



SERIES 764 ECCENTRIC PLUG VALVE

Expect... **AVR**



AVK UK



The AVK Group is one of the leading manufacturers of valves and fittings within the water, gas, waste water, industrial and fire protection industries worldwide and has 90 companies globally.

Our UK based factories manufacture a large range of valves, hydrants, pipe fittings and accessories, each complying with the highest standards of performance, safety and durability. Our UK manufactured valves and fittings are supplemented by an extensive range of products manufactured in other AVK companies located around the world as well as from a few key strategic supply partners. All products designed and manufactured by AVK UK exceed British Standard requirements.

While UK focus is on British Standards, AVK UK and the AVK Group also offers products in accordance with most national and international standards.

With local technical expertise and on-site service teams, AVK UK offers its customers product identification, diagnostics, selection and application advice. We also hold product training courses and operating and maintenance guidance.

All AVK customer facing staff hold the relevant Site Safety Passport and where necessary confined space and other relevant certification.

AVK, through Invicta Valves now offer a full Site Solutions package to support our unrivalled water and waste water product range.

We provide all customer's needs ranging from inspection, site surveys, design, supply, installation, commissioning and maintenance. We even provide supplementary electrical and small civil engineering installation services when required. This service is supplied from 3 locations across the UK, for more information contact us on:

Site Solutions

T: +44 (0) 1622 754613

E: sitesolutions@invictavalves.co.uk

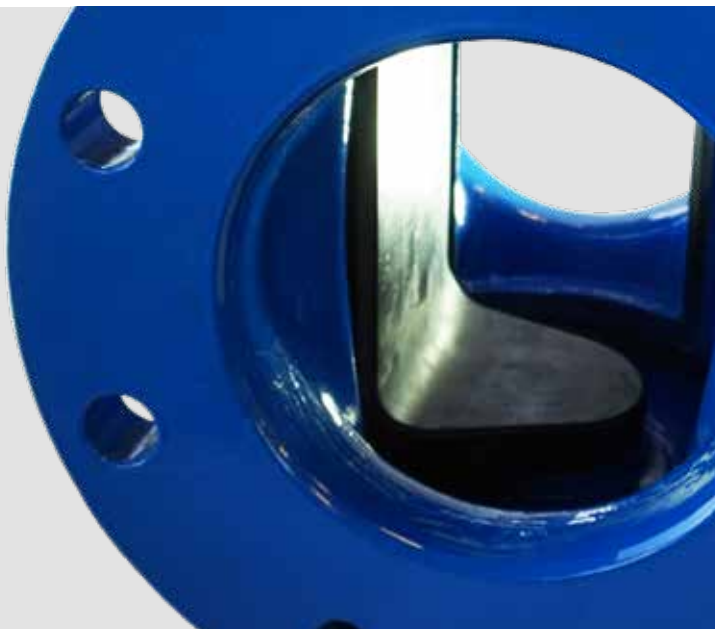


SERIES 764 ECCENTRIC PLUG VALVE

Plug valves are typically used for on/off and throttling duties



WIMES
Compliant



AVK's eccentric plug valve range offers unparalleled strength and robustness in the most demanding of situations.

Plug valves can be used in a variety of applications from potable water, raw water and waste water treatment to mining and general industry. Plug valves have been used with confidence within these applications for many years, where the ability to control and isolate flow is key to the operation.

AVK eccentric plug valves are used for pump control shut-off and throttling service. The plug is fully vulcanized with AVK's own rubber compound which, due to its sturdy design and double bonding vulcanization, features an outstanding durability due to the rubber's ability to regain its original shape.

Available in pressure ratings up to 16 Bar, flanged to suit BS EN 1092-2 PN16 and sizes DN80-300, this resilient seated plug valve range is available from stock at AVK UK.

The valve can be manually operated via lever (dependant on size), gearbox or with an electrical actuation.

We offer sizing, engineering and technical expertise from the supply of the correct plug valve to the on-site installation through Invicta Site Solutions.

Design

- Welded nickel seat with a full port design allowing high flow capability
- Fusion bonded epoxy coated body internally and externally
- Design incorporates a unique integral ISO flange

Operation

The valve consists of a body and a ¼ turn plug that is offset from the seat centerline.

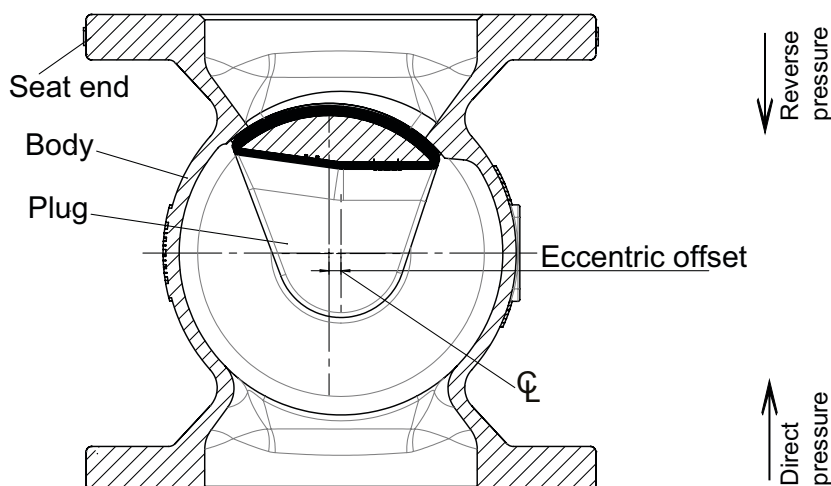
The eccentric offset causes the plug to lift and rotate off the seat simultaneously to reduce seat friction and wear during operation.

The valve is operated by rotating the plug spindle 90°. A clockwise rotation will close the valve.

AVK UK

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DESIGN FEATURES AND BENEFITS

AVK ECCENTRIC PLUG VALVES are designed with safety built into every detail.
UK engineered / high quality / UK stocked

1. Rectangular port opening with full bore reduces headloss creating better flow characteristics.

2. Seals from both directions up to 16 bar, suitable for flow and shut off in either direction.

3. Plug is fully vulcanized and available with AVK's own NBR or EPDM rubber compound which, because of its sturdy design and double bonding vulcanization, features outstanding durability with the plugs rubber's ability to regain its original shape.

4. 95% pure nickel seat welded onto cast body - corrosion and erosion resistance specifically profiled for low torque and extended life.

5. The fully encapsulated plug rotates in self lubricated stainless steel bearings, located in the body and bonnet, along with upper and lower PTFE washers - ensure consistently low operating torque.

16. Standard ISO mounting flange on all sizes - allows for on-site adaptation for gear boxes, powered actuators, or extension devices on to standard valves using the integral ISO flange in the bonnet.

15. Stem seal packing (V-type) - easily adjustable during use.

14. Stainless steel bolt, A2-70 as standard on the gland flange - increased corrosion protection.

13. The bolts are countersunk in the bonnet and ISO flange encapsulated by the bonnet gasket and sealed with holt melt - Prevents corrosion allowing for ease of future maintenance.

12. Key fitted as standard.

11. Gland packing gives a reliable long term seal that can also be adjusted to optimise the torque/sealing performance.

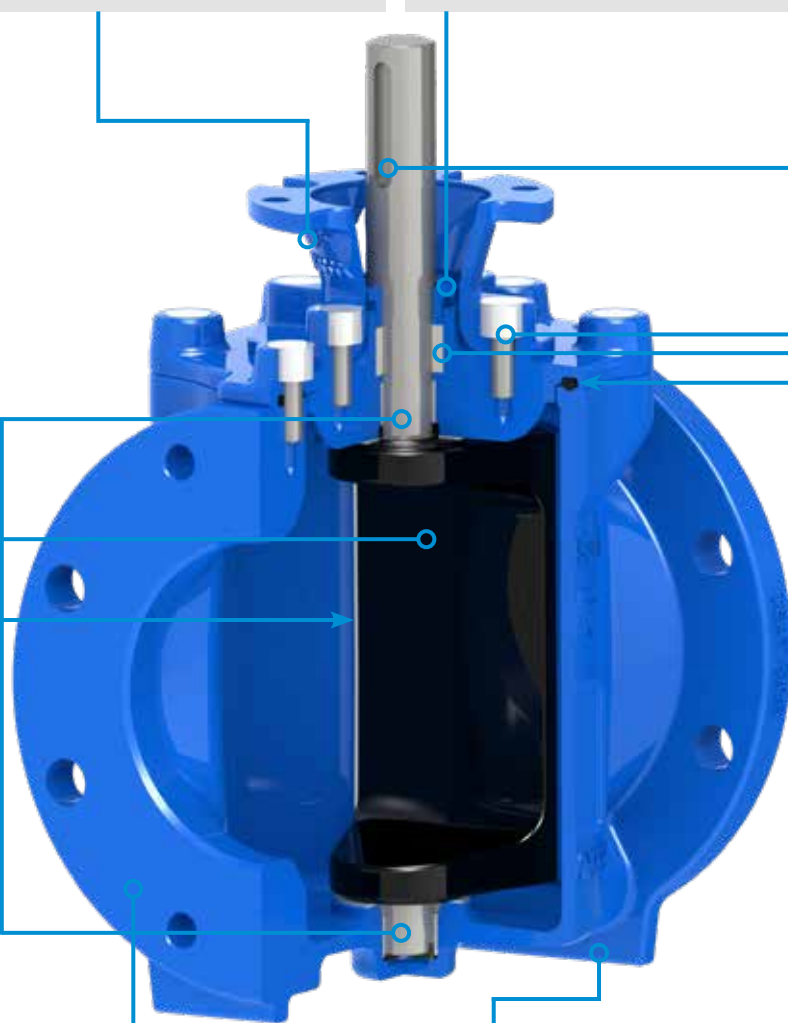
10. Plug extension stems zinc plated - increased corrosion protection.

9. An O-section rubber bonnet gasket fits into a recess in the valve bonnet, preventing it from being displaced by pressure surges.

6. Fusion bonded epoxy internally and externally.

7. Flange feet on larger sizes - easier to transport and offers greater stability and safety.

8. Plugs with integral stems - no corrosion between plug and stem, permanently fixed.



APPLICATION INFORMATION

Installation

The Series 764 eccentric plug valve is suitable for isolation and throttling applications in both directions. It is recommended the valve should generally be installed with the flow acting on the direct pressure side of the valve. Please see images at the bottom of the page which highlight these recommendations. Any installation of this valve type should be done in accordance with the Series 764 Installation, operation and maintenance instructions. Any necessary fittings such as dismantling joints, flange adaptors etc are available from the AVK product offer. Please contact AVK to discuss your exact requirements.

Note: Reverse flow conditions should be stated at the time of order.

Maintenance

The Series 764 eccentric plug valve has been developed to ensure that it provides the optimum performance throughout the duration of its service life. These valves have very low maintenance requirements, details of which are shown in the Series 764 Installation, operation and maintenance instructions.

Design and Construction

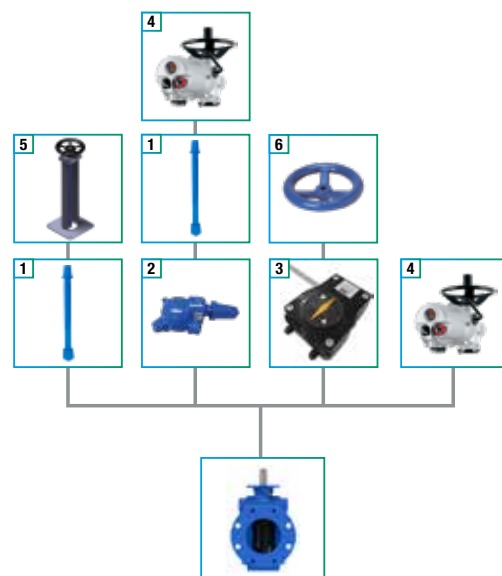
The design and construction of the Series 764 eccentric plug valve has been made in full accordance with AWWA C517. There are a number of design features, all of which are shown on page 4. These features have been included to provide maximum operational performance and flexibility.

Operation

Manual gearboxes and electrical actuation are available to install directly onto each valve using the multi-flexible ISO mounting flange. No additional adaptor pieces or other equipment is required, providing easy and standard fitting of the operator. All accessories such as extension spindles, floor pedestals are available from the AVK product offer allowing the complete operation package to be supplied. Buried service duty is also available and AVK surface boxes can be supplied for these particular applications.

Options

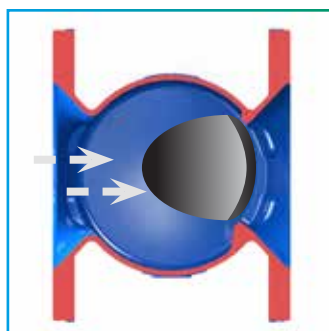
Buried duty and coastal application / aggressive environment / friction collar is available upon request to suit application. Contact AVK to discuss exact requirements.



1. Extension spindle
2. Gearbox
3. Worm gearbox
4. Electrical actuator
5. Floor pedestal
6. Hand wheel

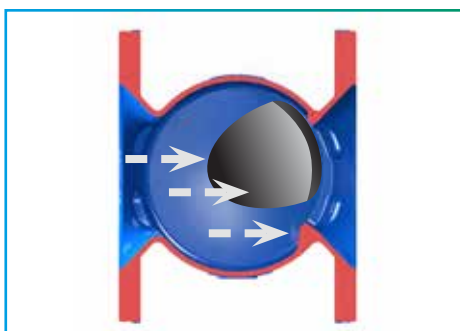
Seat Positions

Due to the design of the valve and the rotary action of the obturator, the Series 764 eccentric plug has many positions giving a range of flow control depending on the system parameters.



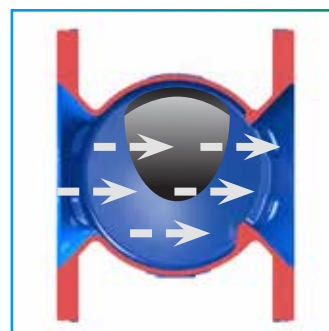
Closed valve position

- Higher differential pressure (direct pressure) forces the plug onto the seat, assisting with drop tight closure.



Partially open position

- From fully closed position, the plug rotates in an anti-clockwise direction away from the seat for instant opening.
- The eccentric (or offset) design helps reduce contact and friction between the plug and seat while opening which increases the longevity of the valve whilst also minimising the operating torque requirements.
- The valve can be used to regulate the flow rate by positioning the plug to the desired opening. For continuous flow control applications, the plug should be a minimum of 20 degrees open.



Fully open position

- When the valve is fully open, it acts as a full bore valve. This ensures minimal headloss occurs across the valve therefore increasing the overall flow efficiency of the system.

ESSENTIAL INSTALLATION INFORMATION

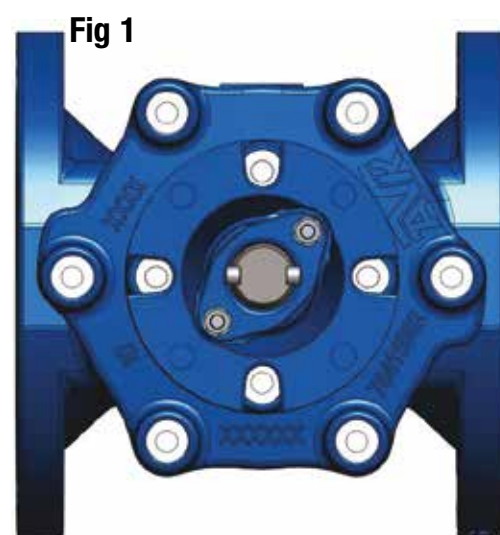


Prior to Installation

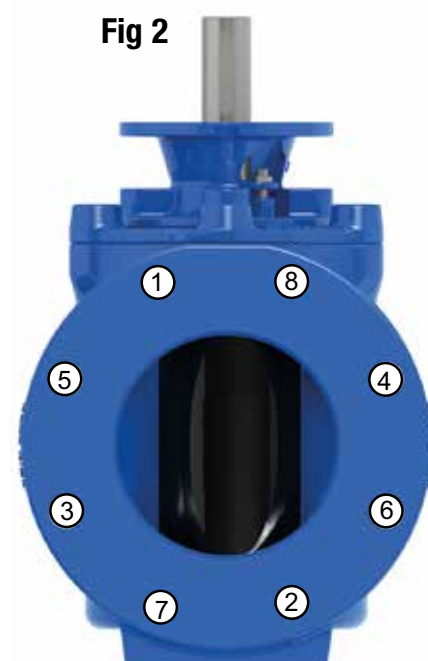
1. Visually inspect each valve for any foreign material in the interior of the valve, and remove it if present.
2. Inspect each valve at the time of receipt for:
 - Damage in shipment.
 - Compliance with specifications, direction of opening, size type of end connections.
 - Visual inspection of the seating surfaces.
 - Any evidence of mishandling during shipment.
 - Each valve should be operated through one complete cycle.

Installation

1. Valves in water distribution lines should, where practical, be located in easily accessible areas. Valve closed and open position can be shown by shaft key position, see Fig1.
2. During installation there is the possibility of foreign materials inadvertently entering the valve. Foreign material can damage the internal working parts during operation of the eccentric plug valves. For this reason, eccentric plug valves should be installed in the closed position. Each valve should be placed on firm footing in the trench to prevent settling and excessive strain on the connection to the pipe. Piping systems should be supported and aligned to avoid damage to the valve.
3. A valve box or vault should be made for each valve in a buried-service application. The valve box should be designed and installed so it does not transmit shock loads or stress to the valve.
4. Special operating provisions should be made for valve valves buried in unusually deep trenches. Gear actuators are recommended for buried valves to hold the valve in position and provide multi-turn closure. The valve should be installed with the shaft horizontal and the actuator nut directed upwards. Either a riser on the stem to permit use of a normal key or a notation on the valve records that a long key will be required.
5. Valves installed above ground or in a plant piping system should be supported and aligned to avoid damage to the valves.
6. Tighten the bolts and nuts in the crossover method shown in Fig.2 to load the pipe and valve evenly and prevent stress on the joints.



- When keys are perpendicular to the flange faces valve fully closed
- When keys are parallel to the flange faces valve fully open



LIQUIDS WITHOUT SUSPENDED SOLIDS

For installations involving liquids without suspended solids, the Series 764 eccentric plug valve can be installed in both horizontal and vertical orientations.

Generally, it is recommended to install the valve with the seat facing the flow direction (see figure on page 3). Before installation, ensure all foreign materials have been removed from the pipeline.

LIQUIDS WITH SUSPENDED SOLIDS

For installations involving liquids with suspended solids, it is important to orientate the valve in such a way to avoid the accumulation of solids inside the valve. Depending on the pipeline orientation, the valve should be mounted as follows:

1. For horizontal installations, it is recommended that the shaft is in the horizontal position with the plug rotating into the top half of the body when fully open and with the seat facing opposite to the flow direction. This prevents the plug from sweeping through settled solids thus protecting the seat and increasing service life of the valve. (See figure 4)
2. For vertical installations, it is recommended that the seat faces in the direction of flow and with the flow acting from the direct pressure side. The plug rotates in the upwards direction until it reaches the fully closed position. This operation prevents accumulated solids draining back into the body. (See figure 3)

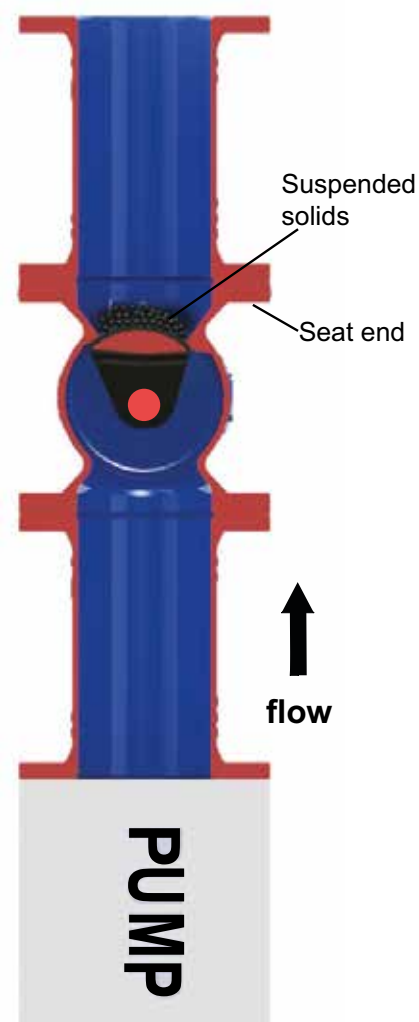


Fig.3 Vertical installation

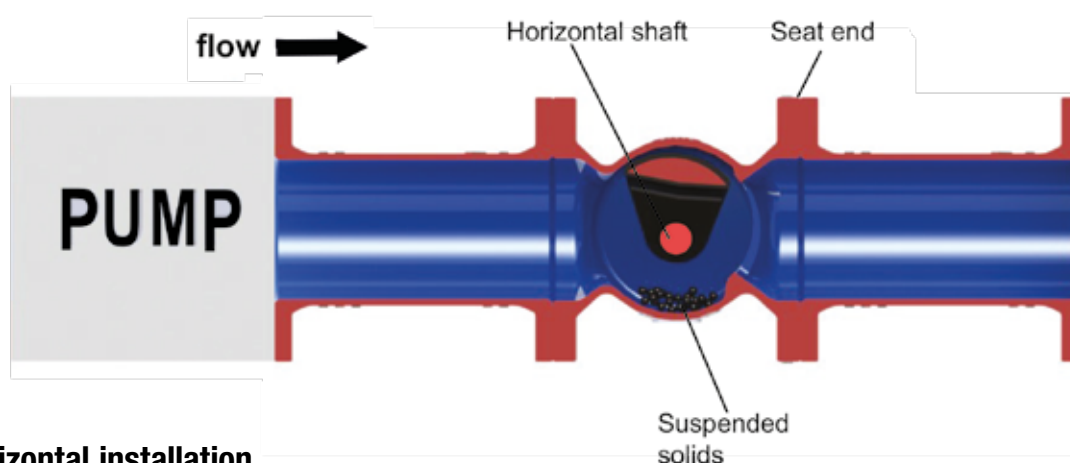
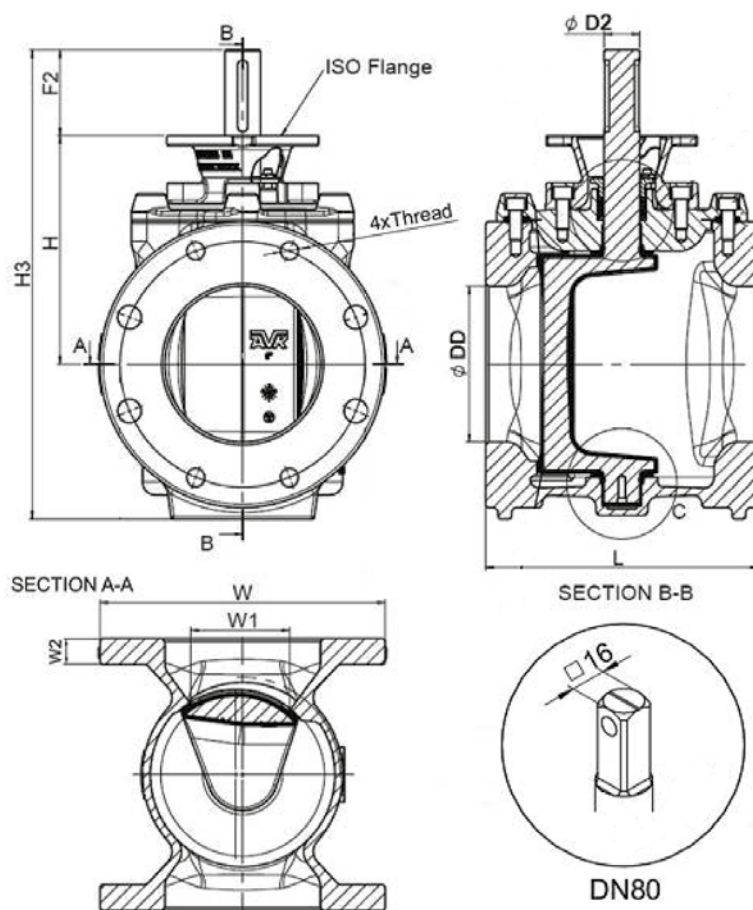


Fig.4 Horizontal installation

TECHNICAL DATA

AVK reference Water Valve	Plug	DN	Dd	L	W	W1	W2	H	H3	F2	D2	ISO Flange	Thread	Key	No. of keys	Weight
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm					Kg
764-080-01-1B36401000	EPDM	80	80	203	200	56.3	19	170	304	34	-	F07	M16	-	-	21
764-100-01-1B36401000	EPDM	100	101.6	229	230	68.6	24	190	367	39	28	F10	M16	45X8X7	2	29
764-150-01-1B36401000	EPDM	150	152.4	267	285	96	25	224	451	40	35	F10/12	M20	60X10X8	2	45
764-200-01-1B36401000	EPDM	200	203.2	292	345	107	28.5	309	628	54	45	F14	M20	80X14X9	2	76
764-250-01-1B36401000	EPDM	250	254	330	405	135	30	367	744	59	55	F14/16	M24	90X16X10	2	115
764-300-01-1B36401000	EPDM	300	304.8	356	485	152	32	419	854	64.7	60	F14/16	M24	90X18X11	2	167

AVK reference Waste Water Valve	Plug	DN	Dd	L	W	W1	W2	H	H3	F2	D2	ISO Flange	Thread	Key	No. of keys	Weight
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm					Kg
764-080-01-1A36401000	NBR	80	80	203	200	56.3	19	170	304	34	-	F07	M16	-	-	21
764-100-01-1A36401000	NBR	100	101.6	229	230	68.6	24	190	367	39	28	F10	M16	45X8X7	2	29
764-150-01-1A36401000	NBR	150	152.4	267	285	96	25	224	451	40	35	F10/12	M20	60X10X8	2	45
764-200-01-1A36401000	NBR	200	203.2	292	345	107	28.5	309	628	54	45	F14	M20	80X14X9	2	76
764-250-01-1A36401000	NBR	250	254	330	405	135	30	367	744	59	55	F14/16	M24	90X16X10	2	115
764-300-01-1A36401000	NBR	300	304.8	356	485	152	32	419	854	64.7	60	F14/16	M24	90X18X11	2	167





Component list

1	Hot melt	-
2	Bolt	EN 4762 grade 8.8 A2A
3	ISO flange	Ductile Iron EN 1563 GJS-450-10
4	Hexagon nut	SS ISO 3506, Grade A4-70
5	Threaded rod	SS ISO 3506, Grade A4-70
6	Washer	SS ISO 3506, Grade A4-70
7	Gland	Ductile Iron EN 1563 GJS-450-10
8	Packing	NBR / EPDM
9	Bonnet	Ductile Iron EN 1563 GJS-450-10
10	Bonnet gasket	NBR / EPDM
11	O-ring	NBR / EPDM
12	Thrust washer	PTFE
13	Bearing	Self lubricating SS backed / PTFE coated bronze
14	Plug core	Ductile Iron EN 1563 GJS-450-10
15	Plug rubber	NBR / EPDM
16	Body	Ductile Iron EN 1563 GJS-450-10
17	Seat	Nickel

Standards:

- Designed according to AWWA C517
- Face to face according to EN 558 Table 2 Basic Series 3
- Standard flange drilling to EN1092-2 (ISO 7005-2), PN16
- WIMES 8.09 compliant

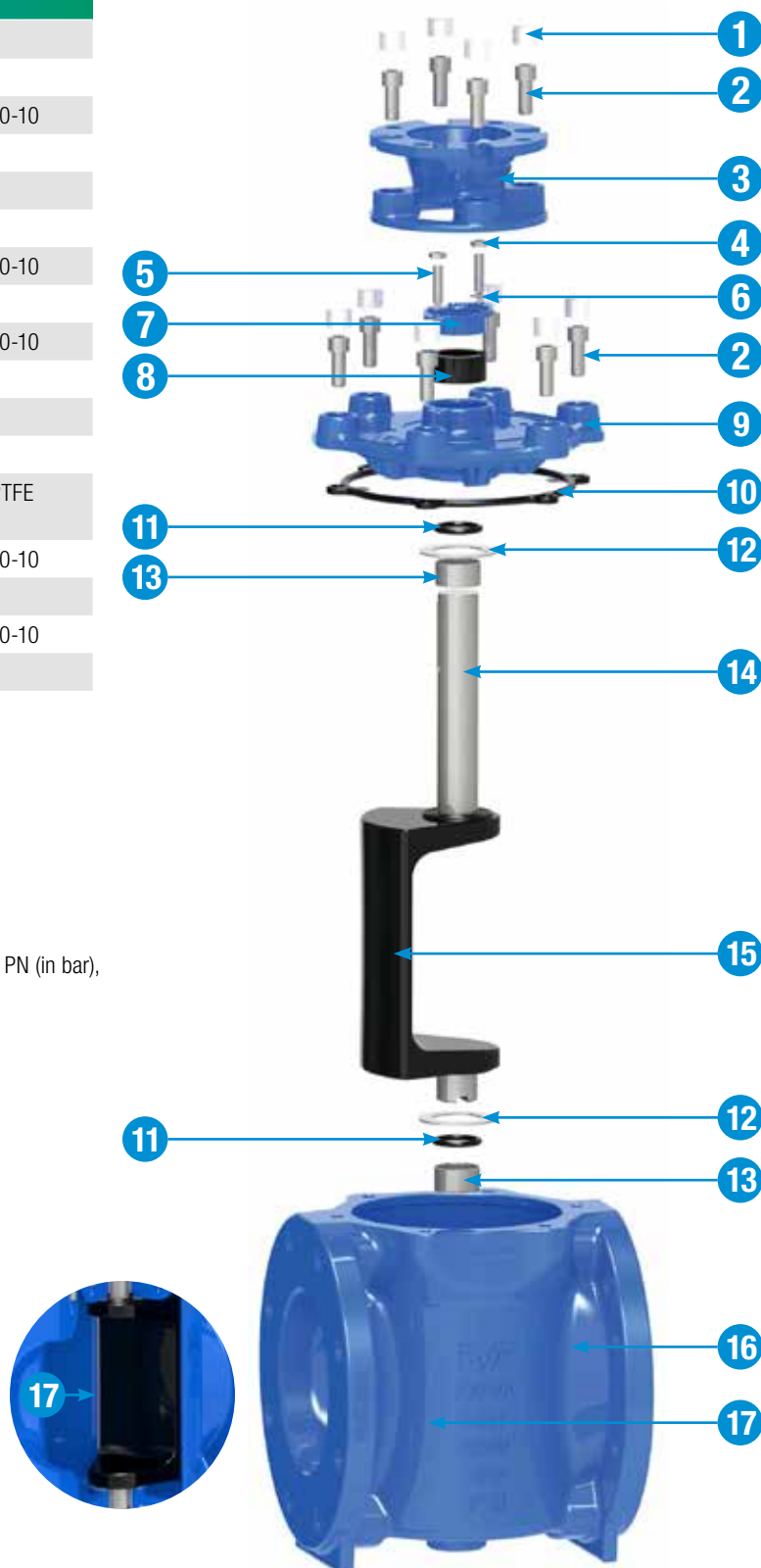
Tests/ Approvals:

- Hydraulic test according to EN1074 / EN12266, seat: 1.1 x PN (in bar), body 1.5 x PN (in bar)
- WRAS approved materials
- Drinking Water Inspectorate Regulation 31 compliant

Considerations to be taken when placing an order:

- Size
- Flange drilling
- Media - installation environment
- Sealing
- Operation (Direction of spindle)
- How the valve will be operated
- Pressure
- Flow Velocity
- Headloss

Please use the Interactive Plug Valve Specification sheet when placing an order, this can be found on page 15 of this brochure or on the 764 product page on our website under downloads.



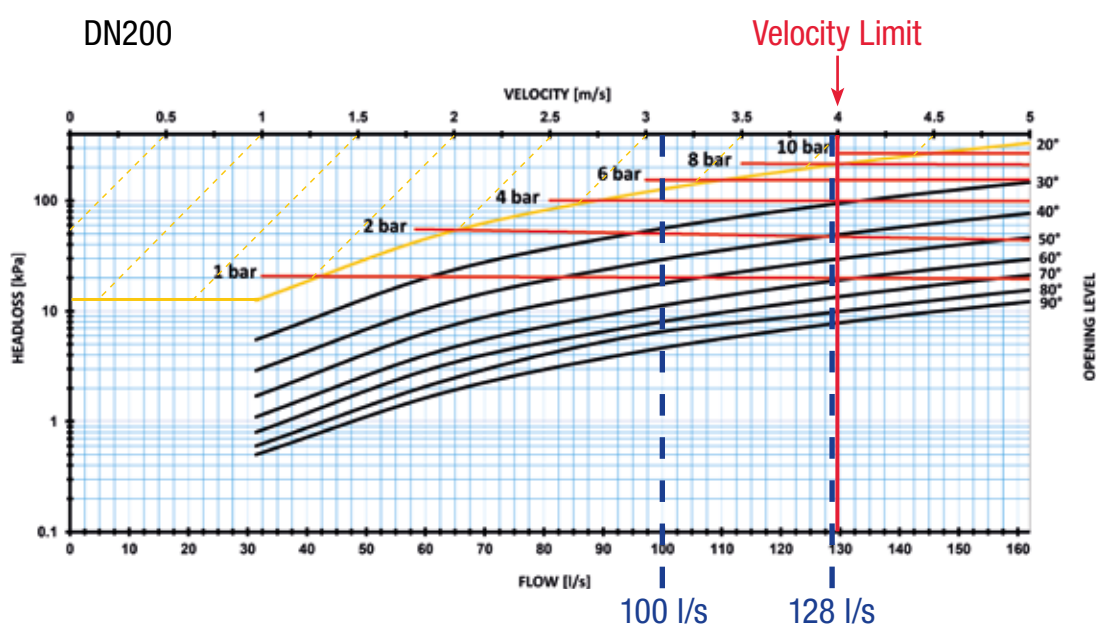
PLUG VALVE SELECTION AND DIMENSIONING

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 considerable 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



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

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

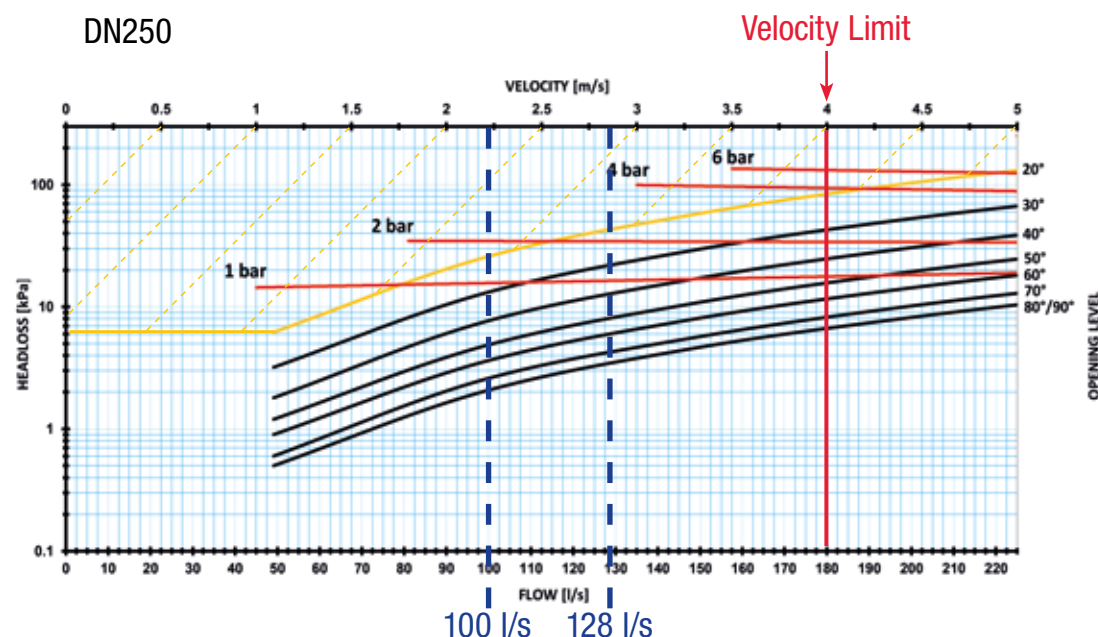
- INLET PRESSURE [bar] = 6 bar
- FLOW RATE normal [l/s] = 100 l/s
- FLOW RATE maximum [l/s] = 128 l/s
- REQ. SIZE by client. = DN200 / 250

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.

DN250

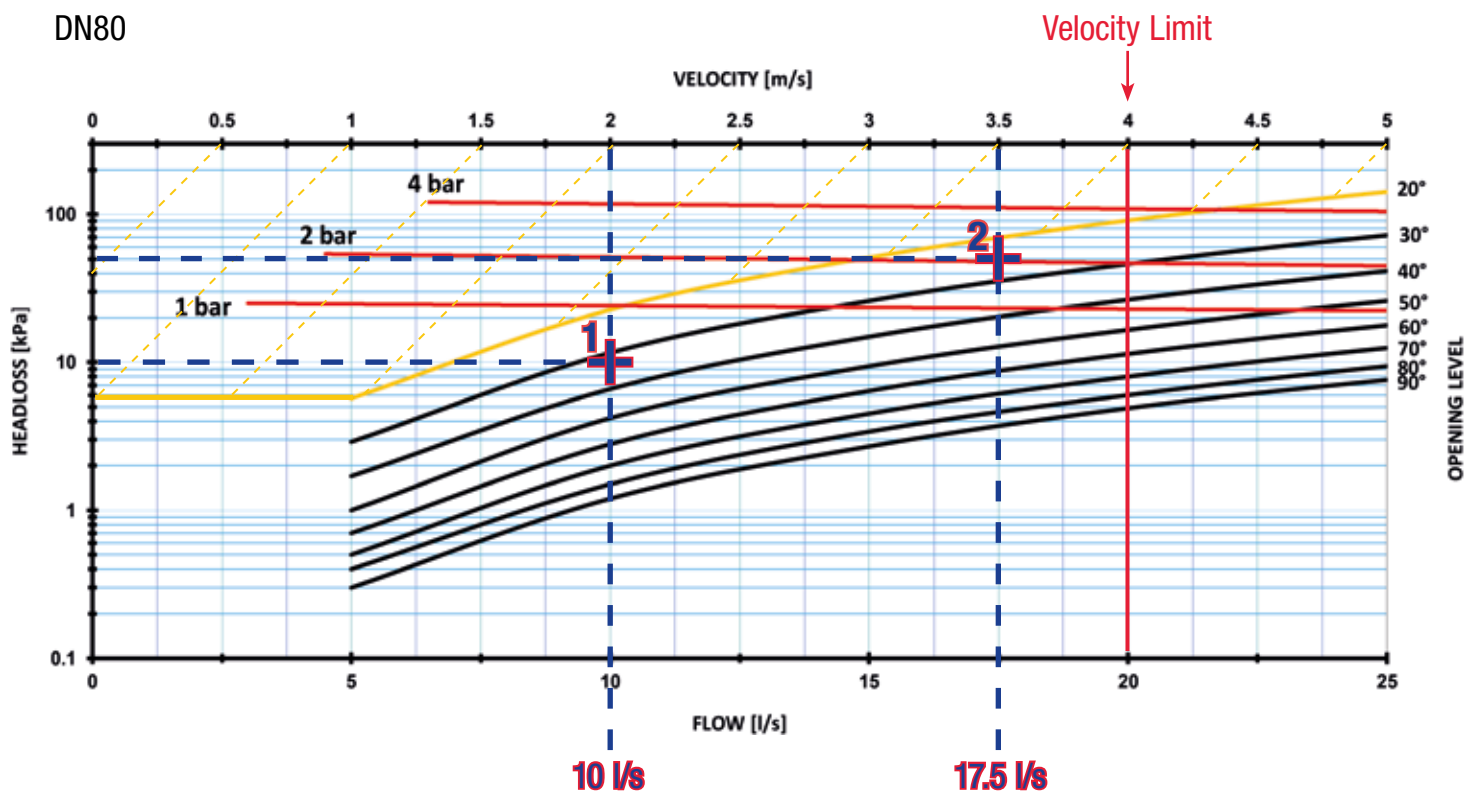




2. Operating conditions example for proper throttling service (cavitation lines):

- 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.

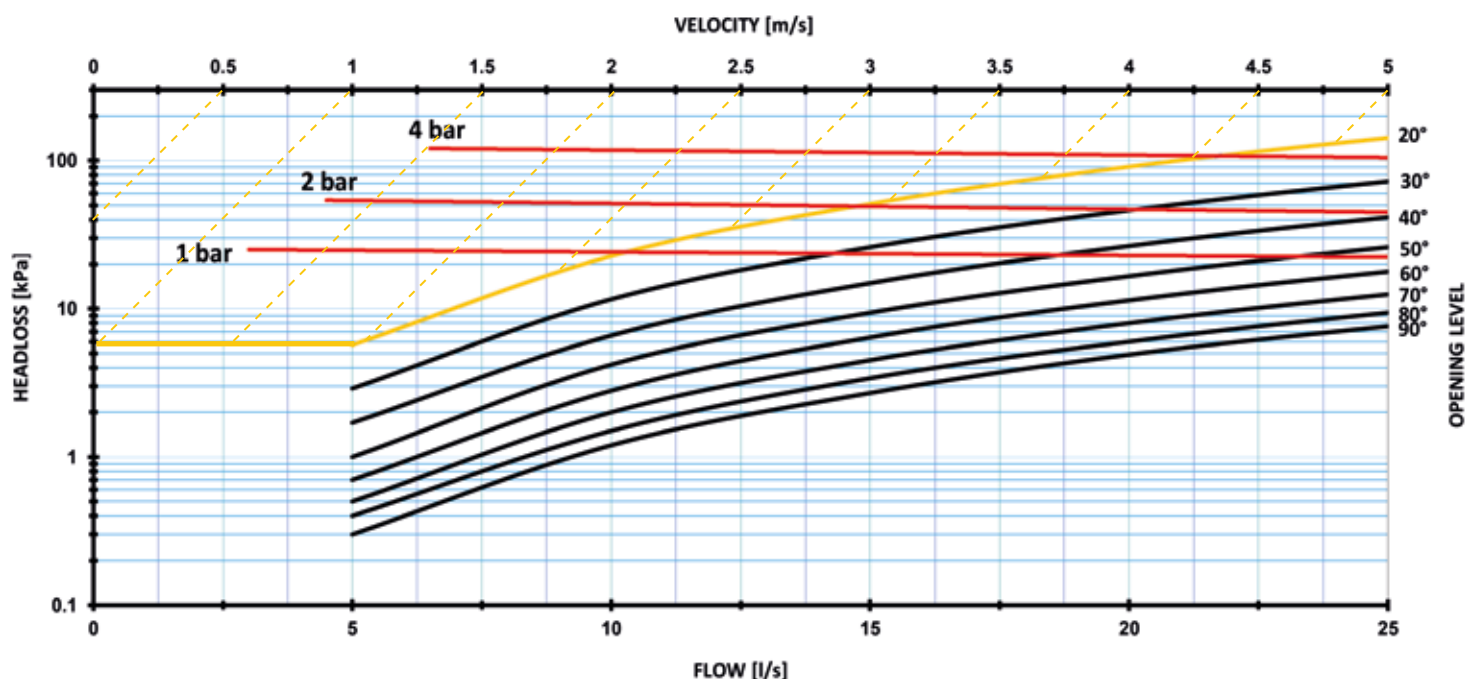
- Points 1 and 2 on the chart for two specific pressure losses and flow rates are located under the red cavitation line for the inlet pressure, this indicates that cavitation will not be a problem. If either of the points are above the red cavitation line there is a risk that cavitation can occur.

- 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.

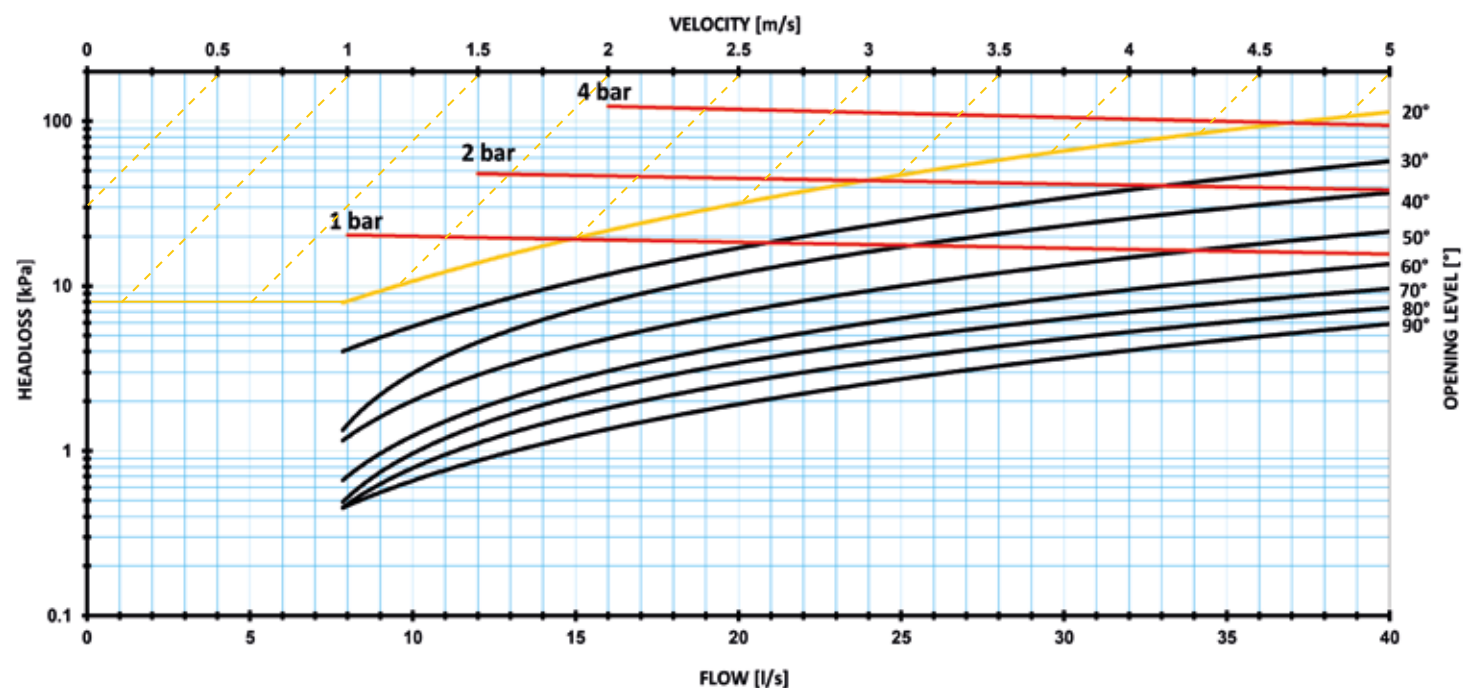


FLOW CHARTS

DN80	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m ³ /h] Excluding pipe headloss	76	108	144	228	279	332	384	459



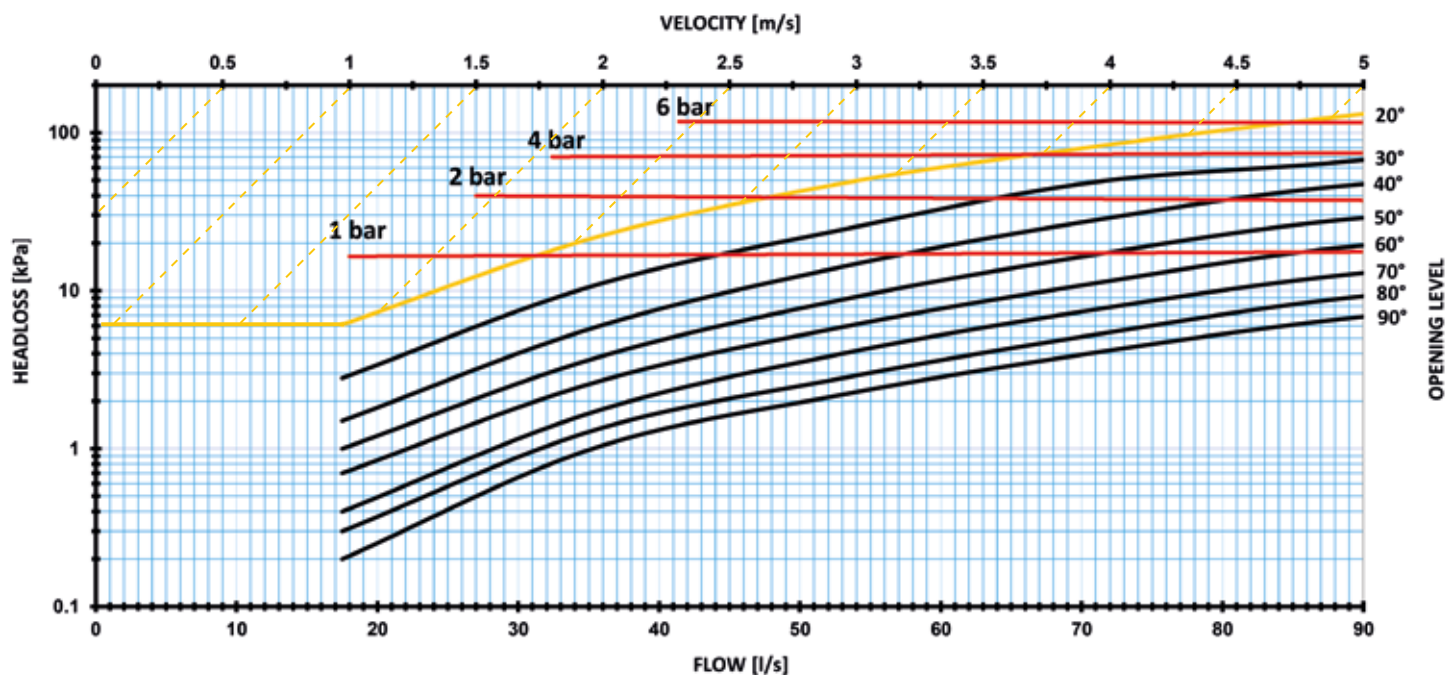
DN100	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m ³ /h] Excluding pipe headloss	137	198	261	346	451	578	675	760



For flow control, valves should **only be** used if the plug is **open to 20° and over**, they should not be used for control at an angle lower than this as represented on the graphs by the **orange** lines.

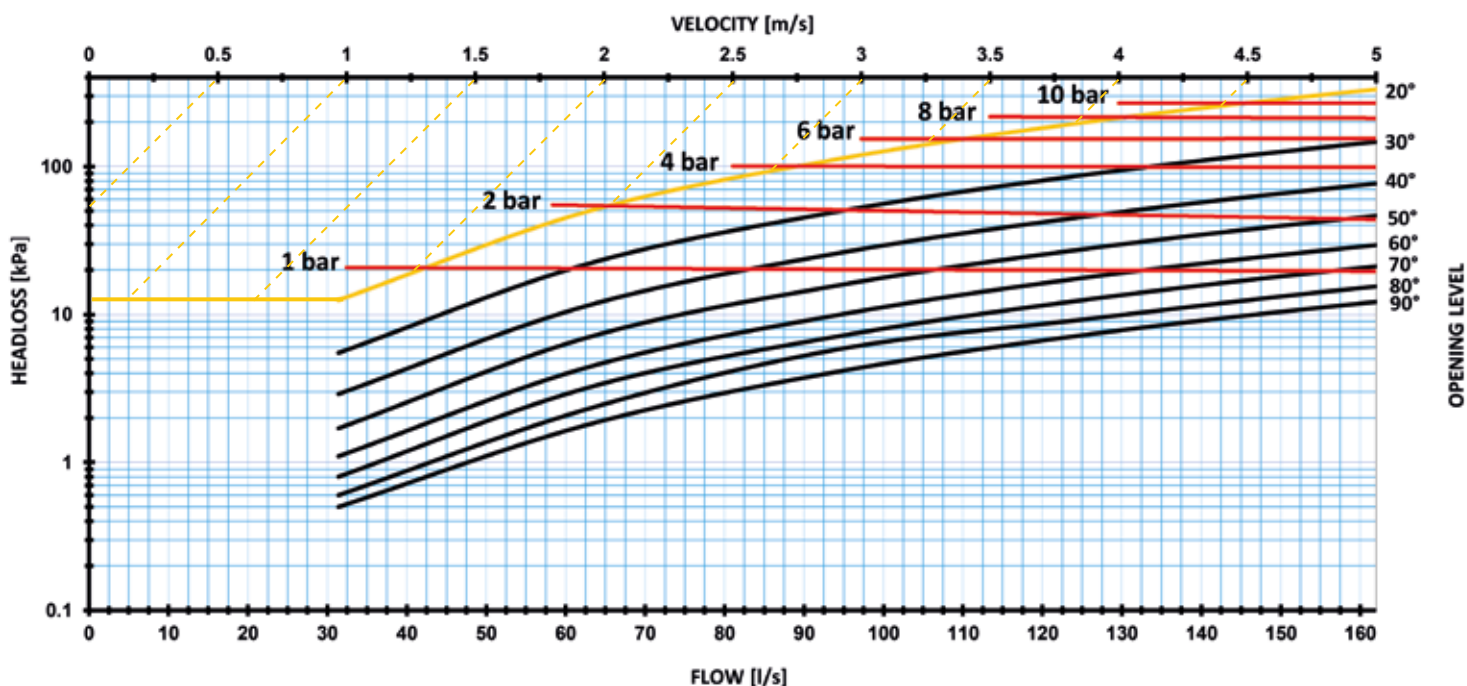
DN150

Position	20°	30°	40°	50°	60°	70°	80°	90°
Kv [m ³ /h] Excluding pipe headloss	285	399	528	833	1007	1245	1468	1548



DN200

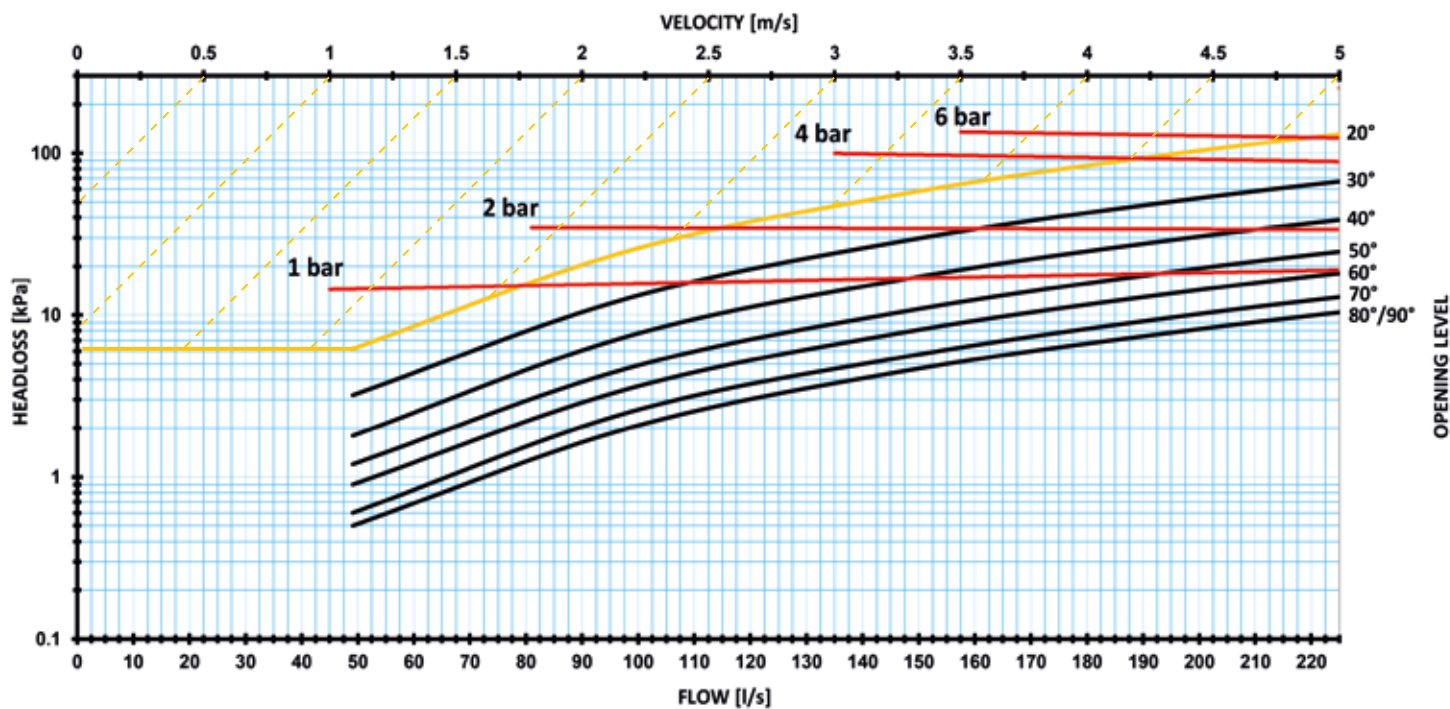
Position	20°	30°	40°	50°	60°	70°	80°	90°
Kv [m ³ /h] Excluding pipe headloss	321	485	675	1112	1337	1592	1832	1844



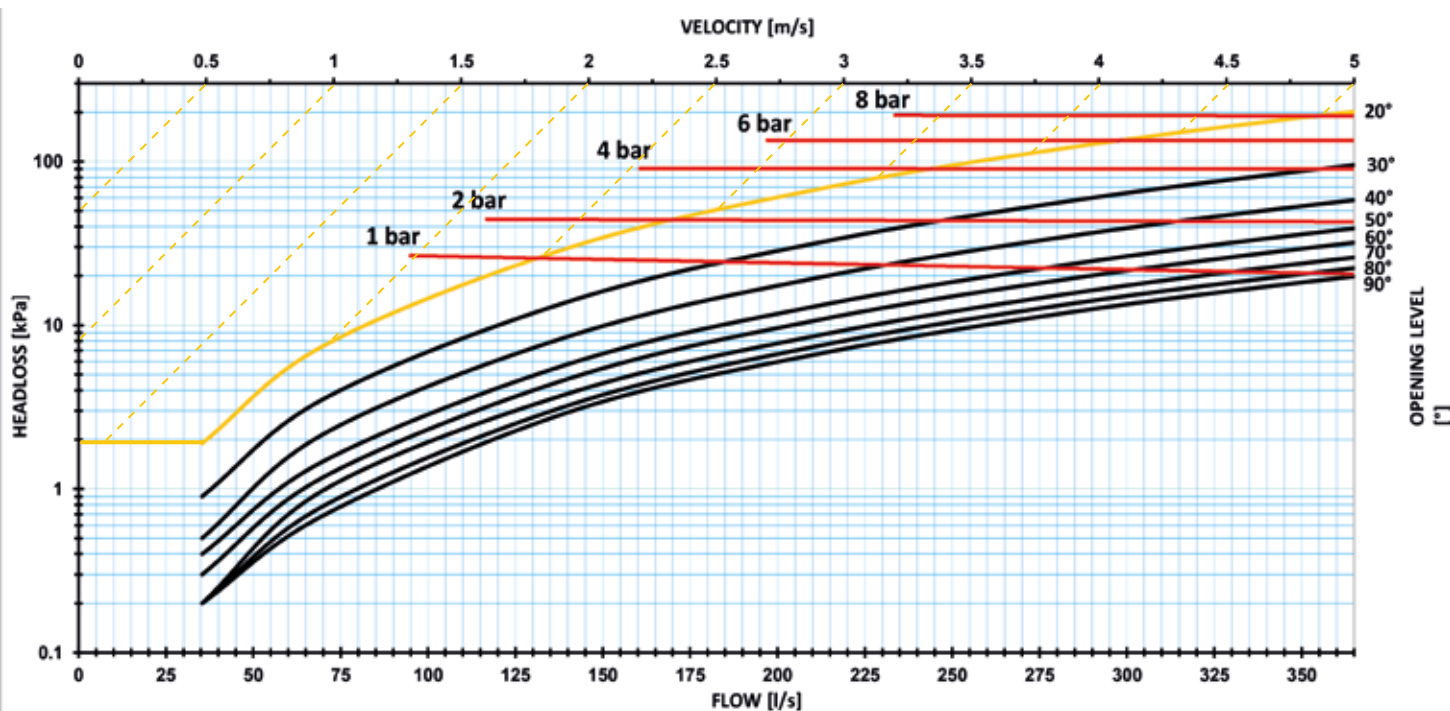


FLOW CHARTS

DN250	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m ³ /h] Excluding pipe headloss	713	1004	1334	2006	2436	2738	2773	2848



DN300	Position	20°	30°	40°	50°	60°	70°	80°	90°
	Kv [m ³ /h] Excluding pipe headloss	929	1360	1749	2391	2670	2895	3075	3081





SERIES 764 ECCENTRIC PLUG VALVE SPECIFICATION

FOR USE WHEN ORDERING

Size (DN)		LNS No (if known)	
Flange Drilling (Circle)	PN10	PN16	ANSI
Media			
Sealing (Circle)	EPDM	NBR	
Orientation - Direction of Spindle (Circle)	Vertical	Angled	Horizontal

Note: Orientation - Refer to page 7 for guidance

Valve to be Operated by (Circle)			
Bare Shaft	Lever Operation	Handwheel	Gearbox
Actuator (Please complete actuation specification sheet)			

Maximum Headloss for Minimum Flow Rate (m)	Maximum Headloss for Maximum Flow Rate (m)

Min Upstream Pressure (Bar)	Max Upstream Pressure (Bar)	Min Downstream pressure (Bar)	Max Downstream pressure (Bar)

Min Upstream Flow [l/s]	Max Upstream Flow [l/s]	Min Downstream Flow [l/s]	Max downstream Flow [l/s]

Nominal Flow [l/s]	Direction of Flow (Circle)	
	Direct	Reverse

Buried Service		Extension Spindle Req		Dismantling Joints Req	
Yes	No	Yes	No	Yes	No

Number of open/close cycles	Day	Week	Month	Year

Other Requirements - Additional Options

Documentation (Special O&M's, Drawing, Test Certification, BIM files available at additional cost)

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