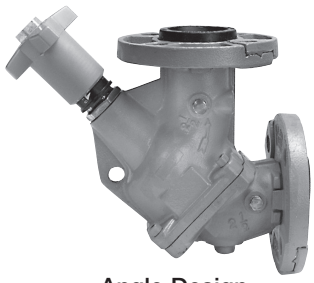
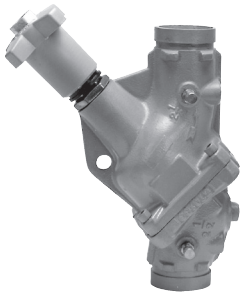
Watts Series CSM-91

Grooved/Flanged
Flow Measurement/Balancing Valves

Installation and Operating Instructions



Angle Design



Straight Design

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1. Installation

1. To ensure accuracy of measurement, the CSM-91 should be located at least five pipe diameters downstream from any fitting and at least ten pipe diameters downstream from a pump. Two pipe diameters downstream from the CSM-91 should be free of any fitting (as illustrated in FIG. 1).
2. CSM-91 valves must be installed with flow in the direction of the arrow on the valve body. Easy access to the pressure taps and handwheel must be provided.
3. Valves can be installed in horizontal or vertical piping. The pressure taps should never be installed below the pipe (pointing down), as this will allow system sediment to accumulate in the ports. (as illustrated, for horizontal piping, in Fig. 2)
4. CBV angle-style valves are designed to replace piping elbows.
5. Metering ports and body plugs may be interchanged for improved accessibility.

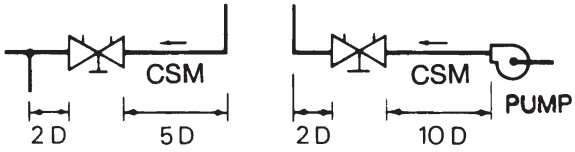
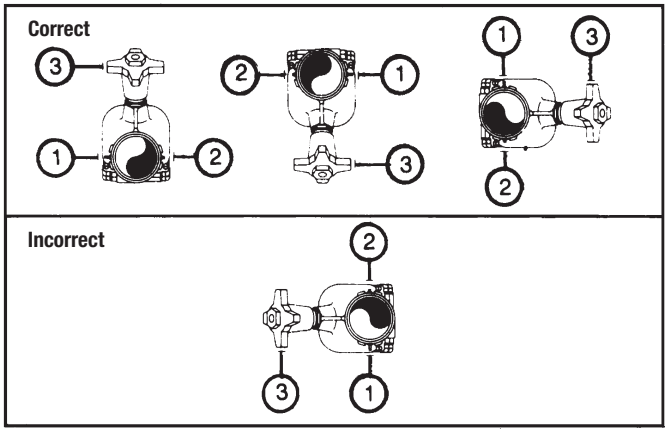


Fig. 1



(1) Metering Port (2) Body Plug & Drain (3) Handwheel

Fig. 2

CALIFORNIA PROPOSITION 65 WARNING

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
(California law requires this warning to be given to customers in the State of California.)
For more information: www.watts.com/prop65

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2. Watts Flange Adapters

1. Position the two halves of the flange adapter onto the groove in the valve body end(s), making sure that the tab on each flange adapter half is located between the two locking lugs on the valve body (Fig. 3A). Insert the two plastic **Positioning Sleeves** (enclosed in the box with the flanges) (Fig. 3B) where the two halves of the flange adapter come together (Fig. 3C). The **Positioning Sleeves** will hold the flange halves together helping to facilitate joining to the mating flange(s).
2. Apply silicon sealer/lubricant to the inner and outer diameters of the flange kit gasket, and press the gasket onto the valve body end. Ensure that the open end of the gasket is facing **AWAY** from the valve body (Fig. 3D).
3. When in place, the gasket will be seated and flush with the valve body ends. **NOTE:** Care should be taken to ensure that the gasket is not pinched or bent between the flanges (Fig. 3E).
4. Position the assembly onto the mating flange and install all flange bolts, being sure to remove **Positioning Sleeves** (Fig. 3F).
5. Tighten all bolts evenly as for a standard flange assembly. The gasket face of the flange should squarely contact the face of the mating flange. When used with a “raised face” flange, there will be a gap between the faces on the outer flange diameters.

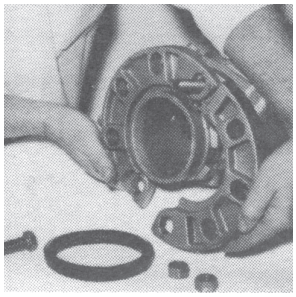


Fig. 3A

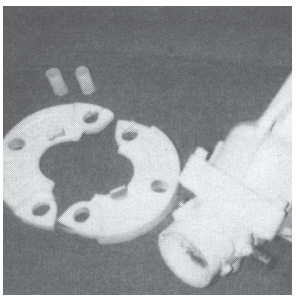


Fig. 3B

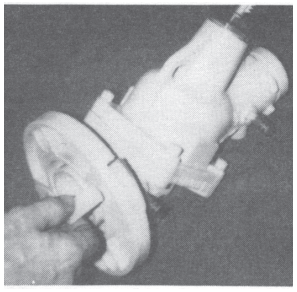


Fig. 3C

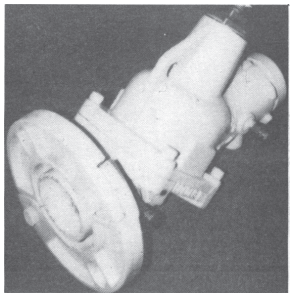


Fig. 3D

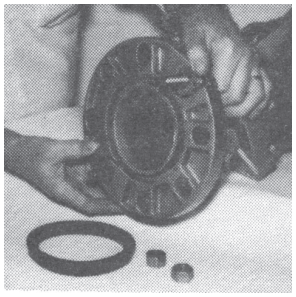


Fig. 3E

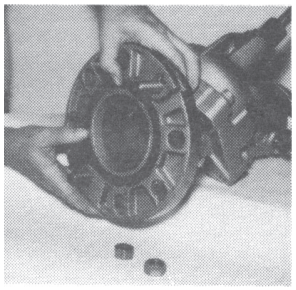


Fig. 3F

3. Conversion (Straight to Angle)

1. Open the valve one complete turn.
2. Remove the body bolts from the valve body.
3. Rotate one-half of the valve body, 180°, making sure the seat and O-ring stay in position and do not get nicked or cut.
4. Replace the body bolts and tighten evenly.

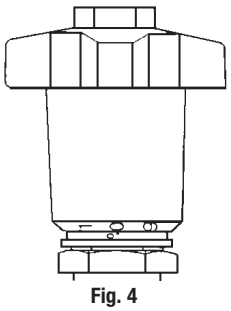


Fig. 4

With no arrows visible, the Inner Scale set at 0 on the indicator line aligned with the 0 on the Outer Scale; the valve is closed.

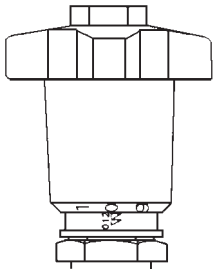


Fig. 5

Shows a valve setting of 2.0, indicating that the valve is partially open.

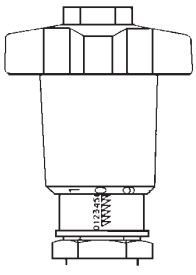


Fig. 6

With all arrows visible, the Inner Scale, set at 6 and the indicator line aligned with Outer Scale 0; the valve setting is 6.0 and the valve is fully open.

4. Operation

1. The valve operates from closed to fully open by a counter-clockwise rotation of the red handwheel, using five (5) 360 turns for the 2½" and 3" valves, six (6) turns for the 4", 5" and 6" valves, 12 turns for the 8" and 10" valves and 14 turns for the 12" valve. The position of the valve is indicated by two scales.

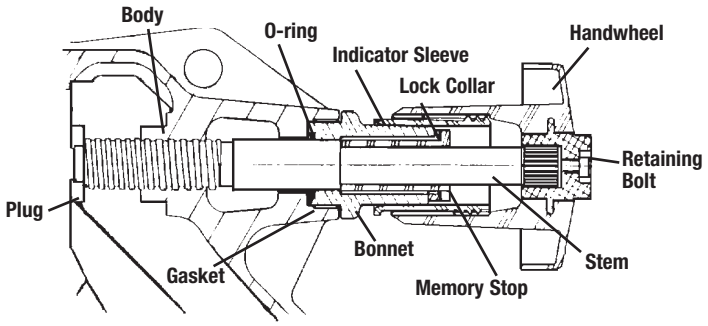
Inner Scale (Fig. 6) - This sleeve has a vertical arrowed scale which indicated the number of full turns the valve have been opened.

Outer Scale (Fig. 6) - This scale is a micrometer-type scale marked 0-9 at the tapered base of the red handwheel. Each gives 1/10th indications for each 360 turn of opening against the indicator line of the Inner Scale.

Connect meter quick-disconnect hoses to metering ports as follows:

- Remove protective cap from metering ports.
- Connect meter hoses to metering ports.

2. The hose with the red fitting upstream; the hose with the blue fitting downstream.
3. Safety glasses should be used.
4. Before taking a flow measurement reading, set the valve to its fully open (4.0) or at a preset position. Read the pressure drop across the valve with a Watts Series PG meter. Determine GPM flow by use of valve Cv curve starting page 5.



5. Memory Setting - 2½" to 6" Valves

1. After the valve has been adjusted to its balance set point and without moving the handwheel, remove the retaining bolt from the end of the handwheel using a ¼" Allen wrench.
2. Carefully remove the handwheel and turn indicator sleeve assembly, leaving the valve at its balance set point.
3. Turn the plastic memory stop (clockwise) down until it stops. Finger-tight pressure is sufficient. Do not overtighten.
4. Holding the memory stops in position, turn the lock collar (clockwise) down until it stops against the valve bonnet. The memory has now been set.
5. With the handwheel/turn indicator sleeve assembly still at its balance set point indication, reinstall them on the valve stem and hold in place with the ¼" retaining bolt.

CAUTION: Care must be taken not to rotate the valve stem or change the handwheel/indicator setting while setting the memory.

6. Memory Setting - 8" Valves and Larger

1. After the valve has been set to the correct balance point, record the setting. Without turning the handwheel, remove the retaining bolt from the end of the handwheel.
2. Carefully remove the handwheel. Slight tapping with a mallet may be required, but do not change the valve stem position.
3. Turn the brass memory lock ring until the aluminum memory ring stop contacts the step on the valve stem. Do not over-tighten. Finger-tight pressure is sufficient.
4. Reinstall the handwheel in the correct orientation so that the original setting is indicated and secure with the retaining bolt.

7. Repositioning Handwheel - 2½" to 6" Valves

1. The handwheel can be removed and repositioned in any of six positions around the stem.
   a. Close valve fully.
   b. Remove handwheel retaining bolt.
   c. Remove handwheel and turn indicator sleeve by grasping the handwheel and pulling away from the valve body along the stem.
   d. Select a new position for easy reading and, with the sleeve and handwheel held together in the closed position (0.0), push them back over the bonnet hex and valve stem.
   e. Replace handwheel retaining bolt.
   f. Open valve.
2. If handwheel is removed for any reason, it is important to first close the valve and then replace the handwheel per Steps 7.1 d) and e) above.

8. Repositioning Handwheel - 8" Valves and Larger

1. The handwheel can be removed and repositioned any of six positions around the stem.
   a. Close valve fully.
   b. Remove handwheel retaining bolt.
   c. Remove handwheel by grasping handwheel and pulling away from the valve body along the stem. Slight tapping with a mallet may be required.
   d. Select a new position for easy reading of the scale and reinstall the handwheel with the “O” mark located at the bottom pointed in this direction. Secure with the retaining bolt.
   e. Loosen the scale retaining ring and rotate the turn indicator scale to align with the “0” on the handwheel. Tighten the scale retaining ring by hand. Do not overtighten.
   f. Open the valve.

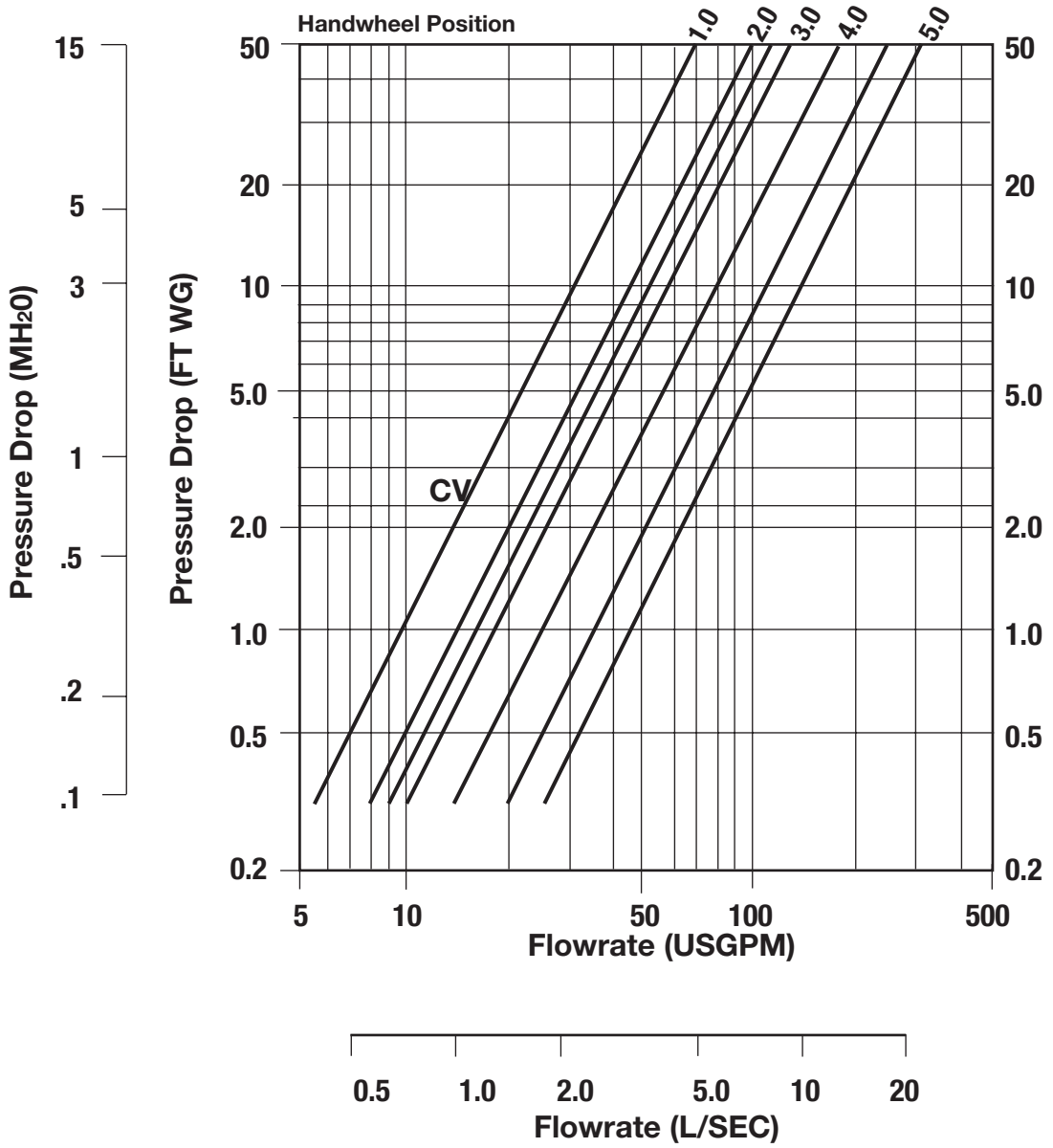
9. Repacking CSM-91 under Full System Pressure - 2½" to 6" Valves

1. Open valve fully to its memory setting and, on a piece of paper, record the valve setting.
2. Remove the handwheel/indicator sleeve assembly as per Steps 5.1 and 5.2.
3. Loosen the lockcollar by turning it counterclockwise until it seats against the top of the memory stop.
4. Remove the memory stop/lockcollar assembly by turning the plastic memory stop counterclockwise.
5. Using the handwheel **WITH THE INDICATOR SLEEVE REMOVED,** turn the valve stem counterclockwise until the valve is fully open and will not turn any further (45 ft./lbs.). A step on the valve plug has now been back-seated against the upper portion of the valve body (metal-to-metal).
6. The valve bonnet may now be removed. There may be slight leakage, as the metal-to-metal backseating does not provide a drip-tight seal.
7. Clean exposed portion of valve stem (Do not scratch).
8. Remove and replace the O-ring and gasket.
9. Install the valve bonnet.
10. Replace memory stop/lockcollar assembly into the valve bonnet.
11. Close the valve fully by turning the stem in a clockwise direction. Tightening valve bonnet is necessary to stop any leaks.
12. Replace handwheel/indicator sleeve assembly per Steps 7.1 d) and e) above.
13. Open valve to balance set point as recorded in Step 9.1.
14. Reset memory per Step 5

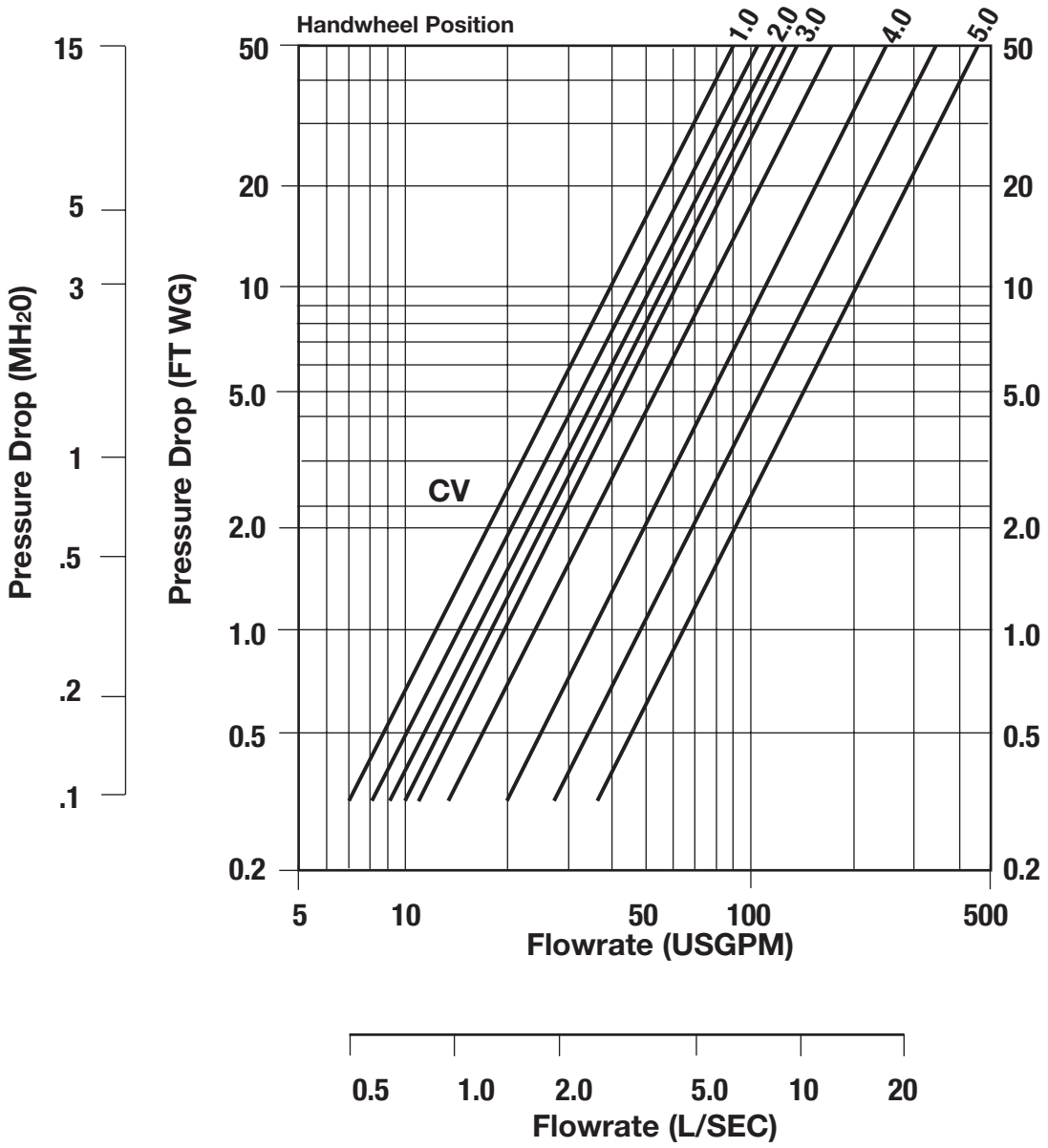
10. Repacking CSM-91 under Full System Pressure - 8” Valves and Larger

1. Open the valve fully to its memory setting and, on a piece of paper, record the valve setting.
2. Remove handwheel as per Steps 6.1 and 6.2.
3. Loosen scale retaining ring and remove turn indicator assembly. It is not necessary to change the memory set point.
4. Using the handwheel, turn the stem counterclockwise until it stops (50 ft./lbs..). A step on the stem has now been back-seated against the upper portion of the valve body.
5. The valve bonnet may now be removed. There may be slight leakage as the backseat does not provide a drip-tight seal.
6. Clean exposed portion of valve stem (Do not scratch).
7. Remove and replace the o-ring and gasket.
8. Install the valve bonnet. Torque to 70 ft./lbs.
9. Close valve fully.
10. Reinstall turn indicator assembly. Scale retaining ring should be hand-tight Do not overtighten.
11. Reinstall handwheel and secure with retaining bolt.
12. Open valve to balance set point as recorded.

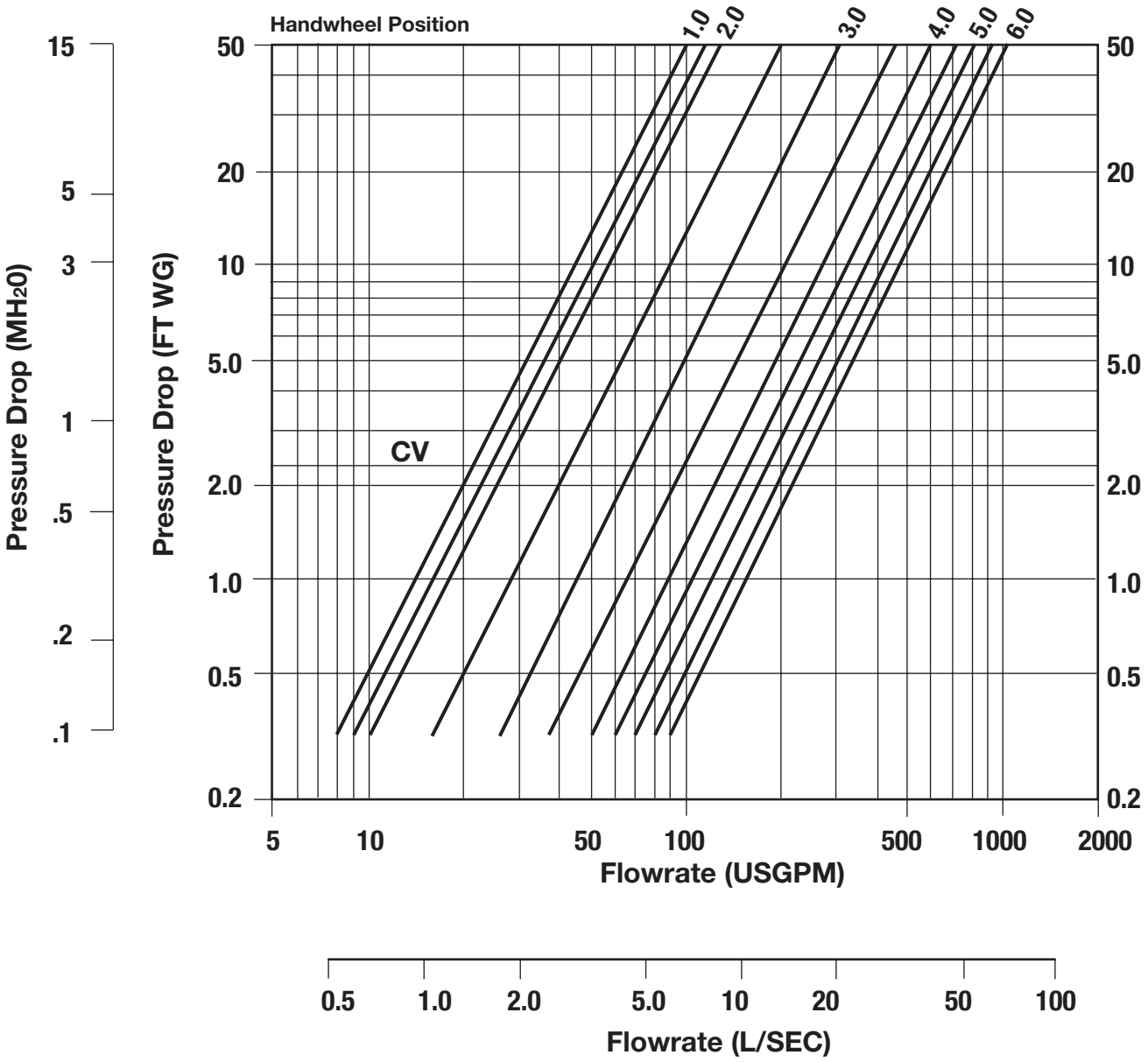
Flow Curve for 2½" Straight Design



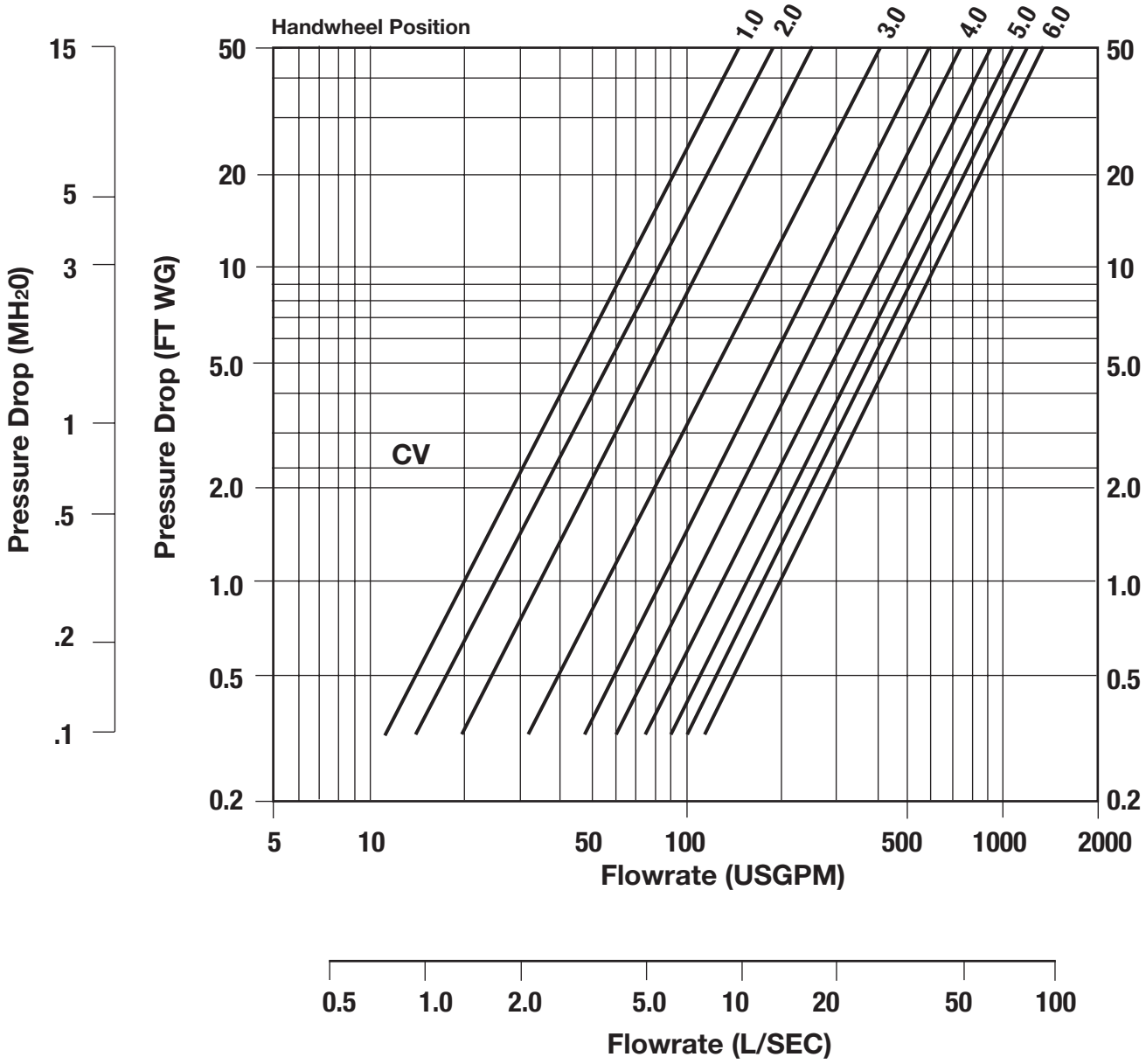
Flow Curve for 3" Straight Design



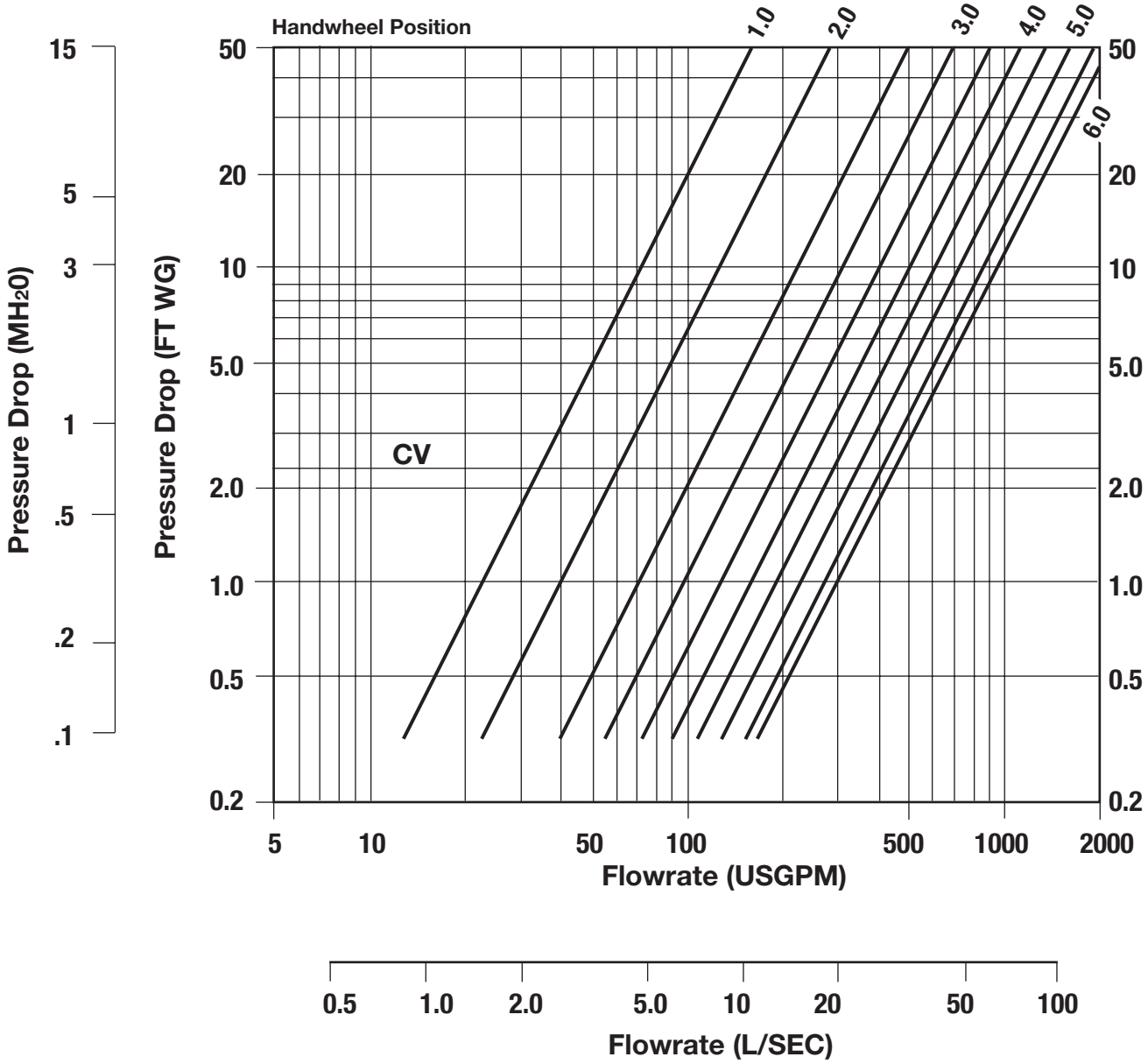
Flow Curve for 4" Straight Design



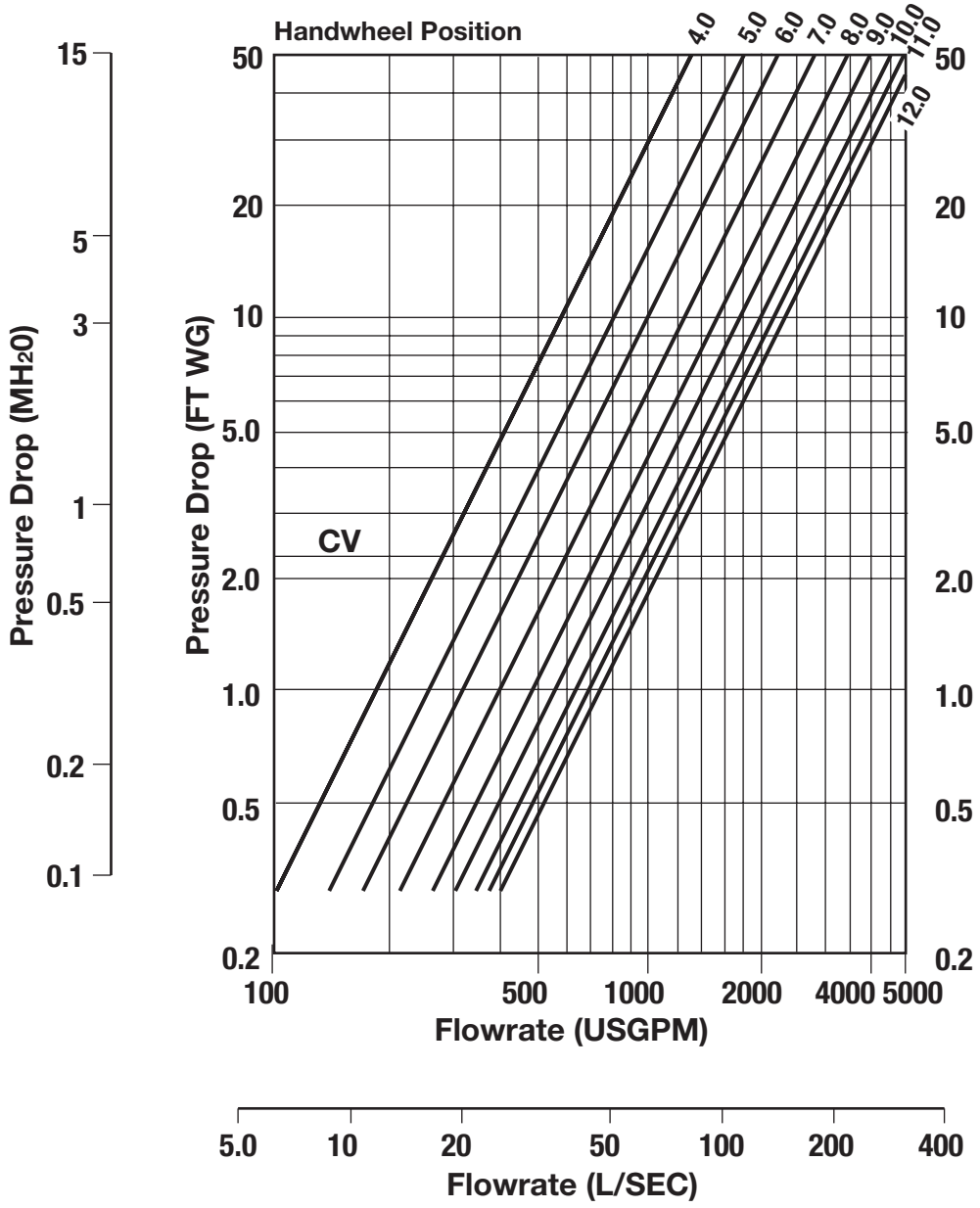
Flow Curve for 5" Straight Design



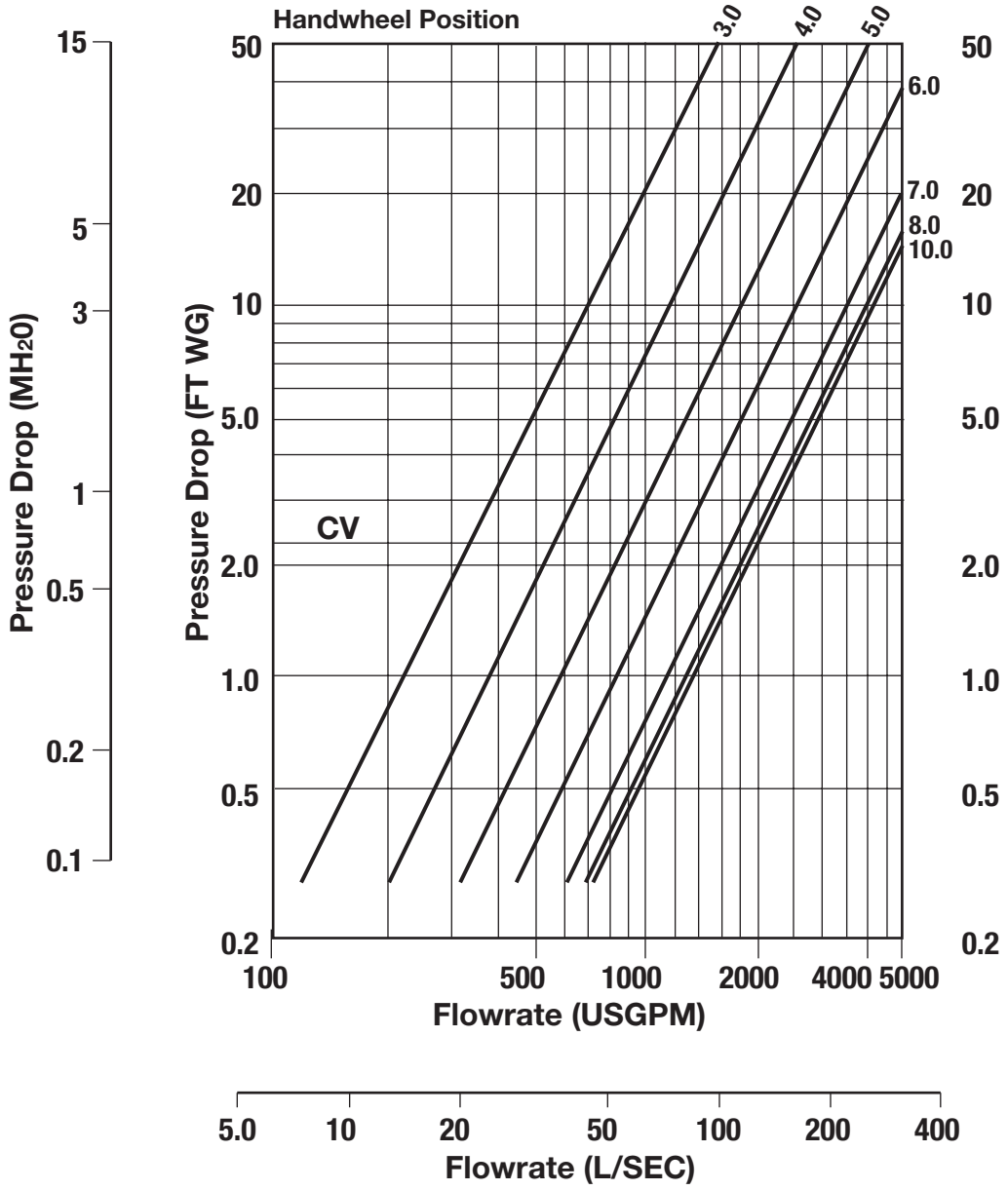
Flow Curve for 6" Straight Design



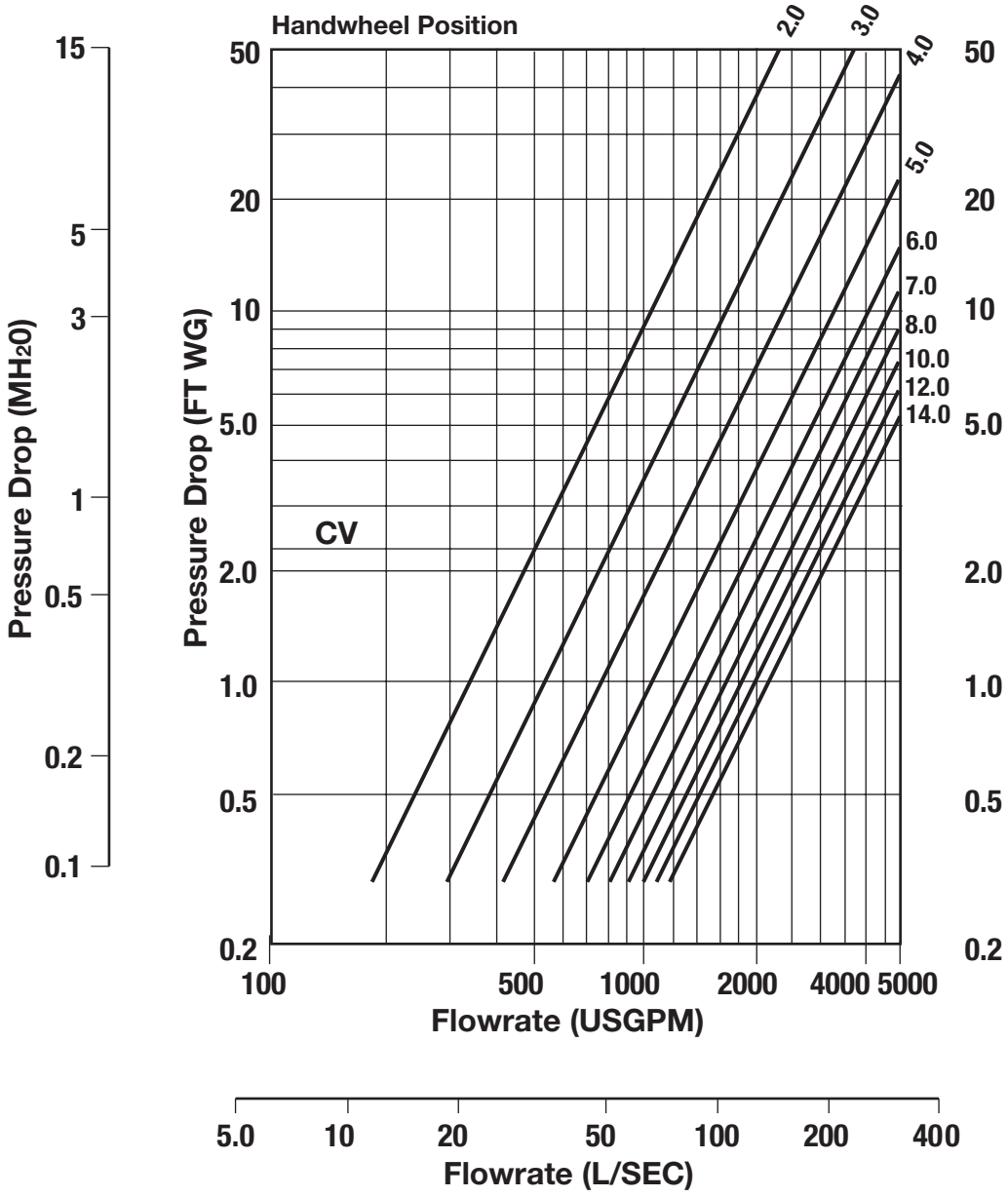
Flow Curve for 8" Straight Design



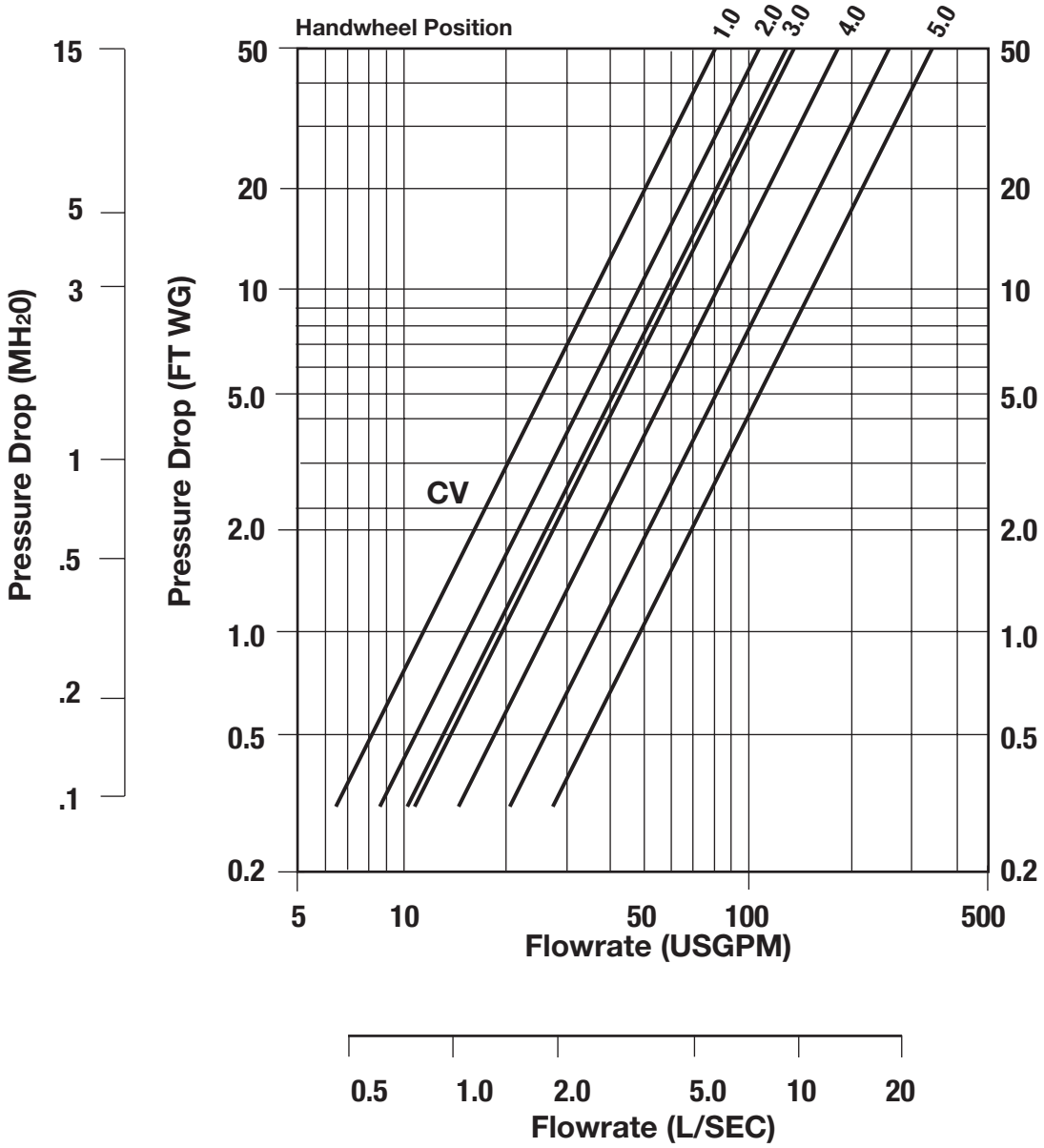
Flow Curve for 10" Straight Design



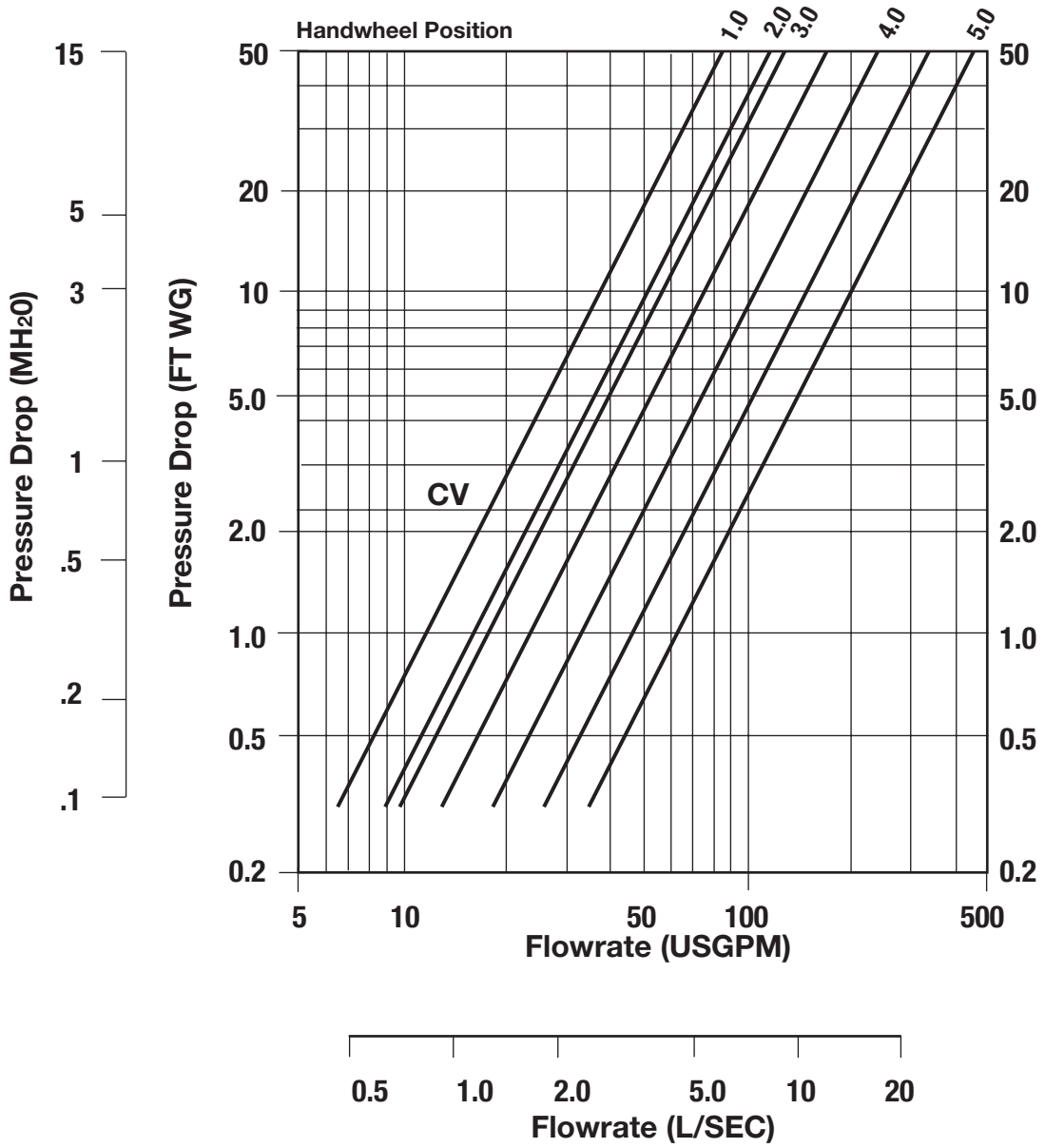
Flow Curve for 12" Straight Design



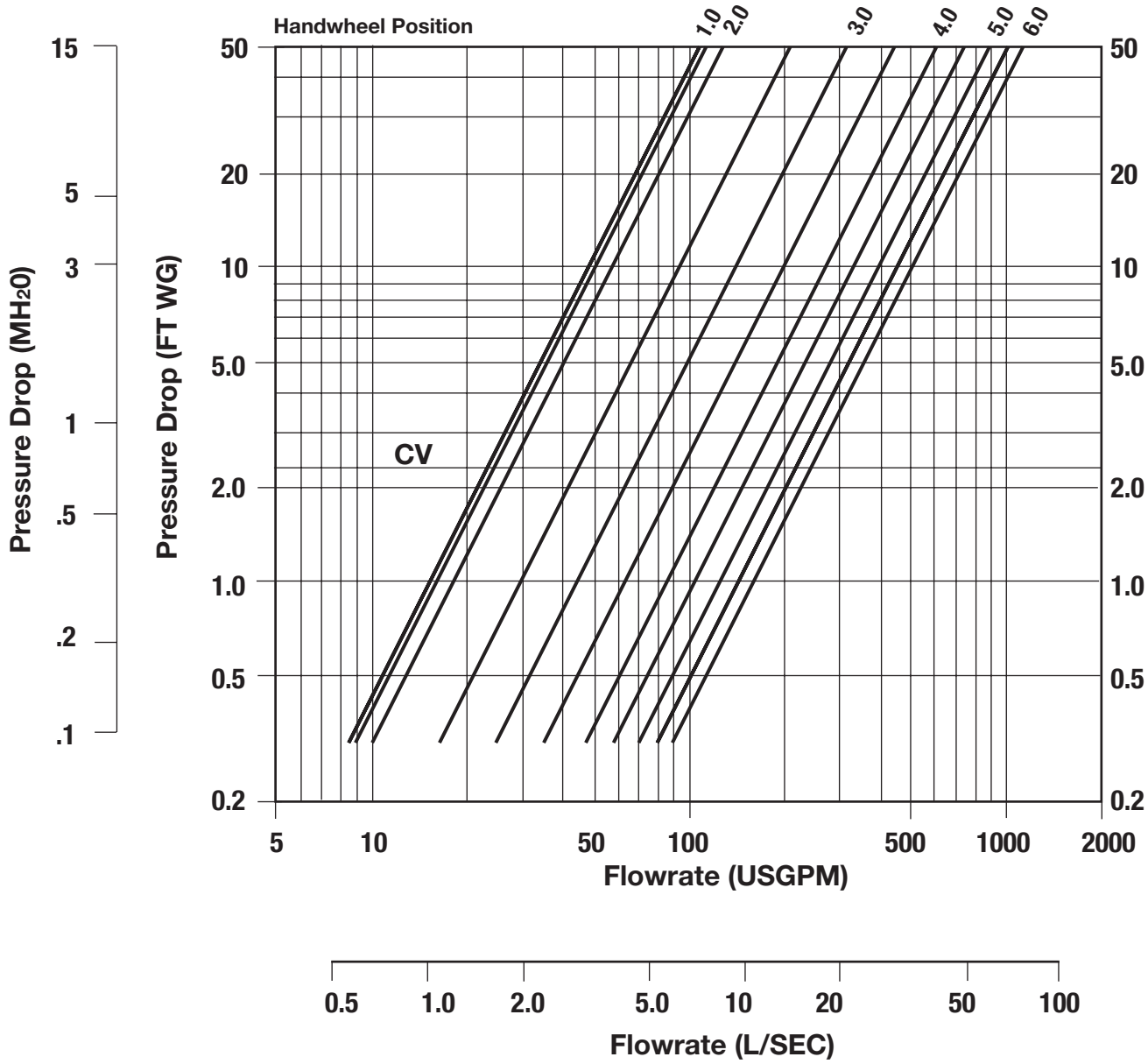
Flow Curve for 2½" Angle Design



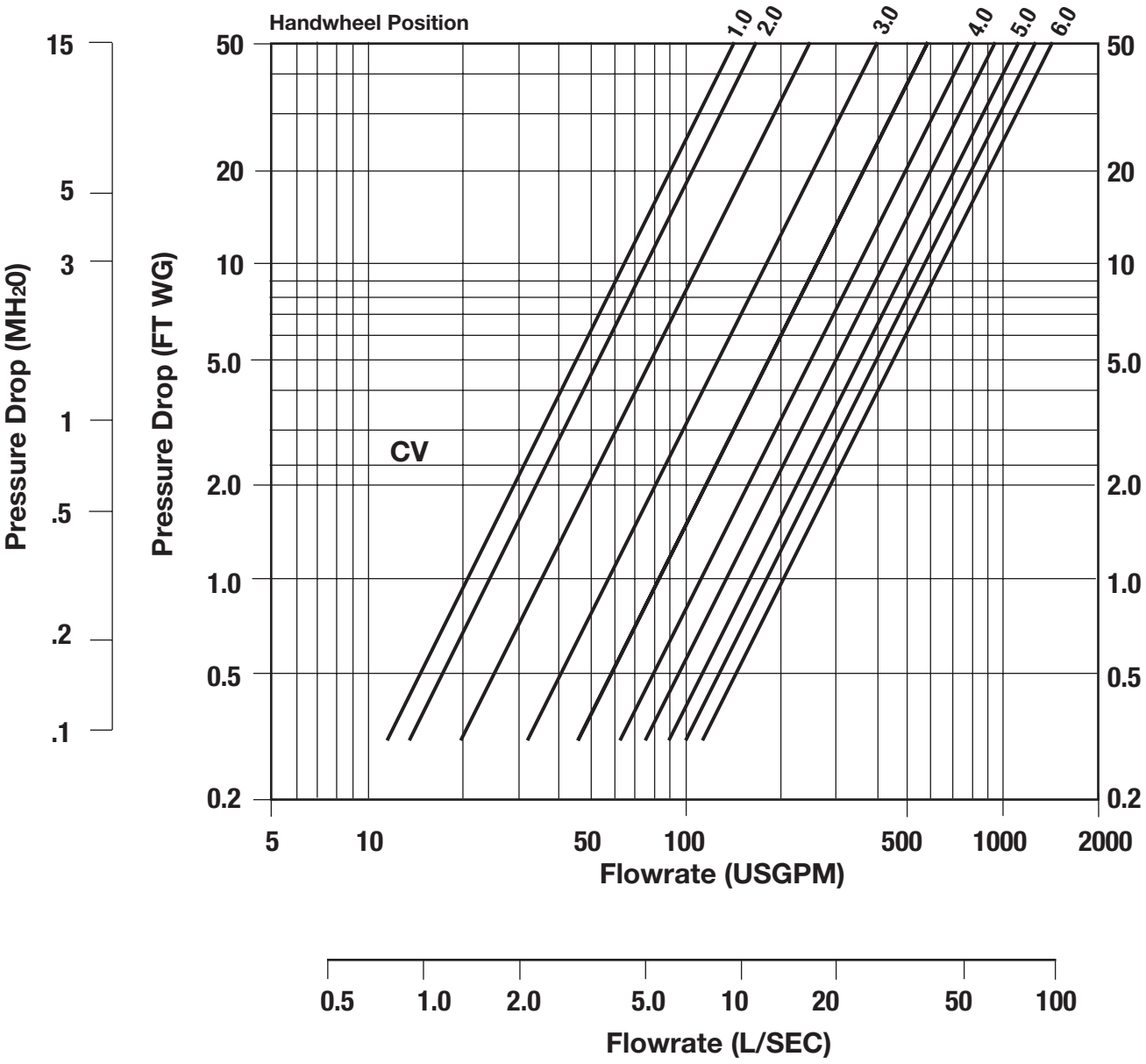
Flow Curve for 3" Angle Design



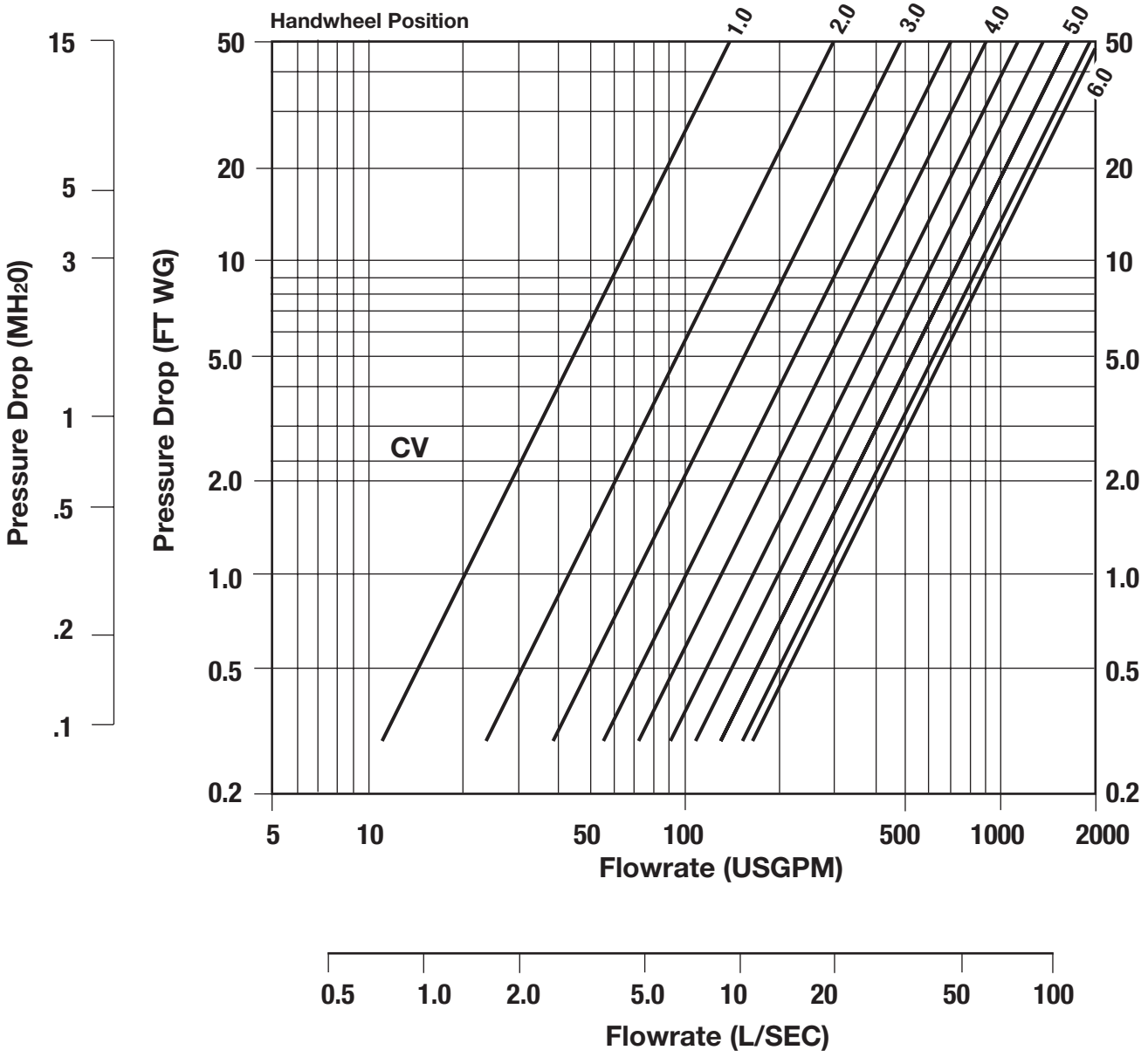
Flow Curve for 4" Angle Design



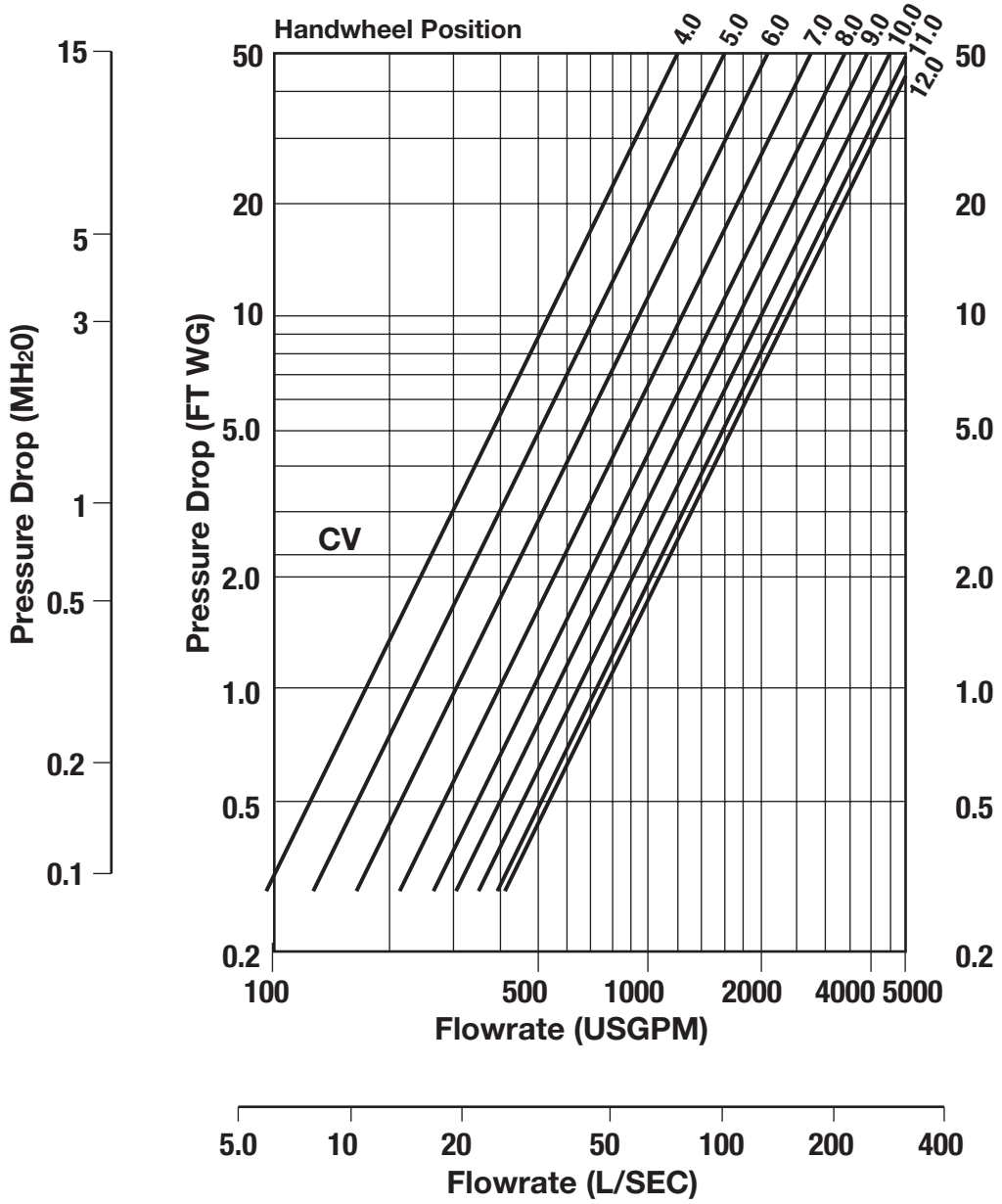
Flow Curve for 5" Angle Design



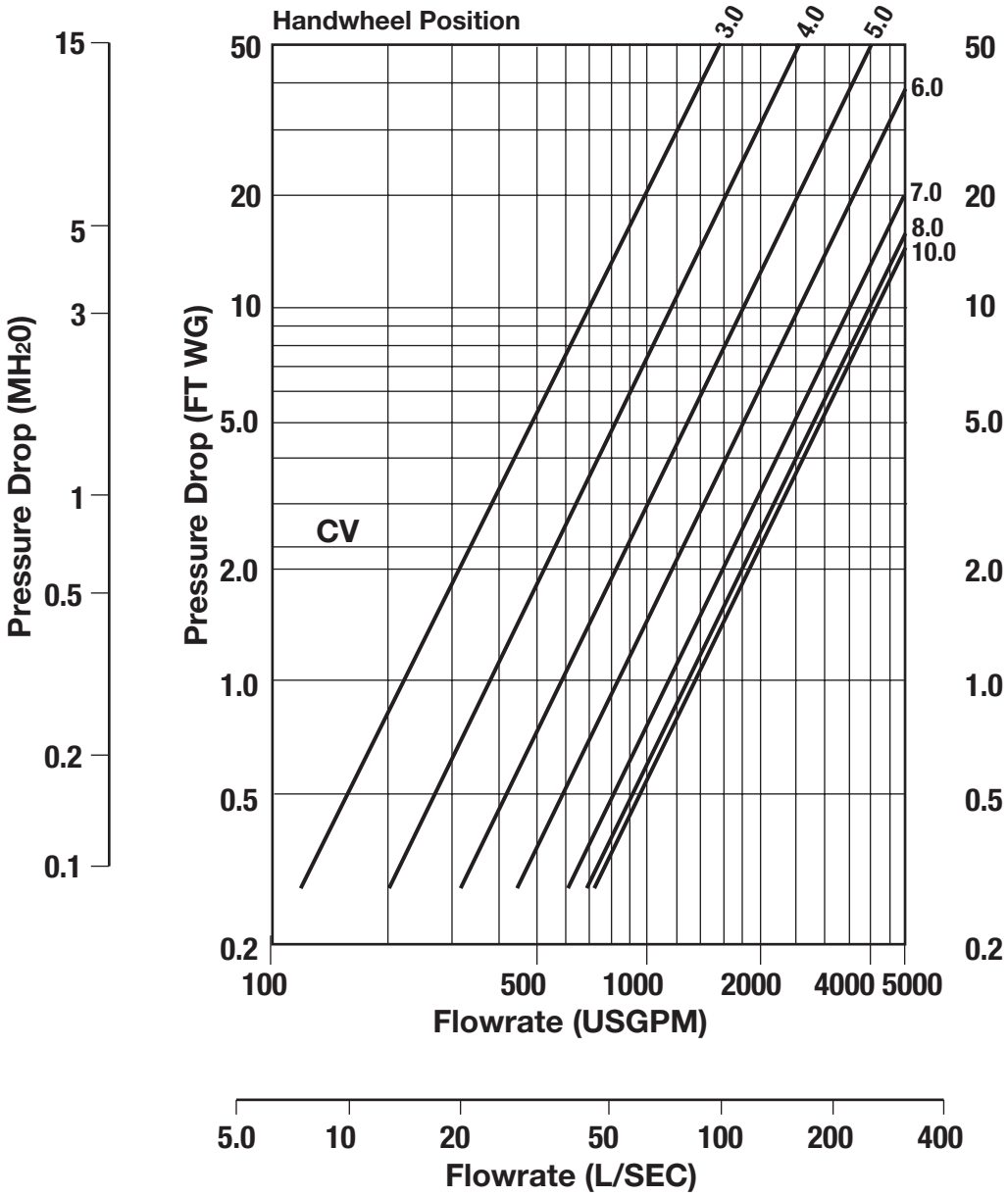
Flow Curve for 6" Angle Design



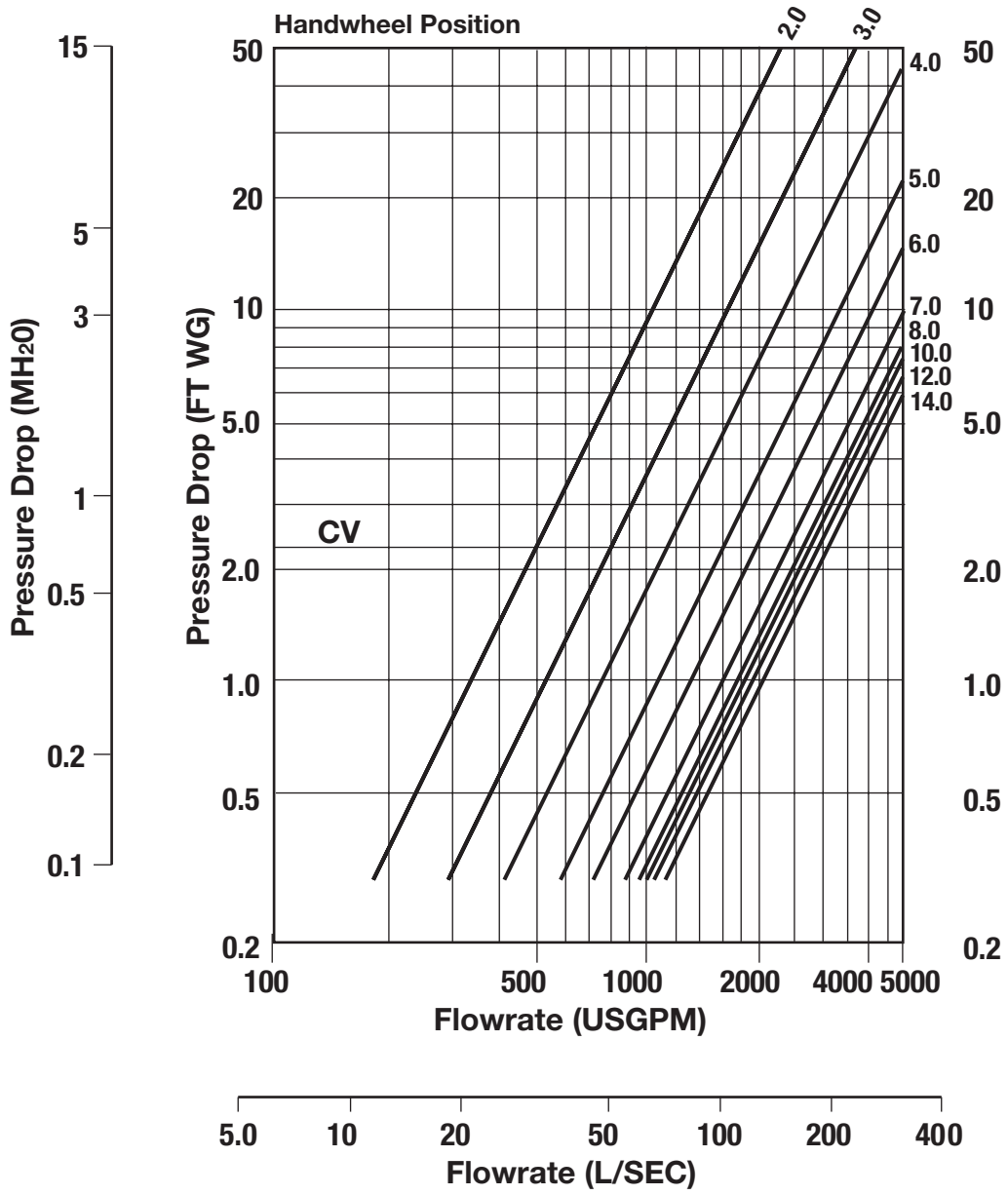
Flow Curve for 8" Angle Design



Flow Curve for 10" Angle Design



Flow Curve for 12" Angle Design



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