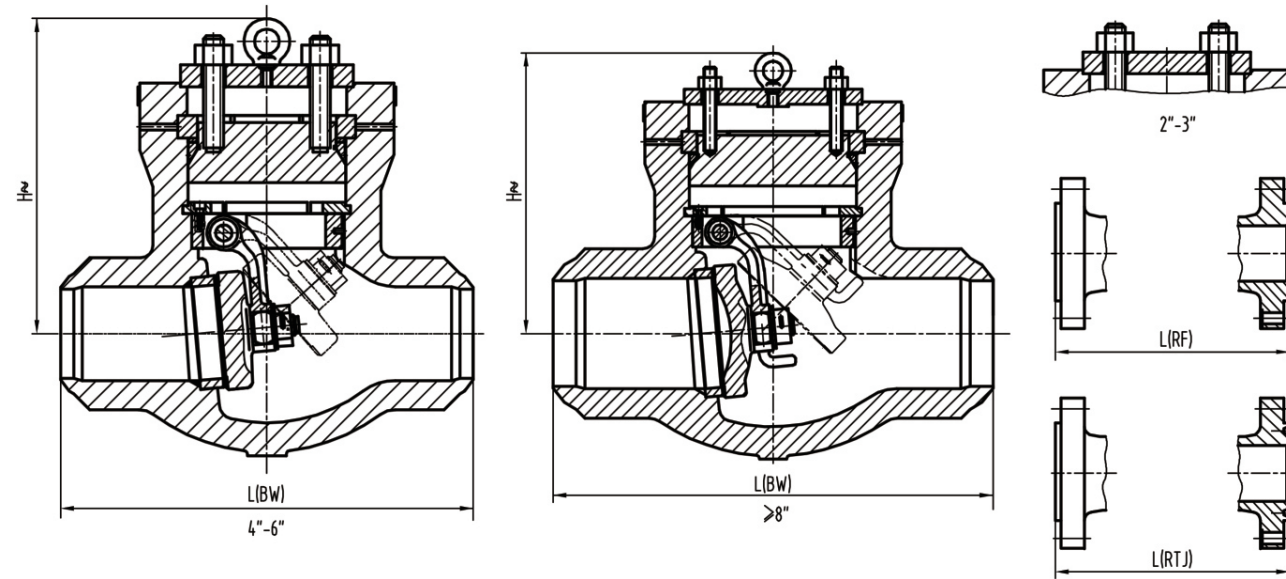
CLASS 900

NPS	In	2	3	4	6	8	10	12	14
DN	mm	50	80	100	150	200	250	300	350
L(BW)	mm	216	305	356	508	660	787	914	991
L(RF)	mm	368	381	457	610	737	838	965	1029
L(RTJ)	mm	371	384	460	613	740	841	968	1038
H≈	mm	209	245	284	357	412	479	550	613
WT(RF/RTJ)	Kg	47	58	89	218	399	627	946	1200
WT(BW)	Kg	23	38	63	138	264	430	668	875
C.V		139	257	480	1129	1990	3109	4544	5510

NPS	In	16	18	20	24	26	28	30
DN	mm	400	450	500	600	650	700	750
L(BW)	mm	1092	1219	1244	1422	1524	1625	1727
L(RF)	mm	1130	1219	1321	1549	—	—	—
L(RTJ)	mm	1140	1232	1334	1568	—	—	—
H≈	mm	670	752	881	889	1016	1066	1168
WT(RTJ)	Kg	1640	2162	3375	4795	—	—	—
WT(BW)	Kg	1252	1750	2700	3900	5050	5630	6380
C.V		7198	9480	11702	16850	19620	22170	24870

DIMENSIONS AND WEIGHTS

PRESSURE SEAL CAST STEEL SWING CHECK VALVES CLASS 1500



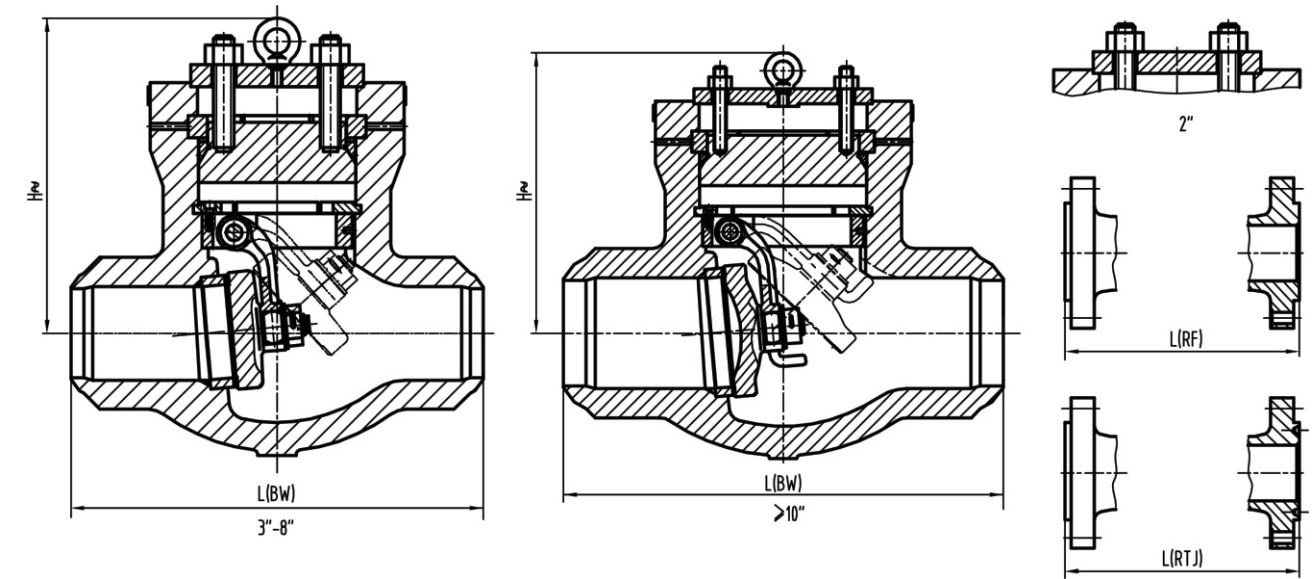
CLASS 1500

NPS	In	2	3	4	6	8	10	12	14
DN	mm	50	80	100	150	200	250	300	350
L(BW)	mm	216	305	406	559	711	864	991	1067
L(RF)	mm	368	470	546	705	832	991	1130	1257
L(RTJ)	mm	371	473	549	711	841	1001	1146	1276
H≈	mm	222	255	308	389	460	559	643	708
WT(RF/RTJ)	Kg	70	140	200	320	520	900	1300	1700
WT(BW)	Kg	25	48	91	208	402	701	1102	1375
C.V		127	238	421	990	1733	2708	3950	4750

NPS	In	16	18	20	24	26	28	30
DN	mm	400	450	500	600	650	700	750
L(BW)	mm	1194	1537	1473	1752	1854	1956	2057
L(RF)	mm	1384	1537	1664	1943	—	—	—
L(RTJ)	mm	1407	1559	1686	1971	—	—	—
H≈	mm	775	890	935	965	1041	1130	1180
WT(RTJ)	Kg	2500	3188	4170	4835	—	—	—
WT(BW)	Kg	1989	2550	3350	3870	5490	6760	8820
C.V		6200	8172	10245	14716	17272	19879	22586

DIMENSIONS AND WEIGHTS

PRESSURE SEAL CAST STEEL SWING CHECK VALVES CLASS 2500



CLASS 2500

NPS	In	2	3	4	6	8	10	12	14	16	18	20	24
DN	mm	50	80	100	150	200	250	300	350	400	450	500	600
L(BW)	mm	279	368	457	610	762	914	1041	1117	1244	1397	1397	1524
L(RF)	mm	451	578	673	914	1022	1270	1422	—	—	—	—	—
L(RTJ)	mm	454	584	683	927	1038	1292	1444	—	—	—	—	—
H≈	mm	272	296	363	445	539	665	735	740	787	812	863	1016
WT(RF/RTJ)	Kg	58	172.5	276.8	322.5	905	1750	2400	—	—	—	—	—
WT(BW)	Kg	44	83	144	276	543	1058	1596	2900	3700	4610	5400	6850
C.V		85	114	193	470	842	1338	1950	2372	3104	4070	4945	7163

LIFT CHECK VALVES INTRODUCTION

Lift check valve is a check valve which disc moves along the centerline of the body. Most of these valves installed in horizontal pipelines, spring structure can also be mounted on a vertical pipelines. Lift check valves are generally used in applications where pressure drop through the valve is not critical, although SUFA lift check valves have a relatively low pressure drop.

Lift check valve includes bolted bonnet forged steel lift check valves(as shown figure 3), pressure seal forged steel lift check valve(as shown figure 4), bolted bonnet cast steel lift check valves(as shown figure 5) and pressure seal cast steel lift check valve(as shown figure 6).

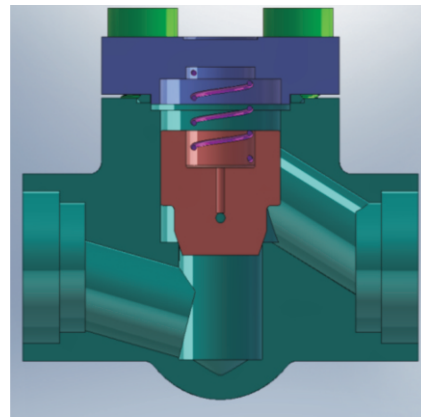


figure 3

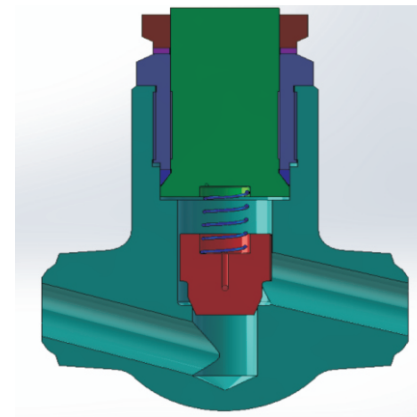


figure 4

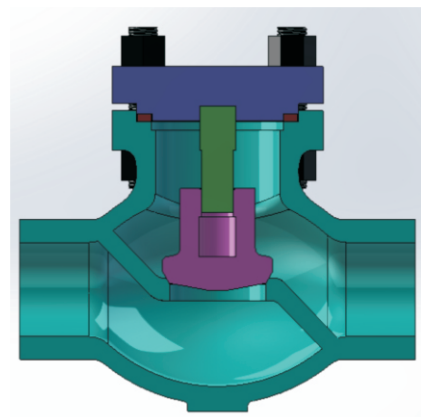


figure 5

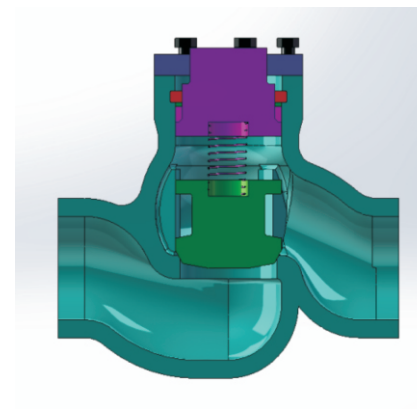


figure 6

INDUSTRY STANDARDS

Pressure/Temperature Ratings

Basic Design

Face-to-Face/End- to- End

Flange Dimensions

Butt-Welding End

Socket Welding End

Threaded End

Testing

ASME B16.34

BS1868 /API 602

ASME B16.10

ASME B16.5

ASME B16.25

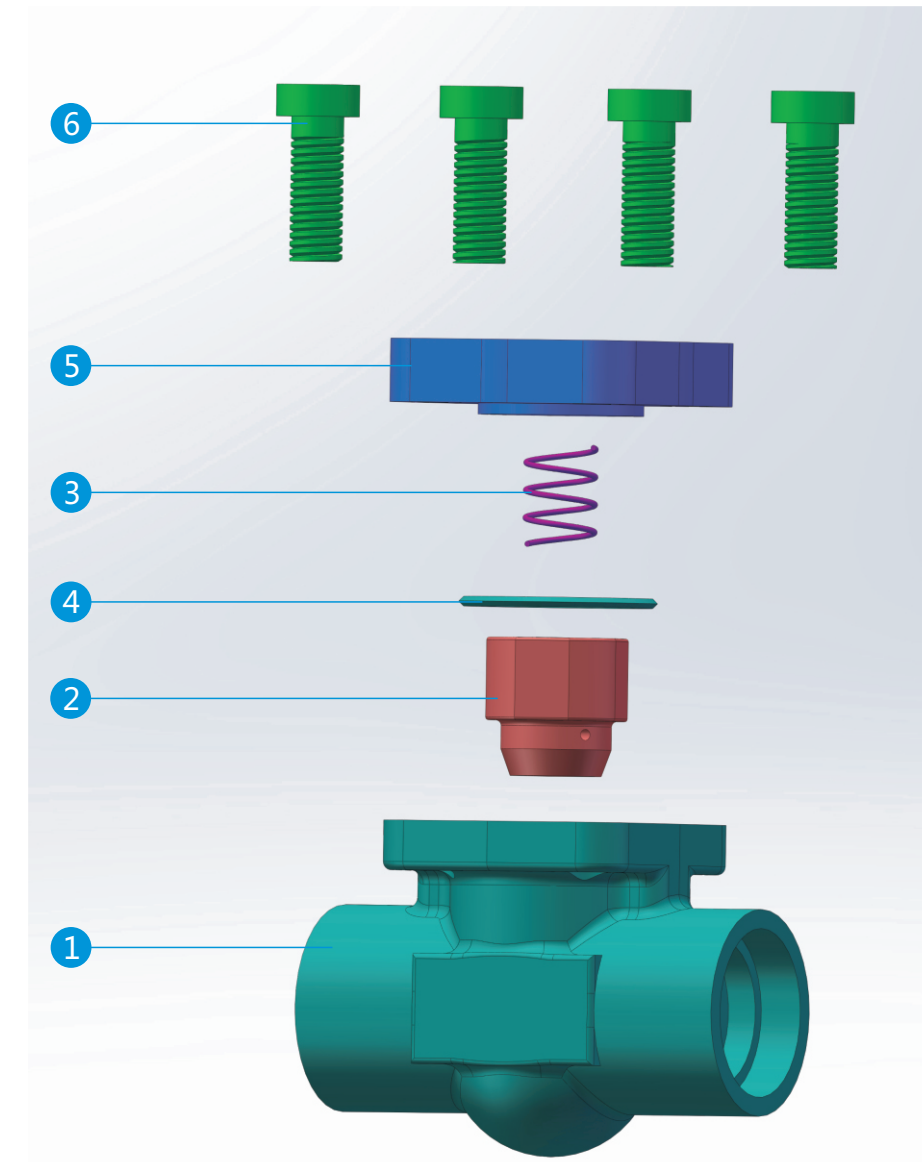
ASME B16.11

ASME B1.20.1

API 598

MAJOR FEATURE

BOLTED BONNET FORGED STEEL LIFT CHECK VALVES



NO. Name

1 Body

2 Disc

3 Spring

4 Gasket

5 Bonnet

6 Bolt

PRODUCT RANGE

CLASS 150 1/2" -2"

CLASS 300 1/2" -2"

CLASS 600 1/2" -2"

CLASS 800 1/2" -2"

DESIGN STANDARDS

BS 1868/API602

ASME B16.34

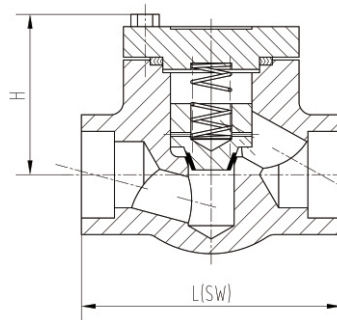
DESIGN FEATURES

Bolted Bonnet

Lift Disc

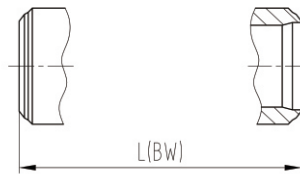
DIMENSIONS AND WEIGHTS

BOLTED BONNET FORGED STEEL LIFT CHECK VALVES CLASS 150~800



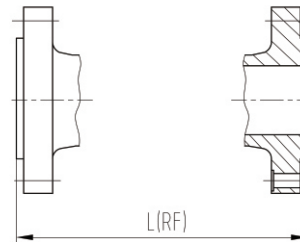
CLASS 150

NPS	In	1/2	3/4	1	1-1/2	2
DN	mm	15	20	25	40	50
L(SW/BW)	mm	76	86	102	117	133
L(RF)	mm	108	117	127	165	203
H≈	mm	70	70	70	70	70
WT(SW/BW)	Kg	1.6	1.7	3.2	4.1	6
WT(RF)	Kg	2	2.2	4	5	7.2



CLASS 300

NPS	In	1/2	3/4	1	1-1/2	2
DN	mm	15	20	25	40	50
L(SW/BW)	mm	76	86	102	117	133
L(RF)	mm	152	178	203	229	267
H≈	mm	70	70	70	70	70
WT(SW/BW)	Kg	1.6	1.7	3.2	4.1	6
WT(RF)	Kg	2.5	3	5	6.5	8.5



CLASS 600

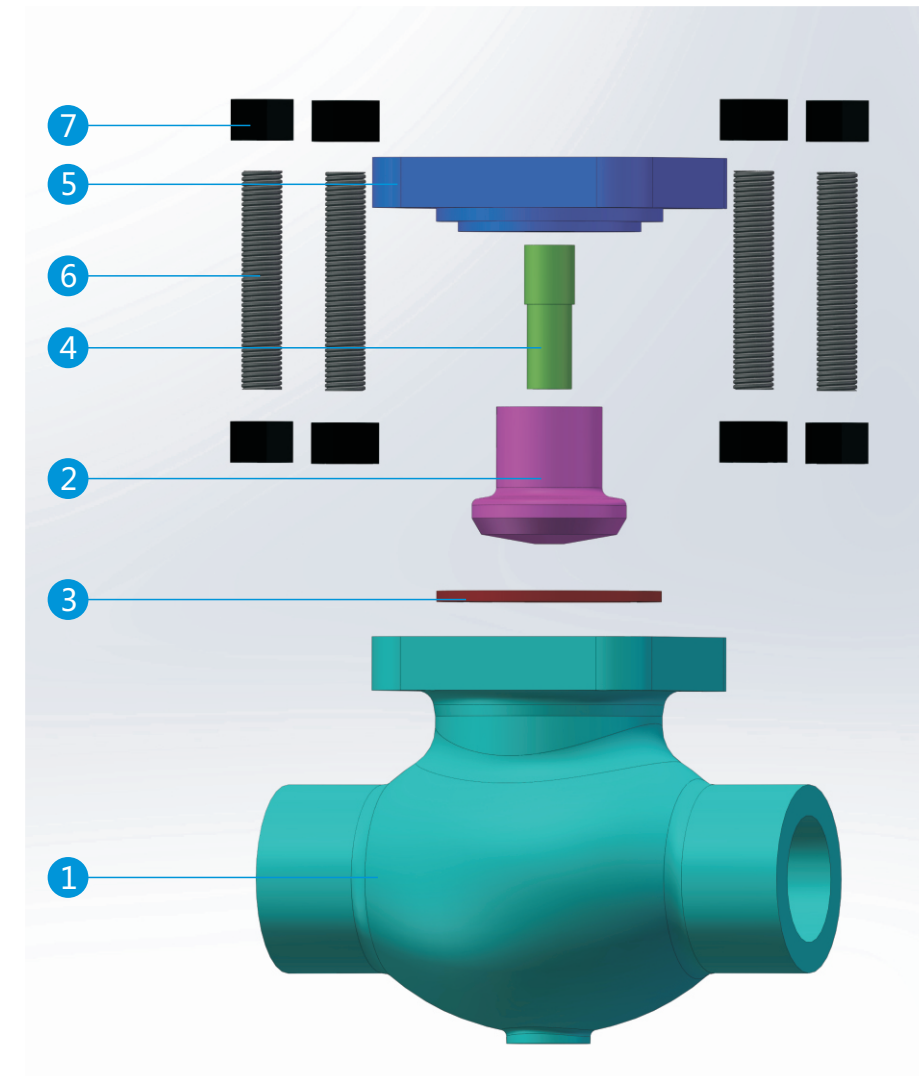
NPS	In	1/2	3/4	1	1-1/2	2
DN	mm	15	20	25	40	50
L(SW/BW)	mm	76	86	102	117	133
L(RF)	mm	165	190	216	241	292
H≈	mm	70	70	70	70	70
WT(SW/BW)	Kg	1.6	1.7	3.2	4.1	6
WT(RF)	Kg	2.8	3.5	6	8	10.8

CLASS 800

NPS	In	1/2	3/4	1	1-1/2	2
DN	mm	15	20	25	40	50
L(SW/BW)	mm	76	86	102	117	133
H≈	mm	70	70	70	70	70
WT(SW/BW)	Kg	1.6	1.7	3.2	4.1	6

MAJOR FEATURE

BOLTED BONNET CAST STEEL LIFT CHECK VALVES



NO. Name

- 1 Body
- 2 Disc
- 3 Gasket
- 4 Guide Pole
- 5 Bonnet
- 6 Stud
- 7 Nut

PRODUCT RANGE

CLASS 150	2" -8"
CLASS 300	2" -8"
CLASS 600	2" -8"

DESIGN STANDARDS

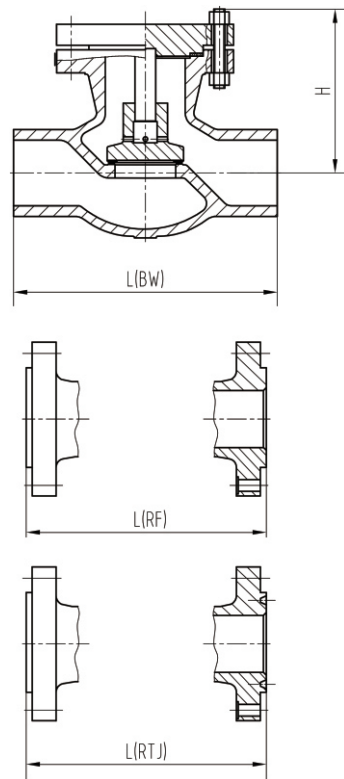
BS 1868/API602
ASME B16.34

DESIGN FEATURES

- Bolted Bonnet
- Lift Disc

DIMENSIONS AND WEIGHTS

BOLTED BONNET CAST STEEL LIFT CHECK VALVES CLASS 150~600



CLASS 150

NPS	In	2	2-1/2	3	4	5	6	8
DN	mm	50	65	80	100	125	150	200
L(RF/BW)	mm	203	216	241	292	356	406	495
L(RTJ)	mm	216	229	254	305	369	419	508
H	mm	235	265	285	325	368	385	450
WT(BW)	Kg	14.5	20.8	27.5	40	58	71.5	110
WT(RF/RTJ)	Kg	18.4	26.5	34.5	50	70	85	120
C.V		60	84	100	185	215	440	810

CLASS 300

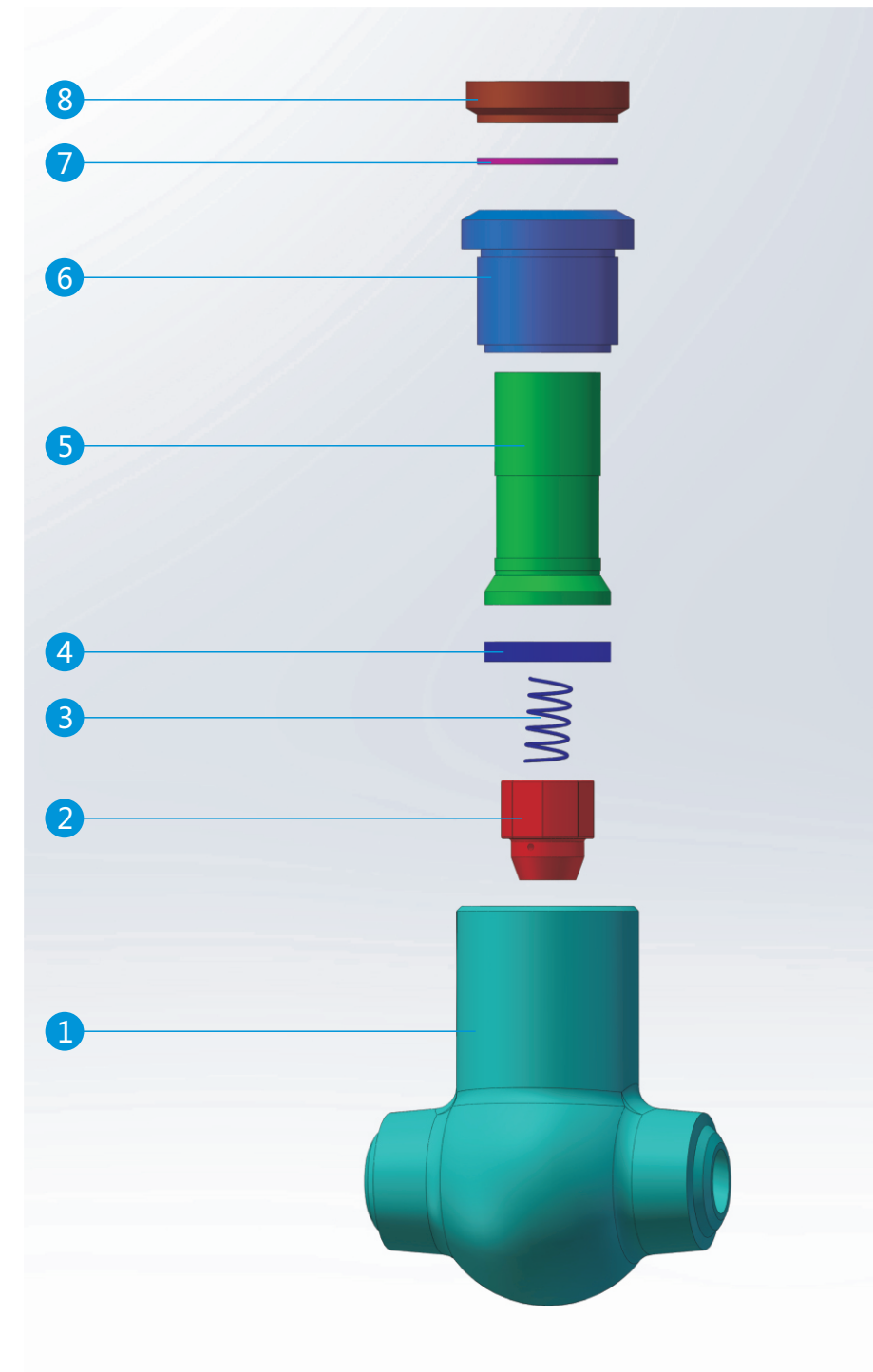
NPS	In	2	2-1/2	3	4	5	6	8
DN	mm	50	65	80	100	125	150	200
L(RF/BW)	mm	267	292	318	356	400	444	559
L(RTJ)	mm	283	308	334	372	416	460	575
H	mm	255	280	305	355	390	435	505
WT(BW)	Kg	18.5	30	37	58	95	114	198
WT(RF/RTJ)	Kg	24	36	48	75	115	145	240
C.V		60	84	100	185	215	440	810

CLASS 600

NPS	In	2	2-1/2	3	4	5	6	8
DN	mm	50	65	80	100	125	150	200
L(RF/BW)	mm	292	330	356	432	508	559	660
L(RTJ)	mm	295	333	359	435	511	562	663
H	mm	267	295	330	400	450	515	585
WT(BW)	Kg	25	34	48.5	80	130	194	334
WT(RF/RTJ)	Kg	31	43	60	105	170	235	395
C.V		58	84	100	185	335	440	780

MAJOR FEATURE

PRESSURE SEAL FORGED STEEL LIFT CHECK VALVES



NO. Name

- 1 Body
- 2 Disc
- 3 Spring
- 4 Stuffing Box
- 5 Sealing Ring
- 6 Washer
- 7 Stud
- 8 Nut

PRODUCT RANGE

CLASS 900	1/2" -2"
CLASS 1500	1/2" -2"
CLASS 2500	1/2" -2"

DESIGN STANDARDS

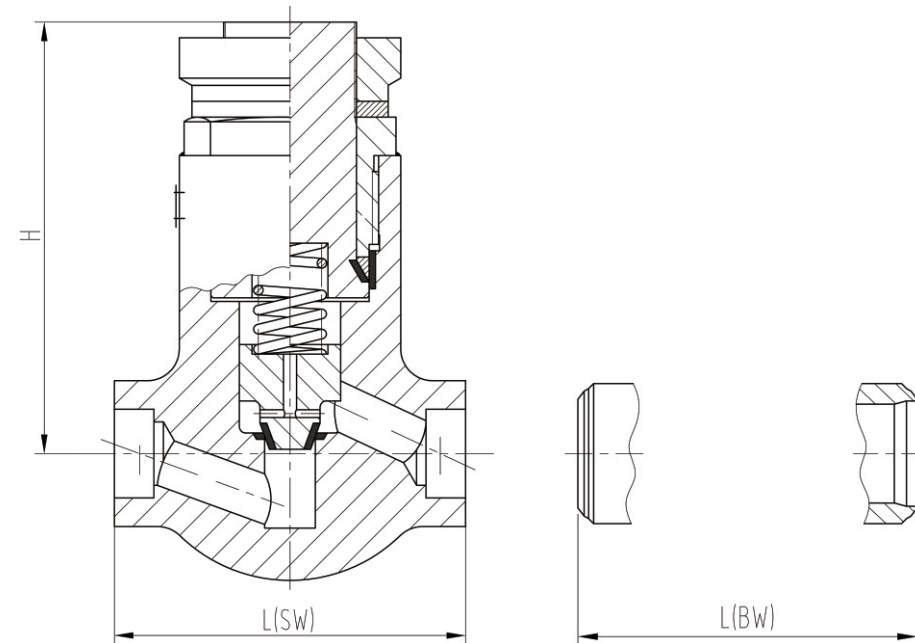
BS 1868/API602
ASME B16.34

DESIGN FEATURES

Pressure Seal
Lift Disc

DIMENSIONS AND WEIGHTS

RESSURE SEAL FORGED STEEL LIFT CHECK VALVES CLASS 900~2500



CLASS 900

NPS	In	1/2	3/4	1	1-1/2	2
DN	mm	15	20	25	40	50
L(BW/SW)	mm	110	111	127	152	216
H	mm	120	130	180	168	225
WT(BW/SW)	Kg	5.2	7.5	12.4	21	30

CLASS 1500

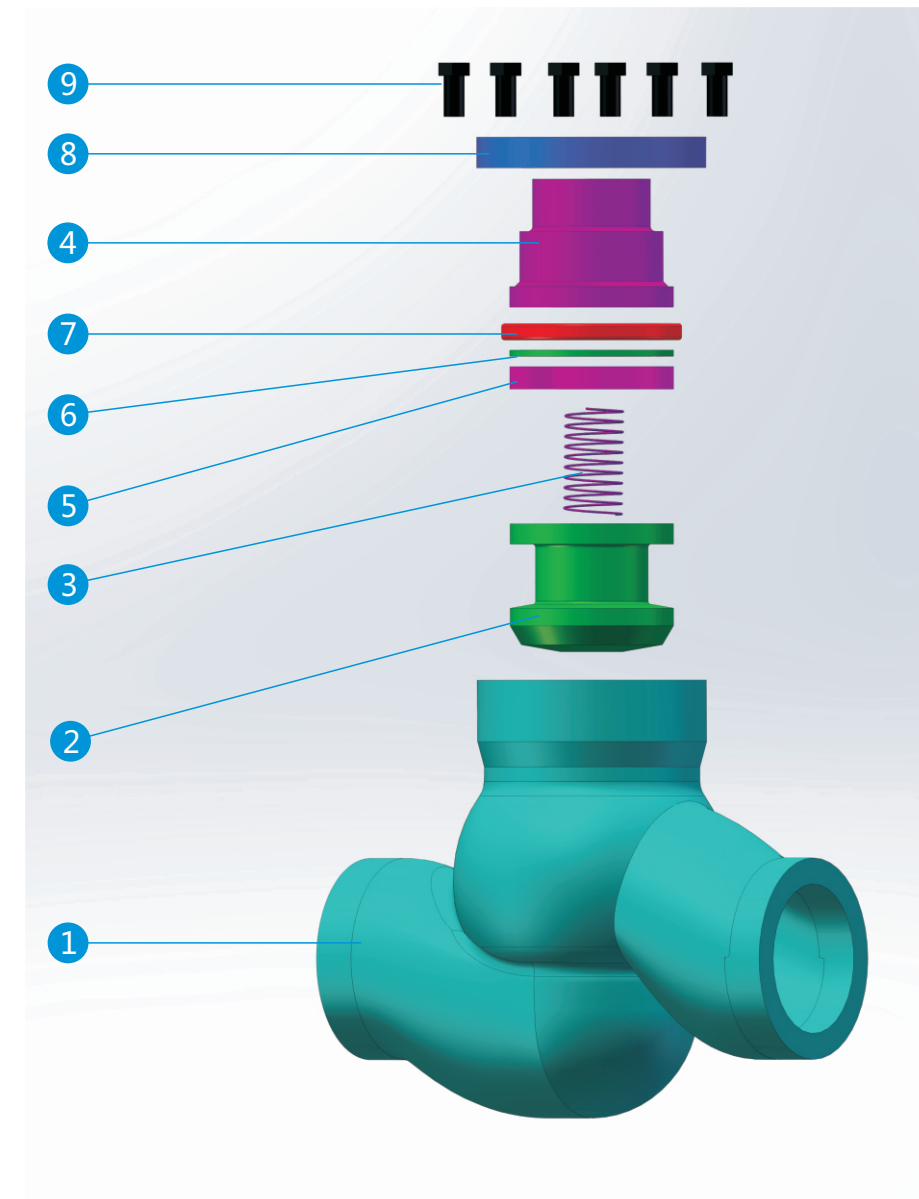
NPS	In	1/2	3/4	1	1-1/2	2
DN	mm	15	20	25	40	50
L(BW/SW)	mm	111	111	127	152	216
H	mm	120	131	180	170	230
WT(BW/SW)	Kg	6	8.9	15	25	45

CLASS 2500

NPS	In	1/2	3/4	1	1-1/2	2
DN	mm	15	20	25	40	50
L(BW/SW)	mm	111	138	190	210	279
H	mm	126	159	180	226	300
WT(BW/SW)	Kg	6.5	12	20.8	28.5	52

MAJOR FEATURE

PRESSURE SEAL CAST STEEL LIFT CHECK VALVES



NO. Name

- | | |
|---|---------------|
| 1 | Body |
| 2 | Disc |
| 3 | Spring |
| 4 | Stuffing Box |
| 5 | Sealing Ring |
| 6 | Washer |
| 7 | Quarter Ring |
| 8 | Bearing Plate |
| 9 | Bolt |

PRODUCT RANGE

CLASS 900	3" -12"
CLASS 1500	3" -12"
CLASS 2500	3" -12"

DESIGN STANDARDS

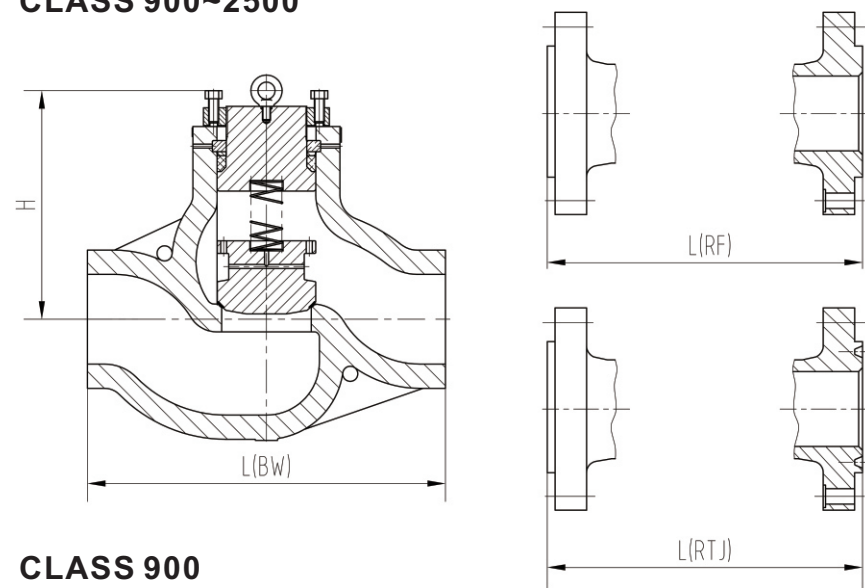
BS 1868
ASME B16.34

DESIGN FEATURES

Pressure Seal
Lift Disc

DIMENSIONS AND WEIGHTS

PRESSURE SEAL CAST STEEL LIFT CHECK VALVES CLASS 900~2500



CLASS 900

NPS	In	3	4	6	8	10	12
DN	mm	80	100	150	200	250	300
L(RF/BW)	mm	381	457	610	737	838	965
L(RTJ)	mm	384	460	613	740	841	968
H	mm	290	308	321	372	487	521
WT(BW)	Kg	110	141	196	275	409	611
WT(RF/RTJ)	Kg	145	195	270	380	590	810
C.V		110	200	530	910	1400	2000

CLASS 1500

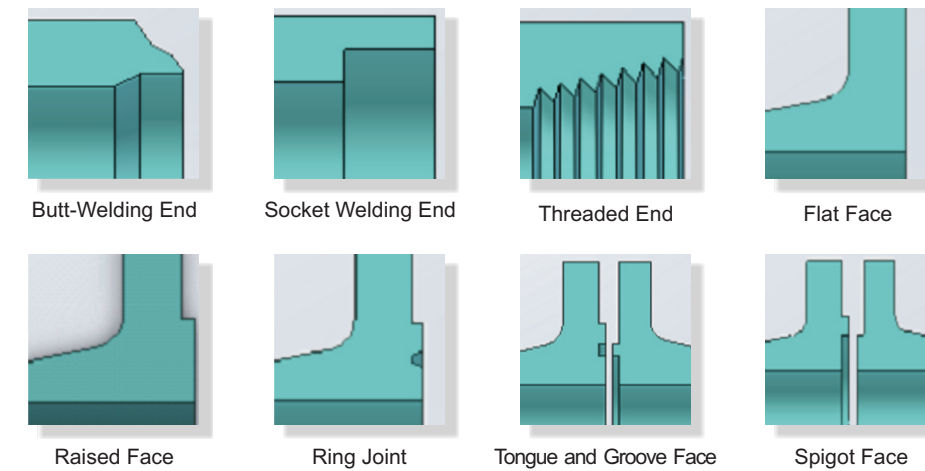
NPS	In	3	4	6	8	10	12
DN	mm	80	100	150	200	250	300
L(BW)	mm	470	546	705	832	991	991
H	mm	270	322	388	442	520	600
WT(BW)	Kg	80	176	270	372	516	679
C.V		110	200	465	790	1250	1750

CLASS 2500

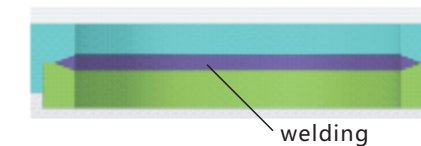
NPS	In	3	4	6	8	10	12
DN	mm	80	100	150	200	250	300
L(BW)	mm	578	673	914	1022	1270	1422
H	mm	305	400	505	612	730	860
WT(BW)	Kg	155	235	435	678	936	1236
C.V		68	110	310	530	980	1450

TYPE OF CONSTRUCTION

END CONNECTIONS



SEAT RING



Welded Seat Ring

This welded seat ring is suitable for the swing check valve.



Threaded Seat Ring

This threaded seat ring is suitable for the lift check valve, which NPS is 2" -8" (CLASS 150), 2" -6" (CLASS 300) and 2" -5" (CLASS 600).

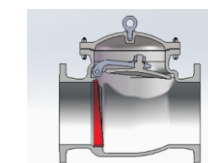


Integral Seat Facing

Integral seat facing is suitable for CLASS 900 and more pressure lift check valve. Sealing facing include integral seat facing or hard facing or other material.

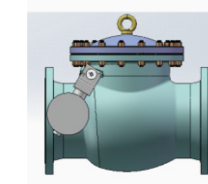
integral or deposit welding seat facing

SPECIAL REQUIREMENTS



Full Open Check Valve

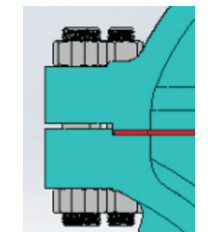
Depending on the customer's requirements, the check valve can be designed to fully open in accordance with the API 6D.



Dash Pot Check Valve

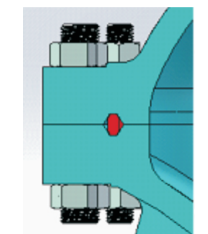
Depending on the customer's requirements, the check valve can be designed With a Hammer or a damping cylinder, which can help check valve Quick open and slow close or quickly closed slowly opening ,in order to reduce the disc impact.

BODY-TO-BONNET JOINT



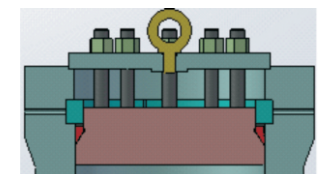
Raised Face

CLASS 150-CLASS 600



Ring Joint

CLASS 600-CLASS2500



Pressure Seal

CLASS 900-CLASS 2500

Sealing material:
Graphite or Metal

SPECIAL SERVICE

NACE Valves

SUFA NACE valves are applicable to the oil exploration and natural gas where contain hydrocarbon medium, such as H₂ and H₂S. The NACE valves can prevent materials crack including sulfide stress cracking (SSC), stress corrosion cracking (SCC) and hydrogen induced cracking (HIC), which are caused by H₂S, since a long time under acidic conditions.

[The quality control of SUFA NACE valves:](#)

1. Material and heat treatment are in strict accordance with NACE MR0175 standard requirements, without using

material which is untested proved.
2. Strengthen heat treatment quality control of materials, with particular emphasis on the hardness control of the weldment's base and heat-affected zone, ensuring the hardness of the base and the heat-affected zone are similar, and the welding parts should be annealing to reduce the sensitivity of the SSC.
3. The hardness of the base material, weld and heat-affected zone should be less than or equal 22HRC (after heat treatment to eliminate stress).

Valve Parts	ASTM Specification	NACE Hardness	API 600 Hardness
Body/Bonnet	A216 WCB	≤HRC 22(234HB)	---
Disc	A216 WCB+13Crdeposit**	≤HRC 22(234HB)	≥250HB*
Seat Rings	A105+13Crdeposit**	≤HRC 22(234HB)	≥250HB*
Hinge Pin	A276 410	≤HRC 22(234HB)	≥200HB
Plug	A276 410	≤HRC 22(234HB)	---
Cage Nut	A276 410	≤HRC 22(234HB)	≥250HB
Lock Washer	A276 410	≤HRC 22(234HB)	
Bonnet Bolts	A193 B7M	≤HRC 22	---
Bonnet Nuts	A194 2HM	≤HRC 22	---

* Hardness differential of 50 HB is required between the seats.

** Double Tempered

Hydrogenation Valves

SUFA Hydrogenation valves are applicable to the hydrotreater where include oil, hydrogen, sulfide, and their mixture or other conditions. They can protect the valves' reliability from harsh conditions, which include Metallic materials' variability caused by hydrogen ions and H₂S stress corrosion cracking under the room temperature (SSC), Hydrogen ions to the inside and outside of the metal decarbonization, rapid and uniform corrosion caused by H₂S, Stress corrosion cracking is accelerated by hydrogen and chloridion together under the high temperature(HIC).

[The quality control of SUFA Hydrogenation valves:](#)

1. Using reasonable structure design, the maximum to avoid stress concentration and stress corrosion generation in the harsh conditions.
2. Material and heat treatment are in

strict accordance with hydrogenation standard requirements, without using material which is untested proved.
3. Carbon steel and alloy steel use the electric furnace + VOD or furnace + AOD smelting method. And strictly control the material's chemical composition and mechanical properties, such as the content of sulfur, phosphorus and other harmful impurities elements, grain size, non-metallic entrainment and other indicators.
4. Body and bonnet of SUFA hydrogenation valves not only apply RT or UT inspection, but also apply the whole surface MT or PT.
5. In addition to routine factory tests, and increase low pressure gas seals test, micro-leakage test, and high-pressure gas strength test according to user requirements.

THE SELECTION RECOMMENDATION TABLE OF SUFA HYDROGENATION VALVE BODY MATERIAL.

Medium	Temperature	Body Material
Oil	≤260°C	ASTM A105、ASTM A216 WCB
Oil	261-350°C	ASTM A105、ASTM A216 WCB
Oil	261-350°C	ASTM A182 F321 or F347、ASTM A351 CF8C
H ₂	≤260°C	ASTM A105、ASTM A216 WCB
H ₂ +H ₂ S	≤200°C	ASTM A105、ASTM A216 WCB
H ₂ +H ₂ S	201-280°C	ASTM A182 F11、ASTM A217 WC6
H ₂ +H ₂ S	281-350°C	ASTM A182 F22、ASTM A217 WC9
H ₂ +H ₂ S	≥351°C	ASTM A182 F321 or F347、ASTM A351 CF8C
Oil+H ₂ +H ₂ S	≤200°C	ASTM A105、ASTM A216 WCB
Oil+H ₂ +H ₂ S	201-280°C	ASTM A182 F11、ASTM A217 WC6
Oil+H ₂ +H ₂ S	281-350°C	ASTM A182 F22、ASTM A217 WC9
Oil+H ₂ +H ₂ S	≥351°C	ASTM A182 F321 or F347、ASTM A351 CF8C

TESTING AND INSPECTION

TESTING

General valve, NACE Valves and Hydrogenation Valves testing are according to the API598. However, Hydrogenation Valves testing time is two times of the requirements, and full (100%) valves must be done high

pressure seal testing with liquid and gas seal testing with 0.6MPa. Hydrogenation valves' micro leak testing is according to requirements of the ISO 15848. The testing of Various valve are as follows.

Test Description	Valve Type		
	General valve	NACE Valves	Hydrogenation Valves
shell	√	√	√
backseat	—	—	—
low-pressure closure	optional	optional	√
high-pressure closure	√	√	√
Micro leak testing	—	—	√

NOTE:

1. The high-pressure closure includes seat ring and disc seal, body and bonnet flange seal.
2. When the purchaser specifies an "optional" test, the test shall be performed in addition to the required tests.
3. When there are clear requirements for the testing items in the order, the testing must be carried out with requirements of the order.

INSPECTION

The inspections of SUFA various types of valves are in accordance with ASME and other related code requirements. According to the different operating conditions and quality controls, the inspection items of the bearing pressure components (including stem) are shown in the following table.

Inspection Items	Valve Type			Normative References
	General valve	NACE Valves	Hydrogenation Valves	
Visual inspection	√	√	√	MSS SP-55
Dimensions	√	√	√	Design Requirements
Hardness control	a	√	√	NACE MR0175
Chemical composition	√	√	√	Relevant Material specifications of ASTM
mechanical properties	√	√	√	Relevant Material specifications of ASTM
Forging ultrasonic testing	b	b	√	ASTM A388
Casting ray testing	c	c	√	ASME B16.34
Surface magnetic particle and penetrant testing	—	—	d	MT: ASTM A275, ASTM E709; PT: ASTM E165
Surfacing sealing surface penetrant testing	√	√	√	ASME BPVC VIII
Butt end beveling ray testing and surface penetration testing	√	√	√	ASME B16.34
others	—	—	e	

NOTE:

1. When there are clear requirements for the inspection items in the order, the inspection must be carried out with requirements of the order.
- a—The bearing pressure components of General valve' hardness reference requirements of the ASTM code.
- b—General valves and NACE valves, which pressure rating is CLASS≥900, the forgings do the ultrasonic testing, however hydrogenation valves are all done in all pressure ratings.
- c—General valves and NACE valves, which pressure rating is CLASS≥900, the Castings do ray testing, however

- hydrogenation valves are all done in all pressure ratings.
- d—The outer surface and the inner surface which can be reached of the carbon steel and alloy steel bearing pressure components shall be magnetic particle testing everyone, and penetrant testing for stainless steel. Of course, penetrant testing can take the place of magnetic particle testing for carbon steel and alloy steel.
- e—The hydrogenation valves also need to inspect the content of harmful elements(such as S and P), grain size, metallurgical structure and so on.