

Safety With Valves

Installation, Operation & Maintenance Manual

Put Safety First

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INTRODUCTION

When installing and commissioning a valve it is important to follow safe working practices. This procedure gives details of safe working practices. It is important that any person who might have contact with the valve should be fully conversant with all plant safety procedures.

Anyone who has dealings with a valve should make themselves aware of what the valve is designed to do. Important points to consider are, type of fluid, pressure, temperature, thermal and mechanical pipe strains, hydraulic tests, water hammer, thermal shocks, corrosion, environmental conditions, etc.

All valves are hydraulically and functionally tested at the factory prior to shipment. The period between leaving the manufacturing plant and installation may involve substantial exposure to degradation due to impact, impingement or corrosion. Such degradation can adversely affect the performance of the valves when in service and can easily be avoided if simple guidelines are followed.

Reference should also be made to the particular valve Operating & Maintenance Manual.

PROTECTION

As a minimum all valves prior to shipment are dried, coated and fitted with protective measures, such as valve end port protection and are wrapped prior to shipment. Larger valves may have their own shipment cases. This protection should be left in place until immediately before the valve is to be fitted into the pipe.

STORAGE

Valves are often stored at the job site for an extended period before they are actually installed. Storage should be in the original delivery crates with any waterproof lining and/or desiccant remaining in place.

To avoid the possibility of any deterioration, storage should be off the ground in a clean, dry indoor environment. If the storage period extends over six months, any desiccant bags supplied in the original packaging should be replaced.

HANDLING

Appropriate care when handling valves should be given, roughness in handling may damage end connections or valve parts. Care should be taken to avoid damage to any type of protection. Valves that require handling by mechanical means should be slung or rigged carefully to avoid damage to exposed valve parts. **Instruments, levers, handwheels and stems should not be used as lifting or rigging points.**

INSTALLATION

Always remove all external and internal packaging together with any temporary protective material.

Always carefully inspect the valve to ensure that no damage has occurred in transit or during subsequent handling.

Always ensure that the valve is the correct type and size and that the identification markings show that the material and pressure/temperature rating is suitable for the service conditions.

Always read the installation instructions carefully and work to them.

Always ensure that the valve is lifted safely into position without damage to the valve.

Always ensure that the valve is installed in the vertical direction. Some valves can be installed in other orientations, but this should be discussed with the factory during order placement.

Always ensure that the valve is installed so that it can be safely operated and maintained without putting persons at risk. Make sure that a firm footing is provided for the person installing the valve with adequate space around the valve to meet operating and maintenance requirements. Also ensure that there is adequate ambient lighting for valve installation.

Always ensure that control devices and indicators are within easy reach and clearly visible from the normal operating position.

Always ensure adjoining pipework and connections are square, true and adequately

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supported to prevent the valve being subjected to stresses that could affect its performance.

Always ensure that the system into which the valve is to be installed is clean and free from any foreign matter.

Always take care that, where direction of flow is indicated, valves are installed the correct way around in the pipeline.

Always fit isolating valves and a bypass arrangement where a valve needs to be maintained whilst the plant is running.

Always ensure that fast moving valves which have a velocity greater than 1/2" (12mm) per second are guarded.

Never install a valve and actuator assembly in an application with a component speed faster than 1m/s in a hazardous environment. EN13463-4 details specific Inherent Safety requirements.

Always ensure that valves that operate at high or low temperatures are positioned or lagged to prevent personnel contacting surfaces which could cause injury.

Always on weld connections ensure that the welder has the exact material designations and is using an approved welding and heat treatment procedure. When welding, have a good earth return onto the valve body (not the superstructure). Have the valve in the open position for welding and heat treatment. Keep the temperature of the seats to a minimum within the temperature ratings of the valve.

Always ensure the valve is earthed when installed in the pipeline. If the valve is on flammable or hazardous duty an explosion could result from a static discharge from the valve components. To avoid this situation make sure the valve body is earthed to the pipeline prior to putting the valve into service.

Always before chemical cleaning flush the valve with water under a moderate pressure and operate the valve to allow the gland packing to be saturated with water to prevent the absorption of chemicals. When chemical cleaning, the valve should be in the half open position to create turbulence for best cleaning effect. Passivate, then flush with water. With water in the valve, operate it several times to flush away any chemicals that may have penetrated the gland packing. If the valves are not to be used immediately, use corrosion inhibitor in the water.

Never over pressurise the system when doing any hydraulic testing. Be aware of the maximum pressure rating of the valve.

Always ensure that all electrical and pneumatic connections are connected in line with approved site installation drawings.

Always make a functional test to ensure the valve and control system is working as intended. Ensure power supplies are safe and correct and that isolators are available to isolate the electric supply. During functional testing and setting, ensure that routine maintenance is carried out and take precautions to prevent any foreign matter finding its way through to the valve which may cause damage to the valve internals and inhibit good valve performance.

OPERATION

Always read the assembly and disassembly instructions and ensure that these are fully understood and carried out. Where manual operation is undertaken ensure that operators are fully trained to carry out their work.

Always check the handwheel or lever markings that show the direction of rotation to close the valve. If no such indication can be seen, positively establish that the valve closes in the conventional clockwise direction.

Never use wheel keys or wrenches to gain extra leverage when operating the valve.

Never delay in repairing a valve once it becomes obvious that something is wrong.

Never remove or tamper with guards fitted to the valve.

Never exceed the temperature ranges for the valve, actuator or instruments. Check the specific product literature for specific ambient and operating temperatures.

MAINTENANCE

Always read the assembly and disassembly instructions.

Always ensure that persons carrying out maintenance are fully trained to carry out their work. If in doubt about maintenance work the factory should be consulted.

Always ensure that the working area or platform area around the valve is stable, free from any obstruction and meets all requirements as a safe working area.

Always know the valve duty. If the valve has been in service with hazardous material, take the necessary precautions before and during maintenance operations.

Always check the external appearance of the valve, including paintwork or lagging, for signs of fault conditions. Special precautions may be needed - if in doubt seek guidance from a supervisor.

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Always isolate any power supplies, either electric or pneumatic and ensure pneumatic pipework is vented before carrying out any maintenance work.

Always check that the valve is at ambient pressure and temperature before carrying out any adjustments or dismantling. Pressure gauges must read zero before commencement. Any drain valve or vent valve in the adjacent piping must be open and not discharging. The vent or drain must not discharge for at least:-

- 5 minutes for valves up to and including 150mm (6") bore.
- 10 minutes for valves above 150mm up to and including 300mm (12") bore.
- 30 minutes for valves larger than 300mm (12") bore.

The valve should be operated through at least half its travel to ensure that there is no sound or any other indication of anything in the valve.

Always use correctly fitting tools. When special maintenance equipment is required to carry out a particular operation, make sure that this is used.

Always ensure that the tooling being used for maintenance work is appropriate to the area classification in which the valve is being maintained.

Always isolate any local and remote operating device (other than direct mounted handwheel or operating lever) before starting maintenance work. Valve designs which incorporate stored energy devices (e.g. springs) must be treated with special care.

Always purge or drain any pipes carrying gas or liquids which operate valves such as relay operated control valves, before commencing work on the valve.

Always ensure that the pipework on either side of the valve is fully and independently supported if it becomes necessary to remove the valve from its installed position. If a valve is removed, it may be necessary to blank off the pipe ends - **find out**.

Always ensure that the valve is adequately and safely lifted during all handling operations.

Always observe the appropriate site safety procedures if asbestos lagging is to be removed from the valve. Asbestos gland packing should be damped down with water, to prevent release of dust, both before and during removal and should be handled and disposed of in accordance with the appropriate site safety instructions.

Always examine all parts for wear, tear, erosion, corrosion and cracking when dismantling the valve and replace as appropriate.

Always use replacement parts supplied by the manufacturer and ensure that they are fitted in accordance with manufacturers instructions.

Always ensure that if heat is applied to any component to aid removal, it is replaced with a new part. This applies particularly to bolting

Always make sure that a visual inspection from a safe distance is carried out with the valve under pressure, before or during re-commissioning if maintenance work has involved the stripping down of pressure containing parts.

Always check the actuator spring on an annual basis. In hazardous areas the actuator spring is a store of energy. Check the spring for signs of corrosion or failure and replace if necessary.

Always check the area classification into which the valve is placed before starting to work on the valve. Valves are manufactured from steel. Depending upon the grade of steel used, impacts could cause a spark. Refer to EN1127-1 for instructions on appropriate tooling.

Always check and adjust packed glands periodically to prevent leakage. Do not adjust or repack glands under pressure.

Never over tighten glands as valve operation may be affected. Tighten glands evenly to avoid scoring of the valve spindle.

Never tighten glands unevenly - scoring of the valve spindle may result.

Never re-pack valve glands under pressure unless the operating & maintenance instructions specially cover this feature.

PREVENTATIVE MAINTENANCE

The valve is a sensitive instrument with several moving parts. It can also be subject to hazardous conditions in terms of pressures and temperatures. As such it is important that a valve maintenance program be established. The valve should be checked periodically, at least every six months, to establish if it is performing satisfactorily. When performing any checks on a valve follow safety procedures.

The following checks should be performed:-

Check for any signs of gasket leakage, either in the area of the bonnet bottom flange (if fitted) or valve flanges. Replace gaskets or tighten flange bolting as necessary.

Check for gland leakage. First ensure that the process medium is not hazardous, if so take any necessary precautions.

Check that wire lock seals, where fitted, are secure and no other damage has occurred.

Caution: finger tightening of valve packings should be sufficient. Overtightening can cause excessive friction or packing box wear.

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Check that the valve and actuator is supplied with lubricant. See the relevant instruction books for details.

Check for external corrosion of the valve. If the valve has started to corrode then the corroded areas should be cleaned and re-painted.

Check the valve for any damage which may be caused by corrosive fumes or process dripping.

Check that the valve strokes smoothly. If jerky motion is experienced this could indicate internal problems.

Check that all clamp nuts, screws, bolts etc are tight.

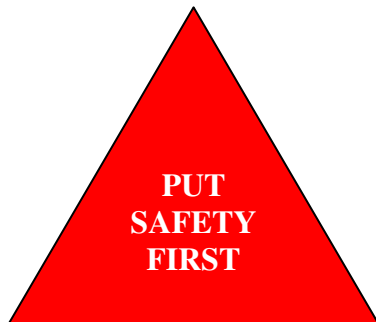
Check the actuator for any air leakage. Spray a soap solution around the actuator cylinder and watch for signs of any soap bubbles.

Check to ensure the plug stem is clean. Any dirt could have an effect on the gland packings.

Check that the instruments appear to be functioning correctly. Where necessary drain or clean any filters.

Check that the valve moves, if practical, by operating levers, handwheels, air supplies, etc.

Check all air connections are tight.



Users should refer also to BS6683 'Guide to Installation and Use of Valves'

Published in the interests of safety at work. However, this is not an exhaustive list, and site conditions and practices must also be taken into account.