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Operation Instruction, General Safety Information

Overview of atomac valves

valve	description	flange connection	face-to-face-dimension	available sizes
<i>atomac ball valve</i>				
AKH2	2-piece design full bore	DIN EN 1092 -PN16 DIN EN 1092 -PN10 ASME B 16.5 -CL150	DIN EN 558 DIN EN 558 ASME B 16.10 °	DN 15 - DN 200 / 150 DN 200, 250, 300, 350 DN ½" - DN 14"
AKH2 CL300	2-piece design full bore	ASME B 16.5 -CL300	ASME B 16.10 °	DN 1" - DN 6"
AKH2A	2-piece design full bore	ASME B 16.5 -CL150	ISO 5752, Tab.6,short ASME B 16.10, short	DN 1" - DN 6"
AKH3	2-piece design venturi port	ASME B 16.5 -CL150	ISO 5752, Tab.6,short ASME B 16.10, short	DN 1" - DN 12"
AKH5	2-piece design with ceramic insert	DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558	DN 25 - DN 150 DN 1" - DN 6"
AKH6	2-piece design vessel drain valve	DIN EN 1092 -PN16 ASME B 16.5 -CL150		DN 25/50 - DN 150/200 DN 1" / 2" - DN 6" / 8"
AKH7/GK	glass connection with splitring	DIN glass ends: DIN EN 12585		DN 25, 40, 50
AKH7/KB	short face to face, wafer	DIN EN 1092 -PN16		DN 25, 40, 50
AKH7/KP	glass connection with ball- cup	DIN glass ends: DIN EN 12585		DN 25, 40, 50
AKH8	2-piece design with monoblock	DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558	DN 15 - DN 100 DN ½" - DN 4"
AKH8A	2-piece design with monoblock	ASME B 16.5 -CL150	ASME B 16.10	DN 1" - DN 6"
AKH2.2	2-piece design	DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558 °	DN 15 - DN 100 DN ½" - DN 4"
AS1	2-piece design full bore	DIN EN 1092 -PN16	DIN EN 558	DN 15 - DN 150
AS2	2-piece design full bore	ASME B 16.5 -CL150	°	DN ¾" - DN 6"
AS3	2-piece design full bore	ASME B 16.5 -CL150	ISO 5752, Tab.6,short ASME B 16.10, short	DN ½" - DN 6"
AS4	2-piece design full bore	JIS B 2220 -10 K	ASME B 16.10, short	DN 15 - DN 150
AS5	2-piece design full bore	JIS B 2220 -10 K		DN 15 - DN 100
AS6	2-piece design full bore with heating jacket	ASME B 16.5 -CL150	ISO 5752, Tab.6,short ASME B 16.10, short	DN 1" - DN 8"
AMP3	2-piece design	DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558 DIN EN 558	DN 25 - DN 150 DN 1" - DN 6"

Overview of atomac valves

valve	description	flange connection	face-to-face-dimension	available sizes
atomac check valve				
ARV	2-piece design	DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558 *	DN 15 - DN 200 DN ½" - DN 8"
ARL		DIN EN 1092-2 -PN16 ASME B 16.5 -CL150	DIN EN 558 DIN EN 558	DN 15 - DN 80 DN 1" - DN 3"
atomac check valve				
ARK2		DIN 1092-2 -PN16 ASME B 16.5 -CL150	DIN EN 558 series 20 ASME B 16.10 Tab.8	DN 50 - DN 400 DN 2" - DN 16"
atomac sight glass				
ASG		DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558	DN 25 - DN 250 DN 1" - DN 10"
ASG/B	vessel sight glass	DIN EN 1092 -PN10		DN 80 - DN 200
ARV/SG		DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558	DN 25 - DN 150 DN 1" - DN 4"
APN/SG	sampling valve - sight glass			DN 25 - DN 80 DN 1" - DN 3"
ASG3	3-way sight glass	DIN EN 1092 -PN16	DIN EN 558	DN 25 - DN 100
atomac sampling valve				
AtoPro	sampling valve			DN 25 - DN 80
APN	T- form sight glass	DIN EN 1092 -PN16 DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558 DIN EN 558	DN 25, 50, 80 DN 25 - DN 80 DN 1" - DN 3"
atomac strainer				
ASF		DIN EN 1092 -PN16 ASME B 16.5 -CL150	DIN EN 558 * ASME B 16.10	DN 25 - DN 200 DN 1" - DN 8"
atomac sleeve line				
T4E1		ASME B 16.5 -CL150	ASME B 16.10, short	DN ½" - DN 14"
T4E2		DIN EN 1092 -PN16 DIN EN 1092 -PN10	DIN EN 558** ASME B 16.10, short	DN 15 - DN 150 DN 200 - DN 300
T4E3		ASME B 16.5 -CL300	ASME B 16.10	DN ½" - DN 12"

° DN ½" and DN ¾": Face-to-Face dimension DIN EN 558 (Basic series 1)

* DN 150 and DN 200: Face-to-Face dimension ANSI B 16.10

** DN 150: Face-to-Face dimension ANSI B 16.10 (short pattern)

Information on Fluorcopolymer-lined atomac valves

Fluorcopolymer-lined valves consist of different materials combining the good mechanical properties of ductile iron with the high corrosion resistance of fluorcopolymer.

Fluorcarbon resins are resistant to a variety of chemical process media. They can be used without any problems in applications where extremely acid and alkaline fluids are used. They allow for the transport of different fluids, changes in process and change-overs to other products, without having to change the valve.

Due to their low slippage resistance and to their non-stick properties, fluorcopolymer-lined valves have an extremely low friction. Even when the line media is slurry, highly viscous or adhesive, the fluorcarbon resin liner prevents the equipment from becoming plugged and allows for easy cleaning. The fluorcarbon resin linings in **atomac** valves are free from pores and are resistant to galvanic corrosion. They are insensitive to thermal and mechanical shocks.

Manufacture of **atomac** valves is subject to the very strict quality control standards according to DIN EN ISO 9001. Permanent controls of the materials used and of production processes assure the consistently good quality of **atomac** valves.

Due to their technically high-standard production process, **atomac** valves are supremely economical and reliable. This is proven by their applications in chemical, petrochemical, pharmaceutical, cosmetic and food processing industries. Furthermore, fluorcopolymer-lined atomac valves are successful in salt mines and with desalination and water treatment industries. They are also used in other processes where extremely aggressive, corrosive, toxic and other critical fluids have to be handled. Due to their corrosion resistance and to their reliability, **atomac** valves provide a maximum protection for people, environment and production.

Fluorcopolymer-lined **atomac** valves are available in DIN-as well as ANSI and JIS versions.

DELIVERY CONDITION

All **atomac** valves are delivered with a flange protection cap at their flanges in order to protect sealing faces during transport. These protection caps must not be removed until immediately before installation.

CONTROL AND CERTIFICATES

Inspection test certificates according to EN 10204 - 3.1 and EN 10204 - 2.2, for casting, lining material, leakage and strength test, can be issued. When an order is placed, the type of certificate, if required, must be specified. The strength test of fluorcopolymer-lined valves is carried out according to DIN EN 12266-1 (P10) and for ANSI-valves according to API 598; the leakage test is carried out according to DIN EN 12266-1 (leak rate A).

The physical properties of the fluorcarbon resins are tested during incoming inspection for the indications made by the raw material manufacturers according to DIN, ANSI and ASTM standards.

BODY SURFACES PROTECTION

Standard **atomac** valves are delivered with a two-component epoxy coating with a minimum layer thickness of 60 µm. Upon request, other paintings are possible.

atomac ball valves with fluorocopolymer lining

atomac ball valves have all the inherent design features of a conventional ball valve:

full port in the main sizes, low pressure drop, low torque, quarter-turn operation. Furthermore, **atomac** ball valves offer a nearly universal corrosion resistance and a high degree of safety.

The most important design features of the **atomac** ball valve are the following:

- 1.) Lining of all interior body surfaces, i.e. all valve parts being in contact with medium are fluorocopolymer-lined.
- 2.) The positive retention of the lining material on the body, ball and stem. Because of this, a high vacuum rating is provided.
- 3.) Due to the fact that ball and stem are separately positioned (floating ball system), the floating ball seals against the downstream seat ring even when line pressure is low. For this reason, an early and perfect sealing in the port of the valve is assured. Furthermore, this systems prevents leverages on the stem.
- 4.) The fluorocopolymer-lined stem (material 1.4470 or ASTM A789) is protected through a metallic bond inside the valve against blow-out. This anti-blow-out stem represents an additional means of safety.
- 5.) The gland follower is not a new idea, but through the use of PTFE chevron packing rings extremely efficient. The vertical pressure on the packing is converted to horizontal expansion without any shearing effect. The gland follower can be adjusted without impairing the function of the stem.
- 6.) **atomac** ball valves are manufactured according to DIN/ISO 9001. For example all fluorocopolymer-lined parts are 100% high voltage spark tested, in order to discover possible damage or cracks.

The tightness of the valves is checked according to applicable inter-/national standards.

Due to their simplicity and inherent strength, **atomac** ball valves are virtually maintenance free. Because of their prolonged service life expectance, they prove to be very economical, even under extreme service conditions.

Fitment of an actuator is very simple:

By means of an adequate bracket (DIN EN ISO 5211) and adaptor, all types of actuators can be fitted within a few minutes without removing the valve from the line.

As a standard, the **atomac** ball valve is provided with a grounding device.

STORAGE AND INSTALLATION

Contrary to pure steel ball valves, fully lined ball valves and all other **atomac** valves require a high degree of care as far as packing, transport, storage and installation is concerned, as the corrosion resistance of the valve is largely dependent on the integrity of the lining.

Therefore it is advisable to avoid damages to the lining caused by blows, shocks or ingress of sand or metal chip etc. onto the sealing faces of the flanges.

Please consider our installation instructions for lined ball valves!

General installation and maintenance instruction for fluorcopolymer-lined atomac valves

Fluorcarbon resin lined valves cannot be treated in the same way as unlined steel valves. The lining material is softer and more sensitive than metal and is subject to cold flow. If only one tiny spot of the lining materials is damaged, this could result in leakage or damage to the metal body by the medium. It is essential for all **atomac** valves that before start-up of a new plant the piping system is being flushed in order to remove possible solids such as welding beads, sand, etc. The atomac valves must be 100% open during the flushing process to avoid impurities which could cause damages when the valve is operated. .

The lining material moves under temperature and pressure, in that it expands and shrinks. This means that in practical applications all data given for lined valves must be seen in relation to certain conditions of temperature and pressure.

For the handling of **atomac** valves, we are giving you the following guidelines:

- 1.) Lined valves have soft sealing faces. Therefore, the flange protection caps intended for transport and storage must not be removed until immediately before installation. Should it prove necessary to remove the protection caps for inspection purposes, care must be taken to re-fit them into their original position upon completion of the inspection.
- 2.) If the flange protection caps are removed, fittings must never be placed so as to rest on the soft sealing faces. If this cannot be avoided, care must be taken to keep the workbench clean and free of metal chip, sand or other solid particles.
- 3.) No additional gaskets are required for the installation of atomac lined valves.
- 4.) For maintenance work on an atomac valve installed in a pipeline, the works safety requirements and the general accident prevention instructions are to be observed. Look for contact between stem , grounding spring and gland follower.
- 5.) 2 - 5 hours after the installation has reached its final operating temperature, flange bolts must be retightened in accordance with the corresponding torque values (see standard valve chart of the respective valve). Should any leakage occur, it is recommended to check by means of a torque wrench that the tension bolts have been tightened evenly. If this is the case, the nut of the tension bolt which is closest to the area where leakage is occurring must be tightened with a 45-degree turn. The 45-degree turns may then be repeated until the valve leak is eliminated. However, where, valves are concerned, the valve must be operated after every 90-degree turn of the nut to make sure that the valves can be opened and closed without problems. If leakage has been eliminated by this method, then all remaining bolts on the same side of the fitting must be tightened by means of a torque wrench. Finally the valve must be operated to check its performance.
- 6.) After lengthy operation period, leakage may occur in the stem area due to normal wear and tear of the material. In such a case, the adjusting nuts above the gland follower must be tightened evenly with short turns until leakage stops. An uneven tightening of the packing gland follower can result in a tilting of the same. Every time that the packing gland follower has been re-adjusted, a test must be carried out to establish that the valves still opens and closes smoothly.

General installation and maintenance instruction for fluorcopolymer-lined atomac valves

CAUTION

Excessive tightening of the adjusting nuts might damage the stem lining. The packing gland follower must only be adjusted to such a degree as is required for the elimination of the leak.

- 7.) If the above measures do not succeed in stopping the leakage, it is recommended to return the valve to the manufacturer in order to have the valve checked and to eliminate the problem. For security reasons, it is absolutely necessary to decontaminate the valve. The user has to confirm the decontamination by fixing a return goods tag on the valve. Before returning the valve, the procedure must be coordinated with **atomac** sales.
- 8.) If, for any reason, an **atomac** valve becomes difficult to operate or jams, you must not use a hammer on the hand lever or extend the hand lever with pipe pieces. Such a procedure may lead to damage of ball and/or stem and invalidates any guarantees.

atomac valves are manufactured, assembled and tested with the utmost care according to DIN EN ISO 9001. Continuous quality controls make sure that defects are reduced to a minimum. This and an adequate handling of the valves during transportation, storage, installation and maintenance will ensure a long service life and many trouble-free hours of operation.

Technical Manual

Quality Assurance Lloyd's acc. to ISO 9001



Certificate of Approval

This is to certify that the Management System of:

Flowserve Ahaus GmbH

von-Braun-Str. 19a, 48683 Ahaus, Germany

has been approved by LRQA to the following standards:

ISO 9001:2015



P.G. Cornelissen - Area Manager North Europe

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The scope of this approval is applicable to:
Design and manufacture of plastic lined valves, ball valves, filters, strainers, check valves, plug valves and sight glasses. Stockholding of process equipment parts manufactured by other Flowserve companies.



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Nodular Graphite Iron EN-GJS-400-18U-LT (GGG-40.3)

EN-GJS-400-18U-LT (GGG-40.3) DIN EN 1563 (comparable to DI-A 395/ASTM 395)
Material No.: EN-JS1049 (0.7043)

Definition acc. to DIN EN 1563 is the following:

„3.1 Cast material based on iron-carbon-silicon,
wherein the carbon is predominantly in the form of
spherical graphite particles is present.“

For the melting of this material, electric and induction furnaces are common. Sometimes however, shaft and cupola melting furnaces can be used. As charge materials, special kinds of raw iron and selected quality steel scrap are used. In order to obtain this nodular graphite iron, small quantities of master alloy magnesium or pure magnesium are given to the melting charge. Depending on the chemical composition of the melting charge and on the rate of cooling, solidification of the material is either ferritic/pearlitic, pearlitic or, as desired, ferritic as cast. The ferritic basic structure is also obtained through a ferritic thermal treatment.

Advantages of this material: mechanical values being similar to those of steel together with a good processibility. In order to determine the mechanical values, the sample pieces can be integrally or separately cast (EN 1563).

EN-GJS-400-18U-LT (GGG-40.3) represents a special ferritic form of nodular graphite iron with a guaranteed notched bar impact. According to AD-Merkblatt W 3/2, for a temperature range of -10°C to 350°C.

In stress case II, the thermal treated material can be used with a temperature of max. -60°C with 75% of the admissible apparent yielding point (AD-Merkblatt W 10).

Material: Cast Iron 5.3103 (EN-GJS-400-18-LT)

Cast iron with ferritic heat treatment

Comparison with foreign standards

State	Standard	Designation
Germany (EU)	DIN EN 1563	Spheroidal graphite cast irons
ISO	ISO 1083 JS/400-18-LT/U	Spheroidal graphite cast irons
USA	ASTM A 395 Grade (60-40-18) UNS F32800	Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
Japan (equivalent)	JIS G 5502 - FCD 400-18L	Spheroidal graphite iron castings

Chemical composition in % of

	C	Si	P	Mn
min.	3	-	-	-
max.	-	2,5	0,05	0,25

Mechanical properties

Tensile strength min.	Rm	~ 20 °C	415 MPa
Yield strength min.	Rp0,2	~ 20 °C	275 MPa
Thickness max.	t	~ 20 °C	30 mm
Elongation at break min.		A (5,65) (30 mm)	18 %
Notched bar impact energy min.		KV (ISO-V)	14 J

Physical properties

Density	~ 20 °C	7,1 kg / dm ³
Specific heat	~ 20 °C	515 J / (kg · K)
Thermal conductivity	~ 100 °C	36,2 W / (m · K)
Mean thermal expansion	20 - 400 °C	12,5 10 ⁻⁶ · K ⁻¹
Magnetizability	noticeably magnetic	
Operating temperature according to AD 2000 - AW 10 is - 60 °C to 400 °C		

Source: <http://www.stahlschluesel.de>, 10.10.2019

Material: Cast Steel 1.0619 WCB (GP240GH)

Quality steels, unalloyed: steels with an average > 0,55% C or Rm > 700 Mpa
Heat treatment: (+ N) Normalizing

Comparison with foreign standards

State	Standard	Designation
Germany (EU)	DIN EN 10213	Steel castings for pressure vessels, ferritic and Martensitic variety
USA	ASTM A 216 Grade WCB UNS J03002	Standard Specification for Castings, Iron-chromium-nickel, Corrosion Resistant, for Severe Service
Japan (equivalent)	JIS G 5151 - SCPH1	Corrosion-resistant cast steels for general applications

Chemical composition in % of

	C	Si	Mn	P	S	Cr	Cu	Mo	Ni	V
min.	0,18	-	0,5	-	-	-	-	-	-	-
max.	0,23	0,6	1,2	0,03	0,02	0,3	0,3	0,12	0,4	0,03

Mechanical properties

Tensile strength min.	Rm	~ 20 °C	420-600 MPa
	Rp0,2	~ 20 °C	240 MPa
Yield strength min.	Rp0,2	~ 100 °C	210 MPa
	Rp0,2	~ 200 °C	175 MPa
Thickness max.	t	~ 20 °C	100 mm
Elongation at break min.		A (5,65) (100 mm)	22 %
Notched bar impact energy min.		KV (ISO-V)	27 J

Physical properties

Density	~ 20 °C	7,8 kg / dm ³
Specific heat	~ 20 °C	460 J / (kg · K)
Thermal conductivity	~ 50 °C	45 W / (m · K)
Mean thermal expansion	20 - 100 °C	12,6 10 ⁻⁶ · K ⁻¹
	20 - 300 °C	13,4 10 ⁻⁶ · K ⁻¹
Magnetizability	magnetic	
Operating temperature according to AD 2000 - AW 10 is - 29 °C to 450 °C		

Source: <http://www.stahlschluessel.de>, 10.10.2019

Material: Stainless Steel 1.4470 (GX2CrNiMoN22-5-3)

Quality steels, unalloyed: Stainless cast steel with > 2.5% Ni, with Mo, without special additives.
Heat treatment: (+ AT) solution annealed

Comparison with foreign standards

State	Standard	Designation
Germany (EU)	DIN EN 10213	Steel Castings for Pressure Purposes
	DIN EN 10283	Corrosion Resistant Steel Castings
USA	ASTMA 890	Standard Specification for Castings, Iron-Chromium-Nickel-Molybdenum Corrosion-Resistant, Duplex (Austenitic/Ferritic) for General
	Grade 4A (CD3MN) UNS J92205	

Chemical composition in % of

	C	Si	Mn	P	S	Cr	Cu	Mo	N	Ni
min.	-	-	-	-	-	21	-	2,5	0,12	4,50
max.	0,03	1,0	2,0	0,035	0,025	23	0,5	3,5	0,2	6,50

Mechanical properties

Tensile strength min.	Rm	~ 20 °C	600 - 800 MPa
	Rp0,2	~ 20 °C	420 MPa
Yield strength min.	Rp0,2	~ 100 °C	330 MPa
	Rp0,2	~ 200 °C	280 MPa
Thickness max.	t	~ 20 °C	150 mm
Elongation at break min.		A (5,65) (150 mm)	20 %
Notched bar impact energy min.		KV (ISO-V)	30 J

Physical properties

Density	~ 20 °C	7,7 kg / dm ³
Specific heat	~ 20 °C	450 J / (kg · K)
Thermal conductivity	~ 50 °C	18,0 W / (m · K)
	~ 100 °C	18,0 W / (m · K)
Mean thermal expansion	20 - 100 °C	13,0 10 ⁻⁶ · K ⁻¹
	20 - 300 °C	14 10 ⁻⁶ · K ⁻¹
Magnetizability	noticeably magnetic	
Operating temperature according to AD 2000 - AW 10 is - 200 °C to 500 °C		

Source: <http://www.stahlschluessel.de>, 10.10.2019

Material: Stainless Steel 1.4408 (GX5CrNiMo 19-11-2)

Quality steels, unalloyed: Stainless cast steel with > 2.5% Ni, with Mo, without special additives.
Heat treatment: (+ AT) solution annealed

Comparison with foreign standards

State	Standard	Designation
Germany (EU)	DIN EN 10213	Steel Castings for Pressure Purposes
	DIN EN 10283	Corrosion Resistant Steel Castings
ISO	ISO 4991	Steel Castings for Pressure Purposes
	ISO 11972	Corrosion-resistant Cast Steels for General Applications
USA	ASTM A 744/A744M	Standard Specification for Castings, Iron-chromium-nickel, Corrosion Resistant, for Severe Service
	Grade CF8M UNS J92900	
Japan (equivalent)	JIS G 5121 - SCS 14	Corrosion-resistant cast steels for general applications

Chemical composition in % of

	C	Si	Mn	P	S	Cr	Cu	Mo	Ni
min.	-	-	-	-	-	18	-	2	9
max.	0,07	1,5	1,5	0,04	0,03	20	0,5	2,5	12

Mechanical properties

Tensile strength min.	Rm	~ 20 °C	440 - 640 MPa
	Rp1,0	~ 20 °C	210 MPa
	Rp0,2	~ 20 °C	185 MPa
Yield strength min.	Rp0,2	~ 100 °C	145 MPa
	Rp0,2	~ 200 °C	110 MPa
Thickness max.	t	~ 20 °C	150 mm
Elongation at break min.		A (5,65) (50 mm)	30 %
Notched bar impact energy min.		KV (ISO-V)	60 J

Physical properties

Density	~ 20 °C	7,9 kg / dm ³
Specific heat	~ 20 °C	530 J / (kg · K)
Thermal conductivity	~ 50 °C	14,5 W / (m · K)
	~ 100 °C	15,8 W / (m · K)
Mean thermal expansion	20 - 100 °C	15,8 · 10 ⁻⁶ · K ⁻¹
	20 - 300 °C	17 · 10 ⁻⁶ · K ⁻¹
Magnetizability	Non-magnetic to weakly magnetic	
Operating temperature according to AD 2000 - AW 10 is - 200 °C to 500 °C		

Source: <http://www.stahlschluessel.de>, 10.10.2019

Material: Stainless Steel 1.4517 (CD4MCuN / Duplex) (GGX2CrNiMoCuN25-6-3-3)

Alloyed stainless steels: Stainless steel with special additives.

Heat treatment: (+ AT) solution annealed

Comparison with foreign standards

State	Standard	Designation
Germany (EU)	DIN EN 10213	Steel Castings for Pressure Purposes
	DIN EN 10283	Corrosion Resistant Steel Castings
ISO	ISO 4991	Steel Castings for Pressure Purposes
USA	ASTM A 890/A995	Standard Specification for Castings, Iron-chromium-nickel, Corrosion Resistant, for Severe Service
	Grade 1B (CD4MCuN) UNS J92205	

Chemical composition in % of

	C	Si	Mn	P	S	Cr	Cu	Mo	Mo	N	Ni
								1.4517	CD4MCuN		
min.	-	-	-	-	-	24,5	2,75	2,50	1,7	0,12	5
max.	0,03	1,0	1,5	0,035	0,025	26,5	3,50	3,50	2,3	0,22	7

Mechanical properties

Tensile strength min.	Rm	~ 20 °C	650 - 850 MPa
	Rp0,2	~ 20 °C	480 MPa
Yield strength min.	Rp0,2	~ 100 °C	390 MPa
	Rp0,2	~ 200 °C	330 MPa
Thickness max.	t	~ 20 °C	150 mm
Elongation at break min.		A (5,65) (150 mm)	22 %
Notched bar impact energy min.		KV (ISO-V)	50 J

Physical properties

Density	~ 20 °C	7,7 kg / dm ³
Specific heat	~ 20 °C	450 J / (kg · K)
Thermal conductivity	~ 50 °C	17,0 W / (m · K)
	~ 100 °C	18,0 W / (m · K)
Mean thermal expansion	20 - 100 °C	13,0 10 ⁻⁶ · K ⁻¹
	20 - 300 °C	14 10 ⁻⁶ · K ⁻¹
Magnetizability	noticeably magnetic	
Operating temperature according to AD 2000 - AW 10 is - 60°C to 500 °C		

Source: <http://www.stahlschlüssel.de>, 10.10.2019

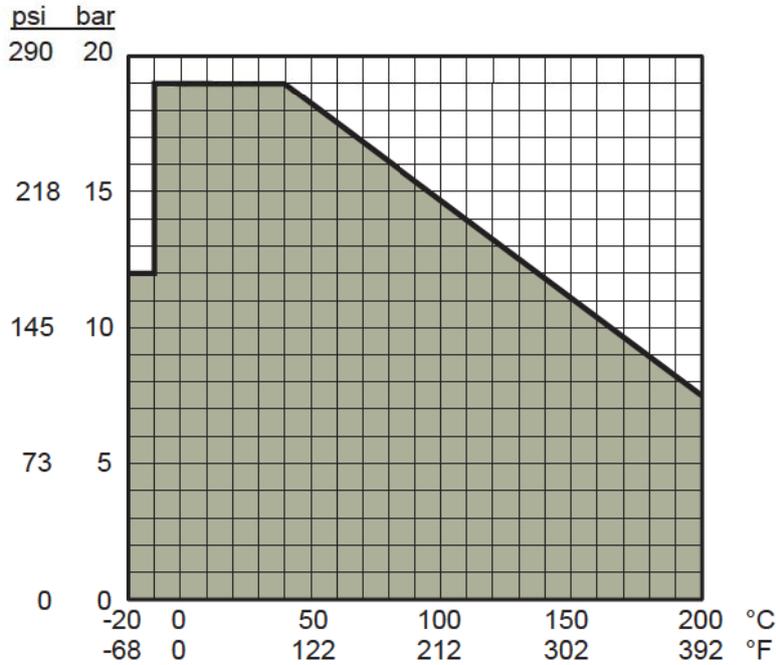
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Typical properties of atomac lining materials

properties	testing method	PTFE	FEP	PFA	PP	units
density	DIN EN ISO 1183-1 ASTM D 792	2,15-2,18	2,12-2,17	2,12-2,17	0,91	g/cm³
tensile strength	DIN EN ISO 527 ASTM D 638	21-35	min. 20,7	min. 26,7	25	N/mm²
breadage elongation	DIN EN ISO 527 ASTM D 638	250-350	min. 250	min. 300	15	%
shore hardness	DIN ISO 7619-1 ASTM D 2440	D52-59	D50-55	D55-60	D67	--
flexural strength	DIN EN ISO 178		breakproof			N/mm²
notched bar impact strength	DIN EN ISO 179-1	16	breakproof		40	KJ/m²
friction		0,01	0,02	0,02	0,3-0,5	--
practical temperature range (depressurized state)		-260/+260	-270/+205	-270/+260	+100	°C
		-436/+500	-454/+401	-454/+500	+212	°F
melting range		230-340	265-275	285-305	165	°C
		608-644	509-529	545-581	329	°F
relative de-electric constant at 50-10 ⁶ Hz	DIN 53483-1	2,1	2,1	2,1	2,25	--
die-electral	DIN 53483-1	0,0003	0,0007	0,0003	0,0005	--
loss factor at 50-10 ⁶ Hz						
specific flow resistance	DIN EN 62631-3-1	10 ¹⁷	10 ¹⁸	10 ¹⁸	10 ¹⁶	Ohm cm
water absorption	DIN EN ISO 62 ASTM D 570		none	0,03	0,05	%
combustibility	DIN EN ISO 295		zero			combustible
chemical resistance			excellent			good

properties	testing method	PFA-C	Tefzel	PVDF	units
density	DIN EN ISO 1183-1 ASTM D 792	2,12	1,7	1,75-1,78	g/cm³
tensile strength	DIN EN ISO 527 ASTM D 638	22	44,1	38-50	N/mm²
breadage elongation	DIN EN ISO 527 ASTM D 638	275	200	20-250	%
shore hardness	DIN ISO 7619-1 ASTM D 2440	--	D75	D73-85	--
flexural strength	DIN EN ISO 178	--	--	--	N/mm²
notched bar impact strength	DIN EN ISO 179-1	--	breakproof	--	KJ/m²
friction		--	0,4	0,2-0,4	--
practical temperature range (depressurized state)		-200/+260	155	-60/+90	°C
		-328/+500	311	-76/+194	°F
melting range		302-310	270	165-178	°C
		576-590	518	329-353	°F
relative de-electric constant at 50-10 ⁶ Hz	DIN 53483-1	--	--	--	--
die-electral	DIN 53483-1	--	0,005	0,17	--
loss factor at 50-10 ⁶ Hz					
specific flow resistance	DIN EN 62631-3-1	15-25	10 ¹⁶	10 ¹⁴	Ohm cm
water absorption	DIN EN ISO 62 ASTM D 570	--	--	0,03	%
combustibility	DIN EN ISO 295	--	--	--	
chemical resistance		exellent	very good	good	

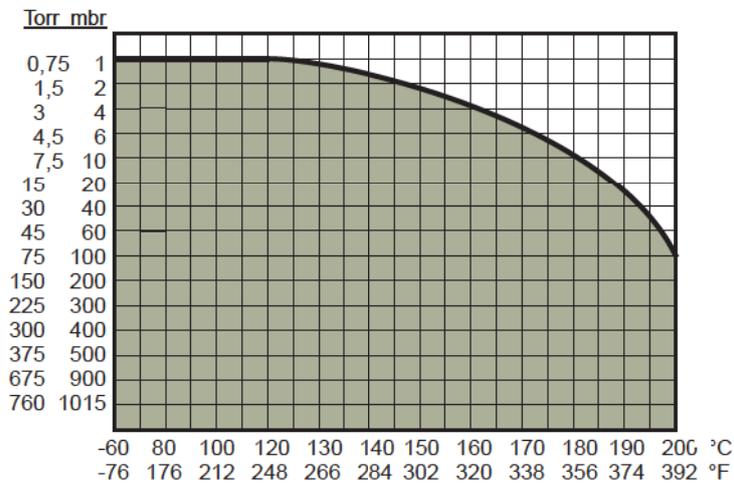
Pressure-Temperature-Diagram



At services below -10°C consult factory

Vacuum-Temperature-Diagram

Test from Jan. 1996



Product Identification

The diagram shows a red identification label with the following fields and callouts:

- factory order number (7-digit):** 8 0 2 2 2 2 0 0 1
- sequential number (3-digit):** 0 0 1
- Pressure class:** PN bar 16
- max: allowable pressure:** PB bar 6
- max: allowable temperature:** TB °C 200
- Valve Type:** ARTIK. NR. ASG
- Size:** DN 150
- Lining material:** AUSKL. WERKST. PFA
- Item no.:** 0000937

valve type	add. Description	valve type	add. Description
<i>atomac</i>	<i>atomac</i>	<i>atomac</i>	<i>atomac</i>
AKH	AKH	APN/T	APN/T
AKH2	AKH2	APN/SG	APN/SG
AKH2 300	AKH2 CL300	AtoPro	AtoPro
AKH3	AKH3	ASG	ASG
AKH4	AKH4	ASG/B	ASG/B
AKH5	AKH5	ASF	ASF
AKH6	AKH6	ARV/SG	ARV/SG
AKH7	AKH7	AKH2.2	AKH2.2
AKH8	AKH8	AKH2A	AKH2A
AKH/R	AKH/R	ASG3	ASG3
AKH 300	AKH CL300	AMP3L	AMP3L
AS1	AtoStar1	AMP3T	AMP3T
AS2	AtoStar2	ARK2	lined Swing Check Valve
AS3	AtoStar3	BUW	Butterfly Wafer / PE
AS4	AtoStar4	BUL	Butterfly Lug / PE
AS5	AtoStar5	BTW	Butterfly Wafer / PTFE
AS6	AtoStar6	BTL	Butterfly Lug / PTFE
ARV	ARV	G4E	Plug Valve, SleeveLine
ARV2	ARV2	G4	Plug Valve, SleeveLine
ARL	ARL	T4E	lined Plug Valve

Conversions

English: <http://www.onlineconversion.com>

German: <http://www.umrechnungen.de>

General Safety Information

applicable to atomac and DURCO,
Flowserve Ahaus GmbH Products

FCD ATENMN0000-00 11/19 - English



*These instructions must be read prior to installing,
operating, and maintaining this equipment.*



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1 SAFETY SYMBOLS AND DESCRIPTION

This User Instruction contains specific safety markings where non-observance of an instruction would cause a hazard. The specific safety markings are:

Table 1: Definition of safety symbols and markings

	DANGER: indicates that death, severe personal injury and/or substantial property damage will occur if proper precautions are not taken.
	WARNING: indicates that death, severe personal injury and/or substantial property damage can occur if proper precautions are not taken.

	CAUTION: indicates that minor personal injury and/or property damage can occur if proper precautions are not taken.
	NOTE: indicates and provides additional technical information, which may not be very obvious even to qualified personnel. Compliance with other, not particularly emphasised notes, with regard to transport, assembly, operation and maintenance and with regard to technical documentation (e.g. in the operating instruction, product documentation or on the product itself) is essential, in order to avoid faults, which in themselves might directly or indirectly cause severe personal injury or property damage.
	ELECTRICAL HAZARD: indicates electrical safety instructions where non-compliance would affect personal safety and could result in loss of life.
	ATEX EXPLOSION PROTECTION: indicates explosive atmosphere marking according to ATEX. It is used in safety instructions where non-compliance in the hazardous area would cause the risk of an explosion.

2 GENERAL INFORMATION

2.1 Scope of manual



WARNING: These instructions must be kept close to the product's operating location or directly with the product.



WARNING: These instructions, together with the applicable product documentation, must be read prior to installing, operating, using, or maintaining the equipment in any region worldwide. The equipment must not be put into service until all the safe operating conditions noted in the instructions have been met.



NOTE: Failure to comply with the information provided in the User Instructions is considered to be misuse. Personal injury, product damage, delay in operation, or product failure caused by misuse are not covered by the FLOWERVE warranty.

The following General Safety Instructions apply to all Flowserve valves produced in Ahaus, hereafter referred to as "equipment":

- Sizes: DN 015 - 600 (NPS ½ - 24)
- Pressure Classes: PN 10 - 40 (Class 150 to 300)
- Assembled with a pneumatic, hydraulic or electric linear actuator or a handwheel



WARNING: For available Size/Class combinations see applicable product documentation. These instructions are intended to familiarize the reader with the product and its permitted use. Operating the product in compliance with these instructions and other applicable documentation is important to help ensure reliability in service and avoid risks. These instructions may not consider all product variations or local regulations; ensure such regulations are observed by all personnel, including those installing the product. Always coordinate repair activities with operations personnel, and follow all plant safety requirements and applicable safety and health legislation. In the event of missing product-related information, clarification must be obtained via the appropriate FLOWERVE sales office. Supplementary user instructions for ancillary equipment such as positioner, solenoid valves, limit switches etc. may apply, depending on the actual configuration of the equipment. Refer to the relevant manufacturer's user instructions for information regarding other ancillary equipment. As these instructions are part of the equipment, they must be handed over when selling the equipment.

2.2 Disclaimer

Information in this User Instruction in combination with the applicable product documentation is believed to be complete and reliable. Despite all FLOWERVE's efforts to provide comprehensive information and instructions, sound engineering and safety practices should always be used. Please consult with a qualified engineer.

FLOWERVE manufactures products to applicable International Quality Management System Standards as certified and audited by external Quality Assurance organizations. Genuine parts and accessories have been designed, tested, and incorporated into the products to help ensure continued product quality and performance in use. As FLOWERVE cannot test parts and accessories sourced from other vendors the incorrect incorporation of such parts and accessories may adversely affect the performance and safety features of the product. The failure to properly select, install, or use authorized FLOWERVE parts and accessories is considered to be misuse. Damage or failure caused by misuse is not covered by FLOWERVE's warranty. In addition, any modification of FLOWERVE products or removal of original components may impair the safety of these products in use.

2.3 Certification instruction

It is a legal requirement that machinery and equipment put into service within certain regions of the world shall conform to the Marking Directives applicable to FLOWERVE products (i.e. Machinery Directive, Low Voltage Directive, Electromagnetic Compatibility (EMC) Directive, Pressure Equipment Directive (PED), Equipment for Potentially Explosive Atmospheres (ATEX), etc.).



NOTE: Certificates defined in the Contract requirements are provided as part of the product documentation where applicable. If required, copies of other certificates sent separately to the Purchaser should be obtained from the Purchaser for retention with this User Instruction.

2.4 Units

All Units used in this document are metric, unless highlighted otherwise.

2.5 Definitions

Equipment: Flowserve as described in Chapter 1.1 including all ancillary equipment. Product documentation: Entirety of applicable documents describing the product. This includes but is not limited to a valve datasheet, generic or product specific user manuals, Certificates, other order related documentation.

3 SAFETY INFORMATION

3.1 Intended use

Flowserve valves are pressure devices for controlling fluids in piping systems.



WARNING: The equipment must not be operated beyond the parameters specified on the TAG plate or in the applicable equipment data sheet. If there is any doubt as to the suitability of the equipment for the application intended, contact FLOWERVE for advice, quoting the serial number.

- Installing, operating, or maintaining the equipment in any way that is not covered in this User Instruction or other applicable documents is considered to be misuse and could cause death, serious personal injury, or damage to the equipment. This includes any modification to the equipment or use of parts not provided by FLOWERVE.
- Only operate the equipment when it has successfully passed all inspection acceptance criteria.
- Do not operate the equipment in a partially assembled condition.

- Observe equipment labels, warning signs, etc., and keep them in a legible condition. Replace any damaged and/or illegible labels immediately.
- Do not expose the equipment to operating conditions (pressure, temperature, process fluid etc.) exceeding the ratings and limits stated in this User Instruction or other applicable documents.
- Flowserve are designed for use in moderate environmental conditions:
 - » Ambient temperature range -40°C to +70°C (-40°F to 158°F)
 - » Air humidity up to 93%, non-condensing
 - » Air pollution up to 300 µg/m³
 - » These parameters may be restricted by accessories attached to the equipment.
 - » The equipment must not be operated or serviced by unqualified personnel (see Section 3.4 of this document)

3.2 General safety information

This manual is intended to assist in unpacking, installing and performing maintenance as required for Flowserve. Product users and maintenance personnel should thoroughly review this bulletin prior to installing, operating or performing any maintenance.



DANGER: In most cases FLOWSERVE equipment is designed for specific applications (e.g. with regard to medium, pressure, temperature). Do not expose the equipment to applications or operating conditions other than those specified in the product documentation without FLOWSERVE approval.

3.3 Hazards

3.3.1 Mechanical Hazards

3.3.1.1 Instructions for lifting Flowserve



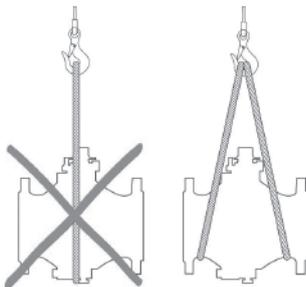
WARNING: Never stand underneath a suspended load. Watch out for swaying or rotating as the load is lifted off the ground. Use proper personal protective equipment, including safety gloves and head protection.

General lifting guidelines

- Always use proper lifting equipment and supports. Check if the devices are eligible for the weight of the equipment. Make sure that the lifting equipment is in good condition before lifting any load.
- Check the weight of the load from the waybill, the equipment brochure, the manual or a dimensional drawing.
- Large, unstable, or awkward loads should always be handled with the assistance of additional personnel or appropriate mechanical means.
- Loads in excess of 25 kg should only be lifted by appropriate mechanical means and in accordance with current local legislation or with the assistance of additional personnel.
- Items less than 25 kg may be prohibited to be lifted without assistance if the lift is repetitive and/or awkward (i.e., away from the body, above the shoulders or below the knees) thus placing excessive stress on the personnel.
- Repetitive lifting of any kind should be evaluated as part of a documented end-user safety program.
- Carefully observe the load when lifting it. First, lift the load only slightly off the ground, then check that all supports are securely attached and the load is in balance. If necessary, lower the load back to the ground and adjust the supports. As you lower the load, make sure that it does not fall over while undoing the supports.
- When attaching lifting equipment, check for sharp edges (e. g. on a valve body) that may be able to damage the equipment. Also, make sure lifting equipment don't damage mounted accessories or air supply tubing.
- Make sure lifting personnel is qualified to do the job.
- Never leave the load suspended in mid-air.
- Unauthorized access to the lifting area is strictly prohibited.
- Report transport damage to the carrier immediately.



NOTE: The load values mentioned in this section are FLOWSERVE recommendations only. All lifting must be done in compliance with site safety protocol, local regulations, and related industry standards.



Lifting Flowserve valves

3.3.1.2 Other mechanical hazards



WARNING: Though during manufacturing of the equipment, all sharp edges have been deburred, damage may occur during transportation or installation that may deform the material of construction in a way that a sharp edge is formed. Workers must observe those edges and protect themselves by using personal protective equipment (safety gloves, protective clothing).

3.3.2 Electrical hazards



WARNING: Flowserve do not emanate electrical hazards. For accessories or third-party actuators see applicable literature in the product documentation package.

3.4 Qualified personnel

All personnel involved in the operation, installation and maintenance of the equipment must be qualified to carry out the work involved. If the personnel in question does not already possess the necessary knowledge and skill, appropriate training and instruction must be provided. If required, the operator may commission the manufacturer / supplier to provide applicable training.

3.5 Industrial health and safety measures

Always co-ordinate work activities on the equipment with the operation's health and safety personnel. Follow all plant safety protocols and applicable safety and health laws and regulations. Use appropriate measures for any work performed on the equipment.

3.6 Potential explosive areas

For ATEX declaration, see Annex B.

3.6.1 Intended use of equipment



NOTE: Flowserve may be installed in areas exposed to gas or dust explosion hazardous areas in ATEX zones 1, 2, 21 and 22. Source of pneumatic power is compressed air or inert gas; this media will be provided from a safe area.



The actuators confirm to equipment group II (equipment intend for use on the surface, not in mines) and may be installed as follows:

- In Zone 2 (Gas, Category 3G) gas groups IIA, IIB and IIC
 - In Zone 22 (Dust, Category 3D) for dust (minimum ignition energy > 3mJ)
 - In Zone 1 (Gas, Category 2 G) gas groups IIA, IIB and IIC
 - In Zone 21 (Dust, Category 2D) for non-conductive dust (minimum ignition energy > 3mJ)
- Before using the equipment in hazardous areas an assessment of hazards during normal operation and foreseeable failure is mandatory.

3.6.2 Compliance with EN 13463, parts 1 to 8 respectively EN ISO 80079-36

The equipment fulfils the following requirements:

- All exposed parts passed push- and environment assessments according EN 13463-1. Assessment has been conducted by Flowserve.

3.6.3 Conclusion of ignition hazard assessment

Per the ignition hazard assessment, no ignition sources have been identified. This assessment has been made for normal operation and foreseeable failures.



Conclusion:

The equipment assessed as above, does not fall under directive 2014/34/EU (ATEX) of the European Community. The equipment will not be marked per EN 13463ff or ISO 80079-36.

3.7 Personal Protective equipment

To avoid personal injury, always use appropriate protective equipment suitable for the work to be done. The protective equipment must comply to local safety protocols as well as to applicable legal requirements.

This also applies to personal protective equipment of the workforce.

Personnel must adhere to the following general rules:

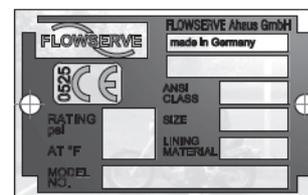
In all environments, use the following protective equipment:	
Tight-fitting protective clothing with long sleeves. Do not wear rings, necklaces or other jewellery.	
Safety shoes with steel toe caps.	
Safety glasses.	
If required by hazards present in the work environment, check for applicability of the following protective equipment:	
Use appropriate safety gloves.	
In case of excessive noise pollution, use of ear protection is required.	
To protect the head from injury, head protection equipment may be required.	

4 PRODUCT DESCRIPTION

4.1 Equipment identification

Each Flowserve comes with an attached product identification plate which includes information to identify the equipment. The serial no. will link the equipment to the appropriate product documentation where you will find detailed information about the equipment.

Figure 1: Flowserve product identification plate



4.2 Detailed product description



WARNING: For detailed technical information on the equipment, see product documentation.

5 PACKAGING, TRANSPORTATION AND STORAGE

5.1 Consignment receipt

Immediately after receipt of the equipment it must be checked against the delivery/shipping documents for its completeness and that there has been no damage in transportation. Any shortage and/or damage must be reported immediately to FLOWSERVE and must be received in writing within one month of receipt of the equipment. Later claims cannot be accepted.

5.2 Unpacking

Larger equipment can be lifted using slings on the yoke or, if present, using the lifting lugs or eyebolt connections provided for this purpose. If slings are used, attach them so that the outer tubing or attaching parts are not damaged. For details see Chapter 2.3.1.



WARNING: If slings are used, be aware that the centre of gravity of the equipment may be above the lifting point. In this case, secure or support the equipment against rotating, to prevent damage or personnel injury. Do not stand under suspended loads.

! **NOTE:** Report transport damage to the carrier immediately.

5.3 **Packaging**

Careful packing, loading and transport arrangements are required to prevent products from being damaged during transport. Standard packaging includes a cardboard box, with or without a wooden pallet base, as needed. Special packaging may include a wooden box. Packaging may use cardboard, plastic wrap, foam, or paper as packing material. Filling material may be a carton type, paper or other adequate material. Shipping marks display product and package dimensions and weight. Packing guidelines for export follow HPE standards. (Nonreturnable packaging may contain up to 90% recyclable materials.)

! **NOTE:** Pay close attention to shipping marks and transport pictograms.

5.4 **Transportation**

Leave the equipment in its shipping container (on the pallet) as long as possible. Use the pallet to move the equipment to the installation site.

! **NOTE:** During transportation, observe all local safety protocols.

5.5 **Storage**

Contrary to pure steel ball valves, fully lined ball valves and all other Flowserve valves require a high degree of care as far as packing, transport, storage and installation is concerned, as the corrosion resistance of the valve is largely dependent on the integrity of the lining. Therefore it is advisable to avoid damages to the lining caused by blows, shocks or ingress of sand or metal chip etc. onto the sealing faces of the flanges.

! **NOTE:** Maximum storage time for a valve is 6 months due to the packing box that begins to break down after this time. Check packing for tightness, otherwise, leakage may develop. Upon arrival on site, store the equipment on a solid base in a cool, dry, closed room. Until its installation, the equipment must be protected from the weather, dirt and other potentially harmful influences.

Do not remove the protective covers from the body flanges of the equipment or from the instrument ports of the actuator and accessories until the equipment is ready for installation at its final position.

6 **INSTALLATION**

 **DANGER:** Before installation check the order-no, serial-no. and/or the tag-no. to ensure that the equipment is suitable for the intended application.

Installation of the equipment must be performed by qualified personnel – see chapter 3.4 of this manual.

6.1 **Inspection and preparation**

Prior to installation of the equipment, the following information needs to be checked to reduce the risk of malfunction and safety related incidents:

- Confirm nominal/operational data on the serial plate matches the operational data of the facility.
- Clean process pipework prior to installation. Make sure to remove dirt, welding slag, chips, scale or other foreign material
- Confirm alignment and position of piping flanges to be in conformance with installation parameters
- Confirm the piping is routed correctly and the equipment is free of additional piping forces.
- Check installation clearance is sufficient. Free access to all parts of the equipment needs to be provided to avoid pinching of employees
- Confirm flow direction of unidirectional valves is following the piping configuration. On noted on unidirectional valve flow direction is shown by an arrow on the valve body.
- Confirm air supply line is dry and clean. Supply air must conform to ISA 7.0.01-1996. Also, check for maximum allowable pressure of the equipment.
- Confirm instrument signal lines are dry and clear of dirt and oil and do comply with the requirements of the equipment.

 **ELECTRICAL HAZZARD:** Confirm grounding of the equipment. Failure to do so may cause electrical discharge.

6.2 **Mounting**

When mounting the equipment into the pipework, observe the following guidelines:

- Try to locate the load's centre of gravity and prepare yourself for how the load will behave to ensure balanced lifting. Lift the equipment in the position in which it will be installed.
- Lift the load at an even pace to avoid swaying.
- While moving the equipment, make sure not to bump it against any obstacle. Also, make sure that the installation space reserved for the equipment is sufficient.
- Beware of the conditions of the installation site, as surfaces may be slippery, for example. Observe that parallel installation work may occur nearby.
- Make sure that the equipment is properly fixed in its installation position before detaching the supports.
- In case no dedicated lifting lugs are provided on the equipment, make sure to attach the lifting gear to the actuator yoke rods or the valve body itself.

6.3 **Installation**

For equipment installation observe the following general guidelines:

- Remove protection caps from piping system. In case of flanged valves, clean flange gasket surfaces.

! **NOTE:** Non-compatible cleaning agents may damage gasket materials and lead to leakage of the flange connection. Consult a current chemical compatibility list before applying.

- Where possible, check for installation of Flowserve in an upright position, with the valve stem having vertical orientation. This will allow easy maintenance of the equipment.

! **NOTE:** An upright installation position is important with low-temperature applications, to keep the distance between the packing material and the medium as large as possible. The packing material then retains the ambient temperature as much as possible.

- Pipelines must be correctly aligned to ensure that the valve is not fitted under tension.
- When connecting the equipment to the process line, observe gaskets to be located in the centre of the body flanges. There is no need for lined valves to mount additional gaskets.
- Tightening of flanged connections preferably should be performed in accordance with ASME PCC-1-2013, if applicable. Always use torque wrenches.
- Before connecting power supply and instrument signal lines, check those to be blocked. Electrical signal lines need to be deactivated.

! **NOTE:** Do not insulate extensions that are provided for hot or cold services.

 **WARNING:** For specific installation procedure of equipment see appropriate product documentation.

7 **COMMISSIONING**

Prior to commissioning of the equipment, the following conditions need to be checked to reduce the risk of malfunction and safety related incidents:

- Clean process pipework prior to installation.
- Re-check direction of flow and compare with plant setup. For unidirectional valves the direction of flow is indicated by an arrow on the valve body.
- If the valve is to be welded into the line, make sure that it is shielded from excessive heat.
- Welding must be performed by qualified welders.
- Before opening instrument air lines, check for conformity with ISA 7.0.01-1996 (min. dew point 10°C below ambient temperature / particle size below 1 µm / oil content max. 1 ppm).
- Avoid critical operating conditions.



CAUTION: Critical operating conditions may generate excessive noise or vibration levels.



WARNING: The temperature of the process medium is transferred to the surface of the equipment and may cause injury if touched with unprotected hands.



WARNING: Insufficient maintenance can result in the emission of the process fluid which may be of hot, cryogenic or toxic nature.



WARNING: To avoid the risk of pinching, do not work on the equipment while it is in operation.



WARNING: During commissioning, use of insufficient maintenance can result in the emission of the process fluid which may be of hot, cryogenic or toxic nature.



WARNING: For specific commissioning procedure of equipment see product documentation.

8 **OPERATION**

8.1 **Preparatory activities**

Prior to start-up, check the equipment as follows:

- Open and close the valve. Observe the movement of the actuator stem. The movement must be smooth.
- Check for maximum stroke compared to change of signal (i.e. pneumatic / electrical signal).
- Check all air connections for leaks.
- All nuts and bolts must be tightened according to the product documentation.
- Valves that have not been operated for a long time can have an increased torque.



NOTE: An excessively tightened packing may cause excessive packing wear and may hinder the free movement of the stem.

- Check fail-safe position. To do this, close supply pressure and / or electrical signal and observe whether the valve opens or closes as defined.

8.2 **Start-up**

During start-up, continuously increase pressure load until operation parameters are reached.



NOTE: Minor relaxation of bolting may occur after initial assembly or if temperature cycling occurs. Retorque all bolted connections and packing assembly as necessary and check for leaks. For bolting torques, see product documentation.

8.3 **Normal operation**



WARNING: For information of the normal operating range of the equipment, limits, and if applicable, any specific activities to properly operate the equipment see product documentation.

8.4 **Activities after operation**

For decommissioning of the equipment, observe the following:

- Equipment remains installed into the pipework:
 - » In case of a long-term shutdown phase, the valve and the pipework needs to be drained and, depending on the process medium, flushed.
- Equipment is detached from the pipework:
 - » Observe general safety information given in this document
 - » Remove the equipment from the pipework per the lifting instructions given in this document
 - » Apply a proper preserving agent to the valve's inner surfaces
 - » Close openings using proper caps
 - » To protect external equipment surfaces from corrosion, apply a proper preserving agent to those surfaces
 - » If the equipment has been decommissioned for a period longer than 1 year, all gasket and packing material must be replaced.

9 **MAINTENANCE**



NOTE: This chapter outlines General Maintenance requirements to ensure good long-term equipment performance. For additional information, see product documentation.

9.1 **General maintenance information**

To avoid possible injury to personnel or damage to products, safety requirements and local health and safety rules must be strictly adhered to. Modifying FLOWSERVE product, substituting non-factory parts, or using maintenance procedures other than outlined in the product documentation could drastically affect performance and be hazardous to personnel and equipment, and will void existing warranties.



DANGER: Between actuator and valve there are moving parts. To avoid injury, keep all hands, hair and clothing away from all moving parts when operating the equipment.

Welding to repair or to connect the valve may only be performed by trained and qualified welding personnel.

Apart from the operating instructions and the obligatory accident prevention directives valid in the country of use, all recognized regulations for safety and good engineering practices must be followed.

9.2 **Recommended maintenance checklist**



NOTE: A proper equipment maintenance schedule needs to be adjusted empirically on-site to take local conditions into account. This said, the following table can only be a basis to work from when customer establishes local maintenance procedures.

Recommended Maintenance Checklist					
No.	Topic	Frequency	Examination	Action	
				Good	Inadequate
1	Visual inspection	Monthly	Equipment is in a good and clean condition; no leakage is observed	No action	Overhaul equipment to restore initial condition. Otherwise, replace equipment.
			No damage caused by corrosive residues or corrosive vapors detected.	No action	Clean equipment and, if necessary, repaint.
			Check all accessories for firm seating	No action	Retighten fasteners.
		Preventive maintenance schedule of plant	Preventive replacement of complete equipment	For preventive maintenance Flowserve recommends to replace the equipment once every 60 months.	
2	Stem packing	Monthly	No packing leakage is observed, valve movement is smooth.	No action. Potentially, clean valve stem with a soft cloth.	Immediately replace defect stem packing
			Preventive replacement of stem packing	For preventive maintenance Flowserve recommends to replace the stem packing once every 24 (PTFE) respectively 18 (Graphite) months.	
3	Gaskets	Monthly	No leakage observed	No action.	Replace defect gasket.
4	Test connection	Monthly	No leakage observed	No action.	Replace defect gasket or plug screw.
5	Pressure retaining bolting	Yearly	No visual damage of bolted connections; no leakage is observed	No action.	Retorque the bolting. If leakage doesn't stop, decommission the equipment and replace bolting and gaskets.
6	Pneumatic actuator	Monthly	Equipment is in a good and clean condition; no pneumatic leakage observed	No action. Potentially, clean actuator stem with a soft cloth.	Overhaul equipment to restore initial condition. Otherwise, replace equipment.
			Air filter is clean and working correctly	No action.	Replace filter.
7	Electric actuator	Monthly	Equipment is in a good and clean condition; no grease/oil on external surfaces.	No action. Potentially, clean actuator stem with a soft cloth.	Overhaul equipment to restore initial condition. Otherwise, replace equipment.
8	Operation test	After retorquing or replacement of stem packing or pressure retaining bolts	No leakage detected		Stroke the equipment 3 times from min. to max. stroke. Check for leakage and smooth movement of the valve stem

9.3 Special tools

WARNING: For information on special tools required for maintenance action, see product documentation.

9.4 Disassembly

WARNING: For detailed information on equipment disassembly, see product documentation.

9.5 Reassembly

WARNING: For detailed information on equipment reassembly, see product documentation.

9.6 Maintenance procedure

DANGER: When it is installed in the process line, before starting any work on the equipment, ensure that the process pipe is depressurized and drained both upstream and downstream of the equipment. Signal and Energy supply lines must be switched off.

For detailed information on equipment reassembly, see product documentation.

9.7 Spare parts

WARNING: Use only FLOWERVE original spare parts. FLOWERVE will not accept responsibility for any damages that occur from using spare parts or fasteners from other manufacturers.

NOTE: If FLOWERVE products (especially sealing materials) have been stored for longer periods check these for corrosion or deterioration before using these products.

Fire protection for FLOWERVE products must be provided by the end user.

10 TROUBLESHOOTING

WARNING: For detailed troubleshooting recommendations, see product documentation.

11 DECOMMISSIONING AND RECOMMISSIONING

11.1 Decommissioning

If the installed equipment is planned to be out of service for an extended period of time, all media that might change its condition by polymerisation, crystallisation, solidification, corrosion or other effects, must be drained off the piping system. If necessary, the system must be rinsed.

When dismantling the equipment from the pipework for decommissioning, after cleaning and rinsing, the equipment must be prepared for storage:

- Apply a suitable preserving agent on all internal surfaces
- Close all openings using proper protection caps
- Apply a suitable preserving agent on all unpainted corrodible external surfaces

11.2 Recommissioning

NOTE: If the equipment has been out of service for more than one year, all gaskets and packings must be replaced.

NOTE: Before re-entering a Flowserve into service, all necessary tests must be repeated and recorded in compliance with all test routines, guidelines and engineering standards.

12 RETURNS AND DISPOSAL

12.1 Returns

The equipment shall be emptied, cleaned, and preserved before returning the equipment to the manufacturer. The manufacturer will only open the returned equipment if the contamination declaration is present.

12.2 Disposal and recycling

At the end of the equipment service life, the relevant materials and parts should be recycled or disposed using local environmental regulation methods. If the product contains substances which are harmful to the environment, then the removal or disposal of the equipment must be in accordance with local/regional regulations. This includes any liquid and/or gas in the sealing and packing areas of the equipment.

WARNING: Refer to Safety Data Sheets and make sure that hazardous substances or toxic fluids are disposed of safely and that the correct personal protective equipment is used. All activities involving hazardous substances or toxic fluids must be in compliance with published safety standards.

Annex A: Declaration of Conformity

Flow Control Division

DECLARATION OF CONFORMITY with the Pressure Equipment Directive 2014/68/EU

Hereby we, the manufacturer: **Flowserve Ahaus GmbH**, von-Braun-Strasse 18a, D-48683 Ahaus, Germany

declare the construction, manufacturing and testing of the pressure equipment is in accordance with the directive 2014/68/EU.

Brand	Type	Description
Atomac	AKH2, AKH2A, AKH3, AKH6, AKH7, AKH9, AKH10, AKH11, AKH12	Lined Ball Valve
Atomac	AR2	Lined Swing Check Valve
Atomac	ARV2, ARL2, AKR2, ARV/SG	Lined Ball / Platen Check Valve
Atomac	ASG, ASG3, ASG4, ASG/B	Lined Sight Glass
Atomac	ASP	Lined Strainer
Atomac	AP/MS	Lined Ball Sampling System
Durco	T4E1, T4E2, T4E3	Lined Plug Valve
Durco	BTL, BTW	Lined Butterfly Valve
Durco	Mach1, G411, G431, G4E	Stemmed Plug Valve

Conformity assessment modules:
Module H - Category III - Fluid Group 1
Lloyd's Certificate No. 50006 / 1

Notified body that carried out the controls and monitors the quality system to 2014/68/EU:
Lloyd's Register Hamburg, Mönkebergstrasse 27, D-20095 Hamburg, Germany - No. 0025

Name and address of the notified body which carried out the inspection:
not applicable

Referenced harmonised standards used:
EN 19 - EN 508 - EN 10213 - EN 1563 - EN 1092 T1/T2 - EN 10204

References of other technical standards, specifications and European Directives used:
DIN EN 12286 T1/T2 - DIN EN12516 T2 - ISO 5211

Authorised person for the manufacturer within the European Community:
Date: Jun-06-2019

Signature: *Wig-Christoph Harnack*
Name: **Wig-Christoph Harnack**
Title: **Managing Director / Plant Manager**

Stamp: **FLOWERVE**
FLOWERVE AHAUS GMBH
von-Braun-Str. 18a, 48683 Ahaus
Phone: +49 25 67 1 44-12
Fax: +49 25 67 1 44-48

Annex B: Declaration of Conformity

Flow Control Division

DECLARATION OF CONFORMITY with the Pressure Equipment Directive 2014/68/EU

Hereby we, the manufacturer: **Flowserve Ahaus GmbH**, von-Braun-Strasse 18a, D-48683 Ahaus, Germany

declare the construction, manufacturing and testing of the pressure equipment is in accordance with the directive 2014/68/EU.

Brand	Type	Description
Atomac	AKH 2.2	Atomac lined valve

Conformity assessment modules:
Module H1 - Category IV - Fluid Group 1
Lloyd's Certificate No. 50006 / 1

Notified body that carried out the controls and monitors the quality system to 2014/68/EU:
Lloyd's Register Hamburg, Mönkebergstrasse 27, D-20095 Hamburg, Germany - No. 0025

Name and address of the notified body which carried out the inspection:
not applicable

Referenced harmonised standards used:
EN 19 - EN 508 - EN 10213 - EN 1563 - EN 1092 T1/T2 - EN 10204

References of other technical standards, specifications and European Directives used:
DIN EN 12286 T1/T2 - DIN EN12516 T2 - ISO 5211

Authorised person for the manufacturer within the European Community:
Date: Jun-06-2019

Signature: *Wig-Christoph Harnack*
Name: **Wig-Christoph Harnack**
Title: **Managing Director / Plant Manager**

Stamp: **FLOWERVE**
FLOWERVE AHAUS GMBH
von-Braun-Str. 18a, 48683 Ahaus
Phone: +49 25 67 1 44-12
Fax: +49 25 67 1 44-48

Annex C: ATEX declaration

Annex D: Declaration of Incorporation

	Consideration of Conformity Directive 2014/34/EU (ATEX)	Revision: 03 Datum: Jun-06-2019
<p>Flowserve Ahaus GmbH Von-Braun-Straße 19a D-48653 Ahaus Germany Tel.: +49 (0) 2561 686-100 E-Mail: FCD_Ahaus@flowserve.com</p>		
<p>Consideration of Conformity with the Directive 2014/34/EU (ATEX)</p> <p>The listed and metallic valves of the brands ATOMAC and DURCO produced by Flowserve Ahaus have been examined according to DIN EN 13463-1 to determine the danger of ignition. Potential sources of ignition coming from the valve itself have not been ascertained. This result was confirmed by the Bundesanstalt für Materialforschung und -prüfung (BAM – Federal Office for Material Research and Testing).</p> <p>The valves are intended for usage in areas where explosive atmosphere will be present from time to time. As no internal sources of ignition were determined, the following statements are valid:</p> <ul style="list-style-type: none"> The valves do not fall within the scope of the Directive 2014/34/EU A corresponding marking is not permissible <p>The specifications and instructions of the corresponding installation and Operation Manuals have to be obeyed. We would like to point out that potential sources of ignition resulting from operating conditions and/or the used medium fall under the responsibility of the operating company. These potential dangers can be minimized or possibly excluded in cooperation with Flowserve with suitable modifications on the valve e.g. by using conductive lining materials to prevent static charging of the mediums during operation.</p>		
<p> Jörg Christian Harnisch Managing Director / Plant Manager</p>		<p> FLOWERVE AHAUS GmbH Von-Braun-Straße 19a D-48653 Ahaus Tel.: +49 (0) 2561 686-100 Fax: +49 (0) 2561 686-48</p>
<p>Seite 1 von 1</p>		

	Einbauerklärung gem. Richtlinie 2006/42/EG Declaration of Incorporation acc. Directive 2006/42/EC	Revision: 04 Datum: 04.07.2019 Jul-04-2019																																																							
<p>Name und Adresse des Herstellers / Name and Address of the Manufacturer Flowserve Ahaus GmbH Von-Braun-Straße 19 a D-48653 Ahaus</p>																																																									
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<p>Richtlinie Directive: 2006/42/EG des Europäischen Parlaments und des Rates vom 17. Mai 2006, "europäische Maschinenrichtlinie" 2006/42/EC of the European Parliament and the Council of 17 May 2006, "European Machinery Directive"</p> <p>Flowserve Ahaus GmbH als Hersteller erklärt hiermit, dass die Kugelhähne aus den oben aufgeführten Armaturen, die für automatisierten Betrieb im Zusammenbau mit pneumatischen, elektrischen oder hydraulischen Antriebsystemen bestimmt sind, die grundsätzlichen Anforderungen der Richtlinie 2006/42/EG als „unvollständige Maschine“ erfüllen: Anhang I, Ziffern 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.5.2, 1.5.4, 1.5.6, 1.5.7, 1.5.13, 1.6.1, 1.7.1, 1.7.2, 1.7.3 und 1.7.4. Die Konformitätsbewertung wurde gemäß der harmonisierten Norm EN ISO 12100:2010 durchgeführt. Die Inbetriebnahme ist solange untersagt, bis sichergestellt ist, dass die Gesamt-Maschine oder Anlage, in die Flowserve-Armaturen eingebaut sind, den Bestimmungen der Richtlinie 2006/42/EG entspricht. Die speziellen technischen Unterlagen für die unvollständige Maschine gemäß Anhang VI Teil B der Richtlinie wurden erstellt und der Hersteller ist verpflichtet, diese Unterlagen einzelstaatlichen Behörden auf begründetes Verlangen elektronisch zu übermitteln. Bewillmächtigter für die Dokumentation: Flowserve Ahaus GmbH (Adresse wie oben) Flowserve Ahaus GmbH, the manufacturer, hereby declares that the above listed valve types and their variants - intended for automated operation in assemblies with pneumatic, electric or hydraulic actuation systems - fulfill the basic requirements of Directive 2006/42/EC for "partly completed machinery". Annex I, paragraphs 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.5.2, 1.5.4, 1.5.6, 1.5.7, 1.5.13, 1.6.1, 1.7.1, 1.7.2, 1.7.3 & 1.7.4. The conformity assessment procedure was conducted in compliance with the Harmonized Standard EN ISO 12100:2010. Any of the above listed products must not be put into operation until the relevant machinery into which the Flowserve products have been incorporated has been declared to be in conformity with the provisions of Directive 2006/42/EC. The relevant technical documentation for partly completed machinery in accordance with Annex VI, part B, has been created and can be provided to national authorities in case of justified requirement. Responsible for documentation: Flowserve Ahaus GmbH (address as above)</p>																																																									
<p>Unterschrift / Signature Jörg Christian Harnisch Managing Director / Plant Manager</p>		<p> FLOWERVE AHAUS GmbH Von-Braun-Straße 19a D-48653 Ahaus Tel.: +49 (0) 2561 686-100 Fax: +49 (0) 2561 686-48</p>																																																							
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