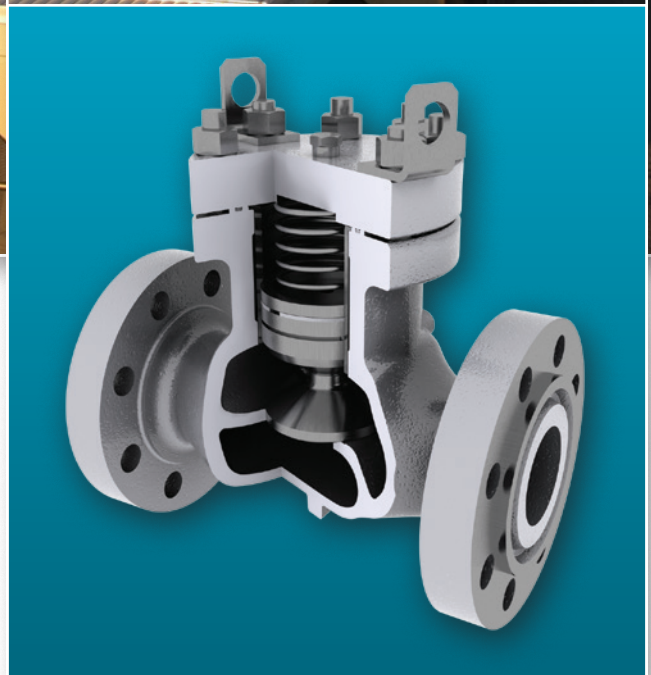




# Piston-Style TOM WHEATLEY Check Valves

Protecting pumps and compressors  
from damaging backflow

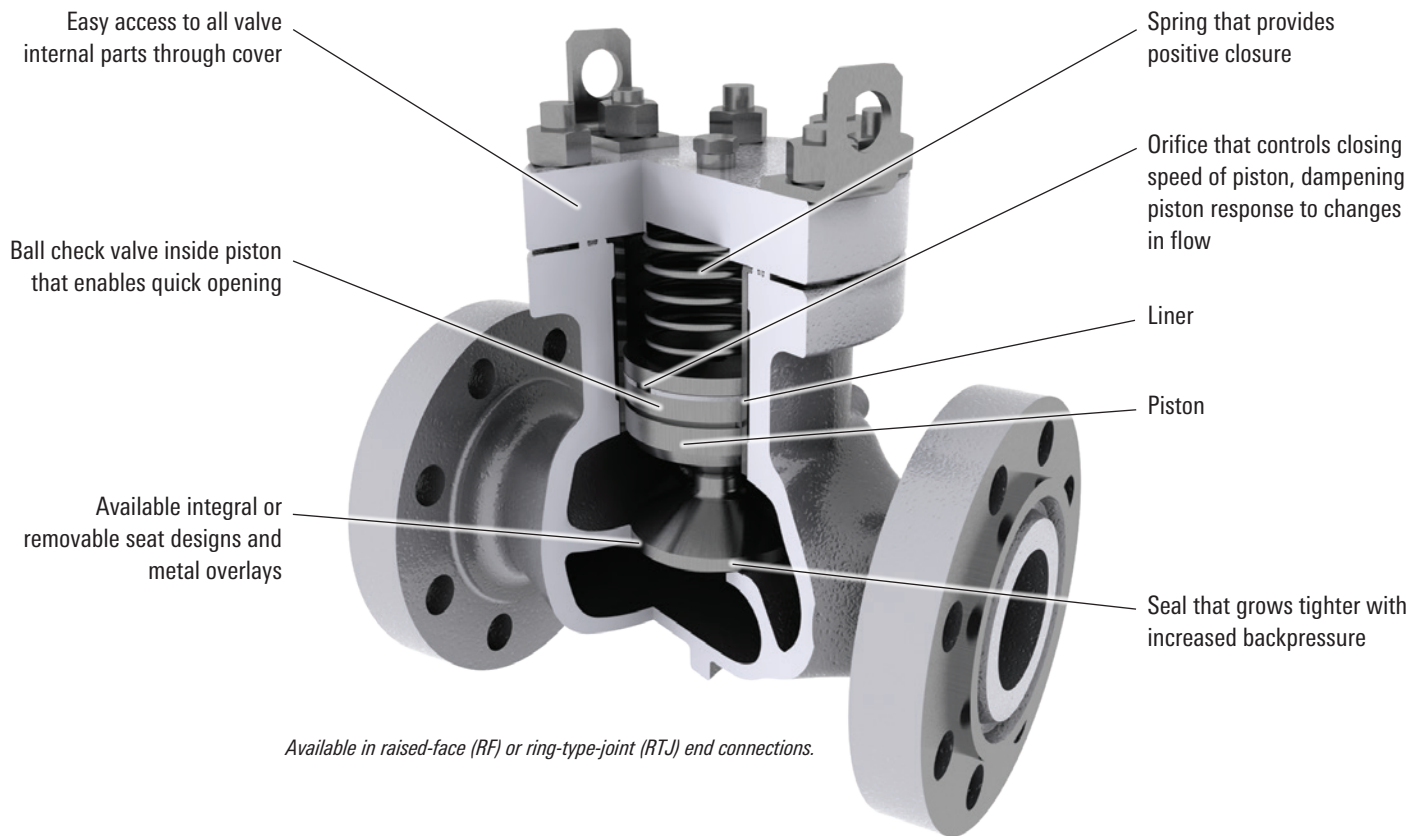


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# Features



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, and 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 |             | ASME Pressure Class |             | End Connection/Seat |                    | Trim Code |                                      | Seal |                                | Piston Seal <sup>†</sup> |                             |
|------------|-------------|---------------------|-------------|---------------------|--------------------|-----------|--------------------------------------|------|--------------------------------|--------------------------|-----------------------------|
| Code       | Description | Code                | Description | Code                | Description        | Code      | Description                          | Code | Description                    | Code                     | Description                 |
| 02         | 2 in        | 01                  | ASME 150    | 73                  | RF/renewable seat  | 10        | US standard trim 10                  | A    | AFLAS®                         | M                        | Metal-to-metal <sup>‡</sup> |
| 03         | 3 in        | 03                  | ASME 300    | 74                  | RTJ/renewable seat | 12        | Canada standard trim 12              | B    | Buna-N                         |                          |                             |
| 04         | 4 in        | 06                  | ASME 600    | 75                  | RF/integral seat   | 20        | Stainless steel trim 20              | H    | Highly saturated nitrile (HSN) |                          |                             |
| 06         | 6 in        | 09                  | ASME 900    | 76                  | RTJ/integral seat  | 30        | Full stainless trim 30               |      |                                |                          |                             |
| 08         | 8 in        | 15 <sup>†</sup>     | ASME 1500   |                     |                    | 40        | Metal-to-metal trim 40               | V    | FKM (Viton®)                   |                          |                             |
| 10         | 10 in       |                     |             |                     |                    | 50        | Stellite™ facing seat/piston trim 50 |      |                                |                          |                             |
| 12         | 12 in       |                     |             |                     |                    |           |                                      |      |                                |                          |                             |

<sup>†</sup> Available only for 2–6 in.

<sup>‡</sup> Use only when the piston seal requires metal-to-metal material.

<sup>§</sup> 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" | Metal-to-Metal Trim 40 "X" "X" | Stellite™ Facing Seat/Piston Trim 50 "X" "X" |
|----------------------|--|---------------------------------|---------------------------------|--------------------------------|--------------------------------|--|
| Body                 | A216-WCC                                 | A352-LCC                        | A216-WCC                        | A351-CF8M                      | A216-WCC                       | A216-WCC                                     |
| Cover                | ASTM A515 Grade 70                       | ASTM A516 Grade 70              | ASTM A515 Grade 70              | A240-316                       | ASTM A515 Grade 70             | ASTM A515 Grade 70                           |
| Cover seal           | See note 1                               | See note 1                      | See note 1                      | See note 1                     | See note 1                     | See note 1                                   |
| Bolting <sup>†</sup> | A193 Grade B7                            | A320 Grade L7M                  | A193 Grade B7                   | A193 Grade B7M                 | A193 Grade B7                  | A193 Grade B7                                |
|                      | 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                                   | 410 SS                          | 410 SS                          | 410 SS                         | 410 SS                         | 410 SS with Stellite #6 hard face            |
| Piston seal          | See note 1                               | See note 1                      | See note 1                      | See note 1                     | N/A                            | See note 1                                   |
| Seat integral        | A216-WCC                                 | A352-LCC                        | N/A                             | A351-CF8M                      | N/A                            | N/A  |
| Seat renewable       | Carbon steel                             | Carbon steel                    | 316 SS                          | 316 SS                         | Carbon steel                   | 410 SS with Stellite #6 hard face            |
| 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                                  |

<sup>†</sup> 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.

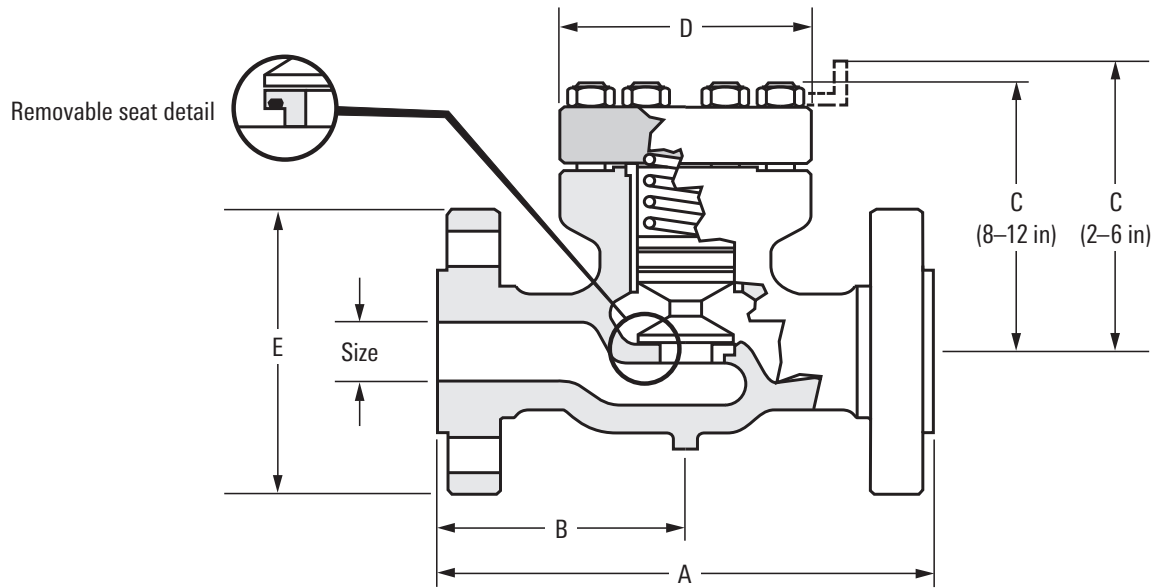
N/A— Not available.

Materials comply with NACE MR0175/ISO 15156.

Other materials available upon request.

# Dimensions

ASME Class 150–1500, 2–12 in

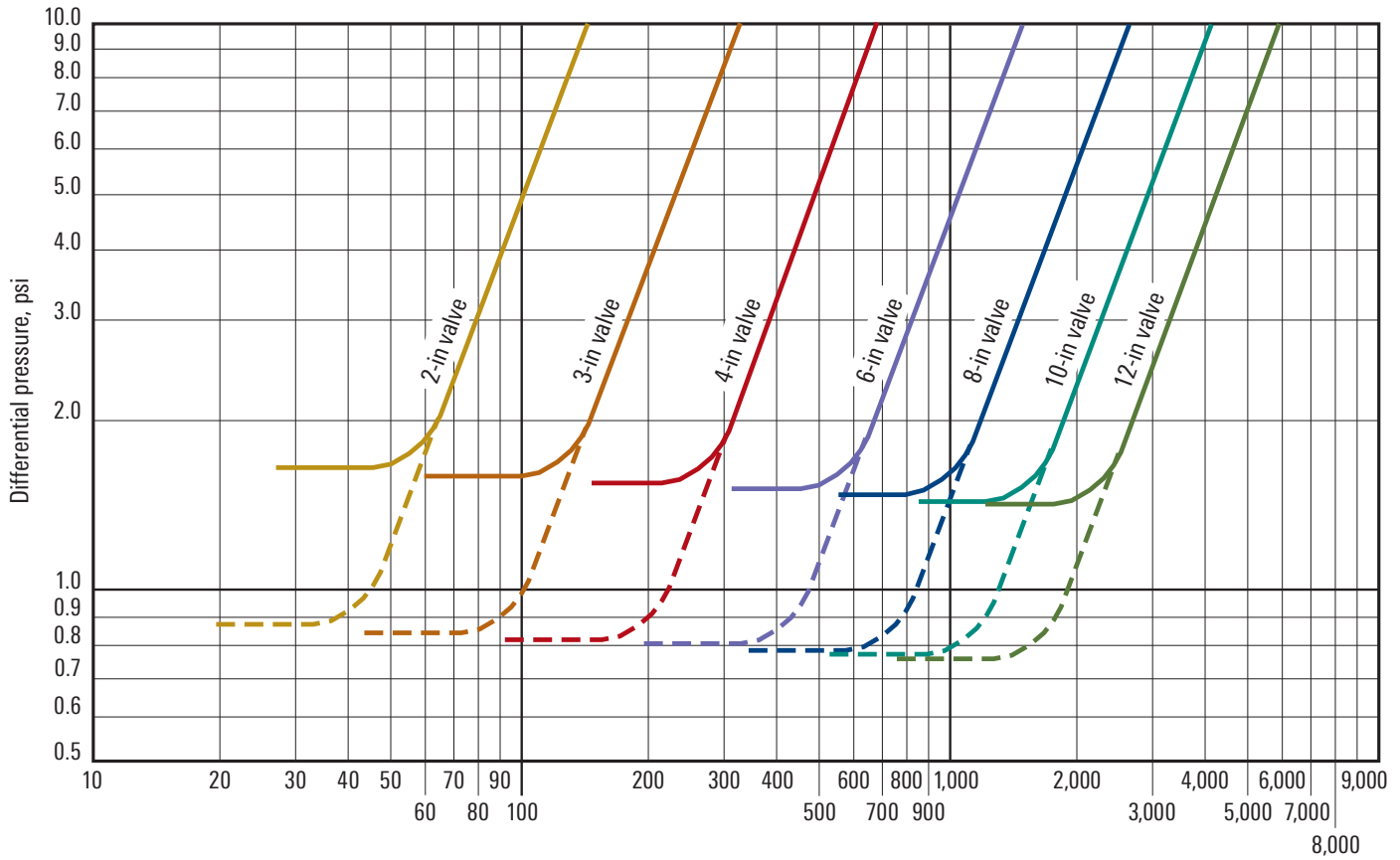


| Nominal size, in [mm] | ASME Class | A (RF), in [mm]          | A (RTJ), in [mm]         | B, in [mm]  | C, in [mm]  | D, in [mm]  | E, in [mm]  |
|-----------------------|------------|--------------------------|--------------------------|-------------|-------------|-------------|-------------|
| 2 [50]                | 150        | 10.50 [267] <sup>†</sup> | 11.13 [283] <sup>†</sup> | 5.25 [134]  | 9.25 [235]  | 7.00 [178]  | 6.00 [152]  |
|                       | 300        | 10.50 [267]              | 11.13 [283]              | 5.25 [134]  | 9.25 [235]  | 7.00 [178]  | 6.50 [165]  |
|                       | 600        | 11.50 [292]              | 11.63 [295]              | 5.75 [146]  | 9.50 [241]  | 7.00 [178]  | 6.50 [165]  |
|                       | 900        | 14.50 [368]              | 14.63 [372]              | 7.25 [184]  | 10.00 [254] | 7.63 [194]  | 8.50 [216]  |
|                       | 1500       | 14.50 [368]              | 14.63 [372]              | 7.25 [184]  | 10.25 [260] | 7.63 [194]  | 8.50 [216]  |
| 3 [80]                | 150        | 12.50 [318] <sup>†</sup> | 13.13 [334] <sup>†</sup> | 6.25 [159]  | 10.75 [273] | 8.25 [210]  | 7.50 [191]  |
|                       | 300        | 12.50 [318]              | 13.13 [334]              | 6.25 [159]  | 10.75 [273] | 8.25 [210]  | 8.25 [210]  |
|                       | 600        | 14.00 [356]              | 14.13 [359]              | 7.00 [178]  | 11.13 [283] | 8.25 [210]  | 8.25 [210]  |
|                       | 900        | 15.00 [381]              | 15.13 [384]              | 7.50 [191]  | 11.38 [289] | 8.25 [210]  | 9.50 [241]  |
|                       | 1500       | 18.50 [470]              | 18.63 [473]              | 9.25 [235]  | 13.13 [334] | 11.63 [295] | 10.50 [267] |
| 4 [100]               | 150        | 14.00 [356] <sup>†</sup> | 14.63 [372] <sup>†</sup> | 7.00 [178]  | 11.50 [292] | 9.75 [248]  | 9.00 [229]  |
|                       | 300        | 14.00 [356]              | 14.63 [372]              | 7.00 [178]  | 11.50 [292] | 9.75 [248]  | 10.00 [254] |
|                       | 600        | 17.00 [432]              | 17.13 [435]              | 8.50 [216]  | 11.88 [302] | 9.75 [248]  | 10.75 [273] |
|                       | 900        | 18.00 [457]              | 18.13 [461]              | 9.00 [229]  | 12.37 [314] | 9.75 [248]  | 11.50 [292] |
|                       | 1500       | 21.50 [546]              | 21.63 [549]              | 10.75 [273] | 13.00 [330] | 10.75 [273] | 12.25 [311] |
| 6 [150]               | 150        | 17.50 [445] <sup>†</sup> | 18.13 [461] <sup>†</sup> | 8.75 [223]  | 16.38 [416] | 11.75 [298] | 11.00 [279] |
|                       | 300        | 17.50 [445]              | 18.13 [461]              | 8.75 [223]  | 16.38 [416] | 11.75 [298] | 12.50 [318] |
|                       | 600        | 22.00 [559]              | 22.13 [562]              | 11.00 [280] | 17.07 [434] | 12.25 [311] | 14.00 [356] |
|                       | 900        | 24.00 [610]              | 24.13 [613]              | 12.00 [305] | 17.25 [438] | 11.75 [298] | 15.00 [381] |
|                       | 1500       | 27.75 [705]              | 28.00 [711]              | 13.88 [353] | 15.75 [400] | 13.13 [334] | 15.50 [394] |
| 8 [200]               | 150        | 19.50 [495]              | 20.00 [508]              | 9.75 [248]  | 13.00 [330] | 14.75 [375] | 13.50 [343] |
|                       | 300        | 21.00 [533]              | 21.63 [549]              | 10.50 [267] | 13.88 [352] | 14.75 [375] | 17.50 [445] |
|                       | 600        | 26.00 [660]              | 26.13 [664]              | 13.00 [330] | 14.88 [378] | 14.75 [375] | 16.50 [419] |
|                       | 900        | 29.00 [737]              | 29.13 [740]              | 14.50 [368] | 15.13 [384] | 14.69 [373] | 18.50 [470] |
| 10 [250]              | 150        | 24.50 [622]              | 25.00 [635]              | 12.25 [311] | 15.38 [391] | 17.50 [445] | 16.00 [406] |
|                       | 300        | 24.50 [622]              | 25.13 [638]              | 12.25 [311] | 15.38 [391] | 17.50 [445] | 17.50 [445] |
|                       | 600        | 31.00 [787]              | 31.13 [791]              | 15.50 [394] | 16.38 [416] | 17.50 [445] | 20.00 [508] |
|                       | 900        | 33.00 [838]              | 33.13 [842]              | 16.50 [419] | 16.88 [429] | 17.50 [445] | 21.50 [546] |
| 12 [300]              | 150        | 27.50 [699]              | 28.00 [711]              | 13.75 [349] | 18.50 [470] | 21.00 [533] | 19.00 [483] |
|                       | 300        | 28.00 [711]              | 28.63 [727]              | 14.00 [356] | 18.50 [470] | 21.00 [533] | 20.50 [521] |
|                       | 600        | 33.00 [838]              | 33.13 [842]              | 16.50 [419] | 18.26 [464] | 21.00 [533] | 22.00 [559] |
|                       | 900        | 38.00 [965]              | 38.13 [969]              | 19.00 [483] | 19.13 [486] | 21.00 [533] | 24.00 [610] |

<sup>†</sup> Length exceeds dimensions given in API 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.

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

## Gas (Compressible Flow)

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

Where

$Q$  = Flow (liquids— galUS/min, gases— ft<sup>3</sup>/h)

$C_v$  = Flow coefficient

$P_1$  = Inlet pressure, psi (absolute)

$P_2$  = Outlet pressure, psi (absolute)

$\Delta P$  = Pressure drop ( $P_1 - P_2$ )

$T$  = Absolute temperature (460 degF)

$G$  = Specific gravity (water = 1)

# Notes

# Piston-Style TOM WHEATLEY Check Valves



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