Piston-style Tom Wheatley check valves

Protecting pumps and compressors from damaging backflow

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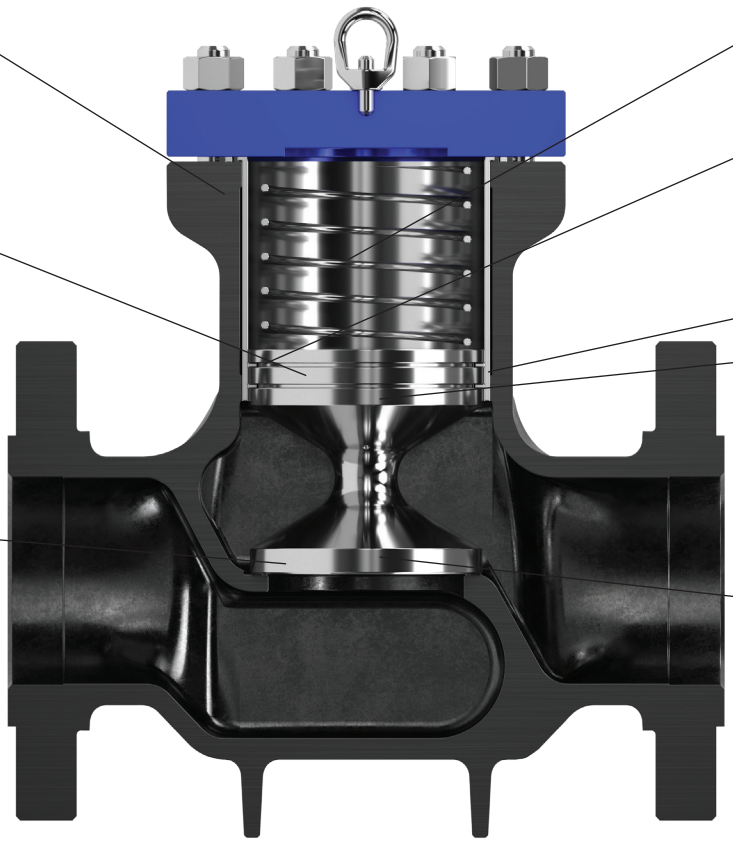


When pressure surges and pulsations are prevalent in a flow system, Tom Wheatley check valves offer efficient system protection.

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
- → 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 Specification 6D, ASTM Standard B16.34, and NACE MR0175/ISO 15156, with 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

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 and Seat

Code	Description
75	RF and integral seat
76	RTJ and integral seat

Trim Code

Code	Description
10	US standard trim 10
12	Canada standard trim 12
20	Stainless steel trim 20
50	Stellite® facing seat and piston trim 50
61	ZPEX® coating trim 61

Seal

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

Materials of construction

Components	US Standard Trim 10 "X"	Canada Standard Trim 12 "X"	Stainless Steel Trim 20 "X"	Stellite Facing Seat and Piston Trim 50 "X"	ZPEX Coating Trim 61 "X"
Body	A216-WCC	A352-LCC	A216-WCC	A216-WCC	A216-WCC and ZPEX
Cover	ASTM A515 Grade 70	ASTM A516 Grade 70	ASTM A515 Grade 70	ASTM A515 Grade 70	ASTM A515 Grade 70 and ZPEX
Cover seal	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
	A194 Grade 2H	A194 Grade 7M	A194 Grade 2H	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
Piston	410 stainless steel (SS)	316 SS	410 SS	410 SS with Stellite no. 6 hardfacing	410 SS
Piston seal	See note	See note	See note	See note	See note
Seat integral	A216-WCC	A352-LCC	Not applicable	Not applicable	A216-WCC and ZPEX
Piston rings	Cast iron	Cast iron	Cast iron	Cast iron	Cast iron
Piston spring	Alloy X-750	Alloy X-750	Alloy X-750	Alloy X-750	Alloy X-750

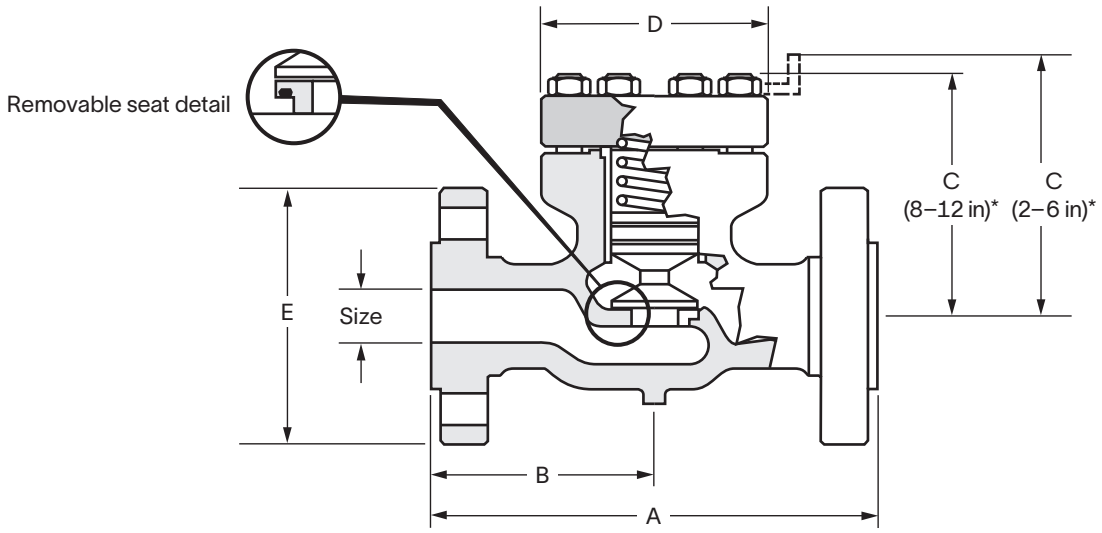
* Alternative equivalent bolting of L7M and 7M may be supplied.

Note: In the trim number description, "X" relates to the cover and piston seal material options.

When ordering, replace the "X" with the cover seal from the list above.

Dimensions

ASME Class 150–1500, 2–12 in

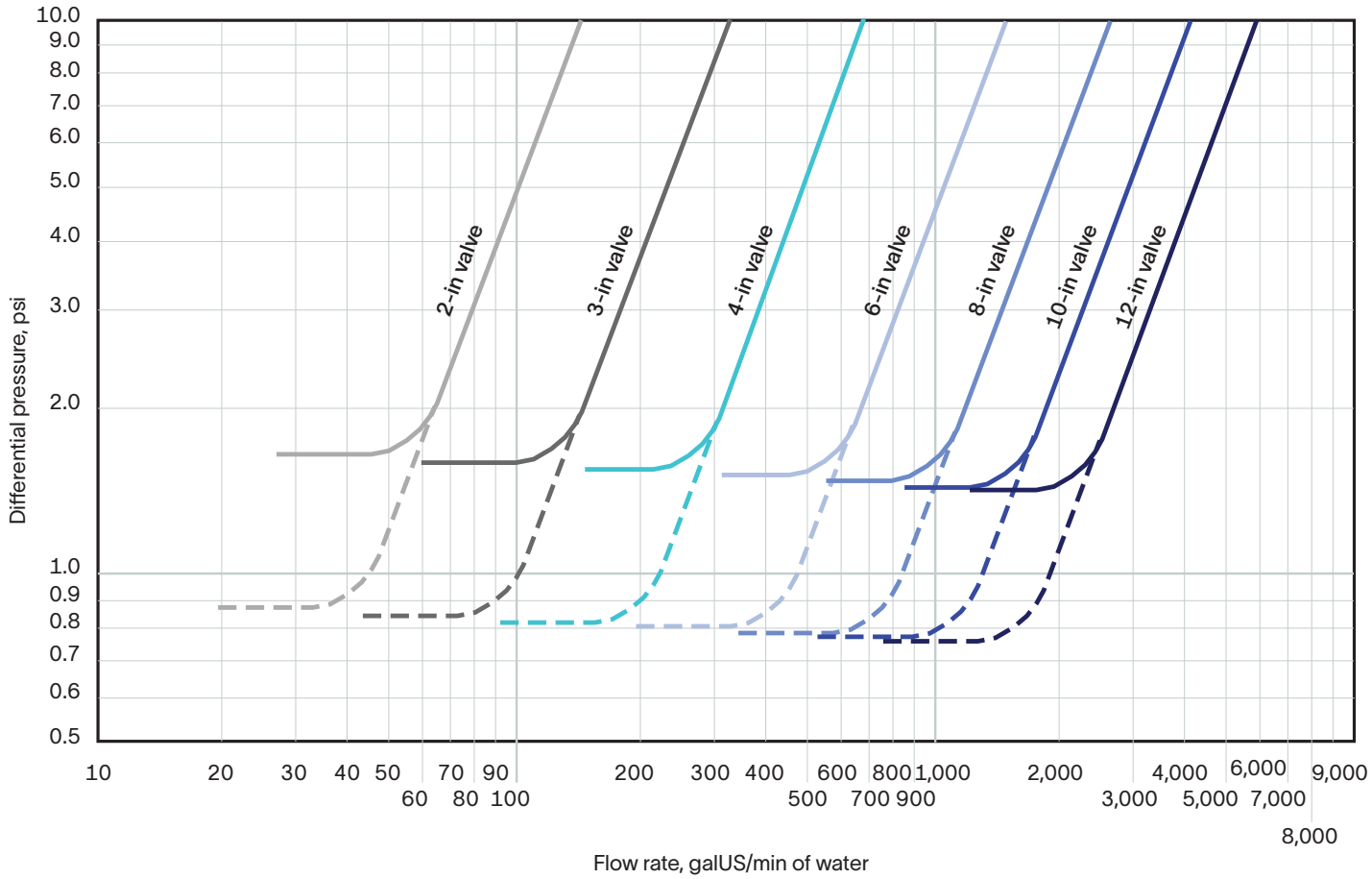


Nominal Size, in [mm]	ASME Class	Working Pressure, psi	Weight, lbm	A (RF), in [mm]	A (RTJ), in [mm]	B, in [mm]	C,* in [mm]	D, in [mm]	E, in [mm]
2 [50]	150	290	61	10.50 [267]**	11.13 [283]**	5.25 [134]	9.25 [235]	7.00 [178]	6.00 [152]
	300	750	63	10.50 [267]	11.13 [283]	5.25 [134]	9.25 [235]	7.00 [178]	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



Solid lines represent pressure loss for valves with springs. Dashed lines are for valves without springs.

Flow coefficients

Flow Coefficients (C_v)—Fully 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 are the basis for the nomogram. The nomogram is a method for solving the equations 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)

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

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)

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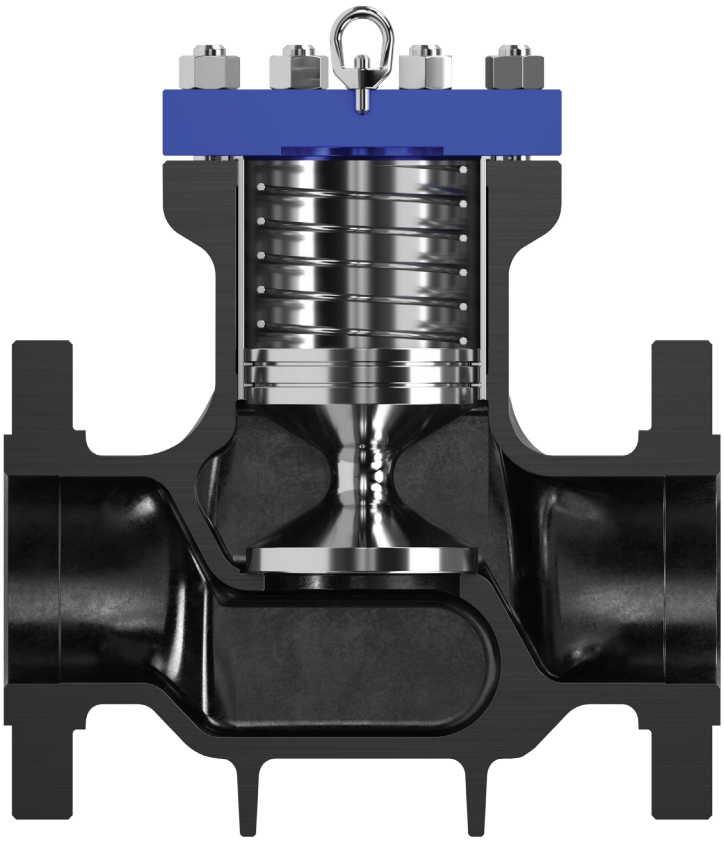

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