# Engineering Data Sheet

Installation, Operation & Maintenance Instructions for
731 Cast Iron Globe Valves

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## CE MARKING AND THE PRESSURE EQUIPMENT DIRECTIVE 97/23/EC

This has been implemented in United Kingdom law by the Pressure Equipment Regulations 1999 (SI 1999/2001).

The regulations apply to all valves with a maximum allowable pressure greater than 0.5 bar. Valves with a maximum allowable pressure not exceeding 0.5 bar are outside the scope of the Directive. Valves are categorised in accordance with the maximum working pressure, size and ascending level of hazard, which is dependent on the fluid being transported. Fluids are classified as Group 1, dangerous fluids or Group 2, all other fluids including steam. Categories are SEP (sound engineering practice) and for ascending levels of hazard, I, II, III or IV. All valves designated as SEP do not bear the CE mark nor require a Declaration of Conformity. Categories I, II, III or IV carry the CE mark and require a Declaration of Conformity (Note- all valves up to and including 25mm (1") having a maximum allowable pressure greater than 0.5 bar are designated SEP regardless of fluid group.)

## CE MARKING AND THE ATEX Directive 94/9/EC

**Concerning equipment and protection systems intended for use in potentially explosive atmospheres.**

This has been implemented in United Kingdom law by the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 (SI 1996/192) and amended by The Equipment and Protective Systems (amendment) Regulations 2001 (SI 2001/3766).

The regulations apply to all valves where each valve:

- has its own potential source of ignition.
- operates in a potentially explosive atmosphere created by:
    - the presence of air / dust mixtures external to the valve.
    - the presence of gases, vapours, mists released from the valve through leakage.

The regulations will not apply to a valve without a potential source of ignition, which operates in a dust free environment and the fluid being transported is cold, inert gas or non-flammable liquid.
The requisite level of protection for valves not exempt from the regulations is defined as Group II category 2 and shall bear the following marking:


**II 2 G/D**

## PRODUCT LIFE CYCLE

The life of the valve is dependent on its application, frequency of use and freedom from misuse. Compatibility with the system into which it is installed must be considered. The properties of the fluid being transported such as pressure, temperature and the nature of the fluid must be taken into account to minimise or avoid premature failure or non-operability. A well-designed system will take into consideration all the factors considered in the valve design, but additionally electrolytic interaction between dissimilar metals in the valve and the system must be examined. Before commissioning a system, it should be flushed to eliminate debris and chemically cleaned as appropriate to eliminate contamination, all of which will prolong the life of the valve.

## LIMITS OF USE

The valves to which these installation, operation and maintenance instructions apply have been;

a) categorised in accordance with the Pressure Equipment Directive.
b) designated with the requisite level of protection in the ATEX Directive as Group II Category 2 equipment.

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**The fluid to be transported is limited to Group 2 gases i.e. non-hazardous and on no account must these valves be used on any Group 1gases or Group 1 liquids.**

**These valves may be used on Group 2 liquids**

| Fluid | Group 2 Gas | | |
|---|---|---|---|
| Fig No. | Rating | DN | Category |
| 731 | PN16 | 50<br>65-200<br>250-300 | SEP<br>I *<br>II* |
| | ANSI 125 | 2" - 2½"<br>3" - 10"<br>12" | SEP<br>I*<br>II* |

* Categories I and II require CE mark

**Operating pressures and temperatures**

| Pressure Rating | Non-shock pressure at temperature range | Non-shock pressure at max. temperature |
|---|---|---|
| PN16 | 16 bar from –10°C to 120°C # | 11.8 bar at 230°C # |
| ANSI 125 | 11.8bar from –10°C to 66°C # | 9 bar at 218°C # |

Not suitable for fatigue loading, creep conditions, fire testing, fire hazard environment, corrosive or erosive service, transporting fluids with abrasive solids, high velocity gases that can cause shock waves.

# The maximum surface temperature under normal use is given in the table. The temperature of a surrounding potentially explosive atmosphere at which ignition could result must exceed the equipment surface temperature by 25% (BS EN 1127-1 clause 6.4.2).

The operating pressures and temperatures given in the table above do not take into account the mechanical difficulty of closing large globe valves against high differential pressures.

The maximum differential pressures the valves will close and isolate against are;

| Size | DN50 to DN150 | DN200 | DN250 | DN300 |
|---|---|---|---|---|
| Pressure bar | 16 | 14 | 9 | 6 |

**PRESSURE/TEMPERATURE RATING**

These valves must be installed in a piping system where the normal pressure and temperature do not exceed this rating.

If system testing will subject the valve to pressures in excess of the working pressure rating, this should be within the test pressure for the body with the valve open.

The maximum allowable pressure in valves as specified in the standards is for non-shock conditions. Water hammer and impact for example, should be avoided.

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If the limits of use specified in these instructions are exceeded or if the valve is used on applications for which it was not designed, a potential hazard could result.

## LAYOUT AND SITING

Conventionally, the valves are installed in horizontal pipework. This is however not a constraint and Fig 731 may be mounted in vertical or inclined pipework, inverted or rotated to clear walls, ceilings and other restrictions.

It should be considered at the design stage where valves will be located to give access for operation, adjustment, maintenance and repair.

Heavy valves may need independent support or anchorage.

In the interests of safety, valves installed on end-of-line service in the closed position with infrequent opening should be fitted with a locking device on the operating mechanism. Alternatively, it should be fitted with a blanking flange on the downstream flange of the valve.

## INSTALLATION

Prior to installation, a check of the identification plate and body marking must be made to ensure that the correct valve is being installed. Any electrical component e.g. actuators, limit switches must be explosion proof and comply with the Directive and Standards as listed in BS EN 1127-1 clause 6.4.5.

Valves are precision manufactured items and as such, should not be subjected to misuse such as careless handling, allowing dirt to enter the valve through the end ports, lack of cleaning both valve and system before operation and excessive force during bolting and handwheel operation.

All special packaging material must be removed.

Valves must be provided with adequate support. Adjoining pipework must be supported to avoid the imposition of pipeline strains on the valve body, which would impair its performance.

When large valves are provided with lifting lugs or eye nuts, these should be used to lift the valve.

Valves should not be lifted using the handwheel or stem.

Immediately prior to valve installation, the pipework to which the valve is to be fastened should be checked for cleanliness and freedom from debris.

Valve end protectors should only be permanently removed immediately before installation. The valve interior should be inspected through the end ports to determine whether it is clean and free from foreign matter.

The mating flange (both valve and pipework flanges) should be checked for correct gasket contact face, surface finish and condition. If a condition is found which might cause leakage, no attempt to assemble should be made until the condition has been corrected.

The gasket should be suitable for operation conditions or maximum pressure/temperature ratings.

The gaskets should be checked to ensure freedom from defects or damage.

Care should be taken to provide correct alignment of the flanges being assembled. Suitable lubricant on bolt threads should be used. In assembly, bolts are tightened sequentially to make the initial contact of flanges and

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gaskets flat and parallel followed by gradual and uniform tightening in an opposite bolting sequence to avoid bending one flange relative to the other, particularly on flanges with raised faces.

Parallel alignment of flanges is especially important when installing a valve into an existing system.

Flanged joints depend on compressive deformation of the gasket material between the flange surfaces.

The bolting must be checked for correct size, length, material and that all connection flange bolt holes are utilized.

At the conclusion of installation and before operating, all dust deposits shall be removed from the equipment.

## OPERATING

The valve is opened by anti-clockwise rotation of the handwheel to a positive stop. Further effort is not necessary. When fully open it is advantageous to rotate the handwheel clockwise 1/2 turn.

To close the valve, the handwheel is rotated clockwise to a positive stop.

Wheelkeys or other similar devices should not be used.

**Note:** The operator should use suitable hand protection at extreme temperature conditions.

## MAINTENANCE

The valve should be at zero pressure and ambient temperature prior to any maintenance.

Maintenance Engineers & Operators are reminded to use correct fitting tools and equipment, as follows:

Valves within the scope of the ATEX Directive with a protection level defined as Group II category 2 will operate in Zone 2 (gases / vapours) or Zone 22 (dusts) designated in BS EN 1127-1 Explosion prevention and protection. Tools are either 'single spark' e.g. screwdriver, spanner, impact screwdriver or 'shower of sparks' e.g. sawing or grinding. Only steel 'single spark' tools are permissible in Zones 2 and 22.
Tools causing showers of sparks are only permissible if:

- no hazardous explosive atmosphere is present.
- dust deposits have been removed.
- the workplace is kept as wet as that dust cannot be dispersed in the air nor that any smouldering process can develop.

The use of tools on equipment in Zones 2 and 22 should be subject to a 'permit to work' system.

A full risk assessment and methodology statement must be compiled prior to any maintenance. This must include the removal of dust deposits.

The risk assessment must take into account the possibility of the limits of use being exceeded whereby a potential hazard could result.

A maintenance programme should therefore include checks on the development of unforeseen conditions, which could lead to failure.

In systems where corrosion could be a potential hazard, wall thickness checks on the body and bonnet should be made. This requires either the removal of the valve from the pipeline or removal of the bonnet with the system at zero pressure. If the wall thickness has reduced by 25%, the valve must be replaced.

The Fig 731 does not require any routine maintenance.

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The stem seal is the only item that may require attention. This will generally only be an adjustment or fitting additional packing. Very occasionally the gland may need to be repacked completely.

**Gland Adjustment**

Carefully tighten the gland nuts, a part turn at a time, alternating from one to the other.

**Note:-** Do not overtighten as this could result in a broken gland flange.

**Fitting Additional Packing**

The globe valve contains graphite rings. If during service the valve requires additional packing fitting, follow the steps listed below.

It is recommended that the valve be at zero pressure and ambient temperature before work commences.

Care must be taken when releasing the gland and if leakage occurs isolate the valve from the system and drain before carrying out gland maintenance.

1. Operate valve fully open (anti-clockwise) onto back seat face (positive stop).

2. Loosen and remove both gland nuts and lift the gland follower plate.

3. With a screwdriver or suitable tool lift the cast iron packing retainer up the stem, a groove has been machined in retainer to facilitate removal.

4. Several layers of a pure graphite tape should be wrapped around the valve stem and pressed into the stuffing box using the packing retainer and then gland follower plate re-tensioning. This operation will need to be carried out 2 to 3 times until sufficient packing has filled the stuffing box.

5. Re-fit the packing retainer and gland, tighten gland nuts evenly and intermittently rotate handwheel to confirm packing resistance.

**BONNET GASKET OR GLAND PACKING REPLACEMENT**

**Replacing Bonnet Gasket**

During this maintenance exercise the bonnet sub-assembly needs to be removed from the valve, necessitating a complete valve isolation and system drain.

1. Operate valve to mid-position.

2. Loosen and remove series of nuts from bonnet body flange (anti-clockwise).

3. Operate valve to closed position (clockwise rotation of handwheel) when closed, operate the valve further 1/2 to 1 turn, this will break the bonnet joint.

4. Open the valve to mid-position (anti-clockwise rotation of handwheel).

5. The complete bonnet sub-assembly including the valve disk can then be lifted off the valve body. It may be convenient to mark the body and bonnet to ensure correct positioning in re-assembly.

6. Remove and discard old gasket.

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7. Clean mating joint surfaces and fit new gasket.

8. Re-fit the bonnet sub-assembly and nuts and tighten diagonally and evenly.

**Replacement of Gland Packing**

During this maintenance exercise the bonnet sub-assembly needs to be removed from the valve, necessitating a complete valve isolation and system drain.

1. Remove bonnet sub-assembly as described in 1 – 5 'Replacing Bonnet Gasket'.

2. Remove the handwheel nut and loosen both gland nuts. Rotate stem manually clockwise (as viewed from the top) until the thread section fully disengages from the yoke bush.

3. Remove the handwheel and withdraw the disk/stem sub-assembly from the bonnet. Remove gland nuts and gland.

4. With a screwdriver or suitable tool remove the cast iron packing retainer, a groove has been machined in retainer to facilitate withdrawal.

5. With a screwdriver, pry out the existing packing.

6. Ensure the stuffing box and stem, are thoroughly cleaned before fitting the new packing rings and packing retainer. Re-fit the gland and nuts finger tight only.

7. Ensure the valve stem is clean and free from damage.

8. Carefully insert the stem into the bonnet, extreme care should be taken and it is advisable to rotate the stem or bonnet whilst the threaded section of the stem passes through the packing rings to prevent damage to new packing.

9. Engage the stem thread into the yoke bush and turn anti-clockwise (as viewed from the top), continue turning the stem to enable the handwheel to be fitted.

10. Re-fit handwheel and tighten nut and operate to the fully open position.

11. Replace bonnet gasket and bonnet sub-assembly (as described in 6 – 9 replacing bonnet gasket).

12. Tighten gland nuts evenly and intermittently rotate handwheel to confirm gland-packing resistance.

For the supply of genuine Hattersley spares or technical assistance contact:

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