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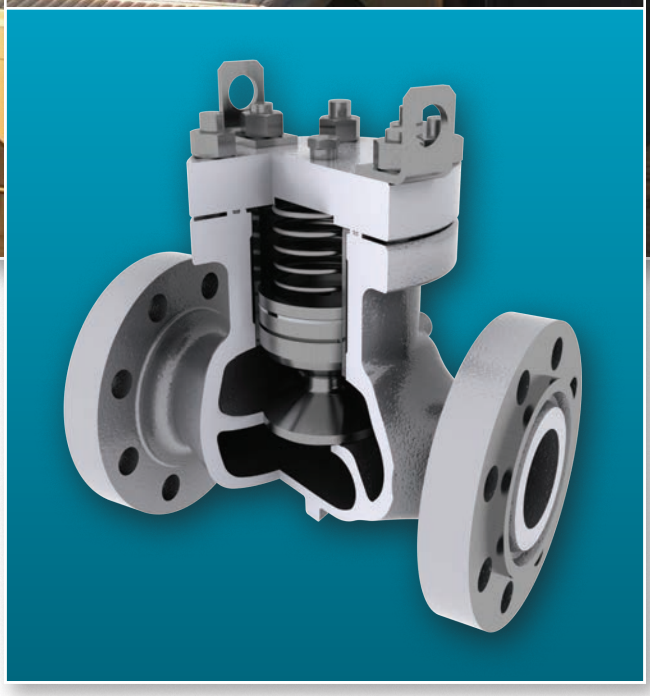


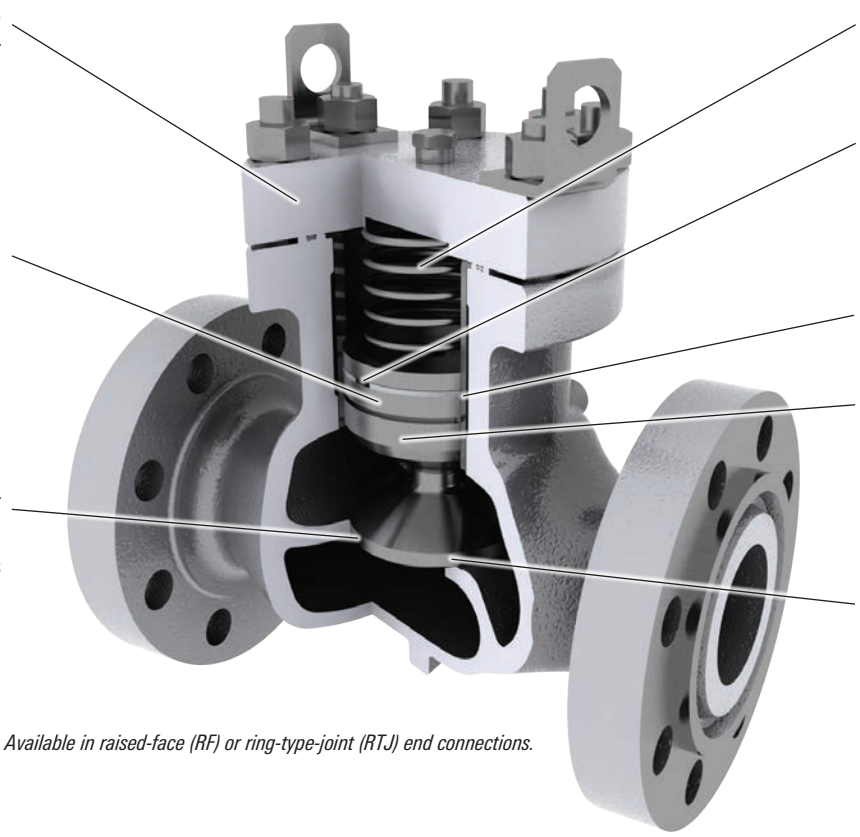
Piston-Style TOM WHEATLEY Check Valves

Protecting pumps and compressors from damaging backflow

Contents

Piston-style TOM WHEATLEY check valves

Features



Available in raised-face (RF) or ring-type-joint (RTJ) end connections.

When pressure surges and pulsations are prevalent in a flow system, TOM WHEATLEY* check valves offer efficient system protection.

Due to a unique nonslam design, piston-style TOM WHEATLEY check valves have provided years of uninterrupted service downstream from reciprocating pumps and compressors and in other applications where conventional check valve designs would be subjected to excessive wear. In addition, the piston-style TOM WHEATLEY check valve top-entry design enables easy access and replacement of all valve internal parts with reduced downtime.

Smooth, reliable prevention of backflow

In the absence of differential pressure, a piston-style TOM WHEATLEY check valve rests in the closed position because of gravity and spring force. Pressure on the upstream end of the valve lifts the piston off the seat and enables flow. As flow varies, the piston of the TOM WHEATLEY check valve floats within a cylinder. Should the flow cease, the piston lowers and seats to create a bubble-tight prevention of backflow.

A ball check mechanism and an adjacent orifice within the piston help to extend valve life by dampening piston movement and eliminating slamming or chattering in the event of sudden pressure surges or erratic flow conditions.

The orifice size affects the degree of piston movement and is optimally selected at the factory to meet the requirements of a specified flow range.

The piston-style TOM WHEATLEY check valve is available with the following features:

- soft seal
- metal-to-metal seal
- renewable seat
- variety of body and trim materials.

As a result of the piston and seat design, the greater the backpressure acting on the piston, the tighter the seal.

These piston-style check valves comply with API Spec 6D, ASTM Standard B16.34, and NACE MR0175/ISO 15156, other certifications such as PED/CE and CRN available upon request. All TOM WHEATLEY check valves are designed for horizontal service. They must be ordered specifically for vertical flow when intended for that service.

How to Order

02067510B: 2-in, ASME 600, raised-face end connection with integral seat, US standard trim 10, Buna-N cover and piston seals material

Example

02 06 75 10 B M

Valve Size	
Code	**Description**
02	2 in
03	3 in
04	4 in
06	6 in
08	8 in
10	10 in
12	12 in

ASME Pressure Class	
Code	**Description**
01	ASME 150
03	ASME 300
06	ASME 600
09	ASME 900
15[†]	ASME 1500

[†] Available only for 2–6 in.

End Connection/Seat	
Code	**Description**
73	RF/renewable seat
74	RTJ/renewable seat
75	RF/integral seat
76	RTJ/integral seat

Trim Code	
Code	**Description**
10	US standard trim 10
12	Canada standard trim 12
20	Stainless steel trim 20
30	Full stainless trim 30
50	Stellite™ facing seat/ piston trim 50
61	ZPEX coating trim 61

Seal	
Code	**Description**
A	AFLAS®
B	Buna-N
H	Highly saturated nitrile (HSN)
V	FKM (Viton®)

Piston Seal[‡]	
Code	**Description**
M	Metal-to-metal[§]

[‡] Use only when the piston seal requires metal-to-metal material.
[§] Not available in integral-seat design.

Materials of Construction

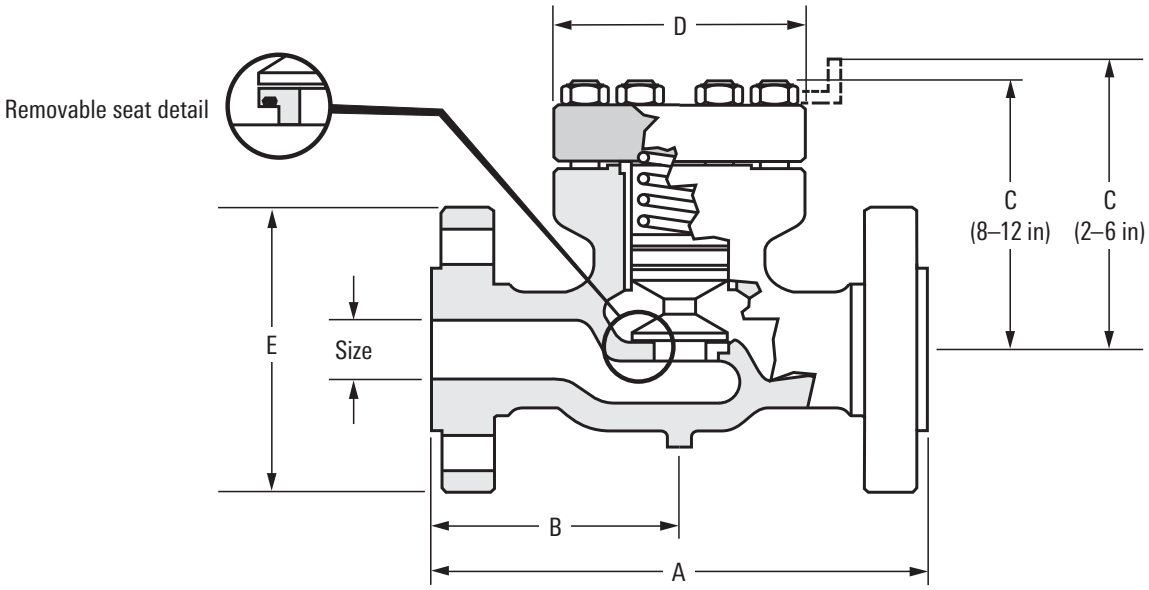
Components	US Standard Trim 10 "X" "X"	Canada Standard Trim 12 "X" "X"	Stainless Steel Trim 20 "X" "X"	Full Stainless Trim 30 "X" "X"	Stellite Facing Seat/Piston Trim 50 "X" "X"	ZPEX Coating Trim 61 "X" "X"
Body	A216-WCC	A352-LCC	A216-WCC	A351-CF8M	A216-WCC	A216-WCC/ZPEX
Cover	ASTM A515 Grade 70	ASTM A516 Grade 70	ASTM A515 Grade 70	A240-316	ASTM A515 Grade 70	ASTM A515 Grade 70/ZPEX
Cover seal	See note 1	See note 1	See note 1	See note 1	See note 1	See note 1
Bolting[†]	A193 Grade L7M	A193 Grade L7M	A193 Grade L7M	A193 Grade L7M	A193 Grade L7M	A193 Grade L7M
	A194 Grade 2H	A194 Grade 7M	A194 Grade 2H	A194 Grade 8M	A194 Grade 2H	A194 Grade 2H
Liner	A29-1018 electroless nickel plated (ENP)	A29-1018 ENP	A29-1018 ENP	A29-1018 ENP	A29-1018 ENP	A29-1018 ENP
Piston	410 SS	316 SS	410 SS	316 SS	410 SS with Stellite #6 hard face	410 SS
Piston seal	See note 1	See note 1	See note 1	See note 1	See note 1	See note 1
Seat integral	A216-WCC	A352-LCC	N/A	A351-CF8M	N/A	A216-WCC/ZPEX
Seat renewable	Carbon steel	Carbon steel	316 SS	316 SS	410 SS with Stellite #6 hard face	Carbon steel/ZPEX
Piston rings	Cast iron	Cast iron	Cast iron	Cast iron ENP	Cast iron	Cast iron
Piston spring	Alloy X-750	Alloy X-750	Alloy X-750	Alloy X-750	Alloy X-750	Alloy X-750

[†] Alternative equivalent bolting of L7M and 7M may be supplied.
Note 1: In the trim number description, "X" "X" relates to the cover and piston seal material options.
When ordering, replace the first "X" with the cover seal from the list above.
Use the second "X" only when the piston seal requires metal-to-metal option.

N/A—Not available.
Materials comply with NACE MR0175/ISO 15156.
Other materials available upon request.

Dimensions

ASME Class 150–1500, 2–12 in

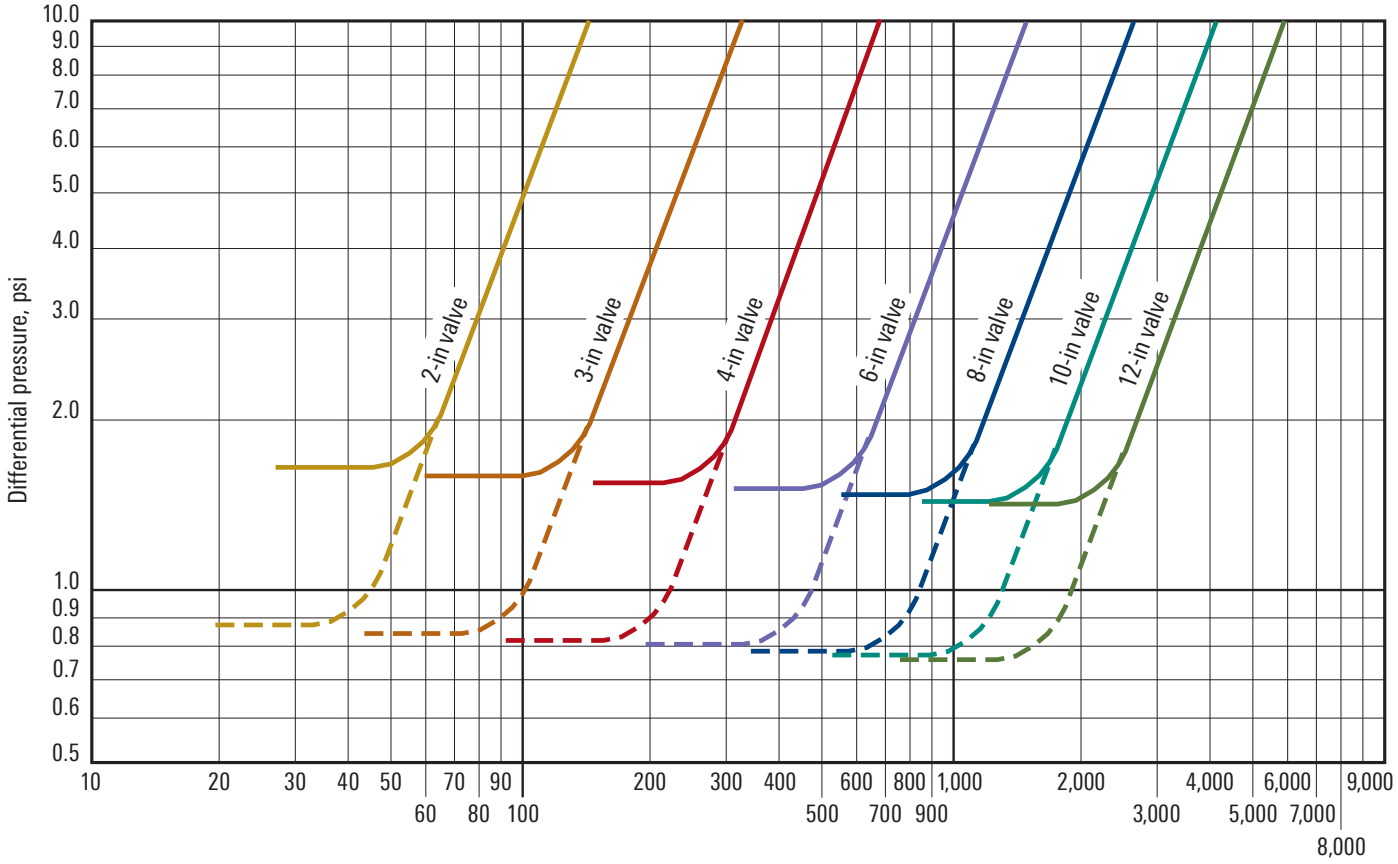


Nominal Size, in [mm]	ASME Class	Working Pressure, psi	Weight, lbm	A (RF), in [mm]	A (RTJ), in [mm]	B, in [mm]	C,† in [mm]	D, in [mm]	E, in [mm]
2 [50]	150	290	61	10.50 [267]‡	11.13 [283]‡	5.25 [134]	9.25 [235]	7.00 [178]	6.00 [152]
	300	750	63	10.50 [267]	11.13 [283]	5.25 [134]	9.25 [235]	7.00 [178]	6.50 [165]
	600	1,500	69	11.50 [292]	11.63 [295]	5.75 [146]	9.50 [241]	7.00 [178]	6.50 [165]
	900	2,250	13	14.50 [368]	14.63 [372]	7.25 [184]	10.00 [254]	7.63 [194]	8.50 [216]
	1500	3,750	136	14.50 [368]	14.63 [372]	7.25 [184]	10.25 [260]	7.63 [194]	8.50 [216]
3 [80]	150	290	96	12.50 [318]‡	13.13 [334]‡	6.25 [159]	10.75 [273]	8.25 [210]	7.50 [191]
	300	750	104	12.50 [318]	13.13 [334]	6.25 [159]	10.75 [273]	8.25 [210]	8.25 [210]
	600	1,500	116	14.00 [356]	14.13 [359]	7.00 [178]	11.13 [283]	8.25 [210]	8.25 [210]
	900	2,250	151	15.00 [381]	15.13 [384]	7.50 [191]	11.38 [289]	8.25 [210]	9.50 [241]
	1500	3,750	344	18.50 [470]	18.63 [473]	9.25 [235]	13.13 [334]	11.63 [295]	10.50 [267]
4 [100]	150	290	137	14.00 [356]‡	14.63 [372]‡	7.00 [178]	11.50 [292]	9.75 [248]	9.00 [229]
	300	750	152	14.00 [356]	14.63 [372]	7.00 [178]	11.50 [292]	9.75 [248]	10.00 [254]
	600	1,500	202	17.00 [432]	17.13 [435]	8.50 [216]	11.88 [302]	9.75 [248]	10.75 [273]
	900	2,250	244	18.00 [457]	18.13 [461]	9.00 [229]	12.37 [314]	9.75 [248]	11.50 [292]
	1500	3,750	387	21.50 [546]	21.63 [549]	10.75 [273]	13.00 [330]	10.75 [273]	12.25 [311]
6 [150]	150	290	386	17.50 [445]‡	18.13 [461]‡	8.75 [223]	16.38 [416]	11.75 [298]	11.00 [279]
	300	750	317	17.50 [445]	18.13 [461]	8.75 [223]	16.38 [416]	11.75 [298]	12.50 [318]
	600	1,500	518	22.00 [559]	22.13 [562]	11.00 [280]	17.07 [434]	12.25 [311]	14.00 [356]
	900	2,250	502	24.00 [610]	24.13 [613]	12.00 [305]	17.25 [438]	11.75 [298]	15.00 [381]
	1500	3,750	966	27.75 [705]	28.00 [711]	13.88 [353]	15.75 [400]	13.13 [334]	15.50 [394]
8 [200]	150	290	350	19.50 [495]	20.00 [508]	9.75 [248]	13.00 [330]	14.75 [375]	13.50 [343]
	300	750	380	21.00 [533]	21.63 [549]	10.50 [267]	14.10 [358]	14.75 [375]	17.50 [445]
	600	1,500	698	26.00 [660]	26.13 [664]	13.00 [330]	14.88 [378]	14.75 [375]	16.50 [419]
	900	2,250	931	29.00 [737]	29.13 [740]	14.50 [368]	15.33 [389]	14.69 [373]	18.50 [470]
10 [250]	150	290	500	24.50 [622]	25.00 [635]	12.25 [311]	15.38 [391]	17.50 [445]	16.00 [406]
	300	750	600	24.50 [622]	25.13 [638]	12.25 [311]	15.38 [391]	17.50 [445]	17.50 [445]
	600	1,500	1,184	31.00 [787]	31.13 [791]	15.50 [394]	16.38 [416]	17.50 [445]	20.00 [508]
	900	2,250	1,464	33.00 [838]	33.13 [842]	16.50 [419]	16.88 [429]	17.50 [445]	21.50 [546]
12 [300]	150	290	700	27.50 [699]	28.00 [711]	13.75 [349]	18.50 [470]	21.00 [533]	19.00 [483]
	300	750	850	28.00 [711]	28.63 [727]	14.00 [356]	18.50 [470]	21.00 [533]	20.50 [521]
	600	1,500	1,757	33.00 [838]	33.13 [842]	16.50 [419]	18.26 [464]	21.00 [533]	22.00 [559]
	900	2,250	2,256	38.00 [965]	38.13 [969]	19.00 [483]	19.13 [486]	21.00 [533]	24.00 [610]

† Sizes 2 to 6 in with eye lid; sizes 8 to 12 in with eye bolt.
‡ Length exceeds dimensions given in API Spec 6D.

Pressure-Loss Curves and Flow Coefficients

Pressure-Loss Curves



Dotted lines represent pressure loss for valves without springs.

Flow coefficients

Flow Coefficients (C_v) — Full Open Valves	
Valve Size, in	**C_v**
2	46
3	104
4	212
6	477
8	848
10	1,325
12	1,908

Liquid (incompressible flow)

The equations listed below are the basis for the above nomogram. The nomogram is a method for solving the equations below quickly and simply when service fluid is water.

$$C_v = Q\sqrt{\frac{G}{\Delta P}} \qquad Q = C_v\sqrt{\frac{\Delta P}{G}} \qquad \Delta P = \left[\frac{Q}{C_v}\right]^2 G$$

Gas (compressible flow)

$$C_v = \frac{Q}{963}\sqrt{\frac{GT}{P_1^2 - P_2^2}} \qquad Q = C_v \cdot 963\sqrt{\frac{P_1^2 - P_2^2}{GT}}$$

Where

Q = Flow (liquids — galUS/min, gases — ft^3/h)

C_v = Flow coefficient

P_1 = Inlet pressure, psi (absolute)

P_2 = Outlet pressure, psi (absolute)

ΔP = Pressure drop (P_1–P_2)

T = Absolute temperature (460 degF)

G = Specific gravity (water = 1)

Notes

Piston-Style TOM WHEATLEY Check Valves

slb.com/valves

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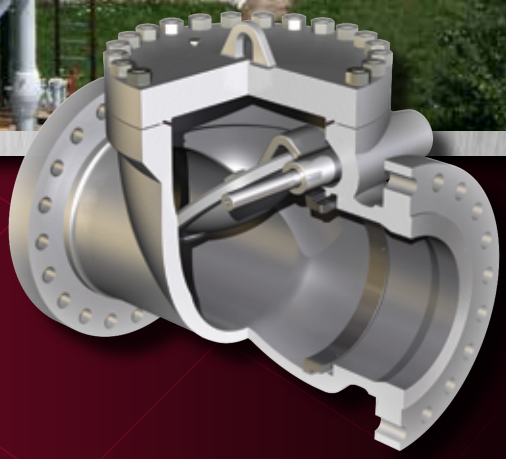
TOM WHEATLEY Swing Check Valves

Simple, field-proven design for backflow prevention in the global hydrocarbon industry

TECHNOLOGY



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TOM WHEATLEY SWING CHECK VALVES

Ville Platte, La., USA

Cameron is a leading provider of valve, valve automation and measurement systems to the oil and gas industry. Our products are primarily used to control, direct and measure the flow of oil and gas as it is moved from individual wellheads through flowlines, gathering lines and transmission systems to refineries, petrochemical plants and industrial centers for processing.

Cameron provides a wide range of valves for use in natural gas, LNG, crude oil, and refined products transmission lines. The traditional CAMERON® fully welded ball valve product line has been combined with the GROVE®, RING-O®, TOM WHEATLEY®, ENTECH™, and TK® product lines. This broad offering has strengthened Cameron's ability to serve as a single source for a wide scope of customer requirements. Cameron also provides critical service valves for refinery, chemical, and petrochemical processing businesses, and for associated storage terminal applications, particularly through the ORBIT® and GENERAL VALVE® product lines. These brands are complemented by WKM®, TBV™, and TEXSTEAM™ valve products and considerably expand the scope of our product offerings.

Cameron's TOM WHEATLEY check valves have been an integral part of the surface and subsea flow control arenas for more than 70 years. With valves in service around the world, in the most critical backflow prevention applications, the TOM WHEATLEY brand is recognized as the industry leader for check valve products. From deepwater subsea check valves, designed to protect offshore platforms, to the fire-resistant valves used in surface pipeline and processing applications, we offer a complete line of swing, piston, and nozzle check products to meet our customers' most demanding applications.

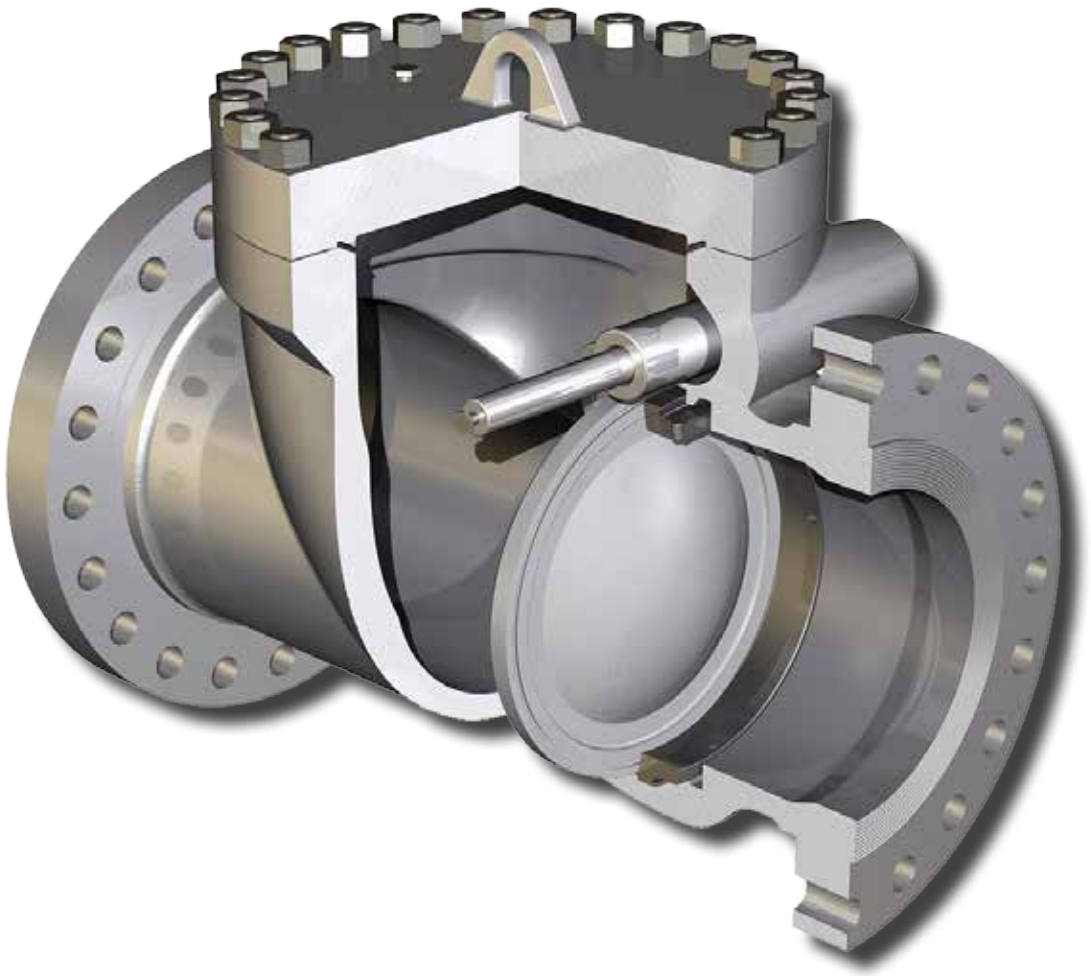
TECHNICAL OVERVIEW

- Check valves are primarily used in oil and gas pipelines to prevent backflow.
- Check valves can be utilized in surface and subsea manifold production systems, or where a pipeline requires isolation.
- Cameron's check valves are available in a wide range of materials to suit various pressures, temperatures, and service conditions.
- From extreme temperatures and pressures to subsea service, valves are available in virtually any size, pressure class, material, trim, and design configuration to handle the industry's most demanding applications.

APPLICATIONS

Cameron's TOM WHEATLEY swing check valves are commonly used by the hydrocarbon industry to:

- Prevent backflow in pipelines
- Prevent leakage to the environment in the event of a pipeline rupture
- Protect the integrity of upstream equipment



DIMENSIONS AND WEIGHTS

6" to 48" (150 mm to 1200 mm)

The majority of valve sizes detailed in this section can be engineered to accept the optional features detailed in this brochure. Sizes, pressure classes, and end connections not listed are available upon request.

Sizes and Pressure Classes Available

Size in. (mm)	ASME Class					
	150	300	600	900	1500	2500
6 (150)	•	•	•	•	•	•
8 (200)	•	•	•	•	•	•
10 (250)	•	•	•	•	•	•
12 (300)	•	•	•	•	•	•
14 (350)	•	•	•	•	•	•
16 (400)	•	•	•	•	•	•
18 (450)	•	•	•	•	•	↓
20 (500)	•	•	•	•	•	
22 (550)	•	•	•	•	•	
24 (600)	•	•	•	•	•	
26 (650)	•	•	•			
28 (700)	•	•	•	•	•	
30 (750)	•	•	•	•	•	
36 (900)	•	•	•	•	↓	
42 (1050)	•	•	•	↓	↓	↓

↓ Other sizes are available upon request.

DESIGN FEATURES

The secret to the TOM WHEATLEY swing check valve's success is simplicity. Without expensive actuation or reliance upon an outside power source, the TOM WHEATLEY swing check valve prevents backflow in a fraction of a second. The clapper is the only moving part, which swings to allow flow. At the moment flow ceases, the clapper returns to the closed position, creating an instant barrier to reverse flow.

In addition, a swing check valve is easy to troubleshoot and easy to maintain with convenient top-entry access to all valve internals.

In its standard configuration, these valves have a bolted cover and a free-swinging clapper. The clapper is the closing member that responds to the prevailing flow conditions.

Design Standards*

- API 6D, 24th Edition
- ANSI B16.34
- API 6DSS
- ISO 14723
- NACE MR0175
- ISO 15156

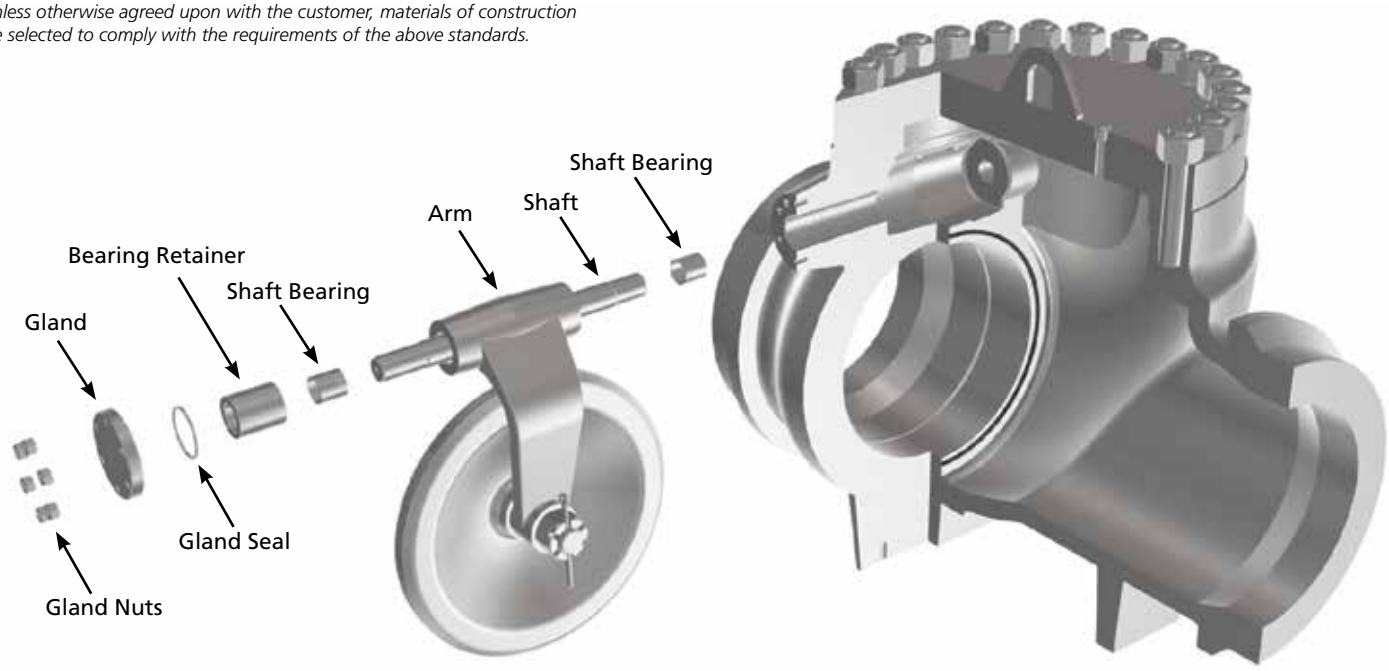
**Unless otherwise agreed upon with the customer, materials of construction are selected to comply with the requirements of the above standards.*

All valves are full-bore, through-conduit and will allow the passage of various pipeline inspection gauges and spheres. The full-bore design ensures a low pressure drop across the valve and less turbulence than with reduced-bore valves or alternative designs of swing check valves.

The valve ends are available to meet any pipeline requirement. The valves are supplied with raised-face, ring-type joint flanges or weld ends. Raised-face and ring-type joint flanges comply with the requirements of ASME B16.5 and ASME B16.47, as appropriate.

Flanges are backfaced to provide a smooth bolting surface to allow even bolt loading during installation in the pipeline.

Weld-end valves comply with ASME B16.25 unless otherwise agreed upon with the customer. Hub ends and other specialty end connections are available upon request.

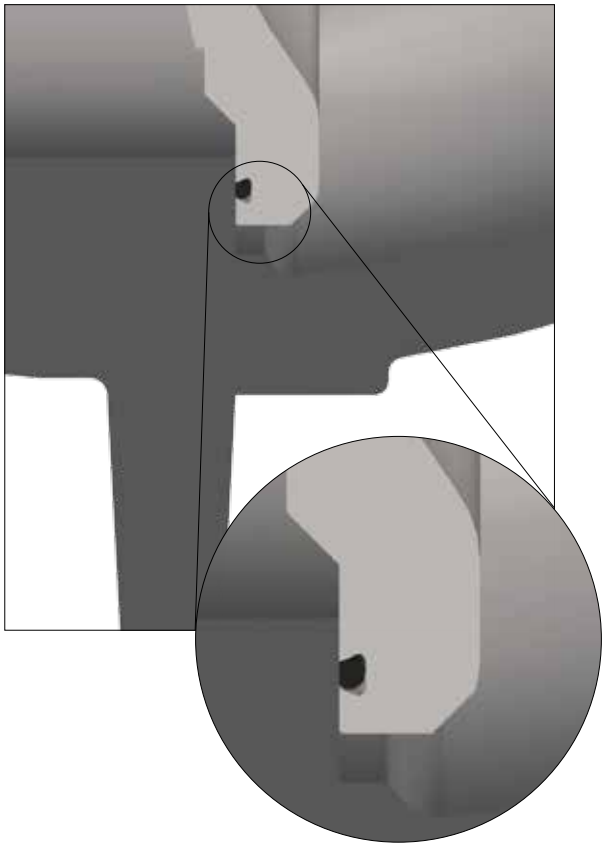


Seat Options

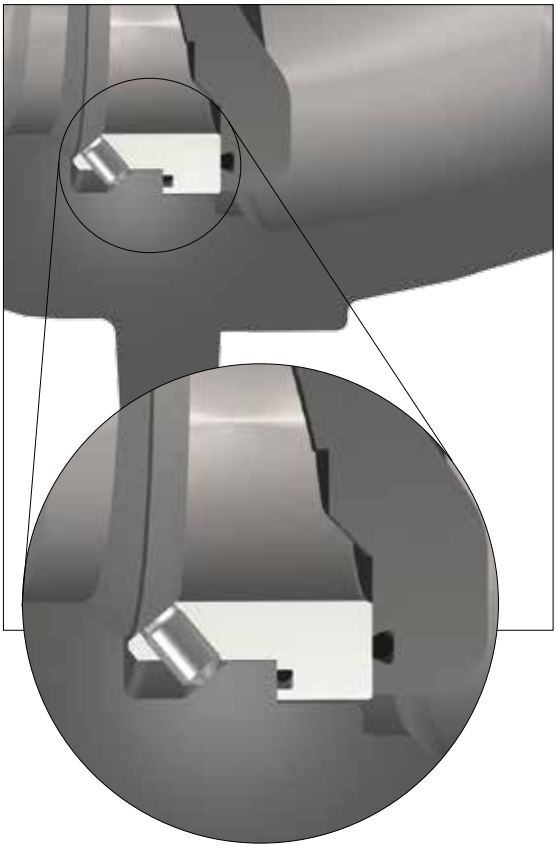
TOM WHEATLEY swing check valves are available with either an integral seat or renewable seat. A renewable seat extends the life of the valve by allowing all internal parts and seals to be replaced with the valve body still installed in the pipeline.

Sealing materials are selected for the valve service conditions. Pressure, temperature, and flow media all are considered when selecting seals. Standard seal materials include Fluoroelastomer and Nitrile for the seat-to-clapper seal. Standard cover seal materials are Fluoroelastomer and Nitrile, but ring joint gaskets also can be used for the cover-to-body seal.

TOM WHEATLEY valves are available with an extended operating shaft to allow the valve to be locked in the open position for pigging or testing purposes, or to mount a rotary damper for pulsating gas flow service.



The TOM WHEATLEY swing check valve features a seat that is integral with the standard body. As an option, a renewable seat is field serviceable and facilitates the use of corrosion-resistant steels, overlays, and seat styles. Renewable seats are securely mounted inside the valve body using fasteners.



The renewable seat option allows the repair or replacement of all the seat sealing elements in the valve. By having both the seat and clapper as separate parts from the body, a damaged valve can be restored to as-new condition and performance. A renewable seat also facilitates use of different corrosion-resistant materials and modified seat designs to accommodate pipeline pigs.

DESIGN FEATURES (CONT.)

Clapper Construction

The clapper is a one-piece cast design that is mounted to the valve clapper arm with a secure and positively located fastener.

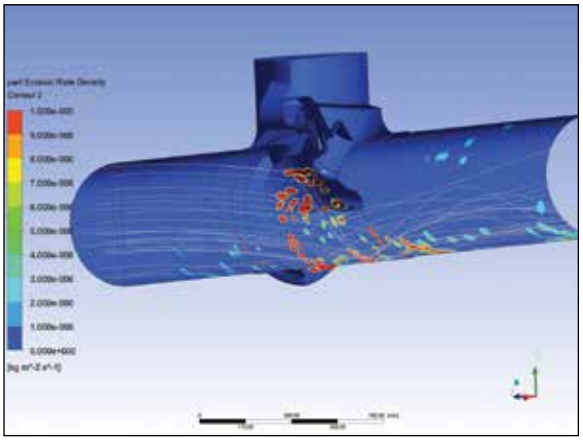
45-Degree Seat

In addition to the conduit clapper, another aid in successful pigging operations, especially in the reverse direction, is the 45-degree seat. The seat ring and clapper seat faces are profiled at a 45-degree angle to assist as pipeline pigs transition through the valve body. Changes in profile at the seat area that could potentially catch the edge of a pig and damage instruments are reduced.

Conduit Clapper

The TOM WHEATLEY check valve is designed to facilitate pigging operations and to protect instrumentation on intelligent pigs. A conduit clapper profile that closely matches the valve bore helps to guide the pig through the body of the valve and into the downstream pipe.

The TOM WHEATLEY swing check valve clapper has been designed using the latest finite element analysis (FEA) and computational flow dynamics (CFD) techniques to create a sealing barrier that is strong, while at the same time allows increased flow with reduced pressure drop through the valve. As a standard, the clapper contains an elastomer seal to create a zero-leakage seal against the seat. Polymer seals are optional. The clapper face also can be overlaid with corrosion-resistant alloys or hard facing for metal-to-metal sealing applications and corrosion resistance.



Glands and Seals

The standard gland is a bolted-on shaft cover with an elastomer seal. The gland bolting pattern is standardized for all gland types to allow multiple gland and shaft seal configurations without machining the body. Polymer seals are optional.

Bearings for Shaft

Stainless steel bearings backed with PTFE are located on both ends of the valve shaft to support the arm and clapper for smooth, low-friction movement of the clapper.

Cover Seals

An elastomer seal is the standard seal. Metal seals are optional and available in various materials options. The cover and bolting patterns are standard, regardless of the type of cover seal.

Body Bolting

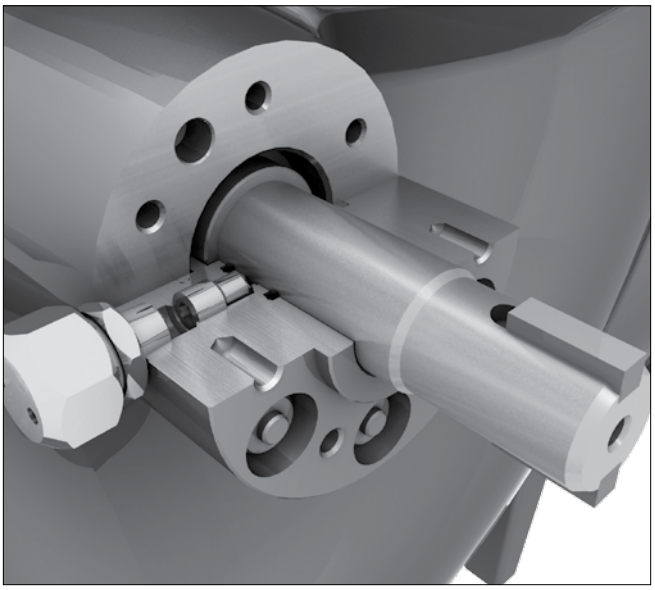
As a standard, all bolting meets ASME B16.34 and ASME VIII Div. 1 design requirements.

OPTIONAL FEATURES

Gland Designs

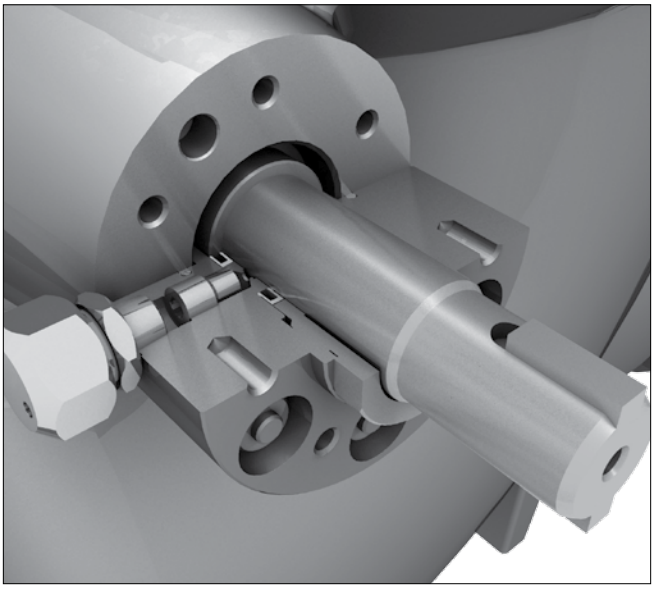
S1 Gland

The S1 gland is the standard gland for extended shaft configurations. It features a bolted-on gland body with two elastomer shaft seals and an elastomer body seal. Lubricant or sealant injection is standard between the primary and secondary shaft seals.



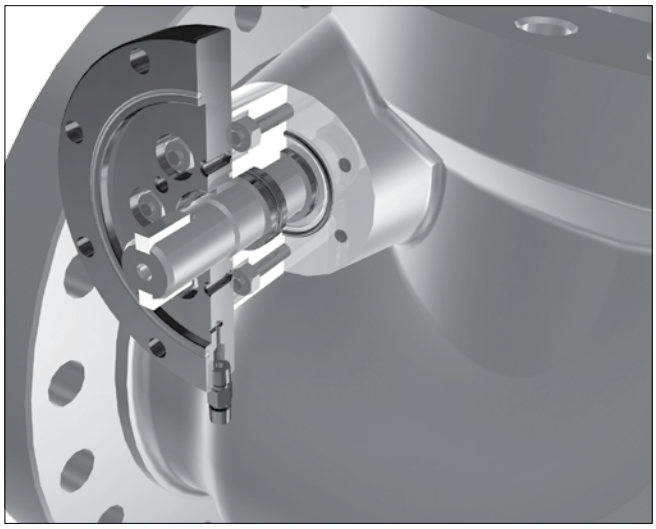
S2 Gland

The S2 gland is an optional gland for extended shaft applications. It features two spring-energized lipseals for shaft seals and an elastomer body seal. Lubricant or sealant injection also is a standard feature on this gland. For 6" to 16" (152 mm to 406 mm) valves, the secondary lipseal is retained by a threaded gland retainer. For valves 20" (508 mm) and larger, the secondary lipseal is retained by the gland flange. In both cases, the secondary lipseal is field replaceable.



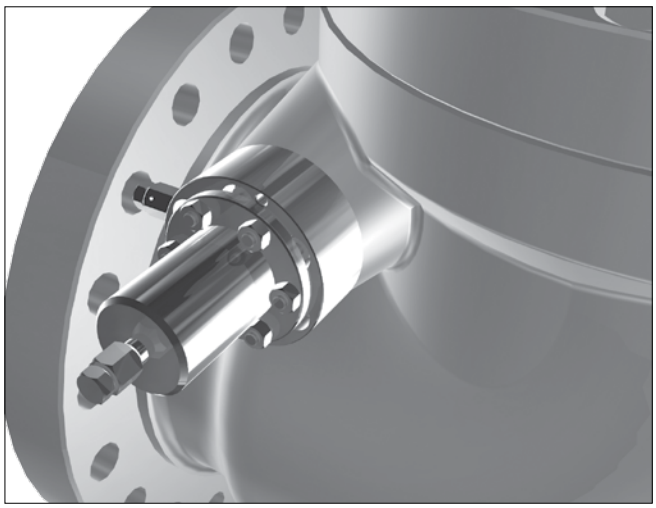
Subsea T1 Gland

The T1 gland is used for subsea service, and features spring-energized polymer lipseals for the dynamic shaft seals and double-barrier elastomer seals for the gland body seals. The gland contains an outward-facing lipseal that prevents ingress of seawater into the valve. The gland flange seals against the gland body and the gear operator to prevent seawater ingress. In the event of shaft seal leakage, the gear operator is protected from internal pressure by means of a pressure-relief fitting installed in the gland flange.



Shaft Cover

An optional shaft cover is available that can bolt directly onto the extended shaft gland or flange to protect the shaft when it is not in use. The shaft cover is designed to contain the valve's full-rated working pressure and to prevent leaks into the environment.



OPTIONAL FEATURES (CONT.)

Lock-Open Device

The lock-open device allows easy opening of the check valve clapper and locks the clapper in the full-open position. The lock-open device is intended for applications requiring the override of the normal check valve function. These applications can include locking open for testing, line drainage, reverse pigging, or other reverse flow conditions. Valves 16" (400 mm) Class 900 and smaller can be locked open using a manual lever or a gear operator. Larger valves are supplied with a gear operator to lock open the valve as a standard. In either configuration, the lock-open device will hold the valve in the open position for operating scenarios. The lock-open feature requires that the valve has an extended shaft. The shaft seal gland can be either an S1 gland with elastomer seals or an S2 gland with lipseals.

Use of the lock-open device requires equalized pressure (balanced pressure) across the closed clapper. Excess force applied to open the valve against differential pressure can damage the internal components of the valve.

A valve shaft cover is furnished with the valve for installation when the lock-open device is not in use.

Rotary Retarder (Mini-Slam)

The TOM WHEATLEY swing check valve can be furnished with a Mini-Slam II rotary dampener that is specifically designed for swing check valves. The dampener acts to reduce the movement of the clapper in pulsating flow service (for example, when installed directly downstream from a reciprocating compressor).

The Mini-Slam II is a self-contained and compact unit that bolts directly to the valve shaft.

SPECIAL FEATURES

Testing

TOM WHEATLEY swing check valves are manufactured and tested per API 6D/ISO 14313 standards. Every valve receives a hydrostatic body shell test at 1.5 times its rated working pressure and a hydrostatic seat test at 1.1 times its rated working pressure. Additional pressure testing is available, including air and nitrogen testing.

High Pressure Gas

TOM WHEATLEY swing check valves can be tested using high-pressure gas upon request. Cameron is fully equipped to carry out supplemental gas testing at ambient, low- or high-temperatures using our in-house testing facilities. External leakage rates, if any, are detected by a mass spectrometer. Leakage through the seats, if any, is measured by calibrated flow meters. For low- or high-temperature service, gas testing can be performed to customer-specified critical conditions. Cameron facilities are capable of testing a wide range of valve sizes and pressure classes.

Qualification Testing

TOM WHEATLEY swing check valves are qualified to a Cameron-specific test program, including fire testing to API 6FD 1st Edition (February 1995, Reaffirmed September 2008).

Materials – NACE Requirements

TOM WHEATLEY swing check valves are built to comply with NACE MR0175/ISO 15156 standards.

AVAILABLE TRIMS

Standard trims are shown below, however, higher materials and overlays are available to suit a variety of service.

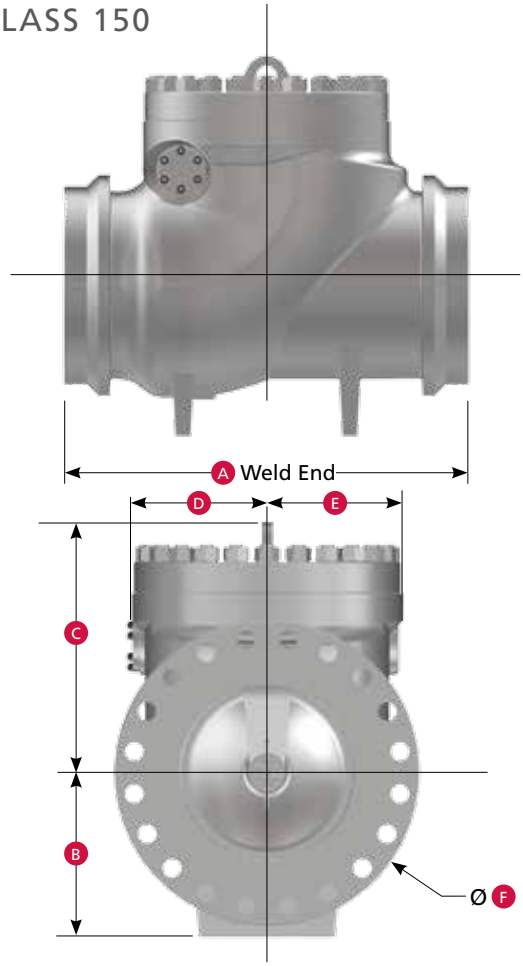
	Trim One	Trim Two	Trim Three	Trim Four	Trim Five	Trim Six
	Non-Corrosive/ Standard Temp.	Non-Corrosive/ Cold Temp.	Mildly Corrosive/ Standard Temp.	Mildly Corrosive/ Low Temp.	Moderately Corrosive/Standard Temp.	Moderately Corrosive/Low Temp.
	Carbon Steel	Carbon Steel	CS with Overlay of CLPR, Seat	CS with Overlay of CLPR, Seat	CS with Overlay of all Seal Areas	CS with Overlay of all Seal Areas
	-20° F to 350° F (-29° C to 212° C)	-50° F to 350° F (-46° C to 212° C)	-20° F to 350° F (-29° C to 212° C)	-50° F to 350° F (-46° C to 212° C)	-20° F to 350° F (-29° C to 212° C)	-50° F to 350° F (-46° C to 212° C)
Body	ASTM A216 WCC	ASTM A352 LCC	ASTM A216 WCC	ASTM A352 LCC	ASTM A216 WCC/316 O/L	ASTM A352 LCC/316 O/L
Cover	ASTM A36	ASTM A350 LF2	ASTM A36	ASTM A350 LF2	ASTM A36/316 O/L	ASTM A350 LF2/316 O/L
Clapper	ASTM A216 WCC	ASTM A352 LCC	ASTM A216 WCC/316 O/L	ASTM A352 LCC/316 O/L	ASTM A216 WCC/316 O/L	ASTM A352 LCC/316 O/L
Arm	ASTM A216 WCC	ASTM A352 LCC	ASTM A216 WCC	ASTM A352 LCC	ASTM A216 WCC	ASTM A352 LCC
Seat (See Note 1)	ASTM A36	ASTM A516 GR 70	ASTM A36/316 O/L	ASTM A516 GR 70/316 O/L	ASTM A36/316 O/L	ASTM A516 GR 70/316 O/L
Shaft, Standard Non-Extended	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Shaft, Extended	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)
Gland, Standard	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2/316 O/L	ASTM A350 LF2/316 O/L
Gland, S1	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	316 SS	316 SS
Gland, T1	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Gland, S2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	316 SS	316 SS
Gland Flange	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70/316 O/L	ASTM A516 GR 70/316 O/L
Gland Flange, Subsea	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70/316 O/L	ASTM A516 GR 70/316 O/L
Gland Retainer (6" to 16" only)	316 SS/FLRCTD	316 SS/FLRCTD	316 SS/FLRCTD	316 SS/FLRCTD	316 SS/FLRCTD	316 SS/FLRCTD
Lift Collar	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)
Bearing Retainer	AISI 4130	ASTM A350 LF2	AISI 4130	ASTM A350 LF2	AISI 4130	ASTM A350 LF2
Gland Cover	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2
Gland Cover, Subsea	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2
Metal Cover Seals (BX, R-TYPE) (See Note 2)	SICP	SICP	316 SS FLRCTD	316 SS FLRCTD	316 SS FLRCTD	316 SS FLRCTD
Bearings	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE
Thrust Washers	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE
Lip Seals – Shaft, Standard	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY
Lip Seals – Shaft, Subsea	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY
Cover and Gland Bolting	B7/2H	L7/7	B7/2H	L7/7	B7/2H	L7/7
Clapper Nut	2HM	L7M	2HM	L7M	2HM	L7M
Clapper Cotter PIN	300 Series SS	300 Series SS	300 Series SS	300 Series SS	300 Series SS	300 Series SS
Clapper Anti-Rotation PIN	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel
Gland Torque PIN	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel
Cover Pipe Plug	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2
Gland Grease Fitting	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Gland Check Fitting	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Gland Flange Relief Fitting	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Keys	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS

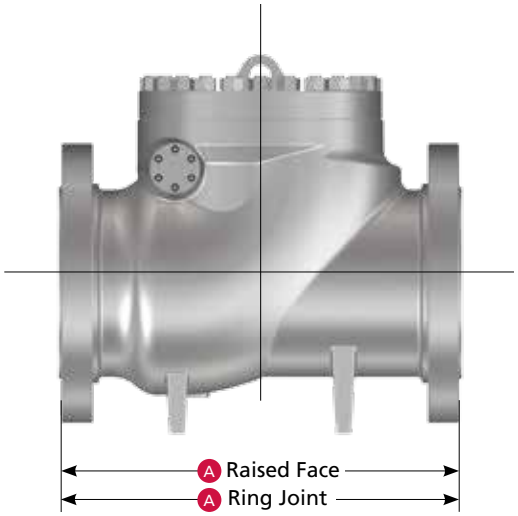
Note:
1. All seats size 16” (400 mm) and smaller are A516 GR 70 only.
2. Standard cover seal is an O-ring. Metal cover seal is optional. All Class 1500 valves have a metal cover seal only.

	Trim Seven	Trim Eight	Trim Nine	Trim Ten	Trim Eleven	Trim Twelve
	Subsea	Moderately Corrosive/Standard Temp.	Moderately Corrosive/Low Temp.	Corrosive/Standard Temp.	Corrosive/Low Temp.	Very Corrosive
	Shallow Water	Stainless Steel CLPR, Seat	Stainless Steel CLPR, Seat	SS CLPR, Seat and O/L of CS Seal Areas	SS CLPR, Seat and O/L of CS Seal Areas	All Stainless Steel
	Gulf of Mexico	-20° F to 350° F (-29° C to 212° C)	-50° F to 350° F (-46° C to 212° C)	-20° F to 350° F (-29° C to 212° C)	-50° F to 350° F (-46° C to 212° C)	-50° F to 350° F (-46° C to 212° C)
Body	ASTM A216 WCC	ASTM A216 WCC	ASTM A352 LCC	ASTM A216 WCC/316 O/L	ASTM A352 LCC/316 O/L	ASTM A351 CF8M Modified
Cover	ASTM A36	ASTM A36	ASTM A350 LF2	ASTM A36/316 O/L	ASTM A350 LF2/316 O/L	F316 SS Modified
Clapper	ASTM A216 WCC/316 O/L	ASTM A351 CF8M Modified	ASTM A351 CF8M Modified	ASTM A351 CF8M Modified	ASTM A351 CF8M Modified	ASTM A351 CF8M Modified
Arm	ASTM A216 WCC	ASTM A216 WCC	ASTM A352 LCC	ASTM A216 WCC	ASTM A352 LCC	ASTM A351 CF8M Modified
Seat (See Note 1)	ASTM A36/316 O/L	316 SS	316 SS	316 SS	316 SS	316 SS
Shaft, Standard Non-Extended	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Shaft, Extended	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)
Gland, Standard	N/A	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2/316 O/L	ASTM A350 LF2/316 O/L	Duplex
Gland, S1	N/A	ASTM A350 LF2	ASTM A350 LF2	316 SS	316 SS	316 SS
Gland, T1	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Gland, S2	N/A	ASTM A350 LF2	ASTM A350 LF2	316 SS	316 SS	316 SS
Gland Flange	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70/316 O/L	ASTM A516 GR 70/316 O/L	316 SS/Duplex
Gland Flange, Subsea	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70	ASTM A516 GR 70/316 O/L	ASTM A516 GR 70/316 O/L	316 SS/Duplex
Gland Retainer (6" to 16" only)	316 SS/FLRCTD	316 SS/FLRCTD	316 SS/FLRCTD	316 SS/FLRCTD	316 SS/FLRCTD	316 SS/FLRCTD
Lift Collar	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)	ASTM A564 Type 630 (17-4 pH)
Bearing Retainer	AISI 4130	AISI 4130	ASTM A350 LF2	AISI 4130	ASTM A350 LF2	316 SS/Duplex
Gland Cover	N/A	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	Duplex
Gland Cover, Subsea	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	Duplex
Metal Cover Seals (BX, R-TYPE) (See Note 2)	316 SS FLRCTD	316 SS FLRCTD	316 SS FLRCTD	316 SS FLRCTD	316 SS FLRCTD	316 SS FLRCTD
Bearings	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE
Thrust Washers	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE	316 SS/PTFE
Lip Seals – Shaft, Standard	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY
Lip Seals – Shaft, Subsea	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY	PTFE/ELGILOY
Cover and Gland Bolting	B7/2H	B7/2H	L7/7	B7/2H	L7/7	660
Clapper Nut	2HM	2HM	L7M	2HM	L7M	660
Clapper Cotter PIN	300 Series SS	300 Series SS	300 Series SS	300 Series SS	300 Series SS	300 Series SS
Clapper Anti-Rotation PIN	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	ASTM A564 Type 630 (17-4 pH)
Gland Torque PIN	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	High-Strength Alloy Steel	ASTM A564 Type 630 (17-4 pH)
Cover Pipe Plug	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	ASTM A350 LF2	DUPLEX
Gland Grease Fitting	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Gland Check Fitting	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Gland Flange Relief Fitting	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Keys	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS

Dimensional Data

ANSI CLASS 150

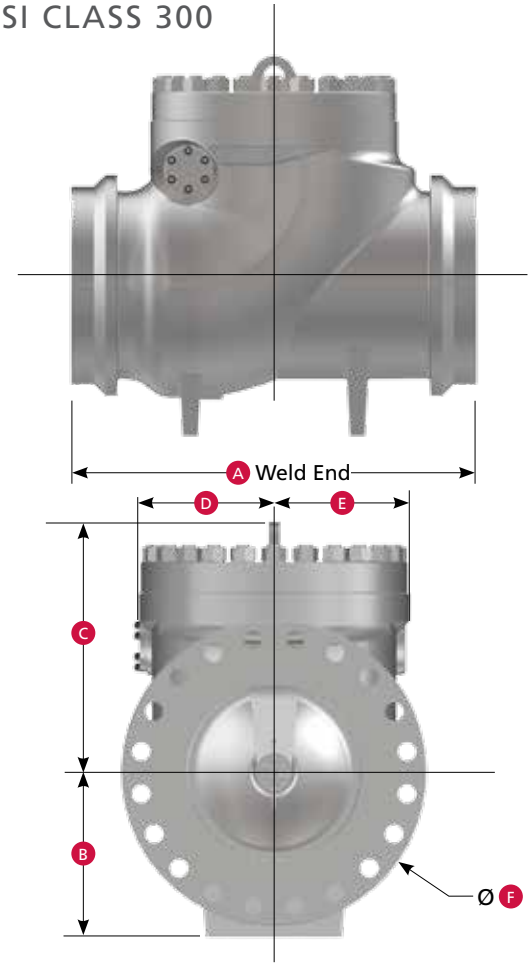


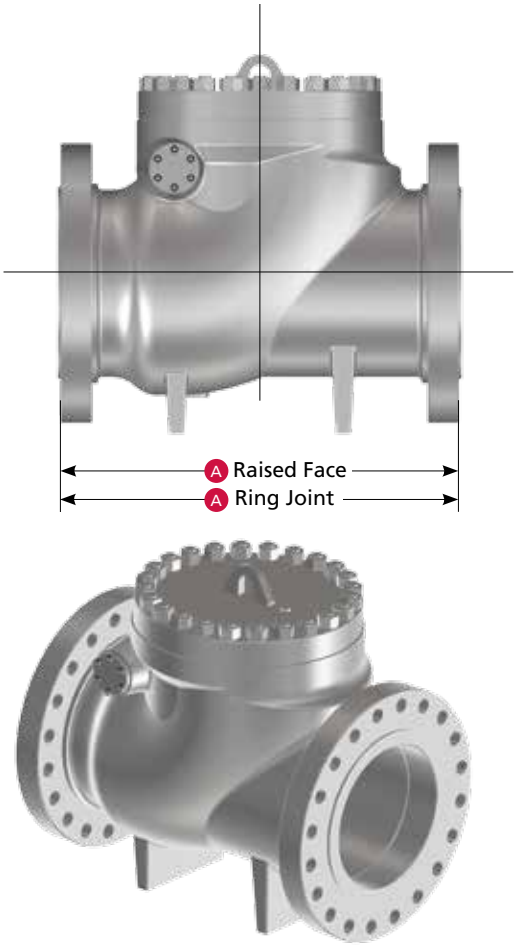


Size in. (mm)	WE – A in. (mm)	RF – A in. (mm)	RTJ – A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	WE Weight lb (kg)	FE Weight lb (kg)
6 (150)	17.5 (445)	17.5 (445)	18.1 (460)	7.25 (184.2)	12.25 (311.2)	6.50 (165.1)	6.00 (152.4)	11.00 (279.4)	270 (122.5)	297 (134.7)
8 (200)	19.5 (495)	19.5 (495)	20.0 (508)	8.50 (215.9)	13.50 (342.9)	6.75 (171.5)	6.75 (171.5)	13.50 (342.9)	403 (182.8)	418 (189.6)
10 (250)	24.5 (622)	24.5 (622)	25.0 (635)	9.75 (247.7)	15.25 (387.4)	9.00 (228.6)	8.25 (209.6)	16.00 (406.4)	619 (280.8)	638 (289.4)
12 (300)	27.5 (699)	27.5 (699)	28.0 (711)	11.25 (285.8)	18.50 (469.9)	9.50 (241.3)	9.25 (235.0)	19.00 (482.6)	803 (364.2)	946 (429.1)
16 (400)	34.0 (864)	34.0 (864)	34.5 (876)	13.75 (349.3)	22.00 (558.8)	11.50 (292.1)	11.00 (279.4)	23.50 (596.9)	1540 (698.5)	1760 (798.3)
20 (500)	38.5 (978)	38.5 (978)	39.0 (991)	16.25 (412.8)	26.50 (673.1)	13.70 (348.0)	13.50 (342.9)	27.50 (698.5)	2310 (1047.8)	2640 (1197.5)
24 (600)	51.0 (1295)	51.0 (1295)	51.5 (1308)	19.00 (482.6)	32.00 (812.8)	18.75 (476.3)	18.75 (476.3)	32.00 (812.8)	3630 (1646.5)	4070 (1846.1)
30 (750)	60.0 (1524)	60.0 (1524)	See Note*	22.50 (571.5)	37.50 (952.5)	19.50 (495.3)	20.50 (520.7)	38.75 (984.3)	6050 (2744.2)	7590 (3442.8)
36 (900)	77.0 (1956)	77.0 (1956)	See Note*	26.00 (660.4)	44.00 (1117.6)	22.50 (571.5)	23.50 (596.9)	46.00 (1168.4)	9130 (4141.3)	10,340 (4690.2)

* Available upon request.

ANSI CLASS 300

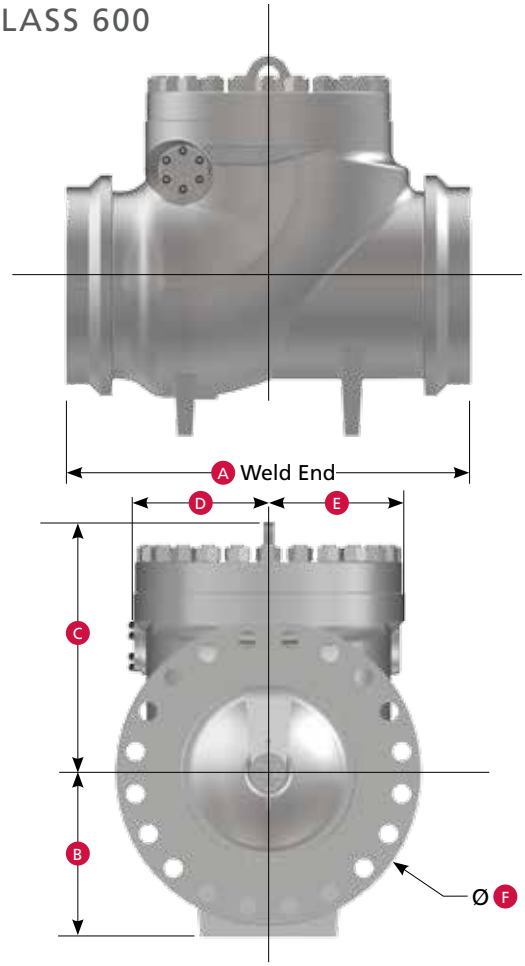


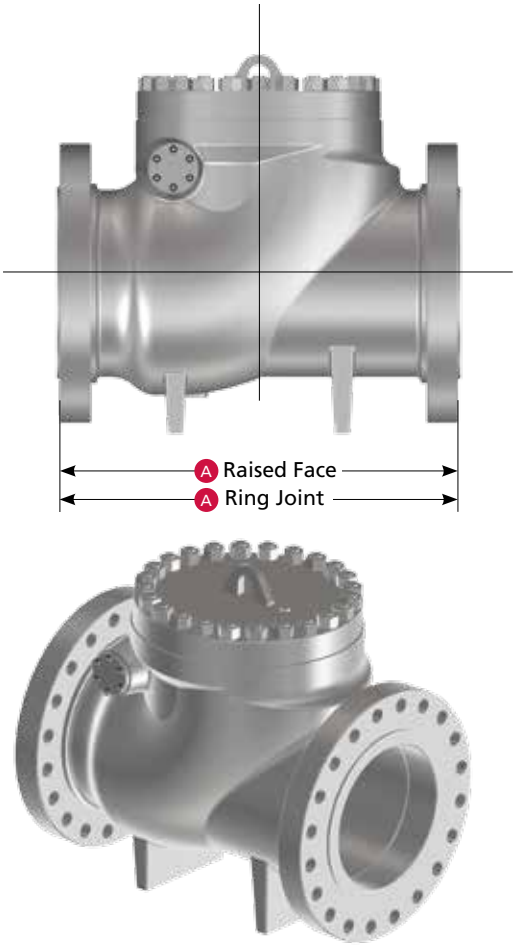


Size in. (mm)	WE – A in. (mm)	RF – A in. (mm)	RTJ – A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	WE Weight lb (kg)	FE Weight lb (kg)
6 (150)	17.5 (445)	17.5 (445)	18.1 (460)	7.25 (184.2)	12.25 (311.2)	6.75 (171.5)	6.00 (152.4)	12.50 (317.5)	264 (120)	308 (139.7)
8 (200)	21.0 (533)	21.0 (533)	21.6 (549)	8.50 (215.9)	13.50 (342.9)	6.75 (171.5)	6.75 (171.5)	15.00 (381.0)	281 (127)	484 (219.5)
10 (250)	24.5 (622)	24.5 (622)	25.1 (638)	9.75 (247.7)	15.25 (387.4)	9.00 (228.6)	8.25 (209.6)	17.50 (444.5)	646 (293)	693 (314.3)
12 (300)	28.0 (711)	28.0 (711)	28.6 (727)	11.25 (285.8)	18.50 (469.9)	9.75 (247.7)	9.25 (235.0)	20.50 (520.7)	937 (425)	1001 (454.1)
16 (400)	34.0 (864)	34.0 (864)	34.6 (879)	13.75 (349.3)	22.00 (558.8)	11.50 (292.1)	11.00 (279.4)	25.50 (647.7)	1540 (698.5)	1760 (798.3)
20 (500)	40.0 (1016)	40.0 (1016)	40.8 (1035)	16.25 (412.8)	26.50 (673.1)	13.75 (349.3)	13.50 (342.9)	30.50 (774.7)	2640 (1197.5)	3080 (1397.1)
24 (600)	53.0 (1346)	53.0 (1346)	53.9 (1368)	19.00 (482.6)	32.00 (812.8)	18.75 (476.3)	18.75 (476.3)	36.00 (914.4)	4290 (1945.9)	4730 (2145.5)
30 (750)	62.8 (1594)	62.8 (1594)	63.7 (1619)	22.50 (571.5)	37.50 (952.5)	19.50 (495.3)	20.50 (520.7)	43.00 (1092.2)	7931 (3597.4)	8250 (3742.1)
36 (900)	82.0 (2083)	82.0 (2083)	See Note*	26.00 (660.4)	44.00 (1117.6)	22.50 (571.5)	23.50 (596.9)	50.00 (1270.0)	13,200 (5987.4)	14,300 (6486.4)

Dimensional Data

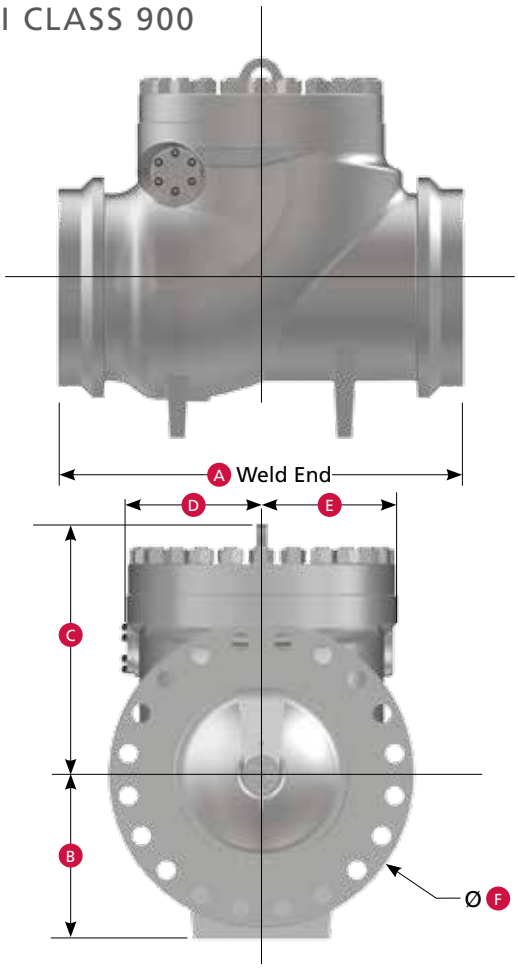
ANSI CLASS 600

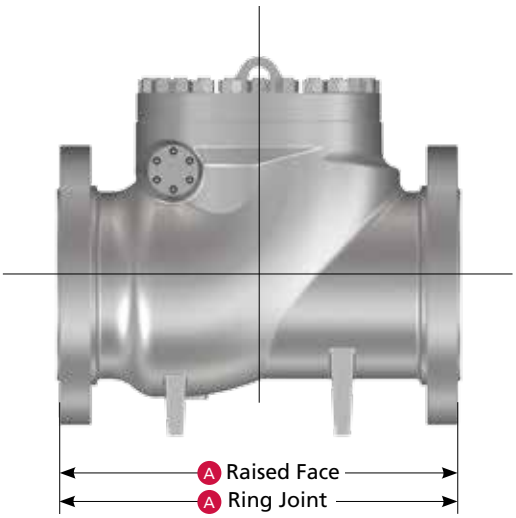




Size in. (mm)	WE – A in. (mm)	RF – A in. (mm)	RTJ – A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	WE Weight lb (kg)	FE Weight lb (kg)
6 (150)	22.0 (559)	22.0 (559)	22.1 (562)	8.00 (203.2)	13.25 (336.6)	8.75 (222.3)	8.00 (203.2)	14.00 (355.6)	407 (185)	462 (210)
8 (200)	26.0 (660)	26.0 (660)	26.1 (664)	9.50 (241.3)	14.50 (368.3)	8.00 (203.2)	7.50 (190.5)	16.50 (419.1)	665 (302)	737 (334)
10 (250)	31.0 (787)	31.0 (787)	31.1 (791)	11.00 (279.4)	16.50 (419.1)	10.00 (254.0)	9.25 (235.0)	20.00 (508.0)	1097 (498)	1210 (549)
12 (300)	33.0 (838)	33.0 (838)	33.1 (841)	12.00 (304.8)	19.55 (496.6)	11.00 (279.4)	10.00 (254.0)	22.00 (558.8)	1421 (644.6)	1540 (698.5)
16 (400)	39.0 (991)	39.0 (991)	39.1 (994)	14.50 (368.3)	22.25 (565.2)	12.40 (315.0)	12.00 (304.8)	27.00 (685.8)	2420 (1098)	2640 (1198)
20 (500)	47.0 (1194)	47.0 (1194)	47.3 (1200)	17.00 (431.8)	28.50 (723.9)	15.00 (381.0)	15.00 (381.0)	32.00 (812.8)	3960 (1796)	4620 (2096)
24 (600)	55.0 (1397)	55.0 (1397)	55.4 (1407)	19.50 (495.3)	34.55 (877.6)	18.00 (457.2)	18.00 (457.2)	37.00 (939.8)	6270 (2844)	7260 (3293)
30 (750)	65.0 (1651)	65.0 (1651)	65.5 (1664)	23.50 (596.9)	39.00 (990.6)	21.50 (546.1)	23.00 (584.2)	44.50 (1130.3)	10,560 (4790)	12,100 (5489)
36 (900)	82.0 (2083)	82.0 (2083)	82.6 (2099)	27.50 (698.5)	48.25 (1225.6)	24.75 (628.7)	25.75 (654.1)	51.75 (1314.5)	18,700 (8482)	20,900 (9480)

ANSI CLASS 900

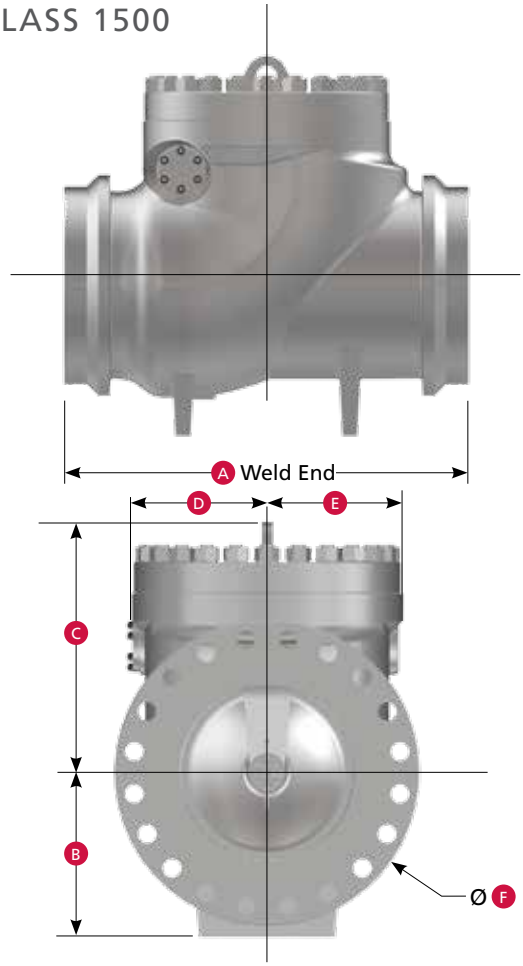


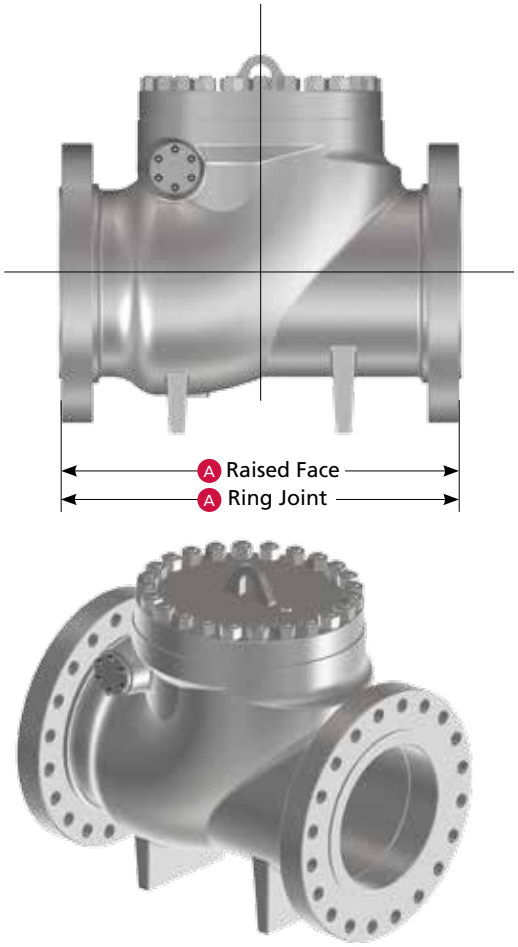


Size in. (mm)	WE – A in. (mm)	RF – A in. (mm)	RTJ – A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	WE Weight lb (kg)	FE Weight lb (kg)
6 (150)	24.0 (610)	24.0 (610)	24.1 (6130)3	8.50 (215.9)	13.75 (349.3)	7.50 (190.5)	6.75 (171.5)	15.00 (381.0)	536 (243)	616 (279)
8 (200)	29.0 (737)	29.0 (737)	29.1 (740)	10.25 (260.4)	15.00 (381.0)	8.75 (222.3)	8.00 (203.2)	18.50 (469.9)	910 (413)	1034 (469)
10 (250)	33.0 (838)	33.0 (838)	33.1 (841)	11.75 (298.5)	17.50 (444.5)	10.75 (273.1)	10.00 (254.0)	21.50 (546.1)	1487 (674)	1650 (748)
12 (300)	38.0 (965)	38.0 (965)	38.1 (968)	13.00 (330.2)	20.75 (527.1)	11.75 (298.5)	10.75 (273.1)	24.00 (609.6)	1836 (833)	2200 (998)
16 (400)	44.5 (1130)	44.5 (1130)	44.9 (1140)	15.00 (381.0)	24.00 (609.6)	13.75 (349.3)	13.00 (330.2)	27.75 (704.9)	3300 (1497)	3740 (1696)
20 (500)	52.0 (1321)	52.0 (1321)	52.5 (1334)	18.00 (457.2)	30.00 (762.0)	15.75 (400.1)	16.00 (406.4)	33.75 (857.3)	5500 (2494)	6600 (2994)
24 (600)	61.0 (1549)	61.0 (1549)	61.8 (1568)	21.50 (546.1)	36.75 (933.5)	19.50 (495.3)	19.50 (495.3)	41.00 (1041.4)	9350 (4241)	12,100 (5488)
30 (750)	74.5 (1892)	74.5 (1892)	74.9 (1902)	25.25 (641.4)	43.00 (1092.2)	23.75 (603.3)	23.25 (590.6)	48.50 (1231.9)	16,500 (7484)	18,700 (8482)
36 (900)	90.5 (2299)	90.5 (2299)	91.1 (2314)	30.00 (762.0)	50.00 (1270.0)	26.75 (679.5)	27.50 (698.5)	57.50 (1460.5)	26,400 (11,975)	31,900 (14,470)

Dimensional Data

ANSI CLASS 1500





Size in. (mm)	WE – A in. (mm)	RF – A in. (mm)	RTJ – A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	WE Weight lb (kg)	FE Weight lb (kg)
6 (150)	27.8 (705)	27.8 (705)	28.0 (711)	8.75 (222.3)	16.00 (406.4)	9.00 (228.6)	7.75 (196.9)	15.50 (393.7)	870 (394.6)	1001 (454.1)
8 (200)	32.8 (832)	32.8 (832)	33.1 (841)	10.50 (266.7)	17.75 (450.9)	10.00 (254.0)	9.00 (228.6)	19.00 (482.6)	1454 (659.5)	1650 (748.4)
10 (250)	39.0 (991)	39.0 (991)	39.4 (1000)	12.50 (317.5)	20.25 (514.4)	12.00 (304.8)	10.75 (273.1)	23.00 (584.2)	2093 (949.4)	2750 (1247.4)
12 (300)	44.5 (1130)	44.5 (1130)	45.1 (1146)	14.25 (362.0)	24.00 (609.6)	13.00 (330.2)	12.50 (317.5)	26.50 (673.1)	3571 (1619.8)	4070 (1846.1)
16 (400)	54.5 (1384)	54.5 (1384)	55.4 (1407)	17.25 (438.2)	27.00 (685.8)	16.00 (406.4)	15.00 (381.0)	32.50 (825.5)	5563 (2523.3)	7040 (3193.3)
20 (500)	65.5 (1664)	65.5 (1664)	66.4 (1686)	20.50 (520.7)	33.00 (838.2)	18.75 (476.3)	18.00 (457.2)	38.75 (984.3)	10,099 (4580.8)	13,200 (5987.4)
24 (600)	76.5 (1943)	76.5 (1943)	77.6 (1972)	24.00 (609.6)	41.25 (1047.8)	21.75 (552.5)	21.75 (552.5)	46.00 (1168.4)	16,485 (7477.5)	20,900 (9480.1)

FLOW COEFFICIENT DATA

Liquid (Incompressible Flow)

$$C_v = Q\sqrt{\frac{G}{\Delta P}} \qquad Q = C_v\sqrt{\frac{\Delta P}{G}} \qquad \Delta P = \left[\frac{Q}{C_v}\right]$$

Gas (Compressible Flow)

$$C_v = \frac{Q}{963}\sqrt{\frac{GT}{P_1^2 - P_2^2}} \qquad Q = C_v\,963\sqrt{\frac{P_1^2 - P_2^2}{GT}}$$

Where:

Q = Flow (gal/min for liquids, cf/hour for gases)

C_v = Flow Coefficient

P_1 = Inlet Pressure (psia)

P_2 = Outlet Pressure (psia)

ΔP = Pressure Drop (P_1 - P_2)

T = Absolute Temperature (° F = 460)

G = Specific Gravity (water = 1)

Size in. (mm)	C_v
12 (300)	5670
16 (400)	14,536
20 (500)	16,771
24 (600)	24,725
30 (750)	29,533
36 (900)	50,492

STANDARD END CONFIGURATIONS

Integral Seat

Figure 54 – Flanged end RTJ x RTJ (Type R ring joint)

Figure 55 – Flanged end RF x RF

Figure 66 – Weld end WE x WE

Renewable Seat

Figure 15XY where:

X represents the ASME pressure class

Y represents the end connection

Other valve end configurations are available, and the figure numbers are listed below. Dimensions and weights for these figure numbers are available upon request.

Integral Seat

Figure 52 – Hub end (customer to specify the hub type)

Figure 56 – Flanged end RTJ x RTJ (type BX ring joint)

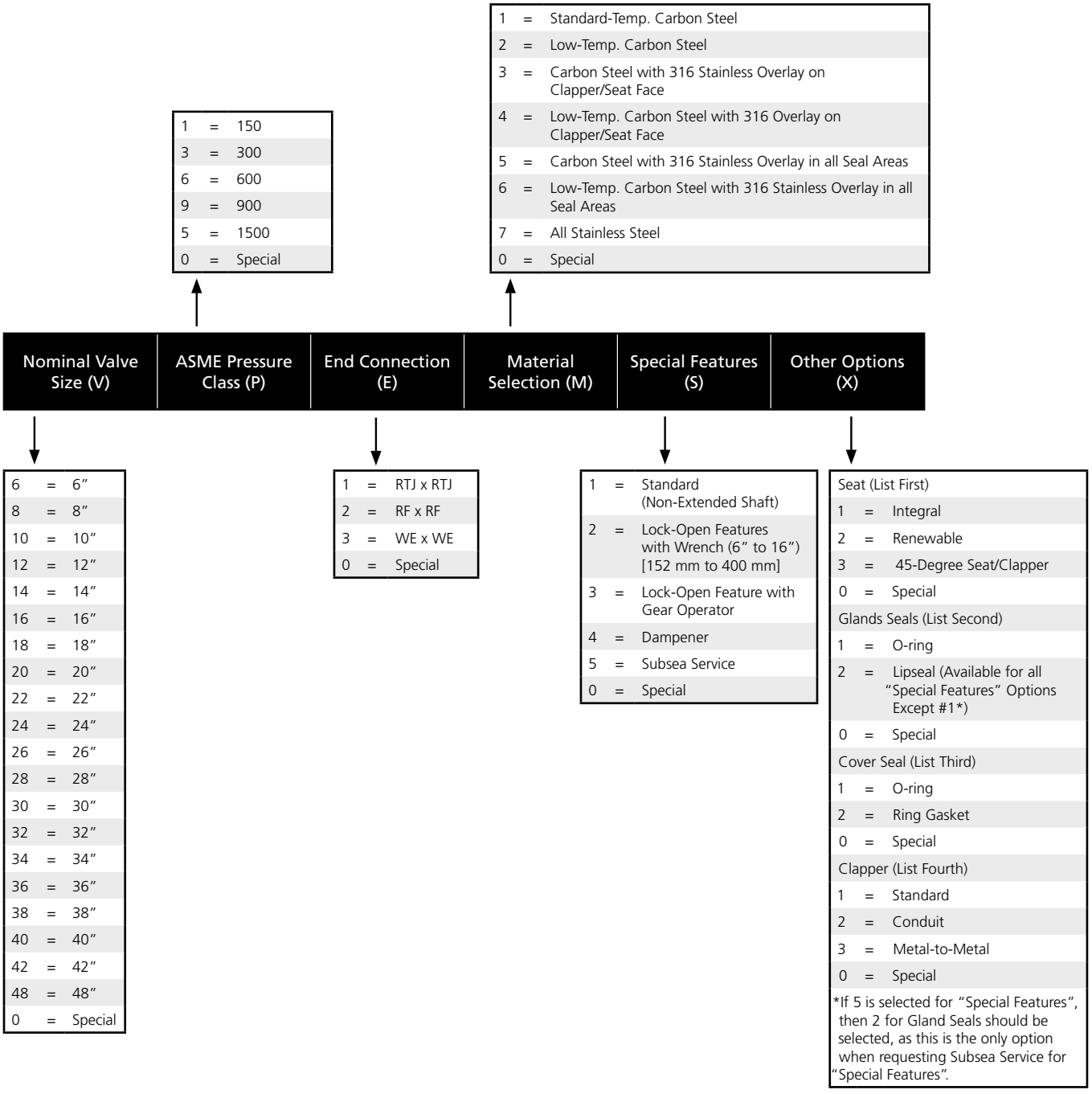
Figure 57 – Flanged end (upstream) x weld end (downstream)

Figure 58 – Weld end (upstream) x flanged end (downstream)

Pressure ASME Class	X
150	1
300	3
400	4
600	6
900	7
1500	8
2500	9

End Connection	Y
RTJ	4
RF	5
WE	9

HOW TO ORDER



Example:
V16-P6-E1-M1-S5-X1211 = 16", ASME Class 600, RTJ x RTJ, Standard-Temperature Carbon Steel, Subsea Service, Integral Seat, Lipseal Gland Seals, O-ring Cover Seals, Standard Clapper.

QUALITY ASSURANCE

Cameron's commitment to quality is based on ISO 9000 and API Q1 codes. All valves are designed in accordance with stringent industry procedures and standards and are built according to the European Directive PED and ATEX, upon request. The quality department monitors and controls all phases of valve production, inspection, and testing.

Cameron uses web-based standardization tools, standardized supplier qualification processes, site-based product validations, and performance metrics to maintain compliance to quality requirements. Cameron applies this quality strategy to its factories globally. Our main goal is to do it right the first time to achieve the best customer satisfaction.

Certifications

Cameron is ISO 9000 certified and meets API Q1 standards.

Licenses

Cameron holds API 6D, API 6D SS, ATEX, PED 97/23/EC (CE), GOST-R, and CRN auditing/inspections.

Testing

All valves are tested per API 6D/ISO 14313 and API598 standards.

CAMERON ball valves and TOM WHEATLEY check valves are used for subsea production.

Services for Valves and Actuation

WE BUILD IT. WE BACK IT.

Global Network and Local Support

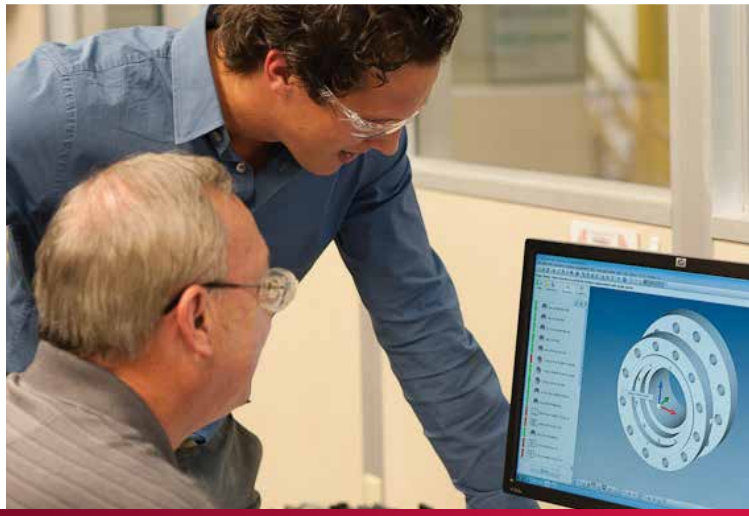
Cameron is well-positioned to deliver total support, quickly and efficiently, with unmatched OEM expertise. Our highly skilled engineers and technicians are available around the clock, seven days a week, to respond to customer queries, troubleshoot problems, and offer reliable solutions.

Easily Accessible Parts and Spare Valves

- OEM spare valves, actuators, and parts (including non-Cameron brands)
- Handling, storage, packaging, and delivery
- Dedicated stocking program

Comprehensive Services Portfolio

- Parts and spare valves
- Repair
- Field services
- Preventative maintenance
- Equipment testing and diagnostics
- Remanufacturing
- Asset preservation
- Customer property management
- Training and recertification services
- Warranty



Customized Total Valve Care℠ (TVC) Programs

Cameron provides customized asset management plans that optimize uptime, availability, and dedicated services.

- Engineering consultancy
- Site management
- Flange management
- Startup and commissioning
- Spare parts and asset management
- Operational support

CAMERON

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www.c-a-m.com/TOMWHEATLEY

HSE Policy Statement
At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.