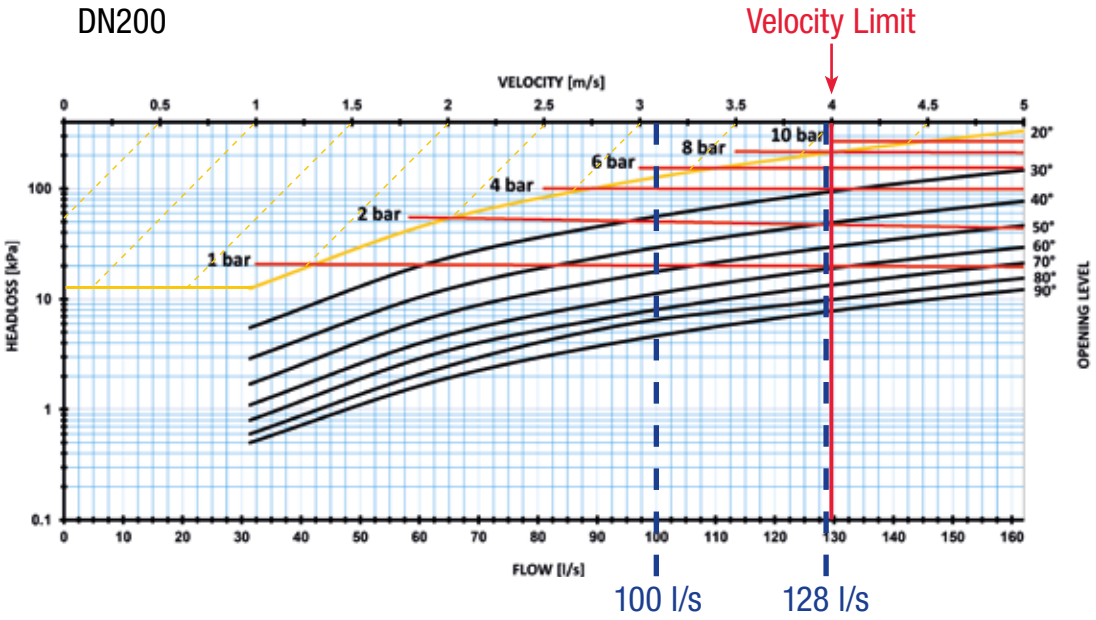
PLUG VALVE SELECTION AND DIMENSIONING
EXAMPLE FLOW CHARTS

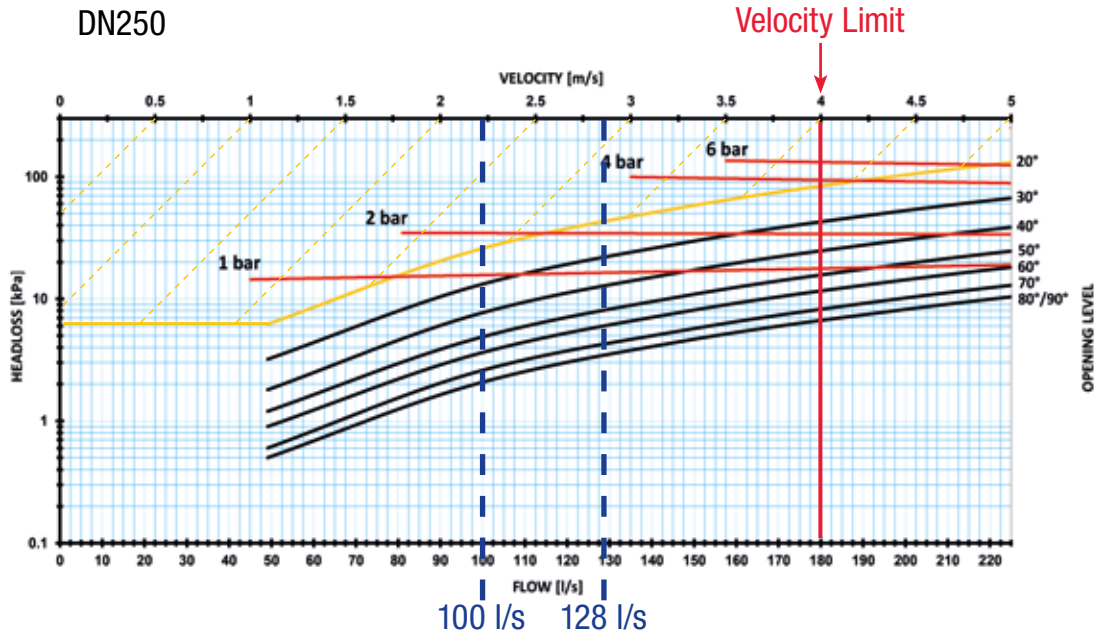
Sizing of the plug valve is dependent on the pressure conditions and minimum / maximum flow rates. When considering throttling service, pressure loss requirements are also needed. Depending on condition, completely different valve diameters compared with pipeline size are required. When using plug valves for control service, cavitation can occur due to the required working conditions. Cavitation depends on a number of aspects, the inlet pressure, opening level, required pressure losses and temperature of water and can cause considerate damage to the valve and downstream pipeline. It is important that cavitation effects are considered when sizing and selecting plug valves.

Plug valves are usually used for ON/OFF and throttling services, the below two examples show how to correctly use the valve with the flow charts and chose the correct valve size depending upon requirements.

DN200



DN250



NOTE: The maximum recommended velocity is 4 m/s as per EN1074.

1. Operating conditions example for proper selection ON/OFF service:

- INLET PRESSURE [bar] = 6 bar
- FLOW RATE normal [l/s] = 100 l/s
- FLOW RATE maximum [l/s] = 128 l/s
- REQ. SIZE by client. = DN200 / 250

Based on above we to need consider two options DN200 and DN250.

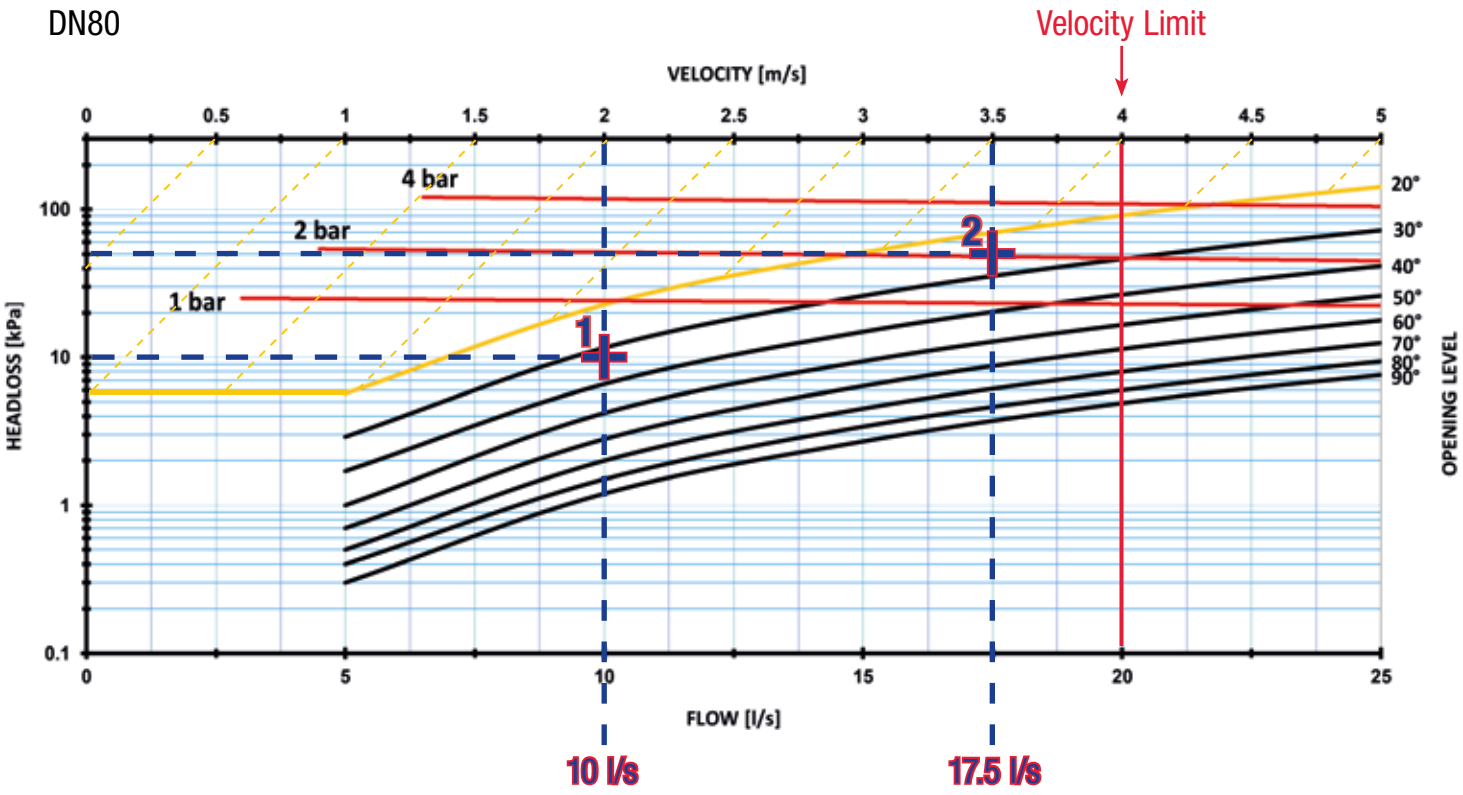
Conclusion - a DN200 can be used however the velocity is near the recommended limit of 4 m/s, this size is better when modulating is required.

Conclusion – the DN250 is the preferred choice considering on/off applications and does not need to achieve low pressure losses at low flow rates. The max required flow gives a velocity of around 2,5 m/s.

2. Operating conditions example for proper throttling service (cavitation lines):

- Inlet pressure [bar] = 4 bar
- Flow rate minimum [l/s] = 10 l/s
- Flow rate maximum [l/s] = 17,5 l/s
- Pressure losses [KPa]:
  - For flow rate min. = 10 KPa
  - For flow rate max. = 50 KPa
- Req. size by client. = DN80

DN80



Point 1 – At a flow of 10 l/s and pressure loss of 10 KPa the valve should be just over 30° open.

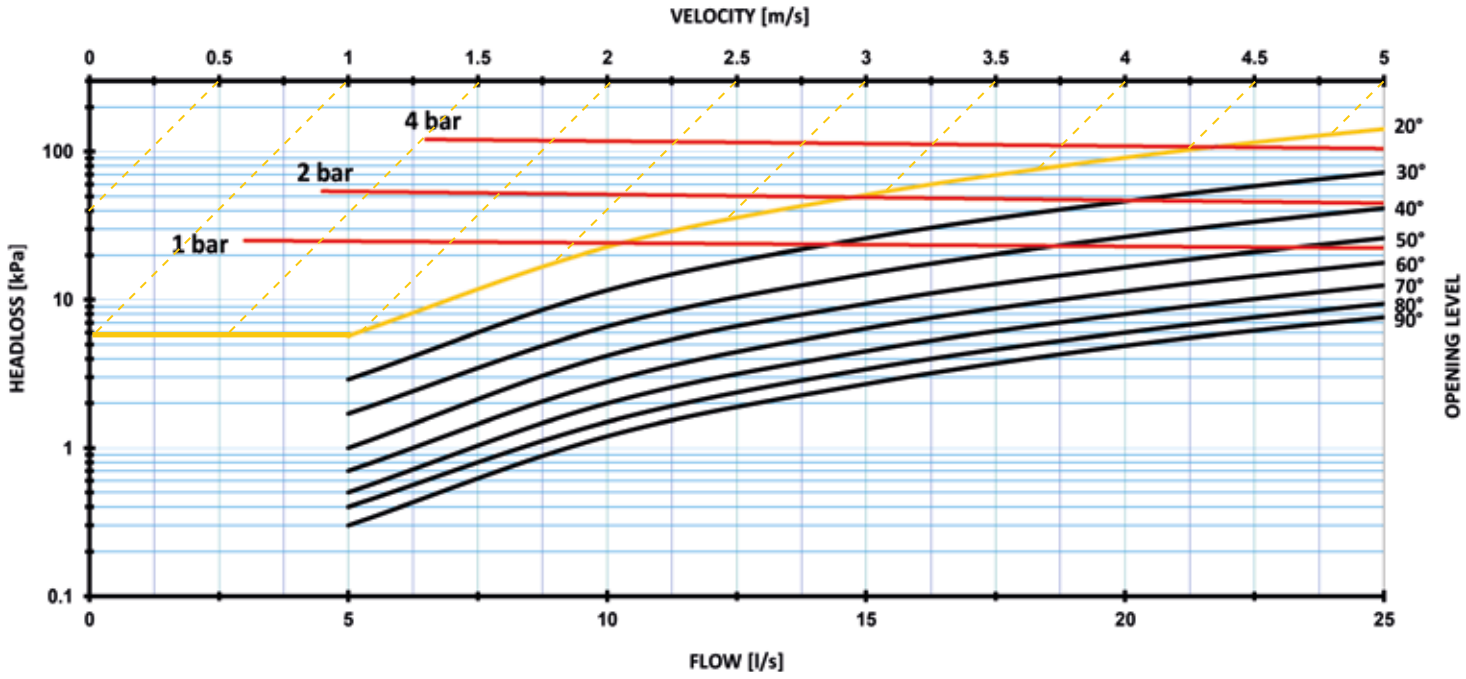
Point 2 – At a flow of 17,5 l/s and a pressure loss of 50 KPa the valve would be approximately 25° open.

Conclusion – the DN80 meets all the requirements.

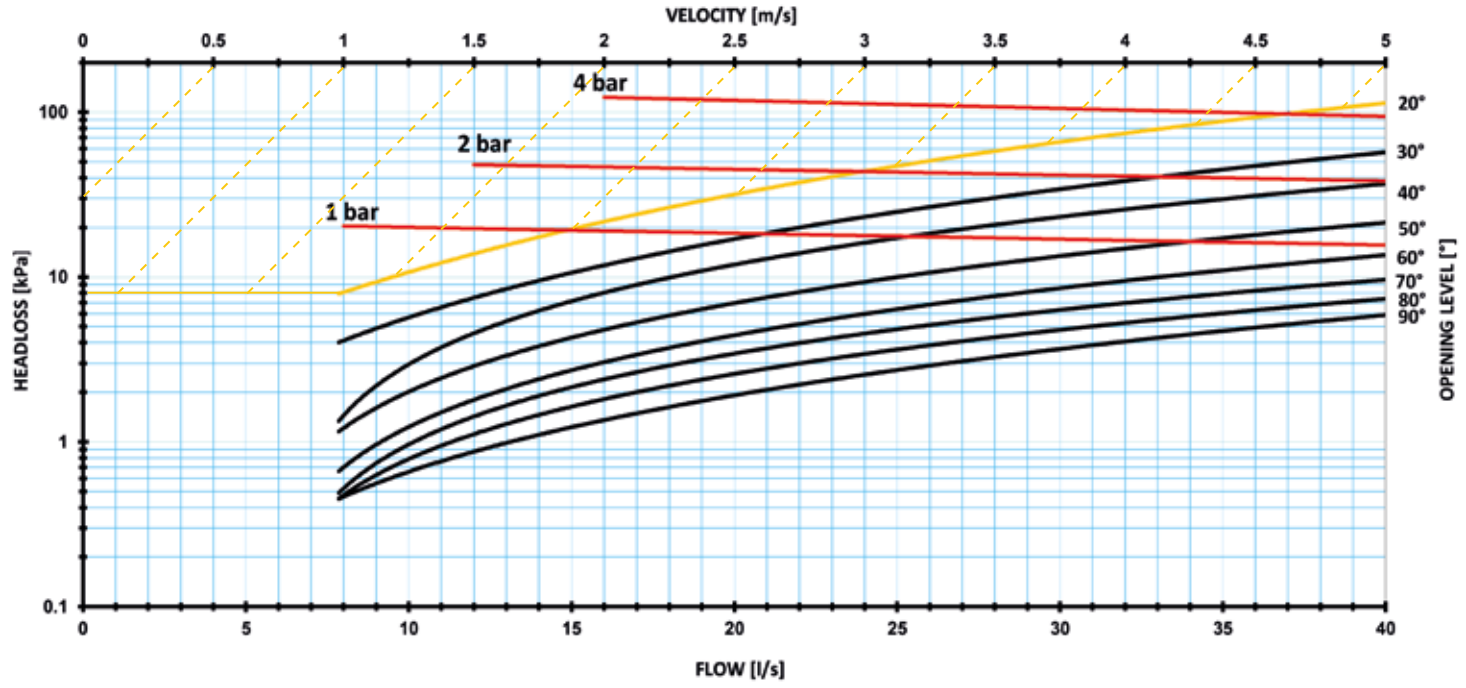
- Points 1 and 2 on the chart for two specific pressure losses and flow rates are located under the red cavitation line for the inlet pressure, this indicates that cavitation will not be a problem. If either of the points are above the red cavitation line there is a risk that cavitation can occur.
- These two points are laying in the allowed valve opening range between 20° to 90°. Any points located above line defining the minimum opening level 20° should not be used.
- The maximum velocity is almost achieved for the maximum flow rate, which is a benefit for modulating duty.

FLOW CHARTS

DN80	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m3/h] Excluding pipe headloss	76	108	144	228	279	332	384	459

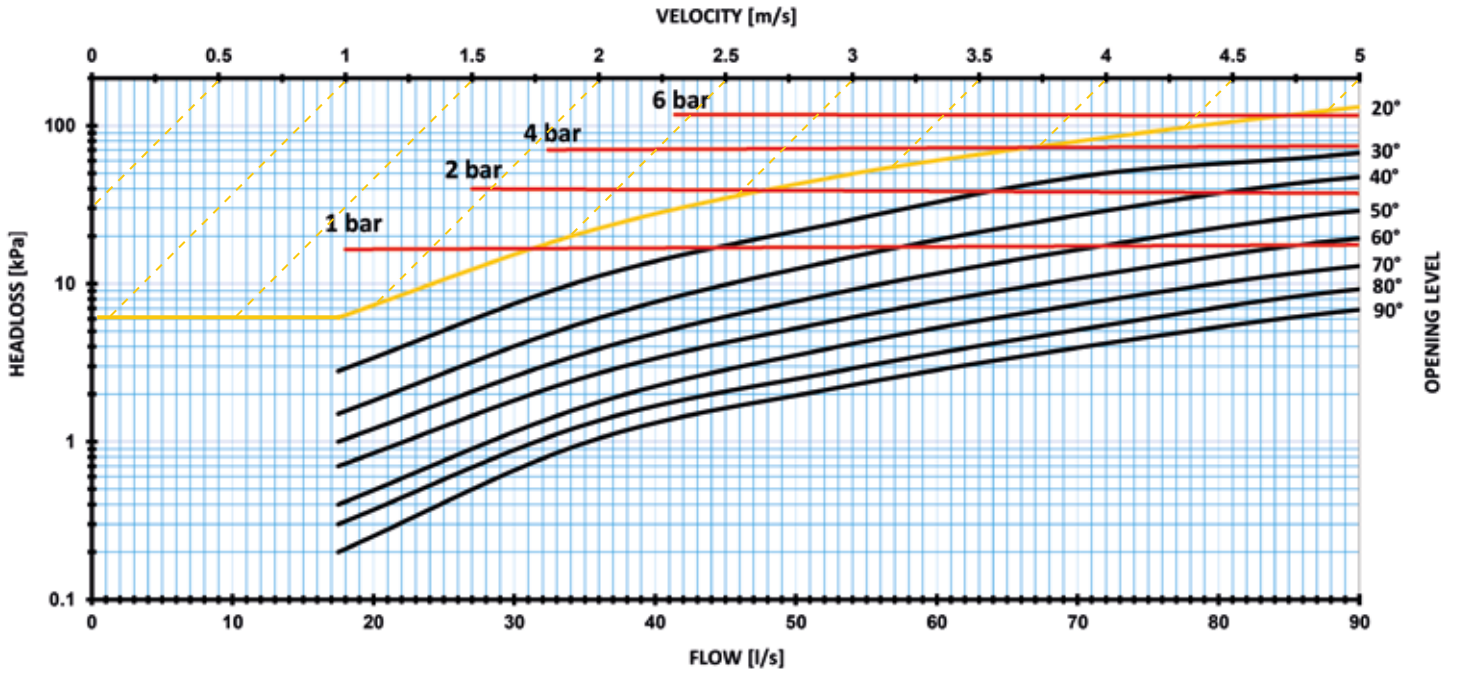


DN100	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m3/h] Excluding pipe headloss	137	198	261	346	451	578	675	760

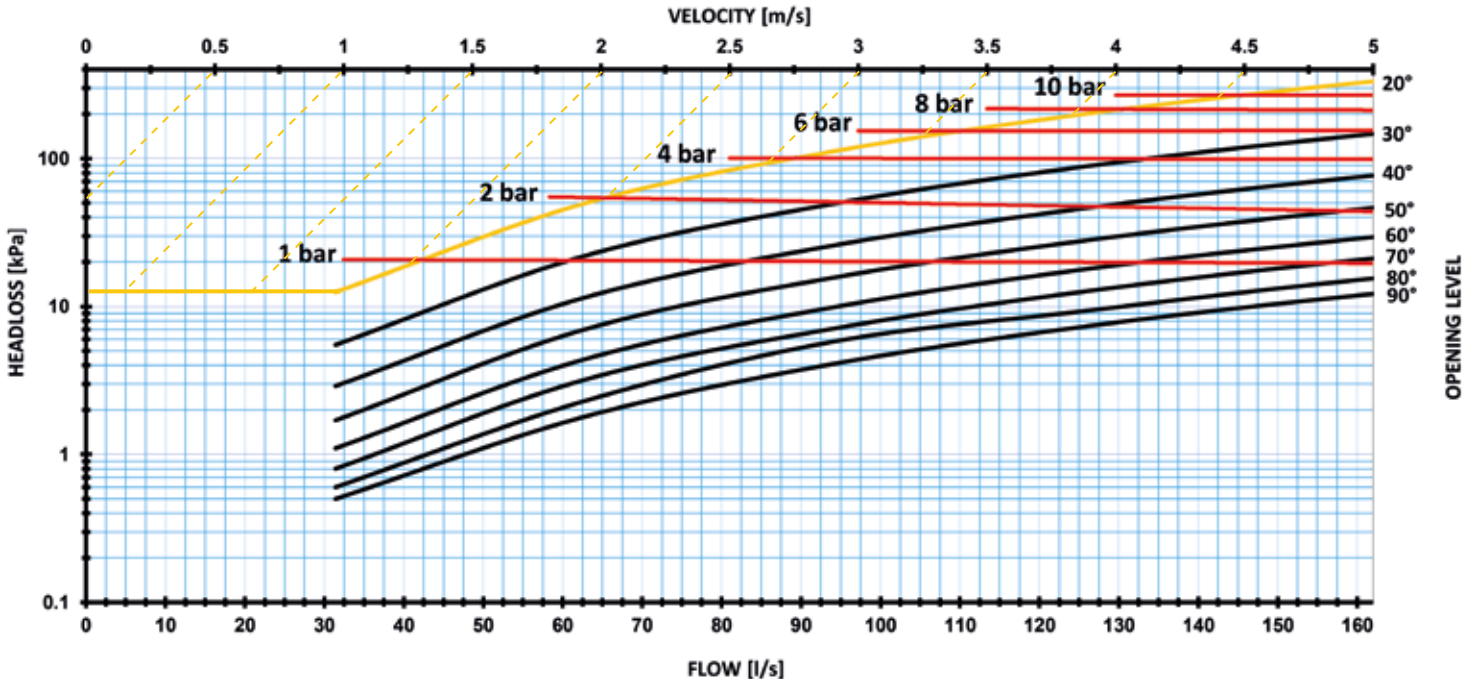


For flow control, valves should **only be** used if the plug is **open to 20⁰ and over**, they should not be used for control at an angle lower than this as represented on the graphs by the **orange** lines.

DN150	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m3/h] Excluding pipe headloss	285	399	528	833	1007	1245	1468	1548

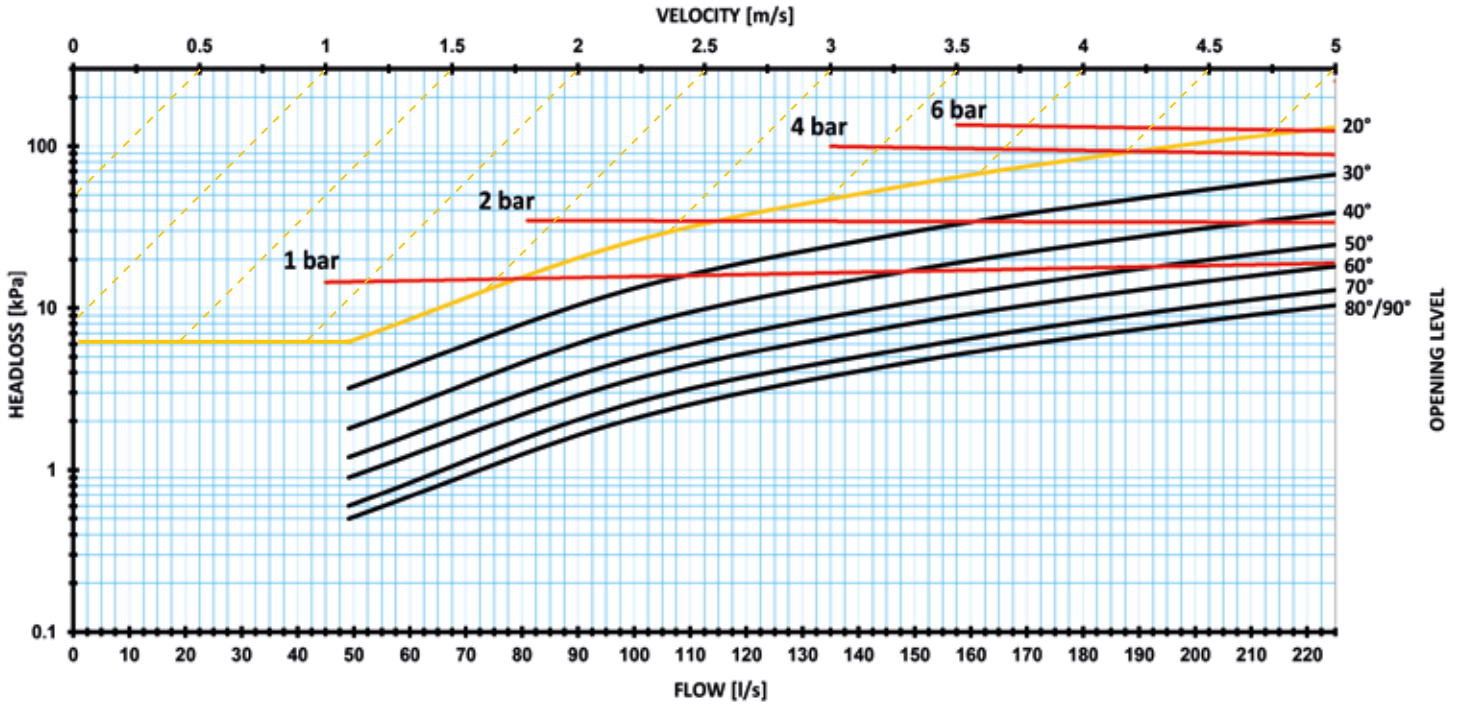


DN200	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m3/h] Excluding pipe headloss	321	485	675	1112	1337	1592	1832	1844



FLOW CHARTS

DN250	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m3/h] Excluding pipe headloss	713	1004	1334	2006	2436	2738	2773	2848



DN300	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m3/h] Excluding pipe headloss	929	1360	1749	2391	2670	2895	3075	3081