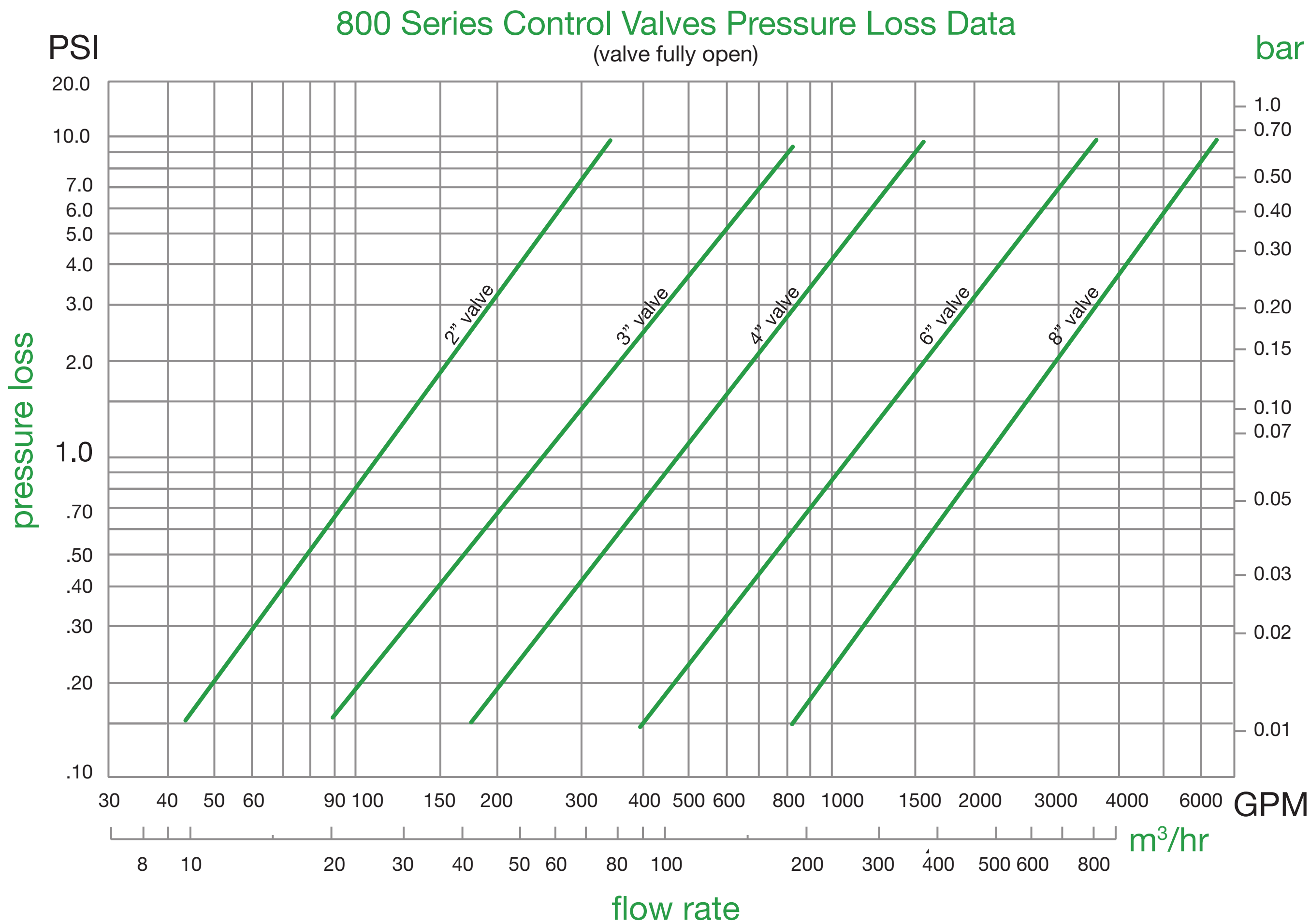
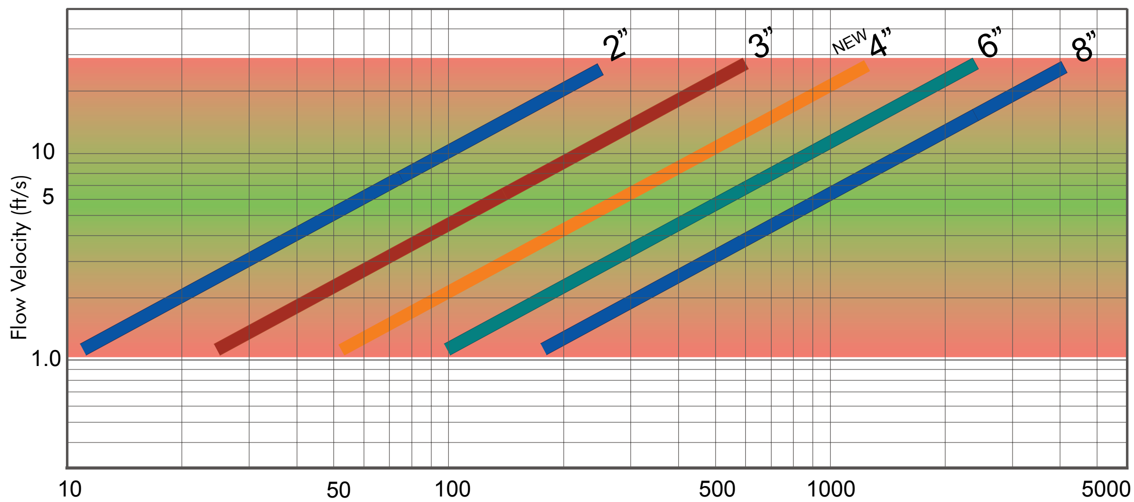


VALVE SIZE SELECTION NOTE: In addition to pressure loss, flow velocity must be considered in order to avoid unwanted valve cavitation and pipe sytem water hammer.

SIZE SELECTION OF NELSON 800 SERIES REGULATING VALVES



*Regulation works well within limits.

RECOMMENDED FOR REGULATION

**Regulation may not be satisfactory.

.Valves perform best within a pressure differential range of 5-80 PSI. Provide adequate upstream pressure to fully open the valve (30 PSI for the 200 PSI valve and 10 PSI for the 50 PSI valve).

..Valve may create slight cavitation noise. To avoid noise keep pressure differential less than 60 PSI or increase downstream pressure setting until noise stopps.

This graph is designed to help select the correct size Nelson 800 Series valve when pressure regulation is needed. To use this graph enter the flow rate axis for the minimum and maximum flows expected. The flow velocity is that estimated for the valve nominal size. Choose the valve size that is within the green band.

EXAMPLE: For a flow range of 200 to 1000 GPM a 6" is the best choice because it lies entirely within the recommended zone. Other factors to consider are the maximum pressure expected on the valve, pressure loss and the expected pressure differential. In the event of two equal choices, it is generally better to choose the smaller valve in a pressure reducing situation. The 50 PSI rated valve has the most sensitive response at low pressure and the 200 PSI rated valve has a tougher sleeve for more extreme conditions.

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MINIMUM FLOWRATE AND PRESSURE FOR 800 SERIES VALVES

	VALVE OPERATING PRESSURE	2 INCH VALVE	3 INCH VALVE	**NEW** 4 INCH VALVE*	6 INCH VALVE	8 INCH VALVE
MINIMUM PRESSURE TO FIRST PASS WATER	10-50 PSI **C1** 3.4 BAR	2 PSI 0.14 BAR	2 PSI 0.14 BAR	2 PSI 0.14 BAR	7 PSI 0.48 BAR	2 PSI 0.14 BAR
	18-80 PSI **C3** 5.5 BAR	7 PSI 0.48 BAR	4 PSI 0.27 BAR	4 PSI 0.27 BAR	8 PSI 0.55 BAR	4 PSI 0.27 BAR
	30-200 PSI **C2** 13.8 BAR	8 PSI 0.55 BAR	6 PSI 0.41 BAR	8 PSI 0.55 BAR	9 PSI 0.62 BAR	6 PSI 0.41 BAR
MINIMUM PRESSURE TO FULLY OPEN VALVE	10-50 PSI **C1** 3.4 BAR	10 PSI 0.69 BAR	10 PSI 0.69 BAR	10 PSI 0.69 BAR	10 PSI 0.69 BAR	10 PSI 0.69 BAR
	18-80 PSI **C3** 5.5 BAR	18 PSI 1.24 BAR	18 PSI 1.24 BAR	18 PSI 1.24 BAR	18 PSI 1.24 BAR	18 PSI 1.24 BAR
	30-200 PSI **C2** 13.8 BAR	28 PSI 1.93 BAR	28 PSI 1.93 BAR	28 PSI 1.93 BAR	28 PSI 1.93 BAR	28 PSI 1.93 BAR
MINIMUM FLOW Pressure Regulating Operation		10 GPM 2.3 M^3/HR	20 GPM 4.5 M^3/HR	40 GPM 8.2 M^3/HR	80 GPM 18 M^3/HR	140 GPM 32 M^3/HR
MAXIMUM FLOW Pressure Regulating Operation		200 GPM 45 M^3/HR	450 GPM 100 M^3/HR	900 GPM 191 M^3/HR	2000 GPM 450 M^3/HR	3200 GPM 720 M^3/HR

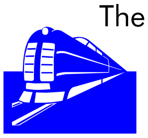
*Please contact factory for OLD STYLE 4" valve data.

WATERHAMMER PERHAPS THERE IS A SIMPLE SOLUTION

What is waterhammer?

Waterhammer is an impact load created by stopping and/or starting water flow suddenly. The results of a waterhammer can be devastating. The waterhammer occurs suddenly, in the millisecond time frame, but the effects of it can burst pipes, damage pumps, break valves and ruin pressure sensors. The initial pressure shock is caused by a change in velocity and is magnified by air pockets. The best way to minimize surge pressures is to change velocities slowly (by using larger pipes to keep velocities lower, using slow-closing valves, using soft-start pumps, etc.) and to prevent air entrapment (by venting high spots). A common example of a waterhammer occurs by quickly starting-up of a pump or quickly opening a valve on empty pipes. A loud thud heard in the pipe is a perfect example of a waterhammer. The key phrase in the example is moving the water flow "quickly" verses changing it slowly. During pump starting and valve opening, if you turn the water slowly, the waterhammer will not occur.

The train example:



The hammer occurs because an entire train of water is being stopped so fast that the end of the train hits up against the front end and sends shock waves through the pipe. This is similar to a real train, instead of slowing to a stop, it hits into a mountain side. The back of the train continues forward even though the front can not go anywhere. Since the water flow is restricted inside the pipe, a shock wave of incompressible water travels back up the pipe (at about the speed of sound) deflecting everything in its path. A momentary negative (vacuum) pressure at the head of the train (recoil) accentuates the problem because the water shock returns back down the line. Only this time the velocity is made up of the full water force and the pull of the water to fill the vacuum. Common irrigation hardware like relief valves, solenoid valves, valves in general, centrifugal pumps, positive displacement pumps, and regulators can and will cause heavy hammer effects. Flow control sprinklers and pressure regulated systems will contribute to the problem. Each can be damaged by waterhammer.

Irrigation system considerations:

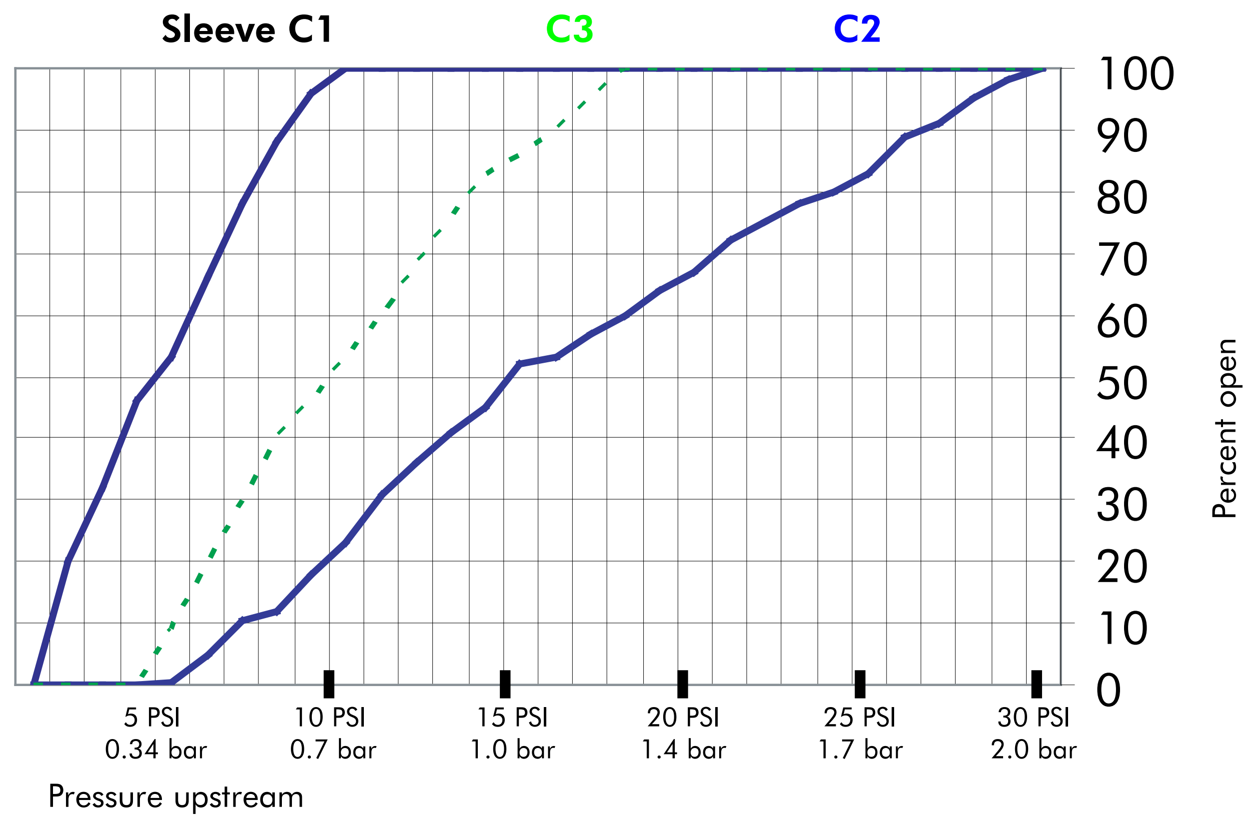
Irrigation and industrial systems are different. Industrial systems use heavy steel pipe which may withstand more shock than plastic pipe. PVC pipe is normally used in irrigation for many design reasons including cost, easy of installation and repair. Many irrigation systems have pipe of larger diameters near the pump and then reduced pipe size at the far irrigation zones. The design method makes sense and is commonly used from a cost efficiency standpoint and from a pressure loss standpoint. The consequence of rapidly pushing water through large pipe into small pipes is an increase in flow velocity which can cause big problems. Proper managing of the system is essential.

Perhaps a simple solution:

The best solution to waterhammer devastating effect is to stop the shock before it starts. The Nelson 800 Series valve is capable of slow opening and closing. Click on this image to see a graph. Some pump start-up systems may need a rapid relief valve 800 Series valve or a surge anticipator valve. One other common solution is to put a Rate-Of-Flow control on the valve to limit how much the valve can open. Keep pipes full of water where possible. Use continuous acting air control valves to vent air out of high spots. If surge is unavoidable, it can be dissipated (by using surge tanks, etc.). The other option is to design the system to withstand surge (both maximum surge and repetitive surge) innovation in irrigation™ NELSON

PERFORMANCE INFORMATION
800 SERIES CONTROL VALVES

800 SERIES VALVE TYPICAL OPENING PROFILE



WATER VOLUME REQUIRED TO FULLY OPEN OR CLOSE VALVE	
8"	4 Quarts
6"	2 Quarts
New 4"	1 Quart
4"	1 Pint
3"	1 Cup
2"	5 oz (145ml)

Nelson Irrigation Corp. 848 Airport Rd. Walla Walla, WA 99362-2271 USA Tel: 509.525.7660 Fax: 509.525.7907 E-mail: info@nelsonirrigation.com Web site: www.nelsonirrigation.com