THINKTANK Safety Valve Operation, Installation, and General Maintenance Instructions

Safety Valve Manual Book

(2023-THINKTANK)

https://cncontrolvalve.com/

1 Introduction

1.1 Manufacturer

THINKTANK specializes in the production of safety valves suitable for a wide range of industrial uses. We offer an extensive variety of valve types, materials, and custom options to meet diverse needs. These safety valves meet all essential quality and environmental standards, ensuring reliable operation in accordance with relevant product certifications.

1.2 About this Document

In this document, We summarizing the types of safety valves and peripheral devices offered under our THINKTANK brand. We provide:

- Spring-loaded safety valves (Type A),
- Pilot-operated safety valves (Type B),
- Supplementary loaded safety valves (Type C).

Our safety valves can be further customized with additional features like bursting discs, pneumatic supplementary loading, bellows, and upstream change-over valves. It's important to note that specific regulations and standards may apply, depending on the system and medium used.

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At THINKTANK, we ensure that all regulations and standards are meticulously followed. Alongside the guidance provided in our operating instructions, we also adhere to the universally accepted safety and workplace regulations.

1.3 Illustration Conventions

Our safety guidelines and warnings highlight crucial safety-related information. In these operating instructions, we categorize the information into different risk levels to ensure clear understanding and adherence.

DANGER

This highlights the most critical risk scenario. Failure to adhere to the guidelines could lead to severe injury or even fatalities.

WARNING

This indicates a situation of significant risk. Failure to follow the guidelines could lead to severe injury or even fatal consequences.

2 Safety

2.1 Proper Use

At THINKTANK, our range of safety valves comes in various designs, each tailored for specific purposes. It's crucial to consider the intended use when selecting a safety valve, as they are designed to operate within a certain pressure range and maximum mass flow. The maximum permissible operating pressure of our safety valves depends on several factors:

- The material of the safety valve
- The temperature of the medium
- The design pressure
- The flange rating class

We ensure that the actual operating pressure and temperature do not exceed the maximum permissible values for the inlet and outlet connections. Our safety valves should only be used for media for which they are approved, as specified on the type plate. We emphasize that improper operation of these valves can lead to faults and failures, posing risks to both people and property. Similarly, incorrectly dimensioned safety valves can cause similar issues.

In our systems, specific threshold values for the medium temperature and the back pressure are critical. We configure the safety valve spring and adjust the set pressure accordingly. In safety valves equipped with bellows, the maximum back pressure might be reduced compared to the rated outlet pressure. For more detailed information on maximum back pressure and other specifications, please feel free to reach out to us at THINKTANK.

When working with dangerous or harmful media, the respective regulations and standards must be observed.

Dangerous media includes:

- Toxic media
- Caustic media
- Irritating media
- Environmentally hazardous media

We at THINKTANK remind you to adhere to all safety regulations and warnings. Should you need more information about this product, please feel free to reach out to us.

2.2 Improper Use

At THINKTANK, we emphasize that our safety valves must not be misused. If they are used improperly, we cannot be held liable.

It's crucial that the seals on our valves remain intact and unaltered. Any modifications can impact the valve's operation and performance, leading to a voided warranty. Also, it's important to avoid applying protective coatings to moving and functionally critical parts of the valve.

Particularly for the actuator and coupling, it's essential that these components of our safety valves remain unobstructed.

Misusing the test gag can compromise safety, as it may disable certain valve functions. Over-tightening the test gag can cause leakage. Our safety valves that are shipped with a tightened test gag for transport protection are marked with a red flag.

Before use, it's necessary to adjust the lifting mechanism from “blocked” (long blocking screw inserted) to “not blocked” (short screw plug inserted).

Furthermore, the levers on our safety valves should never be used as hangers for any objects, nor should their position be altered. It's also important not to add any extra weight to these levers.

2.3 Basic Safety Guidelines

DANGER

At THINKTANK, our brand is synonymous with top-quality safety valves, and we take pride in ensuring their safe and effective operation. Here are some important guidelines to follow:

Regarding changes to safety valves, we strongly advise against any unauthorized modifications that could increase system pressure beyond secure levels or violate regulatory requirements. It's crucial to maintain the conditions of delivery as specified.

For handling dangerous media, which poses risks like poisoning or burns, we recommend using appropriate protective devices and collecting tanks, along with wearing suitable protective gear.

If foreign bodies are present in the safety valve, there's a risk of valve failure or leaks. We suggest flushing the system before installing a safety valve and checking for any foreign objects, which should be promptly removed.

In cases where the bug screen is damaged or missing, there's a risk of dirt, objects, or insects entering the safety valve, leading to malfunction. It's important to correctly install the bug screen and check it regularly.

High ambient temperatures can cause material expansion, potentially disrupting the safety valve's function. If temperatures exceed 60°C, we advise configuring pressure tapping lines to be as long as possible with a water seal, and positioning control cabinets and actuators away from high temperatures.

Conversely, low ambient temperatures can lead to icing, freezing vapors, and reduced flow rates. To prevent disruption, we recommend protecting safety valves and pipelines from the cold, taking appropriate measures for temperatures below 2°C, and heating control cabinets and pressure tapping lines.

For air quality, it's essential that the control air supplied to actuators in H8 and additional loads meets the DIN ISO 8573-1 quality standards.

Dealing with abrasive or corrosive media can cause moving parts to jam or stick. To avoid functional disruptions, we advise servicing the safety valve after each opening, using bellows, and ensuring proper clearance of movable parts.

In the case of media with a high proportion of particles, to prevent deposits and clogging that could lead to malfunction, we suggest using a filter with the correct mesh size and additional filters to increase filter capacity.

Finally, to handle residual media in the safety valve, which poses risks like poisoning or burns, it's important to wear suitable protective equipment and remove any

residual media promptly.

WARNING

Leaky safety valve

Here's how we manage specific risks:

For a leaky safety valve, which can result from damaged gaskets and sealing surfaces, it's vital to protect the valve against vibrations and impacts, particularly during transport and installation. Regular checks for leaks are also essential.

In cases where bonnets, lifters, or spindle guides are open, there's a risk of media leaking. We take steps to ensure that no danger arises from such leaks. This includes maintaining a safe distance and wearing appropriate protective equipment.

There's also a risk of damage from manipulation. To mitigate this, we make sure that the valve cannot be obstructed by any objects.

Regarding the air supply pressure range, especially for model C, it's critical to adhere to the specified limits to ensure proper functioning of the control system. The maximum pressure should be 10 bar, and the minimum pressure should be 4.0 bar. Compliance with these parameters is key to the safe and efficient operation of our safety valves.

CAUTION

At THINKTANK, we prioritize safety when handling various types of media and equipment. Here are our safety guidelines:

For handling hot media, which pose risks of burns or scalding, we ensure that all personnel wear suitable protective equipment.

When dealing with hot surfaces, there is a similar risk of burns. To protect ourselves, we always wear appropriate protective gear.

Cold surfaces can cause cold burns. We mitigate this risk by wearing the necessary protective equipment.

In the case of aggressive media, such as when processing chlorine gas which can lead to acid formation, caustic burns are a significant risk. To prevent these, we equip ourselves with suitable protective gear.

For open bonnets, lifters, or spindle guides, there's a risk of pinching from moving parts. To prevent this, we install suitable safety guards as a precaution.

In the presence of sharp edges and burrs, which can cause injury, we advise wearing safety gloves and handling the safety valve with care to avoid accidents.

Lastly, high noise emission during operations can result in hearing damage. To protect our team, wearing ear protection is a critical safety measure.

3 Marking

After being set and tested, each safety valve is sealed. Only if the seal remains undamaged, can it be assured that the safety valve will function properly as indicated by the marking.
The type plate attached to the safety valve provides various information, including:

- Order data (serial number)
- Technical data
- Set pressure
- Component test number
- CE marking with the designated center number
- UV marking, if applicable

Additional markings may also be applied to meet the requirements of the relevant standards, such as:

- Marking with a marking stamp
- Cast marking
- Separate marking (e.g., for the heating jacket)
- Warning tags (e.g., for a test gag)

In the event of any technical adjustments made to a safety valve, the markings must be updated accordingly.

4 General Information on Safety Valves

4.1 Gaskets and Leaks

Safety valves are manufactured with great precision, paying particular attention to the sealing surfaces.

There are two types of safety valves: soft sealing and metallic sealing.

Metallic sealing safety valves meet the seal tightness requirements of both national and international standards.

Soft-sealing safety valves offer a range of different materials for the seals, which should be carefully chosen based on the specific application, taking into consideration factors such as the medium, pressure, and temperature.

It is the responsibility of the operator to ensure compatibility between the fluid and the chosen sealing material.

To identify leaks, a check gauge can be used. In the case of spring-loaded safety valves, bellows can be employed to prevent any media from leaking out. In the event of leakage, a collecting tank can be utilized.

For models with bellows that operate with an open bonnet, the instructions regarding the open bonnet should be followed.

4.2 Drainage

As a general practice, safety valves are typically provided without a built-in drainage opening. This is because the proper drainage is intended to occur through a designated blow-off line. However, in specific instances such as installation on ships, drainage openings may be allowed or even mandated directly in the safety valve.

If desired, safety valves can be requested and ordered with a preinstalled drainage opening. Alternatively, a drainage opening can be drilled at the specified location post-purchase. It is important to contact the manufacturer and obtain the corresponding drawings for this purpose.

Any drainage openings that serve no purpose should be properly sealed.

4.3 Operating Pressure and Set Pressure

In order to ensure that a safety valve closes reliably, the operating pressure of the system must always be lower than the set pressure. The operating pressure should be at least 5% below the set pressure, taking into account the closing pressure difference.

As the operating pressure increases, the clamping force of a spring-loaded safety valve decreases. The closer the operating pressure gets to the set pressure, the higher the likelihood of the medium escaping (only A). This can lead to leaks,

especially if the sealing surfaces are damaged or dirty.

If the compressed air used for supplementary loading fails, the safety valve will function like a conventional safety valve without supplementary loading (only C).

4.4 Ambient Conditions

The controllers and actuators are designed to be used in temperatures ranging from 2 °C to 60 °C.

When operating under extreme conditions, it is advisable to use safety valves made of stainless steel.
To ensure proper functioning, it is important to protect the safety valves and pipelines from atmospheric factors.

4.5 Protective Coating

Safety valves receive a protective coating at the factory to safeguard them during storage and transportation. When exposed to corrosive external conditions, additional corrosion protection becomes necessary. It is essential to avoid applying the protective coating to moving or crucial components.

4.6 Spring

If springs with winding distances less than the required 2 mm are used, the user will be informed about the associated risk of reduced valve lift or valve malfunction during opening, which can be caused by corrosion or dirt.
It is the user's responsibility to make sure that the selected spring material does not corrode under the actual application conditions and that there are no deposits of dirt between the spring windings.
If needed, the user must regularly inspect the springs to eliminate the aforementioned risks.

5 Packaging, Transport and Storage

5.1 Packaging

Only trained personnel should handle and maintain the safety valve.

Before delivery, safety valves are inspected for damage and leaks. To ensure safe transportation, all sealing surfaces, sealing lips, and threads must be protected using covers.

5.2 Transport

Use the designated transport tabs/cast support brackets (only A) and ring nuts (only B) to lift the safety valves. If a safety valve doesn't have transport tabs/cast support brackets, use appropriate aids like lifting belts for transportation.

Do not lift safety valves using the venting lever or any external pipework.

Take care when transporting safety valves.

They should not be knocked over, as vibrations and impacts can damage the sealing surfaces. Use protectors and suitable packaging to prevent contamination during transport.

5.3 Storage

Store safety valves in a dry area and protect them from dirt.

The recommended storage temperature ranges from 5°C to 40°C.

The maximum temperature for storage is 50 °C, while the minimum is -10 °C.

Safety valves come with factory-provided flange protection caps, which must remain in place during storage.

If safety valves are stored in temperatures below freezing, consider the temperature resistance of the materials, especially the seals.

6 Installation

6.1 General Information about Installation

Only trained personnel are allowed to install safety valves. You can receive training through seminars conducted by THINKTANK, workshops led by experienced professionals, or by studying the documentation provided by THINKTANK, including

video films, catalogues, and installation guides.
In addition to these general operating instructions, we have also developed maintenance instructions specific to each valve type, which must be strictly followed.
Safety valves should be secured according to the specifications in the drawings, using all designated fastening elements to prevent excessive forces or mechanical stress.
Nuts must be fully tightened onto the bolts, leaving 1.5 turns of the thread exposed.

Torques must be followed. Safety valves, especially the sealing surfaces, should be shielded from impacts during installation.

Generally, safety valves should be installed in an upright position. Only if the product-related technical documents specify other installation positions, exceptions can be allowed.

THINKTANK is not accountable for welding operations concerning connection ends.

The properties of the product need to be maintained after welding to ensure they meet the intended application. To achieve this, the following must be considered during the welding process:

- Avoid reducing orifice areas and wall thicknesses.
- Keep the inter pass temperature below 50 °C.

After welding, it may be necessary to anneal the material. The following requirements apply to the annealing process:

- The annealing temperature should be kept below 630 °C.
- The annealing time must not exceed 40 minutes.

During annealing, it is important to limit the heat input to the heat-affected zones of the weld seam in order to prevent the entire valve from heating up. Additionally, the temperature on the flange of the bonnet must not exceed 150 °C throughout the annealing process. This can be achieved by cooling the entire bonnet.

The arrow on the body indicates the required flow direction, which should be followed.

When installing safety valves, it is important to ensure that any dynamic vibrations within the system are not transferred to the valves. In cases where the system has vibrations,
options like bellows, O-rings, or U-shaped expansion pipes can be used to separate

the safety valves from the system
The plant operator is responsible for assessing the reactive forces that may occur during a blow-off. Support brackets attached to safety valves have proven to be effective in transferring these reactive forces.

Safety valves with support brackets enable proper installation within the plant. It is the
plant operator's responsibility to determine the appropriate type and placement of support brackets for a suitable transfer of reactive forces, if needed.
The support brackets absorb the reaction forces.
It is essential to use properly sized gaskets on the connections of the safety valves. Sealants or any components must not obstruct the flow areas or become dislodged and enter the flow space. The connections should adhere to the specifications outlined in the rule groups.

Due to the numerous pipe standards, the inner diameter of the safety valve connection may differ from that of the pipe connection. It is important that the inlet and outlet pipelines have diameters equal to or greater than those at the safety valve.

When designing the supply lines and blow-off lines for the safety valve, it is crucial to ensure they are appropriately sized and tailored to the specific operating conditions. Similar to before, the inlet and outlet pipelines should have diameters equal to or greater than those at the safety valve.

Additionally, it is essential to avoid any flushing devices that could obstruct the flow.

For materials that solidify when cooled, it is necessary to have a heating system that maintains the same viscosity as when the valve was sized.
In specific cases, safety valves require insulation packing. Usually, the bonnet and cooling zone (if present) are left without insulation to avoid excessive heat accumulation around the spring. This should be considered during the valve installation.

The maximum back pressure, maximum inlet pressure loss, and temperature should be considered. It is crucial to ensure the smooth and safe outflow of the substance through the outlet. Horizontal installation is only allowed with explicit consent from the manufacturer. Always make sure that the outlet adapter is facing downwards. Safety valves should not be disabled or obstructed. The release of overflow from the pilot valve into the atmosphere must always be possible. When working with hazardous substances, a separate risk assessment must be conducted.

To properly install the safety valves, ensure that the connections to the pipe lines are not subjected to excessive force or torque. The lines should be sized and installed in a

manner that enables them to withstand the anticipated static, dynamic (reactive forces), and thermal stress, considering the on-site operating conditions.

It is important to install the safety valves in a way that prevents the transfer of unacceptably high levels of static and thermal stress from the supply and discharge lines to the safety valve. Connecting pipes while the system operates should be done without applying force or torque.

Safety valves should be installed in a way that prevents excessive static and thermal stress from being transmitted to them from the supply and discharge lines. When connecting pipes, it is important to do so without applying force or torque.

Reaction forces during blow-off and temperature expansion, as well as during operation, need to be considered during installation. It is important to take into account any reaction forces occurring during blow-off and any temperature expansion during operation.

The blow-off lines should be installed in a way that optimizes the flow. Depending on their intended use, the blow-off lines should have different discharge directions. There are discharge lines for vapours or gases, as well as discharge lines for fluids.

For the discharge line handling vapours or gases, it should be installed in a way that ensures upward movement to guarantee safe discharge.

To effectively drain the discharge line, it should be attached with a downward slope towards the drainage opening at the lowest point. Proper drainage can only be achieved if the discharge line directly behind the safety valve slopes downward, allowing the medium to fully drain off. The discharge line should not have an upward slope immediately after the safety valve.

The drainage opening should be positioned at the lowest point of the discharge line. It should be adequately sized and easily accessible, allowing for monitoring if needed. Any escaping substances should be gathered, for example, through condensate collectors, collecting tanks, or filters.

If a drainage opening or control thread is directly placed on the safety valve or bonnet, it must be protected by safety guards to prevent moisture and dirt from entering.

It is important to adhere to the pressure and temperature limits of safety valves with bellows. Defective bellows can be identified when fluid escapes from the open bonnet or control thread in case of closed bonnets. It is essential to eliminate the danger posed by escaping fluid.

The open inspection hole allows for constant pressure equalization between the bonnet space and the surrounding environment. However, it can pose risks to the valve's functionality under certain conditions. These include moisture penetration, icing, the escape of critical substances, or the presence of insect nests. Appropriate preventive measures should be taken. With the involvement of the responsible monitoring organization, the operator can discuss the closure of the inspection hole on the bonnet using screw plugs or screws, if necessary.

The closure of the inspection hole is allowed only under the following conditions: it is permitted by applicable regulations and standards, there is no risk of excessive pressure buildup in the bonnet based on operating experience, regular maintenance, and inspection of the bonnet area; and there is a higher risk of bellows icing.

In pop action pilots, it is prohibited to close a connection equipped with a factory-mounted bug screen as it would compromise the valve's function. For critical substances, it is important to ensure that escaping process media can be safely drained off when not under pressure (only B).

Closed bonnets with bellows-type designs should be equipped with suitable means to depressurize or have permanent pressure monitoring.

If the system operates at temperatures above 60°C, the pressure tapping lines of the supplementary safety valves need to be as long as possible and include a water seal. The control cabinet and actuators should not be exposed to temperatures higher than 60°C (only C).

There is a risk of icing at temperatures below 2°C. For lower temperatures, it is necessary to heat the control cabinet and pressure tapping lines (only C).
Pressure tapping lines must not be blocked. Locking rails or seals should be used to prevent closures from becoming blocked (only C).
The control cabinet for the supplementary loading must be protected against dirt and kept closed. If it is not possible to prevent dirt, an encapsulated control cabinet must be used (only C).
When using a safety valve with a bursting disc, care must be taken to ensure that the upstream bursting disc does not render the safety valve ineffective. Structural measures should be implemented to prevent incorrect alignment of the bursting disc.

Bursting discs can only be used if they meet safety requirements. Evidence that the bursting discs open without fragmenting must be provided. THINKTANK offers approved safety valve and bursting disc assemblies. Please contact THINKTANK to determine if such assemblies are permissible. The area enclosed between the bursting disc and the safety valve plate must be depressurized or

pressure-monitored.

6.2 Safety Valve Installation

⚠ WARNING

Different installation steps are required depending on the system and type of safety valve. Only the essential installation steps are summarized and provided in the following handling instructions.

The handling instructions are intended as a general guide. For detailed instructions, refer to the maintenance instructions specific to the type of safety valve.

Always follow the instructions and specifications provided by the manufacturers of the seal and flange connections.

Safety valves subject to special cleaning requirements should only be removed from their packaging right before installation. When unpacking these valves, carefully inspect the packaging for any damage and ensure that the safety valve remains uncontaminated. During installation, it is crucial to meet the cleanliness requirements and prevent any contamination of the safety valve.

Prerequisites

1. Remove the protectors from the flanges, bonnet control threads, and closing plates for single pilots and packages.
2. Find the safety valve using the information on the type plate.
3. Visually inspect the system.
4. Check the connections to ensure they are properly sealed.
5. Flush the system to ensure no impurities or foreign objects have entered the safety valve.
6. If the safety valve does not have a test gag, perform a pressure test on the system using a blind flange or sealing plate.

Procedure

1. Make sure the safety valve is securely fastened.
2. If there are support brackets, ensure they are utilized.
3. Connect the supply and discharge lines using properly sized gaskets.
4. If needed, create a drainage system for the discharge line.
5. If needed, position a drainage opening at the lowest point of the discharge line.
6. Take off any securing devices from the safety valve.
7. The installation of the safety valve is now complete.

7 Start-Up

7.1 Starting up the System

WARNING

Safety valves should only be operated and maintained by appropriately trained personnel.

The start-up process varies depending on the
system and type of safety valve. In the following instructions, we have provided a summary of the essential steps for start-up. Please note that
these instructions serve as a general guide.

Prerequisites

» Ensure that the safety valve has been properly installed.

Procedure

1. Conduct a pressure test on safety valves using a test gag. The maximum hydrostatictest pressure should not exceed 1.5 times the rated pressure of the pressure chamber being tested. If you require a higher test pressure, please contact THINKTANK. It is important to determine the test pressure based on the cold differential test pressure, rather than the rated pressure PN, if conducting an additional load test with the help of a test gag.
2. Check the position of the venting lever.
3. Remove the test gag.
4. Secure the blow-off chamber.
5. Start the system slowly and gradually increase the pressure, but avoid reaching the set pressure.
6. To ensure safety, inspect the valves and connections for any leaks.

The system is currently operational..

8 Operation

8.1 General Information about Operation

WARNING

During operation, it is crucial to regularly check the functionality of the safety valve. To test the set pressure of pilot-operated safety valves, you have three options: the pilot lifting device, the main valve lifting device, or the pilot test connector (FTC). It is vital to ensure that the test connector is always accessible (only B).

To assess the operation of the safety valves, they need to be lifted. Safety valves can be vented when the operating pressure reaches 75% of the set pressure. The maintenance intervals should be followed based on the relevant regulations and rule groups. According to THINKTANK, it is recommended to service pilot safety valves annually. This can be done using either a lever or a screw. For lifting with a lever, simply pull it up. For lifting with a screw, turn the cap until the "open" mark is visible. After testing the valve to ensure smooth operation, return the lifting device to its initial position.

Depending on the fluid and operating conditions, the moving guide might damage the sealing surface, requiring servicing. In such cases, release the pressure and blow off the medium through the safety valve.

When cleaning safety valves that are already installed, they should be suitable for the specific cleaning process. Make sure not to exceed the pressure and temperature limits stated in the order during cleaning.

If the safety valve is leaking because of a damaged sealing surface, it needs to be serviced.

Vibration in the system and the pressure-driven flow of PTFE can cause components to become loose. Regularly check screw connections.

The maintenance intervals depend on the usage conditions. Therefore, it is important to establish separate maintenance intervals for all safety valves in consultation with the operator, the manufacturer, and the notified body. In some cases, the maintenance intervals may need to be shortened if corrosive, aggressive, or abrasive substances are being used, or if the safety valve opens frequently.

Inspect the supplementary loading system at least once a year since interfaces and soft seals may become sticky during blow-off.

Pilot-operated safety valves are not suitable for fluids that tend to cause sticking.

In cryogenic designs, the frequency of operation affects the soft gasket. Therefore, a careful selection and regular inspection are necessary.

The reservoir for preheated medium in the heat exchanger system is sufficient for three sequential operations. Any additional operations should only be performed after waiting for at least 30 minutes following the last operation to prevent thermal damage to the soft gasket. In general, it is advisable to examine the soft gasket after each blow-off procedure.

If the safety valve is leaking due to a damaged sealing surface, it needs to be serviced.

8.2 Checking the Operation of the Safety Valve

Different steps are required to test safety valves while they are in operation, and these steps may vary depending on the system and type of valve. The following instructions have been summarized to highlight the necessary steps.

Please note that these handling instructions are intended to provide a general understanding of the process and should not be considered exhaustive. For specific details, please consult the guides specific to each valve type.

For media being discharged at high speed, temperature, and noise levels, there are potential risks of injury and damage to hearing. It is important to follow these precautions:

- Wear protective equipment.
- Use ear protection.

Procedure:

1. Vent the safety valve.
2. If applicable, check the supplementary loading (only for C).
3. Release the medium.
4. Remove any deposits.
5. Verify that the movable guide surfaces or soft seals are not stuck.
6. Ensure the venting lever is easily accessible.
7. Verify the drainage operation.

» The safety valve inspection is now complete.

8.3 Safety Valve Inspection:

Different steps are necessary for testing during operation, which vary based on the system and type of safety valve. Only the crucial steps are summarized in the following handling instructions.

These handling instructions are intended to offer a general guide and are specifically applicable to pilot-operated safety valves (B). For more detailed information, please consult the maintenance instructions specific to your valve type.

To conduct a test during operation, different steps are necessary, depending on the type of valve. Please follow these instructions:

Procedure:

1. Inspect exterior pipelines for any signs of damage.
2. Check the screw connections.
3. Clean pressure tapping and control lines.
4. Inspect attachments for any signs of damage.
5. Check the clearance of the attachments.
6. Regularly clean the filter in front of the pilot.
7. Regularly clean additional filters.

» The safety valve inspection is now complete.

8.4 Service Life:

The service life of safety valves depends on various factors, including ambient conditions and the properties of the medium being used. Under favorable conditions, THINKTANK safety valves can last up to 5 years. To prolong the service life of the valves, it is essential to adhere strictly to the prescribed maintenance intervals and comply with the operating and maintenance instructions. We strongly recommend using only original THINKTANK parts and ensuring that all maintenance work is carried out by qualified personnel. Additionally, it is important to protect all valve components and materials from substances and ambient conditions that could potentially reduce their service life.

9. Decommissioning

All decommissioning tasks should be carried out by qualified personnel. Before removing the valve, make sure that the pressure vessel or pipeline system, to which the safety valve is connected, has been depressurized and is at ambient temperature.

To prevent any damage from escaping hazardous substances, drain and flush the system. Prior to opening the connections to the pipelines, ensure that the assembly is not under stress. When removing the safety valve from the plant, use appropriate lifting equipment, such as a crane. The lifting gear should be attached to the safety valve according to the instructions in chapter 5.2.

10. Maintenance

10.1 General Information about Maintenance:

Only trained personnel should perform maintenance on safety valves. Use only original spare parts from THINKTANK.

Improperly adjusted maintenance intervals and incorrect execution of maintenance tasks can endanger individuals and property.

Anyone who disassembles safety valves must be aware of the associated hazards.

If the valve is used in processes that require special cleaning procedures, it should be cleaned accordingly after servicing.

To perform maintenance work, the safety valve needs to be disassembled. Disassembly may be more challenging if the lubricants have been flushed out.

Before dismounting, release the pressure from the system.

Prior to disassembly, check if there is any medium present in the bonnet. If there is any leakage from the open bonnet or the drainage opening, it indicates a faulty bellows. Faulty bellows should be replaced immediately.

When disassembling the safety valve, inspect the bellows and replace it if any damage is detected.

Bellows have a limited number of load reversals. Replace the bellows once it has reached its maximum load reversals.

Regularly check the gaskets and gasket points. If the sealing requirements are no longer met, replace the gaskets. For operations with frequent opening cycles, THINKTANK recommends shortening the inspection interval for seals, soft gaskets, and bellows. Spare assemblies can be ordered from THINKTANK.

If you want to change the set pressure, you need to use the spring table to check if the spring is suitable. Make sure to use the correct spring for the desired set pressure.

Once the set pressure is changed, you must inspect the entire safety valve configuration.

To adjust the set pressure and replace the spring, you need to remove the seal. However, doing so will void the guarantee. It is recommended to make these changes at the factory, by an authorized workshop, or with the assistance of a notified body.

After adjusting the pilot-operated safety valve, there will be some residual test medium inside. The user should determine if the product is compatible with the fluid and take additional flushing measures if necessary.

For products with a ring clamp connection between the bonnet and housing, please follow these guidelines: When attaching the semi-rings to the bonnet/housing interface, use the appropriate securing devices and tightening torques as specified in LGS 3323.

Ring clamps are sealed before delivery. The seal serves as an indication that the connection should only be undone once the system is fully depressurized. The seal does not bear the manufacturer's mark and has a distinct color. It should only be broken if necessary for the proper operation, maintenance, or repair of the pressure equipment. Breaking the seal on a ring clamp does not require retesting or reapproval of the safety valve's pressure settings.

After maintenance, repair, or cleaning (COP), it is advisable to install a new seal.

10.2 Setting the Set Pressure

The disassembly process may vary depending on the system and type of safety valve. Here, we provide a summary of the essential steps in the handling instructions. It's important to note that these instructions are meant as a general guide and apply specifically to basic safety valves without special options. For detailed instructions, please refer to the type-specific guides.

WARNING

Leaking Medium

This poses a danger to both individuals and the environment. Follow these safety precautions:

- Adhere to safety protocols related to the medium.
- Collect the medium from the pipelines.
- Prevent unauthorized access to the hazardous area.

- Wear appropriate protective gear.

CAUTION

Spindle Not Protected Against Twisting

This could result in damage to the sealing surfaces. Take the following steps:

- Secure the spindle to prevent twisting.

Prerequisites

- Ensure that the system is not pressurized.
- There should be no media present in the bonnet of the safety valves.

Procedure

1. Break the seal.
2. Remove the lever cover.
3. Secure the spindle to prevent twisting.
4. Tighten the spring and adjust the pressure screw to the desired set pressure. Make sure to observe the acceptable range of spring adjustment during this process.

- Turning the pressure screw to the right increases the set pressure. This puts more tension on the spring.
- Turning the pressure screw to the left decreases the set pressure. This relieves tension on the spring.

5. Verify the set pressure.
6. Install the lever cover.
7. Arrange for the safety valve to be resealed by an authorized center.

The set pressure has now been adjusted accordingly.

10.3 Replacing the Spring

To disassemble the safety valve, the steps may vary depending on the system and type. Below, we provide a summary of the essential steps you should follow.

Please keep in mind that these instructions are a general guide and apply only to spring-loaded safety valves without any additional options (A). For specific details, refer to the type-specific guides.

WARNING

Dealing with Leaking Substance

Leaking substances pose risks to people and the environment. Follow these steps:

- Take appropriate safety precautions based on the substance involved.
- Collect the substance from the pipelines.
- Restrict access to the danger zone.
- Wear suitable protective gear.

WARNING

Handling a Spring Under Pressure

A spring under pressure can cause injuries from flying parts. Follow these guidelines:

- Follow the installation instructions for the safety valve.
- Wear protective gear.

WARNING

Avoid Inverting Springs

When disassembling the safety valve, do not turn the springs upside down.

CAUTION

Protecting the Spindle Against Twisting

To safeguard the spindle against twisting, do the following:

- Safeguard the spindle against twisting.
- Tighten the spring and adjust the pressure screw to the desired set pressure. Pay attention to the allowable range of spring adjustment.

Procedures (only A)

1. Break the seal.
2. Remove the lever cover.
3. Secure the spindle to prevent twisting.
4. Raise the pressure screw.
5. Remove the bonnet.
6. Take out the spring.

7. Remove the spindle along with the guide and disc.
8. Clean the seat, disc, and body.
9. Reinstall the spindle with the guide and disc.
10. Insert a new spring.
11. Put the bonnet back on.
12. Secure the spindle to prevent twisting.
13. Tighten the spring and adjust the pressure screw to the desired set pressure. Please note the permissible adjustment range of the spring:

- Turning the pressure screw to the right increases the set pressure, adding more tension to the spring.
- Turning the pressure screw to the left decreases the set pressure, relieving tension on the spring.

14. Verify the set pressure.
15. Install the lever cover.
16. Move the venting lever to the middle position to engage the lifting fork under the coupling.
17. Have the safety valve resealed by an authorized center.

» The spring has now been replaced.

11. Disposal

To decommission the valve, follow the instructions in chapter 9. If the safety valves have come into contact with potentially hazardous substances, they must be decontaminated before disposal. Dispose of the valve in compliance with applicable regulations.
Should you have any questions, Please do not hesitate to contact THINKTANK <marketing@cncontrolvalve.com>