



# XS Series Excess Flow Valve Technical Report

## Scope

This technical report provides selection and ordering information for standard-, medium-, and low-flow trip range

options available with the Swagelok® XS series excess flow valve.

## Introduction

The XS series valve protects against rapid escape of system fluid—should a line rupture or similar event occur—by tripping when flow through the valve increases to a set value.

The valve is available in three sizes, each offering a standard spring that trips at a high flow rate to avoid

nuisance tripping and that satisfies the requirements of most excess flow applications.

To meet the special needs of low-flow, low-pressure systems, two additional optional springs that trip at lower flows and correspondingly lower pressure drops are available.

## Medium- and Low-Flow Options

Optional medium- and low-flow springs are available for each of the three XS series valve sizes.

One of these options may be required in lower-pressure systems or in systems that contain some kind of restriction—such as a regulator, valves, or long piping runs—ahead of the break. In such systems, flow through the rupture might not be sufficient to trip the valve.

The table below lists water flow and pressure drop specifications, along with ordering information, for the standard and optional springs in each XS series valve size. The flow graphs on page 2 and 3 also can help users determine the spring suitable for a particular application.

If the correct spring size for an application can be determined from the table or graphs, specify the desired spring when placing the valve order.

To order the XS series valve with an optional spring, add the desired designator to the valve ordering number.

**Example:** SS-XSS4-1, where -1 is the optional spring designator

If the system flow rates are not known well enough to select the correct spring size from the graphs, a spring can be selected by testing a valve in the specific application. Order a standard valve and a spring kit, which contains all three available springs. Test the standard spring by simulating a line break to see if the valve trips properly. If the valve does not trip, replace the spring with one of the lower-flow springs and repeat the test.

Spring kit ordering numbers:

- XS4 spring kit **MS-13K-XS4**
- XS6 spring kit **MS-13K-XS6**
- XS8 spring kit **MS-13K-XS8**

### XS Series Excess Flow Valve Flow Option Specifications

Series Size in.	XS4 1/4			XS6 3/8			XS8 1/2		
	Nominal Water Flow gal/min	Nominal Pressure Drop, psi	Designator	Nominal Water Flow gal/min	Nominal Pressure Drop, psi	Designator	Nominal Water Flow gal/min	Nominal Pressure Drop, psi	Designator
Low	1	5	-1	3	5	-3	3	5	-3
Medium	3	22	-3	6	15	-6	6	15	-6
Standard	5	75	None	9	40	None	13	90	None

## Water Flow Trip Ranges

- Enter the horizontal scale with the normal flow rate, including surges.
- Read up to the  $C_v$  curve.
- Read across to the vertical scale to obtain the pressure drop.

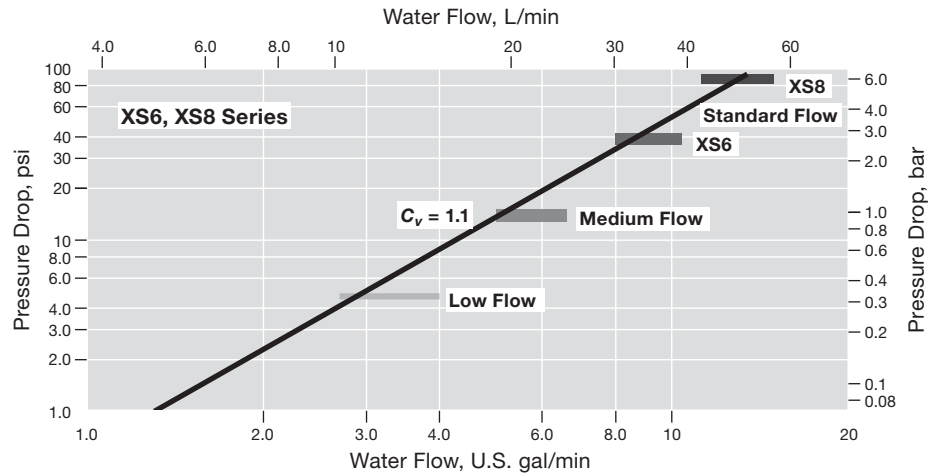
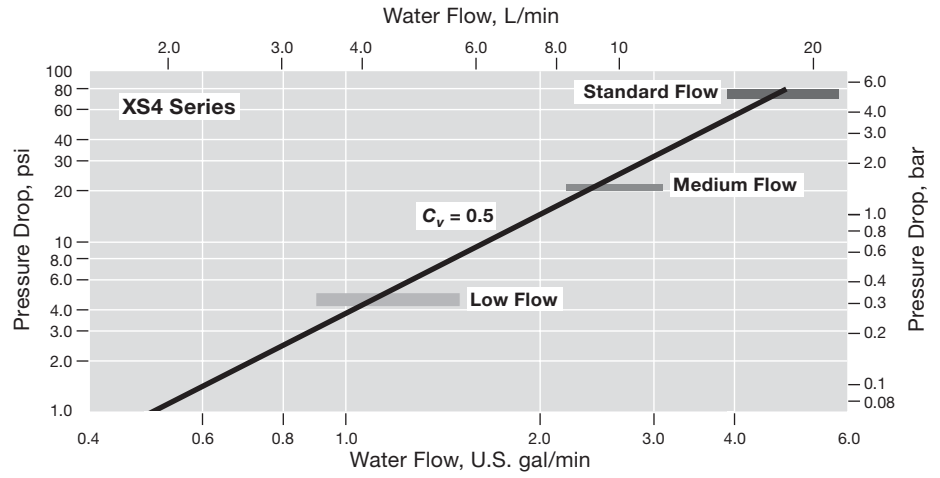
Select a valve and spring with a trip range higher than the expected maximum flow rate. Verify that the system pressure is high enough to provide a drop that will trip the valve.

**Example:** For water with a flow rate of 0.8 U.S. gal/min, the XS4 series valve would have a pressure drop of 2.5 psi. With a low-flow spring, this valve would trip at a flow rate of about 0.9 to 1.5 U.S. gal/min and a pressure drop of 5 psi.

If system surges during operation might exceed that flow rate, either the medium or standard flow springs can be selected to avoid nuisance tripping.

**Example:** For water with a flow rate of 5 U.S. gal/min, an XS6 or XS8 series valve has a pressure drop of about 12 psi, nearly the same as the trip range of the medium-flow spring.

The standard-flow springs with the XS6 or XS8 series valve trip at higher flow rates and could be used to avoid nuisance tripping. Verify that the system pressure is greater than the 40 or 90 psi pressure drop need to trip the XS6 or XS8 series valves.



## Air Flow Trip Ranges

The air flow curves assume that the pressure drop across the valve is at least equal to the pressure drop listed in the table on page 1.

- Enter the vertical scale with the inlet pressure at the valve
- Enter the horizontal scale with the maximum flow rate expected in the system, including surges.
- Note where the inlet pressure and flow rate intersect.

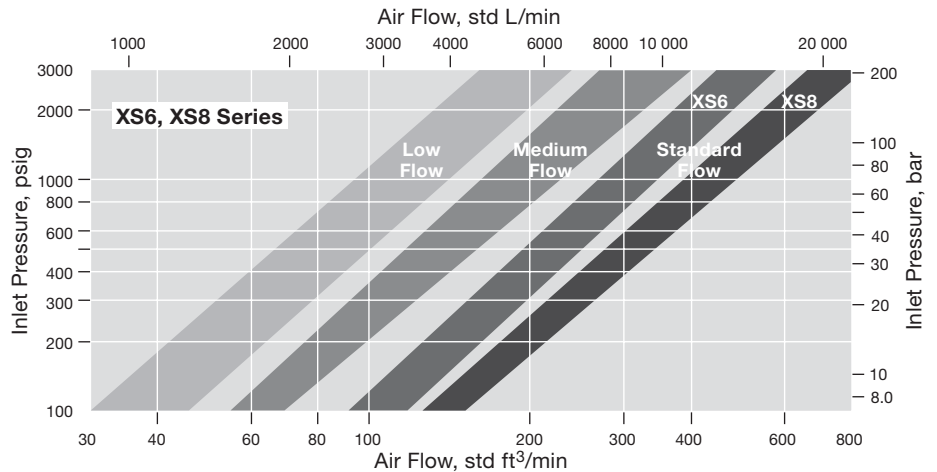
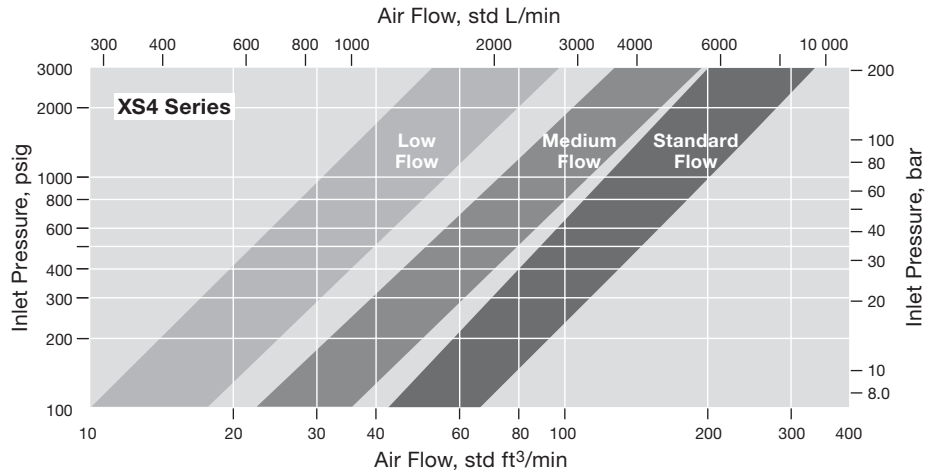
Select a valve and spring with a higher trip range.

**Example:** For air at 800 psig inlet pressure and a maximum flow rate of 30 std ft<sup>3</sup>/min during a surge, select an XS4 series valve with a medium-flow trip range spring.

A low-flow trip range XS4 series valve would trip during normal surges.

**Example:** For air at 150 psig inlet pressure and a maximum flow rate of 40 std ft<sup>3</sup>/min during a surge, select an XS6 series valve with a medium-flow trip range spring or an XS4 series valve with a standard-flow spring.

An XS4 series valve with a low- or medium-flow trip range spring and an XS6 or XS8 series valve with a low-flow trip range spring would trip during normal operation.



### Safe Product Selection

When selecting products, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.