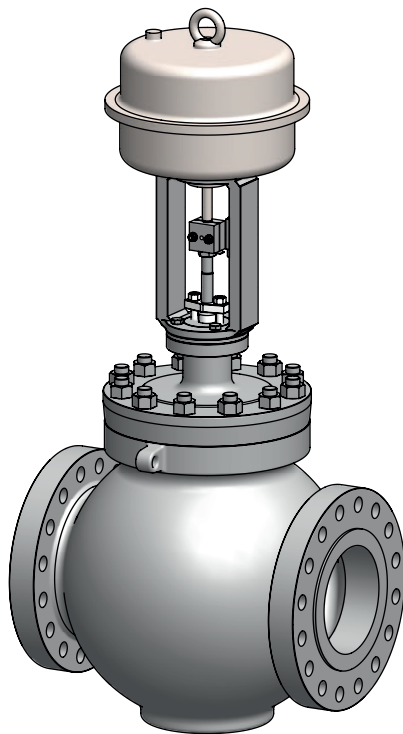


# MOUNTING AND OPERATING INSTRUCTIONS



## EB 8079 EN

Translation of original instructions



Type 3595 Valve with Type 3271 Actuator

### **Type 3595 Valve · ANSI version**

For combination with actuators,  
such as Type 3276 or Type 3271 Pneumatic Actuators

Edition November 2019



## Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices. The images shown in these instructions are for illustration purposes only. The actual product may vary.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact SAMSON's After-sales Service Department ([aftersaleservice@samsongroup.com](mailto:aftersaleservice@samsongroup.com)).



Documents relating to the device, such as the mounting and operating instructions, are available on our website at [www.samsongroup.com](http://www.samsongroup.com) > **Service & Support** > **Downloads** > **Documentation**.

## Definition of signal words

### **DANGER**

*Hazardous situations which, if not avoided, will result in death or serious injury*

### **WARNING**

*Hazardous situations which, if not avoided, could result in death or serious injury*

### **NOTICE**

*Property damage message or malfunction*

### **Note**

*Additional information*

### **Tip**

*Recommended action*

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# 1 Safety instructions and measures

## Intended use

The SAMSON Type 3595 Globe or Angle Valve in combination with an actuator (e.g. Type 3276 or Type 3271 Pneumatic Actuator) is designed to regulate the flow rate, pressure or temperature of liquids, gases or vapors. The valve is suitable for throttling and on/off service in the oil and gas industry as well as for high-temperature applications in power plants.

The valve with its actuator is designed to operate under exactly defined conditions (e.g. operating pressure, process medium, temperature). Therefore, operators must ensure that the control valve is only used in operating conditions that meet the specifications used for sizing the valve at the ordering stage. In case operators intend to use the control valve in other applications or conditions than specified, contact SAMSON.

SAMSON does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

→ Refer to the technical data and nameplate for limits and fields of application as well as possible uses.

## Reasonably foreseeable misuse

The control valve is not suitable for the following applications:

- Use outside the limits defined during sizing and by the technical data
- Use outside the limits defined by the valve accessories connected to the valve

Furthermore, the following activities do not comply with the intended use:

- Use of non-original spare parts
- Performing service and repair work not described

## Qualifications of operating personnel

The control valve must be mounted, started up, serviced and repaired by fully trained and qualified personnel only; the accepted industry codes and practices must be observed.

According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

Welding operations must only be performed by personnel who has the necessary qualification to perform the applied welding procedure and handle the materials used.

## Safety instructions and measures

Explosion-protected versions of this device must be operated only by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.

### Personal protective equipment

We recommend checking the hazards posed by the process medium being used (e.g.

▶ GESTIS (CLP) hazardous substances database). Depending on the process medium and/or the activity, the protective equipment required includes:

- Protective clothing, gloves, eye protection and respiratory protection in applications with hot, cold and/or corrosive media
  - Wear hearing protection when working near the valve
  - Hard hat
  - Safety harness when working at height
  - Safety footwear, ESD (electrostatic discharge) footwear, if necessary
- ➔ Check with the plant operator for details on further protective equipment.

### Revisions and other modifications

Revisions, conversions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

### Safety features

The fail-safe position of the control valve upon air supply or control signal failure depends on the actuator used (see associated actuator documentation). For example, when the valve is combined with a SAMSON Type 3271 Pneumatic Actuator, the valve moves to a certain fail-safe position (see the 'Design and principle of operation' section) upon supply air or control signal failure. The fail-safe action of the actuator is the same as its direction of action and is specified on the nameplate of SAMSON actuators.

### Warning against residual hazards

To avoid personal injury or property damage, plant operators and operating personnel must prevent hazards that could be caused in the control valve by the process medium, the operating pressure, the signal pressure or by moving parts by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warning and caution notes in these mounting and operating instructions.

Furthermore, the intended purpose may involve the use of the device in hazardous areas. In this case, all work on the control valve must only be performed when no potentially explosive atmosphere is present.

Hazards resulting from the special working conditions at the installation site of the valve must be identified in a risk assessment and prevented through the corresponding safety instructions drawn up by the operator.

### **Responsibilities of the operator**

Operators are responsible for proper use and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions as well as the referenced documents to the operating personnel and to instruct them in proper operation. Furthermore, operators must ensure that operating personnel or third parties are not exposed to any danger.

Operators are additionally responsible for ensuring that the limits for the product defined in the technical data are observed. This also applies to the start-up and shutdown procedures. Start-up and shutdown procedures fall within the scope of the operator's duties and, as such, are not part of these mounting and operating instructions. SAMSON is unable to make any statements about these procedures since the operative details (e.g. differential pressures and temperatures) vary in each individual case and are only known to the operator.

### **Responsibilities of operating personnel**

Operating personnel must read and understand these mounting and operating instructions as well as the referenced documents and observe the specified hazard statements, warnings and caution notes. Furthermore, operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

### **Referenced standards, directives and regulations**

The control valves comply with the requirements of the European Pressure Equipment Directive 2014/68/EU. Valves with a CE marking have a declaration of conformity, which includes information about the applied conformity assessment procedure. The 'Certificates' section contains this declaration of conformity.

Non-electric valve versions whose bodies are not lined with an insulating material coating do not have their own potential ignition source according to the hazard assessment stipulated in Clause 5.2 of ISO 80079-36 even in the rare incident of an operating fault. Therefore, such valve versions do not fall within the scope of Directive 2014/34/EU.

→ For connection to the equipotential bonding system, observe the requirements specified in section 6.4 of EN 60079-14 (VDE 0165-1).

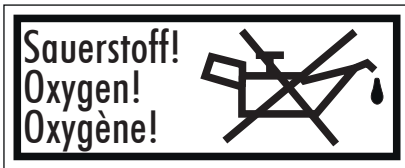
## Safety instructions and measures

### Referenced documentation

The following documents apply in addition to these mounting and operating instructions:

- Mounting and operating instructions for mounted actuator, e.g. ► EB 8318 for Type 3276 Actuator or ► EB 8310-X for Type 3271 Actuator
- Mounting and operating instructions for mounted valve accessories (positioner, solenoid valve etc.)
- For oxygen service <sup>1)</sup>: Manual ► H 01

The packaging of valve constructed and sized for oxygen service has the following label on it:



- When a substance is used in the device, which is listed as being a substance of very high concern on the candidate list of the REACH regulation:  
Information on safe use of the part affected  
► [www.samsongroup.com](http://www.samsongroup.com) > About SAMSON > Material Compliance > REACH  
If a device contains a substance which is listed as being a substance of very high concern on the candidate list of the REACH regulation, this circumstance is indicated on the SAMSON delivery note.

<sup>1)</sup> See information on order-specific installation drawing



## 1.1 Notes on possible severe personal injury

### DANGER

#### **Risk of bursting in pressure equipment.**

Valves and pipelines are pressure equipment. Impermissible pressure or improper opening can lead to valve components bursting.

- Observe the maximum permissible pressure for valve and plant.
- Before starting any work on the control valve, depressurize all plant sections affected as well as the valve.
- Drain the process medium from all the plant sections concerned as well as the valve.

#### **Risk of injury due to incorrect handling of oxygen or cryogenic gases in applications.**

The valve can be used for oxygen service or applications with cryogenic gases. Oxygen is a hazardous substance, which reacts quickly, leading to combustion and explosions. Contact with cryogenic gases causes severe frostbite and cold burns (cryogenic burns). Operating personnel must be trained for these applications. Unqualified operating personnel expose themselves and others to an increased risk of injury.

- Operating personnel must be sufficiently trained and be made aware of the hazards in applications involving oxygen or cryogenic gases.
- Instructions and information on how to safely handle devices for oxygen service can be found in the Manual ► H 01.

## 1.2 Notes on possible personal injury

### WARNING

#### **Risk of burn injuries due to hot or cold components and pipelines.**

Depending on the process medium, valve components and pipelines may get very hot or cold and cause burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **WARNING**

#### **Risk of hearing loss or deafness due to loud noise.**

The noise emissions depend on the valve version, plant facilities and process medium.

- Wear hearing protection when working near the valve.

#### **Risk of personal injury due to exhaust air being vented.**

While the valve is operating, air is vented from the actuator, for example, during closed-loop operation or when the valve opens or closes.

- Install the control valve in such a way that vent openings are not located at eye level and the actuator does not vent at eye level in the work position.
- Use suitable silencers and vent plugs.
- Wear eye protection when working in close proximity to the control valve.

#### **Crush hazard arising from moving parts.**

The control valve contains moving parts (actuator and plug stem), which can injure hands or fingers if inserted into the valve.

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.

#### **Risk of personal injury due to residual process medium in the valve.**

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

- If possible, drain the process medium from all the plant sections affected and the valve.
- Wear protective clothing, safety gloves, respiratory protection and eye protection.

**⚠ WARNING****Risk of personal injury due to preloaded springs.**

Valves in combination with pneumatic actuators with preloaded springs are under tension. These control valves with SAMSON pneumatic actuators can be identified by the long bolts protruding from the bottom of the actuator.

SAMSON piston actuators do not carry any label concerning preloading of the actuator springs.

- Before starting any work on the actuator, relieve the compression from the preloaded springs (see associated actuator documentation).

**Exposure to hazardous substances poses a serious risk to health.**

Certain lubricants and cleaning agents are classified as hazardous substances. These substances have a special label and a material safety data sheet (MSDS) issued by the manufacturer.

- Make sure that an MSDS is available for any hazardous substance used. If necessary, contact the manufacturer to obtain an MSDS.
- Inform yourself about the hazardous substances and their correct handling.

**Risk of personal injury through incorrect operation, use or installation as a result of information on the valve being illegible.**

Over time, markings, labels and nameplates on the valve may become covered with dirt or become illegible in some other way. As a result, hazards may go unnoticed and the necessary instructions not followed. There is a risk of personal injury.

- Keep all relevant markings and inscriptions on the device in a constantly legible state.
- Immediately renew damaged, missing or incorrect nameplates or labels.

## 1.3 Notes on possible property damage

### ! NOTICE

#### **Risk of valve damage due to contamination (e.g. solid particles) in the pipeline.**

The plant operator is responsible for cleaning the pipelines in the plant.

→ Flush the pipelines before start-up.

#### **Risk of valve damage due to unsuitable medium properties.**

The valve is designed for a process medium with defined properties.

→ Only use the process medium specified for sizing the valve.

#### **Risk of leakage and valve damage due to excessively high or low tightening torques.**

Observe the specified torques when tightening control valve components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are too loose may cause leakage.

→ Observe the specified tightening torques (see the 'Tightening torques, lubricants and tools' section in the annex of these instructions).

#### **Risk of valve damage due to the use of unsuitable tools.**

Certain tools are required to work on the valve.

→ Only use tools approved by SAMSON (see the 'Tightening torques, lubricants and tools' section in the annex of these instructions).

#### **Risk of valve damage due to the use of unsuitable lubricants.**

The lubricants to be used depend on the valve material. Unsuitable lubricants may corrode and damage surfaces.

→ Only use lubricants approved by SAMSON (see the 'Tightening torques, lubricants and tools' section in the annex of these instructions).

#### **Risk of the process medium being contaminated through the use of unsuitable lubricants and/or contaminated tools and components.**

→ If necessary, keep the valve and the tools used free from solvents and grease.

→ Make sure that only suitable lubricants are used.

## 2 Markings on the device

### 2.1 Valve nameplate

The valve nameplate includes the key specifications of the valve, e.g.:

- Type designation
- Valve size
- Pressure rating
- Date of manufacture
- Serial number

It is located on the valve body.

### 2.2 Actuator nameplate

See associated actuator documentation.



### 3 Design and principle of operation

See Fig. 3-1

#### Valve style and actuator

The Type 3595 Valve is a cage valve designed as globe or angle valve. The valve can be combined with various electric, electrohydraulic and pneumatic actuators. This documentation includes examples of the combination with the Type 3276 or Type 3271 Pneumatic Actuator.

#### Cage valve

Different valve trims are used in the Type 3595 Valve to meet application requirements. All valve trims have a plug which is guided through a cage with very little clearance over the entire stroke. This cage guide suppresses vibration of the closure member, resulting in a better control performance at high energy forces created by changes in pressure and flow rate. The plug is available with or without pressure balancing.

#### Design

The plug is connected to the plug stem using a form-fit connection. The plug stem is connected to the actuator stem by a stem connector which transfers the linear motion of the actuator to the valve plug. The actuator is connected using a special assembly, which varies depending on the mounted actuator. These assemblies are fitted with an external anti-rotation fixture for the plug stem.

The plug stem in the valve bonnet is sealed by either a PTFE or graphite packing, which is either self adjusting or can be adjusted manually.

The valve has a clamped-in seat. The seat is inserted into the seat bridge. The seat and cage are clamped into place by tightening the body nuts.

#### Function

The medium flows through the valve as indicated by the arrow on the valve body. A change in the pneumatic signal acting on the actuator changes the plug travel and how far the valve is opened as a result. The plug position and cage design determine the released cross-section and the resulting flow rate.

### 3.1 Fail-safe action

The fail-safe position of the control valve upon air supply or control signal failure depends on the actuator used (see associated actuator documentation).

Depending on how the compression springs are arranged in the SAMSON Type 3271 Pneumatic Actuator, the valve has two different fail-safe positions:

#### – Actuator stem extends (FA)

When the signal pressure is reduced or the air supply fails, the springs move the actuator stem downward and close the valve. The valve opens when the signal pressure is increased enough to overcome the force exerted by the springs.

Design and principle of operation

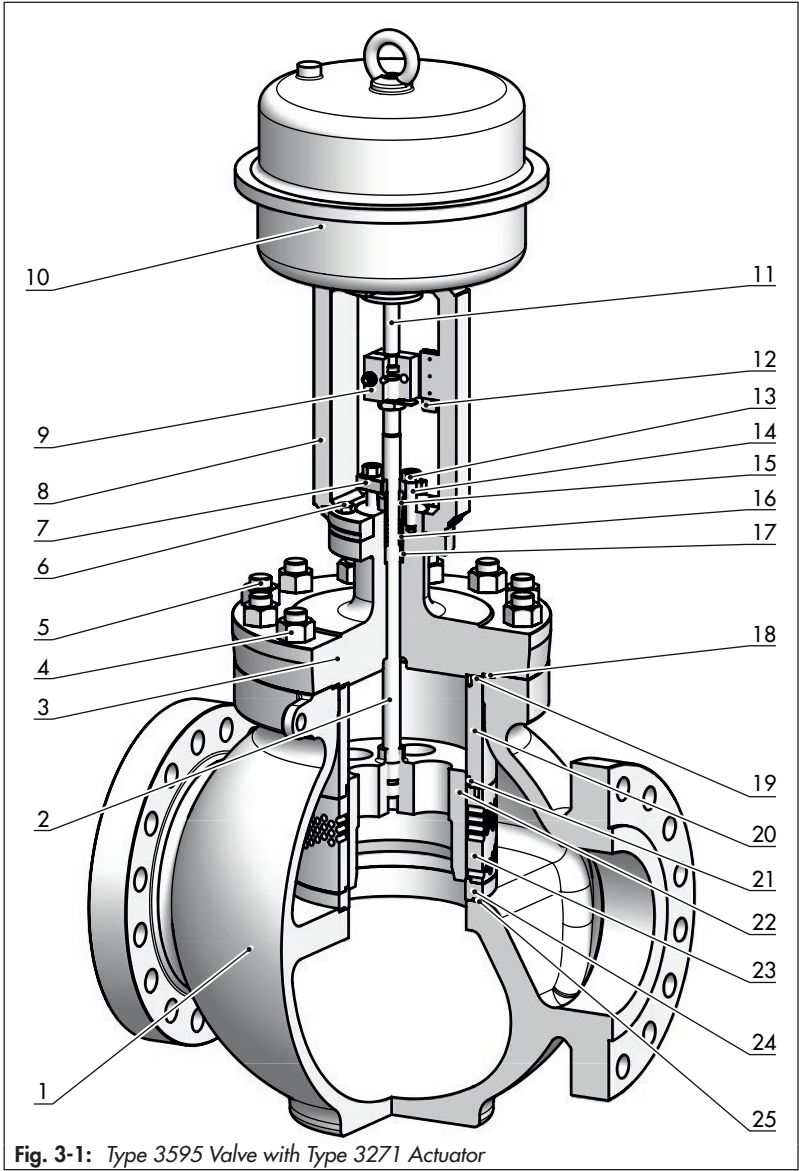


Fig. 3-1: Type 3595 Valve with Type 3271 Actuator



**Legend for Fig. 3-1**

1 Valve body	14 Stud bolt (packing gland)
2 Plug stem	15 Packing follower
3 Valve bonnet	16 Packing rings
4 Body nut	17 Guide bushing
5 Stud bolt (valve body)	18 Gasket (valve body)
6 Screw (yoke)	19 Gasket (valve bonnet)
7 Packing gland	20 Cage
8 Yoke	21 Gasket (cage)
9 Actuator connection assembly	22 Plug
10 Actuator	23 Cage
11 Actuator stem	24 Seat ring
12 Travel indicator scale	25 Gasket (seat ring)
13 Nut (packing gland)	

– **Actuator stem retracts (FE)**

When the signal pressure is reduced or the air supply fails, the springs move the actuator stem upwards and open the valve. The valve closes when the signal pressure is increased enough to overcome the force exerted by the springs.

**Tip**

*The actuator's direction of action can be reversed, if required. Refer to the mounting and operating instructions of the pneumatic actuator:*

► **EB 8310-X for Type 3271**

## 3.2 Versions

### Actuators

In these instructions, the preferable combination with a SAMSON Type 3276 or Type 3271 Pneumatic Actuator is described. The pneumatic actuator (with or without handwheel) can be replaced by another pneumatic actuator in a different size, but with the same travel.

➔ Observe the maximum permissible actuator force.

### **i** Note

*If the travel range of the actuator is larger than the travel range of the valve, the spring assembly in the actuator must be preloaded so that the travel ranges match. See associated actuator documentation.*

## Design and principle of operation

The basic pneumatic actuator can be replaced by an actuator with additional hand-wheel, an electric actuator or an hydraulic piston actuator.

### Bellows seal

The valve can be fitted with a bellows seal to meet special requirements resulting from the process medium used.

and plug stem). Plant operators are responsible for deciding whether a guard is to be used. The decision is based on the risk posed by the plant and its operating conditions.

## 3.3 Additional fittings

### Strainers

We recommend installing a SAMSON strainer upstream of the valve. It prevents solid particles in the process medium from damaging the valve.

### Bypass and shut-off valves

We recommend installing a shut-off valve both upstream of the strainer and downstream of the valve and installing a bypass line. The bypass ensures that the plant does not need to be shut down for service and repair work on the valve.

### Insulation

Control valves can be insulated to reduce heat energy transfer.

Refer to the instructions in the 'Installation' section.

### Safety guard

For operating conditions that require increased safety (e.g. in cases where the valve is freely accessible to untrained staff), a safety guard must be installed to rule out a crush hazard arising from moving parts (actuator

### 3.4 Technical data

The nameplates on the valve and actuator provide information on the control valve version. See the 'Markings on the device' section.

**i Note**

Further technical data for the valve are available in the Data Sheet ▶ T 8079, for actuators in the associated data sheets, for example ▶ T 8318 for Type 3276 Actuator or ▶ T 8310-X for Type 3271 Actuator.

### Noise emissions

SAMSON is unable to make general statements about noise emissions. The noise emissions depend on the valve version (e.g. with cage), plant facilities and process medium.

**Table 3-1: Technical data**

Type 3595 Globe Valve		Cast body		Forged body	
Valve size		NPS ¾ to 2	NPS 3 to 32	NPS ¾ to 2	NPS 3 to 12
Pressure rating		Class 150 to 2500			
Type of connection	Flanges	•	•	•	•
	Welding ends	•	•	•	•
	Welding-neck ends	•	•	•	•
Characteristic		Equal percentage · Linear · Others on request			
Compliance		<b>CE</b>			
<b>Maximum permissible temperature range and leakage class according to IEC 60534-4</b>					
Valve trim	USS/STD™ USS/LDB™	-325 to +1292 °F/-196 to +700 °C			
	BSS/STD™ BSS/LDB™	Leakage class IV, V and VI: -325 to +482 °F/-196 to +250 °C			
	CAVLESS™	Leakage class IV, V and VI: -325 to +482 °F/-196 to +250 °C			
	PILOT/STD™ PILOT/LDB™	Leakage class V: -4 to +1292 °F/-20 to +700 °C			
	MULTICYL™	Leakage class IV, V and VI: -325 to +482 °F/-196 to +250 °C			

## Design and principle of operation

**Table 3-2: Materials**

Type 3595 Globe Valve		Cast body	Forged body
Valve body and valve bonnet	Standard materials	Cast steel or forged steel	A216 WCB
		High-temperature cast steel or forged steel	A217 WC6 A217 WC9
		Stainless steel	A351 CF8M
	Special materials	Duplex steel	A351-CK3MCuN A890 Gr. 4A CD3MN
		Super duplex steel	A890 Gr. 5A CE3MN A890 Gr. 6A CD3MWCuN
Inconel®		A494 CW6MC	
Valve trim (seat, plug, cage etc.)		AISI 410, AISI 420, AISI 316 and Stellite® or other hard-facing alloy A182 F44, A182 F53, A182 F55, B564 N06625	

**Table 3-3: Dimensions of Type 3595 Valve · Valve body with welding ends or welding-neck ends**

**Table 3-3.1: NPS ¾ to 4 · Dimensions in inches and mm**

Dimension	Pressure rating	Valve size NPS						
		¾	1	1½	2	3	4	
Length L	Class 150 to 600	in	7.36	7.36	8.74	10.00	12.52	14.49
		mm	187	187	222	254	318	368
	Class 900 and 1500	in	7.64	7.76	9.25	11.50	12.52	14.49
		mm	194	197	235	292	318	368
Class 2500	in	8.50	8.50	10.24	12.52	15.00	15.98	
	mm	216	216	260	318	381	406	
Height H2	Class 150 to 600	in	On request	1.69	3.15	2.52	3.15	5.71
		mm	On request	43	80	64	80	145
	Class 900 to 1500	in	On request	2.68	3.35	3.58	4.84	5.94
		mm	On request	68	85	91	123	151
	Class 2500	in	On request	2.8	On request	3.86	On request	6.26
		mm	On request	71	On request	98	On request	159

Dimension	Pressure rating		Valve size NPS					
			¾	1	1½	2	3	4
Height H4	Class 150 to 600	in	7.6	7.6	7.76	8.54	10.91	12.76
		mm	193	193	197	217	277	324
	Class 900 to 1500	in	8.66	8.66	9.49	9.96	12.13	12.32
		mm	220	220	241	253	308	313
Class 2500	in	10.04	10.04	10.83	11.54	12.87	14.53	
	mm	255	255	275	293	327	369	
Height H3 with Type 3276 Actuator <sup>1)</sup>	Class 150 to 2500	in	3.94	3.94	3.94	3.94	4.92	5.91
		mm	100	100	100	100	125	150
Height H8 <sup>2)</sup>	Class 150 to 2500	in	On request	On request	On request	On request	On request	On request
		mm	On request	On request	On request	On request	On request	On request

1) H3 with Type 3271 Actuator, see Table 3-7

2) Only with Type 3271 Actuator

**Table 3-3.2:** NPS 6 to 16 · Dimensions in inches and mm

Dimension	Pressure rating		Valve size NPS					
			6	8	10	12	14	16
Length L	Class 150 to 600	in	20	21.38	29.61	32.24	33.5	43.62
		mm	508	543	752	819	851	1108
	Class 900 and 1500	in	20.00	24.02	30.00	35.98	49.49	55.98
		mm	508	610	762	914	1257	1422
Class 2500	in	24.02	30.00	40.00	44.02	On request	On request	
	mm	610	762	1016	1118	On request	On request	
Height H2	Class 150 to 300	in	5.63	6.61	12.4	13.78	16.42	18.5
		mm	143	168	315	350	417	470
	Class 600	in	5.55	6.89	12.8	14.37	16.69	15.75
		mm	141	175	325	365	424	400
	Class 900	in	8.15	10.24	13.5	15.55	17.13	On request
		mm	207	260	343	395	435	On request
	Class 1500	in	8.94	11.26	13.62	15.31	18.11	21.34
		mm	227	286	346	389	460	542
Class 2500	in	9.45	On request	On request	On request	On request	On request	
	mm	240	On request	On request	On request	On request	On request	

## Design and principle of operation

Dimension	Pressure rating		Valve size NPS					
			6	8	10	12	14	16
Height H4	Class 150 to 300	in	15.35	17.64	21.02	22.87	25.2	27.09
		mm	390	448	534	581	640	688
	Class 600	in	15.24	17.28	22.48	23.62	25.2	26.89
		mm	387	439	571	600	640	683
	Class 900	in	14.53	16.65	24.13	24.25	23.23	26.38
		mm	369	423	613	616	590	670
	Class 1500	in	16.57	17.8	24.13	22.72	25.71	29.53
		mm	421	452	613	577	653	750
	Class 2500	in	17.28	21.26	26.89	30.35	34.72	39.02
		mm	439	540	683	771	882	991
Height H3 with Type 3276 Actuator <sup>1)</sup>	Class 150 to 2500	in	7.87	9.84	13.78	15.75	17.72	19.69
		mm	200	250	350	400	450	500
Height H8 <sup>2)</sup>	Class 150 to 2500	in	On request	On request	On request	On request	On request	On request
		mm	On request	On request	On request	On request	On request	On request

<sup>1)</sup> H3 with Type 3271 Actuator, see Table 3-7

<sup>2)</sup> Only with Type 3271 Actuator

**Table 3-4:** Dimensions of Type 3595 Valve · Flanged valve body version

**Table 3-4.1:** NPS ¾ to 4 · Dimensions in inches and mm

Dimension		Pressure rating		Valve size NPS											
				¾		1		1½		2		3		4	
				Flange form											
		RF	RTJ	RF	RTJ	RF	RTJ	RF	RTJ	RF	RTJ	RF	RTJ		
Length L	Class 150	in	7.24	–	7.24	–	8.74	–	10.00	–	11.73	–	13.86	–	
		mm	184	–	184	–	222	–	254	–	298	–	352	–	
	Class 300	in	7.64	–	7.76	–	9.25	–	10.51	–	12.52	–	14.49	–	
		mm	194	–	197	–	235	–	267	–	318	–	368	–	
	Class 600	in	8.11	8.11	8.27	8.27	9.88	9.88	11.26	11.38	13.27	13.39	15.51	15.63	
		mm	206	206	210	210	251	251	286	289	337	340	394	397	
	Class 900	in	10.75	10.75	10.75	10.75	13.11	13.11	13.39	13.5	17.36	17.48	18.27	18.39	
		mm	273	273	273	273	333	333	340	343	441	444	464	467	
	Class 1500	in	10.75	10.75	10.75	10.75	13.11	13.11	13.39	13.5	18.11	18.23	19.02	19.13	
		mm	273	273	273	273	333	333	340	343	460	463	483	486	
	Class 2500	in	12.13	12.13	12.52	12.52	14.13	14.25	15.75	15.87	19.61	19.84	22.64	23.03	
		mm	308	308	318	318	359	362	400	403	498	504	575	585	
	Height H2	Class 150 to 600	in	On request		1.69		3.15		2.52		3.15		5.71	
			mm	On request		43		80		64		80		145	
Class 900 to 1500		in	On request		2.68		3.35		3.58		4.84		5.94		
		mm	On request		68		85		91		123		151		
Class 2500		in	On request		2.8		On request		3.86		On request		6.26		
		mm	On request		71		On request		98		On request		159		
Height H4	Class 150 to 600	in	7.6		7.6		7.76		8.54		10.91		12.76		
		mm	193		193		197		217		277		324		
	Class 900 to 1500	in	8.66		8.66		9.49		9.96		12.13		12.32		
		mm	220		220		241		253		308		313		
	Class 2500	in	10.04		10.04		10.83		11.54		12.87		14.53		
		mm	255		255		275		293		327		369		
Height H3 with Type 3276 Actuator <sup>1)</sup>	Class 150 to 2500	in	3.94		3.94		3.94		3.94		4.92		5.91		
		mm	100		100		100		100		125		150		
Height H8 <sup>2)</sup>	Class 150 to 2500	in	On request		On request		On request		On request		On request		On request		
		mm	On request		On request		On request		On request		On request		On request		

<sup>1)</sup> H3 with Type 3271 Actuator, see Table 3-7

<sup>2)</sup> Only with Type 3271 Actuator

## Design and principle of operation

**Table 3-4.2:** NPS 6 to 16 · Dimensions in inches and mm

Dimension			Valve size NPS											
			6		8		10		12		14		16	
			Flange form											
Pressure rating		RF	RTJ	RF	RTJ	RF	RTJ	RF	RTJ	RF	RTJ	RF	RTJ	
Length L	Class 150	in	17.76	–	21.38	–	26.50	–	29.02	–	35.00	–	40.00	–
		mm	451	–	543	–	673	–	737	–	889	–	1016	–
	Class 300	in	18.62	–	22.36	–	27.87	–	30.51	–	36.50	–	41.61	–
		mm	473	–	568	–	708	–	775	–	927	–	1057	–
	Class 600	in	20.00	20.12	24.02	24.13	29.61	29.72	32.24	32.36	38.27	38.39	43.62	43.74
		mm	508	511	610	613	752	755	819	822	972	975	1108	1111
	Class 900	in	23.62	23.74	30.75	30.87	34.02	34.13	40.00	40.12	49.49	49.88	55.98	56.38
		mm	600	603	781	784	864	867	1016	1019	1257	1267	1422	1432
	Class 1500	in	27.24	27.48	32.99	33.39	39.02	39.41	44.49	45.12	49.49	50.24	55.98	56.85
		mm	692	698	838	848	991	1001	1130	1146	1257	1276	1422	1444
	Class 2500	in	32.24	32.76	40.24	40.87	50.00	50.87	52.01	52.87	On req.	On req.	On req.	On req.
		mm	819	832	1022	1038	1270	1292	1321	1343	On req.	On req.	On req.	On req.
Height H2	Class 150 to 300	in	5.63		6.61		12.4		13.78		16.42		18.5	
		mm	143		168		315		350		417		470	
	Class 600	in	5.55		6.89		12.8		14.37		16.69		15.75	
		mm	141		175		325		365		424		400	
	Class 900	in	8.15		10.24		13.5		15.55		17.13		On request	
		mm	207		260		343		395		435		On request	
	Class 1500	in	8.94		11.26		13.62		15.31		18.11		21.34	
		mm	227		286		346		389		460		542	
	Class 2500	in	9.45		On request		On request		On request		On request		On request	
		mm	240		On request		On request		On request		On request		On request	



		Valve size NPS						
		6	8	10	12	14	16	
Height H4	Class 150 to 300	in	15.35	17.64	21.02	22.87	25.2	27.09
		mm	390	448	534	581	640	688
	Class 600	in	15.24	17.28	22.48	23.62	25.2	26.89
		mm	387	439	571	600	640	683
	Class 900	in	14.53	16.65	24.13	24.25	23.23	26.38
		mm	369	423	613	616	590	670
	Class 1500	in	16.57	17.8	24.13	22.72	25.71	29.53
		mm	421	452	613	577	653	750
	Class 2500	in	17.28	21.26	26.89	30.35	34.72	39.02
		mm	439	540	683	771	882	991
Height H3 with Type 3276 Actuator <sup>1)</sup>	Class 150 to 2500	in	7.87	9.84	13.78	15.75	17.72	19.69
		mm	200	250	350	400	450	500
Height H8 <sup>2)</sup>	Class 150 to 2500	in	On request	On request	On request	On request	On request	On request
		mm	On request	On request	On request	On request	On request	On request

1) H3 with Type 3271 Actuator, see Table 3-7

2) Only with Type 3271 Actuator

**Table 3-5:** Type 3595 Valve without actuator · Weights in kg

Pressure rating	Weight	Valve size (NPS)											
		¾	1	1½	2	3	4	6	8	10	12	14	16
Class 150	kg	On req.	17	28	28	55	96	161	242	589	785	1268	1449
Class 300	kg	On req.	20	28	30	62	105	188	265	627	801	1345	1552
Class 600	kg	On req.	20	28	32	64	115	213	333	806	1072	1463	1830
Class 900	kg	On req.	34	53	78	127	176	335	615	892	1585	2096	3461
Class 1500	kg	On req.	34	53	78	140	193	485	875	1677	2241	3289	5072
Class 2500	kg	On req.	59	108	114	206	311	827	1607	2914	4403	On req.	On req.

## Design and principle of operation

**Table 3-6:** Dimensions for Type 3276 Pneumatic Actuator

Dimension			Version (effective diaphragm area)			
			330 (387 cm <sup>2</sup> )	350 (645 cm <sup>2</sup> )	380 (1032 cm <sup>2</sup> )	390 (1032 cm <sup>2</sup> )
Height H*	Stem extends	in	17.09	27.17	27.91	34.02
		mm	434	690	709	864
	Stem retracts	in	17.6	27.76	31.85	36.65
		mm	447	705	809	931
ØD	in	11.50	15.12	17.99	17.99	
	mm	292	384	457	457	
ØD1	in	9.84	19.69	19.69	19.69	
	mm	250	500	500	500	
Height H <sup>9</sup>	Stem extends	in	6.65	11.14	11.14	15.83
		mm	169	283	283	402
	Stem retracts	in	9.09	15.28	15.94	22.4
		mm	231	388	405	569
Max. travel	in	1.02	2.01	2.99	5.00	
	mm	26	51	76	127	

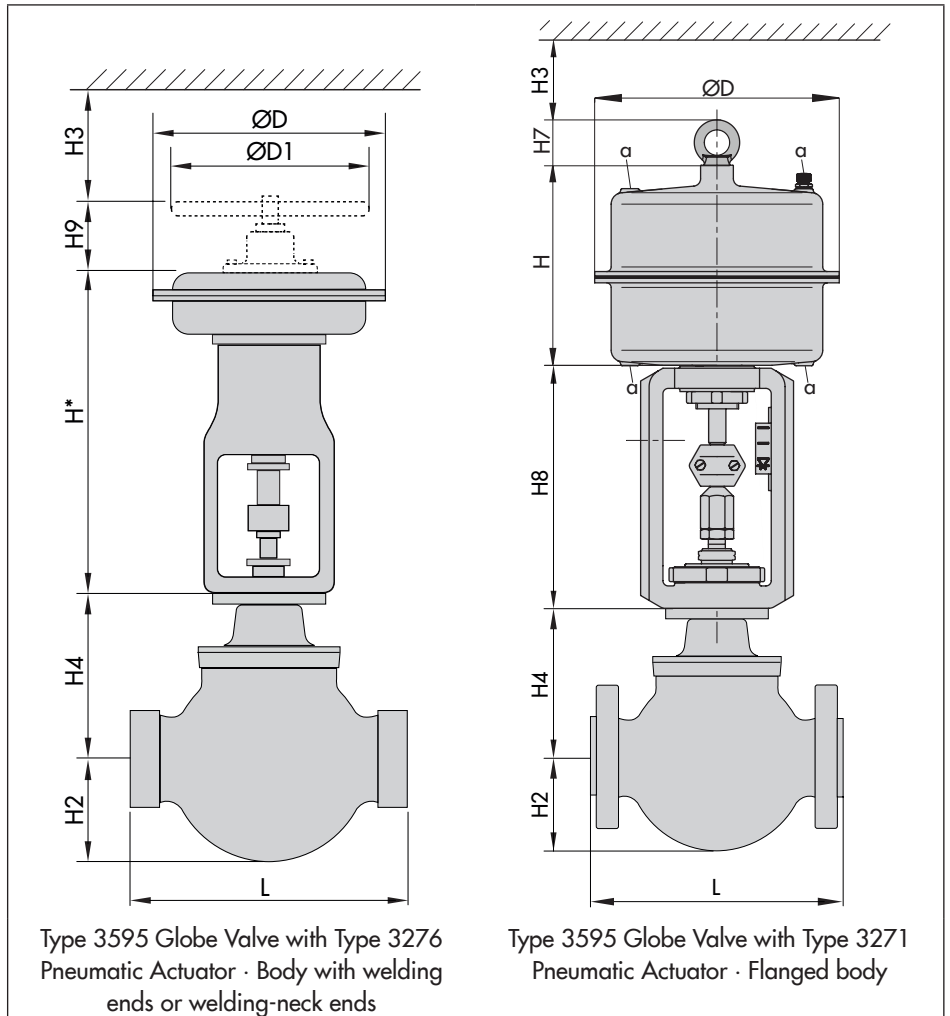
**Table 3-7:** Dimensions for Type 3271 Pneumatic Actuator

Actuator area	cm <sup>2</sup>	1000	1400-60	1400-120	1400-250	2800	2 x 2800
Diaphragm ØD	in	18.19	20.87	21.02	21.02	30.32	30.32
	mm	462	530	534	534	770	770
Height H	in	12.32	9.72	18.5	31.5	23.03	42.72
	mm	313	247	470	800	585	1085
Height H3 <sup>1)</sup>	in	24.02	24.02	25.59	On request	25.59	25.59
	mm	610	610	650	On request	650	650
Height H7 <sup>2)</sup>	in	3.54	3.54	5.04	4.33	5.04	5.04
	mm	90	90	128	110	128	128
Thread		M60x1.5			M100x2		
α		G ¾ (¾ NPT)	G ¾ (¾ NPT)	G 1 (1 NPT)	G 1 (1 NPT)	G 1 (1 NPT)	G 1 (1 NPT)

<sup>1)</sup> Minimum clearance required to remove the actuator

<sup>2)</sup> Height of eyebolt according to DIN 580. Height of the swivel hoist may differ.

Dimensional drawings





## 4 Shipment and on-site transport

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### 4.1 Accepting the delivered goods

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Check that the specifications on the valve nameplate match the specifications in the delivery note. See the 'Markings on the device' section for nameplate details.
2. Check the shipment for transportation damage. Report any damage to SAMSON and the forwarding agent (refer to delivery note).
3. Determine the weight and dimensions of the units to be lifted and transported in order to select the appropriate lifting equipment and lifting accessories. Refer to the transport documents and the 'Technical data' section.

### 4.2 Removing the packaging from the valve

Observe the following sequence:

- Do not open or remove the packaging until immediately before lifting to install the valve into the pipeline.

- Leave the control valve in its transport container or on the pallet to transport it on site.
- Do not remove the protective caps from the inlet and outlet until immediately before installing the valve into the pipeline. They prevent foreign particles from entering the valve.
- Dispose and recycle the packaging in accordance with the local regulations.

### 4.3 Transporting and lifting the valve

---

#### **⚠ DANGER**

***Danger due to suspended loads falling.***

- *Stay clear of suspended or moving loads.*
  - *Close off and secure the transport paths.*
- 

#### **⚠ WARNING**

***Risk of lifting equipment tipping over and risk of damage to lifting accessories due to exceeding the rated lifting capacity.***

- *Only use approved lifting equipment and accessories whose minimum lifting capacity is higher than the weight of the valve (including actuator and packaging, if applicable).*
-

### **WARNING**

**Risk of personal injury due to the control valve tipping over.**

- ➔ Observe the valve's center of gravity.
- ➔ Secure the valve against tipping over or turning.

### **NOTICE**

**Risk of valve damage due to incorrectly attached slings.**

The lifting eyelet/eyebolt on SAMSON actuators is only intended for mounting and removing the actuator as well as lifting the actuator without valve. Do not use this lashing point to lift the entire control valve assembly.

- ➔ When lifting the control valve, make sure that the slings attached to the valve body bear the entire load.
- ➔ Do not attach load-bearing slings to the actuator, handwheel or any other parts.
- ➔ Observe lifting instructions (see section 4.3.2).

### **Tip**

A swivel hoist can be screwed into SAMSON actuators with a female thread on the top diaphragm case in place of the eyebolt (see associated actuator documentation).

In contrast to the lifting eyelet/eyebolt, the swivel hoist may be used as a support when setting a control valve assembly upright. The sling between the swivel hoist and rigging equipment (hook, shackle etc.) must not bear any load when lifting a control valve

assembly. The sling only protects the control valve from tilting while being lifted.

### **Tip**

The valves in valve sizes NPS 16 (Class 300 to 900) and NPS 20 (Class 150 to 900) to 32 (Class 150) can be equipped with additional lifting eyelets to facilitate lifting and transporting.

### **Tip**

Our after-sales service can provide more detailed transport and lifting instructions on request.

## 4.3.1 Transporting the valve

The control valve can be transported using lifting equipment (e.g. crane or forklift).

- ➔ Leave the control valve in its transport container or on the pallet to transport it.
- ➔ Observe the transport instructions.

### **Transport instructions**

- Protect the control valve against external influences (e.g. impact).
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the piping and any mounted valve accessories against damage.
- Protect the control valve against moisture and dirt.

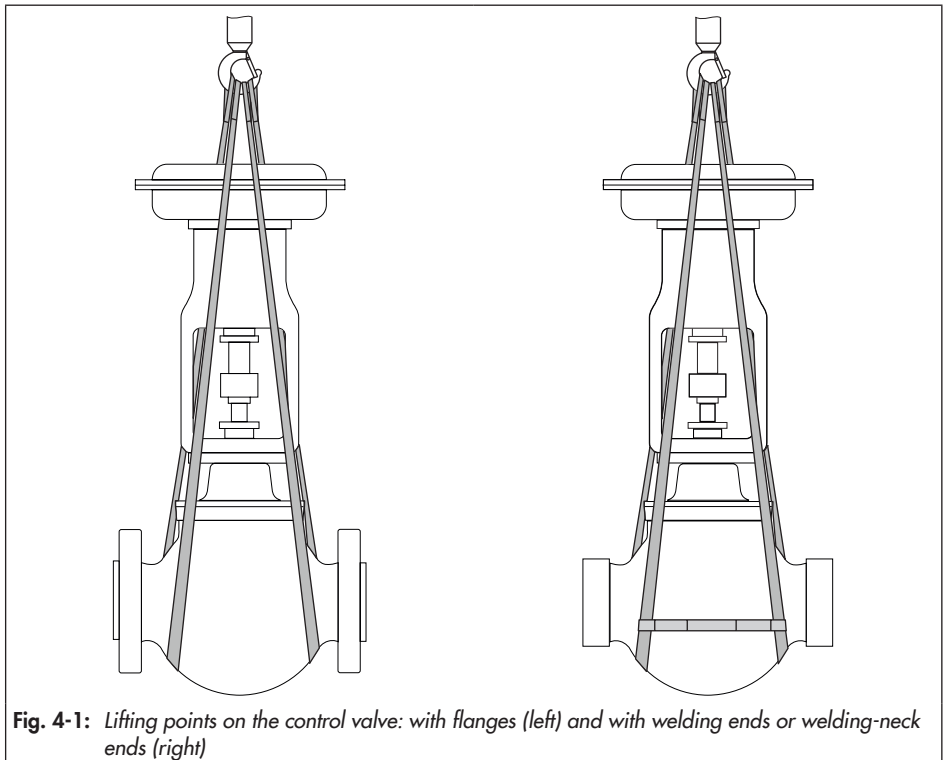
- The permissible transportation temperature of standard control valves is  $-20$  to  $+65$  °C ( $-4$  to  $+149$  °F).

---

**i Note**

Contact our after-sales service for the transportation temperatures of other valve versions.

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### 4.3.2 Lifting the valve

#### **⚠ WARNING**

**Risk of personal injury and valve damage due to incorrect lifting of the valve.**

*Special lifting conditions apply to valves in Class 900 and higher as well as  $\geq$ NPS 24.*

➔ *Contact SAMSON's After-sales Service.*

To install a large valve into the pipeline, use lifting equipment (e.g. crane or forklift) to lift it.

#### **Lifting instructions**

- Use a hook with safety latch (see Fig. 4-1) to secure the slings from slipping off the hook during lifting and transporting.
- Secure slings against slipping.
- Make sure the slings can be removed from the valve once it has been installed into the pipeline.
- Prevent the control valve from tilting or tipping over.
- Do not leave loads suspended when interrupting work for longer periods of time.
- Make sure that the axis of the pipeline is always horizontal during lifting and the axis of the plug stem is always vertical.

#### **Lifting the control valve**

1. Attach one sling (or other suitable lifting tackle) to each flange or welding end of the valve body and to the rigging equipment (e.g. hook) of the crane or forklift (see Fig. 4-1).

2. **Version with welding ends or welding-neck ends:** secure the slings (or other suitable lifting tackle) attached to the valve body against slipping using a connector.
3. Carefully lift the control valve. Check whether the lifting equipment and accessories can bear the weight.
4. Move the control valve at an even pace to the site of installation.
5. Install the valve into the pipeline (see the 'Installation' section).
6. **Version with flanges:** check whether the flanges are bolted tight and the valve in the pipeline holds.  
**Version with welding ends:** check whether the weld seams hold and whether the valve in the pipeline holds.
7. Remove the slings.



## 4.4 Storage

### NOTICE

**Risk of valve damage due to improper storage.**

- Observe the storage instructions.
- Avoid long storage times.
- Contact SAMSON in case of different storage conditions or longer storage times.

### Note

We recommend observing the following points for long storage times:

- Spray a thin film of oil on the inside and outside of the valve.
- Check the control valve and the prevailing storage conditions regularly.

### Storage instructions

- Protect the control valve against external influences (e.g. impact).
- Secure the valve in the stored position against slipping or tipping over.
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the control valve against moisture and dirt. Store it at a relative humidity of less than 75 %. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.
- Place protective caps on the valve's inlet and outlet.

- Make sure that the ambient air is free of acids or other corrosive media.
- The permissible storage temperature of standard control valves is  $-20$  to  $+65$  °C ( $-4$  to  $+149$  °F). Contact our after-sales service for the storage temperatures of other valve versions.
- Do not place any objects on the control valve.

### Special storage instructions for elastomers

Elastomer, e.g. actuator diaphragm

- To keep elastomers in shape and to prevent cracking, do not bend them or hang them up.
- We recommend a storage temperature of  $15$  °C ( $59$  °F) for elastomers.
- Store elastomers away from lubricants, chemicals, solutions and fuels.

### Tip

SAMSON's After-sales Service can provide more detailed storage instructions on request.



## 5 Installation

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### 5.1 Installation conditions

#### Work position

The work position for the control valve is the front view looking onto the operating controls (including valve accessories).

Plant operators must ensure that, after installation of the device, the operating personnel can perform all necessary work safely and easily access the device from the work position.

#### Pipeline routing

The inlet and outlet lengths (see Table 5-1) vary depending on several variables and process conditions and are intended as recommendations. Contact SAMSON if the lengths are significantly shorter than the recommended lengths.

To ensure that the valve functions properly, proceed as follows:

- ➔ Observe the inlet and outlet lengths (see Table 5-1). Contact SAMSON if the valve conditions or states of the medium process deviate.
- ➔ Install the valve free of stress and with the least amount of vibrations as possible. Read information under 'Mounting position' and 'Support or suspension' in this section.

- ➔ Install the valve allowing sufficient space to remove the actuator and valve or to perform service work on them.

#### Mounting position

Generally, we recommend installing the valve with the actuator upright and on top of the valve.

In the following versions, the valve **must** be installed with the actuator on top:

- Valves in NPS 4 and larger
  - Valves with insulating section for low temperatures below  $-10\text{ °C}$  ( $14\text{ °F}$ )
- ➔ Contact SAMSON if the mounting position is not as specified above.

#### Support or suspension

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#### Note

*The plant engineering company is responsible for selecting and implementing a suitable support or suspension of the installed control valve and the pipeline.*

---

Depending on the valve version and mounting position, the valve, actuator and pipeline must be supported or suspended.

A suitable support or suspension must be installed under the following conditions:

- For valves that are not installed with the actuator in the upright position on top of the valve
- For valve sizes NPS 6 or larger or weighing more than 250 kg
- For valves with insulating section or bellows seal

## Installation

- For actuators weighing more than 70 kg (also when installed in the upright position)

We recommend attaching the support or suspension directly to the valve as shown in Fig. 5-1.

- Contact SAMSON's After-sales Service for additional points of attachment.

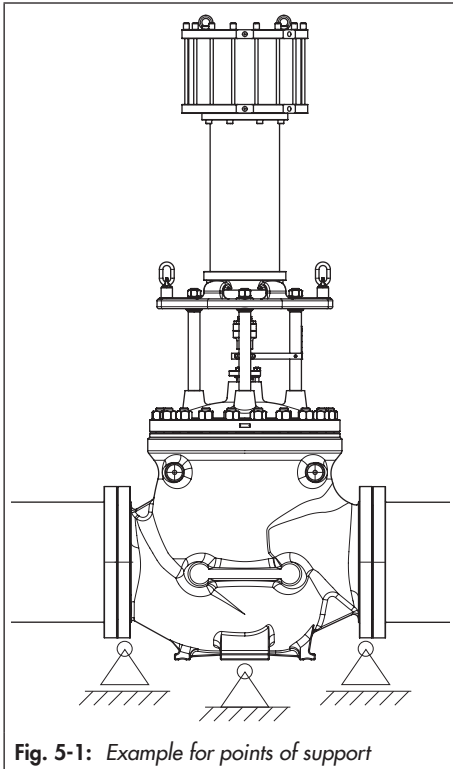


Fig. 5-1: Example for points of support

### Valve accessories

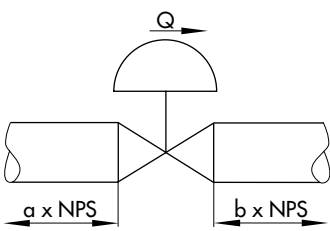
- During connection of valve accessories, make sure that they are easily accessible and can be operated safely from the work position.

### Vent plugs

Vent plugs are screwed into the exhaust air ports of pneumatic and electropneumatic devices. They ensure that any exhaust air that forms can be vented to the atmosphere (to avoid excess pressure in the device). Furthermore, the vent plugs allow air intake to prevent a vacuum from forming in the device.

- Locate the vent plug on the opposite side to the work position of operating personnel.

**Table 5-1: Inlet and outlet lengths**



Q Flow rate  
a Inlet length  
b Outlet length

State of process medium	Valve conditions <sup>1) 2)</sup>	Inlet length a	Outlet length b
Gas	$Ma \leq 0.3$	2	4
	$0.3 \leq Ma \leq 0.7$	2	10
Vapor	$Ma \leq 0.3$ <sup>3)</sup>	2	4
	$0.3 \leq Ma \leq 0.7$ <sup>3)</sup>	2	10
	Saturated steam (percentage of condensate > 5%)	2	20
Liquid	Free of cavitation/ $w < 10$ m/s	2	4
	Cavitation producing noise/ $w \leq 3$ m/s	2	4
	Cavitation producing noise/ $3 < w < 5$ m/s	2	10
	Critical cavitation/ $w \leq 3$ m/s	2	10
	Critical cavitation/ $3 < w < 5$ m/s	2	20
Flashing	–	2	20
Multi-phase	–	10	20

1) Ma: Mach number (dimensionless quantity for velocity)

2) w: Flow velocity

3) No saturated steam

### 5.2 Preparation for installation

Before installation, make sure the following conditions are met:

- The valve is clean.
- The valve and all valve accessories (including piping) are not damaged.
- The valve data on the nameplate (type designation, valve size, material, pressure rating and temperature range) match the plant conditions (size and pressure rating of the pipeline, medium temperature etc.). See the 'Markings on the device' section for nameplate details.
- The requested or required additional pipe fittings (see the 'Additional fittings' section) have been installed or prepared as necessary before installing the valve.

---

#### ! NOTICE

**Risk of control valve damage due to incorrect insulation.**

- When it is necessary to insulate the control valve, do not insulate valve bonnet as well. If the insulating section is insulated, it will not function properly.

---

Proceed as follows:

- Lay out the necessary material and tools to have them ready during installation work.
- Flush the pipelines.

---

#### i Note

The plant operator is responsible for cleaning the pipelines in the plant.

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- For steam applications, dry the pipelines. Moisture will damage the inside of the valve.
- Check any mounted pressure gauges to make sure they function properly.
- When the valve and actuator are already assembled, check the tightening torques of the bolted joints (see the 'Tightening torques, lubricants and tools' section in the annex). Components may loosen during transport.

### 5.3 Mounting the device

The activities listed below are necessary to install the valve and before it can be started up.

---

#### ! NOTICE

**Risk of valve damage due to excessively high or low tightening torques.**

Observe the specified torques when tightening control valve components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are too loose may cause leakage.

- Observe the specified tightening torques (see the 'Tightening torques, lubricants and tools' section in the annex).

---

#### ! NOTICE

**Risk of valve damage due to the use of unsuitable tools.**

- Only use tools approved by SAMSON (see the 'Tightening torques, lubricants and tools' section in the annex).
-

### 5.3.1 Mounting the actuator onto the valve

#### **⚠ WARNING**

#### **Risk of personal injury due to preloaded springs.**

Actuators with preloaded springs are under tension. They can be identified by the long bolts protruding from the bottom of the actuator.

- ➔ Before starting any work on the actuator, relieve the compression from the preloaded springs (see associated actuator documentation).

Depending on the version, SAMSON control valves are either delivered with the actuator already mounted on the valve or the valve and actuator are delivered separately. When delivered separately, the valve and actuator must be assembled together on site.

- ➔ To mount the actuator, proceed as described in the associated actuator documentation.

### 5.3.2 Installing the valve into the pipeline

#### **⚠ NOTICE**

#### **Risk of valve damage due to work being carried out by personnel not qualified for such tasks.**

The plant operator or specialist company performing the welding is responsible for the selection of the welding procedure and the actual welding operations on the valve. This

also applies to any required heat treatment to be performed on the valve.

- ➔ Only allow qualified welding personnel to carry out welding operations.

#### **⚠ NOTICE**

#### **Premature wear and leakage due to insufficient support or suspension.**

- ➔ Support or suspend the valve sufficiently at suitable points.

### a) Version with flanges

1. Close the shut-off valves in the pipeline at the inlet and outlet of the plant section while the valve is being installed.
2. Prepare the relevant section of the pipeline for installing the valve.
3. Remove the protective caps from the valve ports before installing the valve.
4. Lift the valve using suitable lifting equipment to the site of installation (see the 'Lifting the valve' section). Observe the flow direction through the valve. The arrow on the valve indicates the direction of flow.
5. Make sure that the correct flange gaskets are used.
6. Bolt the pipe to the valve free of stress.
7. Attach a support or suspension on the valve, if necessary.

### b) Version with welding ends

1. Proceed as described above under 'Version with flanges', steps 1 to 4.
2. Completely retract the actuator stem to protect the plug from sparks during welding.
3. Weld the valve free of stress into the pipeline.
4. Attach a support or suspension on the valve, if necessary.

### 5.4 Testing the installed valve

#### **⚠ DANGER**

**Risk of bursting due to incorrect opening of pressurized equipment or components.**

Valves and pipelines are pressure equipment that may burst when handled incorrectly. Flying projectile fragments or the release of process medium under pressure can cause serious injury or even death.

Before working on the control valve:

- Depressurize all plant sections affected and the valve (including the actuator). Release any stored energy.
- Drain the process medium from all the plant sections concerned as well as the valve.

#### **⚠ WARNING**

**Risk of personal injury due to pressurized components and process medium being discharged.**

- Do not loosen the screw of the test connection while the valve is pressurized.

#### **⚠ WARNING**

**Risk of hearing loss or deafness due to loud noise.**

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a loud noise may briefly occur through the sudden venting of the pneumatic actuator or pneumatic valve accessories not fitted with noise-reducing fittings. Both can damage hearing.

- Wear hearing protection when working near the valve.

#### **⚠ WARNING**

**Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have become blocked



(e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.

---

**⚠ WARNING**

***Risk of personal injury due to exhaust air being vented.***

While the valve is operating, air is vented from the actuator, for example, during closed-loop operation or when the valve opens or closes.

→ Wear eye protection when working in close proximity to the control valve.

---

**⚠ WARNING**

***Risk of personal injury due to preloaded springs.***

Actuators with preloaded springs are under tension. They can be identified by the long bolts protruding from the bottom of the actuator.

→ Before starting any work on the actuator, relieve the compression from the preloaded springs (see associated actuator documentation).

---

To test the valve functioning before start-up or putting back the valve into operation, perform the following tests:

## 5.4.1 Leak test

The plant operator is responsible for performing the leak test and selecting the test method. The leak test must comply with the requirements of the national and international standards that apply at the site of installation.

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**💡 Tip**

*Our after-sales service can support you to plan and perform a leak test for your plant.*

---

1. Close the valve.
2. Slowly apply the test medium to the inlet space upstream of the valve. A sudden surge in pressure and resulting high flow velocities can damage the valve.
3. Open the valve.
4. Apply the required test pressure.
5. Check the valve for leakage to the atmosphere.
6. Depressurize the pipeline section and valve.
7. Rework any parts that leak (see information below under 'Adjusting the packing') and repeat the leak test.

### Adjusting the packing

---

**⚠ NOTICE**

***Impaired valve functioning due to increased friction as a result of the nut on the packing gland being tightened too far.***

→ Make sure that the plug stem can still move smoothly after the nuts has been tightened.

---

## Installation

1. Tighten the nuts on the packing gland clockwise in a crisscross pattern until the packing seals the valve.
  2. Open and close the valve several times.
  3. Check the valve for leakage to the atmosphere.
  4. Repeat steps 1 and 2 until the packing completely seals the valve.
- If the adjustable packing does not seal properly, contact our after-sales service.

### 5.4.2 Travel motion

The movement of the actuator stem must be linear and smooth.

- Open and close the valve, observing the movement of the actuator stem.
- Apply the maximum and minimum control signals to check the end positions of the valve.
- Check the travel reading at the travel indicator scale.

### 5.4.3 Fail-safe position

- Shut off the signal pressure line.
- Check whether the valve moves to the fail-safe position (see the 'Design and principle of operation' section).

### 5.4.4 Pressure test

The plant operator is responsible for performing the pressure test.



#### Tip

*Our after-sales service can support you to plan and perform a pressure test for your plant.*

---

During the pressure test, make sure the following conditions are met:

- Retract the plug stem to open the valve.
- Observe the maximum permissible pressure for both the valve and plant.

## 6 Start-up

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### **⚠ WARNING**

**Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **⚠ WARNING**

**Risk of personal injury due to pressurized components and process medium being discharged.**

- Do not loosen the screw of the test connection while the valve is pressurized.

### **⚠ WARNING**

**Risk of hearing loss or deafness due to loud noise.**

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a brief loud noise may occur through the sudden venting of the pneumatic actuator (see 'Fail-safe position') or pneumatic valve accessories not fitted with noise-reducing fittings. Both can damage hearing.

- Wear hearing protection when working near the valve.

### **⚠ WARNING**

**Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.

### **⚠ WARNING**

**Risk of personal injury due to exhaust air being vented.**

While the valve is operating, air is vented from the actuator, for example, during closed-loop operation or when the valve opens or closes.

- Wear eye protection when working in close proximity to the control valve.

## Start-up

Before start-up or putting the valve back into service, make sure the following conditions are met:

- The valve is properly installed into the pipeline (see the 'Installation' section).
- The leak and function tests have been completed successfully (see the 'Testing the installed valve' section).
- The prevailing conditions in the plant section concerned meet the valve sizing requirements (see information under 'Intended use' in the 'Safety instructions and measures' section).

### **Start-up/putting the device back into operation**

1. Allow the valve to cool down or warm up to reach ambient temperature before start-up when the ambient temperature and process medium temperature differ greatly or the medium properties require such a measure.
2. Slowly open the shut-off valves in the pipeline. Slowly opening these valves prevents a sudden surge in pressure and high flow velocities which can damage the valve.
3. Check the valve to ensure it functions properly.

## 7 Operation

Immediately after completing start-up or putting the valve back into operation (see the 'Start-up' section), the valve is ready for use.

### **⚠ WARNING**

**Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **⚠ WARNING**

**Risk of personal injury due to pressurized components and process medium being discharged.**

- Do not loosen the screw of the test connection while the valve is pressurized.

### **⚠ WARNING**

**Risk of hearing loss or deafness due to loud noise.**

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a loud noise may briefly occur through the sudden venting of the pneumatic actuator or pneumatic valve accessories not fitted with noise-reducing fittings. Both can damage hearing.

- Wear hearing protection when working near the valve.

### **⚠ WARNING**

**Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.

### **⚠ WARNING**

**Risk of personal injury due to exhaust air being vented.**

While the valve is operating, air is vented from the actuator, for example, during closed-loop operation or when the valve opens or closes.

- Wear eye protection when working in close proximity to the control valve.

### 7.1 Normal operation

The handwheel of valves with actuators fitted with a handwheel must be in the neutral position during normal operation.

### 7.2 Manual operation

Valves with actuators fitted with a handwheel can be manually closed or opened in case of supply air failure.

### 7.3 Lubricator for the packing chamber

In some applications, a lubricator for the packing chamber is required. This lubricator is fitted with a check valve to prevent return flow into the process medium. In some valves, a shut-off valve is additionally installed for better protection.

- The lubricator must always be filled with lubricant and be attached firmly to the valve (but not tightened too tight).
- Turn the lubricator one or two turns every two weeks to achieve the required sealing performance.

## 8 Malfunctions

### 8.1 Troubleshooting

Malfunction	Possible reasons	Recommended action
Actuator and plug stem does not move on demand.	Actuator is blocked.	Check attachment. Remove the blockage. <b>WARNING!</b> A blocked actuator or plug stem (e.g. due to seizing up after remaining in the same position for a long time) can suddenly start to move uncontrollably. Injury to hands or fingers is possible if they are inserted into the actuator or valve. Before trying to unblock the actuator or plug stem, disconnect and lock the pneumatic air supply as well as the control signal. Before unblocking the actuator, release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.
	Diaphragm in the actuator defective	See associated actuator documentation.
	Signal pressure too low	Check the signal pressure. Check the signal pressure line for leakage.
Jolting movement of the actuator and plug stem	Packing tightened too far	Tighten the packing correctly (see information under 'Adjusting the packing' in the 'Testing the installed valve' section).
Actuator and plug stem does not stroke through the entire range.	Signal pressure too low	Check the signal pressure. Check the signal pressure line for leakage.
	Travel stop active	See associated actuator documentation.
	Incorrect setting of valve accessories	Check the settings of the valve accessories.

## Malfunctions

Malfunction	Possible reasons	Recommended action
Increased flow through closed valve (seat leakage)	Dirt or other foreign particles deposited between the seat and plug.	Shut off the section of the pipeline and flush the valve.
	Faces on the seat ring and plug are slightly uneven.	See 'Lapping the seat and plug' in the 'Servicing' section.
	Valve trim is worn out.	Contact our after-sales service.
	Gasket underneath the seat ring is worn out.	See 'Replacing the gaskets' in the 'Servicing' section.
	Gasket at the cage is worn out.	See 'Replacing the gaskets' in the 'Servicing' section.
The valve leaks to the atmosphere (fugitive emissions).	Defective packing	See 'Replacing the packing' in the 'Servicing' section.
	Version with adjustable packing: packing not tightened correctly	Adjust the packing (see information under 'Adjusting the packing' in the 'Testing the installed valve' section). Contact our after-sales service when it continues to leak.
	Version with bellows seal: the bellows seal is defective.	See 'Replacing the bellows seal' in the 'Servicing' section.
	Flange joint loose or gasket worn out	Check the flange joint. See 'Replacing the gaskets' in the 'Servicing' section.

### **i** Note

Contact our after-sales service for malfunctions not listed in the table.



## 8.2 Emergency action

Plant operators are responsible for emergency action to be taken in the plant.

In the event of a valve malfunction:

1. Close the shut-off valves upstream and downstream of the control valve to stop the process medium from flowing through the valve.
2. Perform troubleshooting (see section 8.1).
3. Rectify those malfunctions that can be remedied based on the instructions provided here. Contact our after-sales service in all other cases.

### **Putting the valve back into operation after a malfunction**

See the 'Start-up' section.



## 9 Servicing

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

The following documents are also necessary for servicing the valve:

- Mounting and operating instructions for:
  - ▶ EB 8310-X for Type 3271 Actuator
  - ▶ EB 8318 for Type 3276 Actuator

### **⚠ DANGER**

***Risk of bursting due to incorrect opening of pressurized equipment or components.***

*Valves and pipelines are pressure equipment that may burst when handled incorrectly.*

*Flying projectile fragments or the release of process medium under pressure can cause serious injury or even death.*

*Before working on the control valve:*

- *Depressurize all plant sections affected and the valve (including the actuator). Release any stored energy.*
- *Drain the process medium from all the plant sections concerned as well as the valve.*

### **⚠ WARNING**

***Risk of burn injuries due to hot or cold components and pipeline.***

*Valve components and the pipeline may become very hot or cold. Risk of burn injuries.*

- *Allow components and pipelines to cool down or warm up to the ambient temperature.*
- *Wear protective clothing and safety gloves.*

### **⚠ WARNING**

***Risk of personal injury due to pressurized components and process medium being discharged.***

- *Do not loosen the screw of the test connection while the valve is pressurized.*

### **⚠ WARNING**

***Risk of hearing loss or deafness due to loud noise.***

*Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a loud noise may briefly occur through the sudden venting of the pneumatic actuator or pneumatic valve accessories not fitted with noise-reducing fittings. Both can damage hearing.*

- *Wear hearing protection when working near the valve.*

---

### **⚠ WARNING**

#### ***Crush hazard arising from actuator and plug stem moving.***

- ➔ Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
  - ➔ Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
  - ➔ Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
  - ➔ Before unblocking the actuator and plug stem after they have become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.
- 

### **⚠ WARNING**

#### ***Risk of personal injury due to exhaust air being vented.***

While the valve is operating, air is vented from the actuator, for example, during closed-loop operation or when the valve opens or closes.

- ➔ Wear eye protection when working in close proximity to the control valve.
- 

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### **⚠ WARNING**

#### ***Risk of personal injury due to preloaded springs.***

Actuators with preloaded springs are under tension. They can be identified by the long bolts protruding from the bottom of the actuator.

- ➔ Before starting any work on the actuator, relieve the compression from the preloaded springs (see associated actuator documentation).
- 

### **⚠ WARNING**

#### ***Risk of personal injury due to residual process medium in the valve.***

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

- ➔ Wear protective clothing, safety gloves, respiratory protection and eye protection.
- 

### **ⓘ NOTICE**

#### ***Risk of valve damage due to excessively high or low tightening torques.***

Observe the specified torques when tightening control valve components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are too loose may cause leakage.

- ➔ Observe the specified tightening torques (see the 'Tightening torques, lubricants and tools' section in the annex).
-

**NOTICE**

**Risk of valve damage due to the use of unsuitable tools.**

→ Only use tools approved by SAMSON (see the 'Tightening torques, lubricants and tools' section in the annex).

**NOTICE**

**Risk of valve damage due to the use of unsuitable lubricants.**

→ Only use lubricants approved by SAMSON (see the 'Tightening torques, lubricants and tools' section in the annex).

**Note**

The control valve was checked by SAMSON before it left the factory.

- Certain test results certified by SAMSON lose their validity when the valve is opened. Such testing includes seat leakage and leak tests.
- The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by SAMSON's After-sales Service.
- Only use original spare parts by SAMSON, which comply with the original specifications.

## 9.1 Periodic testing

Depending on the operating conditions, check the valve at certain intervals to prevent possible failure before it can occur. Plant operators are responsible for drawing up an inspection and test plan.

**Tip**

Our after-sales service can support you in drawing up an inspection and test plan for your plant.

## 9.2 Preparing the valve for service work

**Tip**

The valve can remain installed in the pipeline and does not need to be removed to perform the service work.

1. Lay out the necessary material and tools to have them ready for the service work.
2. Put the control valve out of operation (see the 'Decommissioning' section).
3. Remove the actuator from the valve. See associated actuator documentation.
4. Remove the actuator connection assembly from the plug stem.
5. Undo the body nuts on the valve bonnet gradually in a crisscross pattern.
6. Lift the valve bonnet together with the plug stem and plug upwards off the valve body, while holding the plug stem in

## Servicing

place to prevent it from slipping out and damaging the plug stem and plug.

7. Take the cage (two-pieced, if applicable) and seat ring out of the valve body.

The following service work can be performed after preparation is completed:

- Replacing the gaskets (see section 9.4.1)
- Replacing the packing (see section 9.4.2)
- Replacing the bellows seal (see section 9.4.3)
- Lapping the seat and plug (see section 9.4.4)

### 9.3 Mounting the valve after service work

1. Place the seat ring with the gasket into the valve body. Observe the proper position and alignment. The surface sloping by approx. 20° is the seat of the plug and must face towards the valve bonnet (see Fig. 9-4, angle B).

The bottom of the seat ring in the unloaded state by the gasket must be 0.05 inch away from the seating surface in the valve body.

2. Place the cage (both cage parts, if applicable) with the gasket(s) into the valve body. The top of the top cage part must be 0.2 inch below the bottom flange surface of the valve bonnet.
3. Place the valve bonnet including gasket together with the plug stem and plug straight onto the valve body:

- On doing so, guide the plug into the cage.
- Make sure the valve bonnet is aligned so that the packing gland is at a right angle to the valve's direction of flow.

4. Lightly press down the valve bonnet and move the plug up and down a few times to ensure that all inside parts are centered properly.
5. Lubricate the thread of the nuts and stud bolts on the valve body.
6. Firmly press the plug into the seat and fasten down the bonnet with the body nuts. Tighten the nuts gradually in a crisscross pattern and apply the target torque over several rounds. Observe the specified tightening torques and sequence (see the 'Tightening torques, lubricants and tools' section in the annex).

## 9.4 Service work

- Before performing any service work, preparations must be made to the control valve (see section 9.2).
- After all service work is completed, check the control valve before putting it back into operation (see 'Testing the installed valve' in the 'Installation' section).

### 9.4.1 Replacing the gaskets

1. Remove all gaskets on the parts. Carefully clean the sealing faces in the valve body, cage (on both cage parts, if applicable), seat ring and valve bonnet.

2. Insert new gaskets, observing the proper alignment and position/centering of each gasket (see Fig. 9-1).

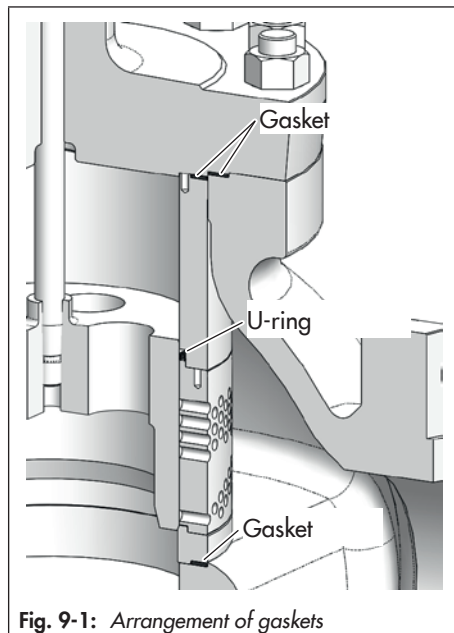


Fig. 9-1: Arrangement of gaskets

**NOTICE**

**Insufficient seal performance due to incorrect mounting.**

→ When a U-ring is used, insert it into the groove on the bottom of the top cage part. Press in the ring evenly over the entire circumference. The open side of the U-ring faces towards the front face of the bottom (see Fig. 9-2).

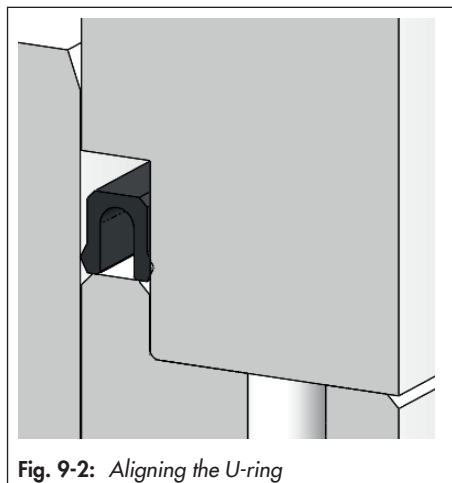


Fig. 9-2: Aligning the U-ring

### 9.4.2 Replacing the packing

1. Unthread the nuts of the packing gland from the valve bonnet.
2. Remove the packing gland and packing follower.
3. Pull the plug stem together with the plug downwards out of the valve bonnet.
4. Pull all the packing parts out of the packing chamber using a suitable tool.

**NOTICE**

**Risk of damage to the inside surface in the valve bonnet due to the use of unsuitable tools.**

→ Use a wire or a similar object made of a material softer than that of the valve bonnet to pull out the packing rings. This prevents scratching or scoring of the sealing face of the packing chamber.

5. Clean the packing chamber thoroughly.
6. Renew damaged parts.
7. Apply a suitable lubricant to all the packing parts and to the plug stem (see the 'Tightening torques, lubricants and tools' section in the annex).
8. Push the plug stem from below through the valve bonnet.
9. Carefully slide the packing parts (especially in the threaded section) over the plug stem into the packing chamber using a suitable tool. Make sure to observe the proper order (see Fig. 9-3).
10. Carefully slide the packing follower downwards over the plug stem.
11. Place the packing gland with the flat side facing upwards onto the stud bolts.
12. Thread the nuts of the packing gland on to the stud bolts and finger tighten them clockwise in a crisscross pattern.

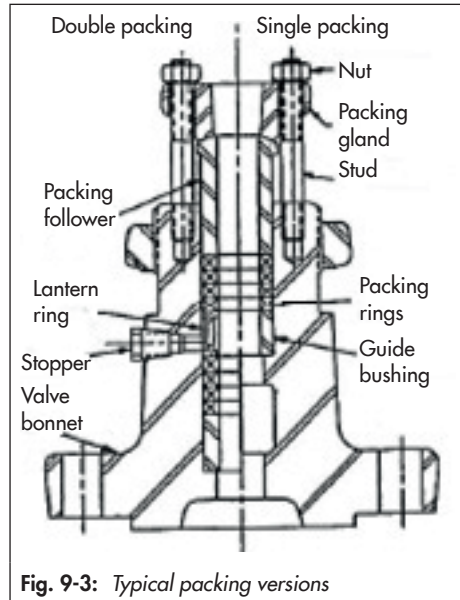


Fig. 9-3: Typical packing versions

### 9.4.3 Replacing the bellows seal

Replace the entire bellows seal assembly when the bellows seal is damaged.

1. Unthread the nuts of the packing gland from the valve bonnet.
2. Remove the packing gland and packing follower.
3. Pull the plug stem together with the plug downwards out of the valve bonnet.
4. Replace the entire bellows seal assembly.
5. Push the plug stem from below through the valve bonnet.
6. Carefully slide the packing parts (especially in the threaded section) over the plug stem into the packing chamber us-



ing a suitable tool. Make sure to observe the proper order (see Fig. 9-3).

7. Carefully slide the packing follower downwards over the plug stem.
8. Place the packing gland with the flat side facing upwards onto the stud bolts.
9. Thread the nuts of the packing gland onto the stud bolts and finger tighten them clockwise in a crisscross pattern.

### 9.4.4 Lapping the seat and plug

Superficial damage (scratches or scoring) on the sealing face of the seat and plug may cause tight shut-off between the seat and plug to be impaired. The unevenness on the sealing faces of the seat and plug can be smoothed by lapping.

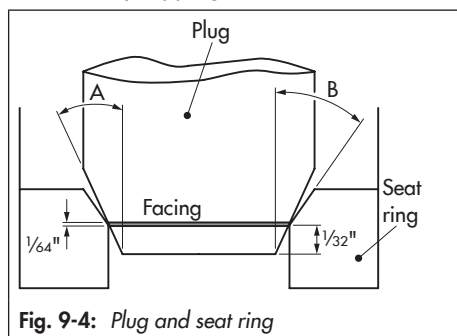


Fig. 9-4: Plug and seat ring

The angle A of the plug must be slightly smaller than the angle B of the seat ring. For example, the plug's angle must be  $20^\circ$  when the seat ring has an angle of  $22^\circ$ .

If the facings have deep scratches or are very uneven, the seat and plug must be reworked or exchanged.

➔ Contact SAMSON's After-sales Service department when reworking is required.

#### Necessary conditions for lapping

In addition to preparation before performing service work, the following points are required for lapping:

- The lapping compound is provided (see the 'Tightening torques, lubricants and tools' section in the annex).
- A suitable lapping tool is provided.

#### Lapping the seat and plug

1. Unthread the nuts of the packing gland from the valve bonnet.
2. Remove the packing gland and packing follower.
3. Pull the plug stem together with the plug downwards out of the valve bonnet.
4. Pull all the packing parts out of the packing chamber using a suitable tool.
5. To make it easier to move the plug stem during the lapping procedure, lightly lubricate the plug stem (see the 'Tightening torques, lubricants and tools' section in the annex).
6. Push the plug stem from below through the valve bonnet.
7. Apply the lapping compound to the facing of the seat ring.

---

### NOTICE

#### **Risk of valve damage due to lapping compound being applied to the plug.**

*The inside surfaces of the cage parts will also be ground during the lapping procedure if lapping compound is applied to the plug. This leads to a changed flow rate and changes the control characteristics of the valve as a result.*

➔ *Only apply lapping compound to the seat ring.*

---

8. Place the seat ring with the gasket into the valve body. Observe the proper position and alignment. The surface sloping by approx. 20° is the seat of the plug and must face towards the valve bonnet (see Fig. 9-4, angle B).
9. Place the cage (both cage parts, if applicable) with the gasket(s) into the valve body.
10. Place the valve bonnet together with the plug stem and plug straight onto the valve body. On doing so, guide the plug through the cage.
11. Fasten the valve bonnet with two or three body nuts.
12. Insert a temporary packing into the valve bonnet to ensure the plug is correctly aligned during lapping. See section 9.4.2.
13. Thread lock nut onto the plug stem.
14. Thread lapping tool onto the plug stem and lock in place with a lock nut.
15. Perform lapping with short oscillating strokes. Turn the plug stem by 90 to 180° back and forth. The weight of the plug, plug stem and lapping tool create sufficient pressure for the lapping procedure.
16. Clean the seat and plug after lapping.
17. To check the tight shut-off of the lapped-in parts, hold the externally protruding plug stem and press the plug by hand into the seat. Apply compressed air to the inlet side of the valve. Repeat the lapping procedure, if necessary.
18. Dismantle all parts (including packing) and clean them thoroughly to remove all residual lapping compound and lubricant.
19. Clean also the packing chamber thoroughly.
20. Apply a suitable lubricant to all the packing parts and to the plug stem (see the 'Tightening torques, lubricants and tools' section in the annex).
21. Push the plug stem from below through the valve bonnet.
22. Carefully slide the packing parts (especially in the threaded section) over the plug stem into the packing chamber using a suitable tool. Make sure to observe the proper order (see Fig. 9-3).
23. Carefully slide the packing follower downwards over the plug stem.
24. Place the packing gland with the flat side facing upwards onto the stud bolts.

25. Thread the nuts of the packing gland on to the stud bolts and finger tighten them clockwise in a crisscross pattern.

## **9.5 Ordering spare parts and operating supplies**

Contact your nearest SAMSON subsidiary or SAMSON's After-sales Service for information on spare parts, lubricants and tools.

### **Spare parts**

See Annex for details on spare parts.

### **Lubricant**

See Annex for details on suitable lubricants.

### **Tools**

See Annex for details on suitable tools.



## 10 Decommissioning

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### **⚠ DANGER**

**Risk of bursting due to incorrect opening of pressurized equipment or components.**

Valves and pipelines are pressure equipment that may burst when handled incorrectly.

Flying projectile fragments or the release of process medium under pressure can cause serious injury or even death.

Before working on the control valve:

- Depressurize all plant sections affected and the valve (including the actuator). Release any stored energy.
- Drain the process medium from all the plant sections concerned as well as the valve.

### **⚠ WARNING**

**Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **⚠ WARNING**

**Risk of personal injury due to pressurized components and process medium being discharged.**

- Do not loosen the screw of the test connection while the valve is pressurized.

### **⚠ WARNING**

**Risk of hearing loss or deafness due to loud noise.**

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a loud noise may briefly occur through the sudden venting of the pneumatic actuator or pneumatic valve accessories not fitted with noise-reducing fittings. Both can damage hearing.

- Wear hearing protection when working near the valve.

### **⚠ WARNING**

**Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.

## Decommissioning

→ Before unblocking the actuator and plug stem after they have become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.

---

### **WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

While the valve is operating, air is vented from the actuator, for example, during closed-loop operation or when the valve opens or closes.

→ Wear eye protection when working in close proximity to the control valve.

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### **WARNING**

#### **Risk of personal injury due to residual process medium in the valve.**

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

→ Wear protective clothing, safety gloves, respiratory protection and eye protection.

---

To decommission the control valve for service work or to remove it from the pipeline, proceed as follows:

1. Close the shut-off valves upstream and downstream of the control valve to stop the process medium from flowing through the valve.

2. Completely drain the pipelines and valve.
3. Disconnect and lock the pneumatic air supply to depressurize the actuator.
4. Release any stored energy.
5. If necessary, allow the pipeline and valve components to cool down or warm up to the ambient temperature.

## 11 Removal

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### **⚠ WARNING**

#### **Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **⚠ WARNING**

#### **Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.

### **⚠ WARNING**

#### **Risk of personal injury due to residual process medium in the valve.**

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

- Wear protective clothing, safety gloves, respiratory protection and eye protection.

### **⚠ WARNING**

#### **Risk of personal injury due to preloaded springs.**

Actuators with preloaded springs are under tension. They can be identified by the long bolts protruding from the bottom of the actuator.

- Before starting any work on the actuator, relieve the compression from the preloaded springs.

Before removing the valve, make sure the following conditions are met:

- The control valve is put out of operation (see the 'Decommissioning' section).

## Removal

### 11.1 Removing the valve from the pipeline

#### a) Version with flanges

1. Support the valve to hold it in place when separated from the pipeline (see the 'Shipment and on-site transport' section).
2. Unbolt the flange joint.
3. Remove the valve from the pipeline (see the 'Shipment and on-site transport' section).

#### b) Version with welding ends

1. Support the valve to hold it in place when separated from the pipeline (see the 'Shipment and on-site transport' section).
2. Cut the pipeline in front of the weld seam.
3. Remove the valve from the pipeline (see the 'Shipment and on-site transport' section).

### 11.2 Removing the actuator from the valve

See associated actuator documentation.



## 12 Repairs

If the valve does not function properly according to how it was originally sized or does not function at all, it is defective and must be repaired or exchanged.

### ! NOTICE

**Risk of valve damage due to incorrect service or repair work.**

- ➔ Do not perform any repair work on your own.
- ➔ Contact SAMSON's After-sales Service for repair work.

### 12.1 Returning devices to SAMSON

Defective devices can be returned to SAMSON for repair.

Proceed as follows to return devices:

1. Exceptions apply concerning some special device models ► [www.samsongroup.com](http://www.samsongroup.com) > Service & Support > After-sales Service.
2. Send an e-mail ► [retouren@samsongroup.com](mailto:retouren@samsongroup.com) to register the return shipment including the following information:
  - Type
  - Article no.
  - Configuration ID
  - Original order

- Completed Declaration on Contamination, which can be downloaded from our website at ► [www.samsongroup.com](http://www.samsongroup.com) > Service & Support > After-sales Service.

**After checking your registration, we will send you a return merchandise authorization (RMA).**

3. Attach the RMA (together with the Declaration on Decontamination) to the outside of your shipment so that the documents are clearly visible.
4. Send the shipment to the address given on the RMA.

### i Note

*Further information on returned devices and how they are handled can be found at ► [www.samsongroup.com](http://www.samsongroup.com) > Service & Support > After-sales Service.*



## 13 Disposal

- Observe local, national and international refuse regulations.
- Do not dispose of components, lubricants and hazardous substances together with your household waste.



## 14 Certificates

The declaration of conformity in accordance with Pressure Equipment Directive 2014/68/EU is provided on the next page.

The certificates shown were up to date at the time of publishing. The latest certificates can be found on our website:

► [www.samsongroup.com](http://www.samsongroup.com) > *Products & Applications* > *Product selector* > *Valves* > *3595*

Other optional certificates are available on request.

# EU DECLARATION OF CONFORMITY TRANSLATION



## Module H / N° CE-0062-PED-H-SAM 001-20-DEU-rev-A

For the following products, SAMSON hereby declares under its sole responsibility:

Devices	Series	Type	Version
Globe valve	240	3241	DIN, body of cast iron from DN 150, body of spheroidal-graphite iron, from DN 100, fluids G2, L1, L2 <sup>1)</sup>
Three-way valve	240	3244	DIN/ANSI, body of steel, etc., all fluids
Cryogenic valve	240	3248	DIN, body of cast iron from DN 150, body of spheroidal-graphite iron, from DN 100, fluids G2, L1, L2 <sup>1)</sup>
Globe valve	250	3251	DIN/ANSI, all fluids
Globe valve	250	3251-E	DIN/ANSI, all fluids
Three-way valve	250	3253	DIN/ANSI, body of steel, etc., all fluids
Globe valve	250	3254	DIN/ANSI, all fluids
Angle valve	250	3258	DIN/ANSI, all fluids
Split-body valve	250	3258	DIN, all fluids
Angle valve (IG standards)	250	3259	DIN, all fluids
Steam-converting valve	280	3281	DIN/ANSI, all fluids
		3284	DIN/ANSI, all fluids
		3286	DIN/ANSI, all fluids
		3288	DIN, all fluids
Globe valve	V2001	3321	DIN, body of steel, etc., all fluids
Three-way valve	V2001	3323	ANSI, all fluids
			DIN, body of steel, etc., all fluids
Angle seat valve	—	3353	DIN, body of steel, etc., all fluids
Silencer	3381	3381-1	DIN/ANSI, single attenuation plate with welding ends, all fluids
		3381-3	DIN/ANSI, all fluids
		3381-4	DIN/ANSI, single attenuation plate multi-stage with welding ends, all fluids
Globe valve	240	3241	ANSI, body of cast iron, Class 125, from NPS 5, fluids G2, L1, L2 <sup>1)</sup>
Cryogenic valve	240	3248	DIN/ANSI, all fluids
Three-way valve	250	3253	DIN, body of cast iron from DN200 PN16, fluids G2, L1, L2 <sup>1)</sup>
Globe valve	290	3291	ANSI, all fluids
Angle valve	290	3296	ANSI, all fluids
Globe valve	590	3591	ANSI, all fluids
Angle valve	590	3596	ANSI, all fluids
Cryogenic valve	590	3598	ANSI, NPS 3 to NPS 8, Class 900, all fluids
Control valve	—	3595	ANSI, all fluids

<sup>1)</sup> Gases according to Article 4(1)(c.i), second indent  
Liquids according to Article 4(1)(c.ii)

that the products mentioned above comply with the requirements of the following standards:

Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to the making available on the market of pressure equipment	2014/68/EU	of 15 May 2014
Applied conformity assessment procedure for fluids according to Article 4(1)	Module H	by Bureau Veritas 0062

The manufacturer's quality management system is monitored by the following notified body:  
Bureau Veritas Services SAS, 8 Cours du Triangle, 92800 PUTEAUX – LA DEFENSE  
Technical standards applied: DIN EN12516-2, DIN EN12516-3, ASME B16.34

Manufacturer: SAMSON AG, Weismuellerstrasse 3, 60314 Frankfurt am Main, Germany  
Frankfurt am Main, 7 April 2021



Dr. Andreas Widi  
Chief Executive Officer (CEO)



Dr. Thomas Steckmair  
Chief Technology Officer (CTO)

Revision 08

## 15 Annex

### 15.1 Tightening torques, lubricants and tools

#### Tightening torques

**Table 15-1:** *Tightening torques for nuts on the valve bonnet/body*

**Table 15-1.1:** *List of materials (Part A)*

UNC-UN thread in inches	Thread pitches per inch	Material							
		A320 L7		A193 B7/B16		A193M B7M/ A320 L7M		A193 B8/ B8M Cl. 1	
		Increase per round	Target torque	Increase per round	Target torque	Increase per round	Target torque	Increase per round	Target torque
5/16"	18	14.59	29.19	13.03	26.06	11.07	22.14	4.13	8.25
3/8"	16	27.28	54.56	23.40	46.80	20.70	41.39	7.71	15.43
7/16"	14	42.65	85.30	37.45	74.89	32.35	64.71	12.06	24.12
1/2"	13	65.25	130.50	57.98	115.95	49.50	99.00	18.45	36.90
9/16"	12	92.19	184.37	84.38	168.76	69.93	139.87	26.07	52.13
5/8"	11	128.35	256.71	117.80	235.59	97.37	194.74	36.29	72.59
3/4"	10	224.88	449.75	208.11	416.22	170.60	341.19	63.59	127.17
7/8"	9	359.68	719.37	334.34	668.68	272.86	545.73	101.70	203.41
1"	8	536.95	1073.90	499.72	999.45	407.34	814.68	151.83	303.65
1 1/8"	8	780.65	1561.30	734.03	1468.06	592.22	1184.43	220.74	441.47
1 1/4"	8	1088.66	2177.32	1032.15	2064.30	825.88	1651.76	307.83	615.65
1 3/8"	8	1467.48	2934.96	1400.78	2801.56	1113.26	2226.52	414.94	829.89
1 1/2"	8	1926.43	3852.87	1849.40	3698.79	1461.43	2922.87	544.72	1089.43
1 5/8"	8	2470.85	4941.70	2383.52	4767.05	1874.44	3748.88	698.65	1397.31
1 3/4"	8	3109.93	6219.86	3012.54	6025.08	2359.26	4718.52	879.36	1758.72
1 7/8"	8	3851.16	7702.33	3744.10	7488.20	2921.57	5843.14	1088.95	2177.90
2"	8	4699.60	9399.20	4583.44	9166.88	3565.21	7130.42	1328.85	2657.70
2 1/4"	8	6756.53	13513.06	6624.62	13249.25	5125.64	10251.29	1910.47	3820.93
2 1/2"	8	9337.23	18674.46	9194.00	18388.01	7083.42	14166.84	2640.18	5280.37

UNC-UN thread in inches	Thread pitches per inch	Material							
		A320 L7		A193 B7/B16		A193M B7M/ A320 L7M		A193 B8/ B8M Cl. 1	
		Tightening torque in Nm							
		Increase per round	Target torque	Increase per round	Target torque	Increase per round	Target torque	Increase per round	Target torque
2¾"	8	12505.18	25010.37	11163.45	22326.89	9486.69	18973.38	3535.95	7071.90
3"	8	16345.35	32690.70	14634.46	29268.92	12399.92	24799.84	4621.79	9243.58
3¼"	8	20859.31	41718.62	18721.89	37443.77	15824.31	31648.61	5898.15	11796.30
3½"	8	26142.80	52285.60	23513.90	47027.79	19832.47	39664.94	7392.10	14784.21
3¾"	8	32122.68	64245.36	28945.77	57891.53	24368.93	48737.86	9082.97	18165.93
4"	8	39247.97	78495.94	35423.58	70847.17	29774.32	59548.65	11097.70	22195.40

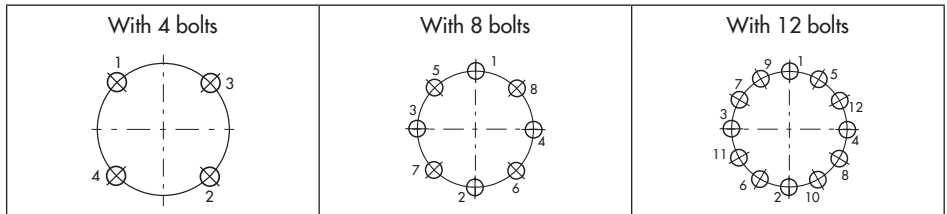
Table 15-1.2: List of materials (Part B)

UNC-UN thread in inches	Thread pitches per inch	Material							
		A193 B8 Cl. 2/ A2 70		A193 B8M Cl. 2		A453 660B		A320 L43	
		Tightening torque in Nm							
		Increase per round	Target torque	Increase per round	Target torque	Increase per round	Target torque	Increase per round	Target torque
⅝"	18	12.46	24.92	13.19	26.37	11.78	23.55	14.49	28.99
⅜"	16	23.29	46.58	24.65	49.29	22.01	44.03	27.09	54.19
7/16"	14	36.41	72.83	38.53	77.06	34.41	68.83	42.35	84.71
½"	13	55.71	111.42	58.95	117.90	52.65	105.30	64.80	129.60
⅝"	12	78.71	157.41	83.28	166.57	74.38	148.77	91.55	183.10
⅝"	11	109.59	219.18	115.96	231.92	103.57	207.14	127.47	254.94
¾"	10	192.00	384.00	203.16	406.33	181.45	362.90	223.33	446.65
7/8"	9	272.86	545.73	272.86	545.73	290.23	580.46	357.20	714.41
1"	8	407.34	814.68	407.34	814.68	433.26	866.53	533.25	1066.49
1⅛"	8	484.54	969.08	484.54	969.08	629.90	1259.81	775.27	1550.53
1¼"	8	675.72	1351.44	675.72	1351.44	878.43	1756.87	1081.15	2162.30
1⅜"	8	698.32	1396.64	698.32	1396.64	1184.10	2368.21	1457.36	2914.72
1½"	8	916.72	1833.43	916.72	1833.43	1554.43	3108.87	1913.15	3826.30
1⅝"	8	1175.78	2351.57	1175.78	2351.57	1993.72	3987.44	2453.81	4907.62



UNC-UN thread in inches	Thread pitches per inch	Material							
		A193 B8 Cl. 2/ A2 70		A193 B8M Cl. 2		A453 660B		A320 L43	
		Tightening torque in Nm							
		Increase per round	Target torque	Increase per round	Target torque	Increase per round	Target torque	Increase per round	Target torque
1¾"	8	1479.90	2959.80	1479.90	2959.80	2509.39	5018.79	3088.48	6176.97
1⅞"	8	1832.62	3665.25	1832.62	3665.25	3107.49	6214.98	3824.60	7649.21
2"	8	2236.36	4472.72	2236.36	4472.72	3792.09	7584.18	4667.19	9334.37
2¼"	8	3215.18	6430.35	3215.18	6430.35	5451.82	10903.64	6709.93	13419.87
2½"	8	4443.23	8886.47	4443.23	8886.47	7534.18	15068.36	9272.84	18545.68
2¾"	8	5950.74	11901.49	5950.74	11901.49	10090.39	20180.78	12418.94	24837.88
3"	8	7778.13	15556.26	7778.13	15556.26	13189.01	26378.01	16232.62	32465.25
3¼"	8	9926.16	19852.31	9926.16	19852.31	16831.31	33662.61	20715.45	41430.91
3½"	8	12440.37	24880.74	12440.37	24880.74	21094.54	42189.07	25962.51	51925.01
3¾"	8	15285.97	30571.93	15285.97	30571.93	25919.68	51839.36	31901.15	63802.29
4"	8	18676.62	37353.24	18676.62	37353.24	31669.05	63338.10	38977.30	77954.59

Table 15-2: Tightening sequence



**Table 15-3:** *Tightening torques for plug/plug stem*

Plug stem diameter [in]	Tightening torque [m·kg]
½	3.4
¾	6.8
1	14

**Lubricant****Table 15-4:** *Lubricant and lapping compound*

Lubricant	Parts/pairs of parts	Reason	Application	Cleaning <sup>1)</sup>
Oil	Inside and outside of the valve	Before long periods of storage to protect the valve against corrosion	Apply a thin film	Yes
Machine oil	Plug stem	To make the plug move easier during lapping of the seat and plug.	Apply a thin film	Yes
Silicone-based lubricant	Packing rings	To slide the packing rings on the plug stem	Apply a thin film	No
Grease (compatible with the process medium)	Spring pin in the plug/plug stem	To insert the pin through the hole	Grease the entire pin	No

Lubricant	Parts/pairs of parts	Reason	Application	Cleaning <sup>1)</sup>
Crane anti-seize mounting paste	Plug/plug stem	To screw the plug stem into the plug or screwing the plug onto the plug stem	Apply to the threads of the plug and plug stem	No
	Stud bolts/nuts	To mount the valve body onto the valve body	Apply to the thread of the nuts and stud bolts	No

<sup>1)</sup> All the lubricant must be wiped off before start-up or putting back the valve into service

Lapping compound	Parts/pairs of parts	Reason	Application	Cleaning <sup>1)</sup>
Grinding compound, grit size A or smaller, mixed with a small amount of lubricant (e.g. graphite)	Seat ring	For lapping the seat and plug	Apply only to the facing of the seat ring	Yes
Silicon carbide paste, medium grit size (CM)				

<sup>1)</sup> All the grinding compound must be wiped off before start-up or putting back the valve into service

### Tools

In addition to the standard tool, special tools are required to assemble and remove some parts. Use adjustable torque wrenches with a stop signal or that indicate the torque being applied to achieve the right tightening torques. Valves in large valve sizes often require tightening torques that can only be achieved through additional torque multiplication by using a torque multiplier or hydraulic power tool.

Contact SAMSON's After-sales Service concerning the special tools required. Contact our after-sales service.

## 15.2 Spare parts

Contact SAMSON's After-sales Service if you need spare parts.

## 15.3 After-sales service

Contact our after-sales service for support concerning service or repair work or when malfunctions or defects arise.

### E-mail address

You can reach our after-sales service at [aftersalesservice@samsongroup.com](mailto:aftersalesservice@samsongroup.com).

### Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website ([www.samsongroup.com](http://www.samsongroup.com)) or in all SAMSON product catalogs.

### Required specifications

Please submit the following details:

- Order number and position number in the order
- Type, model number, valve size and valve version
- Pressure and temperature of the process medium
- Flow rate in cu.ft./min or m<sup>3</sup>/h
- Type and bench range of the actuator (e.g. 0.2 to 1 bar)
- Is a strainer installed?
- Installation drawing







**EB 8079 EN**



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