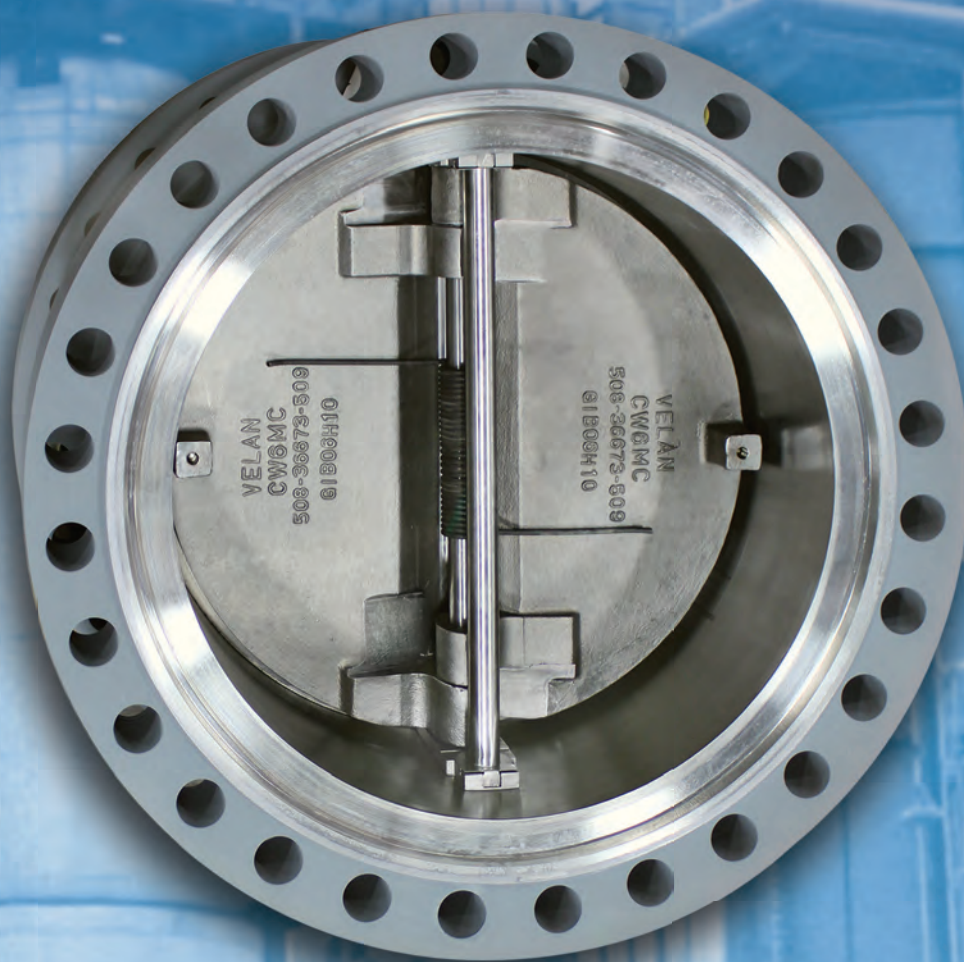


Proquip Dual-plate check valves



ASME Classes: 150–2500
API: 2000–5000
Sizes: NPS 2–60 (DN 50–1500)

VELAN

VELAN'S PROFILE

VELAN AT A GLANCE

History

- Founded in 1950

People

- Over 2,000 employees

Product line

A world-leading range of valves across all major industrial applications:

- Cast steel gate, globe, check, and ball valves
- Forged steel gate, globe, check, and ball valves
- Triple-offset butterfly valves
- Knife gate valves
- Severe service valves
- Bellows seal valves
- Steam traps

Quality

All major certifications and approvals

- ASME N/NPT
- ISO 9001
- ISO 14001
- OHSAS 18001
- PED
- API
- SIL, and
- TA-Luft
- Comprehensive quality programs that are compliant with the most stringent industry standards such as ISO 9001, API Q1, NCA 4000, ASME NQA-1 and 10 CFR 50 Appendix B.
- Velan has been surveyed and audited by leading organizations around the world such as Bureau Veritas, API, ASME, NUPIC, Newport News Shipbuilding, and DCMA.

Headquartered in Montreal, Velan has several international subsidiaries.
For general inquiries:

Velan head office:
7007 Côte de Liesse,
Montreal, QC H4T 1G2 Canada

Tel: +1 514 748 7743
Fax: +1 514 748 8635

Check our website for more specific contact information.

www.velan.com



Velan is one of the world's leading manufacturers of cast and forged steel gate, globe, check, ball, triple-offset, knife gate, highly engineered severe service valves, and steam traps offering superior performance across all major industrial applications including: fossil, nuclear, and cogeneration power; oil and gas; refining and petrochemicals; chemicals and pharmaceutical; LNG and cryogenics; marine; HVAC; mining; water and wastewater; pulp and paper; and subsea. The company also supplies actuators and integrated control packages.

Founded in 1950, Velan has earned a reputation for product excellence and innovation by bringing to the market superior products with special emphasis on quality, safety, ease of operation, and long service life. Velan valves have an extremely broad installation base and are approved by major companies worldwide.

Velan concentrates on one business—the design, manufacture and marketing of steel valves and steam traps in a broad range of types and sizes for high performance service in a wide range of applications. The company's talented people are focused on Velan's core values of quality, reliability, innovation, and integrity and mission to be the world's leading valve brand.

TABLE OF CONTENTS

Velan's global network	3
Manufacturing program	4
Application industries.....	5
Total quality & process improvement	6-7
Design features	8-10
Standard materials and specifications	11
Wafer type - PW.....	12-13
Solid lug type - PL, PM.....	14-15
Double flanged type - PF, PG.....	16-17
Solid lug type - PL, PM for API 6A.....	18
Hub end type - PH	19
Butt weld end type - PZ.....	20
Engineering data	21
Best installation practices.....	22
How to order valves	23

VELAN'S GLOBAL NETWORK

Head office



Montreal, Canada
Velan Inc.

- 17 production facilities
- 5 plants in North America
- 6 plants in Europe
- 6 plants in Asia
- 5 stocking and distribution centers
- Hundreds of distributors worldwide
- Over 60 service shops worldwide

Manufacturing plants

North America



Montreal, Canada
Velan Inc., Plant 1



Montreal, Canada
Velan Inc., Plant 2 and 7



Granby, Canada
Velan Inc., Plant 4 and 6



Montreal, Canada
Velan Inc., Plant 5



Williston, VT, U.S.A.
Velan Valve Corp., Plant 3



Europe



Lyon, France
Velan S.A.S.



Mennecey, France
Segault S.A.



Leicester, UK
Velan Valves Ltd.



Lisbon, Portugal
Velan Válvulas Industriais, Lda.



Lucca, Italy
Velan ABV S.p.A., Plant 1



Lucca, Italy
Velan ABV S.p.A., Plant 2

Asia



Ansan City, South Korea
Velan Ltd., Plant 1



Ansan City, South Korea
Velan Ltd., Plant 2



Ansan City, South Korea
Velan Ltd., Plant 3



Taichung, Taiwan
Velan Valvac Mfg. Co., Ltd.



Suzhou, China
Velan Valve (Suzhou) Co., Ltd.



Coimbatore, India
Velan Valves India Pvt. Ltd.

Distribution centers



Granby, Canada
VelCAN



Benicia, CA, U.S.A.
VelCAL



Marietta, GA, U.S.A.
VelEAST



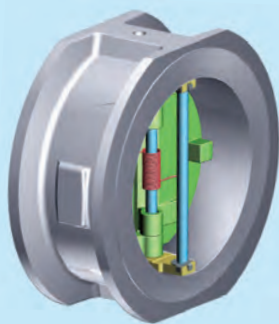
Houston, TX, U.S.A.
VelTEX



Willich, Germany
Velan GmbH

– ASME N-stamp accredited manufacturer

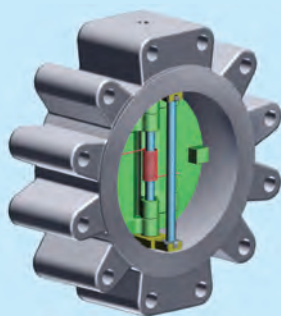
STANDARD MANUFACTURING PROGRAM



WAFER TYPE - PW

- Retainerless design is supplied as standard
- API 594 Face-to-face dimension
- To suit ANSI B16.5 flanges, NPS 2-24 (DN 50-600)
- To suit ANSI B16.47 Series A flanges, NPS 26 (DN 650) and larger

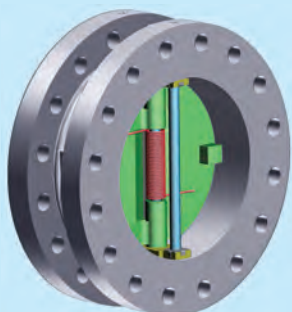
ASME CLASS					
150	300	600	900	1500	2500
NPS 2-60 DN 50-1500	NPS 2-60 DN 50-1500	NPS 2-60 DN 50-1500	NPS 2-48 DN 50-1200	NPS 2-24 DN 50-600	NPS 2-12 DN 50-300



SOLID LUG TYPE - PL, PM

- Retainerless design is supplied as standard
- API 594 Face-to-face dimension
- To suit ANSI B16.5 flanges, NPS 2-24 (DN 50-600)
- To suit ANSI B16.47 Series A flanges, NPS 26 (DN 650) and larger

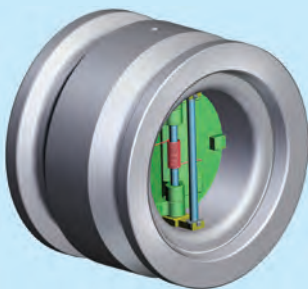
ASME CLASS					
150	300	600	900	1500	2500
NPS 2-10 DN 50-250	NPS 2-10 DN 50-250	NPS 2-10 DN 50-250	NPS 2-10 DN 50-250	NPS 2-24 DN 50-600	NPS 2-12 DN 50-300



DOUBLE FLANGED TYPE - PF, PG

- Retainerless design is supplied as standard
- API 594 Face-to-face dimension
- To suit ANSI B16.5 flanges, NPS 2-24 (DN 50-600)
- To suit ANSI B16.47 Series A Flanges, NPS 26 (DN 650) and larger

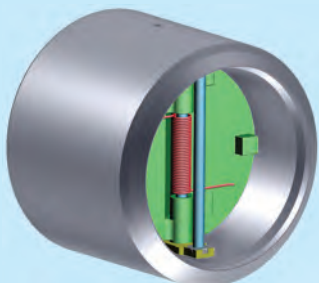
ASME CLASS			
150	300	600	900
NPS 12-60 DN 300-1500	NPS 12-60 DN 300-1500	NPS 12-60 DN 300-1500	NPS 12-48 DN 300-1200



HUB END TYPE - PH

- Retainerless design is supplied as standard
- To suit customer's specified hub-ended details

ASME CLASS			
600	900	1500	2500
NPS 2-24 DN 50-600	NPS 2-24 DN 50-600	NPS 2-24 DN 50-600	NPS 2-24 DN 50-600



BUTT WELD END TYPE - PZ

- Retainerless design is supplied as standard

ASME CLASS		
150	300	600
NPS 3-36 DN 80-900	NPS 3-36 DN 80-900	NPS 3-36 DN 80-900

For valve sizes, ASME Classes and designs not identified herein, please consult the Velan Marketing department.

APPLICATIONS IN MAJOR INDUSTRIES



Fossil, Nuclear & Cogeneration Power



Pulp & Paper



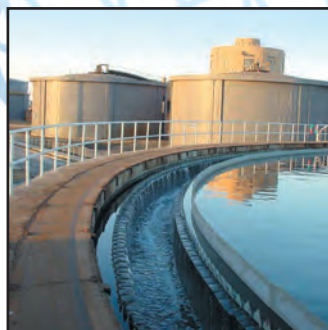
Refining



Marine



Petrochemicals



Water & Wastewater



Chemical

All over the world, Velan valves are used by the world's leading industrial companies to help keep their operating facilities running smoothly. In fact, Velan valves have a long history of proving themselves in many of the industrial world's toughest applications.



Mining



LNG & Cryogenics



Offshore

TOTAL QUALITY & PROCESS IMPROVEMENT

VELAN

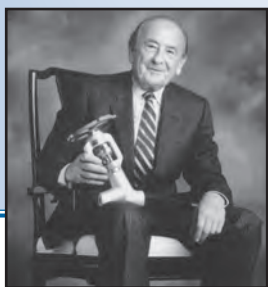
▼ Total Quality Commitment ▼

Velan Total Quality Program

Our aim is to offer products and services that not only meet but clearly exceed the expectations of our customers.

Through training, teamwork, and performance, our employees strive to achieve continuous improvement of all processes.

Our goal is Total Quality and On-Time Delivery; our method is Total Commitment.



A.K. Velan

**A.K. Velan,
Founder of Velan**

Velan's number-one priority is quality. From order entry to design engineering to the shop floor, the entire company is totally committed to offering products and services that not only meet but exceed customer expectations. All Velan valves are designed and manufactured with an emphasis on low emissions, safety, simple maintenance, ease of operation, and, above all, long and reliable service life.

TOTAL PROCESS IMPROVEMENT

While Velan has always made quality a priority, in 1990 the company adopted a formal Total Quality Management Program, aimed at improving production processes and was awarded ISO 9001 status the following year.

Today, Velan's Total Process Improvement Program brings together a group of industry best practices, including Lean Manufacturing and Six-Sigma, with the goal of creating a more balanced and efficient production system.

TOTAL PROCESS IMPROVEMENT PROGRAM

- Total Quality Management Program (since 1990)
- Lean Manufacturing
- Six-Sigma

CERTIFICATIONS/APPROVALS

- ASME N/NPT (since 1970)
- ISO 9001 (since 1991)
- ISO 14001
- OHSAS 18001
- PED
- API
- SIL
- TA-Luft

CERTIFICATES/APPROVALS

Velan holds major applicable approvals, including ASME N/NPT, ISO 9001, ISO 14001, OHSAS 18001, PED, API, SIL, TA-Luft, etc. Velan designs and manufactures valves in accordance with ASME B16.34 and other recognized International standards such as API and ASME Sec. III; we implement comprehensive quality programs that are compliant with the most stringent industry standards such as ISO 9001, API Q1, NCA 4000, ASME NQA-1 and 10 CFR 50 Appendix B.

Velan has been surveyed and audited by leading organizations around the world such as Bureau Veritas, API, ASME, NUPIC, Newport News Shipbuilding, and DCMA.



6 SYSTEMS ENSURE THE FINAL QUALITY GOALS

1. DESIGN

All valves are designed to comply with the requirements of API 594, ASME B16.34, the ASME code, and special customer requirements, as applicable.

2. QUALITY ASSURANCE

Every step from procurement through production, welding, assembly, testing, and packaging is in accordance with written quality programs and procedures. (An ASME Section III manual for code valve production and an ISO 9001 QA manual for all other production.) Velan's five North American plants are certified to ISO 9001 and three plants have ASME N type certificates of authorization. Velan has been fully approved to supply CE marked valves in accordance with the PED (European Pressure Equipment Directive). Orders are reviewed by the Engineering and QA departments and all special customer requirements are incorporated into QCI (Quality Control Instructions) issued for each project. The QA Department also maintains calibration and gauge-control systems, and trains and qualifies skilled welders and NDT inspectors.

3. QUALITY CONTROL

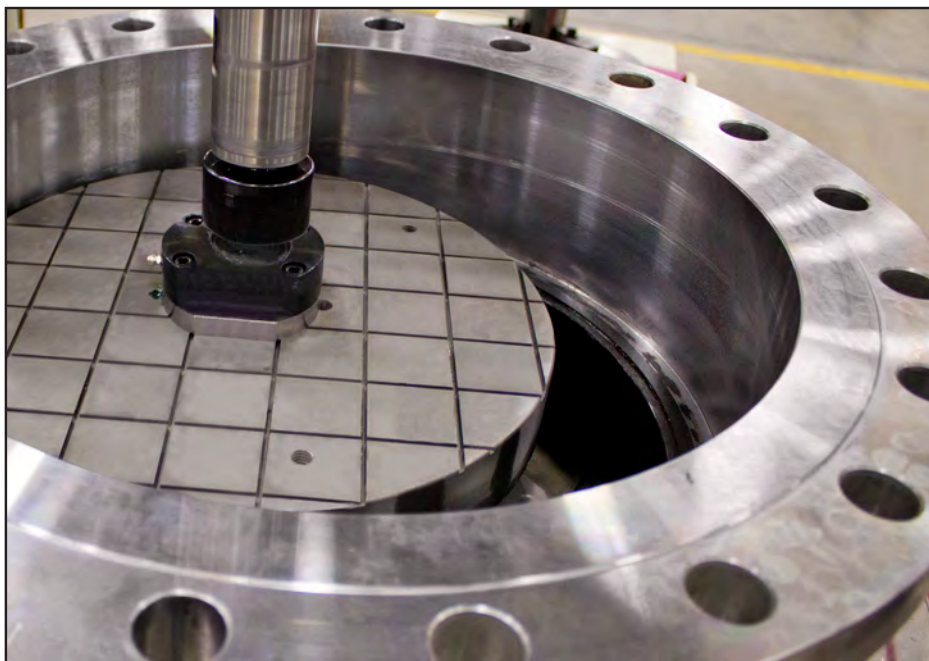
The QC Department is responsible for all aspects of quality, from receiving of material to control of machining processes, welding, nondestructive examination, assembly, pressure testing, cleaning, painting, and packaging. When required, a permanent record of all completed quality goals is prepared and sent to customers in the form of a "Valve Data Package."



Dual-plate check valve after cryogenic testing.

4. PRESSURE TESTING

Each valve is pressure tested in accordance with API 598 or special customer requirements as applicable. In all plants test status is integrated into production control/inventory management software.



Additional body seat lapping to meet tight seat leak requirements.

5. IMPROVEMENT TEAMS

Continuous improvement teams at point of manufacturing ensure quality at source, process control, higher quality workmanship, and operator ownership.

6. QUALIFICATION TESTING

A key to reliability is the performance of functional qualification tests. These tests are performed on all valves to determine reliability and service life.

SUPERIOR PERFORMANCE OF THE

THE ADVANTAGES OF DUAL-PLATE CHECK VALVES VERSUS SWING CHECK VALVES

COST SAVING DESIGN

The inherent design of the dual-plate check valve results in significantly reduced weight when compared to conventional full-bodied swing check valves. As valves increase in size the dual-plate check valves can be as little as one fifth the weight of the equivalent full-bodied unit. This results in savings in initial cost, space and pipe support element installation.

REDUCED LINE SHOCK

To minimize or eliminate line shock, check valves must close as quickly as possible prior to the flow having an opportunity to reverse. As each of the discs in dual-plate check valves are only half the size of that of a full bodied check, they experience reduced fluid drag and can move more quickly to the closed position. Their swing radius is one half that of the conventional check valves. The leading edge distance from open to closed position is halved, in turn reducing the travel time by 50%.

The reduced weight of a dual-plate valve disc versus the full bodied swing check is a major factor in minimizing slamming and water hammer. The heavier full bodied disc has greater momentum when swinging closed, causing it to slam into the valve seat (in large valve sizes the disc can weigh up to a ton).

LOWER PRESSURE DROP AND INCREASED C_v FOR VALVES NPS 24 (DN 600) AND LARGER

The two factors that affect pressure drop across any valve are:

- 1) The unobstructed flow area.
- 2) The energy required to maintain the valve in the open position. Specifically, full-bodied swing check valves have a disc which is hinged at the top with gravity working to keep it in the closed position. Flow must provide sufficient energy to overcome this force of gravity and lift the disc. This energy requirement increases dramatically in larger sizes.

Dual-plate check valves are designed such that the discs are hinged at their sides like a door, eliminating the effect of gravity. Consequently, very little energy is needed to open the valve and maintain this position, resulting in lower energy costs.

BODY SURFACE WITH UNINTERRUPTED GASKET SURFACE

The problem: Other retainerless dual-plate check valve designs have a machining operation that cuts into the body wall in order to facilitate its retention of the internal components. This machining operation (1) encroaches into the gasket sealing surface that may restrict the type of gaskets that can be used, and (2) may cause the bore of the valve to be reduced, thereby increasing the pressure drop through the valve.

The solution: The internal retention method does not encroach on the gasket sealing surface, and therefore, the Velan design maximizes the flow path area through the valve with a lower pressure drop.

INTRINSICALLY FIRE SAFE

With no drilling through the body wall, the Proquip dual-plate check valve is intrinsically fire safe.

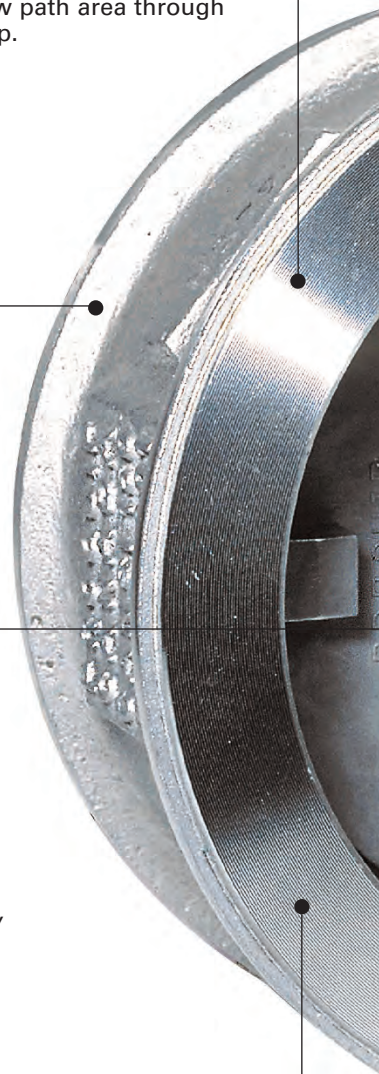
QUICK ACTING SPRING

Velan springs provide a fast-acting response to flow reversal, while designed to minimize stress and maximize service life.

Wafer type - PW shown here.

LAPPED BODY & DISC SEATS

The heart of each valve is the seat/seal interface. Proquip valves are manufactured using the most updated machining methods and equipment to achieve maximum flatness with a fine lapped finish. The end result are valves that easily meet and exceed test requirements of API 598 for metal-seated check valves.

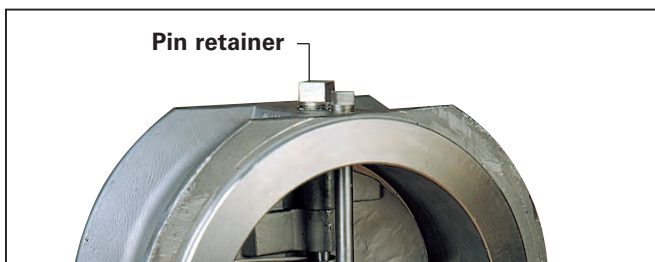


PROQUIP DUAL-PLATE CHECK VALVE DESIGN

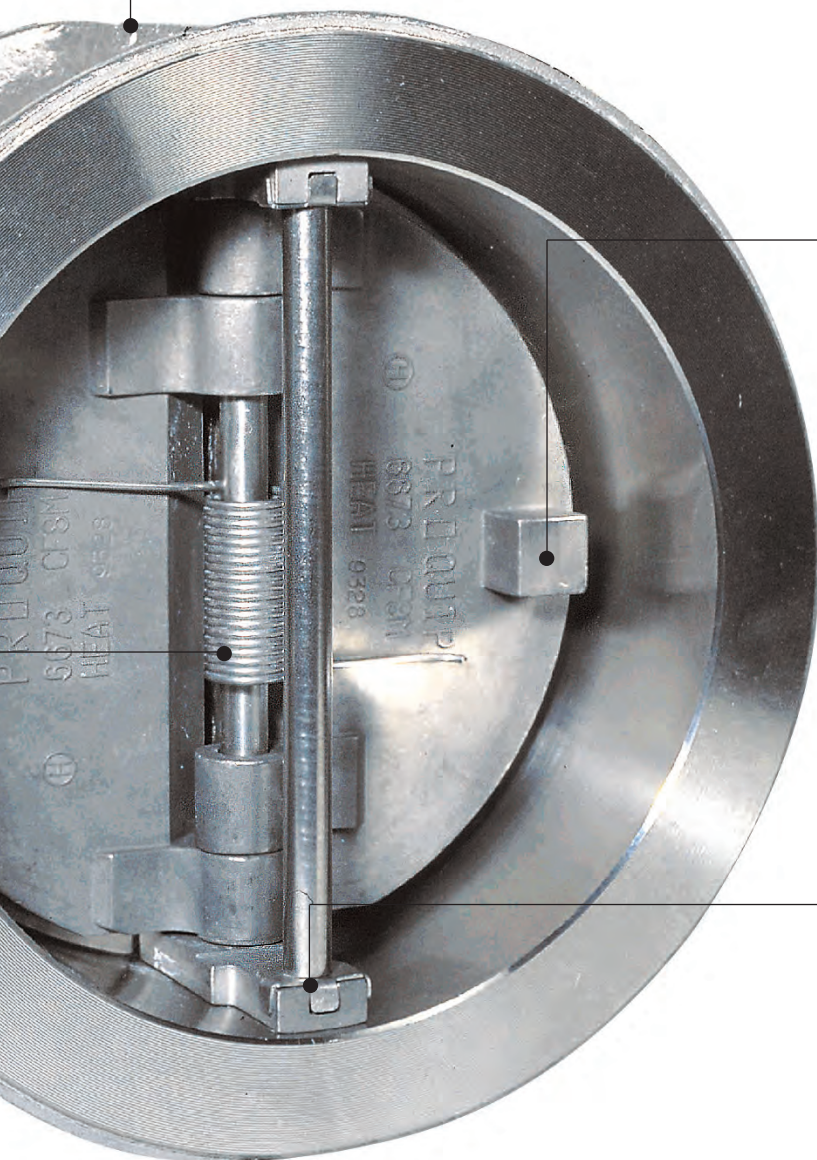
RETAINERLESS BODY DESIGN

The problem: Conventional dual-plate check valves require holes through the body wall to facilitate the installation of the hinge and stop pins. These holes are sealed by threaded pipe plugs called retainers. After being in service for a period of time, these plugs often leak due to temperature cycling, vibration, and other causes.

The solution: No holes through the body wall, so leakage to the outside is impossible, and therefore emissions-free!



Competitive dual-plate check valve design with pin retainers.



SHOCK BUMPERS

The problem: Competitive designs do not have shock bumpers.

The solution: The Proquip design uses shock bumpers on the back of each disc. These bumpers meet when the valve is in the full open position, thus preventing the discs from striking the stop pin. This arrangement reduces the shock force on the hinges; ensuring internal components have an extended cycle life with minimal wear under the most severe service conditions.



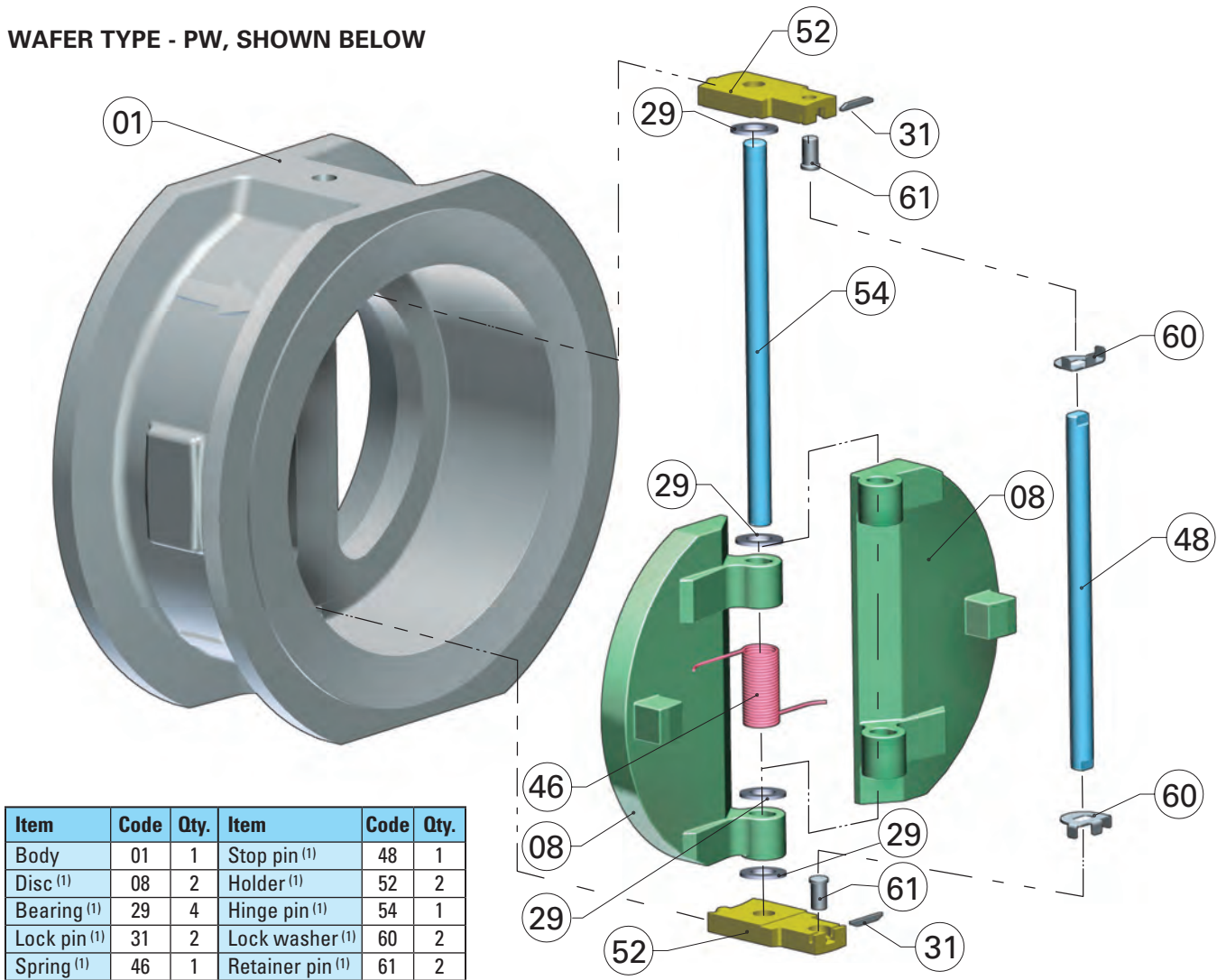
EXTENDED SEAT LIFE

The problem: The clearance between the disc hinge and hinge pin in competitive designs allow the disc to drag on to the body seating surface when opening, which leads to reduced usefulness of the sealing area.

The solution: The Proquip design and clearance between the disc hinge and hinge pin, allow the heel of the discs to lift off the body seating surface first as the flow cracks open the valve. As the flow increases through the valve, the discs open and the dragging effect is eliminated. As a result, the integrity of the sealing area is extended.

EXPLODED VIEW AND PARTS LIST

WAFER TYPE - PW, SHOWN BELOW



Item	Code	Qty.	Item	Code	Qty.
Body	01	1	Stop pin ⁽¹⁾	48	1
Disc ⁽¹⁾	08	2	Holder ⁽¹⁾	52	2
Bearing ⁽¹⁾	29	4	Hinge pin ⁽¹⁾	54	1
Lock pin ⁽¹⁾	31	2	Lock washer ⁽¹⁾	60	2
Spring ⁽¹⁾	46	1	Retainer pin ⁽¹⁾	61	2

(1) Spare parts available.

Valve profile is subject to change without notice

TYPICAL BODY, DISC, HOLDER AND PIN MATERIALS

DESCRIPTION		CARBON STEEL		ALLOY STEEL				STAINLESS STEEL				BAR STOCK	
				1¼ CR ½ Mo	2¼ CR-1 Mo	5 CR	9 CR-1Mo	13 CR	316	316L	304	13 CR	SS
ASTM DESIG	A216 WCB	A352 LCC	A217 WC6	A217 WC9	A217 C5	A217 C12	A217 CA15	A351 CF8M	A351 CF3M	A351 CF8	A479 410	A 479 316	
Composition %	Carbon	0.25 ⁽¹⁾	0.25	0.20	0.18	0.20	0.20	0.15	0.08	0.03	0.08	0.15	0.08
	Manganese	1.00	1.20	0.50-0.80	0.40-0.70	0.40-0.70	0.35-0.65	1.00	1.50	1.50	1.50	1.00	2.00
	Phosphorus	0.04	0.04	0.04	0.40	0.04	0.04	0.04	0.04	0.04	0.04	0.040	0.045
	Sulphur	0.045	0.045	0.045	0.045	0.045	0.045	0.040	0.040	0.040	0.040	0.030	0.030
	Silicon	0.60	0.60	0.60	0.60	0.75	1.00	1.50	1.50	1.50	2.00	1.00	1.00
	Nickel	0.50	0.50	0.50	0.50	0.50	0.50	1.00	9.00-12.00	9.00-13.00	8.00-11.00	—	10.00-14.00
	Chromium	0.50	0.50	1.00-1.50	2.00-2.75	4.00-6.50	8.00-10.00	11.5-14.0	18.00-21.00	17.00-21.00	18.00-21.00	11.50-13.50	16.00-18.00
	Molybdenum	0.20	0.20	0.45-0.65	0.90-1.20	0.45-0.65	0.90-1.20	0.50	2.0-3.00	2.0-3.00	0.50	—	2.00-3.00
	Copper	0.30	0.30	0.50	—	0.50	0.50	—	—	—	—	—	—
Heat treat.	Anneal	Quench & temper	Temper	Temper	Temper	Temper	Solution anneal				Class 2	Sol. Ann.	
Tensile psi min.	70,000	70,000-95,000	70,000-90,000	70,000-90,000	90,000-115,000	90,000-115,000	90,000-115,000	70,000	70,000	70,000	110,000	75,000	
Yield psi min.	36,000	40,000	40,000	40,000	60,000	60,000	65,000	30,000	30,000	30,000	85,000	30,000	
Elong. % min.	22	22	20	20	18	18	18	30	30	35	15	30	
R. area % min.	35	35	35	35	35	35	30	—	—	—	45	40	
Hardness HB	187 max.	200 max.	207 max.	207 max.	241 max.	241 max.	327-381	—	187 max.	—	269 max.	—	

(1) Velan standard: 0.25 or less.

DESIGN & TYPICAL MATERIALS OF CONSTRUCTION

DESIGN STANDARDS

Design standard	API 594
Pressure-temperature ratings	ASME 16.34
Valve testing	API 598
Face-to-face dimensions	API 594 Also complies with API 6D, ISO 14313, ASME B16.10
Flange dimensions	ASME B16.5 for NPS 2-24 (DN 50-600) ASME B16.47 series A for NPS 26 (DN 650) and larger ASME B16.47 series B available upon request Alternative flange compliance available upon request
Materials	ASTM Standards

API STANDARD 594 TRIM

API 594 Seventh Edition, September 2010; Clause 6.4.1, defines “trim” as

- body seating surface;
- plate or disc seating surfaces.

TYPICAL TRIM DEMAND:	TRIM #1	TRIM #5	TRIM #8	TRIM #10	TRIM #12
Body seating surface	11-13Cr	CoCr alloy	CoCr alloy	18Cr-8Ni-Mo	CoCr alloy
Disc seating surfaces	11-13Cr	CoCr alloy	11-13Cr	18Cr-8Ni-Mo	18Cr-8Ni-Mo

CARBON STEEL BODY COMPONENT

FIGURE NO.	BODY	BODY SEAT	DISCS	DISC SEAT	SPRING	WETTED PARTS	TRIM #
02D10-3DB	A216 WCB	As body	A351 CF8M	AS DISCS	Inconel X-750	316 SS	-
02D13-3DB	A216 WCB	Viton A	A351 CF8M	AS DISCS	Inconel X-750	316 SS	-
02D17-3DB	A216 WCB	316 SS	A351 CF8M	AS DISCS	Inconel X-750	316 SS	10
02D19-3DB	A216 WCB	CoCr alloy	A351 CF8M	AS DISCS	Inconel X-750	316 SS	12
02D89-3DB	A216 WCB	CoCr alloy	A351 CF8M	CoCr alloy	Inconel X-750	316 SS	5
02E18-3EB	A216 WCB	410 SS	A217 CA15	AS DISCS	Inconel X-750	410 SS	1
02E19-3EB	A216 WCB	CoCr alloy	A217 CA15	AS DISCS	Inconel X-750	410 SS	8

LOW-TEMPERATURE CARBON STEEL BODY COMPONENT

FIGURE NO.	BODY	BODY SEAT	DISCS	DISC SEAT	SPRING	WETTED PARTS	TRIM #
31D10-3DB	A352 LCC	As body	A351 CF8M	AS DISCS	Inconel X-750	316 SS	-
31D19-3DB	A352 LCC	CoCr alloy	A351 CF8M	AS DISCS	Inconel X-750	316 SS	12
31D89-3DB	A352 LCC	CoCr alloy	A351 CF8M	CoCr alloy	Inconel X-750	316 SS	5

STAINLESS STEEL BODY COMPONENT

FIGURE NO.	BODY	BODY SEAT	DISCS	DISC SEAT	SPRING	WETTED PARTS	TRIM #
13D10-3DB	A351 CF8M	As body	A351 CF8M	AS DISCS	Inconel X-750	316 SS	10
13D13-3DB	A351 CF8M	Viton A	A351 CF8M	AS DISCS	Inconel X-750	316 SS	-
13D19-3DB	A351 CF8M	CoCr alloy	A351 CF8M	AS DISCS	Inconel X-750	316 SS	12
13D89-3DB	A351 CF8M	CoCr alloy	A351 CF8M	CoCr alloy	Inconel X-750	316 SS	5

(1) For alternative materials, please consult the How to Order table on page 23.

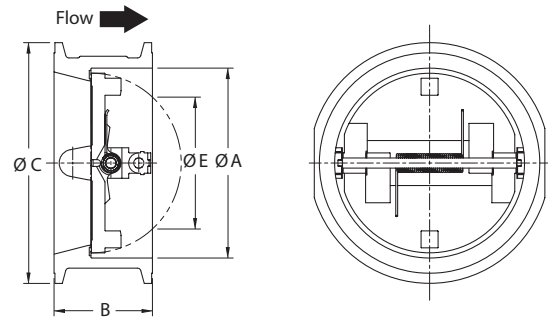
(2) Wetted parts comprise the following components: holders, hinge pin, stop pin and retainer pins (part numbers 48, 52, 54, and 61).

(3) The lock washer and lock pin (part numbers 60 and 31) remain as 316 SS, for standard materials of construction (above).

Note: CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite™ and other approved manufacturers.

INSTALLATION DIMENSIONS

WAFER TYPE - PW ANSI B16.5 / ANSI B16.47 SERIES A



Size		Pressure and Class		Dimensions								Approx. weight		Flange details				Eye bolt hole size
				Ø A		B		Ø C		Ø E				No.	Dia	Length RF ends	Length RTJ ends	
NPS	DN	Class	PN	in	mm	in	mm	in	mm	in	mm	lbs	kg					
2	50	150	20	2.41	61	2.38	60	4.13	105	0.00	0	6	3	4	5/8	5.75	6.50	-
2	50	300	50	2.41	61	2.38	60	4.38	111	0.00	0	7	3	8	5/8	6.00	7.00	-
2	50	600	100	2.41	61	2.38	60	4.38	111	0.00	0	7	3	8	5/8	6.50	7.00	-
2	50	900	150	2.41	61	2.75	70	5.63	143	0.00	0	12	5	8	7/8	8.50	8.75	-
2	50	1500	260	2.41	61	2.75	70	5.63	143	0.00	0	12	5	8	7/8	8.50	8.75	-
2	50	2500	420	2.41	61	2.75	70	5.75	146	0.00	0	13	6	8	1	9.75	10.00	-
2 1/2	65	150	20	2.88	73	2.63	67	4.88	124	1.25	32	10	5	4	5/8	6.25	7.00	-
2 1/2	65	300	50	2.88	73	2.63	67	5.13	130	1.24	31	10	5	8	3/4	6.75	7.75	-
2 1/2	65	600	100	2.88	73	2.63	67	5.13	130	1.24	31	10	5	8	3/4	7.25	7.75	-
3	80	150	20	3.51	89	2.88	73	5.38	137	2.00	51	12	5	4	5/8	6.75	7.25	-
3	80	300	50	3.51	89	2.88	73	5.88	149	1.98	50	14	6	8	3/4	7.25	8.25	-
3	80	600	100	3.51	89	2.88	73	5.88	149	1.94	49	14	6	8	3/4	7.75	8.25	-
3	80	900	150	3.51	89	3.25	83	6.63	168	2.18	55	23	10	8	7/8	8.50	9.00	-
3	80	1500	260	3.51	89	3.25	83	6.88	175	1.75	44	23	10	8	1 1/8	10.25	10.50	-
3	80	2500	420	3.51	89	3.38	86	7.75	197	2.48	63	27	12	8	1 1/4	12.00	12.50	3/8
4	100	150	20	4.50	114	2.88	73	6.88	175	3.37	85	18	8	8	5/8	6.75	7.25	-
4	100	300	50	4.50	114	2.88	73	7.13	181	3.37	85	18	8	8	3/4	7.50	8.50	-
4	100	600	100	4.50	114	3.13	79	7.63	194	3.39	86	24	11	8	7/8	8.75	9.25	-
4	100	900	150	4.50	114	4.00	102	8.13	206	3.30	84	37	17	8	1 1/8	10.25	10.75	3/8
4	100	1500	260	4.50	114	4.00	102	8.25	210	3.30	84	37	17	8	1 1/4	11.75	12.00	3/8
4	100	2500	420	4.50	114	4.13	105	9.25	235	3.25	83	48	22	8	1 1/2	14.25	14.75	3/8
5	125	150	20	5.56	141	3.38	86	7.75	197	3.71	94	24	11	8	3/4	7.50	8.00	-
5	125	300	50	5.56	141	3.38	86	8.50	216	4.42	112	25	11	8	3/4	8.25	9.25	3/8
6	150	150	20	6.63	168	3.88	98	8.75	222	5.62	143	31	14	8	3/4	8.00	8.75	1/2
6	150	300	50	6.63	168	3.88	98	9.88	251	5.55	141	40	18	12	3/4	9.00	9.75	1/2
6	150	600	100	6.63	168	5.38	137	10.50	267	5.03	128	62	28	12	1	12.00	12.75	1/2
6	150	900	150	6.63	168	6.25	159	11.38	289	4.52	115	105	48	12	1 1/8	13.25	13.75	1/2
6	150	1500	260	6.63	168	6.25	159	11.13	283	4.53	115	104	47	12	1 3/8	16.50	17.00	1/2
6	150	2500	420	6.63	168	6.25	159	12.50	318	4.88	124	144	65	8	2	20.00	20.75	1/2
8	200	150	20	8.63	219	5.00	127	11.00	279	7.63	194	57	26	8	3/4	9.50	10.00	1/2
8	200	300	50	8.63	219	5.00	127	12.13	308	7.35	187	71	32	12	7/8	10.75	11.50	1/2
8	200	600	100	8.63	219	6.50	165	12.63	321	6.71	170	108	49	12	1 1/8	14.25	14.75	1/2
8	200	900	150	8.63	219	8.13	206	14.13	359	5.60	142	207	94	12	1 3/8	16.50	17.00	1/2
8	200	1500	260	8.63	219	8.13	206	13.88	352	5.47	139	205	93	12	1 5/8	19.75	20.50	1/2
8	200	2500	420	8.63	219	8.13	206	15.25	387	6.75	171	283	128	12	2	23.25	24.25	1/2
10	250	150	20	10.75	273	5.75	146	13.38	340	9.00	229	98	44	12	7/8	10.50	11.25	1/2
10	250	300	50	10.75	273	5.75	146	14.25	362	9.51	242	115	52	16	1	12.25	13.00	1/2
10	250	600	100	10.75	273	8.38	213	15.75	400	8.27	210	205	93	16	1 1/4	17.00	17.50	3/4
10	250	900	150	10.75	273	9.50	241	17.13	435	7.44	189	287	130	16	1 3/8	18.50	18.75	3/4
10	250	1500	260	10.75	273	9.75	248	17.13	435	7.68	195	373	169	12	1 7/8	23.25	23.75	3/4
10	250	2500	420	10.75	273	10.00	254	18.75	476	9.12	232	548	249	12	2 1/2	29.25	30.50	3/4
12	300	150	20	12.75	324	7.13	181	16.13	410	11.15	283	176	80	12	7/8	12.25	12.75	1/2
12	300	300	50	12.75	324	7.13	181	16.63	422	11.15	283	175	79	16	1 1/8	14.25	15.00	1/2
12	300	600	100	12.75	324	9.00	229	18.00	457	9.91	252	275	125	20	1 1/4	17.75	18.25	3/4
12	300	900	150	12.75	324	11.50	292	19.63	498	7.39	188	450	204	20	1 3/8	21.00	21.50	3/4
12	300	1500	260	12.75	324	12.00	305	20.50	521	8.01	203	639	290	16	2	27.00	28.00	3/4
12	300	2500	420	12.75	324	12.00	305	21.63	549	10.83	275	925	420	12	2 3/4	33.25	34.75	3/4
14	350	150	20	14.00	356	7.25	184	17.75	451	12.12	308	190	86	12	1	12.75	13.25	3/4
14	350	300	50	14.00	356	8.75	222	19.13	486	12.14	308	271	123	20	1 1/8	16.00	17.00	3/4
14	350	600	100	14.00	356	10.75	273	19.38	492	9.72	247	397	180	20	1 3/8	20.25	20.75	3/4
14	350	900	150	14.00	356	14.00	356	20.50	521	7.21	183	648	294	20	1 1/2	24.00	24.50	3/4
14	350	1500	260	14.00	356	14.00	356	22.75	578	7.21	183	886	402	16	2 1/4	30.25	31.50	1

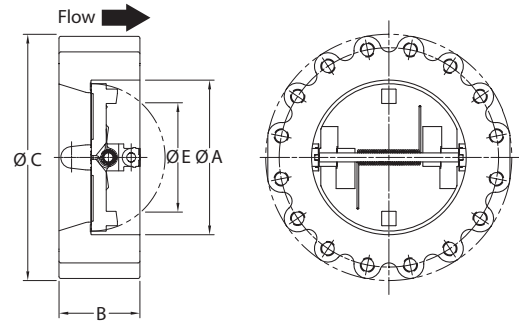
INSTALLATION DIMENSIONS

WAFER TYPE - PW ANSI B16.5 / ANSI B16.47 SERIES A

Size		Pressure and Class		Dimensions								Approx. weight		Flange details				Eye bolt hole size
				Ø A		B		Ø C		Ø E				No.	Dia	Length RF ends	Length RTJ ends	
NPS	DN	Class	PN	in	mm	in	mm	in	mm	in	mm	lbs	kg			Stud	Stud	
16	400	150	20	16.00	406	7.50	191	20.25	514	13.90	353	246	112	16	1	13.25	13.75	3/4
16	400	300	50	16.00	406	9.13	232	21.25	540	14.13	359	350	159	20	1 1/4	17.00	17.75	3/4
16	400	600	100	16.00	406	12.00	305	22.25	565	12.54	319	570	259	20	1 1/2	22.25	22.75	3/4
16	400	900	150	16.00	406	15.13	384	22.63	575	11.18	284	861	390	20	1 5/8	26.50	27.00	3/4
16	400	1500	260	16.00	406	15.13	384	25.25	641	12.50	318	1240	562	16	2 1/2	33.00	33.50	3/4
18	450	150	20	18.00	457	8.00	203	21.63	549	15.95	405	300	136	16	1 1/8	14.25	14.75	3/4
18	450	300	50	18.00	457	10.38	264	23.50	597	16.27	413	513	233	24	1 1/4	18.50	19.50	1
18	450	600	100	18.00	457	14.25	362	24.13	613	14.00	356	780	354	20	1 5/8	25.25	25.75	1
18	450	900	150	18.00	457	17.75	451	25.13	638	9.81	249	1190	540	20	1 7/8	30.50	31.00	1
18	450	1500	260	18.00	457	18.44	468	27.75	705	9.81	249	1774	805	16	2 3/4	38.00	39.50	1
20	500	150	20	20.00	508	8.63	219	23.88	606	17.78	452	380	172	20	1 1/8	15.25	15.75	3/4
20	500	300	50	20.00	508	11.50	292	25.75	654	17.81	452	651	295	24	1 1/4	20.00	21.00	1
20	500	600	100	20.00	508	14.50	368	26.88	683	16.77	426	1021	463	24	1 5/8	26.00	26.75	1
20	500	900	150	20.00	508	17.75	451	27.50	699	13.00	330	1480	671	20	2	31.00	31.50	1
20	500	1500	260	20.00	508	21.00	533	29.75	756	17.06	433	2600	1179	16	3	42.50	44.00	1
24	600	150	20	24.00	610	8.75	222	28.25	718	21.68	551	525	238	20	1 1/4	16.00	16.50	3/4
24	600	300	50	24.00	610	12.50	318	30.50	775	21.73	552	1050	476	24	1 1/2	22.00	23.25	1
24	600	600	100	24.00	610	17.25	438	31.13	791	19.88	505	1720	780	24	1 7/8	30.00	30.75	1
24	600	900	150	24.00	610	19.50	495	33.00	838	18.97	482	2270	1029	20	2 1/2	36.50	37.25	1
24	600	1500	260	24.00	610	22.00	559	35.50	902	18.62	473	3598	1632	16	3 1/2	46.50	48.50	1
26	650	150	20	26.00	660	14.00	356	30.50	775	21.96	558	1000	454	24	1 1/4	23.25	24.25	1
26	650	300	50	26.00	660	14.00	356	32.88	835	22.85	580	1250	567	28	1 5/8	25.00	26.00	1
26	650	600	100	26.00	660	18.00	457	34.13	867	22.47	571	2070	940	28	1 7/8	31.75	32.75	1
26	650	900	150	24.00	610	21.00	533	34.75	883	20.51	521	2700	1225	20	2 3/4	39.00	40.25	1
28	700	150	20	28.00	711	15.00	381	32.75	832	22.06	560	1200	544	28	1 1/4	24.50	25.50	1
28	700	300	50	28.00	711	15.00	381	35.38	899	24.41	620	1500	680	28	1 5/8	26.50	27.50	1
28	700	600	100	28.00	711	19.00	483	36.00	914	25.15	639	2472	1121	28	2	33.25	34.25	1
28	700	900	150	26.00	660	22.50	572	37.25	946	21.53	547	3300	1497	20	3	41.25	42.50	1
30	750	150	20	30.00	762	12.00	305	34.75	883	28.13	715	1100	499	28	1 1/4	21.75	22.75	1
30	750	300	50	30.00	762	14.50	368	37.50	953	27.98	711	1780	807	28	1 3/4	26.75	27.75	1
30	750	600	100	30.00	762	19.88	505	38.25	972	26.74	679	2890	1311	28	2	34.25	35.25	1
30	750	900	150	28.00	711	25.00	635	39.75	1010	22.75	578	4150	1882	20	3	44.25	45.75	1
32	800	150	20	32.00	813	14.00	356	37.00	940	29.25	743	1400	635	28	1 1/2	24.75	26.00	1
32	800	300	50	30.00	762	16.00	406	39.63	1006	27.28	693	2133	968	28	1 7/8	29.00	30.25	1
32	800	600	100	32.00	813	21.00	533	40.25	1022	27.92	709	3200	1452	28	2 1/4	36.25	37.25	1
32	800	900	150	30.00	762	26.00	660	42.25	1073	25.33	643	4900	2223	20	3 1/4	46.50	47.75	1
36	900	150	20	36.00	914	14.50	368	41.25	1048	33.40	848	1750	794	32	1 1/2	26.00	27.25	1
36	900	300	50	36.00	914	19.00	483	44.00	1118	31.97	812	2802	1271	32	2	32.75	33.75	1
36	900	600	100	36.00	914	25.00	635	44.50	1130	31.21	793	4720	2141	28	2 1/2	41.25	42.50	1
36	900	900	150	34.00	864	28.25	718	47.25	1200	31.47	799	6600	2994	20	3 1/2	50.25	51.75	1
40	1000	150	20	40.00	1016	17.00	432	45.75	1162	37.56	954	2600	1179	36	1 1/2	28.50	28.50	1 1/2
40	1000	300	50	36.00	914	21.50	546	43.88	1114	36.29	922	3400	1542	32	1 5/8	35.25	35.25	1 1/2
40	1000	600	100	36.00	914	26.00	660	45.50	1156	33.38	848	5200	2359	32	2 1/4	44.50	44.50	1 1/2
40	1000	900	150	34.00	864	30.00	762	49.25	1251	32.61	828	7800	3538	24	3 1/2	54.00	54.00	1 1/2
42	1050	150	20	42.00	1067	17.00	432	48.00	1219	39.20	996	2850	1293	36	1 1/2	29.00	29.00	1 1/2
42	1050	300	50	40.00	1016	22.38	568	45.88	1165	35.99	914	4200	1905	32	1 5/8	36.50	36.50	1 1/2
42	1050	600	100	38.00	965	27.63	702	48.00	1219	32.38	822	6170	2798	28	2 1/2	47.25	47.25	1 1/2
42	1050	900	150	36.00	914	31.00	787	51.25	1302	34.61	879	8700	3946	24	3 1/2	55.75	55.75	1 1/2
48	1200	150	20	48.00	1219	20.63	524	54.50	1384	43.06	1094	4400	1996	44	1 1/2	31.00	31.00	1 1/2
48	1200	300	50	44.00	1118	24.75	629	52.13	1324	43.68	1109	7350	3334	32	1 7/8	40.50	40.50	1 1/2
48	1200	600	100	42.00	1067	31.00	787	54.75	1391	42.25	1073	8600	3901	32	2 3/4	52.75	52.75	1 1/2
48	1200	900	150	42.00	1067	34.00	864	58.50	1486	41.67	1058	12500	5670	24	4	61.75	61.75	1 1/2
54	1350	150	20	54.00	1372	23.25	591	61.00	1549	50.44	1281	5500	2495	44	1 3/4	35.75	35.75	1 1/2
54	1350	300	50	50.00	1270	28.25	718	58.75	1492	48.65	1236	7300	3311	28	2 1/4	46.25	46.25	1 1/2
54	1350	600	100	48.00	1219	35.00	889	61.25	1556	48.34	1228	12100	5489	32	3	59.00	59.00	1 1/2
60	1500	150	20	60.00	1524	26.00	660	67.50	1715	55.68	1414	7200	3266	52	1 3/4	38.75	38.75	1 1/2
60	1500	300	50	56.00	1422	33.00	838	64.75	1645	48.00	1219	10000	4536	32	2 1/4	51.75	51.75	1 1/2
60	1500	600	100	54.00	1372	39.00	991	68.25	1734	45.00	1143	17000	7711	28	3 1/2	65.75	65.75	2

INSTALLATION DIMENSIONS

SOLID LUG TYPE - PL, PM ANSI B16.5 / ANSI B16.47 SERIES A



Size		Pressure and Class		Dimensions								Approx. weight		Flange details				Eye bolt hole size
NPS	DN	Class	PN	Ø A		B		Ø C		Ø E		lbs	kg	No.(2)	Dia	Length RF ends	Length RTJ ends	
				in	mm	in	mm	in	mm	in	mm					Stud ⁽¹⁾	Stud ⁽¹⁾	
2	50	150	20	2.41	61	2.38	60	6.00	152	0.00	0	9	4	4	5/8	2.75	3.25	-
2	50	300	50	2.41	61	2.38	60	6.50	165	0.00	0	14	6	8	5/8	2.75	3.50	-
2	50	600	100	2.41	61	2.38	60	6.50	165	0.00	0	14	6	8	5/8	3.25	3.75	-
2	50	900	150	2.41	61	2.75	70	8.50	216	0.00	0	31	14	8	7/8	4.25	4.75	-
2	50	1500	260	2.41	61	2.75	70	8.50	216	0.00	0	31	14	8	7/8	4.25	4.75	-
2	50	2500	420	2.41	61	2.75	70	9.25	235	0.00	0	35	16	8	1	5.25	5.50	-
3	80	150	20	3.51	89	2.88	73	7.50	191	2.00	51	18	8	4	5/8	3.00	3.50	-
3	80	300	50	3.51	89	2.88	73	8.25	210	1.98	50	24	11	8	3/4	3.50	4.25	-
3	80	600	100	3.51	89	2.88	73	8.25	210	1.94	49	24	11	8	3/4	3.75	4.25	-
3	80	900	150	3.51	89	3.25	83	9.50	241	1.94	49	48	22	8	7/8	4.00	4.50	-
3	80	1500	260	3.51	89	3.25	83	10.50	267	1.94	49	55	24	8	1 1/8	5.25	5.75	3/8
3	80	2500	420	3.51	89	3.38	86	12.00	305	2.18	55	71	32	8	1 1/4	6.50	7.00	3/8
4	100	150	20	4.50	114	2.88	73	9.00	229	3.37	85	33	15	8	5/8	3.00	3.50	3/8
4	100	300	50	4.50	114	2.88	73	10.00	254	3.37	85	36	16	8	3/4	3.50	4.25	3/8
4	100	600	100	4.50	114	3.13	79	10.75	273	3.39	86	35	16	8	7/8	4.25	4.75	3/8
4	100	900	150	4.50	114	4.00	102	11.50	292	3.05	77	65	29	8	1 1/8	5.00	5.50	3/8
4	100	1500	260	4.50	114	4.00	102	12.25	311	3.30	84	80	36	8	1 1/4	6.00	6.25	1/2
4	100	2500	420	4.50	114	4.13	105	14.00	356	3.25	83	105	48	8	1 1/2	7.50	8.00	1/2
6	150	150	20	6.63	168	3.88	98	11.00	279	5.62	143	53	24	8	3/4	3.25	3.75	1/2
6	150	300	50	6.63	168	3.88	98	12.50	318	5.55	141	68	31	12	3/4	3.75	4.50	1/2
6	150	600	100	6.63	168	5.38	137	14.00	356	5.03	128	122	55	12	1	5.00	5.50	1/2
6	150	900	150	6.63	168	6.25	159	15.00	381	4.75	121	210	95	12	1 1/8	5.25	5.75	1/2
6	150	1500	260	6.63	168	6.25	159	15.50	394	4.53	115	205	93	12	1 3/8	7.25	7.75	1/2
6	150	2500	420	6.63	168	6.25	159	19.00	483	4.88	124	430	195	8	2	10.00	10.75	1/2
8	200	150	20	8.63	219	5.00	127	13.50	343	7.63	194	90	41	8	3/4	3.50	4.00	1/2
8	200	300	50	8.63	219	5.00	127	15.00	381	7.35	187	115	52	12	7/8	4.25	5.00	1/2
8	200	600	100	8.63	219	6.50	165	16.50	419	6.71	170	204	93	12	1 1/8	5.75	6.00	1/2
8	200	900	150	8.63	219	8.13	206	18.50	470	5.60	142	380	172	12	1 3/8	6.25	6.75	1/2
8	200	1500	260	8.63	219	8.13	206	19.00	483	5.47	139	385	175	12	1 5/8	8.25	9.00	1/2
8	200	2500	420	8.63	219	8.13	206	21.75	552	6.75	171	580	263	12	2	10.75	11.50	1/2
10	250	150	20	10.75	273	5.75	146	16.00	406	9.00	229	160	73	12	7/8	3.75	4.25	1/2
10	250	300	50	10.75	273	5.75	146	17.50	445	9.51	242	220	100	16	1	4.75	5.50	1/2
10	250	600	100	10.75	273	8.38	213	20.00	508	8.27	210	382	173	16	1 1/4	6.25	6.75	3/4
10	250	900	150	10.75	273	9.50	241	21.50	546	7.83	199	625	283	16	1 3/8	6.50	7.00	3/4
10	250	1500	260	10.75	273	9.75	248	23.00	584	7.56	192	780	354	12	1 7/8	9.50	10.25	3/4
10	250	2500	420	10.75	273	10.00	254	26.50	673	9.12	232	1080	490	12	2 1/2	13.50	14.75	3/4
12	300	150	20	12.75	324	7.13	181	19.00	483	11.15	283	290	132	12	7/8	3.75	4.50	1/2
12	300	300	50	12.75	324	7.13	181	20.50	521	11.15	283	375	170	16	1 1/8	5.25	6.00	1/2
12	300	600	100	12.75	324	9.00	229	22.00	559	9.91	252	565	256	20	1 1/4	6.50	6.75	3/4
12	300	900	150	12.75	324	11.50	292	24.00	610	9.53	253	850	386	20	1 3/8	6.75	7.25	3/4
12	300	1500	260	12.75	324	12.00	305	26.50	673	9.11	231	1250	567	16	2	10.50	11.50	3/4
12	300	2500	420	12.75	324	12.00	305	30.00	762	10.83	275	1600	726	12	2 3/4	14.75	16.25	1
14	350	150	20	14.00	356	7.25	184	21.00	533	12.12	308	335	152	12	1	4.25	4.75	3/4
14	350	300	50	14.00	356	8.75	222	23.00	584	12.14	308	630	286	20	1 1/8	5.25	6.00	3/4
14	350	600	100	14.00	356	10.75	273	23.75	603	9.72	247	785	356	20	1 3/8	6.75	7.25	3/4
14	350	900	150	14.00	356	14.00	356	25.25	641	9.30	236	1250	567	20	1 1/2	7.25	7.75	3/4
14	350	1500	260	14.00	356	14.00	356	29.50	749	7.21	183	1800	816	16	2 1/4	11.50	12.75	1

1) Stud details are provided for "PL" type, threaded lug construction. For stud details of "PM" type, drilled-thru lug construction, refer to Wafer type - PW.

2) Number of studs is per flange. For installation purposes, double the number of studs.

INSTALLATION DIMENSIONS

SOLID LUG TYPE - PL, PM

ANSI B16.5 / ANSI B16.47 SERIES A

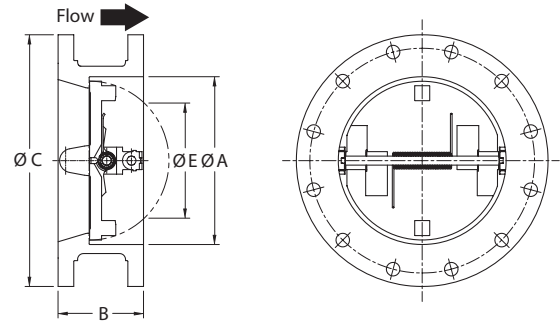
Size		Pressure and Class		Dimensions								Approx. weight		Flange details				Eye bolt hole size
				Ø A		B		Ø C		Ø E				No.(2)	Dia	Length RF ends	Length RTJ ends	
NPS	DN	Class	PN	in	mm	in	mm	in	mm	in	mm	lbs	kg					
16	400	150	20	16.00	406	7.50	191	23.50	597	13.90	353	440	200	16	1	4.25	4.75	3/4
16	400	300	50	16.00	406	9.13	232	25.50	648	14.13	359	775	352	20	1 1/4	5.75	6.50	3/4
16	400	600	100	16.00	406	12.00	305	27.00	686	12.54	319	1125	510	20	1 1/2	7.50	7.75	3/4
16	400	900	150	16.00	406	15.13	384	27.75	705	12.25	311	1650	748	20	1 5/8	7.75	8.50	3/4
16	400	1500	260	16.00	406	15.13	384	32.50	826	12.50	318	2410	1093	16	2 1/2	12.75	14.00	1
18	450	150	20	18.00	457	8.00	203	25.00	635	15.95	405	520	236	16	1 1/8	4.75	5.25	3/4
18	450	300	50	18.00	457	10.38	264	28.00	711	16.27	413	1080	490	24	1 1/4	6.00	6.75	1
18	450	600	100	18.00	457	14.25	362	29.25	743	14.00	356	1565	710	20	1 5/8	8.00	8.50	1
18	450	900	150	18.00	457	17.75	451	31.00	787	14.06	357	2500	1134	20	1 7/8	8.50	9.50	1
18	450	1500	260	18.00	457	18.44	468	36.00	914	9.81	249	3349	1519	16	2 3/4	14.00	15.25	1 1/2
20	500	150	20	20.00	508	8.63	219	27.50	699	17.75	451	710	322	20	1 1/8	5.00	5.50	3/4
20	500	300	50	20.00	508	11.50	292	30.50	775	17.81	452	1435	651	24	1 1/4	6.00	7.00	1
20	500	600	100	20.00	508	14.50	368	32.00	813	16.77	426	1900	862	24	1 5/8	8.25	9.00	1
20	500	900	150	20.00	508	17.75	451	33.75	857	17.06	433	2900	1315	20	2	9.25	10.00	1
20	500	1500	260	20.00	508	21.00	533	38.75	984	17.06	433	5800	2631	16	3	15.25	16.75	1 1/2
24	600	150	20	24.00	610	8.75	222	32.00	813	21.68	551	855	388	20	1 1/4	5.50	6.00	3/4
24	600	300	50	24.00	610	12.50	318	36.00	914	21.87	555	1850	839	24	1 1/2	7.00	8.00	1
24	600	600	100	24.00	610	17.50	445	37.00	940	19.88	505	3000	1361	24	1 7/8	8.75	9.50	1
24	600	900	150	24.00	610	19.50	495	41.00	1041	16.56	421	4400	1996	20	2 1/2	11.00	12.00	1
24	600	1500	260	24.00	610	22.00	559	46.00	1168	18.62	473	6998	3174	16	3 1/2	17.50	19.25	1 1/2
26	650	150	20	26.00	660	14.00	356	34.25	870	21.96	558	1600	726	24	1 1/4	6.50	7.50	1
26	650	300	50	26.00	660	14.00	356	38.25	972	22.85	580	2200	998	28	1 5/8	7.75	8.75	1
26	650	600	100	26.00	660	18.00	457	40.00	1016	21.74	552	3400	1542	28	1 7/8	9.50	10.50	1
26	650	900	150	24.00	610	21.00	533	42.75	1086	20.51	521	5000	2268	20	2 3/4	13.00	14.50	1
28	700	150	20	28.00	711	15.00	381	36.50	927	22.06	560	1900	862	28	1 1/4	6.50	7.50	1
28	700	300	50	28.00	711	15.00	381	40.75	1035	24.41	620	2700	1225	28	1 5/8	8.25	9.25	1
28	700	600	100	28.00	711	19.00	483	42.25	1073	23.89	607	4000	1814	28	2	10.00	11.00	1
28	700	900	150	26.00	660	22.63	575	46.00	1168	21.53	547	6200	2812	20	3	13.75	15.25	1
30	750	150	20	30.00	762	12.00	305	38.75	984	28.13	715	1880	853	28	1 1/4	6.75	7.75	1
30	750	300	50	30.00	762	14.50	368	43.00	1092	27.98	711	3325	1508	28	1 3/4	8.75	9.75	1
30	750	600	100	30.00	762	19.88	505	44.50	1130	27.88	708	4700	2132	28	2	10.25	11.25	1
30	750	900	150	28.00	711	26.00	660	48.50	1232	27.88	708	7500	3402	20	3	14.00	15.50	1
32	800	150	20	32.00	813	14.00	356	41.75	1060	29.25	743	2400	1089	28	1 1/2	7.50	8.75	1
32	800	300	50	32.00	813	16.00	406	45.25	1149	28.93	735	3400	1542	28	1 7/8	9.25	10.50	1
32	800	600	100	32.00	813	21.00	533	47.00	1194	27.92	709	5400	2449	28	2 1/4	11.00	12.00	1
32	800	900	150	30.00	762	26.00	660	51.75	1314	25.33	643	9000	4082	20	3 1/4	15.00	16.50	1
36	900	150	20	36.00	914	14.50	368	46.00	1168	33.40	848	3120	1415	32	1 1/2	8.00	9.00	1
36	900	300	50	36.00	914	19.00	483	50.00	1270	31.97	812	4600	2087	32	2	9.75	11.00	1
36	900	600	100	36.00	914	25.00	635	51.75	1314	31.21	793	7725	3504	28	2 1/2	11.75	13.00	1
36	900	900	150	34.00	864	28.25	718	57.50	1461	31.47	799	11900	5398	20	3 1/2	16.25	17.75	1
40	1000	150	20	40.00	1016	17.00	432	50.75	1289	37.56	954	4100	1860	36	1 1/2	8.00	8.00	1 1/2
40	1000	300	50	36.00	914	21.50	546	48.75	1238	36.29	922	5100	2313	32	1 5/8	9.25	9.25	1 1/2
40	1000	600	100	36.00	914	26.00	660	52.00	1321	33.38	848	8100	3674	32	2 1/4	12.50	12.50	1 1/2
40	1000	900	150	34.00	864	30.00	762	59.50	1511	32.61	828	13700	6214	24	3 1/2	17.25	17.25	1 1/2
42	1050	150	20	42.00	1067	17.00	432	53.00	1346	39.20	996	4400	1996	36	1 1/2	8.25	8.25	1 1/2
42	1050	300	50	40.00	1016	22.38	568	50.75	1289	35.99	914	6100	2767	32	1 5/8	9.50	9.50	1 1/2
42	1050	600	100	38.00	965	27.63	702	55.25	1403	32.38	822	9600	4354	28	2 1/2	13.50	13.50	1 1/2
42	1050	900	150	36.00	914	31.00	787	61.50	1562	34.61	879	15000	6804	24	3 1/2	17.50	17.50	1 1/2
48	1200	150	20	48.00	1219	20.63	524	59.50	1511	43.06	1094	6600	2994	44	1 1/2	8.75	8.75	1 1/2
48	1200	300	50	44.00	1118	24.75	629	57.75	1467	43.68	1109	10000	4536	32	1 7/8	10.50	10.50	1 1/2
48	1200	600	100	42.00	1067	31.00	787	62.75	1594	42.25	1073	13700	6214	32	2 3/4	15.00	15.00	1 1/2
48	1200	900	150	42.00	1067	34.00	864	70.25	1784	41.67	1058	21500	9752	24	4	20.00	20.00	1 1/2

1) Stud details are provided for "PL" type, threaded lug construction. For stud details of "PM" type, drilled-thru lug construction, refer to Wafer type - PW.

2) Number of studs is per flange. For installation purposes, double the number of studs.

INSTALLATION DIMENSIONS

DOUBLE FLANGE TYPE - PF, PG ANSI B16.5 / ANSI B16.47 SERIES A



Size		Pressure and Class		Dimensions								Approx. weight		Flange details				Eye bolt hole size
				Ø A		B		Ø C		Ø E				No.(1)	Dia	Length RF ends	Length RTJ ends	
NPS	DN	Class	PN	in	mm	in	mm	in	mm	in	mm	lbs	kg					Stud(2)
12	300	150	20	12.75	324	7.13	181	19.00	483	11.15	283	220	100	12	7/8	4.75	5.25	1/2
12	300	300	50	12.75	324	7.13	181	20.50	521	11.02	280	312	142	16	1 1/8	6.75	7.50	1/2
12	300	600	100	12.75	324	9.00	229	22.00	559	9.91	252	492	223	20	1 1/4	8.50	9.00	3/4
12	300	900	150	12.75	324	11.50	292	24.00	610	7.39	188	770	349	20	1 3/8	8.75	9.25	3/4
14	350	150	20	14.00	356	7.25	184	21.00	533	12.10	307	272	123	12	1	5.25	5.75	1/2
14	350	300	50	14.00	356	8.75	222	23.00	584	12.14	308	459	208	20	1 1/8	7.00	7.75	3/4
14	350	600	100	14.00	356	10.75	273	23.75	603	9.72	247	625	283	20	1 3/8	9.00	9.50	3/4
14	350	900	150	14.00	356	14.00	356	25.25	641	7.22	183	1240	562	20	1 1/2	9.25	10.00	3/4
16	400	150	20	16.00	406	7.50	191	23.50	597	13.90	353	340	154	16	1	5.50	6.00	1/2
16	400	300	50	16.00	406	9.13	232	25.50	648	14.08	358	675	306	20	1 1/4	7.50	8.25	3/4
16	400	600	100	16.00	406	12.00	305	27.00	686	12.54	319	900	408	20	1 1/2	9.75	10.25	3/4
16	400	900	150	16.00	406	15.13	384	27.75	705	11.18	284	1210	549	20	1 5/8	10.00	10.75	3/4
18	450	150	20	18.00	457	8.00	203	25.00	635	15.95	405	410	186	16	1 1/8	6.00	6.50	1/2
18	450	300	50	18.00	457	10.38	264	28.00	711	16.22	412	775	352	24	1 1/4	7.75	8.50	1
18	450	600	100	18.00	457	14.25	362	29.25	743	14.00	356	1215	551	20	1 5/8	10.50	11.00	1
18	450	900	150	18.00	457	17.75	451	31.00	787	9.81	249	1845	837	20	1 7/8	11.00	11.75	1
20	500	150	20	20.00	508	8.63	219	27.50	699	17.75	451	522	237	20	1 1/8	6.25	6.75	3/4
20	500	300	50	20.00	508	11.50	292	30.50	775	17.64	448	992	450	24	1 1/4	8.25	9.00	1
20	500	600	100	20.00	508	14.50	368	32.00	813	16.77	426	1520	689	24	1 5/8	11.25	11.75	1
20	500	900	150	20.00	508	17.75	451	33.75	857	13.00	330	2390	1084	20	2	12.00	12.75	1
24	600	150	20	24.00	610	8.75	222	32.00	813	21.68	551	760	345	20	1 1/4	7.00	7.50	3/4
24	600	300	50	24.00	610	12.50	318	36.00	914	21.73	552	1541	699	24	1 1/2	9.25	10.25	1
24	600	600	100	24.00	610	17.25	438	37.00	940	19.96	507	2385	1082	24	1 7/8	12.25	13.00	1
24	600	900	150	24.00	610	19.50	495	41.00	1041	18.97	482	3700	1678	20	2 1/2	14.00	15.00	1
26	650	150	20	26.00	660	14.00	356	34.25	870	21.96	558	1500	680	24	1 1/4	8.75	9.75	1
26	650	300	50	26.00	660	14.00	356	38.25	972	22.85	580	2200	998	28	1 5/8	10.50	11.50	1
26	650	600	100	26.00	660	18.00	457	40.00	1016	21.74	552	3100	1406	28	1 7/8	13.25	14.25	1
26	650	900	150	24.00	610	21.00	533	42.75	1086	20.51	521	5000	2268	20	2 3/4	17.50	19.00	1
28	700	150	20	28.00	711	15.00	381	36.50	927	22.06	560	1700	771	28	1 1/4	9.00	10.00	1
28	700	300	50	28.00	711	15.00	381	40.75	1035	24.41	620	2600	1179	28	1 5/8	11.00	12.00	1
28	700	600	100	28.00	711	19.00	483	42.25	1073	23.89	607	3800	1724	28	2	14.00	15.00	1
28	700	900	150	26.00	660	22.63	575	46.00	1168	21.53	547	6000	2722	20	3	18.50	19.75	1 1/4
30	750	150	20	30.00	762	12.00	305	38.75	984	27.81	706	1750	794	28	1 1/4	9.25	10.25	3/4
30	750	300	50	30.00	762	14.50	368	43.00	1092	27.98	711	2608	1183	28	1 3/4	11.75	12.75	1
30	750	600	100	30.00	762	19.88	505	44.50	1130	25.80	655	3815	1730	28	2	14.00	15.00	1
30	750	900	150	28.00	711	25.00	635	48.50	1232	22.75	578	6300	2858	20	3	19.00	20.50	1
32	800	150	20	32.00	813	14.00	356	41.75	1060	29.25	743	2300	1043	28	1 1/2	10.50	11.50	3/4
32	800	300	50	30.00	762	16.00	406	45.25	1149	27.28	693	3300	1497	28	1 7/8	12.75	13.75	1
32	800	600	100	32.00	813	21.00	533	47.00	1194	27.92	709	5000	2268	28	2 1/4	14.75	16.00	1
32	800	900	150	30.00	762	26.00	660	51.75	1314	25.33	643	8500	3856	20	3 1/4	20.25	21.75	1 1/4
36	900	150	20	36.00	914	14.50	368	46.00	1168	33.47	850	2541	1153	32	1 1/2	11.25	12.25	1
36	900	300	50	36.00	914	19.00	483	50.00	1270	32.30	820	3985	1808	32	2	13.25	14.50	1
36	900	600	100	36.00	914	25.00	635	51.75	1314	31.08	789	5988	2716	28	2 1/2	16.00	17.00	1
36	900	900	150	34.00	864	28.25	718	57.50	1461	31.47	799	11300	5126	20	3 1/2	21.75	23.50	1 1/2

1) Number of studs is per flange. For installation purposes, double the number of studs.

2) Stud length is per flange.

INSTALLATION DIMENSIONS

DOUBLE FLANGE TYPE - PF, PG ANSI B16.5 / ANSI B16.47 SERIES A

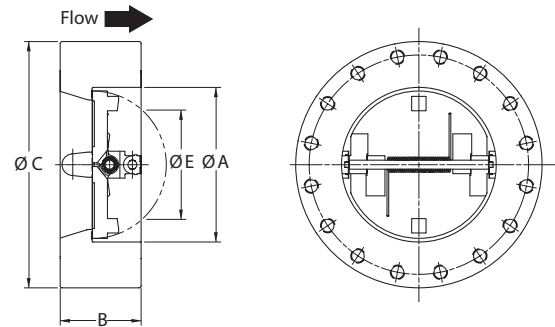
Size		Pressure and Class		Dimensions								Approx. weight		Flange details				Eye bolt hole size
				Ø A		B		Ø C		Ø E				No.(1)	Dia	Length RF ends	Length RTJ ends	
NPS	DN	Class	PN	in	mm	in	mm	in	mm	in	mm	lbs	kg					
40	1000	150	20	40.00	1016	17.00	432	50.75	1289	37.56	954	3900	1769	36	1 1/2	11.25	11.25	1
40	1000	300	50	36.00	914	21.50	546	48.75	1238	36.29	922	4900	2223	32	1 5/8	13.25	13.25	1
40	1000	600	100	36.00	914	26.00	660	52.00	1321	33.38	848	7800	3538	32	2 1/4	18.00	18.00	1 1/4
40	1000	900	150	34.00	864	30.00	762	59.50	1511	32.61	828	13700	6214	24	3 1/2	23.75	23.75	1 3/4
42	1050	150	20	42.00	1067	17.00	432	53.00	1346	39.20	996	4220	1914	36	1 1/2	11.75	11.75	1
42	1050	300	50	40.00	1016	22.38	568	50.75	1289	34.03	864	4640	2105	32	1 5/8	13.75	13.75	1 1/4
42	1050	600	100	38.00	965	27.63	702	55.25	1403	36.78	934	9400	4264	28	2 1/2	19.50	19.50	1 1/2
42	1050	900	150	36.00	914	31.00	787	61.50	1562	34.61	879	15000	6804	24	3 1/2	24.50	24.50	1 3/4
48	1200	150	20	48.00	1219	20.63	524	59.50	1511	43.06	1094	5900	2676	44	1 1/2	12.50	12.50	1 1/4
48	1200	300	50	44.00	1118	24.75	629	57.75	1467	43.68	1109	7400	3357	32	1 7/8	15.25	15.25	1 1/2
48	1200	600	100	42.00	1067	31.00	787	62.75	1594	42.25	1073	13600	6169	32	2 3/4	21.75	21.75	2
48	1200	900	150	42.00	1067	34.00	864	70.25	1784	41.67	1058	21100	9571	24	4	27.75	27.75	2 1/2
54	1350	150	20	54.00	1372	23.25	591	66.25	1683	50.44	1281	7700	3493	44	1 3/4	14.00	14.00	1 1/2
54	1350	300	50	50.00	1270	28.25	718	65.25	1657	48.65	1236	10600	4808	28	2 1/4	17.50	17.50	1 3/4
54	1350	600	100	48.00	1219	35.00	889	70.00	1778	48.34	1228	18500	8391	32	3	23.75	23.75	2
60	1500	150	20	60.00	1524	26.00	660	73.00	1854	55.68	1414	10000	4536	52	1 3/4	15.00	15.00	1 1/2
60	1500	300	50	56.00	1422	33.00	838	71.25	1810	48.00	1219	13000	5897	32	2 1/4	18.75	18.75	2
60	1500	600	100	54.00	1372	39.00	991	78.50	1994	45.00	1143	23400	10614	28	3 1/2	26.75	26.75	2 1/2

1) Number of studs is per flange. For installation purposes, double the number of studs.

2) Stud length is per flange.

INSTALLATION DIMENSIONS

SOLID LUG TYPE - PM API 6A

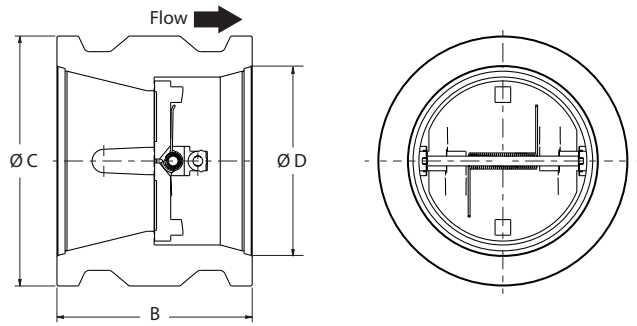


Size	API RATING, CWP (Psi)	Dimensions								Approx. weight		Flange details				Eye bolt hole size
		Ø A		B		Ø C		Ø E				No.	Dia	Length RF ends	Length RTJ ends	
		in	mm	in	mm	in	mm	in	mm	lbs	kg			Stud ⁽¹⁾	Stud ⁽¹⁾	
2 1/16	2000	2.38	60	2.75	70	6.50	165	0.00	0	26	12	8	5/8	7.50	7.75	1/4
2 1/16	3000	2.38	60	2.75	70	8.50	216	0.00	0	48	22	8	7/8	9.00	9.25	1/4
2 1/16	5000	2.38	60	2.75	70	8.50	216	0.00	0	48	22	8	7/8	9.00	9.25	1/4
2 9/16	2000	2.88	73	3.25	83	7.50	191	0.00	0	41	18	8	3/4	8.50	8.75	1/4
2 9/16	3000	2.88	73	3.25	83	9.63	245	0.00	0	72	33	8	1	10.25	10.50	1/4
2 9/16	5000	2.88	73	3.25	83	9.63	245	0.00	0	72	33	8	1	10.25	10.50	1/4
3 1/8	2000	2.91	74	3.25	83	8.25	210	2.14	54	51	23	8	3/4	8.75	9.00	1/4
3 1/8	3000	2.91	74	3.25	83	9.50	241	2.01	51	69	31	8	7/8	9.50	9.75	1/4
3 1/8	5000	2.91	74	3.38	86	10.50	267	2.01	51	90	41	8	1 1/8	11.00	11.25	1/4
4 1/16	2000	4.50	114	4.00	102	10.75	273	3.54	90	100	45	8	7/8	10.25	10.50	1/4
4 1/16	3000	4.50	114	4.00	102	11.50	292	3.36	85	117	53	8	1 1/8	12.50	12.75	1/4
4 1/16	5000	4.50	114	4.12	105	12.25	311	3.18	81	140	63	8	1 1/4	12.75	13.00	3/8
5 1/8	2000	5.56	141	4.00	102	13.00	330	4.42	112	144	65	8	1	11.25	11.50	3/8
5 1/8	3000	5.56	141	5.25	133	13.75	349	4.00	102	217	98	8	1 1/4	13.50	13.75	3/8
5 1/8	5000	5.56	141	5.25	133	14.75	375	4.00	102	256	116	8	1 1/2	16.00	16.25	3/8
7 1/16	2000	6.63	168	6.25	159	14.00	356	5.22	133	248	113	12	1	13.75	14.00	3/8
7 1/16	3000	6.63	168	6.25	159	15.00	381	4.87	124	296	134	12	1 1/8	14.50	15.00	1/2
7 1/16	5000	6.63	168	6.25	159	15.50	394	4.87	124	320	145	12	1 3/8	17.50	18.00	1/2
9	2000	8.63	219	8.12	206	16.50	419	6.98	177	419	190	12	1 1/8	16.50	17.00	1/2
9	3000	8.63	219	8.12	206	18.50	470	5.88	149	568	258	12	1 3/8	17.50	18.00	1/2
9	5000	8.63	219	8.12	206	19.00	483	5.88	149	608	276	12	1 5/8	20.75	21.25	1/2
11	2000	10.75	273	9.50	241	20.00	508	9.08	231	706	320	16	1 1/4	18.75	19.25	1/2
11	3000	10.75	273	9.75	248	21.50	546	9.12	232	883	400	16	1 3/8	19.75	20.25	1/2
11	5000	10.75	273	10.00	254	23.00	584	9.12	232	1080	490	12	1 7/8	24.50	25.00	1/2
13 5/8	2000	12.75	324	11.50	292	22.00	559	11.32	288	965	438	20	1 1/4	21.00	21.50	3/4
13 5/8	3000	12.75	324	12.00	305	24.00	610	9.98	253	1296	588	20	1 3/8	22.75	23.50	3/4
16 3/4	2000	16.00	406	12.00	305	27.00	686	12.89	327	1482	672	20	1 1/2	23.00	23.50	1
16 3/4	3000	16.00	406	15.13	384	27.75	705	12.25	311	2031	921	20	1 5/8	27.50	28.25	1
20 3/4	2000	20.00	508	14.50	368	32.00	813	17.06	433	2363	1072	24	1 5/8	26.75	27.50	1
20 3/4	3000	20.00	508	17.75	451	33.75	857	17.06	433	3426	1554	20	2	32.75	33.50	1

1) Stud details are provided for "PM" type, drilled-thru lug construction.

INSTALLATION DIMENSIONS

HUB END TYPE - PH

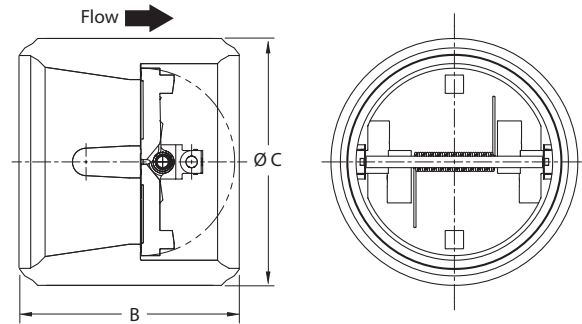


Size		SEAL RING NUMBER	Dimensions						Approx. weight		Eye bolt hole size
			ØC		B		Ø D				
							SEAL RING ID				
NPS	DN		in	mm	in	mm	in	mm	lbs	kg	
2	50	20	3.63	92	4.50	114	2.06	52	9	4	-
2	50	14	3.63	92	4.50	114	1.61	41	9	4	-
2	50	13	3.63	92	4.50	114	1.50	38	9	4	-
3	80	27	5.00	127	4.50	114	3.06	78	20	9	1/4
3	80	25	5.00	127	4.50	114	2.67	68	20	9	1/4
3	80	20	5.00	127	4.50	114	2.06	52	20	9	1/4
4	100	40	6.00	152	5.00	127	4.06	103	24	11	1/4
4	100	34	6.00	152	5.00	127	3.69	94	24	11	1/4
4	100	31	6.00	152	5.00	127	3.25	83	24	11	1/4
4	100	25	6.00	152	5.00	127	2.67	68	33	15	1/4
6	150	62	9.25	235	6.25	159	6.07	154	77	35	3/8
6	150	52	9.25	235	6.25	159	5.31	135	81	37	3/8
6	150	46	9.25	235	6.25	159	4.75	121	81	37	3/8
6	150	40	9.25	235	6.25	159	4.06	103	88	40	3/8
8	200	82	11.50	292	8.13	207	8.25	210	158	72	1/2
8	200	76	11.50	292	8.13	207	7.75	197	158	72	1/2
8	200	72	11.50	292	8.13	207	7.25	184	158	72	1/2
8	200	62	11.50	292	8.13	207	6.07	154	183	83	3/8
8	200	52	11.50	292	8.13	207	5.31	135	183	83	3/8
10	250	97	13.63	346	9.75	248	9.88	251	242	110	1/2
10	250	94	13.63	346	9.75	248	9.50	241	242	110	1/2
10	250	84	13.63	346	9.75	248	8.50	216	308	140	1/2
10	250	82X	13.63	346	9.75	248	8.25	210	308	140	1/2
10	250	72	13.63	346	9.75	248	7.25	184	308	140	1/2
10	250	62	13.63	346	9.75	248	6.07	154	345	156	1/2
10	250	62X	13.63	346	9.75	248	6.07	154	345	156	1/2
12	300	120	16.00	406	12.50	318	12.00	305	389	176	1/2
12	300	112	16.00	406	12.50	318	11.25	286	389	176	1/2
12	300	102	16.00	406	12.50	318	10.25	260	502	228	1/2
12	300	82	16.00	406	12.50	318	8.25	210	590	268	1/2
12	300	82X	16.00	406	12.50	318	8.25	210	590	268	1/2
14	350	130	18.50	470	14.00	356	13.00	330	890	404	3/4
14	350	120	18.50	470	14.00	356	12.00	305	890	404	3/4
14	350	106	18.50	470	14.00	356	10.75	273	890	404	3/4
16	400	140	21.00	533	16.50	419	14.00	356	1120	508	3/4
16	400	137	21.00	533	16.50	419	13.88	352	1240	563	3/4
16	400	130	21.00	533	16.50	419	13.00	330	1240	563	3/4
16	400	120	21.00	533	16.50	419	12.00	305	1240	563	3/4
18	450	170	21.00	533	16.50	419	17.00	432	1120	508	1
18	450	162	21.00	533	16.50	419	16.25	413	1120	508	1
18	450	152	21.00	533	16.50	419	15.25	387	1240	563	1
20	500	180	26.00	660	18.25	464	18.00	457	2150	975	1
20	500	162	26.00	660	18.25	464	16.25	413	2150	975	1
24	600	220	29.50	749	22.75	578	22.00	559	3860	1751	1 1/4
24	600	180	29.50	749	22.75	578	18.00	457	3860	1751	1 1/4

1) Extended body length (face-to-face) can be provided, upon request. 2) Customer must provide hub drawings with inquiries and orders. 3) Hubs, seal rings and clamp assemblies are not supplied with hub end type valves.

INSTALLATION DIMENSIONS

BUTT WELD END TYPE - PZ



Size		PRESSURE AND CLASS		Dimensions				Approx. weight		Eye bolt hole size
				Ø C		B				
NPS	DN	CLASS	PN	in	mm	in	mm	lbs	kg	
3	80	150	20	3.50	90	5.25	133	14.5	6.6	-
3	80	300	50	3.50	90	5.25	133	14.5	6.6	-
3	80	600	100	3.75	95	5.50	140	14.5	6.6	-
4	100	150	20	5.00	127	4.75	121	16	7.3	-
4	100	300	50	5.00	127	4.75	121	16	7.3	-
4	100	600	100	5.25	133	4.75	121	16	7.3	-
6	150	150	20	6.63	168	5.50	140	29	13.2	1/4
6	150	300	50	6.63	168	5.50	140	29	13.2	1/4
6	150	600	100	6.63	168	5.50	140	33	15.0	1/4
8	200	150	20	8.63	219	6.00	152	48.5	22.0	1/4
8	200	300	50	8.63	219	6.00	152	55	25.0	1/4
8	200	600	100	9.00	229	8.50	216	95	43.1	3/8
10	250	150	20	10.75	273	7.50	191	95	43.1	3/8
10	250	300	50	10.75	273	7.50	191	95	43.1	3/8
10	250	600	100	11.12	282	10.25	260	172	78.0	3/8
12	300	150	20	12.75	324	8.50	216	139	63.1	3/8
12	300	300	50	12.75	324	8.50	216	152	69.0	3/8
12	300	600	100	13.50	343	12.00	305	205	93.0	1/2
14	350	150	20	14.00	356	10.25	260	225	102.1	1/2
14	350	300	50	14.00	356	10.25	260	250	113.4	1/2
14	350	600	100	14.00	356	14.00	356	440	199.6	1/2
16	400	150	20	16.00	406	12.00	305	322	146.1	1/2
16	400	300	50	16.00	406	12.00	305	362	164.2	1/2
16	400	600	100	16.25	413	16.00	406	472	214.2	3/4
18	450	150	20	18.00	457	13.00	330	420	190.6	1/2
18	450	300	50	18.00	457	13.00	330	474	215.1	1/2
18	450	600	100	18.00	457	17.50	445	675	306.3	3/4
20	500	150	20	20.00	508	15.75	400	602	273.1	3/4
20	500	300	50	20.00	508	15.75	400	645	292.6	3/4
20	500	600	100	20.00	508	19.50	495	806	365.7	3/4
24	600	150	20	24.00	610	13.50	343	795	360.7	3/4
24	600	300	50	24.00	610	16.50	419	1010	458.3	1
24	600	600	100	24.25	616	21.75	552	1345	610.3	1
30	750	150	20	30.00	762	15.25	387	1300	589.8	1
30	750	300	50	30.00	762	17.00	432	1575	714.6	1
30	750	600	100	30.00	762	27.00	686	2750	1247.7	1 1/4
36	900	150	20	36.00	914	16.50	419	2030	921.1	1
36	900	300	50	36.00	914	19.00	483	2464	1118.0	1 1/4
36	900	600	100	36.00	914	31.75	806	4100	1860.3	1 1/4

ENGINEERING DATA

FLOW COEFFICIENTS⁽¹⁾

Valve Size		ASME classes			
NPS	DN	150		300	
		Cv	Kv	Cv	Kv
2	50	54	46	54	46
2½	65	120	102	120	102
3	80	130	111	130	111
4	100	320	272	320	272
5	125	650	553	650	553
6	150	800	680	800	680
8	200	1400	1190	1400	1190
10	250	2600	2210	2600	2210
12	300	3850	3273	3850	3273
14	350	5000	4250	4500	3825
16	400	7250	6163	6525	5546
18	450	10000	8500	9000	7650
20	500	12400	10540	11160	9486
24	600	23000	19550	20700	17595
26	650	27000	22950	24300	20655
28	700	32000	27200	28800	24480
30	750	40000	34000	36000	30600
32	800	46000	39100	41400	35190
34	850	52000	44200	46800	39780
36	900	60000	51000	54000	45900
38	950	67000	56950	60300	51255
40	1000	75000	63750	67500	57375
42	1050	81000	68850	72900	61965
44	1100	89000	75650	80100	68085
46	1150	98000	83300	88200	74970
48	1200	111000	94350	99900	84915

VALVE CRACKING PRESSURE⁽²⁾

Valve Size		Valve cracking pressure			
NPS	DN	Standard torque spring		Low torque spring	
		psi	mbar	psi	mbar
2	50	0.15	10	0.12	8
2½	65	0.08	6	0.06	4
3	80	0.14	10	0.10	7
4	100	0.19	13	0.10	7
5	125	0.10	7	0.05	3
6	150	0.08	6	0.05	3
8	200	0.18	12	0.09	6
10	250	0.21	14	0.09	6
12	300	0.14	10	0.06	4
14	350	0.11	8	0.05	3
16	400	0.13	9	0.07	5
18	450	0.13	9	0.06	4
20	500	0.14	10	0.05	3
24	600	0.15	10	0.04	3

1) Velan has established these Cv results through a series of tests conducted at both in-house and sub-contracted test facilities, which have been combined with calculations to provide extrapolated test results. Velan Engineering should be consulted for items not identified above.

2) The valve cracking pressure is the minimum upstream pressure required to lift the discs off the body seating surface. The above table identifies the minimum pressure required for Class 150 dual-plate check valves with Inconel X-750 springs. Dual-plate check valves with low torque springs cannot be used as relief valves.

DATA FOR CALCULATION OF FLOW

The coefficient of flow Cv expresses the rate of flow in gallons per minute at 60°F water with a pressure drop of 1 psi across the valve. The Cv coefficients for the various types and sizes, shown in the tables, have been determined from actual flow tests.

NOTE: Kv is the metric equivalent of Cv. $K_v = C_v \times 0.85$

FOR LIQUIDS:

$$(1) Q_L = C_v \sqrt{\frac{\Delta P}{G_L}}$$

$$(2) \Delta P = G_L \left(\frac{Q_L}{C_v} \right)^2$$

WHERE:

Q_L = Flow in U.S. gallons per minute.
 ΔP = (P₁-P₂) Pressure drop in psi
 G_L = Specific gravity of liquid
 (water = 1 at 60°F)

FOR GASES:

$$(3) Q_g = 1360 C_v \sqrt{\frac{\Delta P}{G_g T}} \cdot \sqrt{\frac{P_1 + P_2}{2}}$$

$$(4) \Delta P = P_1 - \sqrt{P_1^2 - 2 G_g T \left(\frac{Q_g}{1360 C_v} \right)^2}$$

WHERE:

Q_g = Volumetric flow of gas (SCFH)
 G_g = Specific gravity of gas at standard conditions
 (air at atmosphere and 60°F = 1)
 T = Absolute temperature of gas (°F + 460)

FOR STEAM:

$$(5) W = \frac{2.1}{1 + 0.0007 T_s} C_v \sqrt{\Delta P (P_1 + P_2)}$$

$$(6) \Delta P = P_1 - \sqrt{P_1^2 - K^2}$$

WHERE:

$$K = \left(\frac{1 + 0.0007 T_s}{2.1 C_v} \right) \cdot W$$

W = Pounds per hour of steam
 ΔP = (P₁-P₂) Pressure drop in psi
 T_s = Degree of superheat (°F)
 P₁ = inlet pressure
 P₂ = outlet pressure

NOTE: For saturated steam T_s = 0

NOTE: For gas and steam, max. ΔP = ½ P₁, and min.
 P₂ = ½ P₁, and P₁, P₂ are absolute pressures (psia)

BEST INSTALLATION PRACTICES

VALVE INSTALLATION

Check valves are not shut-off valves. While soft-seated dual-plate check valves provide zero seat leakage per API 598, soft-seated valves should not be used as shut-off valves.

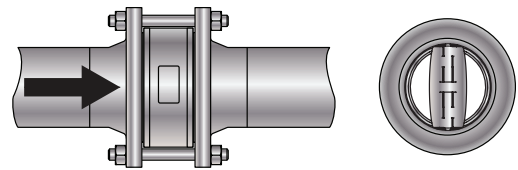
Velan dual-plate check valves are not pigable.

All check valves, where the disc closing force is provided inside the valve by spring, gravity, back flow or a combination of those forces, shall not be used to replace a shut-off valve in the piping.

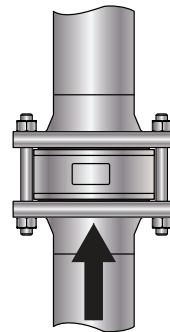
Check valves shall always be accompanied by a shut-off valve with an external indication of the closing member (disc or wedge) position. The exception to this rule, are the check valves with an external force assisting the closing of the disc, such as for example stop-check valves that have an external position indication.

Check valves should be installed a minimum of 5 pipe diameters downstream of any piping component (pump, compressor, elbow, tee, valve, etc.) to allow the flow to stabilize. There should also be a minimum of 2 diameters of straight pipe downstream of the valve before the next fitting to allow for pressure recovery. The distance of 5 pipe diameters downstream is applicable to both vertical and horizontal pipe runs.

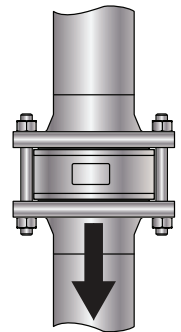
→ Indicates flow direction



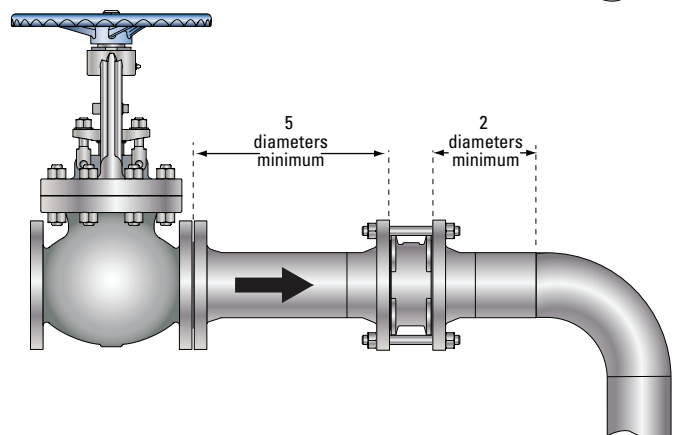
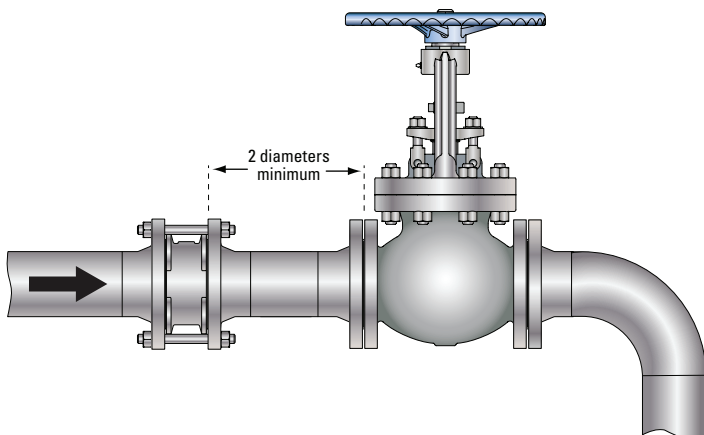
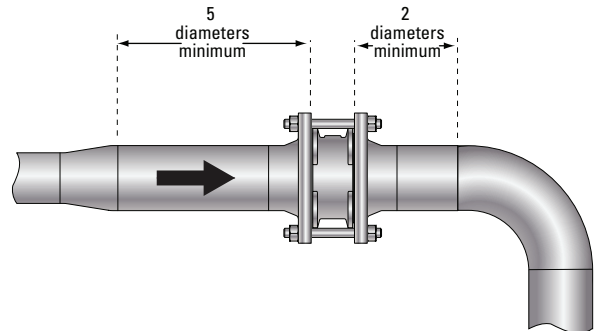
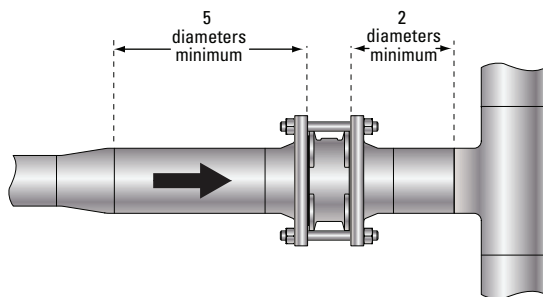
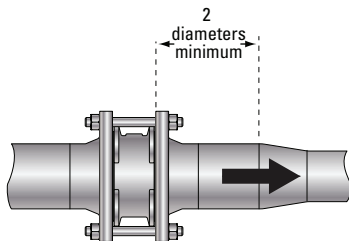
Correct installation, pins must be vertical.



Vertical pipe with flow UP.



Vertical pipe flow DOWN. In general, flow down installation is not recommended. Consult factory with specific size, rating, and application.



PROQUIP DUAL-PLATE CHECK VALVES

Valve type	Size of connection	Pressure rating	Body	Disc	Seat surfaces	Spring	Wetted parts	End connection
A	B	C	D	E	F	G	H	I
 	 	— 	 		 	— 		
P W	1 2	— 2	0 2	D	1 7	— 3	D	B

Example: NPS 4 (DN 100), wafer type dual-plate check valve, ASME class 600, WCB body, CF8M disc, 316 stainless steel seating surfaces, Inconel X-750 springs, 316 SS wetted parts, and raised face with 175-250 AARH finish on end facing.

A DUAL-PLATE CHECK VALVE TYPE	
Standard manufacturing program:	To suit ASME B16.47 series B flanges:
PF Double flange, drilled-thru	PK Solid lug, threaded
PG Double flange, threaded	PN Solid lug, drilled-thru
PH Hub end	PQ Wafer (flangeless)
PL Solid lug, threaded	PP Double flange, drilled-thru
PM Solid lug, drilled-thru	
PW Wafer (flangeless)	
PZ Butt weld end	

B SIZE OF CONNECTION	
Customers have the choice of specifying valve size as part of the valve figure number (B) using the numbers below, or indicating valve size separately. Sizes shown in NPS (DN)	
EXAMPLES: PW12-202D17-3DB (valve size is part of figure number) NPS 4 PW-202D17-3DB (valve size is shown separately)	
API 6A sizes (NPS)	
AA 2 1/16	AJ 2 9/16
BA 3 1/16	BB 3 1/8
CA 4 1/16	DB 5 1/8
EA 7 1/16	GO 9
JO 11	LK 13 5/8
PM 16 3/4	TM 20 3/4
08 2 (50)	19 14 (350)
09 2 1/2 (65)	20 16 (400)
10 3 (80)	21 18 (450)
11 3 1/2 (90)	22 20 (500)
12 4 (100)	23 22 (550)
13 5 (125)	24 24 (600)
14 6 (150)	26 26 (650)
15 8 (200)	28 28 (700)
16 10 (250)	30 30 (750)
18 12 (300)	32 32 (800)
34 34 (850)	36 36 (900)
40 40 (1000)	42 42 (1050)
44 44 (1100)	46 46 (1150)
48 48 (1200)	54 54 (1370)
56 56 (1425)	60 60 (1500)

C PRESSURE RATING	
0 ASME 150	3 ASME 1500
1 ASME 300	4 ASME 2500
2 ASME 600	5 ASME 4500
6 ASME 400	C API 2000
7 ASME 900	E API 5000
D API 3000	F API 10000

D BODY MATERIALS	
02 A216 WCB	Carbon steel
04 A217 C5	5 Cr - 1/2 Mo
05 A217 WC6	1 1/4 Cr - 1/2 Mo - Si
06 A217 WC9	2 1/4 Cr - 1Mo
09 A217 C12	9 Cr - 1Mo
11 A351 CF8	304 stainless steel
13 A351 CF8M	316 stainless steel
14 A351 CF3M	316L stainless steel
15 A351 CF8C	347 stainless steel
19 A494 M35-1	Monel 400
20 A494 CW6MC	Inconel 625
21 A494 CW12MW	Hastelloy C276
23 A351 CN7M	Alloy 20
26 A350 LF2 CL 1	Low temp. carbon steel
28 A351 CG8M	317 stainless steel
31 A352 LCC	Low temp. carbon steel
32 A995 4A	22% Cr duplex
35 A351 CK3MCuN	254 SMO stainless steel
37 A494 CU5MCuC	Incoloy 825
40 B367 C2	Titanium Gr 2
45 A995 6A	25% Cr super duplex
48 A995 5A	25% Cr super duplex
55 B148 C95800	Nickel aluminum bronze
57 B148 C95400	Aluminum bronze

E DISC MATERIALS	
A CoCr alloy	J A494 CW6MC
B A216 WCB	K B367 C2
C A351 CF3M	L A352 LCC
D A351 CF8M	M A494 M35-1
E A217 CA15	N A352 CA6NM
F A494 CU5MCuC	P A217 WC9
G A494 CW12MW	Q A351 CN7M
H B148 C95800	R A995 4A
S A995 5A	T A351 CF8
U A217 C5	V A217 C12
W A351 CF8C	Y A217 WC6
Z A351 CK3MCuN	

F SEAT SURFACE	
Body seating surface	Operating temp. range °F (°C)
10 Same as body	As body / disc
11 Buna-N®	-22 to +250 (-30 to +121)
12 Neoprene®	-40 to +250 (-40 to +121)
13 Viton A®	-15 to +400 (-26 to +204)
15 Teflon	-60 to +180 (-51 to +82)
17 316 stainless steel	-425 to +1500 (-254 to +538)
18 410 stainless steel	-20 to +1000 (-29 to +538)
19 CoCr alloy	-450 to +1500 (-267 to +815)
20 Monel 400	-321 to +900 (-196 to +482)
21 Ethylene propylene (EPDM)	-14 to +230 (-25 to +110)
22 Inconel 625	
28 Viton B®	-5 to +400 (-20 to +204)
Body and disc seating surfaces	
Operating temp. range °F (°C)	
85 Inconel 625	
87 316 stainless steel	-425 to +1500 (-254 to +538)
88 410 stainless steel	-20 to +1000 (-29 to +538)
89 CoCr alloy	-450 to +1500 (-267 to +815)

G SPRING MATERIAL	
1 316 stainless steel	5 Inconel 718®
3 Inconel X-750®	7 Inconel 625®
4 Monel 400®	8 Carpenter 20®
A Titanium	

H WETTED PARTS	
D 316 Stainless steel	Q UNS N08020 / Alloy 20
E 410 Stainless steel	R UNS S31803 / 22% Cr. Duplex
G Hastelloy C276®	S UNS S32750 / S32760 / 25% Cr. Duplex
J UNS N06625 / Inconel 625®	T 304 stainless steel
K Titanium	W 347 stainless steel
M UNS N04400 / Monel 400®	Z UNS S31254 / 6% Moly.

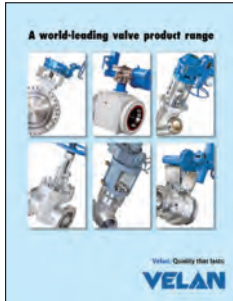
NOTE: Wetted parts comprise of the hinge pin, stop pin, retainer pins, and holders.

I END CONNECTION	
A Raised face, 125 - 175 AARH finish	J Raised face, 250 - 500 AARH finish
B Raised face, 175 - 250 AARH finish	N Flat face, 125 - 175 AARH finish
C Ring type joint	P Flat face, 175 - 250 AARH finish
H Hub end (specify model & joint size)	W Weld end (specify pipe wall thickness)

Note: CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite™, and other approved manufacturers.

The most comprehensive line of industrial forged and cast steel gate, globe, check, ball, butterfly, and knife gate valves and steam traps.

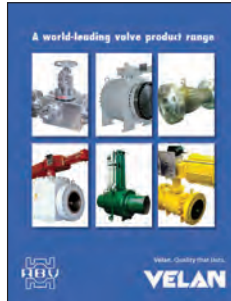
ASME pressure classes 150–4500 in carbon, alloy, and stainless steel



BRO-FLB



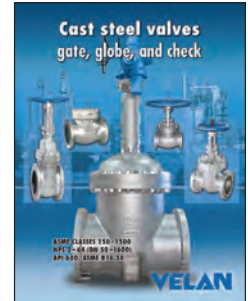
SAS-FLB



ABV-FLB



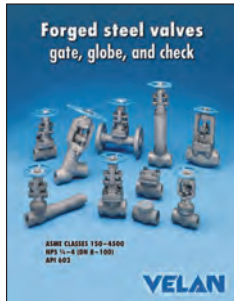
VEL-PS



CAT-CSV



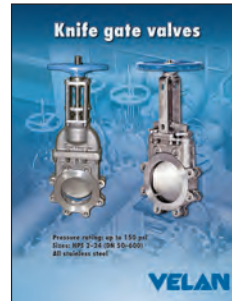
CAT-CSSV



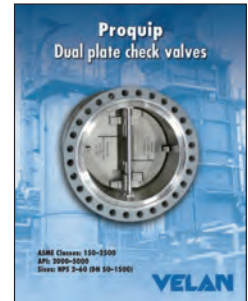
CAT-SFV



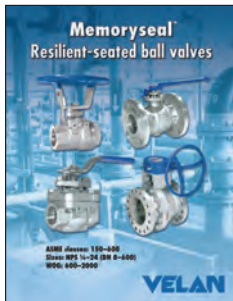
CAT-BG



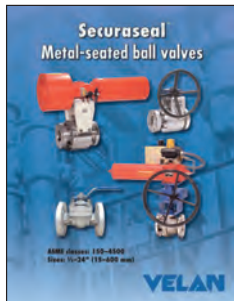
CAT-KGV



CAT-DPCV



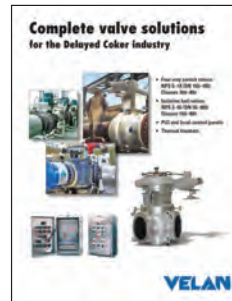
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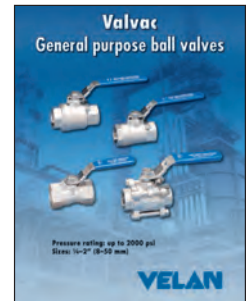
VEL-MS



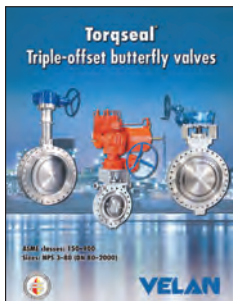
CAT-PBV



BRO-CBV



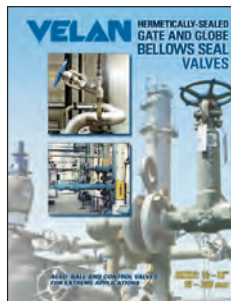
CAT-GBV



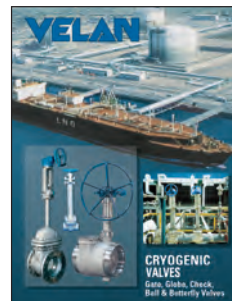
CAT-BF



SAS-CCV



VEL-BS



VEL-CRYO



CAT-ST

Headquartered in Montreal, Canada, Velan has several international subsidiaries. For general inquiries:

Velan head office

7007 Côte de Liesse, Montreal, QC H4T 1G2 Canada

Tel: +1 514 748 7743 Fax: +1 514 748 8635

Check our website for more specific contact information.

www.velan.com

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