B.F.E. S.p.A.

BONNEY FORGE
VALVE LICENSEE

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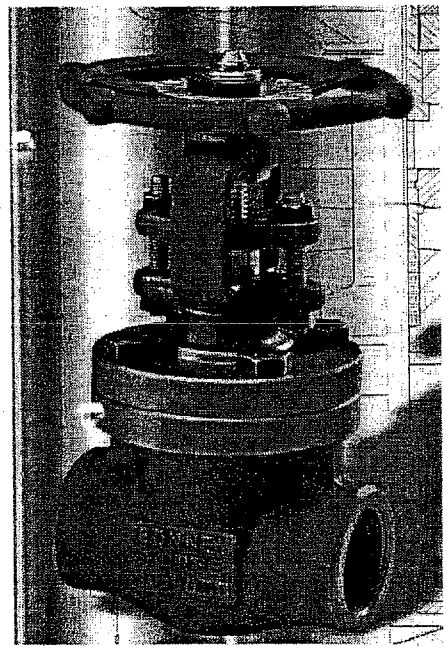
USER'S MANUAL

for INSTALLATION,

USE and MAINTENANCE



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INDEX

1.0 - GENERAL DESCRIPTION.

1.1 - FUNTIONAL DESCRIPTION AND PURPOSE.

Choosing the correct valve for a particular operation or service is very important, however attention must also be directed toward proper installation, operation and maintenance.
The type of valves discussed here in are:

A - Gate valves; which should be used either in the fully open or fully closed position.
B - Globe valves; which may be used for throttling control as well as on-off service.
C - Self-actuated Check valves.

With proper care and regular maintenance you can expect long life and good performance from B.F.E. valves. It is important to note that maintenance and repairs are sometimes needed and can be performed in the field. If major repairs become necessary, it is recommended that the valve be returned to the factory for inspection and possible re-work.

1.2 – CATALOGUE.

A copy of our catalogue is available on application.

2.0 - TECHNICAL DATA.

Main technical data are marked on valve nameplate. For further information go through this manual or contact B.F.E.

3.0 - INSTALLATION AND MAINTENANCE.

3.1 – INSTALLATION.

Preliminary consideration for installation:
- use experienced trained personnel.
- observe all standard safety precaution.
- always use proper tools.

3.1.1 - VALVE CONNECTION TYPE.

Depending on valve end configuration, four (4) basic installation procedure are used:
- SOCKET WELDS in accordance with ANSI B16.11
- BUTT WELDS in accordance with ANSI B16.25
- SCREWED ENDS in accordance with ANSI B1.20.1 (NPT) female
- FLANGED ENDS in accordance with ANSI B16.5

Valves supplied by B.F.E. Spa are manufactured using forged steel bodies and bonnets of carbon, alloy or stainless steel material.
These types of materials have excellent welding properties, which allow the valves to be fitted in line by welding.
Valves having threaded ends are also suitable for subsequent seal welding should be needed for sealing purposes.

3.1.1.1 - BUTT WELDING OR SOCKET WELDING ENDS.

Proper welding is required to ensure a pressure tight seat and to retain their ability to withstand stress. Remember that the valve, pipe and weld root must be of compatible materials and the welding be performed by a properly trained welder and approved weld procedures and qualifications.

Be sure to leave 1/16" gap between the end of the pipe and bottom of the valve socket. This will allow for expansion of the materials as it is welded, since the valve body is compact and has only a short distance from end to end, any extended welding time could cause excessive heat build up on the valve seat area which could cause damage such as loosening of the seat rings, surface distortion etc.

To avoid this problem, we suggest allowing the part to cool after each pass of the weld and alternate welding passes from one valve to the next. For alloy steel valves or when welding specification or service conditions require PWHT, the valve may be ordered with pipe nipples already welded and heat treated in the factory before valve assembly. The specified PWHT can then be performed in line without affecting the valve. When welding the valve directly in the line make sure the valve is close position. Shortly after welding, open and close the valve to check for proper operation to make sure no binding has occurred due to welding heat.

3.1.1.2 - SCREWED ENDS.

Care must also be taken in installing these types of valves. First inspect all threads before assembly and use a pipe thread compound. Always apply threading compound to pipe threads, never to valve threads. Excess compound on pipe threads will be pushed out of the valve allowing removal whereas excess compound on valve threads will be pushed into the valve where it will be difficult to remove. When installing thread ends valves, do not turn the valve by applying force to the bonnet, yoke or handwheel. Proper spanner or wrench should be used, one engaging the valve and the other engaging the corresponding pipe.

3.1.1.3 - FLANGED ENDS.

Make sure that two like flanges are being fitted together. Usually the proper set-up is either plain face to plain face or raised face to raised face flange. Tighten the flange bolts in a crossover patter as follows:

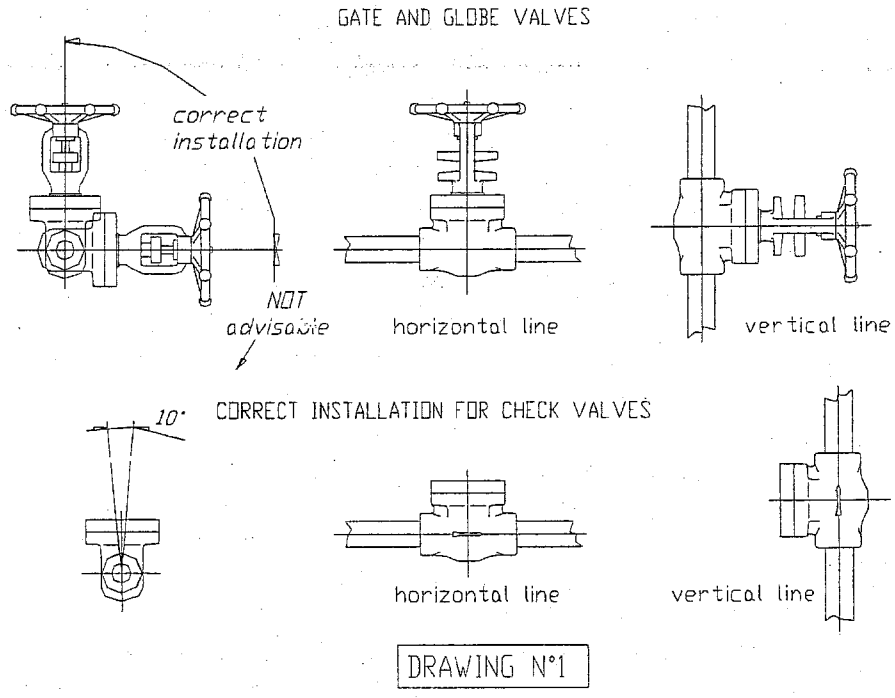
A -Slightly torque all bolts using a crossover bolt sequence. Bolts should be tightened evenly to prevent cocking of the flange and uneven gasket loading.

B -Repeat step 'A' using additional torque until all bolts are tightened properly
This may require several re-torque since as one bolt is torqued it will relieve stress on the adjacent bolts.

C -On high pressure. High temperature applications, it is recommended that the bolts be retightened after 24 hours of operation to compensate for any relaxation or creep that may have occurred.

3.1.2 - VAL VE POSITIONING (ref. to dwg n°1).

Positioning the valve in the pipe run is very important. Prior to actual installation, check for clearance around the valve to ensure adequate room for proper operation. Also keep in mind the need for clearance for future maintenance and repair. Once proper positioning and clearance have been assured the system should be cleaned of all foreign matter. Whenever possible, blow out the pipeline with water to remove grit and dirt. Also be sure to remove the valve end protectors and again check the valve for cleanliness



3.1.2.1 - CHECK VALVES.

These valves must be fitted in horizontal pipe runs with the cover facing vertically upward. Variance to either side of the vertical axis must not exceed 5 degrees. Swing check valves and spring loaded check valve design allow for additional position, such as vertical upwards flow. Valves must not be installed in vertical downward flow pipe runs or in horizontal pipe runs with the cover not in vertical up position. Always install valves in the direction indicated by the flow arrow stamped on the body. Stop check valves should be fitted similarly to check valves.

3.1.2.2 - GATE AND GLOBE VALVES.

Gate and globe valves should be installed with the stem in an upward position on horizontal lines. However, an alternate stem position is at an angle between the vertical and horizontal axis that will allows for complete drainage. If installed with the stem below the horizontal axis, complete drainage is not possible and solids may accumulate in the valve bonnet, which will greatly affect the valve operation and service life. A gate valve can be installed in line with disregard to flow direction. Globe valves can also operate in either direction of flow but it is recommended that the pressure always acts under the disc.

3.1.2.3 - PURGING AND TESTING OF LINE.

Once the valve is in line, open the valve and flush or blow out the line again to remove any dirt or foreign objects that may have collected during installation. Check for tightness of body/bonnet bolts and for proper packing gland adjustment. Operate the valve to make sure of proper operation. Pressure test the valve to ensure the integrity of all joints.

3.2 - MAINTENANCE ISTRUCTION.

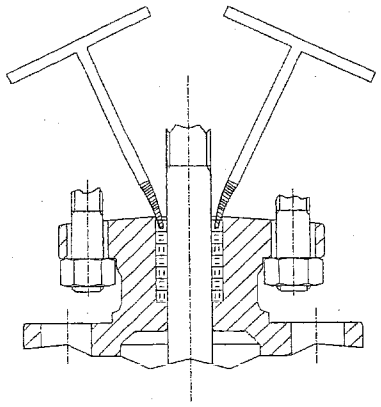
Valves are normally shipped from the manufacturing plant with adequate protection for indoor storage for up three months. This protection consists of a rust preventative and plastic valve end protectors. The valves are shipped in the closed position to protect the seat surfaces during transportation. Upon receipt, the valves should be inspected for shipping damage. If the end protectors are removed for inspection purpose, be sure to re-install them to maintain internal cleanliness. If caps are missing, an inspection of the valve cavity is required. All foreign matter must be removed.

If cleaning of the valve is required care must be token as to the type of solvents used, particularly if the valve is to be connected to the line by welding. The maintenance and repair of B.F.E. valves is usually limited to the adjustment of the packing gland and the lubrication of yoke sleeve as previously stated. Should you require other repairs the following information should be used as a guide in your repairs:

3.2.1 – STEM PAKING.

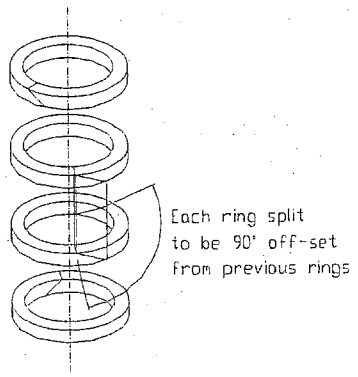
If the gland has run out of travel or excessive tightening does not stop the leakage, isolate and de-pressurize the valve for repacking. The valve need not be taken out of line for simple repacking, however, repacking is not recommended while the valve is in service.
To extract packing, remove the gland nuts and studs, lift the gland flange and gland out of the stuffing box. Remove old packing, use an extractor tool of the correct size (see dwg n^{0}2). Any remains of old packing must be removed from the stuffing box and the stem. Clean the stem and stuffing box and examine it for damage. Install new packing rings, one at a time, with the diagonal cut in each ring 90 degree away from the cut in the ring previously installed. (see dwg n^{0}3).

Extraction of packing



DRAWING N°2

Position of packing rings



DRAWING N° 3

Each ring should be firmly compressed into position before the next ring is added. Rings should fit snugly into the stuffing box. Install the gland and the gland flange and secure with the gland nuts, tighten the nuts uniformly and only to the extent needed to prevent leakage.
When graphite packing is to be installed, their replacement may be made by cutting the preformed rings in two halves, or by a single cut and carefully open the ring to allow its insertion into the stuffing box.
Procedure to insert is then the same as stated for normal packing.

3.2.2 – BODY/BONNET DISASSEMBLY - TORQUE VALUES FOR BOLTS.

Complete disassembly procedures are listed below. However, it is recommended that disassembly be limited only to the extent required to carry out repairs.

1 - Isolate and de-pressurize the system and operate the valve to its full open position.
2 - Match mark the body and bonnet, the wedge and body to maintain their relation upon reassemble.
3 - Remove the body bolts and lift up the entire bonnet assembly, taking care not to damage the wedge.

To avoid bolts over stressing in valve reassemble the following chart indicates the maximum values allowed far each size. Valves shown are mainly referred to joints using spiral wound gaskets and including valves of 150-300-600-800 and 1500 lbs ratings. (the same valves may be used on bonnets with ring joint gaskets).

To guarantee a perfect tightness the gasket must be compressed to an established amount. For this reason, the depth of female groove on to the body, the height of raised face on to the bonnet and thickness of gasket itself must be kept within close tolerance to obtain the required gasket compression once the two mating flanges come into contact.

Great importance is given to gasket construction, especially for the tension applied to metal strip in coiling operation.

Once the two flanges become in contact, a sudden increase of torque force is perceived. No further torque is then required, even if the value is lower than the one listed on the chart. If the joint is leaking, a re-check of gasket contact surfaces and the gasket itself has to be made. Maximum torque allowed for bolted bolting (values shown are referred to un-lubricated cap screws).

BOLT	METRIC	10	12	14	16	20
SIZE	UNC	3/8"	1/2"	9/16"	5/8"	3/4"
TORQUE	B7	60 to 70	80 to 90	140 to 160	220 to 250	300 to 350
N/m	B7M-B8-B8M	45 to 50	60 to 70	100 to 120	160 to 180	220 to 260

3.2.3 - GASKET REPLACEMENT.

Examine the gasket-seating surface of the body and the bonnet for evidence of wear damage or deterioration. Discard the old gasket. Replace or repair all damaged parts, then clean seating surfaces to remove all rust, gasket residue and other debris. Next polish gasket-seating surfaces using a fine emery cloth. Remove any radial scratches or other damage, taking care that the emery cloth does not remain in the valve. A radial scratch across the seating surface may allow for a leakage path. To affect a good seat, the gasket-seating surface must be flat and should have a finish between 1,6 and 3,2 Ra μm. Again, clean the surface to remove all polishing residue. Install a new gasket and reassemble the valve. No gasket-sealing compound should be used when installing the gasket. Care should be taken to insure that the wedge does not contact the seats during reassemble and bolt tightening. Re-tighten the bolts as previously stated in paragraph 3.2.2.

3.2.4 - SEATING ON GATE VALVES.

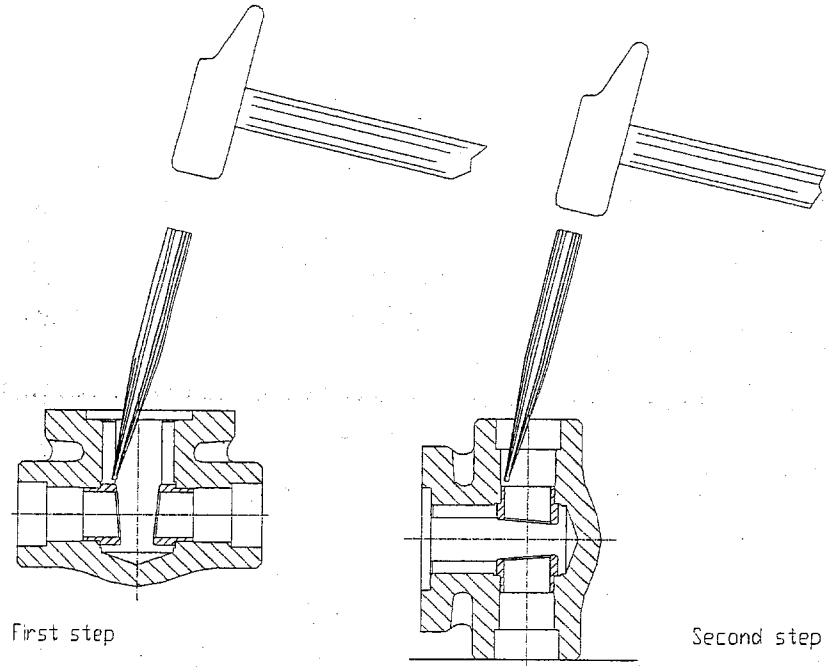
The valve and seat ring design and the method of seat ring installation are such that the valve must be removed from the line when seat ring replacement is necessary. Therefore, we recommend that the valve be replaced or returned to the factory for seat replacement.

3.2.4.1 - REPAIR, REMOVAL AND INSTALLATION.

Seat rings for gate valves in sizes 1" and larger, if not too badly damaged, may be repaired in the body by lapping. Smaller size valves con be repaired but with great difficulty, therefore, we recommended the installation of new seats.
The seats can be lapped in the body, using a flat lapping plate 1/4" thick with the OD 1/16" larger than that of the seat and having a 1/4" high boss on one side 1/32" small in diameter than ID of seat. The plate must have a square hole in he centre for attachment to a square end tool. Make a square tool of suitable size and length with one end to fit a brace and the other end attached to the plate. Valve seats can then be hand lapped by using a grinding compound. Wedges can be lapped on any surface plate but care should be taken to maintain the correct wedge angle. As noted previously, we recommend that the valves be replaced or returned to the factory for seat ring replacement. However, the following instructions are issued to aid in any attempts of seat replacement in the field.

3.2.4.1A - SEAT REMOVAL.

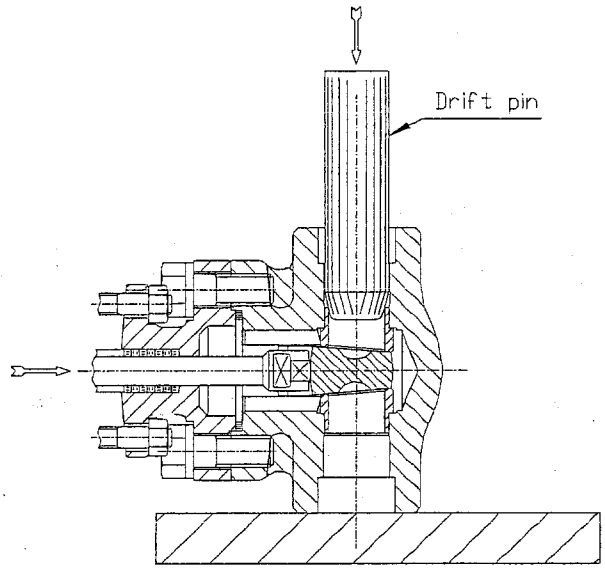
The seats may be removed as illustrated in dwg n°4. The seats are collapsed with a blunt chisel. The chisel is then inserted through the end of the valve end the seat driven out of the socket and removed through the bonnet operating in he valve.



DRAWING N°4

3.2.4.1B - SEAT INSTALLATION.

Drawing number 5 shows the drift pin method used to expand the seats into place. Before placing the seats in the valve body be sure that all surfaces on body and seats are clean and free of all burrs, scale and foreign matter.
The seats are then placed in the body through the bonnet opening with the top or narrow part in the centre and in line with the run of the valve. They should have just sufficient clearance to run freely in the body. A small amount of grease may be applied to the seat to aid in holding the set in place. The wedge is now placed in the body sing a false or dummy stem. Line up the seats with the wedge by using a rocking motion of the stem. Be sure the seats and wedge are in perfect alignment and the stem is in the center of bonnet opening. Tap the stem lightly to force the wedge into sealing position, it is ready for trial impression. This is accomplished by using a lead mallet and driving the wedge in sufficiently tight to form a light impression on the seats of the wedge.
Remove the wedge, and if a uniform impression is obtained all around on both sides of the wedge. The valve is ready for final assembly. Do not move the seats after trial impression is made.
Assemble valve complete with packing, the close valve, forcing wedge into closed position. Valve is now ready for expanding of the seat skirt.



DRAWING N°5

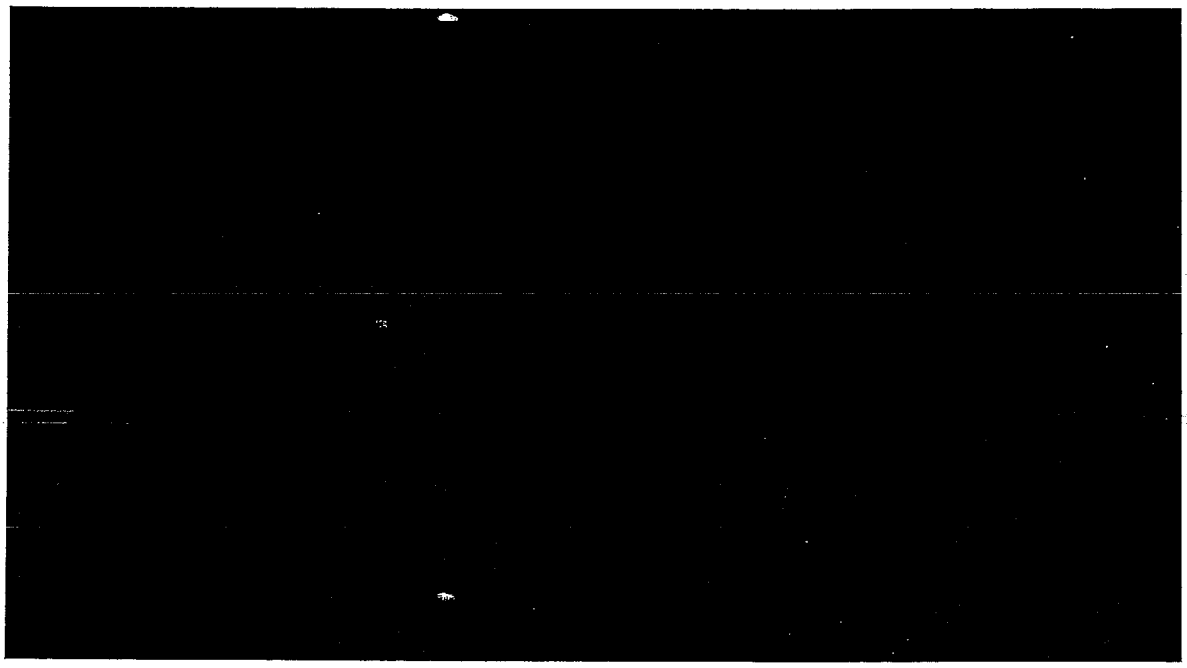
When using a drift pin as illustrated in dwg n°5, place valve on solid foundation, lubricate the point of contact with the drift pin to prevent galling of seat skirt, and drive the drift in until the seat skirt is fully expanded and tight against the body. Reverse valve and expand the other seat being careful not to over expand. Loosen wedge to check work and if seats are properly expanded the valve is ready for testing.

3.2.5 – SEATING ON GLOBE AND CHECK VALVES.

These items are available with either threaded-in seat rings or an integral seat both of which may be repaired (or for threaded in seats, replaced) white the valve is in line.

3.2.5.1 - REPAIR.

Prior to lapping the disc of the globe valves may require refinishing.
When defects are found on the stem/disc assembly-seating surface, it becomes convenient to place the stem/disc assembly into a lathe spindle and check the disc diameter, without taking the assembly apart. Hold the disc using a 3-jaw chuck so that large 0D and seating surface run true. Grind the seating surface using a tool grinder. Machine only deep enough to clean the surface. Then polish the seating surface with a fine emery cloth. Retain the original shape of the disc.
When surface damage is minor, the seats may be repaired by a lapping operation by placing a small quantity of lapping compound between the seat and the disc surfaces.
It is important that not too much pressure be applied to the disc and seat. With the lapping compound in place, between the mating surface, the disc should be reciprocally rotated, the strokes should be light and the disc should be lifted frequently and turned to a new position, circularly around the valve body, so the lapping will take place over a new area. Continue lapping until all defects are removed, and then final finish with a fine compound. It is recommended that the face of the disc be blued to check for contact of seating surface after final lapping. The globe valve stem/disc assembly may be used in the lapping operation. However, due to its loose disc design, it is necessary to prevent the disc from rotating on the stem. This can be accomplished by preparing a fixture as show in dwg n° 6.



The valve handwheel con then be re-attached to the stem and used as a convenient handle when re-lapping the seats.
Globe and piston check valves require a fixture to maintain alignment during the lapping operation. This fixture can be mode to fit into the gasket area of the body.
The section of the fixture extending into the body is to be made 1/64" less then the body bore. A hole in the centre of the fixture is required for the stem. This hole should be 1/64" larger then the shank of the stem or OD of spacer (see dwg n°6). On ball check valves the rolling action of the ball retains seating surfaces in good condition until ball size or ball guide is worn and replacement parts needed. Valves having renewable (threaded-in) seats may have the seat ring replaced while the valve is in line. The inside area of the seat ring has a hexagonal shape, except needle type valve which have a cross-slotted head seat ring and a circular inside area. In the first case a hexagonal shape tool may be inserted in the second case a proper cross wrench has to be used.
The seat ring may then be removed by un-threading in the counter-clockwise direction. The seat threads in the valve body should be carefully inspected to make sure they are in a usable condition. When installing new seats, the seats should be screwed tightly into the valve body, then unscrewed to make sure they are making continuous contact for a tight seal.

3.2.6 - LIST OF TOOLS.

No special tools required for maintenance.

3.2.7 - LUBRICATION AND GENERAL MAINTENANCE.

B.F.E. valves are made from selected materials to give long and trouble free service. When properly installed in the correct applications. Proper care and maintenance in the field can contribute to extended performance of the valve.
The general maintenance operation on a valve usually consists of lubrication and packing.
The valve yoke sleeve should be lubricated periodically based on cycle and service conditions, but not less then once a year. Exposed stem threads should be kept clean and should be lubricated.

Because a tacky lubricant on exposed stem threads can attract abrasive particles from the atmosphere the use of dry lubricants is recommended. Graphite powder can be applied on, by spraying or (if no suitable means are available) by the use of a normal brush. Leakage through the stuffing box does not always indicate a defective valve, the valve may simply require the packing to be tightened. Excessive tightening may cause difficult operation of the valve and possible damage to the stem.

4.0 - SPARE PARTS.

4.1 For standard maintenance of valves the only components suitable to be substitute are:

Stuffing box packing
Body/bonnet gasket

For special preparation all other components are available as spare.

5.0 - PRECAUTIONS

WORKING PRESSURE AND TEMPERATURE
When using the valve, be sure to work with proper pressure temperature combination within the maximum allowed as per class rating marked on valve nameplate. The rating tables are those of ANSI/ASME B16.34. For materials not mentioned in ANSI/ASME B16.34 the following shall be applied:

DIN C22.8	*group n° 1.1*	*DIN X6CrNiMoTi17.1*	*group n° 2.2*
DIN X12CrMo91	*group n° 1.14*	*DIN X6CrNiTi18.1*	*group n° 2.4*
DIN 13CrMo44	*group n° 1.9*	*ASTM B462 UNS N08028*	*group n° 3.8*
DIN 10CrMo9.10	*group n° 1.11*	*ASTM A494 UNS N30002*	*group n° 3.15*
ASTM A182 F55	*group n° 2.8*	*ASTM A494 UNS N26625*	*group n° 3.15*
ASTM A182 F317L	*group n° 2.2*	*ASTM A494 UNS N30012*	*group n° 3.15*
ASTM B381 F2	*group n° 2.2*	*ASTM A494 UNS N30007*	*group n° 3.15*
ASTM B564 UNS N08811	*group n° 3.15*	*ASTM B564 UNS N05500*	*group n° 3.6*

For alluminium bronze material ASTM B148 UNS C95400 rating table as per BS 5354 series A must be applied.

VALVE MATERIAL CHOICE
It is client responsibility to choose the material based upon the fluid and operation condition. With a correct choice a long valve life is expected, vice versa corrosion, erosion or other factors can lead to a reduced valve life.

CORROSION ALLOWANCE
Valves are designed taking into account a maximum corrosion allowance of 3 mm. Never use the valve with higher corrosion.

PIPELINE LOAD
The valve has not been designed for support purposing, and hence the client must avoid any significant pipeline load concentration at valve interface. If the case B.F.E. can supply the necessary information to allow the costumer to perform the relevant verification, or be required to perform the verification based on client data.

CYCLIC LOAD

In case of significant number of cycles and load variations further stress analysis shall be performed to verify the valve strength. If the case B.F.E. can supply the necessary information to allow the costumer to perform the relevant verification, or be required to perform the verification based on client data.

START-UP

Once the valve has been installed with all the prescriptions and precautions as described in the previous chapters, the valve can be started-up.
For gate valves only, be careful not to heat up the valve in closed position with fluids inside that could over pressure the valve.

NORMAL OPERATION

When in operation, the gate and globe valve can be hand-operated from open to close or vice versa by the handwheel. Before to operate the valve, take care of the temperature of the handwheel is not too hot or cold to get injuries to the operator hands.

NORMAL SHUT-DOWN PROCEDURE

No special prescriptions are required for shut-down procedure.

LEAKAGE THROUGH THE PACKING

In case of small leakage proceed with a re-tightening of the packing bolts. In case the leakage persists or in case of wide leakage through the packing, the valve must be put in fully open position (backseat position), and the packing substituted.
If the problem persists contact B.F.E. for further instructions.

LEAKAGE THROUGH THE BODY-BONNET GASKET

In case of leakage, stop and de-pressurize the pipeline section on which the valve is installed and proceed with gasket substitution.
If the problem persists contact B.F.E. for further instructions.

LEAKGE THROUGH THE BODY, BONNET.

Stop and de-pressurize the pipeline section on which the valve is installed and contact B.F.E. for further instructions.

SEAT LEAKAGE

If a leakage is detected when the valve is closed, for some reason the seat and or the closure member are damaged. See previous chapter for internal parts adjustment/substitution.

VALVE MODIFICATION

In no case the user is allowed to modify the geometry or the material of valve components. This action determines the immediate expiring of CE marking.

FLUID GROUP (P.E.D. 97/23/EC)

According to P.E.D. 97/23/EC the valves are classified in category III (higher possible category) and then can be used with fluid group 1 or 2 including unstable gas.