

In the case of set pressures below 100 KPa gage (since pressure drop becomes proportionately larger) the maximum inlet pressure drop at design flow rate may be extended to 5% of set pressure (KPa, gage). The purpose of this requirement, which applies to both conventional and bellows type valves, is to prevent chattering.

Chattering caused by undersized inlet piping may sometimes be eliminated on pilot operated PR valves if the pilot valve pressure tapping is taken directly from the vessel being protected. However, it is recommended that the above inlet pressure drop limitations still be applied, to avoid the capacity reduction that would result from excessive inlet losses and to ensure freedom from chatter.

The entire inlet line must be at least the size of the PR valve inlet. When multiple safety valves are manifolded on the inlet side, the cross-sectional area of the manifold piping must be equal to or greater than the sum of all the inlet areas of valves open to the manifold.

Prevention of Plugging in PR Valve Inlets

1. Heat tracing of PR valve inlet piping should be provided where plugging by icing, deposition of wax or congealing of viscous liquids may occur at ambient temperatures.

2. Where inlet piping plugging may occur as the result of coke formation, solids deposition, etc., from the process stream, a continuous purge or blowback injection of clean fluid (e.g., steam) should be provided just below the PR valve. Flow is normally controlled by a restriction orifice sized to provide a flow of at least 1.5 m/s in the inlet line. In the particular case of catalytic cracking reactor PR valves, experience has demonstrated that the inlet lines can be kept free of plugging by catalyst and coke if they are provided with an internal extension elbow within the reactor facing horizontally toward the vessel centerline. Any internal connection must be equal to or larger than the diameter of the pressure relief valve inlet. This is in addition to the steam purge.

Selection of Atmospheric or Closed Discharge for PR Valves

Discharge to a closed system is required for PR valves in the following categories:

1. PR valves handling materials which are liquid or partially liquid at the valve inlet. An exception to this is made for certain thermal expansion relief valves as described below.