	INSTRUCTION FOR INSTALLATION AND MAINTENANCE	CV/SV 320 to 332 Ex
	CONTROL VALVE, SHUT-OFF VALVE	PM - 207/20/03/GB

The instructions for installation and maintenance of valves RV/UV 3x0 and 3x2 Ex are binding for users to ensure proper function of valves. The user must keep the rules said here while installation, operation and maintenance. Technical details of individual type are specified in catalogue data sheets. If the usage of the valves is different from mentioned herein, the guarantee terms are not valid any more. For installation and service of the valves the following is valid: CLC/TR 60079-32-1: 08/2016
EN ISO 80079-36: 09/2016
EN 1127-1 ed.2 :02/2012

This instructions are valid for these products

CV/SV 320Ex, CV/SV 330Ex ... two-way valve, straight-through

CV 322Ex, CV 332Ex ... two-way valve with pressure-balanced plug, straight-through

This instruction does not include instructions for installation and operating of actuators and accessories. These are mentioned in instructions issued by manufacturers of actuators and are part of delivery. In case of need it is possible to obtain them from the supplier.

The valves can be assembled with actuators approved for such using by producer of the valves and running time cannot exceed 1m/s.

1. Description and application

The valve was manufactured and tested in accordance with ISO 9001 standard (Quality management systems Requirements).

1.1 Description

Control valves and shut-off valves are designed to control and/or shut off of process medium flow such as water (except of drinkable), steam, non-aggressive gases and other media compatible with material of valve body and inner parts. The valves are also designed for media such as industrial and fuel gases and inflammable liquids. Only liquids with sufficient electric conductivity ($>1000\text{pS/m}$) may be used. The temperature of flowing liquid must not exceed 80% of minimal ignition temperature of surrounding inflammable atmosphere and must be lower than maximal temperature of liquid permitted by producer.

The body material is optimally made of cast steel, cast stainless steel, inner parts are made of high quality stainless steel. Flow characteristics, Kvs values and leakage rate correspond to international standards.

Valves type Ex fulfil the requirements II1/2G IIC TX Ga/Gb resp. II1/2G IIB TX Ga/Gb acc.to EN ISO 80079-36 (9/2016) and EN 1127-1 ed.2 (1/2012)

Standard painting of the valves:

- the inner surfaces are not painted
- the outer surfaces upto temperature 400°C - colour Burcharths Aqua Air G4901
- the outer surfaces over temperature 400°C THERMODUR 600 STAN SILBR GRAU
- stainless steel valves are not painted

Thickness of colour layers for II1/2G IIB TX Ga/Gb do not exceed 2 mm.

Thickness of colour layers for II1/2G IIC TX Ga/Gb do not exceed 0,2 mm.

In case of painting repairs, the value of maximum tightness must be observed. The values must be kept on main (large) surface areas. In the vicinity of corners and edges, the value breaking is possible.

1.2 Operating conditions

Valves should be operated under the condition, which were considered during their selection (type, dimension, materials etc.) In case of different working conditions ask the manufacturer for review/confirmation of suitability. Explosive gases atmosphere (zone 1) can occasionally occur in the vicinity of packing, if the valve with graphite packing is used for flammable/explosive medium. In this case, it is necessary to periodically check the stuffing box every 3 months.

Ex type valves must be properly earthed according to CLC/TR 60079-32-1 (conduct the valves with earthed part of nearby device/structure).

Further, the prevention of highly efficient charge generating mechanisms (leading to propagation brush discharges on non-conductive layers and coatings) must be done according to EN ISO 80079-36.

For reliable function of the valves, the producer recommends to install the filter of mechanical impurities. Installation of the filter is necessary for valve with micro-throttling system ($Kvs \leq 0.16$ or $Cv \leq 0.18$).

Recommended strainer dimensions:

NPS, Type	Recommended maximum mesh size
NPS 1/2"-1", $Kvs \leq 0,16$ ($Cv \leq 0,18$)	0,25 mm
NPS 1/2"-2"	0,6 mm
NPS 3"-8"	1,0 mm
NPS 10"-16"	1,6 mm

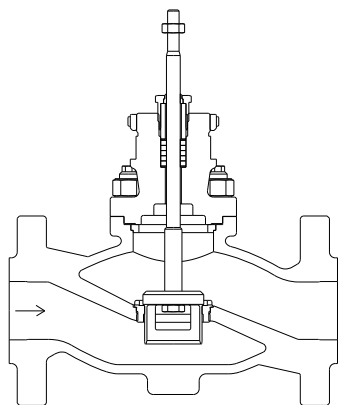
2.1 Preparation before installation

The valves are delivered completely assembled, adjusted and tested. Prior to the valve installation, it is necessary to compare the data on the valve tag with data from accompanying documents. The protective blinds must be removed from the valve. The valves shall be inspected against mechanical damage or impurities, especially in the inner area and on sealing flanges. Also the piping system shall be cleared from all impurities that could cause damage of seat/plug sealing surface and thus cause a loss of tightness of the valve.

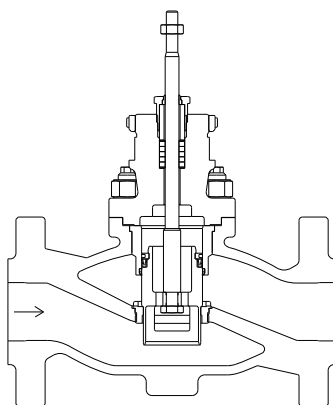
2.2 Installation of valve into pipeline

The valve must be installed in such direction, that the arrows on the valve body correspond to the process medium flow.

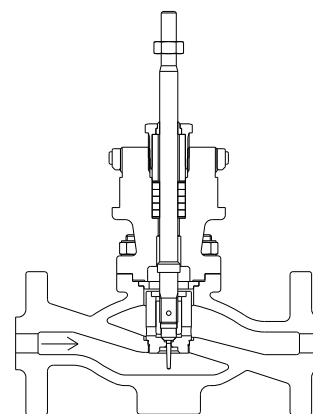
CV 3x0 Ex



CV 3x2 Ex

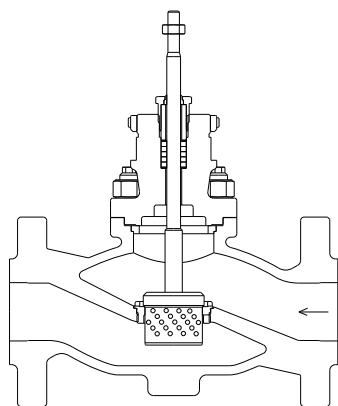


CV 3x0 Ex

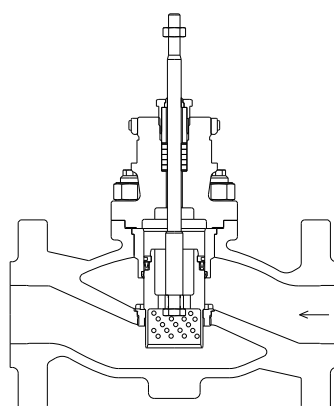


Pic.1: Flow direction for two-way valve with V-ported or contour plug
CV 3xx xxx xxxx Lx xx/xxx-xxx (Char. L; R; P; S; U)

CV 3x0 Ex

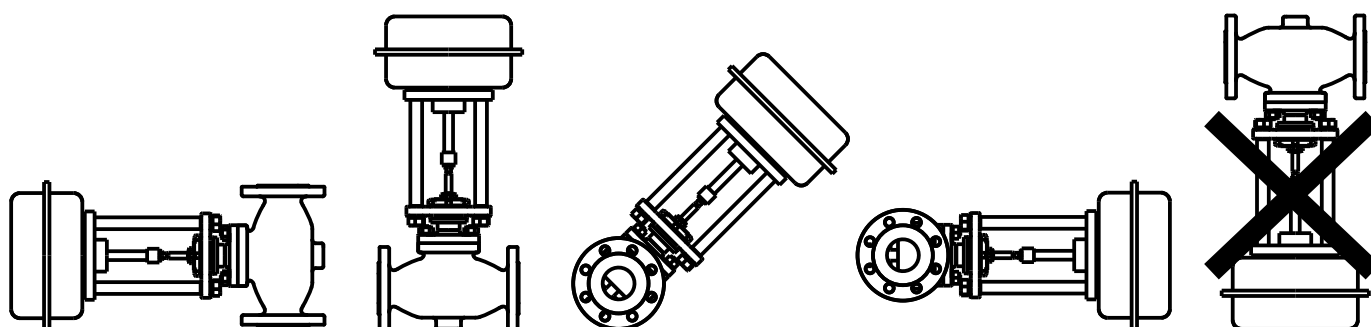


CV 3x2 Ex



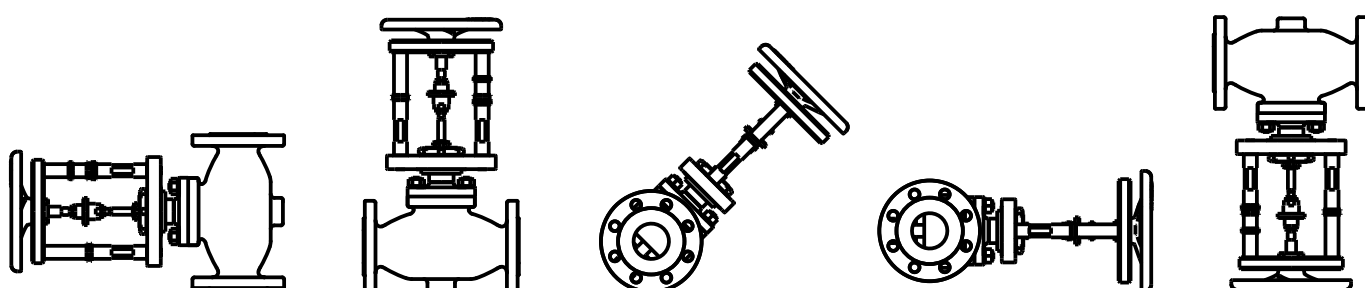
Pic.2: Flow direction for valve with perforated plug
CV 3xx xxx xxxx Dx xx/xxx-xxx (Char. D; Z; Q)

The valves **NPS ½" - 6"** can be installed in any way except the position, when the actuator is under the valve body. In case the stem of the valve is positioned horizontally, the actuator must be turned so that the columns of the actuator are positioned above each other. In operating the valve with high temperature medium, it is necessary to protect the actuator against excessive heat exposure, for example by tilting it from vertical direction and carefully insulate the pipeline. In case the valve is mounted in vertical or in horizontal pipeline with actuator being positioned vertically, the flexible support or hanging of the actuator is necessary, picture 6.



Pic. 3: Installation position for valves with electro- or pneumatic actuators

For the valves equipped by hand-wheel any installation position is allowed/suitable.



Pic. 4: Installation position for valves with hand wheel

For the valves **NPS 8"** and greater, the basic working position, i.e. vertical stem and actuator above the valve, is strictly recommended, regarding the operation and maintenance purposes.

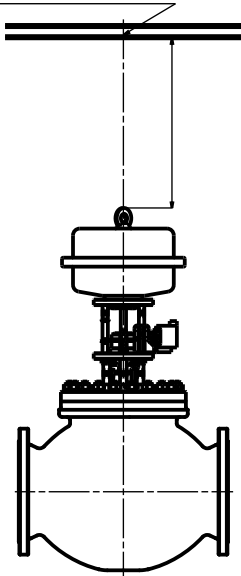
If necessary, the other positions are possible (see pic.3 and 4) but, in case of valve dismantling from the pipeline for the repairs, the additional expenses for dismantling and back installation aren't in the scope of warranty and must be paid by customer as extra money. It's necessary to support or hang the valve in all positions except the basic one (see pic.6). The pipeline and valve's body must be properly insulated in case of high temperature medium. Opposite to it, the actuator yoke/columns and the actuator itself must be insulation free, to keep the surface/ambient temperature in the limits given by the actuator producer.

The valves operated with medium temperatures below 0°C (32°F), must be installed in basic position, i.e. the actuator or hand wheel is above the valve body (condition valid for all NPS).

The valve must be installed with proper space around (esp. below and above), for the maintenance and other activities linked with valve operation. For the valves NPS 4" and greater, the clearance above the valve and suspension for lifting device must be provided, see pic.5.

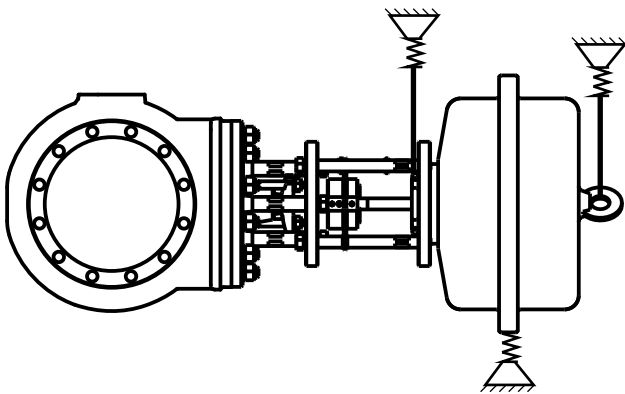
NPS	A (minimum distance for disassembly)
NPS ½" - 3"	500 mm
NPS 4" - 12"	1500 mm, with suspension
NPS 16"	2000 mm, with suspension

Beam, lifting lug



Pic.5: Minimum space above the valve

In case the valve is equipped with bellows packing or the vibrations of the pipeline may occur, it is advisable to support the **actuator flexibly** in all accessible mounting positions.



Pic.6: Recommended fixing points

For proper function of control valve, below-mentioned instructions must be obeyed

- the valve can not be installed just behind the pipe bend. Pipeline should be straight min.6x NPS in front of the valve.
- piping reduction prior and behind the valve should be smooth and gentle (recommended slope regarding the pipeline axis is from 12 to 15°) and max. two dimensions difference between the valve and pipeline is allowed.
- no excessive forces can be transferred from pipeline to valve, valve not be used as pipe support.
- the installation itself shall be carried out carefully with alternate tightening of the screws so as to prevent tension.

In case of pipeline cleaning (flushing, outblowing) the valve must be replaced by appropriate pipe spacer!

2.3 Electric actuator or electrohydraulic actuator installation

These work may be carried out by trained personnel only. It is necessary to keep all safety rules relating to electric machines. Further it is necessary to follow instructions for installation, operation and maintenance of electric actuators issued by the producer. Position transmitter and signalisation switches, if part of delivery, are positioned under the actuator cover.

Before valve commissioning, the data, given in the actuator ID plate (especially supply voltage and voltage of control signal), should be checked/compared with given specification and verify, that the actuator can be connected to superordinate regulator.

Regarding the fact the valve is delivered with its actuator as a complet, the basic adjusting is carried out. Closed position is adjusted with torque switch, so that the valve is tightly closed. Open position is adjusted with position limit switch.

In case the actuator was removed from the valve, it is necessary to check this setting or set the actuator once again. The producer does not take over the damage caused by wrong setting of the actuator. In case of need, the assistance of our subsidiary LDM Service can be required.

The length of the actuator´s cables shall be selected so that the actuator can be removed from the valve without disconnection from the terminal board.

WARNING: It's necessary to observe the mechanical stroke indicator placed at actuator's joke or directly at the electromotor, if the valve is operated (opened or closed) by hand wheel. The extra care must be taken near to OPEN and CLOSE position. Neither position nor torque switches are in function in such case and there is a danger of valve or actuator serious damage. It's strongly prohibited to use any mechanical tools (force boosters) for hand wheel operation.

2.4 Pneumatic actuator connection

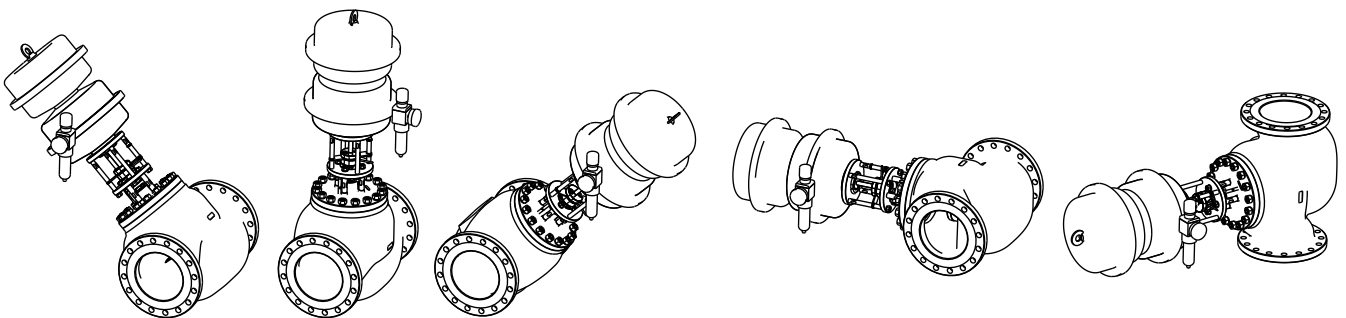
These work may by carried out by trained personnel only. It is necessary to follow instructions for installation, operation and maintenance of pneumatic actuators issued by the producer of the actuator.

Connection of pneumatic actuator to air supply is done by plastic, copper or stainless-steel tubes, recommended dimension is 8x1 mm. The 12x1 mm tubes are recommended for the actuators with membrane area larger than 600 cm² or in case the length of air pipeline is more than 10m.

Before valve commissioning, the data, given in the actuator and positioner ID plate (especially air supply maximum pressure), should be checked/compared with given specification. If the pressure of air supply is higher, the pressure reduction valve must be used.

As the valve is supplied with actuator as a complet, the basic setting is also carried out. In case the actuator was removed from the valve, it is necessary to check this setting or set the actuator once again. The producer does not take over the damage caused by wrong setting of the actuator. In case of need, the assistance of our subsidiary LDM Service can be required.

In case of pressure air regulator (air supply to pneumatic actuator) fixed directly on the valve/actuator yoke, the regulator must be placed in vertical position (draincock/draincup down), see pic. 7. If the valve mounting position is known during the valve-actuator assembly, the right position is set on the production line/during final test.



Pic. 7: Examples of filter/regulator position

2.5 Checking after installation

Piping system should be pressured after valve installation and the checked if there is not leak. Check the packing set tightness as well. Then check the proper function of actuator by doing a few strokes.

2.6 Warming-through steam fitting

Fittings have to be filled and warmed-through by regulating the steam supply and drainage so that the trend of the temperature increase is observed (see the table). After the required temperature is reached, the operation of the steam piping is regulated depending on the need of the given appliance.

Armatura	Carbon material of body	Alloy material of body	Austenite material of body
NPS 1/2" - 2 1/2"	8°C/min	6°C/min	8°C/min
NPS 3" - 16"	6°C/min	4°C/min	6°C/min

3. Operating and Service

Recommended period controls external leakage

Media Type	Packing set	Cover and flanged joints
Normal fluids - water, steam, air, ...	min. 1x per 6 months	min. 1x per 12 months
Dangerous liquids - flammable, explosive, toxic or other dangerous	min. 1x per 3 months	min. 1x per 6 months

3.1 Packing set

In case the valves are equipped with sealings made of PTFE, the packing does not require any maintenance and packing screw cannot be tightened. If the leakage occurs, the complete packing set shall be replaced. If the packing rings are made of graphite, the sealing material gets worn and in case of any leakage it is necessary to tighten the packing screw, possibly add new sealing ring. Graphite packing shall be tightened successively by 1/4 of turn only to achieving the tightness again. The bellows does not require any maintenance and in case of damage to the bellows, the trained personnel shall be required.

3.2 Exchange of packing set

If there is need to exchange the packing set because of high leakage, first the actuator must be dismantled and then the packing screw must be screwed out. **The pipeline may not be under pressure during changing of packing set.** After this, there is need to check the state of spindle surface and clean the inside of the packing box. The surface of spindle must be smooth and not damaged. If necessary, the spindle must be exchanged. Packing set is filled, by the producer, with a special lubricant acc. to the type of used packing. Such lubricant ensures the proper function of the packing rings within their service life. **The spindle may not be greased during the operation!**

After exchange of packing set, the packing screw must be tightened:

- firmly to the bottom of gland box when PTFE is used
- to press the packing set about 10% of the height when graphite rings are used

After installation of actuator, there is necessary to make test as in 2.5.

3.3 Maintenance of actuators

During operating and maintenance of the actuators, it is necessary to follow the instructions issued by the producer of the actuators. If a defect is detected, follow the mounting instructions or ask for assistance of trained personnel from LDM service. The temperature of the actuator surface cannot exceed the value specified by the producer of actuator.

3.4 Elimination of defects and malfunctions

If a defect is detected on the valve (leakage, leakage of packing or bonnet sealing, etc.), it is necessary to ensure its repair immediately otherwise a permanent damage may occur to sealing surfaces and other parts exposed to effects of leaking medium. **Prior to any repair work on the valve, make sure that piping system is free of pressure!**

Defect	Possible cause	Elimination of defect
Valve leakage	- higher Δp_{max} than recommended for given type of the valve	- lower the diff. pressure value on the valve - use stronger actuator - use pressure-balanced valve
	- insufficient linear force of the actuator	- check the function and setting of the actuator possibly positioner
	- seizure of impurity in seat area	- open and close the valve fully
	- damaged sealing surfaces of the plug and seat	- it is necessary to lap plug and seat or replace damaged parts - requires trained personnel
Packing leakage	- sealing force of graphite packing is too low	- tighten the graphite packing or add another sealing ring (see 3.1)
	- packing is worn or damaged	- change the whole packing set (see 3.2)
	- damaged stem	- replace packing and stem - requires trained personnel

Defect	Possible cause	Elimination of defect
Leakage of bonnet / extension	- low adherence pressure to gasket - damaged gasket	- tighten screws - to change cover gasket
Leakage of body	- damage caused by aggressiveness, abrasion, or erosion of media	- it si need to change of body - trained personnel required
Stem won't move	- no supply to actuator (electric or pneumatic)	- electric actuators: check supply and feeding voltage - pneumatic actuators: check supply and feeding pressure
	- actuator control signal failure	- measure the value of input control signal
	- the defect of actuator or its accessories	- follow the instructions for actuator or require trained personnel
	- graphite packing tightened too much	- loosen the packing and retighten it just to ensure tightness
	- seizure inside the valve due to impurities	- it is necessary to dismantle the valve and replace damaged parts - trained personnel required
Stem jerky movement	- insufficient actuator force	- compare parametres of the product with the real parametres - if OK, ensure responsible service personnel
	- damaged positioner	- follow the instructions issued by its producer, possibly ensure trained service personnel
Valve won't move in full range of its stroke	- wrong setting of end position switches	- check the setting of the switches
	- pneumatic and electrohydraulic actuators: hand wheel got stuck in wrong position	- adjust the hand wheel into its basic position
	- pneumatic actuators: feeding pressure is too low	- ensure the required pressure of supply air
	- pneumatic actuators wrongly adjusted or defected positioner	- readjust the positioner acc. to instructions issued by its producer
	- impurities inside the valve	- close and open the valve fully, possibly ensure trained service personnel

If the valve is in guarantee period, it is necessary to ensure authorised service for all service except tightening of graphite packing!

In case of Ex type valves, the surface dirt (e.g. rust from connecting parts) must be removed immediately after repairs, to secure the conductive connection of all valve parts.

3.5 Spare parts

Spare parts are not part of valve delivery. They must be ordered separately. For the spare parts order, following data must be written: type of a valve, nominal diameter DN, Serial valve's number, name of a spare part.

	Parts for 3 years of operation	Additional parts for 5 years of operation *)
CV 3x0Ex	- packing set (stuffing box complete) - cover gasket - in case of bellows valve also bellows gasket and safety packing set	- stem (in case of bellows valve complete subassembly stem-bellows) - seat - plug
CV 3x2Ex	- packing set (stuffing box complete) - cover gasket - plug's gasket - in case of bellows valve also bellows gasket and safety packing set	<u>valve with pressure-balanced plug to 315°C</u> - stem (in case of bellows valve complete subassembly stem-bellows) - seat - plug with wiping and safety ring - plug's guide <u>valve with pressure-balanced plug over 315°C</u> - stem (in case of bellows valve complete subassembly stem-bellows) - seat - plug with wiping rings - plug's guide

*) It's recommended for 5-years spare parts ordering to order 2 sets for 3-years operation and 1 set of additional parts for 5-years operation.

4. Guarantee conditions

The producer does not guarantee the operation and safety of the product under conditions different from data given in the catalogue data sheet. Any using of the valve under different conditions shall be consulted with the producer. Defects of the valve caused by impurities in process medium shall be considered as out of guarantee terms. The producer does not take over the guarantee if any change was made by the user without prior written consent from the producer (except the packing tightening).

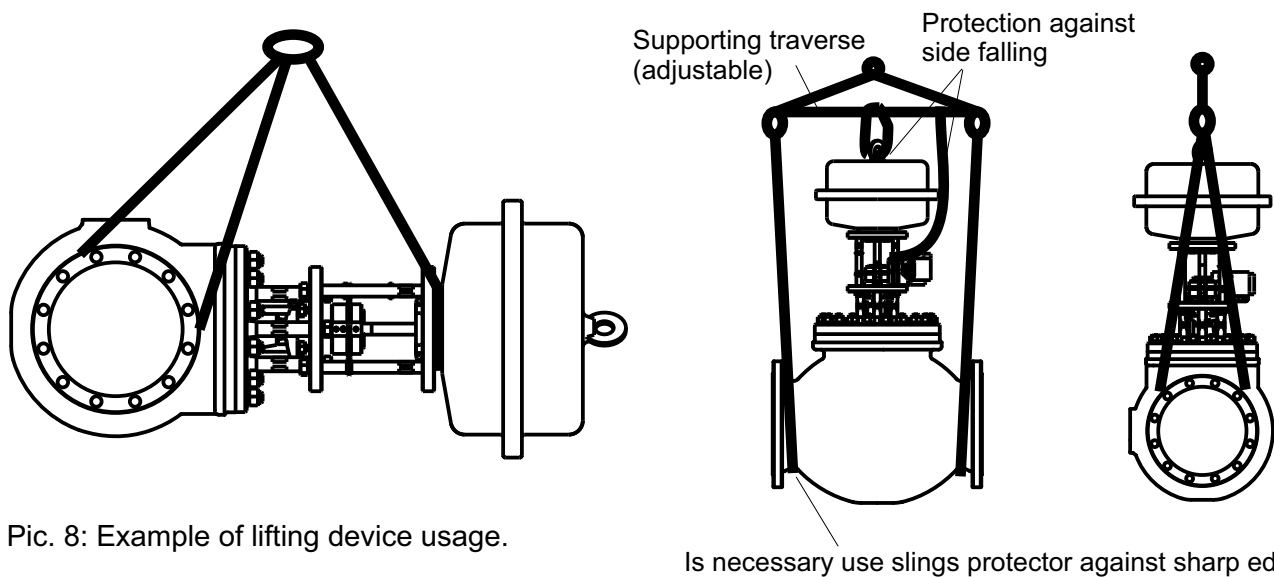
5. Transportation and storage

During transport and storage, the valve must not be exposed to water or placed in environment with relative humidity exceeding 90 %.

With respect to used actuators, the temperature during transport and storage shall be within the range of -20 to 55°C (-4 to 131°F).

Flanges (weld ends) must be protected with blinds (these are part of delivery) .

Suitable tools/devices should be used for valve lifting during the transport and installation (e.g. lifting harness entwinded around flanges (weld ends), actuator yoke etc.). **Never lift the valve by the lifting device fixed on the actuator only!**



Pic. 8: Example of lifting device usage.

It is necessary to make sure the valve can not be damaged during transport. **Special attention shall be paid to the valve stem, stroke indicator and outside accessories fixed to the actuator.** If the valves are stored for more than 3 years, the producer recommends to carry out professional inspection of the valves.

6. Waste disposal

Packaging and the valves (after their scrapping) shall be disposed off in the common way, e.g. by handing over to a specialized company for a disposal (body and metal parts - metal scrap, packaging + other non-metallic parts - communal waste).

7. Maximum permissible working pressure

Maximal permissible operating pressures according to ASME B16.34-2013 [MPa]

Material	Class	Temperature [°C]																
		RT ¹⁾	50	100	150	200	250	300	325	350	375	400	425	450	475	500	538	550
A216 WCB	150	1.96	1.92	1.77	1.58	1.38	1.21	1.02	0.93	0.84	0.74	0.65	0.55	---	---	---	---	---
	300	5.11	5.01	4.66	4.51	4.38	4.19	3.98	3.87	3.76	3.64	3.47	2.88	---	---	---	---	---
	600	10.21	10.02	9.32	9.02	8.76	8.39	7.96	7.74	7.51	7.27	6.94	5.75	---	---	---	---	---
A217 WC6 ²⁾	150	1.98	1.95	1.77	1.58	1.38	1.21	1.02	0.93	0.84	0.74	0.65	0.55	0.46	0.37	0.28	0.14	0.14
	300	5.17	5.17	5.15	4.97	4.80	4.63	4.29	4.14	4.03	3.89	3.65	3.52	3.37	3.17	2.57	1.49	1.27
	600	10.34	10.34	10.30	9.95	9.59	9.27	8.57	8.26	8.04	7.76	7.33	7.00	6.77	6.34	5.15	2.98	2.54
A351 CF8M ³⁾	150	1.90	1.84	1.62	1.48	1.37	1.21	1.02	0.93	0.84	0.74	0.65	0.55	0.46	0.37	0.28	0.14	0.14
	300	4.96	4.81	4.22	3.85	3.57	3.34	3.16	3.09	3.03	2.99	2.94	2.91	2.88	2.87	2.82	2.52	2.50
	600	9.93	9.62	8.44	7.70	7.13	6.68	6.32	6.18	6.07	5.98	5.89	5.83	5.77	5.73	5.65	5.00	4.98

¹⁾ -29°C to 38°C

²⁾ Normalized annealed material only. The deliberate addition of any element which is not listed in ASTM A 217 is inadmissible, with the exception of Ca and Mg for deoxidation.

³⁾ With a temperature above 540°C (1004°F) use only when the carbon content is $\geq 0,04\%$.

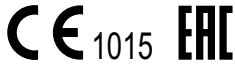
Maximal permissible operating pressures according to ASME B16.34-2013 [psig]

Material	Class	Temperature [°F]														
		RT ¹⁾	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050
A216 WCB	150	285	260	230	200	170	140	125	110	95	80	---	---	---	---	---
	300	740	680	655	635	605	570	550	530	505	410	---	---	---	---	---
	600	1480	1360	1310	1265	1205	1135	1100	1060	1015	825	---	---	---	---	---
A217 WC6 ²⁾	150	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20
	300	750	750	720	695	665	605	590	570	530	510	485	450	320	215	145
	600	1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290
A351 CF8M ³⁾	150	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20
	300	720	620	560	515	480	450	440	435	425	420	420	415	385	365	360
	600	1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720

¹⁾ -20°F to 100°F

²⁾ Normalized annealed material only. The deliberate addition of any element which is not listed in ASTM A 217 is inadmissible, with the exception of Ca and Mg for deoxidation.

³⁾ With a temperature above 540°C (1004°F) use only when the carbon content is $\geq 0,04\%$.



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