



Langley Valves, Gate, Globe & Check Valves

API 600, API 603/ASME B16.34 Designs
Class 150-2500: DN15-760 (2-30")
Cast Stainless Steel and Nickel Alloys

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COMPANY PROFILE

YPS Valves Ltd is one of Europe's leading manufacturers of special purpose & commodity stainless steel & high alloy valves with over 40 experience supplying valves of our own design range under the Langley brand name. YPS valves is also an approved stockist of a complete range of international brands which are all suitable for our fast track design & modification service which includes amongst many things conversions to bellow seal or cryogenic types & a high temperature emission certified product.

Our Langley valve can be manufactured to suit end user applications and specifications ranging from high alloy valves with specialist features for critical service or manufactured to industry standard valve requirements.

Our Langley range is designed and quality controlled under strict adherence to ISO 9001: 2008 and in accordance with PED Category 3, module H. All relevant valves are CE marked by YPS Valves Ltd and certified to the required specification and standards.

YPS Valves Ltd is committed through the manufacture of our Langley range of valves to provide the end user with a product that meets their service requirements & applications including a full design & technical support facility. Our continuing commitment to quality, service & delivery has enabled YPS & our Langley brand to be selected & supplied to international end user such as Exxon, Mobil, Shell, BP, Chevron, Sasol & Sinopec etc. See catalogue.

For more information please visit our website: **www.yps-valves.co.uk**



Rachel Wormald
Managing Director YPS Valves Ltd



Adrian Ducker
Chairman YPS Valves Ltd

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YPS Valves Ltd has over 40 years experience producing bespoke and individually specified Langley Valves.

Langley Valve Stainless Product Range Includes:

- Wedge Gate Valves
- Wedge In Wedge (Catalyst) Gate Valves for High Temperature Service
- Globe and Y Type Globe Valves
- Check Valves including wafer check
- Two Piece Swing Check Valves For Corrosive Service Applications
- Bellows Sealed Valves
- Wrought Gate, Globe and Check Valves
- Elevated Temperature and Cryogenic Service Valves
- ASME B16.34/API603, API 600/ISO 10434, API 602/ISO 15761, BS1868 and BS 1873 Designs

All valves are manufactured in accordance with ISO 9001: 2008 (design, manufacturing and testing) and to PED Category 3, Module H. and in accordance with Pressure Equipment Directive 97/23/EC



Modern production facilities and highly skilled operatives are employed.



All valves are assembled and quality checked prior to testing.



Castings for production

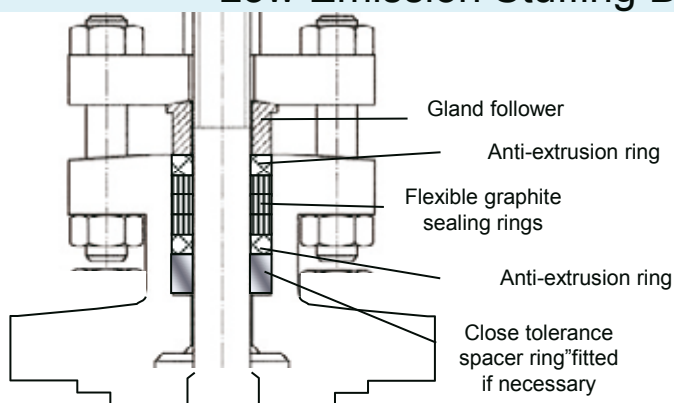


** Where specifications permit, Langley stock valves can be modified to suit end user service applications reducing lead times*



Every valve is 100% tested to API 598 or to end user requirements .

Low Emission Stuffing Box Design As Standard



Fire resistant 99.5% pure graphite packing material, which contains no PTFE or other organic materials are used in all valve stuffing boxes as standard in accordance with major end user specifications.

From cryogenic to high temperature service, - 200°C to 650°C.

Stuffing box clearances are optimised for flexible graphite low emission design to comply with all current emission rules.

Standard gaskets are spiral wound graphite filled or graphite reinforced

PRODUCTION AND SPECIALIST TESTING for Valves and Related Assemblies

YPS Valves Ltd are committed to the continual improvement of our Langley range of valves. Our comprehensive testing facility acquired from Leeds University enables us to continually assess the performance of our Langley Valve product range.

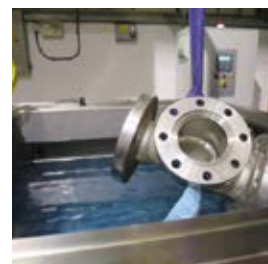
YPS Valves Ltd includes and provides a complete testing service under quality controlled approved and inspected systems ensuring valves are certified to meet the requirements of the design and end user specifications.

Testing Services include:

- Hydrostatic Pressure Testing up to 700 bar (10,000 PSI) including butt weld end assemblies.
- Low Temperature Cryogenic Testing up to 500 bar (7250 PSI) and down to -196°C
- Elevated Temperature Testing up to 700°C.
- Elevated and Sub Zero Emission testing.
- Liquid Dye Penetrant Testing to ASME and ASTM E165 with PCN level 2 Operative Qualification.
- Positive Material Identification Testing PAMI, or PMI utilising Spectro Analyser.
- Ultra sonic cleaning for oxygen service. Capacity 1500kg

All our tests are conducted in accordance with Industry standards and end user specifications including API598, API 600, BS EN ISO15848 (Shell 77/312) fugitive emission test and BS6364Shell (77/200) Valves in low temperature and cryogenic service.

Where required our Specialist Test Technical Engineers can provide bespoke methods and procedures should a valve require to achieve and satisfy specification over and above Internationally recognised standards and procedures.



Ultra Sonic degreasing centre for cleaning Oxygen service valves up to 1500Kg)



High Pressure Gas Test Panel capable of 500 barg (7150 PSI) with video link to Test Cell



Emission Tests are conducted via Maspectrometer Leak detector

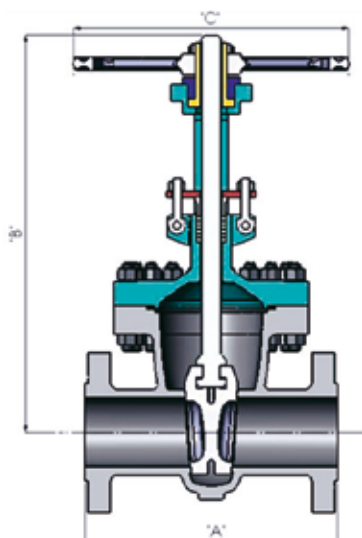


Test Cell with blast walls



Up to 24" Bore, 3 Ton (3000kg) capability

LANGLEY RANGE Cast Gates Stainless Steel and Nickel Alloys to API 600



Features

Ø - Wall thickness to API 600/ISO 10434 which exceeds ASME B16.34/EN 12516 by a minimum of 3mm.

Ø - Full Bore, Bolted Bonnet, OS & Y.

Ø - Castings production method qualified to ASME B16.34 sect. 8

Ø - Integral seats

Ø - Flexible Graphite low emissions stuffing box

Ø - Bubble tight shut off to API 598, better than ANSI class V and VI

Ø - Wetted parts conform to NACE MR-01-75

Ø - Traceable body shell materials

Ø - CE marked products to PED 97/23/EC

Options

Ø - Austenitic, and Duplex Stainless Steels; Nickel Alloys and Superalloys

Ø - Flexible wedge on 2" and greater

Ø - Bonnet extensions for low & high temperatures

Ø - Hardfaced trim for non-lubricating fluids

Ø - Soft seats for searching applications below 220 °C

Ø - Live loaded gland packing

Ø - Flat, spiral wound and ring type bonnet gaskets

Ø - Indicator and locking device

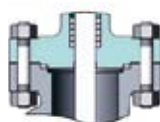
Ø - Impactor handwheels, reduction gears

Ø - Radiographic quality levels 2 or 1 to E446

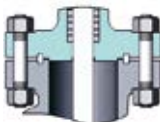
Ø - Special functional and material testing

Dimensions

Class	Size	DN	A (mm)	B (mm)	C (mm)	Wt (Kg)	Cv (usgpm)
150#	0.5"	15	108	227	127	5.5	16
	0.75"	20	118	238	127	7.0	38
	1"	25	127	282	178	9.5	70
	1.5"	40	165	343	203	16.5	164
	2"	50	178	375	203	20.0	307
	3"	80	203	502	229	37.0	709
	4"	100	229	606	254	54.0	1290
	6"	150	267	832	305	96.0	3100
	8"	200	292	1042	500	173	5710
	10"	250	330	1355	508	278	8920
	12"	300	356	1500	508	332	13300
	14"	350	381	1651	559	433	16200
300#	16"	400	406	1854	559	572	21500
	18"	450	432	2090	661	726	28600
	20"	500	457	2312	711	876	35700
	24"	600	508	2731	762	1344	52100
	0.5"	15	140	229	127	5.0	16
	0.75"	20	152	240	127	6.4	38
	1"	25	165	286	178	10.0	70
	1.5"	40	191	343	203	19.5	164
	2"	50	216	448	203	29.0	307
	3"	80	283	549	254	53.1	709
	4"	100	305	648	305	100	1290
	6"	150	403	959	406	220	3100
600#	8"	200	419	1067	508	263	5710
	10"	250	457	1448	508	353	8920
	12"	300	502	1626	559	567	13300
	14"	350	562	1816	660	780	16200
	16"	400	638	2089	711	1025	21500
	18"	450	714	2311	762	1352	27800
	20"	500	791	2540	800	1687	34800
	24"	600	1143	2845	900	2059	51000
	0.5"	15	165	273	152	9.1	16
	0.75"	20	190	286	152	9.6	38
	1"	25	216	359	152	15.0	70
	1.5"	40	241	451	216	29.5	164
900#	2"	50	292	495	216	39.5	307
	3"	80	356	603	330	73.9	709
	4"	100	432	686	406	118	1290
	6"	150	559	1010	508	234	3100
	8"	200	660	1300	610	463	5520
	10"	250	787	1511	660	658	8480
	3"	80	381	690	325	151	648
	4"	100	457	795	375	248	1210
	6"	150	610	1070	560	495	2850
	8"	200	737	1305	650	741	5020
	0.5"	15	216	378	152	18.1	16
	0.75"	20	229	403	152	27.2	31
1500#	1"	25	254	426	216	44.9	52
	1.5"	40	305	533	254	70.0	136
	2"	50	368	610	508	106	268
	3"	80	470	826	559	254	595
	4"	100	546	965	300	370	1060
	6"	150	705	1232	600	762	2480
	8"	200	832	1435	600	1461	4370
	10"	250	991	1727	600	2408	7830



Fully confined spiral wound gasket standard except on CI 150 gates 3" and larger



Oval Section Ring type bonnet joint option on class 600 and above



Flat gasket on CI 150 gates 3" and larger

LANGLEY RANGE Cast Globes in Stainless Steel and Nickel Alloys to BS1873



Features

Ø - BS1873 generally to API 600, Heavy wall, exceeds ASME B16.34/EN 12516 wall thickness by minimum of 3mm.

Ø - Full Bore, Bolted Bonnet, OS & Y.

Ø - Castings production method qualified to ASME B16.34 sect. 8

Ø - Integral seat

Ø - Flexible Graphite low emissions stuffing box

Ø - Bubble tight shut off to API 598, better than ANSI class V and VI

Ø - Wetted parts conform to NACE MR-01-75

Ø - Traceable body shell materials

Ø - CE marked products to PED 97/23/EC

Options

Ø - Austenitic, and Duplex Stainless Steels; Nickel Alloys and Superalloys

Ø - Bonnet extensions for low & high temperatures

Ø - Hardfaced trim for non-lubricating fluids.

Ø - Needle disc for flow setting applications eg control valve bypass

Ø - Check and Feed or Screw-Down-Non-Return, functions as check valve when open

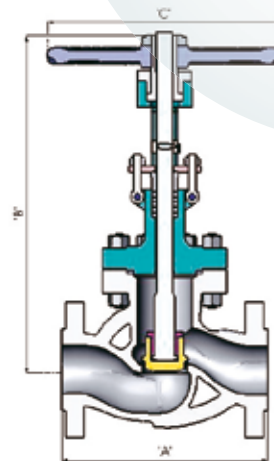
Ø - Soft disc insert for searching applications to 220C

Ø - Live loaded gland packing

Ø - Flat, spiral wound and ring type bonnet gaskets

Ø - Indicator and locking device

Ø - Impactor handwheels, reduction gears.

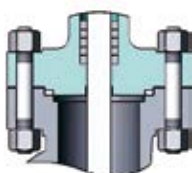


Dimensions

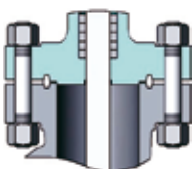
Class	Size	DN	A (mm)	B (mm)	C (mm)	Wt (Kg)	Cv (usgpm)
150#	0.5"	15	108	156	89	3.2	2.4
	0.75"	20	118	191	89	4.5	5.6
	1"	25	127	257	114	6.3	10
	1.5"	40	165	283	152	12.7	24
	2"	50	203	324	203	17.7	46
	3"	80	241	394	254	35.4	107
	4"	100	292	476	254	65.3	195
300#	6"	150	406	565	381	110.0	469
	8"	200	495	711	508	191	864
	10"	250	622	876	610	263	1340
	0.5"	15	152	206	89	5.0	2.4
	0.75"	20	178	229	89	6.8	5.6
	1"	25	203	279	114	11.3	10
	1.5"	40	229	340	203	20.4	24
600#	2"	50	267	372	203	26.3	46
	3"	80	318	457	254	60.3	107
	4"	100	356	514	331	84.0	195
	6"	150	445	749	457	185	469
	8"	200	559	781	508	303	864
	0.5"	15	165	254	89	7.1	2.4
	0.75"	20	191	279	114	12.7	5.6
900#	1"	25	216	311	152	15.3	10
	1.5"	40	241	375	203	28.6	240
	2"	50	292	457	203	42.0	46
	3"	80	356	572	381	75.3	107
	4"	100	432	686	559	127	195
	6"	150	559	857	686	315	469
	3"	80	381	620	450	157	105
1500#	4"	100	457	765	520	336	198
	6"	150	610	1016	610	750	465
	8"	200	737	1140	610	982	820
	0.5"	15	216	318	152	14.9	2.4
	0.75"	20	229	318	152	16.8	4.8
	1"	25	254	397	203	33.1	8.0
	1.5"	40	305	467	305	54.4	21
	2"	50	368	695	381	123	41
	3"	80	470	826	508	254	90
	4"	100	546	965	610	533	160
	6"	150	705	1300	610	1195	376

Ø - Special functional and material testing

Ø - Radiographic quality levels 2 or 1 to E446

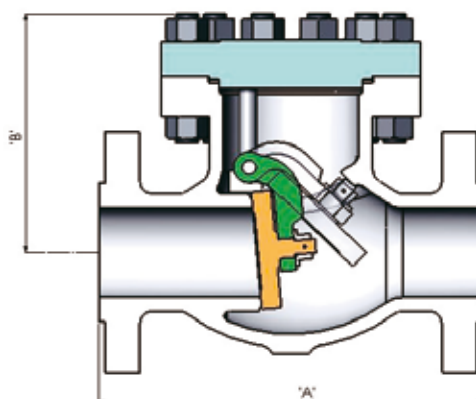


Fully confined spiral wound gasket standard

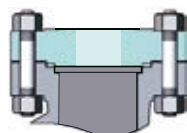


Oval Section Ring type bonnet joint option on class 600 and above

LANGLEY RANGE Cast Swing Checks in Stainless Steel and Nickel Alloys to BS1868



Features



Fully confined
spiral wound
gasket standard

Ø - API 6D regular opening and BS1868
generally to API 600 Heavy wall, exceeds
ASME B16.34/EN 12516 wall thickness by 3mm

Ø - Full Bore, Bolted Cover, swing disc

Ø - Castings to ASTM E446 Level 3

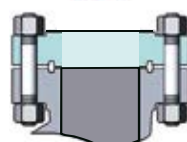
Ø - Integral seat

Ø - Wetted parts conform to NACE MR-01-75

Ø - Traceable body shell materials

Ø - CE marked products to PED 97/23/EC

Options



Oval Section
Ring type cover
joint option on
class 600 and
above

Ø - Austenitic, and Duplex Stainless Steels;
Nickel Alloys and Superalloys

Ø - Hardfaced trim for non-lubricating fluids

Ø - Soft seats for searching applications below 220 °C

Ø - Flat, spiral wound and ring type bonnet gaskets

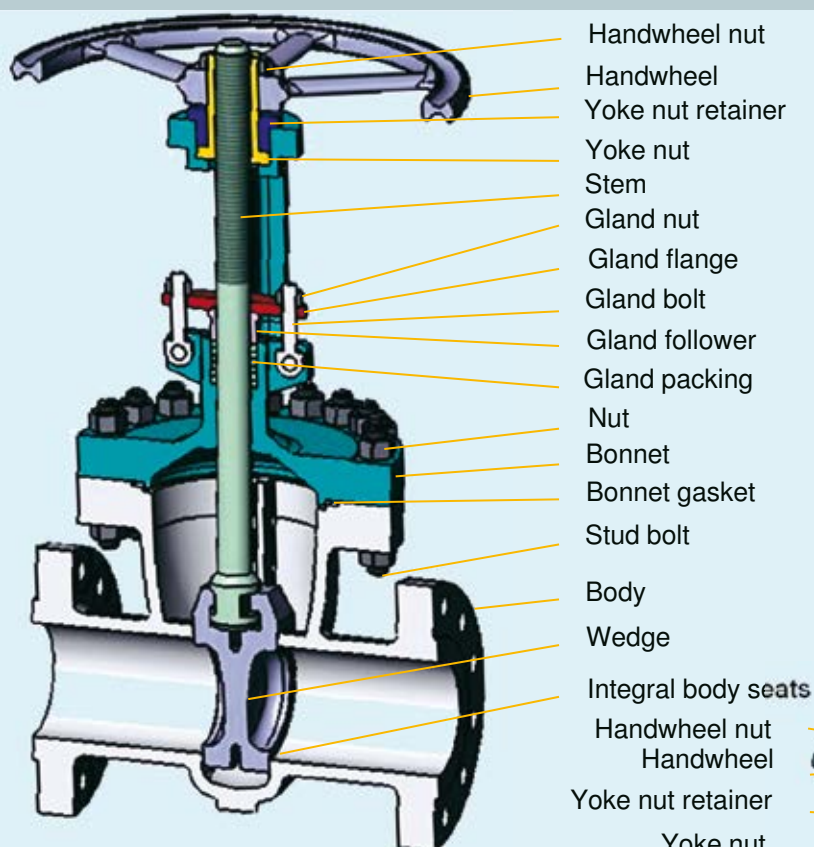
Ø - Radiographic quality levels 2 or 1 to E446

Ø - Special functional and material testing

Dimensions

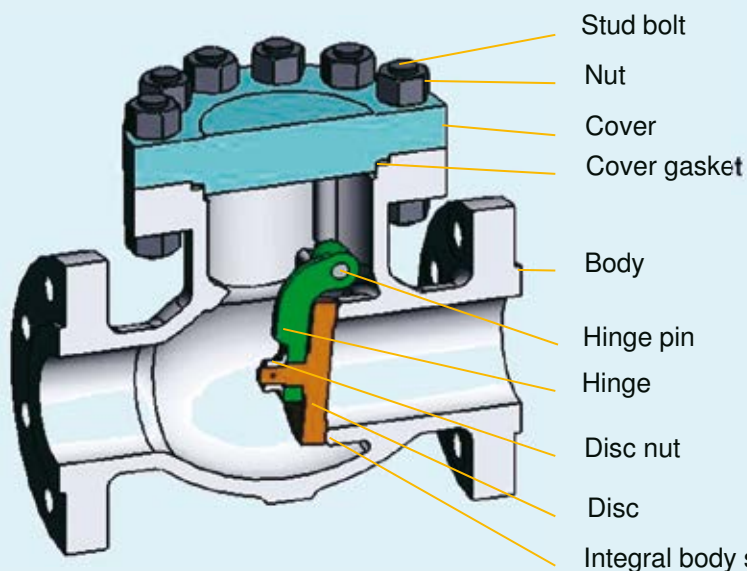
Class	Size	DN	A (mm)	B (mm)	Wt (Kg)	Cv (usgpm)
150#	0.5"	15	108	95	2.8	10
	0.75"	20	118	101	4.1	18
	1"	25	127	111	5.0	31
	1.5"	40	165	130	10.0	76
	2"	50	203	152	14.5	120
	3"	80	241	184	25.7	280
	4"	100	292	216	47.6	520
	6"	150	356	235	82.5	1200
	8"	200	495	295	137	2300
	10"	250	622	355	216	3600
	12"	300	698	419	356	5400
	14"	350	787	453	431	6600
300#	0.5"	15	152	98	3.2	10
	0.75"	20	178	105	5.4	18
	1"	25	216	121	7.1	31
	1.5"	40	241	146	16.4	76
	2"	50	267	174	25.6	120
	3"	80	318	216	49.0	280
	4"	100	356	238	71.7	520
	6"	150	444	311	141	1200
	8"	200	533	380	218	2300
	10"	250	622	432	358	3600
	12"	300	711	483	522	5300
	14"	350	838	502	717	6400
600#	0.5"	15	165	121	5.3	10
	0.75"	20	191	143	7.3	18
	1"	25	216	159	11.8	31
	1.5"	40	241	181	26.0	76
	2"	50	292	216	36.0	120
	3"	80	356	263	61.7	270
	4"	100	432	288	106	470
	6"	150	559	354	209	1100
	8"	200	660	432	379	2100
	10"	250	787	511	472	3300
900#	3"	80	381	290	107	260
	4"	100	457	354	189	470
	6"	150	610	432	404	1140
	8"	200	737	511	626	1980
1500#	0.5"	15	216	378	19.5	9
	0.75"	20	229	403	21.3	16
	1"	25	254	426	36.7	27
	1.5"	40	305	533	55.3	66
	2"	50	368	610	70	110
	3"	80	470	826	159	230
	4"	100	546	965	230	410
	6"	150	705	1232	659	950
	8"	200	832	1435	1013	1640

Glossary of Valve Parts



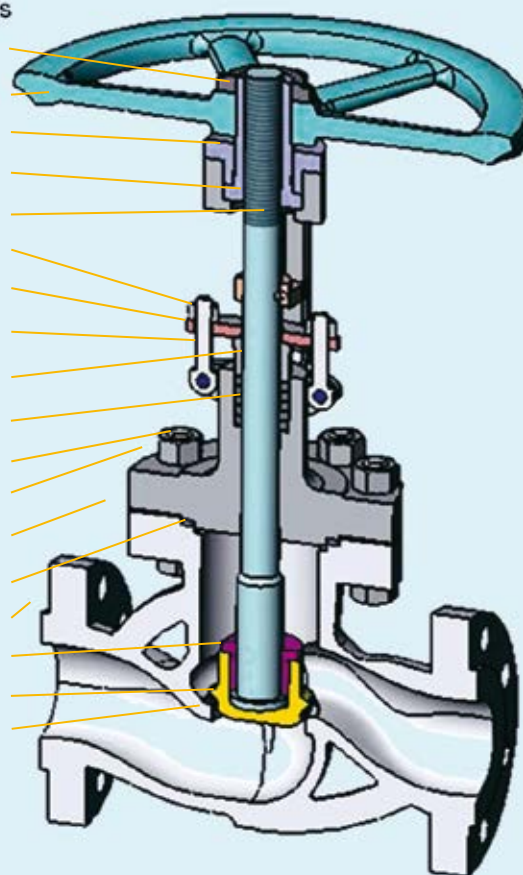
Handwheel nut
Handwheel
Yoke nut retainer
Yoke nut
Stem
Gland nut
Gland flange
Gland bolt
Gland follower
Gland packing
Nut
Bonnet
Bonnet gasket
Stud bolt
Body
Wedge
Integral body seats

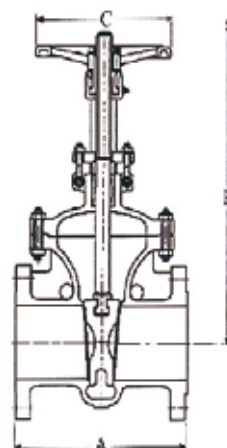
Handwheel nut
Handwheel
Yoke nut retainer
Yoke nut
Stem
Gland nut
Gland flange
Gland bolt
Gland follower
Gland packing
Stud bolt
Nut
Bonnet
Bonnet gasket
Body
Disc nut
Disc
Integral body seat



Stud bolt
Nut
Cover
Cover gasket

Body
Hinge pin
Hinge
Disc nut
Disc
Integral body seats



LANGLEY RANGE Cast Gates in stainless steel to ASME B16.34

Features

Ø - Light wall design API 603 and ASME B16.34

Ø - Full Bore, Bolted Bonnet, OS & Y.

Ø - Integral seats

Ø - Flexible Graphite low emissions stuffing box

Ø - Flexible wedge

Ø - Bubble tight shut off to API 598, better than ANSI class V and VI

Ø - Wetted parts conform to NACE MR-01-75

Ø - Traceable body shell materials

Ø - CE marked products to PED 97/23/EC

Options

Ø - Austenitic, and Duplex Stainless Steels;

Ø - Bonnet extensions for low temperatures

Ø - Hardfaced trim for non-lubricating fluids

Ø - Live loaded gland packing

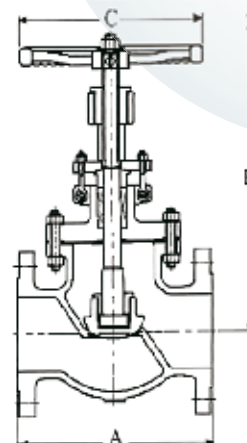
Ø - Flat, spiral wound and ring type bonnet gaskets

Dimensions

Class	Size	DN	A (mm)	B (mm)	C (mm)	Wt (Kg)	Cv (usgpm)
150#	0.5"	15	108	174	100	3.2	16
	0.75"	20	118	182	100	3.6	38
	1"	25	127	189	100	4.3	70
	1.5"	40	165	229	138	7.8	164
	2"	50	178	268	160	11.4	307
	2.5"	65	190	229	200	16.9	484
	3"	80	203	345	200	19.8	709
	4"	100	229	401	224	31.5	1290
	6"	150	267	561	280	57.5	3100
	8"	200	292	713	300	90	5710
	10"	250	330	872	350	139	8920
	12"	300	356	1065	450	227	13300
	14"	350	381	1355	500	322	16200
	16"	400	406	1540	560	369	21500
300#	18"	450	432	1910	560	560	28600
	20"	500	457	2143	630	725	35700
	24"	600	508	2472	630	1012	52100
	0.5"	15	140	179	100	3.9	16
	0.75"	20	152	179	100	5.0	38
	1"	25	165	221	138	7.5	70
	1.5"	40	191	259	200	12.6	164
	2"	50	216	275	200	15.6	307
	3"	80	283	384	224	40.0	709
	4"	100	305	440	300	59.0	1290
	6"	150	403	601	350	108	3100
	8"	200	419	774	400	199	5710
	10"	250	457	962	450	313	8920
	12"	300	502	1150	500	462	13300
	14"	350	562	1638	560	630	16200
	16"	400	638	1784	560	854	21500
	18"	450	914	1972	630	1029	27800
	20"	500	991	2200	630	1661	34800
	24"	600	1143	2553	630	2594	51000

Ø - Radiographic quality to ASME B16.34 Appx I

Ø - Special functional and material testing

LANGLEY RANGE Cast Globes in stainless steel to ASME B16.34

Features

Ø - Light wall design to ASME B16.34 standard class
Generally to BS1873 as applicable

Ø - Full Bore, Bolted Bonnet, OS & Y.

Ø - Integral seat

Ø - Flexible Graphite low emissions stuffing box

Ø - Bubble tight shut off to API 598, better than
ANSI class V and VI

Ø - Wetted parts conform to NACE MR-01-75

Ø - Traceable body shell materials

Ø - CE marked products to PED 97/23/EC

Options

Ø - Austenitic, and Duplex Stainless Steels;

Ø - Bonnet extensions for low temperatures

Ø - Hardfaced trim for non-lubricating fluids.

Ø - Check and Feed or Screw-Down-Non-Return,
functions as check valve when open

Ø - Soft disc insert for searching applications to 220 °C

Ø - Live loaded gland packing

Ø - Replaceable threaded seat ring

Dimensions

Class	Size	DN	A (mm)	B (mm)	C (mm)	Wt (Kg)	Cv (usgpm)
150#	0.5"	15	108	165	100	3.3	2.4
	0.75"	20	118	171	100	3.8	5.6
	1"	25	127	185	100	5.0	10
	1.5"	40	165	214	140	7.0	24
	2"	50	203	235	160	11	46
	3"	80	241	367	225	34	107
	4"	100	292	421	280	56	195
	6"	150	406	581	350	100	469
	8"	200	495	674	450	165	864
300#	10"	250	622	674	450	210	1340
	0.5"	15	152	176	100	3.9	2.4
	0.75"	20	178	177	100	4.9	5.6
	1"	25	203	203	138	7.4	10
	1.5"	40	229	238	200	13	24
	2"	50	267	249	200	16	46
	3"	80	318	365	280	39	107
	4"	100	356	421	350	64	195
	6"	150	445	606	400	138	469
	8"	200	559	870	450	295	864
	10"	250	622	870	610	410	1340

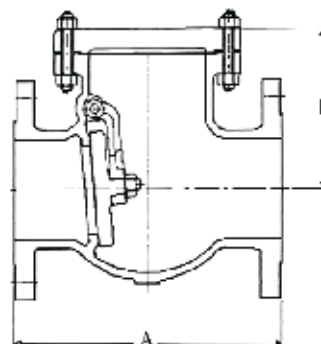
Ø - Flat & spiral wound bonnet gaskets

Ø - Indicator and locking device

Ø - Impactor handwheels, reduction gears.

Ø - Special functional and material testing

Ø - Radiographic quality to ASME B16.34 Annex 1



Features

- Ø - Light wall design to ASME B16.34
Generally to BS1868 as applicable
- Ø - Full Bore, Bolted Cover, swing disc
- Ø - Integral seat
- Ø - Wetted parts conform to NACE MR-01-75
- Ø - Traceable body shell materials
- Ø - CE marked products to PED 97/23/EC

Options

- Ø - Austenitic, and Duplex Stainless Steels;
Nickel Alloys and Superalloys
- Ø - Hardfaced trim for erosive fluids
- Ø - Replaceable threaded seat ring
- Ø - Soft seats for searching applications below 220 °C
- Ø - Flat or spiral wound bonnet gaskets
- Ø - Radiographic quality to ASME B16.34 Appx I

Dimensions

Class	Size	DN	A (mm)	B (mm)	Wt (Kg)	Cv (usgpm)
150#	0.5"	15	108	67	1.8	10
	0.75"	20	118	71	2.4	18
	1"	25	127	80	3.6	31
	1.5"	40	165	96	5.8	76
	2"	50	203	108	8.6	120
	3"	80	241	165	25.0	280
	4"	100	292	201	40.0	520
	6"	150	356	248	69.0	1200
	8"	200	495	293	120	2300
	10"	250	622	330	173	3600
	12"	300	698	354	273	5400
	14"	350	787	387	336	6600
300#	16"	400	864	421	588	8700
	18"	450	978	461	683	11700
	0.5"	15	152	84	4.0	10
	0.75"	20	178	85	5.0	18
	1"	25	216	88	7.5	31
	1.5"	40	241	91	12.8	76
	2"	50	267	101	15.6	120
	3"	80	318	172	34.3	280
	4"	100	356	225	56.0	520
	6"	150	444	262	111	1200
	8"	200	533	312	161	2300
	10"	250	622	355	305	3600
	12"	300	711	393	424	5300
	14"	350	838	440	747	6400
	16"	400	864	480	932	8300
	18"	450	978	535	947	11000

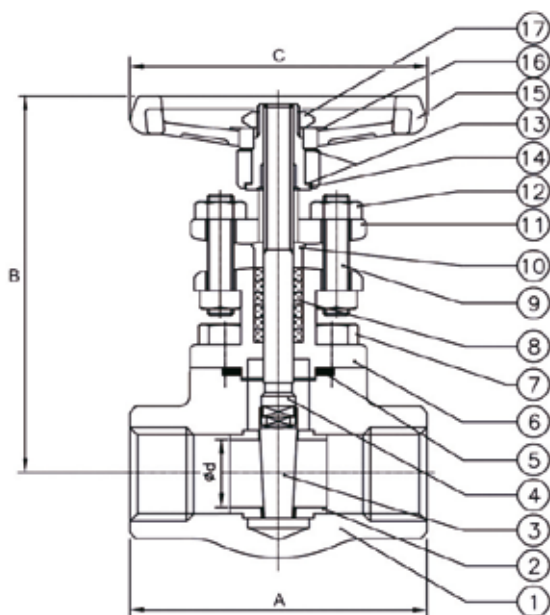
LANGLEY RANGE Forged Gate stainless steel to API 602

Features

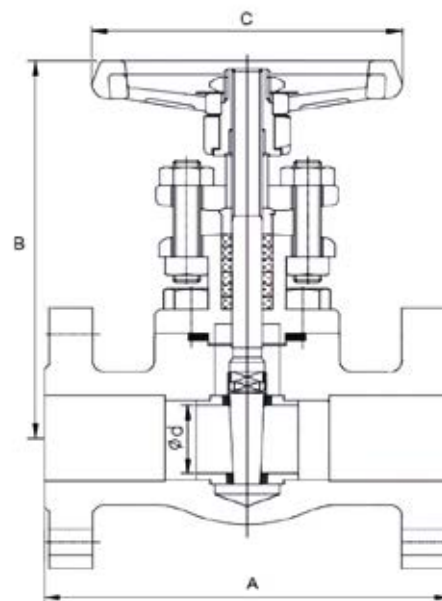
- ⊖ - Design to API 602, ISO 15761 and ASME B16.34
- ⊖ - Ends threaded NPT, socket weld or integral ASME flanged.
- ⊖ - Standard bore, bolted bonnet,
- ⊖ - Spiral wound gasket
- ⊖ - Stellite faced renewable seat rings
- ⊖ - ACME threaded stem OS & Y.
- ⊖ - Flexible graphite low emissions stuffing box
- ⊖ - Bubble tight shut off to API 598
- ⊖ - Traceable body shell materials
- ⊖ - CE marked products to PED 97/23/EC

Dimensions

Class	Size	DN	A (mm)	B (mm)	C (mm)	ød (mm)	Wt (Kg)	Cv (usgpm)
800# NPT SW	0.5"	15	79	158	100	10	2.0	6
	0.75"	20	92	162	100	13.5	2.3	11
	1"	25	111	197	120	17.5	4.0	25
	1.5"	40	140	243	150	28.6	6.0	55
	2"	50	172	265	150	36.5	10.6	90
150# Flanged	0.5"	15	108	143	100	9.5	3.4	6
	0.75"	20	118	151	100	12.7	3.5	11
	1"	25	127	179	120	17.5	5.7	25
	1.5"	40	165	243	150	28.6	10.4	55
	2"	50	178	265	150	36.5	14.4	90
300# Flanged	0.5"	15	140	143	100	9.5	4.0	6
	0.75"	20	152	151	100	12.7	5.0	11
	1"	25	165	179	120	17.5	7.0	25
	1.5"	40	190	243	150	28.6	14.0	55
	2"	50	216	265	150	36.5	18.0	90
600# Flanged	0.5"	15	165	143	100	9.5	4.2	6
	0.75"	20	190	151	100	12.7	5.8	11
	1"	25	216	179	120	17.5	8.8	25
	1.5"	40	241	243	150	28.6	15.0	55
	2"	50	292	265	150	36.5	19.5	90



Class 800 SW or NPT ends



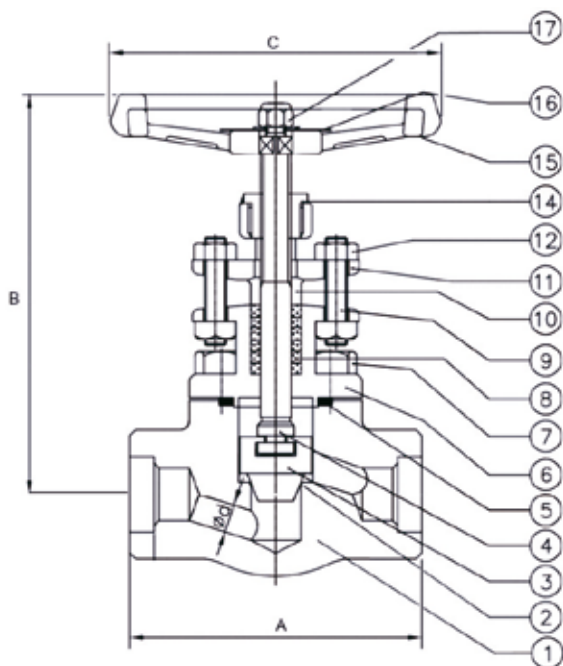
Flanged Class 150, 300 and 600

COMPONENT	MATERIAL (ASTM)
1 BODY	A182 F316L
2 SEAT RING	A276-316L + STELLITE 6
3 WEDGE	A182 F316L + STELLITE 6
4 STEM	A182 F316
5 GASKET	316S/S SPW + GRAPHITE
6 BONNET	A182 F316L
7 BONNET BOLT	A193 B8M CL2
8 GLAND PACKING	FLEXIBLE GRAPHITE
9 GLAND BOLT	A193 B8M CL2
10 GLAND	A276-316
11 GLAND FLANGE	A182 F316
12 GLAND NUT	A194 8M
13 THRUST WASHER	STAINLESS STEEL
14 YOKE SLEEVE	A276-410
15 HANDWHEEL	A197
16 NAME PLATE	304S/S
17 HANDWHEEL NUT	A194 8M

LANGLEY RANGE Forged Globe stainless steel to API 602

Features

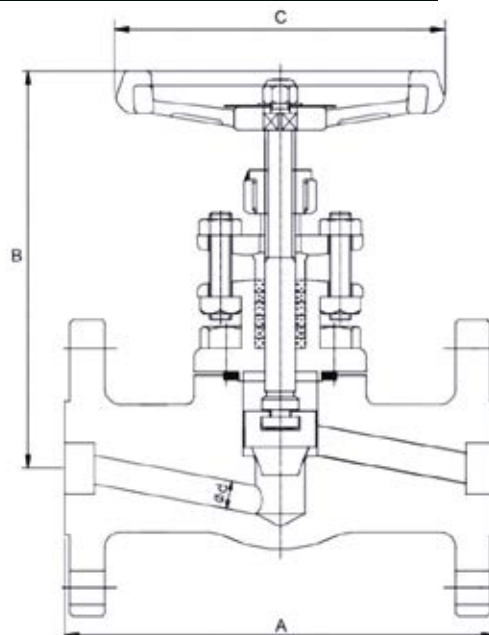
- ⊖ - Design to API 602, ISO 15761 and ASME B16.34
- ⊖ - Ends threaded NPT, socket weld or integral ASME flanged.
- ⊖ - Standard bore, bolted bonnet,
- ⊖ - Spiral wound gasket
- ⊖ - Stellite faced integral body seat
- ⊖ - ACME threaded stem OS & Y.
- ⊖ - Flexible graphite low emissions stuffing box
- ⊖ - Bubble tight shut off to API 598
- ⊖ - Traceable body shell materials
- ⊖ - CE marked products to PED 97/23/EC



Class 800 SW or NPT ends

Dimensions

Class	Size	DN	A (mm)	B (mm)	C (mm)	ød (mm)	Wt (Kg)	Cv (usgpm)
800# NPT SW	0.5"	15	79	168	100	10	2.0	1.5
	0.75"	20	92	170	100	13.5	2.3	3
	1"	25	111	205	120	17.5	4.0	5
	1.5"	40	140	235	150	28.6	6.0	14
150# Flanged	2"	50	172	282	180	36.5	10.6	24
	0.5"	15	108	155	100	10	4.5	1.5
	0.75"	20	118	160	100	13.5	6.9	3
	1"	25	127	185	120	17.5	9.8	5
300# Flanged	1.5"	40	165	235	150	28.6	19.5	14
	2"	50	203	282	180	36.5	28.0	24
	0.5"	15	152	155	100	10	4.8	1.5
	0.75"	20	178	160	100	13.5	7.7	3
600# Flanged	1"	25	203	185	120	17.5	11.0	5
	1.5"	40	229	235	150	28.6	21.2	14
	2"	50	267	282	180	36.5	32.6	24
	0.5"	15	165	155	100	10	5.6	1.5
	0.75"	20	190	160	100	13.5	7.8	3
	1"	25	216	185	120	17.5	12.5	5
	1.5"	40	241	235	150	28.6	23.5	14
	2"	50	292	282	180	36.5	38.8	24



Flanged Class 150, 300 and 600

COMPONENT	MATERIAL (ASTM)
1 BODY	A182 F316L
2 INTEGRAL BODY SEAT	STELLITE 6
3 DISC	A276 F316L + STELLITE 6
4 STEM	A182 F316
5 GASKET	316S/S SPW + GRAPHITE
6 BONNET	A182 F316L
7 BONNET BOLT	A193 B8M CL2
8 GLAND PACKING	FLEXIBLE GRAPHITE
9 GLAND BOLT	A193 B8M CL2
10 GLAND	A276-316
11 GLAND FLANGE	A182 F316
12 GLAND NUT	A194 8M
13 THRUST WASHER	STAINLESS STEEL
14 YOKE BUSH	A276-410
15 HANDWHEEL	A197
16 NAME PLATE	304S/S
17 HANDWHEEL NUT	A194 8M

LANGLEY RANGE Forged Piston & Swing Check stainless steel to API 602

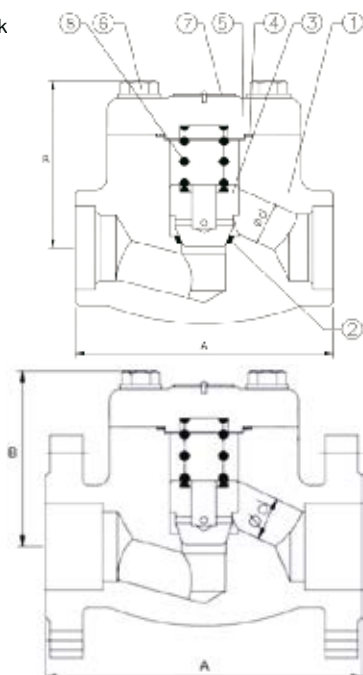
Features

- Θ - Design to API 602, ISO 15761 and ASME B16.34
- Θ - Ends threaded NPT, socket weld or integral ASME flanged.
- Θ - Standard bore, bolted cover,
- Θ - Spiral wound gasket
- Θ - Stellite faced body seat and disc
- Θ - Horizontal and vertical line installation.
- Θ - ISO 15761 / API 598 seat tightness
- Θ - Traceable body shell materials
- Θ - CE marked products to PED 97/23/EC

Dimensions

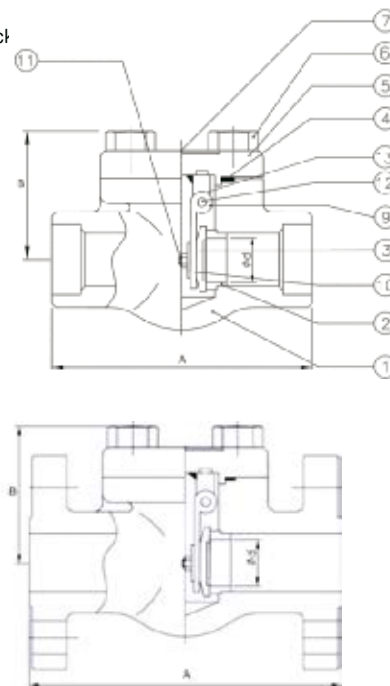
Class	Size	DN	A Piston (mm)	A Swing (mm)	B (mm)	ød Piston (mm)	ød Swing (mm)	Wt (Kg)	Cv Piston (usgpm)	Cv Swing (usgpm)
800# NPT	0.5"	15	79	79	62	9.5	10	1.4	1.5	3.6
	0.75"	20	92	92	62	12.7	13.5	1.9	3.0	6.7
	1"	25	111	111	76	17.5	17.5	2.6	5.0	11.6
	1.5"	40	140	118	100	28.6	29	5.3	14.0	33
	2"	50	172	132	118	36.5	36.5	9.0	18	55
150# Flanged	0.5"	15	108	108	52	9.5	10	3.4	1.5	3.6
	0.75"	20	118	118	57	12.7	13.5	4.4	3.0	6.7
	1"	25	127	127	66	17.5	17.5	8.2	5.0	11.6
	1.5"	40	165	165	80	28.6	29	12.0	14.0	33
	2"	50	203	203	100	36.5	36.5	14.3	18	55
300# Flanged	0.5"	15	152	152	53	9.5	10	3.7	1.5	3.6
	0.75"	20	178	178	57	12.7	13.5	4.8	3.0	6.7
	1"	25	203	216	69	17.5	17.5	8.8	5.0	11.6
	1.5"	40	229	241	100	28.6	29	13.7	14.0	33
	2"	50	267	267	118	36.5	36.5	17.8	18	55
600# Flanged	0.5"	15	165	165	53	9.5	10	3.7	1.5	3.6
	0.75"	20	190	190	57	12.7	13.5	5.8	3.0	6.7
	1"	25	216	216	69	17.5	17.5	9.5	5.0	11.6
	1.5"	40	241	241	100	28.6	29	15.6	14.0	33
	2"	50	292	292	118	36.5	36.5	24.5	18	55

Piston Check



Flanged Class 150, 300 and 600

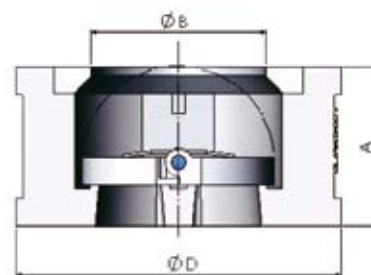
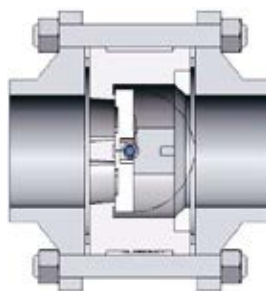
Swing check

Class 800 SW
or NPT ends

Flanged ends

COMPONENT	MATERIAL (ASTM)
1 BODY	A182 F316L
2 BODY SEAT*	A182 F316L + STELLITE 6
3 DISC	A276 F316L + STELLITE 6
4 GASKET	316S/S SPW + GRAPHITE
5 COVER	A182 F316L
6 COVER BOLT	ASTM A193 B8M CL2
7 NAMEPLATE	ALUMINIUM
8 SPRING	316 S/S
9 HINGE	A351 CF3M
10 DISC WASHER	STAINLESS STEEL
11 DISC NUT	ASTM A194 8M
12 HINGE PIN	A276 F316
13 HINGE SUPPORT	A276 F316

* Piston check seat is integral hard-faced

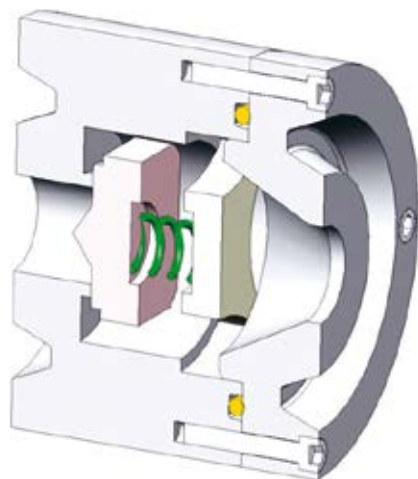
LANGLEY RANGE Wafer Check

Dimensions

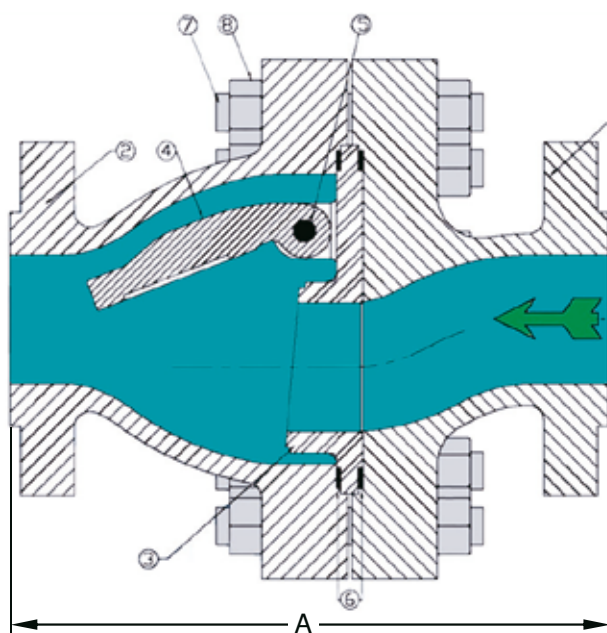
Class	Size	DN	A (mm)	B (mm)	D (mm)	Approx Wt (Kg)
150#	0.5"	15	25	13	48	0.4
	0.75"	20	32	19	57	0.6
	1"	25	36	25	67	1.0
	1.5"	40	45	38	86	2.0
	2"	50	60	57	105	3.0
	3"	80	73	87	137	6.0
	4"	100	73	113	175	9.0
	6"	150	98	166	222	15
	8"	200	127	207	279	30
	10"	250	146	260	340	50
	12"	300	181	300	410	95
	14"	350	184	339	451	111
300#	16"	400	191	394	514	143
	18"	450	203	438	549	157
	0.5"	15	25	13	54	0.4
	0.75"	20	32	19	67	0.8
	1"	25	36	25	73	1.1
	1.5"	40	45	38	95	2.1
	2"	50	60	57	111	3.5
	3"	80	73	87	149	7.1
	4"	100	73	113	181	10
	6"	150	98	166	251	24
	8"	200	127	207	308	45
	10"	250	146	260	362	64
600#	12"	300	181	300	422	108
	14"	350	222	339	486	179
	16"	400	232	394	540	215
	18"	450	264	438	597	294
	0.5"	15	25	13	54	0.4
	0.75"	20	32	19	67	0.8
	1"	25	36	25	73	1.1
	1.5"	40	45	38	95	2.2
	2"	50	60	57	111	3.5
	3"	80	73	87	149	7.1
	4"	100	79	113	194	13
	6"	150	136	166	267	39
900#	8"	200	165	207	321	67
	10"	250	213	260	400	132
	3"	80	83	87	168	11
	4"	100	102	113	206	20
1500#	6"	150	159	166	289	59
	8"	200	206	207	359	116
	0.5"	15	25	13	64	0.6
	0.75"	20	32	19	70	0.9
	1"	25	36	25	79	1.3
	1.5"	40	45	38	98	2.4
	2"	50	70	57	143	8
	3"	80	83	87	175	13
	4"	100	102	113	210	22
	6"	150	159	166	283	27
	8"	200	206	207	352	114

Light weight compact check valve

- ⊗ Range of corrosion resistant body materials available.
- ⊗ Installed clamped between ASME B16.5 flanges
- ⊗ Inconel X-750 springs or better to match body.
- ⊗ Hardfaced trim option for severe service
- ⊗ CE marked products to PED 97/23/EC
- ⊗ Plate and pin material equal to body
- ⊗ Integral seat, metal to metal sealing
- ⊗ Dual plate design $\geq 2"$ (DN50)
In-line sprung disc $\leq 1.5"$ (DN40)
- ⊗ API 594 face to face dimensions.
- ⊗ Wetted parts to NACE MR-0175
- ⊗ Quick closing and non-slam.
- ⊗ Tested to API 598



LANGLEY RANGE 2-Piece Swing Check for Corrosive Applications

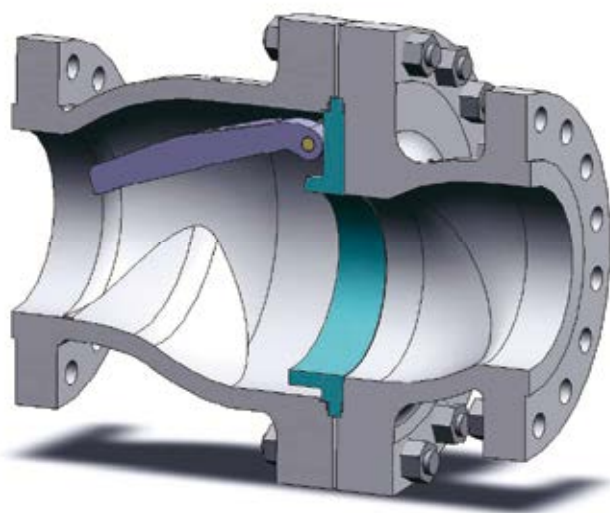


SPECIAL FEATURES

- Corrosion resistant design is free from screw threads, welds and overlays
- Fully maintainable with replaceable trim unit including disc, seat & hinge pin.
- Valve body materials ① ② selected from any castable corrosion resistant alloy.
- Trim parts ③ ④ ⑤ are available in any cast or wrought material
- Materials of construction include Nickel Alloys 400, 600, 625, B, C, and Zirconium.
- Conforms to BS1868, ASME B16.34.
- API 598 test.

Dimensions

Class	Size	DN	A (mm)	Cv (usgpm)
150#	0.5"	15	108	10
	0.75"	20	118	18
	1"	25	127	31
	1.5"	40	165	76
	2"	50	203	120
	3"	80	241	280
	4"	100	292	520
	6"	150	356	1200
	8"	200	495	2300
	10"	250	622	3600
	12"	300	698	5400
	14"	350	787	6600
300#	16"	400	864	8700
	18"	450	978	11700
	0.5"	15	152	10
	0.75"	20	178	18
	1"	25	216	31
	1.5"	40	241	76
	2"	50	267	120
	3"	80	318	280
	4"	100	356	520
	6"	150	444	1200
	8"	200	533	2300
	10"	250	622	3600
600#	12"	300	711	5300
	14"	350	838	6400
	16"	400	864	8300
	18"	450	978	11000
	0.5"	15	165	10
	0.75"	20	191	18
	1"	25	216	31
	1.5"	40	241	76
	2"	50	292	120
	3"	80	356	270
	4"	100	432	470
	6"	150	559	1100
900#	8"	200	660	2100
	10"	250	787	3300
	3"	80	381	260
	4"	100	457	470
	6"	150	610	1140
	8"	200	737	1980
1500#	0.5"	15	216	9
	0.75"	20	229	16
	1"	25	254	27
	1.5"	40	305	66
	2"	50	368	110
	3"	80	470	230
	4"	100	546	410
	6"	150	705	950
	8"	200	832	1640



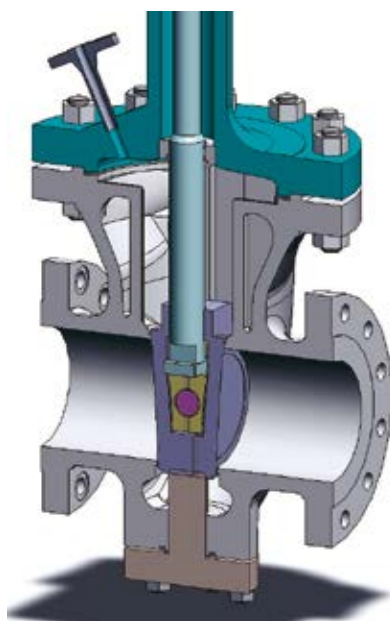


A special wedge gate valve design suitable for:

- ⊖ High frequency of operation
- ⊖ Quick opening and closing
- ⊖ High temperatures

Types of application including:

- ⊖ Heavy hydrocarbons, propylene, ethylene
- ⊖ Gases with catalyst
- ⊖ Steam



Conforms to:

ASME B16.34, ISO 10434/API 600

ASME B16.10

Dimensions

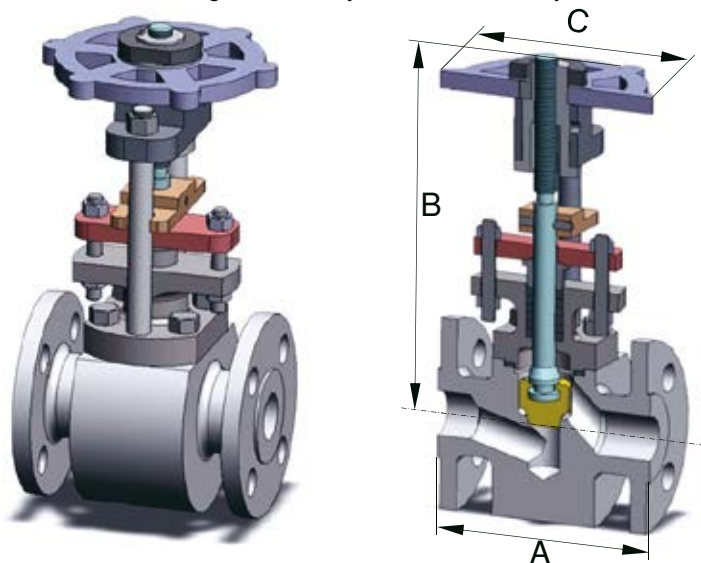
Class	Size	DN	Length (mm)	Cv (usgpm)
150#	2"	50	178	307
	3"	80	203	709
	4"	100	229	1290
	6"	150	267	3100
	8"	200	292	5710
	10"	250	330	8920
	12"	300	356	13300
	14"	350	381	16200
	16"	400	406	21500
	18"	450	432	28600
300#	20"	500	457	35700
	24"	600	508	52100
	2"	50	216	307
	3"	80	283	709
	4"	100	305	1290
	6"	150	403	3100
	8"	200	419	5710
	10"	250	457	8920
	12"	300	502	13300
	14"	350	762	16200
600#	16"	400	838	21500
	18"	450	914	27800
	20"	500	991	34800
	24"	600	1143	51000
	2"	50	292	307
	3"	80	356	709
	4"	100	432	1290
	6"	150	559	3100
	8"	200	660	5520
	10"	250	787	8480

Features	Benefits
Seat fully covered by gate prior to application of seating load	Allows Rapid actuated closure, reduced operating forces & torques
Final seating load applied by inner wedge to static outer wedge	Avoids seat scuffing, minimises wear, enables high cycle life to be achieved
Hard-faced wedge ,seats and guides	Eliminates galling and wear, maximum temperature 816C
Extended bonnet	Minimises need for special actuator materials
Optional Purge connections	Removal of abrasive material prior to valve operation

LANGLEY RANGE Wrought Gate, Globe & Check Valves from forged billet or bar

Wrought valves are recommended for:

- Small raw material volumes when castings & closed die forgings are uneconomic.
- Difficult to forge nickel alloys such as Hastelloy B, C and Inconel 625



Dimensions

Features

Ø - ISO 15761, exceeds ASME
B16.34 / EN 12516 wall thickness

Ø - Reduced Bore, Bolted Bonnet, OS & Y.

Ø - Materials to ASME B16.34 Table 1

Ø - Flexible Graphite low emissions stuffing box

Ø - Fully confined spiral wound bonnet gasket

Ø - Wetted parts conform to NACE MR-01-75

Ø - Traceable bodyshell materials

Ø - 0.5"-1" SEP & 1.25"-2" CE marked products to PED

Options

Ø - Austenitic, and Duplex Stainless Steels;
Inconel, Incoloy, Hastelloys, Titanium & Zirconium

Ø - Full port to ASME B16.34 table A1

Ø - Bonnet extensions for low temperatures

Ø - Hardfaced trim for non-lubricating fluids

Ø - Soft seats for searching applications below 220 °C

Ø - Live loaded gland packing & bellows sealed

Ø - Spiral wound and ring type bonnet gaskets

Ø - Integral & renewable seats

Ø - Butt weld, socket weld and clamp hub end connections

Ø - Indicator and locking device

Ø - Special functional and material testing

	Class	Size	DN	A (mm)	B (mm)	C (mm)	Wt (Kg)	R.Bore Cv (usgpm)
Gate	150#	0.5"	15	108	207	89	5	5.5
		0.75"	20	118	235	89	7	12.0
		1"	25	127	254	89	9	27.0
		1.5"	40	165	356	114	16	80.0
		2"	50	178	372	152	25	105.0
	300#	0.5"	15	140	235	89	8	5.5
		0.75"	20	152	251	89	12	12.0
		1"	25	165	311	114	16	27.0
		1.5"	40	191	426	152	28	80.0
		2"	50	216	483	216	36	105.0
	600#	0.5"	15	165	273	152	9	5.5
		0.75"	20	190	286	152	15	12.0
		1"	25	216	359	152	21	27.0
		1.5"	40	241	451	216	35	80.0
		2"	50	292	495	216	49	105.0
	1500#	0.5"	15	216	378	152	19	5.5
		0.75"	20	229	403	152	24	12.0
		1"	25	254	426	216	35	27.0
		1.5"	40	305	533	254	61	80.0
		2"	50	368	610	508	104	105.0
Globe	150#	0.5"	15	108	156	89	5	1.5
		0.75"	20	118	191	89	7	3.8
		1"	25	127	257	114	9	6.8
		1.5"	40	165	283	152	16	14.3
		2"	50	203	324	203	28	25.0
	300#	0.5"	15	152	206	89	8	1.5
		0.75"	20	178	229	89	14	3.8
		1"	25	203	279	114	19	6.8
		1.5"	40	229	340	203	34	14.3
		2"	50	267	372	203	45	25.0
	600#	0.5"	15	165	254	89	9	1.5
		0.75"	20	191	279	114	15	3.8
		1"	25	216	311	152	21	6.8
		1.5"	40	241	375	203	35	14.3
		2"	50	292	457	203	49	25.0
	1500#	0.5"	15	216	318	152	19	1.5
		0.75"	20	229	318	152	24	3.8
		1"	25	254	397	203	35	6.8
		1.5"	40	305	467	305	61	14.3
		2"	50	368	695	381	104	25.0
Piston Check	150#	0.5"	15	108	156		5	1.0
		0.75"	20	118	191		7	2.8
		1"	25	127	257		9	6.0
		1.5"	40	165	283		16	11.0
		2"	50	203	324		28	18.0
	300#	0.5"	15	152	206		8	1.0
		0.75"	20	178	229		14	2.8
		1"	25	203	279		19	6.0
		1.5"	40	229	340		34	11.0
		2"	50	267	372		45	18.0
	600#	0.5"	15	165	254		9	1.0
		0.75"	20	191	279		15	2.8
		1"	25	216	311		21	6.0
		1.5"	40	241	375		35	11.0
		2"	50	292	457		49	18.0
	1500#	0.5"	15	216	318		19	1.0
		0.75"	20	229	318		24	2.8
		1"	25	254	397		35	6.0
		1.5"	40	305	467		61	11.0
		2"	50	368	695		104	18.0

VALVE MATERIALS

Material Group	Common Name	ASTM Casting Specification for Body/ Bonnet/ Disc/ Hinge.	Application Notes	Equivalent Forged Material
Stainless Steel	Austenitic S.Steel 300 series S.Steel	A351-CF8	0.04% min.C, temps.>538°C	A182-F304
		A351-CF3	Up to 427°C	A182-F304L
		A351-CF8M	0.04% min.C, temps.>538°C	A182-F316
		A351-CF3M	Up to 454°C	A182-F316L
		A351-CG3M	Up to 454°C	A182-F317L
		A351-CF8C	Service to 816°C.0.04% min.C, temps.>538°C	A182-F347
		A351-CF10C		A182-F347H
		A351-CF10MC	service to 816°C	UNS S31640
		A351-CK20	service to 816°C	A182 F310H
	Alloy 20	A351-CN7M	service to 316°C	A182 F20
	Duplex	A890-grade 4A =CD3MN (UNS J92205)	service to 316°C	A182-F51/F60
	Super Duplex	A890-grade 5A = CE3MN (UNS J93404)	service to 316°C	A182-F53
	Super Duplex	A890-grade 6A =CD3MWCuN (UNS J93380)	service to 316°C	A182-F55
	Super Austenitic 6Mo	A351-CK3MCuN	service to 400°C	A182-F44
	Super Austenitic 904L	AFNOR Z6NCDU25204M	service to 316°C	UNS N08904
Nickel	Nickel	A494-CZ-100	service to 316°C	B160- N02200
Nickel-Copper	Monel	A494-M35-1	service to 482°C	B564-N04400
Nickel-Molybdenum	Hastelloy B-2	A494-N-7M	Up to 427°C	B335-N10665
	Hastelloy B-3	-----		B564-N10675
Nickel-Chromium-Iron	Inconel 600	A494-CY40	Up to 649°C	B564-N06600
	Incoloy 800H	A351-CT15C	service to 816°C	B564-N08810
	Incoloy 825	A494-CU5MCuC	service to 538°C	B425-N08825
Nickel-Chromium-Molybdenum	Inconel 625	A494-CW-6MC	Up to 649°C	B564-N06625* B446-N06625(BAR)
	Hastelloy C-4	A494-CW2M		B574-N06455
	Hastelloy C-22	A494-CX2MW		B564-N06022
	Hastelloy C-276	A494-CW6M (older spec CW12MC)		B564-N10276
Titanium	Titanium	B367-C2		B381-F2
Zirconium	Zirconium	R60702 -C		B493-R60702
		R60705 -C		B493-R60705

Stem/Stem Nut /Hinge Pin Materials

Stem materials are at least equal to the valve body material for corrosion resistance, and are produced from barstock to an appropriate specification including ASTM A479 for Stainless Steels and ASTM B574 for Nickel Chromium Molybdenum alloys.

Wedge/Discs and Seats

Seats are normally integral design in stainless steel and nickel alloy valves the faces being renewable through lapping or grinding when necessary to restore sealing performance. Integral or welded in seats are always recommended for steam and gaseous service.

The base material for disc and seat material is at least equal to the valve body material. When required seating surfaces are normally hardfaced with Stellite 6 to prevent erosion and galling, recommended for all non-lubricating services including low temperature liquified gases, dry gases at all temperatures, water and

Bonnet/Cover Gasket Types and Materials

Spiral wound gaskets are available for all pressure classes. The winding and inner ring material have at least the corrosion resistance of the body material. The filler material is Graphite as standard, having nearly universal fluid compatibility, the best sealing performance and fire resistance.

Non-circular gaskets for class 150 gate valves in sizes 3" and above are made from metal mesh reinforced Graphite material. The mesh is produced from material of at least equal corrosion resistance to the body.

Ring Joint bonnet gaskets are available for class 600 valves and above. The ring is produced from material of at least equal corrosion resistance to the body.

Other gasket materials and designs are available on request for specific applications.

Gland Packing - Stem Seal

For class 150-600 the standard gland packing is a 5 ring system comprising 3 central flexible graphite sealing rings with 2 anti-extrusion braided carbon fibre end rings fitted top and bottom.

For class 900 and above, the standard gland packing is a 6 ring system comprising 4 central flexible graphite sealing rings with 2 anti-extrusion braided carbon fibre end rings fitted top and bottom.

Gland Packing - qualified against specific leak tightness classes according to ISO 15484 by production testing as required.

Other gland packing materials and designs are available on request for specific applications.

Bolting

Bonnet bolting as standard is ASTM A193 - B8M class 2 studs fitted with ASTM A194 - grade 8M nuts.

Other bolting materials are available to order. High strength bolting is recommended on class 600 and above.

Sour Oil & Gas Application

The wetted parts of Langley valves conform to NACE MR-01-75, NACE MR-01-03 and ISO 15161 for resistance to sulphide stress cracking in oil and gas environments containing hydrogen sulphide (H₂S). Where requested stress cracking resistant exterior bolting can be provided when it is exposed to wet H₂S.

RATING TABLES Stainless Steels

Metric Units - °C/bar g - from ASME B16.34 A351-CF8/CF3 A182-F304/F304H ASME B16.34 Group 2.1							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	19.0	49.6	99.3	132.4	148.9	248.2	413.7
0	19.0	49.6	99.3	132.4	148.9	248.2	413.7
38	19.0	49.6	99.3	132.4	148.9	248.2	413.7
50	18.3	47.8	95.6	127.5	143.5	239.1	398.5
100	15.7	40.9	81.7	109.0	122.6	204.3	340.4
150	14.2	37.0	74.0	98.7	111.0	185.0	308.4
200	13.2	34.5	69.0	91.9	103.4	172.4	287.3
250	12.1	32.5	65.0	86.7	97.5	162.4	270.7
300	10.2	30.9	61.8	82.4	92.7	154.6	257.6
325	9.3	30.2	60.4	80.6	90.7	151.1	251.9
350	8.4	29.6	59.3	79.0	88.9	148.1	246.9
375	7.4	29.0	58.1	77.4	87.1	145.2	241.9
400	6.5	28.4	56.9	75.8	85.3	142.2	237.0
425	5.5	28.0	56.0	74.7	84.0	140.0	233.3
450	4.6	27.4	54.8	73.1	82.2	137.0	228.4
475	3.7	26.9	53.9	71.8	80.8	134.7	224.5
500	2.8	26.5	53.0	70.7	79.5	132.4	220.7
538	1.4	24.4	48.9	65.2	73.3	122.1	203.6
550	1.4	23.6	47.1	62.8	70.7	117.8	196.3
575	1.4	20.8	41.7	55.6	62.5	104.2	173.7
600	1.4	16.9	33.8	45.0	50.6	84.4	140.7
625	1.4	13.8	27.6	36.8	41.4	68.9	114.9
650	1.4	11.3	22.5	30.0	33.8	56.3	93.8
675	1.4	9.3	18.7	24.9	28.0	46.7	77.9
700	1.4	8.0	16.1	21.4	24.1	40.1	66.9
725	1.4	6.8	13.5	18.0	20.3	33.8	56.3
750	1.4	5.8	11.6	15.4	17.3	28.9	48.1
775	1.4	4.6	9.0	12.1	13.7	22.8	38.0
800	1.2	3.5	7.0	9.3	10.5	17.4	29.2
816	1.0	2.8	5.9	7.7	8.6	14.1	23.8

CF8/F304: At temperatures above 538°C use only when the carbon content is 0.04% minimum.

Metric Units - °C/bar g - from ASME B16.34 A351-CF8M/CF3M/CG8M ASME B16.34 Group 2.2							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	19.0	49.6	99.3	132.4	148.9	248.2	413.7
0	19.0	49.6	99.3	132.4	148.9	248.2	413.7
38	19.0	49.7	99.3	132.4	148.9	248.2	413.7
50	18.4	48.1	96.2	128.3	144.3	240.6	400.9
100	16.2	42.2	84.4	112.5	126.6	211.0	351.6
150	14.8	38.5	77.0	102.7	115.5	192.5	320.8
200	13.7	35.7	71.3	95.1	107.0	178.3	297.2
250	12.1	33.4	66.8	89.0	100.1	166.9	278.1
300	10.2	31.6	63.2	84.3	94.9	158.1	263.5
325	9.3	30.9	61.8	82.4	92.7	154.4	257.4
350	8.4	30.3	60.7	80.9	91.0	151.6	252.7
375	7.4	29.9	59.8	79.7	89.6	149.4	249.0
400	6.5	29.4	58.9	78.5	88.3	147.2	245.3
425	5.5	29.1	58.3	77.7	87.4	145.7	242.9
450	4.6	28.8	57.7	76.9	86.5	144.2	240.4
475	3.7	28.7	57.3	76.4	86.0	143.4	238.9
500	2.8	28.2	56.5	75.3	84.7	140.9	235.0
538	1.4	25.2	50.0	66.8	75.2	125.5	208.9
550	1.4	25.0	49.8	66.5	74.8	124.9	208.0
575	1.4	24.0	47.9	63.8	71.8	119.7	199.5
600	1.4	19.9	39.8	53.1	59.7	99.5	165.9
625	1.4	15.8	31.6	42.1	47.4	79.1	131.8
650	1.4	12.7	25.3	33.8	38.0	63.3	105.5
675	1.4	10.3	20.6	27.5	31.0	51.6	86.0
700	1.4	8.4	16.8	22.3	25.1	41.9	69.8
725	1.4	7.0	14.0	18.7	21.0	34.9	58.2
750	1.4	5.9	11.7	15.6	17.6	29.3	48.9
775	1.4	4.6	9.0	12.1	13.7	22.8	38.0
800	1.2	3.5	7.0	9.3	10.5	17.4	29.2
816	1.0	2.8	5.9	7.7	8.6	14.1	23.8

Note: CF3A, CF8A not to be used over 345°C

CF3M not to be used over 455°C

CG8M not to be used over 538°C

0.04% carbon min. required for CF8M, F316 to be used above 538°C

Metric Units - °C/bar g - from ASME B16.34 A351-CF8C ASME B16.34 Group 2.11							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	19.0	49.6	99.3	132.4	148.9	248.2	413.7
0	19.0	49.6	99.3	132.4	148.9	248.2	413.7
38	19.0	49.6	99.3	132.4	148.9	248.2	413.7
50	18.7	48.8	97.5	130.0	146.3	243.8	406.4
100	17.4	45.3	90.6	120.8	135.9	226.5	377.4
150	15.8	42.5	84.9	113.2	127.4	212.4	353.9
200	13.8	39.9	79.9	106.5	119.8	199.7	332.8
250	12.1	37.8	75.6	100.8	113.4	189.1	315.1
300	10.2	36.1	72.2	96.3	108.3	180.4	300.7
325	9.3	35.4	70.7	106.1	106.1	176.8	294.6
350	8.4	34.8	69.5	92.7	104.3	173.8	289.6
375	7.4	34.2	68.4	91.2	102.6	171.0	285.1
400	6.5	33.9	67.8	90.4	101.7	169.5	282.6
425	5.5	33.6	67.2	89.6	100.8	168.1	280.1
450	4.6	33.5	66.9	89.2	100.4	167.3	278.8
475	3.7	31.7	63.4	84.5	95.1	158.2	263.9
500	2.8	28.2	56.5	75.3	84.7	140.9	235.0
538	1.4	25.2	50.0	66.8	75.2	125.5	208.9
550	1.4	25.0	49.8	66.5	74.8	124.9	208.0
575	1.4	24.0	47.9	63.8	71.8	119.7	199.5
600	1.4	19.8	39.6	52.8	59.4	99.0	165.1
625	1.4	13.9	27.7	37.0	41.6	69.3	115.5
650	1.4	10.3	20.6	27.5	30.9	51.2	85.8
675	1.4	8.0	15.9	21.2	23.9	39.8	66.3
700	1.4	5.6	11.2	14.9	16.8	28.1	46.8
725	1.4	4.0	8.0	10.6	11.9	19.9	33.1
750	1.2	3.1	6.2	8.3	9.3	15.5	25.8
775	0.9	2.5	4.9	6.6	7.4	12.3	20.4
800	0.8	2.0	4.0	5.4	6.1	10.1	16.9
816	0.7	1.9	3.8	5.1	5.7	9.5	15.8

0.04% minimum Carbon required for use above 538°C

Metric Units - °C/bar g - from ASME B16.34 Duplex/Superduplex/Superaustenitic ASME B16.34 Group 2.8							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	20.0	51.7	103.4	137.9	155.1	258.6	430.9
0	20.0	51.7	103.4	137.9	155.1	258.6	430.9
38	20.0	51.7	103.4	137.9	155.1	258.6	430.9
50	19.5	51.7	103.4	137.9	155.1	258.6	430.9
100	17.7	50.7	101.3	135.1	152.0	253.3	422.2
150	15.8	45.9	91.9	122.5	137.8	229.6	382.7
200	13.8	42.7	85.3	113.8	128.0	213.3	355.4
250	12.1	40.5	80.9	107.9	121.4	202.3	337.2
300	10.2	38.9	77.7	103.6	116.6	194.3	323.8
325	9.3	38.2	76.3	101.8	114.5	190.8	318.0

Notes: Duplex & Superduplex not to be used over 315°C

Metric Units - °C/bar g - from ASME B16.34 A351-CN7M ASME B16.34 Group 3.17							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	15.9	41.4	82.7	110.3	124.1	206.8	344.7
0	15.9	41.4	82.7	110.3	124.1	206.8	344.7
38	15.9	41.4	82.7	110.3	124.1	206.8	344.7
50	15.4	40.1	80.3	107.0	120.4	200.7	334.4
100	13.5	35.3	70.6	94.1	105.9	176.5	294.2
150	12.3	32.0	64.1	85.4	96.1	160.2	267.0
200	11.3	29.4	58.7	78.3	88.1	146.8	244.7
250	10.4	27.2	54.4	72.6	81.7	136.1	226.9
300	9.7	25.4	50.8	67.7	76.1	126.9	211.5
325	9.3	24.4	48.8	65.1	73.3	122.1	203.5

Notes: 1MPa = 10 bar; 100 kPa = 1 bar

RATING TABLES Nickel Alloys and Test Pressures

Metric Units - °C/bar g - values from ASME B16.34							
A494-M35-1 /B564-UNS N04400 ASME B16.34 Group 3.4							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	15.9	41.4	82.7	110.3	124.1	206.8	344.7
0	15.9	41.4	82.7	110.3	124.1	206.8	344.7
38	15.9	41.4	82.7	110.3	124.1	206.8	344.7
50	15.4	40.2	80.5	107.3	120.7	201.2	335.3
100	13.8	35.9	71.9	95.8	107.8	179.7	299.5
150	12.9	33.7	67.5	90.0	101.2	168.7	281.1
200	12.5	32.7	65.4	87.2	98.1	163.5	272.4
250	12.1	32.6	65.2	86.9	97.8	163.0	271.7
300	10.2	32.6	65.2	86.9	97.8	163.0	271.7
325	9.3	32.6	65.2	86.9	97.8	163.0	271.7
350	8.4	32.6	65.1	86.8	97.7	162.8	271.3
375	7.4	32.4	64.8	86.4	97.2	161.9	269.9
400	6.5	32.1	64.2	85.5	96.2	160.4	267.4
425	5.5	31.6	63.3	84.4	94.9	158.2	263.6
450	4.6	26.9	53.8	71.7	80.7	134.5	224.2
475	3.7	20.8	41.5	55.4	62.3	103.8	173.0

Metric Units - °C/bar g - values from ASME B16.34							
UNS-N08810 A494-CW-12MW; N-12MV Group 3.15							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	15.9	41.4	82.7	110.3	124.1	206.8	344.7
0	15.9	41.4	82.7	110.3	124.1	206.8	344.7
38	15.9	41.4	82.7	110.3	124.1	206.8	344.7
50	15.6	40.6	81.3	108.4	121.9	203.2	338.7
100	14.5	37.8	75.6	100.8	113.4	189.0	315.0
150	13.7	35.9	71.2	95.5	107.6	179.3	298.9
200	13.0	33.9	67.9	90.5	101.8	169.6	282.7
250	12.1	32.3	64.5	86.0	96.8	161.3	268.9
300	10.2	30.7	61.5	82.0	92.2	153.7	256.2
325	9.3	30.1	60.1	80.2	90.2	150.3	250.5
350	8.4	29.4	58.8	78.5	88.3	147.1	245.2
375	7.4	28.7	57.4	76.6	86.2	143.6	239.4
400	6.5	28.3	56.5	75.4	84.8	141.3	235.6
425	5.5	27.7	55.3	73.8	83.0	138.4	230.6
450	4.6	27.2	54.4	72.6	81.7	136.1	226.8
475	3.7	26.8	53.5	71.4	80.3	133.9	223.1
500	2.8	26.3	52.6	70.2	79.0	131.6	219.4
538	1.4	25.2	50.0	66.8	75.2	125.5	208.9
550	1.4	25.0	49.8	66.5	74.8	124.9	208.0
575	1.4	24.0	47.9	63.8	71.8	119.7	199.5
600	1.4	21.6	42.9	57.1	64.2	107.0	178.5
625	1.4	18.3	36.6	48.8	54.9	91.2	152.0
650	1.4	14.1	28.1	37.7	42.5	70.7	117.7
675	1.4	12.4	25.2	33.5	37.6	62.7	104.5
700	1.4	10.1	20.0	26.5	29.8	49.7	83.0
725	1.4	7.9	15.4	20.6	23.2	38.6	64.4
750	1.4	5.9	11.7	15.6	17.6	29.6	49.1
775	1.4	4.6	9.0	12.1	13.7	22.8	38.0
800	1.2	3.5	7.0	9.3	10.5	17.4	29.2
816	1.0	2.8	5.9	7.7	8.6	14.1	23.8

CW-12MW limited to 538°C,
 CT15C limited to 816°C
 N-12MV limited to 427°C

Metric Units - °C/bar g - values from ASME B16.34							
N10665/N06625/N08825 ASME B16.34 Group 3.8 & 3.7							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	20.0	51.7	103.4	137.9	155.1	258.6	430.9
0	20.0	51.7	103.4	137.9	155.1	258.6	430.9
38	20.0	51.7	103.4	137.9	155.1	258.6	430.9
50	19.5	51.7	103.4	137.9	155.1	258.6	430.9
100	17.7	51.5	103.0	137.4	154.6	257.6	429.4
150	15.8	50.3	100.3	133.8	150.6	250.8	418.2
200	13.8	48.3	96.7	128.9	145.0	241.7	402.8
250	12.1	46.3	92.7	123.6	139.0	231.8	386.2
300	10.2	42.9	85.7	114.3	128.6	214.4	357.1
325	9.3	41.4	82.6	110.2	124.0	206.6	344.3
350	8.4	40.3	80.4	107.3	120.7	201.1	335.3
375	7.4	38.9	77.6	103.5	116.5	194.1	323.2
400	6.5	36.5	73.3	97.6	109.8	183.1	304.9
425	5.5	35.2	70.0	93.4	105.1	175.1	291.6
450	4.6	33.7	67.7	90.2	101.4	169.0	281.8
475	3.7	31.7	63.4	84.5	95.1	158.2	263.9
500	2.8	28.2	56.5	75.3	84.7	140.9	235.0
538	1.4	25.2	50.0	66.8	75.2	125.5	208.9
550	1.4	25.0	49.8	66.5	74.9	124.9	208.0
575	1.4	24.0	47.9	63.8	71.8	119.7	199.5
600	1.4	21.6	42.9	57.1	64.2	107.0	178.5
625	1.4	18.3	36.6	48.8	54.9	91.2	152.0
650	1.4	14.1	28.1	37.5	42.2	70.4	117.3
675	1.4	11.5	23.0	30.7	34.6	57.6	96.0

N08825 limited to 538°C, N06625 limited to 645°C
 N06455, N10665 & N10675 limited to 425°C
 N10276 limited to 675°C

Metric Units - °C/bar g - values from ASME B16.34							
A494-CY40, B564-N06600 ASME B16.34 Group 3.5							
T°C	CL150	CL300	CL600	CL800	CL900	CL1500	CL2500
-29	20.0	51.7	103.4	137.9	155.1	258.6	430.9
0	20.0	51.7	103.4	137.9	155.1	258.6	430.9
38	20.0	51.7	103.4	137.9	155.1	258.6	430.9
50	19.5	51.7	103.4	137.9	155.1	258.6	430.9
100	17.7	51.5	103.0	137.4	154.6	257.6	429.4
150	15.8	50.3	100.3	133.8	150.6	250.8	418.2
200	13.8	48.6	97.2	129.6	145.8	243.4	405.4
250	12.1	46.3	92.7	123.6	139.0	231.8	386.2
300	10.2	42.9	85.7	114.3	128.6	214.4	357.1
325	9.3	41.4	82.6	110.2	124.0	206.6	344.3
350	8.4	40.3	80.4	107.3	120.7	201.1	335.3
375	7.4	38.9	77.6	103.5	116.5	194.1	323.2
400	6.5	36.5	73.3	97.6	109.8	183.1	304.9
425	5.5	35.2	70.0	93.4	105.1	175.1	291.6
450	4.6	33.7	67.7	90.2	101.4	169.0	281.8
475	3.7	31.7	63.4	84.5	95.1	158.2	263.9
500	2.8	28.2	56.5	75.3	84.7	140.9	235.0
538	1.4	16.5	33.1	44.1	49.6	82.7	137.9
550	1.4	13.9	27.9	37.2	41.8	69.7	116.2
575	1.4	9.4	18.9	25.2	28.3	47.2	78.6
600	1.4	6.6	13.3	17.7	19.9	33.2	55.3
625	1.4	5.1	10.3	13.7	15.4	25.7	42.8
650	1.4	4.7	9.5	12.6	14.2	23.6	39.4

Test Pressures

Grade	Shell Test Pressures (bar g)			High Pressure Seat Test (bar g)		
	CF3, CF3M CF8, CF8C CF8M, CF10, CG3M, CG8M F316, F304 F347	CD3MWCuN CD4MCuN CE8MN N10665 N06600 N06625 N08825	CN7M, CW-12MW M35-1 N04400 N12MV N08810	CF3, CF3M CF8, CF8C CF8M, CF10, CG3M, CG8M F316, F304 F347	CD3MWCuN CD4MCuN CE8MN N10665 N06600 N06625 N08825	CN7M, CW-12MW M35-1 N04400 N12MV N08810
150#	29	30	24	21	22	18
300#	75	78	63	55	57	46
600#	149	156	125	110	114	91
800#	199	207	166	146	152	122
900#	224	233	187	164	171	137
1500#	373	388	311	274	285	228
2500#	621	647	518	456	474	380
Low Pressure Seat test, 5 bar g air						

ASME B16.5 Flange Dimensions

ASME 150 Flanges							RF		Bolting	
NB	Flange O/dia (mm)	Bolt Circle W (mm)	Bolt Hole Dia (mm)	No. of holes	Integral Flange Thick-ness Min. (mm)	2mm Raised Face dia R (mm)	Dia of Bolts (ins)	length of Stud bolts (mm)		
0.5"	90	60.3	15.9	4	8.0	34.9	1/2	55		
0.75"	100	69.9	15.9	4	8.9	42.9	1/2	65		
1"	110	79.4	15.9	4	9.6	50.8	1/2	65		
1.5"	125	98.4	15.9	4	12.7	73.0	1/2	70		
2"	150	120.7	19.1	4	14.3	92.1	5/8	85		
3"	190	152.4	19.1	4	17.5	127.0	5/8	90		
4"	230	190.5	19.1	8	22.3	157.2	5/8	90		
6"	280	241.3	22.2	8	23.9	215.9	3/4	100		
8"	345	298.5	22.2	8	27.0	269.9	3/4	110		
10"	405	362.0	25.4	12	28.6	323.8	7/8	115		
12"	485	431.8	25.4	12	30.2	381.0	7/8	120		
14"	535	476.3	28.6	12	33.4	412.8	1	135		
16"	595	539.8	28.6	16	35.0	469.9	1	135		
18"	635	577.9	31.8	16	38.1	533.4	1 1/8	145		
20"	700	635.0	31.8	20	41.3	584.2	1 1/8	160		
24"	815	749.3	34.9	20	46.1	692.2	1 1/4	170		

ASME 600 Flanges							RF		Ring Joint Face				Bolting	
NB	Flange O/dia (mm)	Bolt Circle W (mm)	Bolt Hole Dia (mm)	No. of holes	Flange Thick-ness Min. (mm)	7mm Raised Face dia R (mm)	Groove Number	Pitch Dia. P(mm)	Height of RJ face =Depth of groove E(mm)	Width of groove F(mm)	RJ Face Dia. K _{min} (mm)	Dia of Bolts (ins)	Length of Stud bolts (mm)	
0.5"	95	66.7	15.9	4	14.3	34.9	R11	34.14	5.54	7.14	51.0	1/2	75	
0.75"	115	82.6	19.1	4	15.9	42.9	R13	42.88	6.35	8.74	63.5	5/8	90	
1"	125	88.9	19.1	4	17.5	50.8	R16	50.80	6.35	8.74	70.0	5/8	90	
1.5"	155	114.3	22.2	4	22.3	73.0	R20	68.27	6.35	8.74	90.5	3/4	110	
2"	165	127.0	19.1	8	25.4	92.1	R23	82.55	7.92	11.91	108.0	5/8	110	
3"	210	168.3	22.2	8	31.8	127.0	R31	123.83	7.92	11.91	146.0	3/4	125	
4"	275	215.9	25.4	8	38.1	157.2	R37	149.23	7.92	11.91	175.0	7/8	145	
6"	355	292.1	28.6	12	47.7	215.9	R45	211.12	7.92	11.91	241.0	1	170	
8"	420	349.2	31.8	12	55.6	269.9	R49	269.88	7.92	11.91	302.0	1 1/8	195	
10"	510	431.8	34.9	16	63.5	323.8	R53	323.85	7.92	11.91	356.0	1 1/4	215	
12"	560	489.0	34.9	20	66.7	381.0	R57	381.00	7.92	11.91	413.0	1 1/4	220	
14"	605	527.0	38.1	20	69.9	412.8	R61	419.10	7.92	11.91	457.0	1 3/8	235	
16"	685	603.2	41.3	20	76.2	469.9	R65	469.90	7.92	11.91	508.0	1 1/2	255	
18"	745	654.0	44.5	20	82.6	533.4	R69	533.40	7.92	11.91	575.0	1 5/8	275	
20"	815	723.9	44.5	24	88.9	584.2	R73	584.20	9.53	13.49	635.0	1 5/8	290	
24"	940	838.2	50.8	24	101.6	692.2	R77	692.15	11.13	16.66	749.0	1 7/8	335	

ASME 300 Flanges							RF		Bolting	
NB	Flange O/dia (mm)	Bolt Circle W (mm)	Bolt Hole Dia (mm)	No. of holes	Flange Thick-ness Min. (mm)	2mm Raised Face dia R (mm)	Dia of Bolts (ins)	length of Stud bolts (mm)		
0.5"	95	66.7	15.9	4	12.7	34.9	1/2	65		
0.75"	115	82.6	19.1	4	14.3	42.9	5/8	75		
1"	125	88.9	19.1	4	15.9	50.8	5/8	75		
1.5"	155	114.3	22.2	4	19.1	73.0	3/4	90		
2"	165	127.0	19.1	8	20.7	92.1	5/8	90		
3"	210	168.3	22.2	8	27.0	127.0	3/4	110		
4"	255	200.0	22.2	8	30.2	157.2	3/4	115		
6"	320	269.9	22.2	12	35.0	215.9	3/4	120		
8"	380	330.2	25.4	12	39.7	269.9	7/8	140		
10"	445	387.4	28.6	16	46.1	323.8	1	160		
12"	520	450.8	31.8	16	49.3	381.0	1 1/8	170		
14"	585	514.4	31.8	20	52.4	412.8	1 1/8	180		
16"	650	571.5	34.9	20	55.6	469.9	1 1/4	190		
18"	710	628.6	34.9	24	58.8	533.4	1 1/4	195		
20"	775	685.8	34.9	24	62.0	584.2	1 1/4	205		
24"	915	812.8	41.3	24	68.3	692.2	1 1/2	230		

ASME 900 Flanges							RF		Ring Joint Face				Bolting	
NB	Flange O/dia (mm)	Bolt Circle W (mm)	Bolt Hole Dia (mm)	No. of holes	Flange Thick-ness Min. (mm)	7mm Raised Face dia R (mm)	Groove Number	Pitch Dia. P(mm)	Height of RJ face =Depth of groove E(mm)	Width of groove F(mm)	RJ Face Dia. K _{min} (mm)	Dia of Bolts (ins)	Length of Stud bolts RF (mm)	Length of Stud bolts RJ (mm)
0.5"														
0.75"														
1"														
1.5"														
2"														
3"	240	190.5	25.4	8	38.1	127.0	R31	123.83	7.92	11.91	156.0	7/8	145	145
4"	290	235.0	31.8	8	44.5	157.2	R37	149.23	7.92	11.91	181.0	1 1/8	170	170
6"	380	317.5	31.8	12	55.6	215.9	R45	211.12	7.92	11.91	241.0	1 1/8	190	195
8"	470	393.7	38.1	12	63.5	269.9	R49	269.88	7.92	11.91	308.0	1 3/8	220	220
10"	545	469.9	38.1	16	69.9	323.8	R53	323.85	7.92	11.91	362.0	1 3/8	235	235
12"	610	533.4	38.1	20	79.4	381.0	R57	381.00	7.92	11.91	419.0	1 3/8	255	255
14"	640	558.8	41.3	20	85.8	412.8	R62	419.10	11.13	16.66	467.0	1 1/2	275	280
16"	705	616.0	44.5	20	88.9	469.9	R66	469.90	11.13	16.66	524.0	1 5/8	285	290
18"	785	685.8	50.8	20	101.6	533.4	R70	533.40	12.70	19.84	594.0	1 7/8	325	335
20"	855	749.3	54.0	20	108.0	584.2	R74	584.20	12.70	19.84	648.0	2	350	360
24"	1040	901.7	66.7	20	139.7	692.2	R78	692.15	15.88	26.97	772.0	2 1/2	440	455

ASME 1500 Flanges					RF			Ring Joint Face			Bolting			
NB	Flange O/dia (mm)	Bolt Circle W (mm)	Bolt Hole Dia (mm)	No. of holes	Flange Thick-ness Min. (mm)	7mm Raised Face dia R (mm)	Groove Number	Pitch Dia. P(mm)	Height of RJ face =Depth of groove E(mm)	Width of groove F(mm)	RJ Face Dia. K _{min} (mm)	Dia of Bolts (ins)	Length of Stud bolts RF (mm)	Length of Stud bolts RJ (mm)
0.5"	120	82.6	22.2	4	22.3	34.9	R12	39.67	6.35	8.74	60.5	3/4	110	110
0.75"	130	88.9	22.2	4	25.4	42.9	R14	44.45	6.35	8.74	71.5	3/4	115	115
1"	150	101.6	25.4	4	28.6	50.8	R16	50.80	6.35	8.74	81.0	7/8	125	125
1.5"	180	123.8	28.6	4	31.8	73.0	R20	68.27	6.35	8.74	92.0	1	140	140
2"	215	165.1	25.4	8	38.1	92.1	R24	95.25	7.92	11.91	124.0	7/8	145	145
3"	265	203.2	31.8	8	47.7	127.0	R35	136.53	7.92	11.91	168.0	1 1/8	180	180
4"	310	241.3	34.9	8	54.0	157.2	R39	161.93	7.92	11.91	194.0	1 1/4	195	195
6"	395	317.5	38.1	12	82.6	215.9	R46	211.14	9.53	13.49	248.0	1 3/8	260	265
8"	485	393.7	44.5	12	92.1	269.9	R50	269.88	11.13	16.66	318.0	1 5/8	290	325
10"	585	482.6	50.8	12	108.0	323.8	R54	323.85	11.13	16.66	371.0	1 7/8	335	345
12"	675	571.5	54.0	16	123.9	381.0	R58	381.00	14.27	23.01	438.0	2	375	385
14"	750	635.0	60.3	16	133.4	412.8	R63	419.10	15.88	26.97	489.0	2 1/4	405	425
16"	825	704.8	66.7	16	146.1	469.9	R67	469.90	17.48	30.18	546.0	2 1/2	445	470
18"	915	774.7	73.0	16	162.0	533.4	R71	533.40	17.48	30.18	613.0	2 3/4	495	525
20"	985	831.8	79.4	16	177.8	584.2	R75	584.20	17.48	33.32	673.0	3	540	565
24"	1170	990.6	92.1	16	203.2	692.2	R79	692.15	20.62	36.53	794.0	3 1/2	615	650

ASME 2500 Flanges					RF			Ring Joint Face			Bolting			
NB	Flange O/dia (mm)	Bolt Circle W (mm)	Bolt Hole Dia (mm)	No. of holes	Flange Thick-ness Min. (mm)	7mm Raised Face dia R (mm)	Groove Number	Pitch Dia. P(mm)	Height of RJ face =Depth of groove E(mm)	Width of groove F(mm)	RJ Face Dia. K _{min} (mm)	Dia of Bolts (ins)	Length of Stud bolts RF (mm)	Length of Stud bolts RJ (mm)
0.5"	135	88.9	22.2	4	30.2	34.9	R13	42.88	6.35	8.74	65.0	3/4	120	120
0.75"	140	95.2	22.2	4	31.8	42.9	R16	50.80	6.35	8.74	73.0	3/4	125	125
1"	160	108.0	25.4	4	35.0	50.8	R18	60.33	6.35	8.74	82.5	7/8	140	140
1.5"	205	146.0	31.8	4	44									

Valve & Pipe Bores

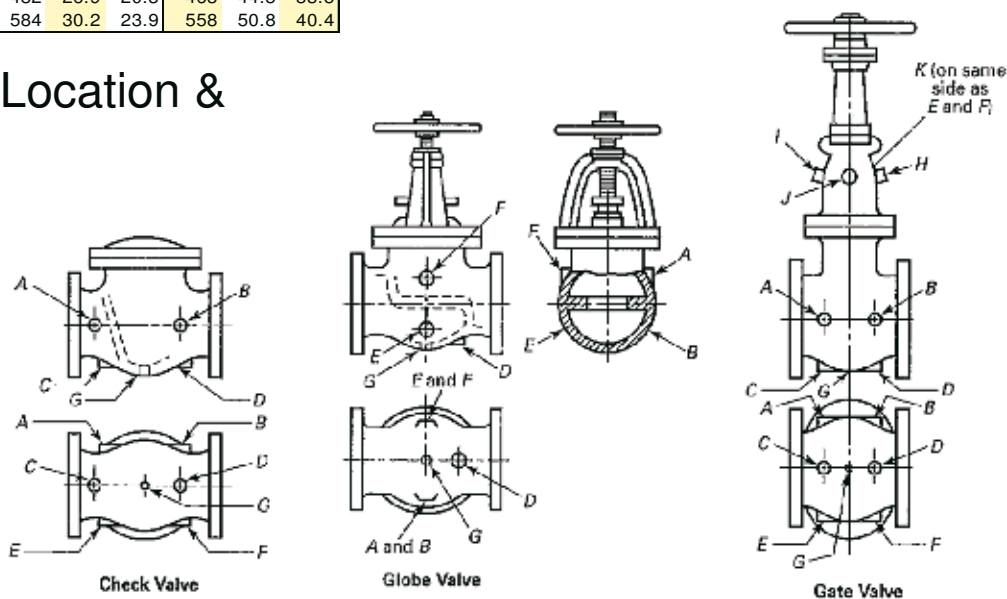
SCHEDULED PIPE													Nominal Valve Bores ASME B16.34					
SIZE			sch10 bore	sch10 wt	sch40 bore	sch 40 wt	sch80 bore	sch 80 wt	sch160 bore	sch 160 wt	schxxs bore	sch xxs wt	150#	300#	600#	900#	1500#	2500#
	nps	OD																
DN15	0.5"	21.3	17.1	2.11	15.8	2.77	13.8	3.73	11.7	4.78	6.4	7.47	0.5"	13	13	13	13	11
DN20	0.75"	26.7	22.5	2.11	21.0	2.87	18.9	3.91	15.6	5.56	11.1	7.82	0.75"	19	19	19	18	14
DN25	1"	33.4	27.9	2.77	26.6	3.38	24.3	4.55	20.7	6.35	15.2	9.09	1"	25	25	25	22	19
DN32	1.25"	42.2	36.7	2.77	35.1	3.56	32.5	4.85	29.5	6.35	22.8	9.70	1.25"	32	32	32	28	25
DN40	1.5"	48.3	42.8	2.77	40.9	3.68	38.1	5.08	34.0	7.14	28.0	10.16	1.5"	38	38	38	35	28
DN50	2"	60.3	54.8	2.77	52.5	3.91	49.2	5.54	42.8	8.74	38.2	11.07	2"	51	51	51	47	38
DN65	2.5"	73.0	66.9	3.05	62.7	5.16	59.0	7.01	54.0	9.52	45.0	14.02	2.5"	63	63	63	57	47
DN80	3"	88.9	82.8	3.05	77.9	5.49	73.7	7.62	66.6	11.13	58.4	15.24	3"	76	76	76	73	57
DN100	4"	114.3	108.2	3.05	102.3	6.02	97.2	8.56	87.3	13.49	80.1	17.12	4"	102	102	102	98	73
DN150	6"	168.3	161.5	3.40	154.1	7.11	146.4	10.97	131.8	18.26	124.4	21.95	6"	152	152	152	146	111
DN200	8"	219.1	211.6	3.76	202.7	8.18	193.7	12.70	173.1	23.01	174.7	22.22	8"	203	203	200	191	146
DN250	10"	273.0	264.6	4.19	254.5	9.27	242.8	15.09	215.8	28.58	222.2	25.40	10"	254	254	248	238	184
DN300	12"	323.9	314.8	4.57	303.3	10.31	289.0	17.47	257.2	33.34	273.1	25.40	12"	305	305	298	282	219
DN350	14"	355.6	342.9	6.35	333.3	11.13	317.5	19.05	284.2	35.71			14"	337	337	327	311	241
DN400	16"	406.4	393.7	6.35	381.0	12.70	363.5	21.44	325.4	40.49			16"	387	387	375	356	276
DN450	18"	457.2	444.5	6.35	428.7	14.27	409.6	23.82	366.7	45.24			18"	438	432	419	400	311
DN500	20"	508.0	495.3	6.35	477.8	15.09	455.6	26.19	408.0	50.01			20"	489	483	464	445	343
DN600	24"	609.6	596.9	6.35	574.6	17.48	547.7	30.96	490.5	59.54			24"	591	584	559	533	413

Wall Thickness Comparison Between API 600/ISO10434 & ASME B16.34

		CI 150#			CI 300#			CI 600#			800#	CI 900#			CI 1500#			CI 2500#		
		Bore (mm)	Wall Thickness (mm)		Bore (mm)	Wall Thickness (mm)		Bore (mm)	Wall Thickness (mm)			Bore (mm)	Wall Thickness (mm)		Bore (mm)	Wall Thickness (mm)		Bore (mm)	Wall Thickness (mm)	
SIZE	NPS		API	ASME		API	ASME		API	ASME	800#		API	ASME		API	ASME		API	ASME
DN15	0.5"	13	-	3.1	13	-	3.3	13	-	3.8	4.1	13	-	4.3	13	-	4.8	11	-	6.4
DN20	0.75"	19	-	3.6	19	-	3.8	19	-	4.3	4.8	18	-	5.1	18	-	5.8	14	-	7.4
DN25	1"	25	6.4	4.1	25	6.4	4.3	25	7.9	4.8	5.6	22	12.7	6.4	22	12.7	6.6	19	15.0	6.6
DN40	1.5"	38	6.4	4.8	38	7.9	5.3	38	9.4	5.6	6.1	34	15.0	6.9	34	15.0	8.9	28	19.1	8.9
DN50	2"	50	8.6	5.6	50	9.7	6.4	50	11.2	6.4	7.1	47	19.1	7.6	47	19.1	11.2	38	22.4	15.7
DN65	2.5"	63	9.7	5.8	63	11.2	6.8	63	11.9	6.9	8.4	57	22.4	9.3	57	22.4	14.5	47	25.4	19.1
DN80	3"	76	10.4	6.1	76	11.9	7.1	76	12.7	7.6	9.7	72	19.1	10.2	69	23.9	15.5	57	30.2	22.3
DN100	4"	100	11.2	6.6	100	12.7	7.9	100	16.0	9.4	11.9	98	21.3	12.7	92	28.7	19.6	72	35.8	27.7
DN150	6"	150	11.9	7.1	150	16.0	9.4	150	19.1	13.0	-	146	26.2	17.8	136	38.1	27.7	111	48.5	40.4
DN200	8"	200	12.7	8.1	200	17.5	11.2	199	25.4	16.0	-	190	31.8	22.4	177	47.8	35.3	146	62.0	52.3
DN250	10"	250	14.2	8.9	250	19.1	12.7	247	28.7	19.3	-	238	36.6	27.4	222	57.2	43.4	184	67.6	65.8
DN300	12"	300	16.0	9.7	300	20.6	14.5	298	31.8	22.9										
DN350	14"	336	16.8	10.2	336	22.4	15.5	326	35.1	24.6										
DN400	16"	387	17.5	10.9	387	23.9	17.3	374	38.1	27.9										
DN450	18"	438	18.3	11.9	431	25.4	18.8	419	41.4	31.0										
DN500	20"	488	19.1	12.7	482	26.9	20.3	463	44.5	33.5										
DN600	24"	590	20.6	14.2	584	30.2	23.9	558	50.8	40.4										

Body Tapping Location & Sizes

Auxiliary Connection Size		
Valve size range DN	Minimum Connection Size	
	DN	NPS
50 ≤ DN ≤ 100	15	1/2"
150 ≤ DN ≤ 200	20	3/4"
250 ≤ DN ≤ 600	25	1"



Pressure loss equations: Liquid - incompressible flow

1a) pressure loss
$$\Delta P = S \left(\frac{1.16Q}{C_v} \right)^2$$

Gas - compressible flow

2a) pressure loss
$$\Delta P = \frac{W^2 \bar{V}}{745 C_v^2 Y^2}$$

Check Valve Sizing

3a) Minimum mean flow velocity for full bore

swing check valves. $v_{\min} = 60\sqrt{\bar{V}}$ 3b) Horizontal Lift check $v_{\min} = 50\sqrt{\bar{V}}$

3c) Calculation of flow velocity given flow rate and valve bore
$$v = \frac{1111W\bar{V}}{\pi d^2}$$

Equivalent length of pipe in metres with the same flow resistance from the valve C_v , pipe dia in mm or alternatively based on the minor loss coefficient K and pipe diameter in mm.

4a)
$$L = \frac{d^5}{8027 C_v^2} = 0.058 K d$$

4b) Calculation of K
$$K = \frac{d^4}{465.6 C_v^2}$$

5a)

Calculation of Gas specific volume using gas properties on page 22.
$$\bar{V} = \frac{T V_r}{289.4 P_{abs}}$$

5b) Alternative calculation for specific volume:
$$\bar{V} = \frac{0.08314 T}{M P_{abs}}$$

6 Glossary

C_v = valve flow coefficient : usgpm

d = valve inlet diameter = seat diameter : mm

L = equivalent length of pipe : m

K = dimensionless flow loss coefficient : no units

M = molecular mass : kg/kmol

P_{abs} = absolute operating pressure = gauge pressure + 1.01325 : bar abs

ΔP = valve pressure loss : bar = 100 kPa = 10^5 Pa

π = pi = 3.142 : no units

Q = volume flow rate : m^3 / h

S = relative density = density of liquid / density of water = density / 1000 : no units

T = absolute operating temperature : $K = ^\circ C + 273$

v = mean flow velocity : m/s

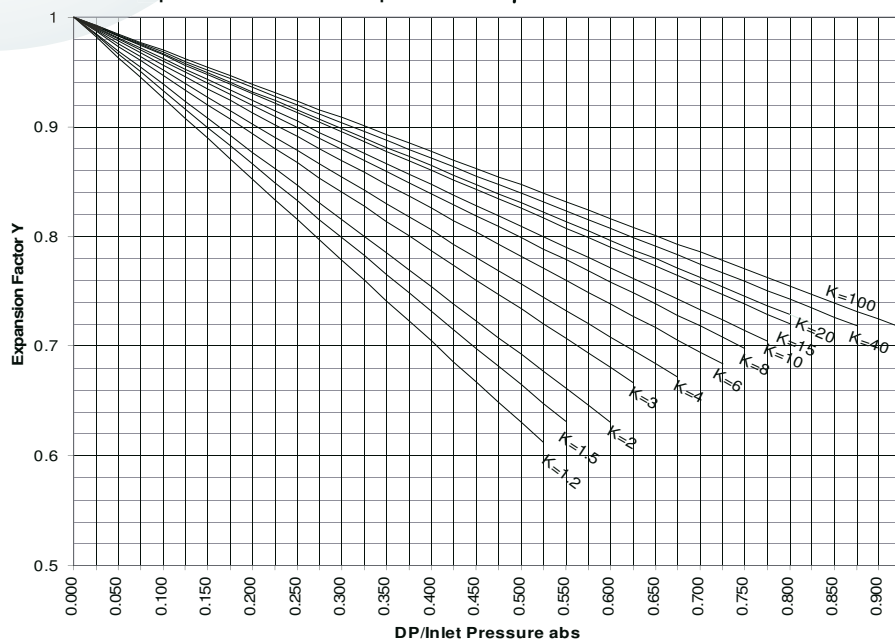
$\bar{V}$ = specific volume at inlet = 1 / density : m^3 / kg

V_r = specific volume at atmospheric pressure and 20°C : m^3 / kg from table on P18

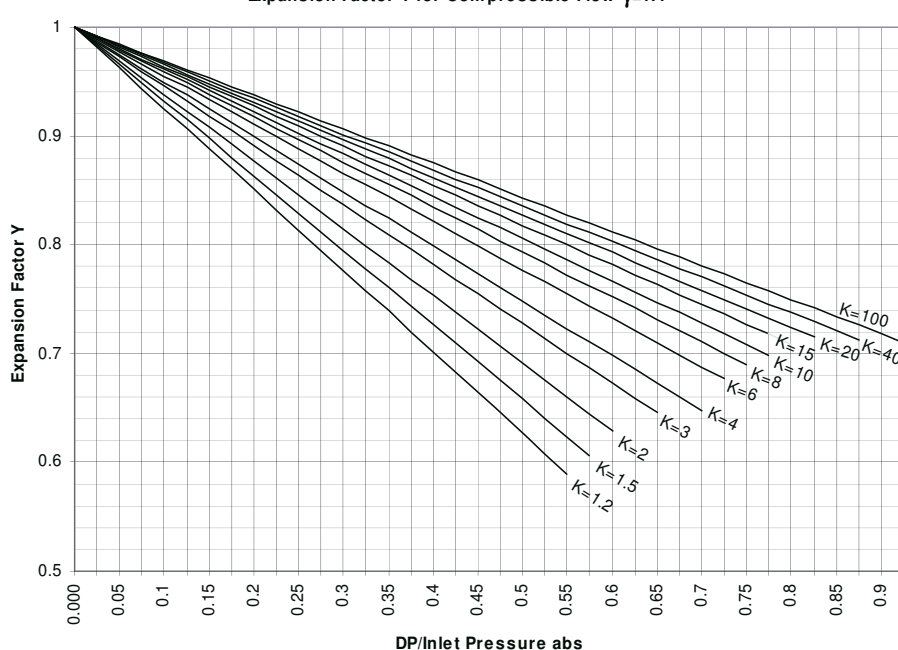
W = mass flow rate : kg/h

Y = Expansion factor for compressible flow - select nearest value from chart on p.18 : no units

Fluid properties

Expansion Factor Y for Compressible Flow $\gamma=1.3$ Limiting Factors for Sonic Velocity $\gamma = 1.3$

K	$\Delta P/P_1$	Y
1.2	0.525	0.612
1.5	0.550	0.631
2	0.593	0.635
3	0.642	0.658
4	0.678	0.670
6	0.722	0.685
8	0.750	0.698
10	0.773	0.705
15	0.807	0.718
20	0.831	0.718
40	0.877	0.718
100	0.920	0.718

Expansion Factor Y for Compressible Flow $\gamma=1.4$ Limiting Factors for Sonic Velocity $\gamma = 1.4$

K	$\Delta P/P_1$	Y
1.2	0.552	0.588
1.5	0.576	0.606
2	0.612	0.622
3	0.662	0.639
4	0.697	0.649
6	0.737	0.671
8	0.762	0.685
10	0.784	0.695
15	0.818	0.702
20	0.839	0.710
40	0.883	0.710
100	0.926	0.710

Name of Gas	Formula	Molecular Weight (kg/kmol)	Specific Volume (m³/kg)	Ratio of specific heats γ	Name of Gas	Formula	Molecular Weight (kg/kmol)	Specific Volume at 293K (m³/kg)	Ratio of specific heats γ
Acetylene (ethyne)	C ₂ H ₂	26.0	0.915	1.26	Hydrogen chloride	HCl	36.5	0.655	1.41
Air	4N ₂ +O ₂	29.0	0.830	1.40	Hydrogen sulphide	H ₂ S	34.1	0.698	1.32
Ammonia	NH ₃	17.0	1.393	1.34	Methane	CH ₄	16.0	1.499	1.31
Argon	A	39.9	0.602	1.67	Methyl chloride	CH ₃ Cl	50.5	0.465	1.20
Butane	C ₄ H ₁₀	58.1	0.402	1.11	Natural gas	-	19.5	1.250	1.27
Carbon dioxide	CO ₂	44.0	0.543	1.30	Nitrogen	N	28.0	0.859	1.41
Carbon monoxide	CO	28.0	0.859	1.40	Nitrogen Oxide	NO	30.0	0.801	1.39
Chlorine	Cl ₂	70.9	0.334	1.36	Nitrogen dioxide	NO ₂	46.0	0.522	1.31
Ethane	C ₂ H ₆	30.0	0.791	1.22	Nitrous Oxide (dinitrogen oxide)	N ₂ O	44.0	0.543	1.30
Ethylene (ethene)	C ₂ H ₄	28.0	0.851	1.26	Oxygen	O ₂	32.0	0.751	1.40
Helium	He	4.0	6.013	1.63	Propane	C ₃ H ₈	44.1	0.532	1.13
Hydrogen	H ₂	2.0	11.947	1.41	Sulphur dioxide	SO ₂	64.1	0.367	1.26

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