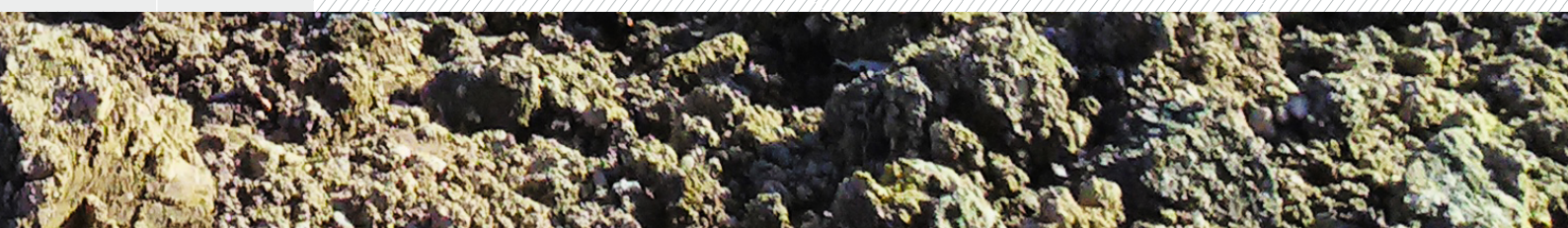
AVK GROUP Water Transmission Pipelines - Valves & Pipeline Accessories

WATER TRANSMISSION PIPELINES - VALVES & PIPELINE ACCESSORIES



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INTRODUCTION TO THE AVK GROUP

AVK are world leaders in the design, manufacturing, marketing and sales of high performance, high integrity valves and fittings for use in Water Transmission Pipelines.

From dams/reservoirs – transmission pipelines (also known as: bulk water - trunk mains - water transfer/conveyance pipelines) - treatment plants - pumping stations and distribution networks, down to the individual house connection.

Our product specialists carry out design and development in our state of the art technology centre in Denmark while sales and distribution are handled by local AVK sales companies, agents and distributors worldwide. Production and sales take place via the AVK Group's network of more than 100 companies in 85 countries across Europe, the Middle East, North and South America, Australia, Asia and Africa.

Our expansion has led to a comprehensive product range and an efficient global sales network which supports our dedication to growth and continued improvements. Company acquisitions that have strengthened AVK's Product Offer for Water Transmission Pipelines include Glenfield Valves (Scotland), Orbinox (Spain), AC.MO S.r.l. (Italy), Premier Brand (South Africa) and Gunric Brand (South Africa) Johannesburg.

Our products comply with, and often exceed, the highest standards of safety and durability and are in accordance with all common national and international standards.

Our comprehensive product range and global presence enables us to comply with project restrictions related to package supply as well as country of origin.

INTRODUCTION & DEFINITIONS
WATER TRANSMISSION PIPELINES

The transport of water from storage facilities to distribution networks takes place through water transmission pipelines. The pressure is created either through gravity or through associated pumping stations.

The water is channelled from the source, such as a reservoir, to water treatment plants and then usually pumped into service reservoirs and distribution networks to private homes and industries.

Typically water transmission pipelines are constructed using concrete pressure pipes, ductile iron pipes, steel pipes or GRP/GRE pipes. At the lower end of the dimensional range plastic pipes (such as HDPE) may be used.

The pressure rating of transmission pipelines is often that of PN10 or PN16 bars, however the AVK Group's product offering also covers higher pressure applications. This is essential when conveying water over very long distances and/or in mountainous landscapes

There are various historical design reasons as to why individual authorities & consulting engineers may prefer different valve designs. Some designers are more comfortable with gate valves others with butterfly valves - and within each valve category there are also alternative design options available.

AVK and its associated companies manufacture valves and pipeline accessories for all elements of the application process. Detailed technical information for each type of valve is available in our product data sheets and other technical documentation – these can be found on our websites.

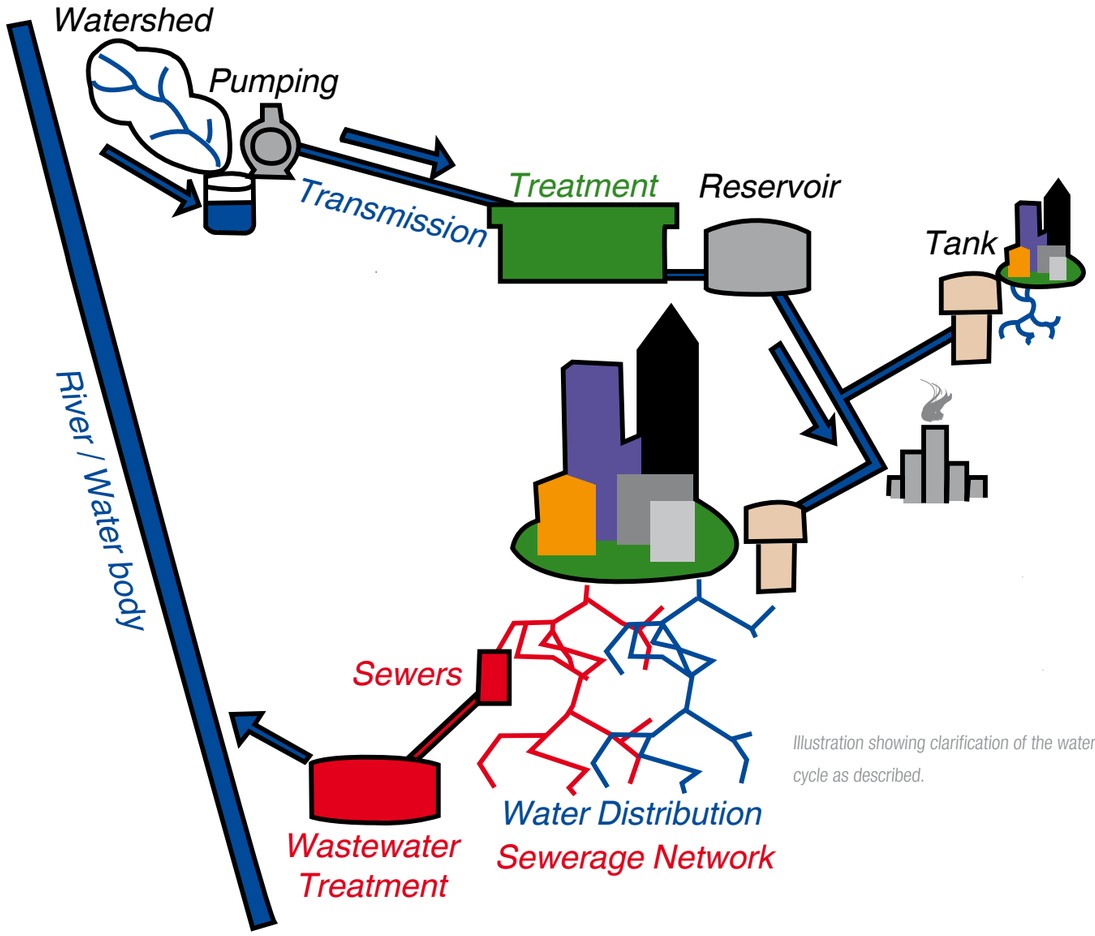

Illustration showing clarification of the water cycle as described.

SELECTED REFERENCE LIST
PROJECT LISTINGS

Middle East Supplies include:

- Qatar: GTC 45, Project Owner: KAHRAMAA (2005-2007).
- Kuwait: Ministry of Electricity & Water – i.e. Subiya C1 project - Phase 1 & 2 (2004-2006).
- Iraq: Hilla Pipeline Project, Mosul.
- Qatar : Ras Laffan B Water Transmission Pipeline (88 km DN1400 & DN1600). Project owner : Kahramaa. Butterfly Valves and Control Valves. (2005-2007).

Asia Supplies include:

- Singapore: Public Utilities Board (PUB). A significant amount of various large dimension butterfly valves supplied since 1982.
- India: HUUDA Transmission Pipeline Project. Project owner: HARYANA URBAN DEVELOPMENT AUTHORITY Janakpuri, New Delhi. Gate Valves up to DN1600. (2012).
- India: Kaleswaram Project, Nizambad District. Butterfly valves up to DN2400
- Malaysia: Transmission Pipeline of Nyabau WTP (Phase I&II) at Bintulu Sarawak. Butterfly Valves up to DN1000 & Check Valves. (2014).
- Malaysia: Bekalan Air Kuantan Fasa III Pakej 7. Butterfly valves up to DN1600, Gate Valves & Air Valves. (2014).
- Malaysia: Bukit Jelutong Booster Pumping Station. Butterfly valves up to DN1500 & Gate Valves up to DN1200, Check Valves & Air Valves. (2015).
- Malaysia: Skim Sungai Semenyih. Butterfly Valves & Gate Valves up to DN1600. (2016).
- Brunei: Transmission Pipeline from Bukit Barum 7 WTP Negara Darussalam. Butterfly Valves up to DN1200, Gate Valves, Check Valves & Air Valves.
- China: Hangzhou Qiandao Late Water.. Large Butterfly Valves & Gate Valves. (2017-2019).
- China: Water Transmission Pipeline to Nanjing from Nanjing BEIHEKOU Water Treatment Plant. Butterfly Valves up to DN2800. (2015).
- China: Taizhou Raw Water Pipeline Project. Project owner: Taizhou Binhai Water Co. Ltd. Butterfly valves up to DN2400. (2020).

SELECTED REFERENCE LIST
PROJECT LISTINGS

UK Supplies include:

- Scotland: Amlaird Pipeline 50+ Air Valves, Gate Valves up to DN1000, PN16 and PN25 and Hydrants. (2017).
- Scotland: Dalmacoulter Resilience Scheme: 4 DN800 S55 Resilient Seated Gate Valves and 9 DN900 Metal Seated Gate Valves (2017).
- Edinburgh South: 32 x DN700 S54 Gate Valves, 40+ Air Valves (2018).
- Scotland: Highlees: 20+ DN900 S54, PN16 & PN25. 20+ Air Valves and Recoil Check Valves (2019).
- Huntingdon (Grafam Resilience) Anglian Water 40+ AV's DN800 & DN900 Pipeline .
- WIGIS (Thirlmere) United Utilities. Western Infrastructure Gateway Integrated System DN900 Pipeline 80+ AV's.
- Old Stratford to Kiln Farm (Anglian) 4 x 700mm gates, 4 x 800mm gates.
- Stratford A1/M11 Link (Affinity) 13 x 700mm gates.
- Oldham to Royston (UU) 24 x 600mm gates.
- Chertsey (Affinity) 19 x 600mm gates.

American Continent Supplies include:

- Mexico: Colorado River Tijuana Aqueduct (ARCT Project) – several project phases, Gate valves up to DN1800. (2010).

Australian Supplies Include

- Bulk water infrastructure at Aspley Reservoir site, South East Queensland. Project owner: Segwater. Butterfly Valves up to DN1600. (2018.)
- Transmission pipeline from Stirling Dam connecting to an existing pipeline near Harris Dam, Western Australia. Butterfly Valves up to DN900. (2017)
- Transmission pipeline from Hope Valley storage site, South Australia. Project owner: SA Water. PN25 rated Butterfly Valves up to DN1200. (2017).

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SELECTED REFERENCE LIST
PROJECT LISTINGS

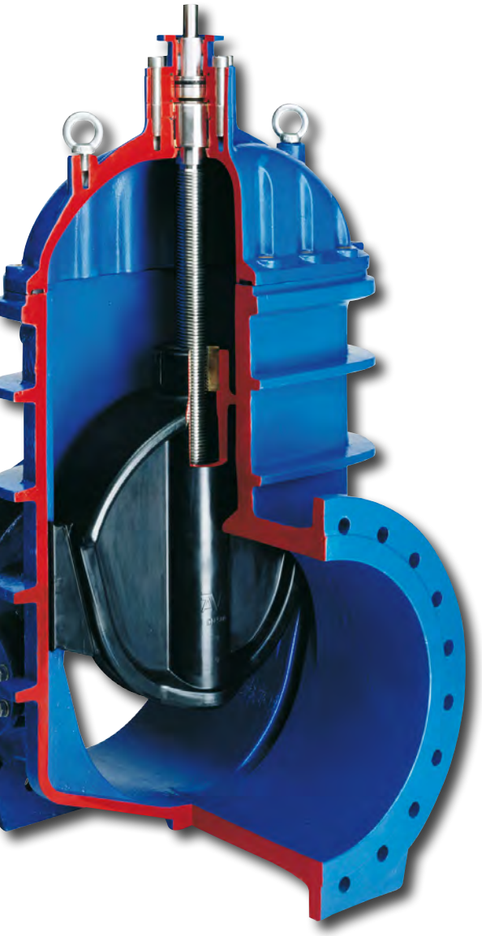
Continental European Supplies include:

- Germany: Airport Berlin Brandenburg International (2006/07).
- Holland: Water companies in Zeeland, Gelderland, PGEM, DWL, EWR, Rotterdam, Overijssel, Zuid from 1966 till now.
- Finland: Turku Water (Turun Seudun Vesi Oy) - water transfer pipeline Huittinen-Turku (2008).
- Austria: Vienna Fernwasser Torgau. Valves up to DN1200.
- Belgium: Transmission Pipeline Aalst to Gent. Project owner: Farys. Gate valves up to DN900 and dismantling joints. (2017).
- Finland: 900 km Water Transmission Pipeline up to DN1200. Helsinki Water
- Germany: Transmission line from water reservoirs to the clean water pump stations of the Walddörfer Waterworks, Hamburg. Butterfly valves up to DN1000. (2016).

African Continent Supplies include:

- Tunisia – SOCOOPEC. Needle Valves etc. (2010-2020).
- Botswana: North South Carrier Pipeline, 360 km. Project owner: WUC. We supplied the valves for initial stage around 1998 – and at 2nd phase in 2014. The largest engineering project ever taken place in Botswana. Gate Valves, Butterfly Valves, Check Valves, Control Valves & Air Valves supplied. Up to DN1600 valves.
- Botswana: Serowi Water Supply Project. 59 nos PN25 rated DN600 Gate valves. (2010).
- Ghana: Upper Volta River transmission system. Project owner: Ghana Water Ltd Co. Gate Valves, Butterfly Valves & Air Valves. (2015/2016).
- Ghana – Winneba Water Transmission Pipeline.
- Uganda: Kampala - Katosi water transmission system.Project owner: NWSC. Butterfly Valves, Gate Valves, Air Valves, Pipe Couplings. (2018/2019.)
- Nigeria: Abuja Water Supply System, Transmission Pipeline to Lower Usuma Dam Treatment Plant, Project Owner: Federal Capital Development Authority. . Gate Valves & Butterfly Valves (up to DN1500). (2006-2010).

LARGE DIAMETER GATE VALVES
RESILIENT SEATED DESIGN



The AVK resilient seated gate valve, sizes DN600, 800 and 1000 are part of the AVK range of high quality gate valves available with pressure ratings of PN10, PN16 and PN25.

Unlike most other large diameter gate valves the AVK valves are resilient seated. AVK were one of the first manufacturers designing and manufacturing resilient seated gate valves, and have more than 35 years of experience.

AVK focuses on safety, and therefore we recommend installation of by-pass for slow filling and balancing of pressure and to prevent water hammer in the system.

After pressure compensation, the main valve can be easily opened. If a pipeline is to be emptied due to leakage or for inspection, the by-pass can be used to drain the pipe slowly thus avoiding collapse of the pipe due to vacuum.

The rubber is vulcanised to the ductile iron wedge by AVK GUMMI A/S, one of the world's leading manufacturers of high technology moulded rubber components. The rubber also protects the wedge against any risk of corrosion, thus increasing the lifetime of the valve.

Valves within this dimensional range can be delivered to all international standards.

LARGE DIAMETER GATE VALVES
METAL SEATED DESIGN

The wedge gate valve is available in sizes up to DN2200. The valves are designed in accordance with the main international standards, e.g. EN, BS, DIN, AS, AWWA, WIMES etc.

The valves are usually constructed in ductile iron with bronze seats and a stainless steel stem. They are protected externally and internally with appropriate coatings.

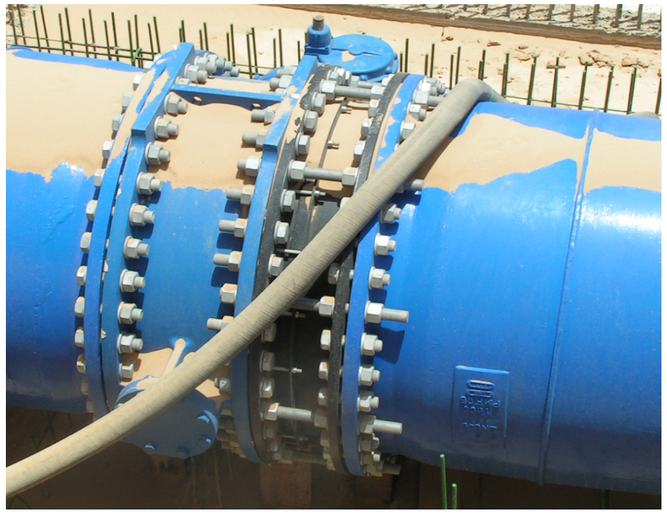
Each and every valve is thoroughly tested before it leaves our production facilities. Shell (body) and seat tests naturally comply with national and international standards.

We supply PN10 and PN16 rated valves as standard – and up to PN50 in certain dimensions/ applications. For AWWA we can supply 150 PSI, 250 PSI and up to 300 PSI nominal working pressure.

A gate valve (also applicable for resilient seated executions) has much lower head loss than a butterfly valve and therefore consumes less energy during system operation. The annual energy savings that result from using this design gate valve over a butterfly valve are therefore considerable. The full open headloss coefficient for large gate valves is in order of 0.05 against 0.18 for butterfly valves. The energy saving is proportional to this.

The gate valves are also suitable for pipe pigging and for higher velocities in full open position compared to most other isolating valves. This valve design is also suitable for other segments/ applications.

LARGE DIAMETER BUTTERFLY VALVES
DOUBLE ECCENTRIC DESIGN



The double eccentric butterfly valve is well suited for water supply applications, used for their strength and resistance even at high pressure They are available in PN10, PN16, PN25 and PN40 up to a maximum of DN3600. Designed with tilted and fixed disc for extended service life and easy operation.

All of our butterfly valves are manufactured and tested to internationally recognised standards

We offer one of the widest ranges of butterfly valves on the market reflecting our customers' needs. And of course, we offer a wide variety of material configurations for each of these types as well as any type of actuation. This means we can supply the right valve for your application.

Butterfly valves are not designed for throttling but for fully open - fully closed service. If temporary throttling is required please consult us for further information.

LARGE DIAMETER BUTTERFLY VALVES
TRIPLE ECCENTRIC DESIGN

Our metal seated, triple eccentric butterfly valve is available in dimensions up to DN2500 and pressure ratings up to class 900 (160 Bar).

The Gunric Triple Eccentric Butterfly was first designed and manufactured in South Africa. It was also the only manufacturer of this valve type on the African Continent. The design utilises triple offset geometry to achieve precise contact between disc seat and body seal in the full shut off position, without any rubbing or gauling.

Butterfly valves are commonly used in waterworks and industrial application for isolating duties either in the fully closed or fully open position.

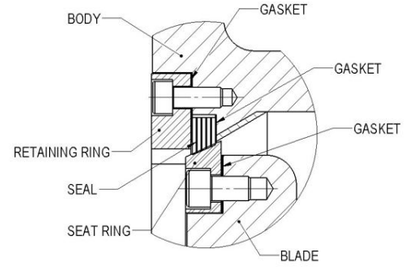
The valve may also be used for regulating duties. Sealing arrangements may vary to suit the various duties.

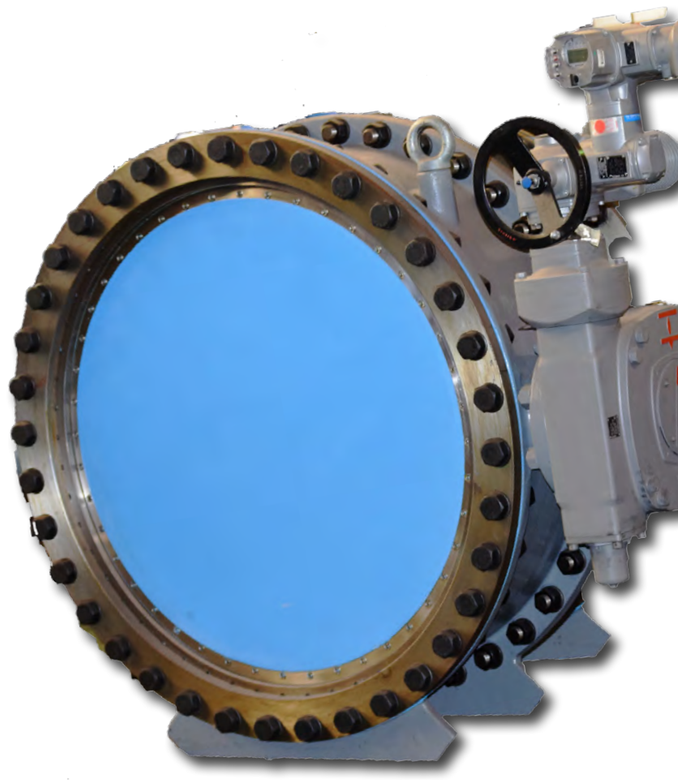
The seal of a Triple Eccentric Metal Seat Butterfly Valve is obtained by means of a laminated or solid metal seal (Seal Ring) secured to the edge of the body by a retaining ring and seating on a corresponding metal seat (Seat Ring) in the body.

Triple eccentric butterfly valves are made of high grade materials making them suitable for use in critical applications, such as water transmission pipelines with high pressure rating requirements. An area of installation where breakdown and maintenance can cause critical interruption of supply of water to an entire city.

The minimum valve opening and thus minimum flow rate required should be obtained with a blade angle of not less than 20 degrees from the fully closed position. Angles less than this result in excessive velocity, vibration, cavitation and damage to the valve.

It is this bi-directional tight shut off feature that enables it to achieve a long, low maintenance service life in general water applications, as well as providing optimal performance and durability in severe service process environments.





LARGE DIAMETER BUTTERFLY VALVES
CONCENTRIC DESIGN

Our concentric butterfly valves with fixed liner feature an outstanding seating concept. The rubber is injection moulded directly on the valve body forming a permanent bond. Aviailable up to DN3000, in PN10 and PN16 pressure ratings.

Consequently, there is no risk of deformation or dislocation of the liner making the valves suitable for negative pressure, under vacuum conditions. The combination of the profiled disc edge and the excellent AVK rubber quality ensures maximum durability of the liner.

Butterfly valves are suited for almost all applications. Tailored to market needs - such as reliability, no maintenance and long service life AVK have developed a complete range of industrial butterfly valves. Experience, continuous research and development has enabled us to innovate the range of butterfly valves to provide maximum efficiency.

In addition to our standard design, a variety of optional material combinations are available on request. Technical assistance in the correct selection of suitable materials is part of our service. All our butterfly valves are designed in accordance with the latest international standards and environmental requirements.

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CHECK VALVES
TILTING DISC, SWING CHECK AND RECOIL DESIGN

Check valves are often referred to as non return valves, as they prevent reverse flow. In many pumped installations the switch from forward to reverse flow is very rapid resulting in harmful “water hammer”.

Check valves must therefore close very quickly, before reverse flow of the fluid column is established i.e. valves must close the instant forward flow ceases. Our High Performance tilting disc check valve, swing check, reflux and non-slam recoil valves are designed to work in extreme conditions.

AVK can supply check valves in either metal seated (up to DN1000, PN 16/25) or resilient seated design (up to DN300, PN 10/16). The resilient seated design protects the disc against corrosion and ensures drop tight closure, low noise and long life. Our metal seated reflux valve complete with one piece body is constructed from S.G iron with metal seats, offered in bronze or stainless steel, self-closing with multi door options, available up to DN400 with a maximum Pressure rating of PN50

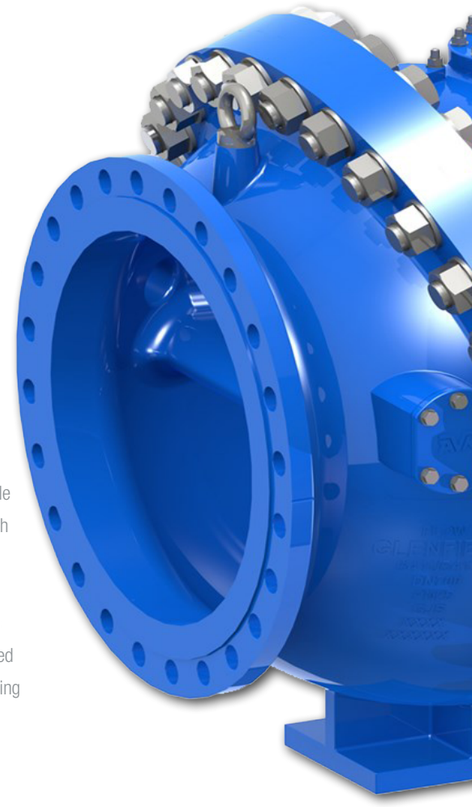
The tilting disc check valve (up to DN2500, PN40) features eccentric shafts and metal-to-metal sealing. This ensures tight shut-off and efficient handling of various mediums.

Optional externalhydraulic damper cylinders can be fitted to prevent the disc from slamming shut, ensuring smooth closing.

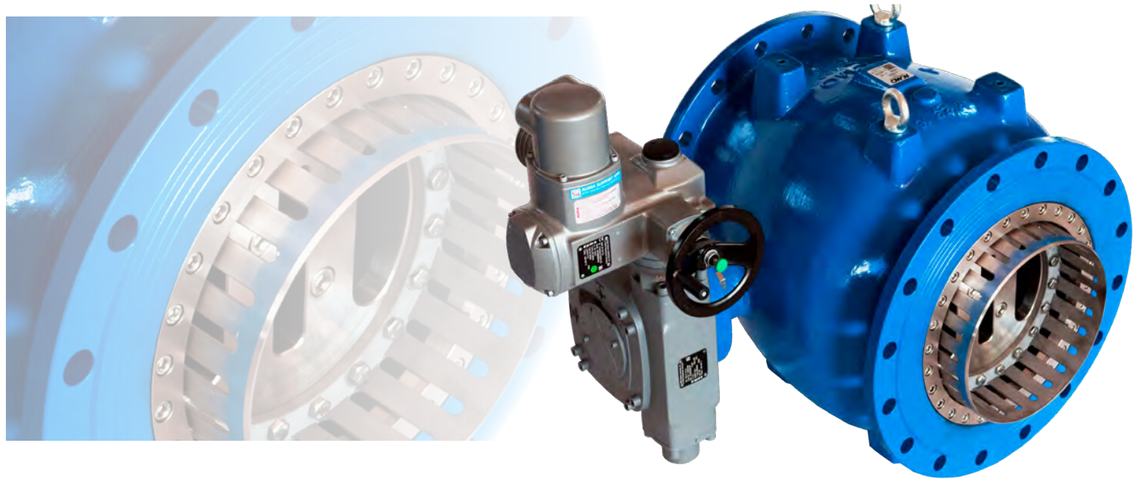
Typically swing check valves are installed in pumping or gravity systems in which sluggish to moderately brisk flow reversal can occur. These are generally described as systems with low deceleration gradient and often comprise of single pump installations having low to moderate branch velocities.

AVK also manufacture check valves in flangeless wafer type design (Type ECV). This design supplied with bonded rubber seat in body – and a self acting pivoting double disc.

Headloss and valve characteristic graphs are available upon request.



NEEDLE VALVES
PRECISION FLOW CONTROL



The control of flow within a pipeline can vary from moderately to extremely severe and involves difficulties such as vibration, cavitation, erosion and scouring.

Our needle valves are designed for regulation or throttling of water at high flow rates and pressure in piping systems for water supply. The focus is on durability and reliabilty with the sturdy valve housing made of either stainless steel for or ductile iron coated with fusion bonded epoxy. It regulates with high precision and the high quality materials guarantee long service life with easy maintenance access.

Needle valves, sometimes referred to as plunger valves, enable engineers to finely control flows. This precision is achieved through the fine movement on the needle/plunger which enables the gearbox to open or close the internal sleeve in small and accurate increments to the desired position.

Needle valves require very low operating torques as they are always in hydraulic balance i.e. there are equal and opposite forces at play internally at all valve positions.This feature significantly reduces actuator and gearbox costs.

AVK needle valves could effectively be referred to as ‘maintenance free’. Depending on operating conditions, after extensive use over many years, the guide strips through which the needle passes may possibly show signs of wear.

The AVK design allows these guide strips to be removed and replaced thereby extending the longevity of the valve. In alternative designs where the guide strips are welded in position the likelihood is that the whole valve will need to be removed and replaced at a considerably higher cost.

The needle valve is manufactured by AVK’s Italian subsidiary (ACMO).
Available in PN10/16/25/40/64
DN80-DN1600 (Note: DN1800 and DN2000 available upon request).

AIR VALVES
MAXIMISING AIR EFFICIENCY

Freely dissolved air exists in all fluid transmission systems. The principal sources for this air are;
1. Incomplete filling of the line - which leaves air pockets in high places.
2. Air dissolved in the fluid that is released when the pressure drops and/or there is a rise in temperature.
3. Vortexes in the fluid, at the points where it is pumped, introduce air into the system.
4. Air is sucked into the system through openings and accessories

Air valves should generally be used whenever there is a rapid change in velocity i.e. water pump or at high points in the system as air tends to move upwards and will therefore naturally accumulate at the highest points in the system.

AVK double orifice, air valves are designed for automatic rapid pipe filling and pipe draining as well as for automatic discharge of accumulated air during normal working conditions. The unique ‘Aerokinetic’ design, where air rushing out of the system cannot force the float upwards and close it prematurely, makes sure that the valve closes only after all air has left the system and water has entered the chamber.

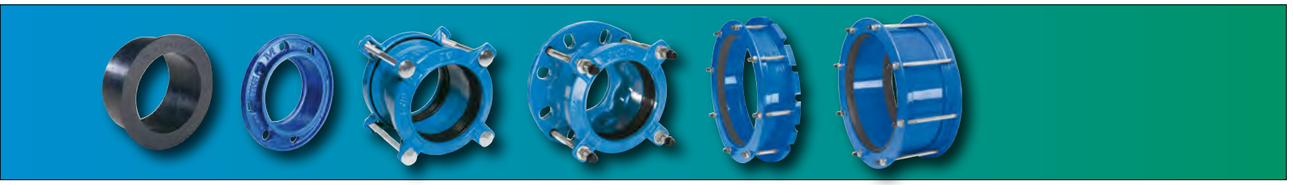
All seals are made of drinking water approved EPDM rubber featuring an excellent compression set and ability to regain its original shape.

AVK offers a comprehensive range of air valves with a sealing range of 0.02 bar minimum. We offer inlet sizes across our range sizes up to DN150, PN16 and PN25.

Please contact us for correct selection/sizing. Two basic types are available, which are:
1. Single beat direct operated, Series 854 (1005/1006)
2. Single beat pressure operated Series 854 (1048)

PIPELINE ACCESSORIES

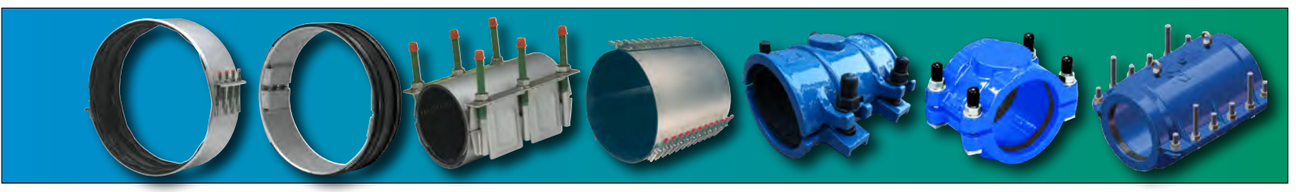
PIPE COUPLINGS AND FLANGE ADAPTORS



TENSILE PIPE COUPLINGS AND FLANGE ADAPTORS

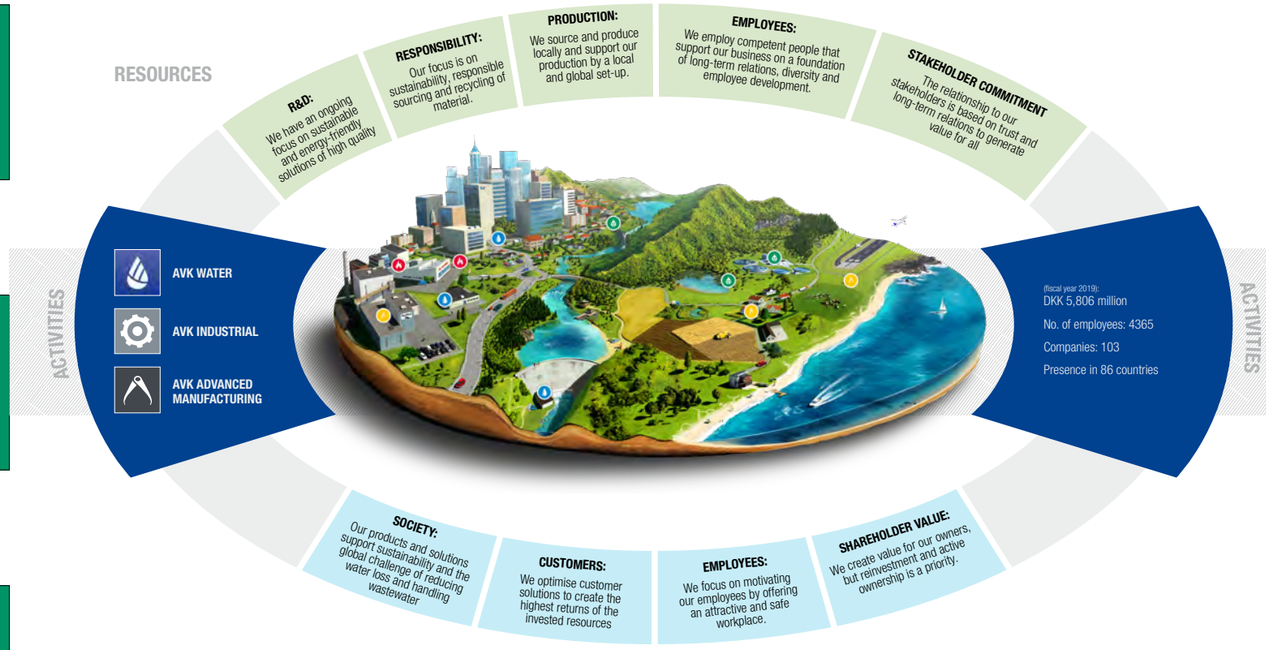
DISMANTLING JOINTS

PIPE REPAIR CLAMPS - INTERNAL & EXTERNAL



DUCTILE IRON FITTINGS AND TEES

THE AVK BUSINESS MODEL



CREATION OF VALUE

OUR BUSINESS IS CENTERED AROUND FIVE AREAS OF DISCIPLINE

As a global leader it is our obligation to keep pushing the boundaries of what the market can expect. In our business there are five cornerstones that must be in place in order to meet customer expectations:

QUALITY

CUSTOMER SERVICE

SUSTAINABILITY

INNOVATION

RELIABILITY

AVK is a global company operating worldwide and as such must take different circumstances in different countries into account and the risks that this entails. In all the countries where AVK is present, it is fundamental to act responsibly towards employees, the environment and the surrounding society. AVK keeps a close watch on all business units of the Group, and through regular visits ensures that the Group complies with the defined human rights principles and criteria.

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