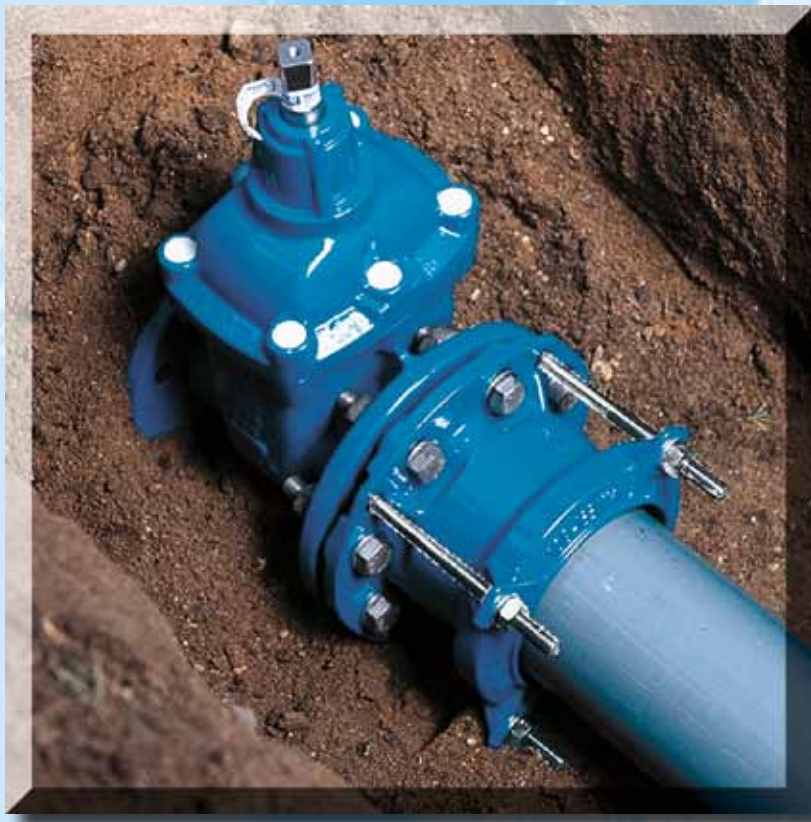


More than meets the eye





AVK is the only gate valve manufacturer that meets all of the most common standards:

- DIN
- ISO
- BS
- AWWA
- JWWA
- NF
- CEN
- SABS
- AS
- GB
- GOST
- IS

AVK supplies valves accessories and fittings for:



Water Supply



Gas Supply



Sewage Treatment



Fire Protection

A group of features gives the AVK valve extensive durability and reliability - above and below ground

Durability is one of the most important customer demands on our products. Irrespective of the type of application, valves and assemblings in the pipelines must last for many years without malfunction and without contaminating the drinking water.

90% of our products are installed underground where they must be protected against external influences of any kind. All our products are part of vital infrastructures and must be resistant to any kind of stress occurring in pipelines for water, waste water or natural gas.

Over many years, even the slightest defect in the coating or mechanical parts can be fatal. Precision and a methodical approach are therefore the pillars of AVK's quality assurance.

The following will provide information about AVK's unique rubber compounds that have been developed in our own labs, about a unique internal and external coating and about an integrated logistics and distribution system which ensures that we not only produce, but also supply products with exceptionally long operating life.

The invisible quality features are the most important.
"You get much more than meets the eye"



"you get much more than meets the eye"



Product development and quality control
Page 4-5



Wedge and resilient rubber vulcanization
Page 6-7



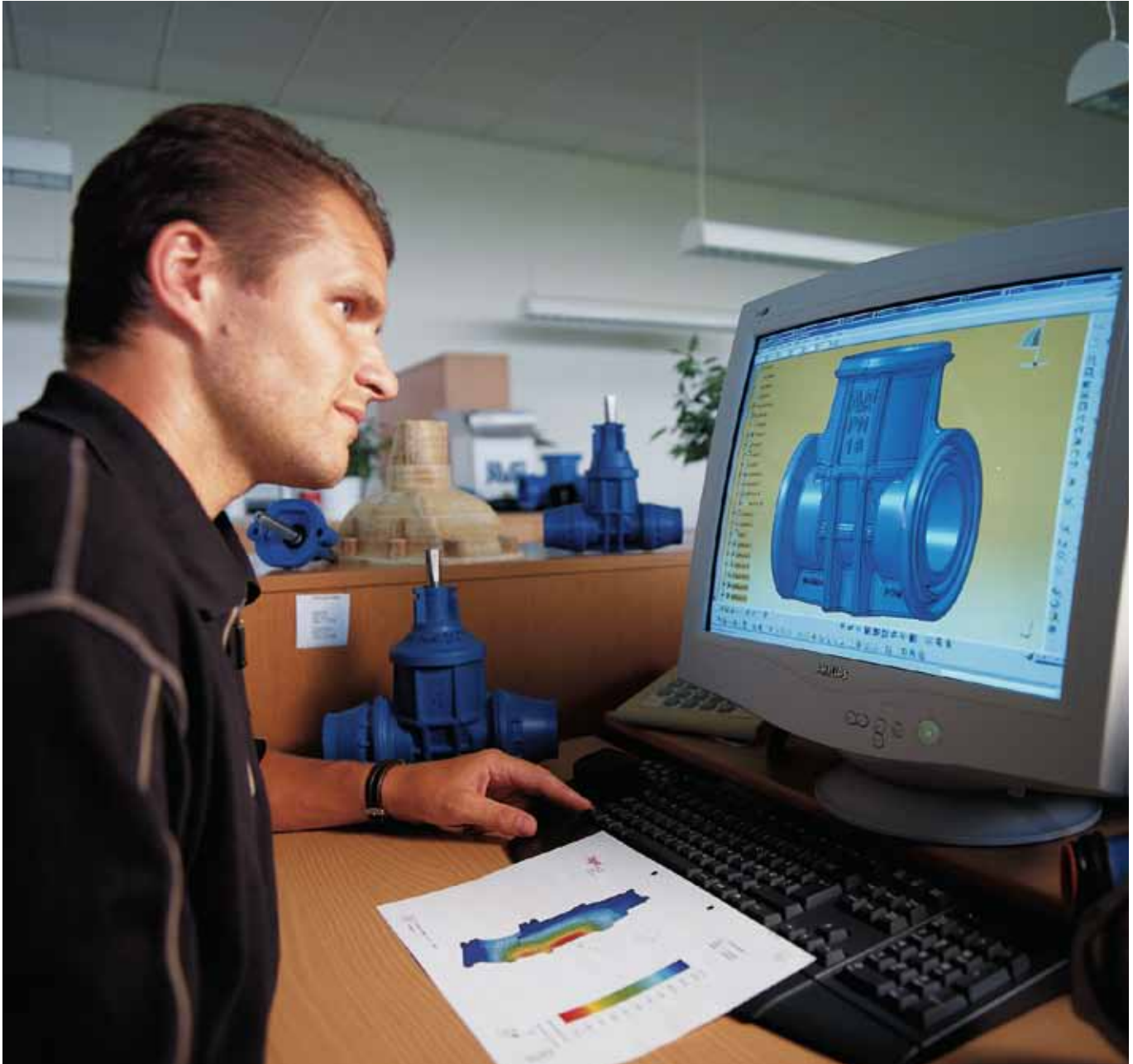
Valve body and corrosion protection
Page 8-9



Product features, assembly and pressure testing
Page 10-11



Logistics, handling and documentation
Page 11-12



AVK's product development is based on customer feedback as well as years of experience and superior engineering.

Our customers' practical experiences with installation and operations are important sources of inspiration for new and improved AVK products. In addition to new designs, we keep expanding our product programme, making us your one-stop-shopping partner no matter what market you are in. We make

purchasing and installation simple for our customers.

Testing and quality control of new products includes:

- Computer simulation
- Prototype tests
- Accelerated lifetime tests
- Destructive tests
- Field tests

Quality control starts long before we have the physical product

Before AVK products are released on the market, they are subject to a comprehensive and precisely defined series of tests and quality evaluations. This ensures the quality, durability and reliability of new products.

Testing and quality control of new products includes:

Computer simulation using 3-D software simulates strength and pressure load on all parts of the product, enabling us to reinforce and optimise possible weak zones at the very early stages of development.

Prototype tests of physical dimensions, reliability and durability ensure that the product complies with specified tolerances and functions optimally right from the start. We will even measure flow capacity if it is part of the design criteria.

Accelerated lifetime tests carried out to ensure that the products function even after many years underground. Various pressure and tensile strength tests are conducted in carefully monitored test basins.

Destructive tests made to find maximum load limits for a specific product. This might be a pressure test to prove the durability of the pressure bearing components or a tensile strength test for joints, or an operating test to prove the durability of the working parts.

Field tests made in co-operation with large utilities. We know that the end-users with their daily work experience are the most competent source of feedback on products yet to be released. Their evaluations are essential ingredients in our product development.

Relevant product development is a matter of exploiting experiences from practical life - studying the products in totally different networks and environments. Every single product delivered by AVK has its own identity and can be traced right back to the supplier of the raw materials.

New product information is provided in our frequently issued newsletters, available either in print or electronic form. Customers wishing to subscribe to these newsletters, may contact local distributors or AVK sales representatives - or visit our website at www.avkvalves.com.



▲ *AVK develops its own rubber compounds to ensure extremely long life with no permanent deformation - essential for resilient seated gate valves.*



◀ *Tests prove that the wedge bonding is unaffected after more than 5,000 open/close cycles.*



The wedge is the heart of the valve. It must open and close easily, and it must remain absolutely tight even after many years of operation.

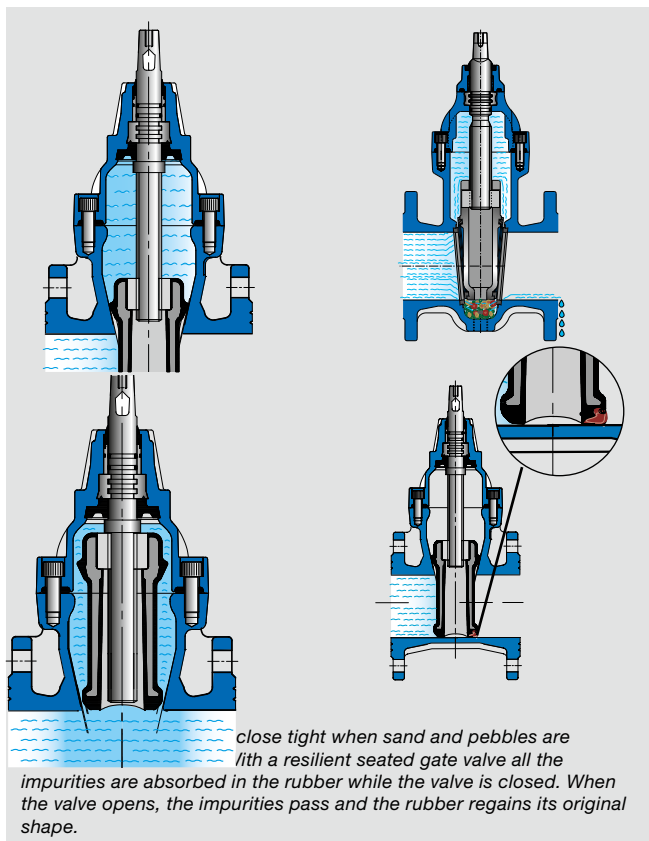
Tests prove that the bonding is unaffected after more than 5,000 open/close cycles, that the rubber surface of the wedge absorbs impurities up to $\text{Ø}8.7$ mm (for a DN 150 valve) and that the surface regains its original shape when the valve is opened and the impurities wash through.



The reliability of the wedge is based on innovation, quality raw materials and precision

The characteristic feature of the AVK valve is the resilient seated wedge - a much more durable solution than a metal seated wedge. The rubber-bonded wedge is maintenance free and requires no adjustments. However, this design imposes extreme demands on the rubber quality and the method used to bond the rubber to the metal core.

Very low deformation: Even after many years of service, tiny pebbles, sand and other impurities will not affect the rubber surface or the tightness of the valve. We use unique AVK rubber compounds to ensure that the wedge absorbs the impurities in closed position. The impurities are flushed away when the valve is reopened and the wedge will regain its original shape.



Taste, smell and colour neutrality: In drinking water it is obviously essential that the rubber does not give off taste, smell or colour. Consequently our compounds are tested frequently in our own labs to ensure taste, smell and colour neutrality even after many years of operation.

Resistant to water treatment chemicals: Chlorine or other chemicals are commonly used to clean new pipelines or disinfect old ones. Very often ozone and chlorine are used in low concentrations to make the water drinkable. AVK has developed an EPDM rubber that is resistant to such water treatment chemicals.

No breeding ground for bacteria: In many countries, legislation requires that valves do not contribute to the growth of bacteria in the pipeline. Moreover, some countries have stringent standards that limit the maximum permissible level of bio-residue. To comply with these regulations, AVK valves are tested over extended periods. AVK meets all legislation and standards in this area.

Resistant to oil and gas: AVK has developed a special NBR rubber compound that is resistant to oil, gas and other types of chemicals found in a natural gas pipeline.

Fully corrosion-free: The rubber is vulcanised to the metal core of the wedge with a process that fully bonds the two materials. The rubber seals the metal core completely - internally and externally. Even if a sharp object penetrates the rubber, the core will not be exposed. This prevents creeping corrosion.

During vulcanisation, the metal wedge core remains untouched by outside bodies which may impede the bonding process between the metal core and the rubber.





AVK valve bodies are made from grey or ductile iron, like all other valve bodies, but this is where the similarity ends. In material and dimension control, blast cleaning and coating, we operate to our own quality standards which not merely fulfil but even surpass the usual norms and standards for effective, long term corrosion protection.

The process is fully automated and subject to the latest technology for epoxy, enamel and PUR coatings.

The automation process ensures uniform, effective corrosion protection on the many thousands of parts processed each day.

Production process:

- Incoming control
- Check points at working stations
- Blast cleaning
- Epoxy coating
- Internal enamel coating
- External PUR coating

Extreme demands on the durability of the products place extreme demands on the surface

AVK meets the DIN norms and other international standards for effective corrosion protection. In addition, our whole coating process is approved and monitored by RAL Gütezeichen Schwerer Korrosionsschutz (GSK).

A carefully specified, step-by-step process with monitored times, temperatures, coating thickness etc. ensures that each individual step as well as the whole production process is optimised for the durability of the coating.

Incoming control: On arrival from the foundries, the valve bodies are checked for compliance with our specifications. They are also checked for sharp edges and oil residues from the casting process.

Check points at working stations: Spot tests are conducted at all working stations to ensure that the processing of components, which are part of the complete product, is always in compliance with valid drawings and specified tolerances.

Blast cleaning: Prior to coating, all cast parts are blast cleaned according to the international standard DIN 55928 SA 2.5. After blast cleaning, the parts are only handled with fibre free gloves to ensure optimum adhesion of the coating.

Epoxy coating: Epoxy is the most common type of coating as it lives up to the most extreme durability requirements. Epoxy is applied manually or by our automatic fluid bed system. Our quality standard is DIN 30677 and coating thickness, adhesion

and impact resistance are carefully monitored. Additionally our coating is approved and monitored in accordance with the guidelines for RAL-GZ 662.

Internal enamel coating: For raw water or water with additives, a ceramic coating is applied that is as resistant and durable as glass. The smooth surface prevents impurities from bonding to the surface, rather like epoxy. The chemical bonding of the enamel to the iron effectively prevents creeping corrosion.

External PUR coating: A 1.5 mm thick and 100% pinhole-free, polyurethane coating is often applied to valves used on gas pipelines to protect them even in very aggressive soil. The PUR coating provides cathode protection and is used for steel pipelines.



RAL Gütezeichen Schwerer Korrosionsschutz monitoring of coating plant

Blast cleaning to DIN 55928 SA 2.5 - then:

Epoxy coating

- Coating thickness to DIN 30677 - min. 250 my on all pressure bearing parts

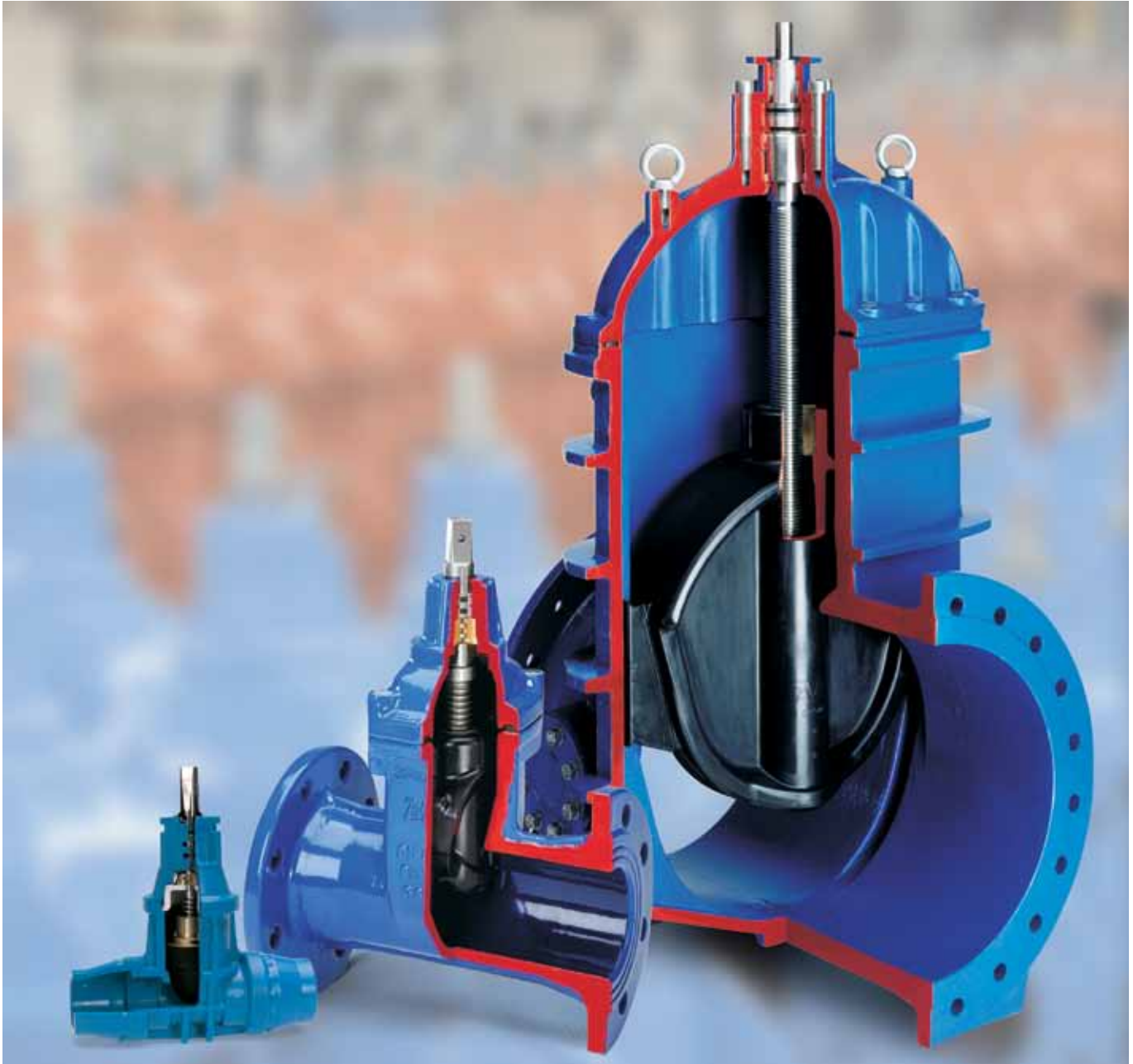
Enamel to DIN 3475

- Min. coating thickness of 150 my
- Max. average coating thickness of 400 my
- Max. point thickness of 1000 my

PUR coating

- Min. coating thickness of 1.5 mm
- 100% pinhole free surface





Visitors to our factories expect to see solid raw materials such as cast iron, steel and rubber being processed in an industrial inferno with the heat, noise and dirt characteristic of heavy industry.

What greets the visitors is a well-ordered, congenial environment - similar to that found in industries subject to the most stringent demands for cleanliness and tidiness. Precision, quality and efficiency thrive in

surroundings which bear witness to these values.

Maximum durability due to:

- Triple safety in the stem sealing system
- Tight assembly of valve body and bonnet
- Corrosion protection of the bonnet bolts
- Pressure test of the entire valve

The process from raw material to AVK valve is a long series of check points on tested solutions

The resilient seated wedge and the corrosion protected valve body are the main components, but the AVK valve has many other built-in features. Throughout the process a number of checks are made to ensure optimum durability and operational reliability of the valve.

Triple safety in the stem sealing system: AVK offers four different stem sealing systems in order to comply with the international standards (DIN, BS and AWWA). Three independent seals are common to all: An NBR wiper ring protects against impurities from the outside. A polyamid bearing with O-rings ensures low friction. A rubber lip gasket seals the valve internally and allows leak free repair even if the pipeline is under pressure.

Tight assembly of valve body and bonnet: The rubber bonnet gasket fits into a recess between valve body and bonnet and along with the bolts, ensures that the gasket remains in place, even when subject to heavy water hammer.

Corrosion protection of the bonnet bolts: The bonnet bolts are partially encircled by the bonnet gasket, countersunk in the bonnet and protected by hot melt to prevent corrosion of any kind.

Pressure test of the entire valve: Every single valve is pressure tested before leaving the factory. This test is mostly according to DIN 3230 (part 4 for water and part 5 for gas).



Pressure test of the entire valve:

Water:

- PN 10: 17 bar in open position
- PN 16: 25 bar in open position
- PN 10 and PN 16: 1.1 x PN
- in closed position and tested from both sides

Spot test:

- 0.5 bar in closed position

Gas:

- 0.5 bar with air in open position
- 1.5 x PN in open position
- 1.1 x PN with air in open position and tested from both sides
- 0.5 bar with air in closed position
- 1.1 x PN with air in closed position and tested from both sides





AVK is close to its end-users and its markets. Our global sales and service network offers consulting engineers, building contractors and operators quick and easy access to technical guidance. The availability of products is assured through a comprehensive network of agents and dealers who stock valves approved for the local market.

We offer access to product information, including exact specifications and drawings, over the Internet or via CD-ROM.

The process includes:

- Efficient transportation protection
- Efficient distribution
- One-stop-shopping
- Accessible information

Producing valves of high quality is one thing, delivering them at the proper time and place another

Quality concerns more than the quality of the physical product. Protection of the goods during shipping is an essential element of AVK's quality assurance to its customers. Efficient logistics and distribution ensure correct delivery on time - and in acute situations - quick supply of specific products. Methodical, accessible technical documents make it easy for all parties involved in a project to work with AVK products - in the project phase and in the field.

Efficient transportation protection: All AVK products are packed to ensure there is no contact with other items. To protect the coating AVK has developed special protection collars for the valve and end caps for the flanges. The end-user is guaranteed a valve without impurities and with a perfect coating.

Efficient distribution: AVK is represented in more than 80 markets by agents and distributors. The vast majority carry stock. By providing sales and technical support through its own representatives AVK stays in close contact with its customers. We have established local production in many key markets.

One-stop-shopping: No other manufacturer offers the customer such a wide range of valves, fittings and accessories. Within our field of products, we aim to fulfil all of our customers' needs and requirements. We encourage open dialogue - whether it is about standard products or special requirements

for a specific project. One-stop-shopping is the most efficient way to do business - for us as well as for our customers.

Accessible information: Technical information on AVK products is accessible in print and electronically. Information can be sent directly to you by mail or we can arrange for a personal demonstration and guidance on specific products. AVK's show busses are constantly touring our markets. We would be delighted to pay you a visit, if you wish.



AVK's product documentation includes:

- Brochures and data sheets for all products in our comprehensive product programme
- CD-ROM with detailed information about products, installation options, including data sheets, tender texts, etc.
- CD-ROM with full scale drawings for direct import in Auto CAD
- Web site with on-line access to product information, contacts, news, etc.





Examples of built-in products:

- Tapping saddles or repair clamps with service connection valves, extension spindles and street covers with support plates.
- Main gate valves with extension spindles and street covers with support plates.
- Flanged gate valves and spigot end valves with combi flanges or flange adaptors/ couplings.
- Gate valves and butterfly valves in larger diameters (DN 300 and up) with dismantling joints.
- Hydrants with flex drains and street covers.
- Combi-cross with hydrant.
- Flanged gate valves with actuators.

Easy installation - built-in

Construction of pipelines with valves and other components, as part of a complex water network, is often undertaken in difficult working conditions on tight time schedules and requires peak efficiency. Careful preparation and complete solutions save time.

AVK's comprehensive product programme includes all items required for a complete solution. They are ready for quick and easy assembly on site.

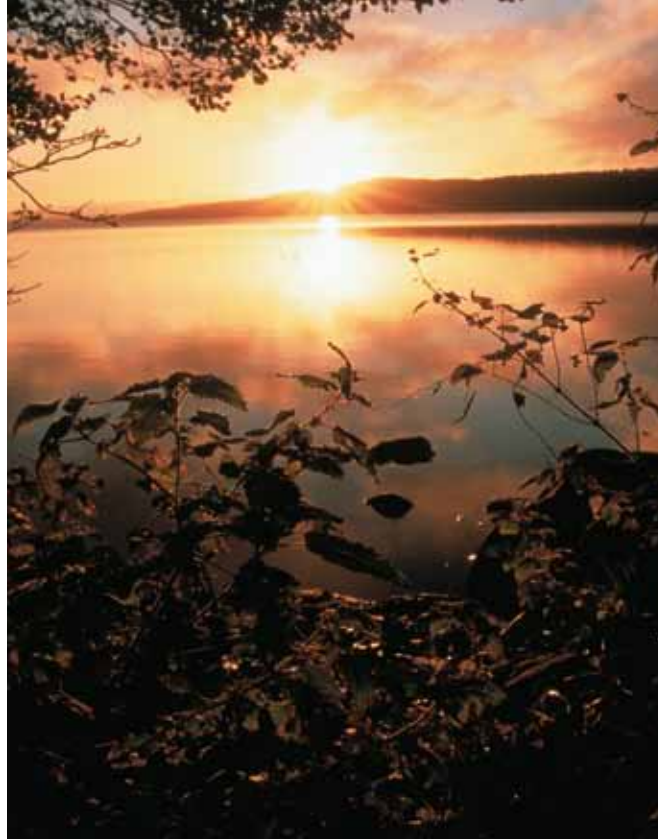
All AVK valves are designed and developed as part of a complete system, ensuring problem free and easy assembly. Our valves are supplied with extension spindles designed to fit the specific valve. Valve and extension spindle are assembled with a simple "click". We provide tapping saddles, extension spindles, and street covers for service connections.

We also provide all the components suitable for a pipeline in a water treatment plant or pump station including swing check valves, couplings, air valves, etc.

For pipelines we produce large diameter check valves, adaptors, fittings and air valves.



AVK is certified according to ISO 9001, ISO 14001, and OHSAS 18001



AVK Focuses on the Environment

AVK recognize the dangers of environmental impact also from a global point of view. AVK products are part of the infrastructure and as such they are an important part of the environment.

Therefore, we constantly work on reducing this impact. AVK constantly seek to identify areas of improvement – not only in our production processes but also in relation to our suppliers.



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At our factories and in all processes AVK works systematically with:

- Always complying with environmental and work environmental legislation and other relevant requirements from authorities.
- Reducing the amount of waste within the company. Where possible we recycle waste materials from production or alternatively apply the most environmentally friendly waste disposal methods.
- Minimizing the consumption of energy and raw materials.
- Minimizing the use of materials and processes which may be hazardous to the external environment or the work environment.
- Informing and educating employees, enabling them to act in accordance with our environmental objectives and thereby contribute to minimising environmental hazard.
- Taking environmental factors into consideration when choosing suppliers.
- Advising customers on the use and disposal of our products.
- Continuous improvement on prevention of pollution.
- On-going evaluation of the environment and work environment.