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# *BOLTED BONNET & PRESSURE SEAL VALVES*

# *USER'S MANUAL for INSTALLATION, USE and MAINTENANCE*

## *Technical Manual N° 007.en*

| ***Date*** | *22/10/2009* | *18/06/2010* | *26/09/2011* | *18/10/2011* | *7/03/2014* |
|---|---|---|---|---|---|
| ***Rev.*** | *E* | *E01* | *F* | *G* | *H* |
| ***Prep.*** | *SG* | *SG* | *SG* | *PZ* | *SG* |
| ***Appr.*** | *SG* | *SG* | *SG* | *SG* | *SG* |

# INDEX

## *1.0 - INTRODUCTION*

*This manual has been prepared to provide the end user with general guidelines in the installation, operation and routine maintenance of VITAS valves.*
*The instructions contained within this manual apply to all VITAS bolted bonnet & pressure seal valves unless otherwise stated. If after reviewing the contents of this manual You require any special instructions, assistance, repair services, or have any additional questions, please contact either our factory or our nearest representative for assistance.*

## *2.0 - WARNING, CAUTIONS AND NOTES*

*Warning, cautions and notes within the manual are used to define a special situation for the following purpose.*

### *2.1 - Warning (specified with W )*

*Warning provide information related to a potentially hazardous condition.*
*If the warning is not strictly followed or observed, an injury to personnel or severe damage to the equipment could result.*

### *2.2 - Cautions ( specified with C )*

*Cautions provide information related to a potentially damaging condition.*
*Non compliance with the caution could result in damage to the equipment.*

### *2.3 - Notes ( specified with N )*

*Notes are information that is useful in procedure and practice.*
*Notes are intended for assistance and provide useful information.*

## *3.0 - GENERAL DESCRIPTION.*

### *3.1 - FUNCTIONAL 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 periodical 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 VITAS 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.*

### *3.2 - CATALOGUE.*

*A copy of our catalogue is available on application.*

### *4.0 - TECHNICAL DATA ( name plate & valve information ).*

*The nameplate permanently attached to the valve, provided you with the rated working pressure, temperature range and material used.*
*On the rim of the flanges provide the serial number that has been assigned to each valve.*
*When ordering replacement parts, reference to the information provided on the nameplate will aid to ensuring that You receive correct component parts for Your valves.*
*For further information go through this manual or contact VITAS Customer Service.*

***W*** *Never attempt to modify VITAS valves in any parts without authorisation and assistance of VITAS, otherwise the mechanical guarantee is not more applicable and severe damage to the equipment could result.*

### *5.0 - HANDLING AND STORAGE.*

*5.1 – HANDLING*

***W*** *See appropriate commercial drawing where are defined weights and handling points*

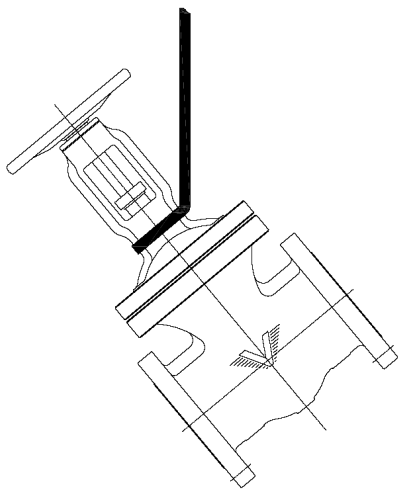
*GENERAL INFORMATION ABOUT THE HANDLING:*

*VITAS valves are shipped from the factory in box, crates or on skids.*
*Protruding parts, such as the handwheel, indicator rods, and stem protector are sometimes removed from the valves and either attached to the box or crate or packaged separately.*

***C*** *All valves and associated parts should be inspected carefully for any visible sign of damage and if necessary, claims promptly submitted to the carrier.*
*Any parts shipped loose or separately should be properly installed immediately to prevent loss or damage.*
*Care should be taken in handling the valve to prevent damage, particularly to an equipment extending above the valve bonnet and any fittings protruding from the valve body it self.*

***N*** *Most handling can be accomplished by hooking diagonally into holes on each side of the end flanges, or by the usage of straps slung around the arms of the valve body*

***W*** *Never attempt to lift any valve by the handwheel or gland bolting. Also, caution must be exercised if straps are slung around the valve body to prevent damage to protruding body bonnet fittings.*



***C*** *Transport, unpack and store carefully not to scratch the surfaces of flanges or gasket and not to allow inclusion of hazardous matters into the valves.*
*Wooden plate or plastic caps should not be removed until the piping installation.*

*5.2 - STORAGE*

***W*** *If the valves are to be stored for any extended period of time, the flange or end protector should be examined to ensure they are fastened securely, and any other open areas should be sealed to prevent any moisture damage.*
*All valves should be securely held in place by banding or other means of support to prevent accidental damage due to movement of the valves.*

***N*** *Prior to installation, confirm that there is no scratch on the surfaces of flanges and stem, and clean insides of the valve with dry cloth. Especially, as the seat surfaces are the most important portion for obtaining the valve function, special attention should be paid so as not to scratch or damage these surfaces.*

***6.0 - INSTALLATION.***

*6.1 - PRELIMINARY CONSIDERATION FOR INSTALLATION:*

***N*** *- use experienced trained personnel.*
*- observe all standard safety precaution.*
*- always use proper tools.*

*6.2 - GENERAL INFORMATION*

*All VITAS Valves are shipped from the factory in the closed position and normally will have a coating of rust protective oil (type MOBILARMA500 , alternative SHELL ALVANIA2 , or similar), the protective oil is a light oil with good chemical stability and wear features , on the majority of cases is not necessary to remove the protective oil with flushing , in any case during the flushing of the line the protective oil dissolving.*

***C*** *Following installation of the valve, operate the gate disc fully open and closed at least once prior to hydrostatic testing of the line to ensure freedom of operation. After completion of hydrostatic testing, the valve should be drained to eliminate any water or test fluid which may have been trapped in the valve.*

*6.3 - VALVE CONNECTION TYPE.*

*Depending on valve end configuration, three (3) basic installation procedure are used:*
*- BUTT WELDS in accordance with ANSI B16.25*
*- FLANGED ENDS in accordance with ANSI B16.5 , ASME B16.47 Type A or other client request.*
*- CLAMP ENDS*

*Valves supplied by VITAS are manufactured using cast 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 (BUTT WELDS).*

*6.3.1 - BUTT WELDING ENDS.*

***W*** *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.*

***C*** *Be sure to leave proper gap between the end of the pipe and the end of the valve. This will allow for expansion of the materials as it is welded, 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 pup pipe 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.*
*Also welding slags and spatters are to be completely removed and cleaned to avoid damage on seats areas.*

*6.3.2 - 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 pattern as follows:*

***C*** *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 and/or 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.*

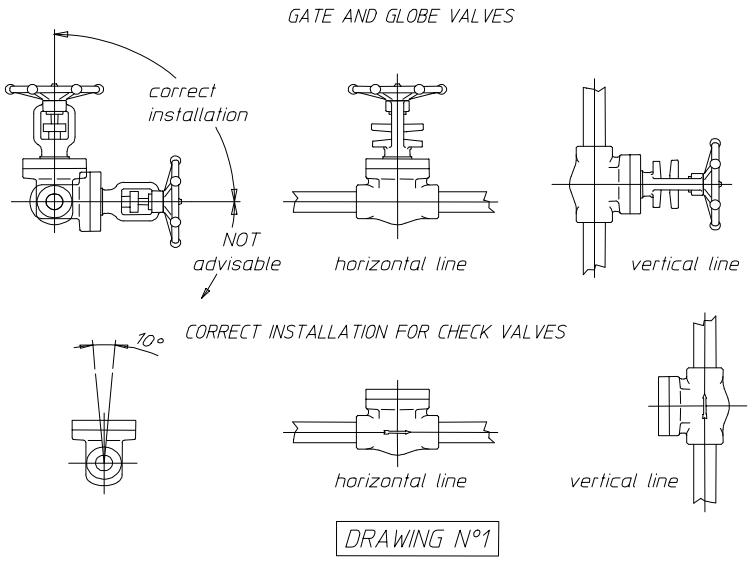
*6.3.3 - CLAMP ENDS.*

*Care must also be taken in installing these types of valves.*
*First inspect all clamps and before assembly to make sure that seal portion is not damaged.*
*Always insert the special clamp gasket through valve and pipe and close the extremity ends with appropriate clamp and relative bolting.*
*Close alternate the four bolting in a cross section until are tightened properly.*

*6.4 - 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 space 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.*
*Elevation and position of the valve handwheel shall take account of the ergonomic requirements specified by the purchaser under offer.*

**W** *Placements other than those specified, may lead to malfunction or damage the valve*



DRAWING N°1

*6.4.1 - 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. Piston and stop check valves should be fitted similarly to check valves (but not in vertical line).*

*The vertical axis of valves equipped with external device (such as damper, external hinge with or without counterweight, Bevel Gear, Actuator, etc.) should be most accurate possible, otherwise an operation failure or a valve damage can occur.*
*Vertical upwards flow position is always admissible but an external hinge and counterweight repositioning can be necessary. Please, specify when purchase.*

*6.4.2 - 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. However, install the valve carefully according to the flow direction arrow, when the wedge is provided with pressure balance holes to prevent abnormal pressure increase.*

*6.5 - 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.*

***W*** *Valve shall not be used for isolation during piping pressure test field.*
*Piping pressure test shall not be done against a closed valve because it may damage the sealing surfaces of seat and wedge or disc*

***7.0 - OPERATING INSTRUCTION***

***N*** *The gate globe valve is closed by rotating the handwheel in the clockwise direction; and is opened by rotating the handwheel in the counter clockwise direction.*

***C*** *Do not apply excessive torque to a gate of valve after it has reached the fully open or closed position since this could result in damage of the gate, stem, seats or operating nut.*

***W*** *Gate valve should be used in fully opened or fully closed position. If it is used in slight or half opened position, the disc may vibrate at a high speed flow, which may cause pulsation of the flow.*
*There fore do not apply the gate valve for the flow control.*
*Shall not be used for throttling purpose.*

***C*** *Globe valve can also operate in back-flow direction but it is recommended that pressure always acts under the disc (arrow on the body direction).*

## *8.0 - MAINTENANCE*

*8.1 - RECOMMENDED PREVENTIVE MAINTENANCE.*

***C*** *Maintenance programs vary greatly from application to application, dependent on factors such as operational frequency, fluid make up, external environment etc.*
*The end user should establish a routine maintenance program to extend the life of the valves and minimise downtime for repair.*

*8.1.1 - Monthly*

1. *Visually inspect the valve for signs of leakage or corrosion*
2. *Visually inspect stem packing to avoid any leakage from stuffing box.*
3. *Lubricate the valve if necessary ( stem and stem nut ).*

*8.1.2 - 6 Months*

1. *Cycle the valve fully open and closed at least once to check for freedom of operation.*
2. *Remove the stem protection and lubricate the valve stem*
3. *Repeat steps 1, 2 and 3 from the monthly maintenance recommendations.*

*8.2 - MAINTENANCE INSTRUCTION*

*Valves are normally shipped from the manufacturing plant with adequate protection for indoor storage for up to three months. This protection consists of a rust preventative and plastic or wooden 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.*

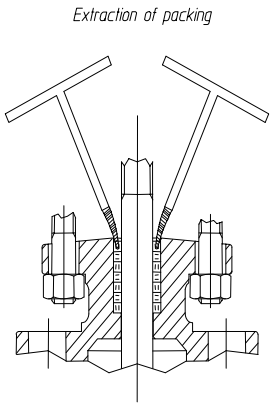
*If cleaning of the valve is required care must be token as to the type of solvents used, particularly if the valve is to be connected to the line by welding, if cleaning the valve in line use ONLY duster/cloth wet. The maintenance and repair of VITAS valves is usually limited to the adjustment of the 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*

*8.2.1 - STEM PACKING.*

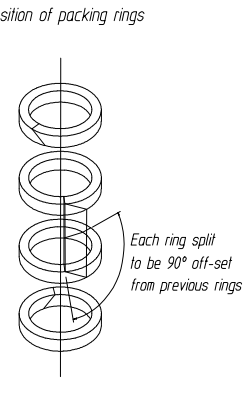
***W*** *If the gland has run out of travel or excessive tightening does not stop the leakage, isolate and de-pressurise the valve for repacking. The valve need not be taken out of line for simple repacking, however, repacking is not recommended while the valve is in service.*

***W*** *If the stem does not backseat correctly and seal completely against the backseat bushing, the stem packing can not be replaced while the valve is under service conditions.*

***N*** *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 ).*




DRAWING N°2




DRAWING N° 3

***C*** *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 (check it in service).*
*When graphite packing is to be installed, their replacement may be made by the interlaced rings 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.*

*8.2.2 – 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.*

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

***C*** *To avoid bolts over stressing in valve reassemble shall be follow the bolting torque table that allowed for each size.*

*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.*

*8.2.3 - GASKET REPLACEMENT BOLTED BONNET TYPE.*

*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 200 □inch concentric or phonographic for spiral wound gasket and 63 □inch for RJ groove. 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 ensure that the wedge does not contact the seats during reassemble and bolt tightening. Re-tighten the bolts as previously stated in paragraph 8.2.2.*

*8.2.3.1 – HINGE / DISC ASSEMBLY (VALVES WITH LATERAL FLANGE)*

*The pin is housed in a hole on the valve body.*
*The pin is protruding out of the body and it is kept in position by an anti-blow out flange.*

*To remove the hinge / disc assembly is necessary:*

***W*** *Isolate and de-pressurize the system.*

- *remove the valve bonnet*
- *remove the lateral flange (take same care as a cover)*
- *support the hinge / disc assembly with belt or chain*
- *pull out the hinge pin*
- *lift up the hinge / disc assembly making care to not damage seating surfaces.*

***W*** *The use of adequate belt or chain is necessary to support the assembly and to avoid injury to personnel or damage to the equipment*

## BOLTING TORQUE TABLE

| **BOLT SIZE ASME B1.1** | **ASTM A 193 B7 – L7** | | **ASTM A 193 B7M** | | **ASTM 193 B8 - B8M - B8C class.1** | |
|---|---|---|---|---|---|---|
| [Inch] | [Nm] | [FtLbs] | [Nm] | [FtLbs] | [Nm] | [FtLbs] |
| 1/4 | 6 | 5 | 5 | 4 | 8 | 6 |
| 5/16 | 14 | 10 | 11 | 8 | 16 | 12 |
| 3/8 | 24 | 18 | 19 | 14 | 29 | 21 |
| 7/16 | 39 | 29 | 31 | 23 | 47 | 35 |
| 1/2 | 61 | 45 | 49 | 36 | 73 | 54 |
| 9/16 | 89 | 66 | 71 | 53 | 106 | 79 |
| 5/8 | 123 | 91 | 99 | 73 | 148 | 109 |
| 3/4 | 223 | 165 | 179 | 132 | 268 | 198 |
| 7/8 | 364 | 269 | 292 | 215 | 436 | 322 |
| **1** | 546 | 403 | 438 | 324 | 656 | 484 |
| **1 1/8** | 817 | 604 | 655 | 484 | 981 | 725 |
| **1 1/4** | 1166 | 861 | 935 | 691 | 1400 | 1034 |
| **1 3/8** | 1600 | 1182 | 1283 | 948 | 1920 | 1418 |
| **1 1/2** | 2131 | 1574 | 1709 | 1262 | 2557 | 1889 |
| **1 5/8** | 2768 | 2045 | 2220 | 1640 | 3322 | 2454 |
| **1 3/4** | 3523 | 2602 | 2825 | 2087 | 4228 | 3123 |
| **1 7/8** | 4404 | 3253 | 3532 | 2609 | 5286 | 3905 |
| **2** | 5418 | 4002 | 4345 | 3210 | 6502 | 4803 |
| **2 1/4** | 7897 | 5834 | 6334 | 4679 | 9479 | 7002 |
| **2 1/2** | 11029 | 8147 | 8846 | 6534 | 13238 | 9778 |
| **2 3/4** | 14903 | 11008 | 11953 | 8829 | 17887 | 13212 |
| **3** | 19588 | 14469 | 15711 | 11605 | 23510 | 17366 |
| **3 1/4** | 25172 | 18594 | 20189 | 14913 | 30213 | 22317 |
| **3 1/2** | 31725 | 23434 | 25445 | 18795 | 38077 | 28126 |
| **3 3/4** | 39314 | 29040 | 31532 | 23292 | 47186 | 34855 |
| **4** | 48045 | 35490 | 38535 | 28464 | 57665 | 42596 |

***N*** *Adjust nut torque wrench to half the value required for each size and tighten the bolts in a cross-way.*
*Adjust nut torque wrench on the final torque and tighten bolts as described above. Bolts can be coated with grease Molykote type C.*
*Different torques are obtained from -50% (in good lubrication), up to +100% (dry) according to the values given in Table*

*8.2.3.2 - GASKET REPLACEMENT PRESSURE SEAL TYPE*

*Great importance shall be paid on disassembly and re-assembly of pressure seal valves, due to the particular configuration of the bonnet area.*

- *loosen the retainer bolts acting alternatively on opposite diameter.*
- *remove the bolts an pull out the bonnet retainer.*
- *push on the bonnet to remove it from the sealing area with the body and extract the sector retainer ring.*
- *draw out the group composed by bonnet, stem & wedge. The bonnet will carry with it self the spacer ring and the body bonnet gasket.*
- *before to proceed check the surfaces of the body bonnet gasket (generally made in stainless steel) or replace it if made in pre-compressed graphite. Check the relating housing on the body and bonnet did not present any trace of corrosion or scratch.*
- *re-assembly shall be done in the opposite way after to have positioned the bonnet with the respective gasket and spacer ring, place the sector retainer ring and screw in the bonnet retainer bolts, taking care to tighten alternatively by opposite diameters.*

***C*** *It could happen that at a low pressure the valve leaks between body and bonnet. In this case retighten the bolts on the opposite diameter and take care to assure a perfect positioning of the bonnet.*

*To assure the tightening it is necessary to pressurise the valve at full pressure and tighten the bolts.*

*8.2.4 - 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 maintenance work shop for seat replacement.*

*8.2.4.1 - REPAIR, REMOVAL AND INSTALLATION.*

*Seat rings for gate valves sizes 2" and larger, if not too badly damaged ( defect not deeper 0,3÷0,4 mm), may be repaired in the body by lapping.*
*The seats can be lapped in the body, using a flat lapping plate larger than that of the seat.*
*The plate must have a square hole in the 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 fine grain 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 maintenance work shop.*

*8.2.4.1A - REPAIR BY LAPPING*

*For the gate and check valve, make the center line of the port perpendicular, then set the seat in the horizontal position by inserting and adjusting the wooden pads between the flange surface and the working table. Clean around the seat portion throughly and be careful not to adhere any dust or substance to the lapping surface in order to avoid sintering.*
*Apply a proper quantity of lapping compound to the surface plate observe the dryness of the compound. Occasionally take out the surface plate, wipe out the old compound and replace with new one.*
*When lapping manually, the worker should rotate the surface plate both clockwise and counter clockwise. An adequate pressure of about 1kg/cm2 should be applied to the lapping surface, however, the pressure should be adjusted according to the progress of the work.*

*When lapping by machine, rotate the lapping surface plate as slow as possible. 60-80 rpm is adequate for a 8" valve. If there are some local scratches on the lapping surfaces made by galling, it is necessary to increase the quantity of compound.*
*For the final mirror finishing, apply a very small quantity of compound and lap until it dries.*
*Do not press heavily or lap too long, otherwise it may cause sintering.*

*8.2.4.1B - LAPPING OF DISC.*

*Prior to the real lapping work, lap off the damages convex to about rough finishing grade. Then lightly strike the disc into the valve body and check whether the inclined surface is fitted to the seat surface. When cleaned surface becomes well fitted to the seat surface, proceed to finishing. If not fitted, lightly lap off the convex of the disc using the compound according to the normal procedure.*
*Set the lapping surface to a horizontal position using pads, and secure it so as not to move during the work. After completion of lapping, thinly apply minium to the lapped surface of the disc or the seat, then lightly hit the disc between the seats. Check the disc seal and the valve body seat contact.*
*After lapping work, clean the lapped surfaces of the disc and the seat with petroleum and wipe it off with cloth or soft paper.*

*Tools and consumables:*
- *Lapping compound ( Carborundum )*
- *Grain size: 400 - 600 mesh – for rough finishing.*
- *Grain size: 800 – 1200 mesh – for fine finishing.*
- *The surface plate should be homogenous cast iron having approximate HB 250 Hardness.*
- *Machine oil, fillet scraper, minium, waste cloth.*

*8.2.4.1C - SEAT REMOVAL.*

*Depending on valve configuration, seat rings may be supplied in the following way:*
1- *Screwed (std. Production for VITAS valves).*
2- *Screwed and seal welded (upon request).*
3- *Welded in (upon request and P.S. valves).*

*Seat rings for bolted bonnet valve normally are screwed in and may be removed only by means a special tools (Supplied only if request). Therefore the substitution can be done only in the factory or in a n equipped maintenance workshop.*

*8.2.4.1D - SEAT INSTALLAT1ON.*

*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 light oil may be applied to the seat to screw the set in place.*
*This operation can be done by hand until the seat ring are completely screwed in seat pocket area and them by means of the special tools with the help of pneumatic key setted with a proper torque value. After the substitution can be necessary a lapping of the seat contact area that can be done using the same tool of para. 8.2.4.1 or by machine.*

## *SEATING TORQUE TABLE (Kgm)*

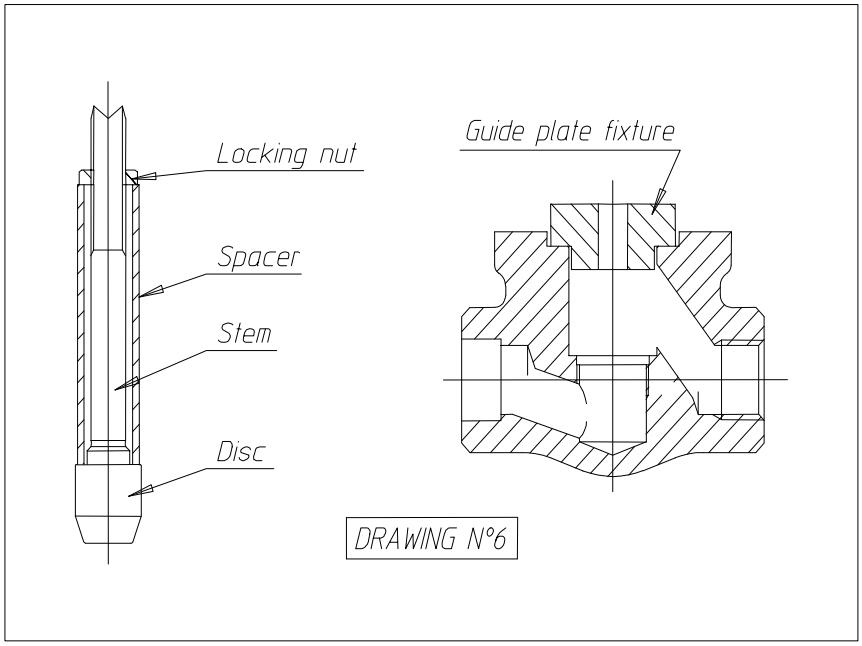
| *SEAT DIAMETER (INCH)* | *CLASS 150/300* | *CLASS 600/900* | *CLASS 1500/2500* |
|---|---|---|---|
| *2* | *35* | *52* | *78* |
| *3* | *62* | *93* | *134* |
| *4* | *85* | *128* | *186* |
| *6* | *154* | *232* | *343* |
| *8* | *209* | *314* | *465* |
| *10* | *279* | *418* | *625* |
| *12* | *364* | *546* | *801* |
| *14* | *465* | *700* | *1014* |
| *16* | *581* | *871* | *1278* |
| *18* | *700* | *1069* | *1568* |
| *20* | *851* | *1278* | *1858* |
| *22* | *1014* | *1510* | *2207* |
| *24* | *1161* | *1742* | *2555* |
| *26* | *1394* | *2091* | *3020* |
| *28* | *1626* | *2439* | *3485* |
| *30* | *1858* | *2778* | *4065* |
| *32* | *2090* | *3136* | *4646* |
| *34* | *2320* | *3485* | *5227* |
| *36* | *2555* | *3833* | *5808* |
| *38* | *2846* | *4298* | *6388* |
| *40* | *3136* | *4762* | *6996* |
| *42* | *3485* | *5227* | *7550* |
| *44* | *3833* | *5691* | |
| *46* | *4182* | *6273* | |
| *48* | *4530* | *6853* | |
| *50* | *4878* | *7434* | |
| *52* | *5343* | *8015* | |
| *54* | *5808* | *8711* | |
| *56* | *6216* | | |
| *58* | *6720* | | |
| *60* | *7202* | | |

*8.2.5 – SEATING ON GLOBE AND CHECK VALVES.*

*See para. 8.2.4.*

*8.2.5.1 - 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 OD 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 suggested in the factory by means of special tools.*
*The seat ring (and the disc if necessary) may 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 and check there are a continuous contact for a tight seal. Finally reassemble the seat at the appropriate torque.*

*8.2.6 - LIST OF TOOLS.*

*- Seat removing tools*
*(For remove the threading seat rings special tools is required for maintenance. This tools can be supplied upon request)*
*- Packing extraction tool (can be supplied upon request)*
*- Injector gun (can be supplied upon request).*

*8.2.7 - LUBRICATION.*

*VITAS 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 periodical lubrication.*

*8.2.7.1 - STEM THREADS LUBRICATION*

***C*** *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.*

*8.2.7.2 - GEAR HOUSING LUBRIFICATION*

*On valves equipped with bevel gear operators, the operators are basically sealed units which can be considered to be permanently lubricated. VITAS recommends that the operators be at least partially disassembled every three years to inspect the condition of the lubrication and component parts. Should dirt, water, or other foreign matter be round during the inspection, the units should be flushed using a commercial cleaner/degreaser such as which is not corrosive and does not defect an bearings, gears, and other close fitting parts should be liberally coated by hand with grease prior to re-assembly.*

*8.2.7.3 - STEM NUT BEARING LUBRICATION*

*On valves not equipped with bevel operators, injection fittings will be round located on the bearing housing.*
*The valve Yoke-sleeve shall be lubricated periodically based on cycle and service conditions, but not less then once a year.*
*Any good grade of grease may be used on these parts. Only a small around of grease is required: over lubricating the stem bearings will result in leakage of grease around the bearing housing.*

*8.2.8 LUBRICANT CHART*

| ***PART TO BE LUBRICATED*** | ***SUGGESTED GREASE LIST*** | |
|---|---|---|
| | *(low ambient temp.)* *( -60 °C to +65 °C )* | *(common ambient temp.)* *( -30 °C to +85 °C )* |
| ***RUNTIME MAINTENANCE*** | | |
| ***YOKE BUSHING*** <br> ***BEVEL GEAR*** <br> ***STEM THREADING*** | ***TECNOLUBESEAL*** <br> *GX100* | ***AGIP*** <br> *GR MU3* <br> *EP1* <br> ***BP*** <br> *LTX 1* |
| ***STEM PACKING*** <br> ***SEATS*** | ***TECNOLUBESEAL*** <br> *643 Synthetic HV Plug Valve Lubricant & Sealant* <br> ***NORDSTROM*** <br> *950* | ***TECNOLUBESEAL*** <br> *607L Valve Plus* <br> ***SEALWELD*** <br> *Total-Lube 911* |
| ***IN CASE OF LEAKAGE*** | | |
| ***STEM*** | ***TECNOLUBESEAL*** <br> *Liquid-O-Ring 104S* <br> *Valve Synthetic 622 artic grade* <br> ***SEALWELD*** <br> *Winterseal 2525* | ***TECNOLUBESEAL*** <br> *Semi Liquid 505* <br> *506SYN Semi-Liquid Packing* <br> ***SEALWELD*** <br> *5050* |
| ***SEAT*** | ***SEALWELD*** <br> *Winterseal 2525* <br> *Valve Synthetic 622 artic grade* <br> ***LUBCHEM*** <br> *50-300* <br> ***NORDSTROM*** <br> *555 WG* | ***TECNOLUBESEAL*** <br> *Valve Synthetic Peanut* <br> ***SEALWELD*** <br> *5050* <br> ***LUBCHEM*** <br> *50-400* |
| ***ASSEMBLY GREASE*** | | |
| ***TECNOLUBESEAL****:* <br> *BC 101 (-15 / +120°C* <br> ***AGIP*** <br> *GR MU3* | | |
| ***RUST PROTECTION for not painted parts*** | | |
| ***TECNOLUBE SEAL*** <br> *RUSTY 75* <br> *SEAL RUSTY 207* <br> ***MACON*** <br> *MACONFLUID RS-P* | | |

*NOTE: ABOUT THE APPLICATION SEE MAINTENANCE INSTRUCTION.*
*With ambient temperatures below -60°C, we suggest to remove all lubricants and greases and apply a thin film of PTFE.*
*For special applications, please, contact Vitas division of Valvitalia S.p.a,*

***9.0 - SPARE PARTS.***

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

*Stuffing box packing*
*Body/bonnet gasket*

*For extraordinary maintenance special preparation all other components are available as spare, upon request see attached sketch showed recommended spare parts.*

***10.0 – PRECAUTIONS.***

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

| | |
|---|---|
| *ASTM A 351 CF10* | *( Group 2.1 )* |
| *ASTM A 351 CT15C* | *( Group 3.6 )* |
| *ASTM A 890 Gr. 4A, 5A, 6A* | *( Group 2.8 )* |
| *ASTM A 494 M35* | *( Group 3.4 )* |
| *ASTM A 494 CY40* | *( Group 3.5 )* |
| *ASTM A 494 CW6MC* | *( Group 3.8 )* |
| *ASTM A 494 CU5MCuC* | *( Group 3.8 )* |
| *ASTM A 494 N7M* | *( Group 3.8 )* |
| *ASTM B 367 Gr. C2 (ASTM B 381 F2 )* | *( Group 2.2 )* |

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

*VALVE MATERIAL CHOICE*
*It is joint responsibility of the manufacture and the purchaser 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 be safe taking into account a corrosion allowance depending to the nominal diameter of the valve (generally never less than 3,2 mm)*

*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. In particular case VITAS can supply the necessary information to allow the customer 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 VITAS can supply the necessary information to allow the customer 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.*

*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 and of warranty.*

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

## *11.0 - POTENTIAL FAILURE AND TROUBLESHOOTING*

| FAILURE | CAUSE | TROUBLESHOOTING |
|---|---|---|
| Leakage of packing | 1 – Gland flange nuts loose<br>2 – Rings of packing not enough<br>3 – Packing aged or failure<br>4 – Stem sealing damage | 1 – Equally tighten eyebolt nuts<br>2 – Add packing<br>3 – Replace packing<br>4 – Stem shall be maintained by reparation or replacement conjunction with the maintenance of pipeline/plant facilities |
| Leakage between sealing surface | 1 – Dirties between sealing surfaces<br>2 – Sealing surface damaged | 1 – Clean sealing surface<br>2 – Repair the sealing surfaces |
| Operation failure | 1 – Packing too tight<br>2 – Stem nut over worn<br>3 – Stem bent<br>4 – Foreigner existence between stem and stem nut or gland or gland flange | 1 – Proper loose gland flange nuts<br>2 – Replace stem nut<br>3 – Rectify or replace stem<br>4 – Clean foreign matter |
| Leakage between body/bonnet flanges | 1 – Bonnet bolts loose<br>2 – Bonnet gasket failure | 1 – Proper tighten bonnets nuts<br>2 – Replace bonnet gasket |
| Body and bonnet broken and leaked | 1 – Unscrew bolting or relax<br>2 – Fatigue<br>3 – Freezing broken | 1 – Screw the bolts with appropriate torque<br>2 – Replace valve that exceeds guarantee period or is found with early fatigue defection<br>3 – Drain away water in winter when valve is not used |
| Disc failed to open | 1 – Disc blocked in the body<br>2 – Stem is overheated and blocks the disc | 1 – Use proper torque<br>2 – When the valve is closed and the pipeline is heated, rotate the handwheel some bit counter clockwise for unload at interval |

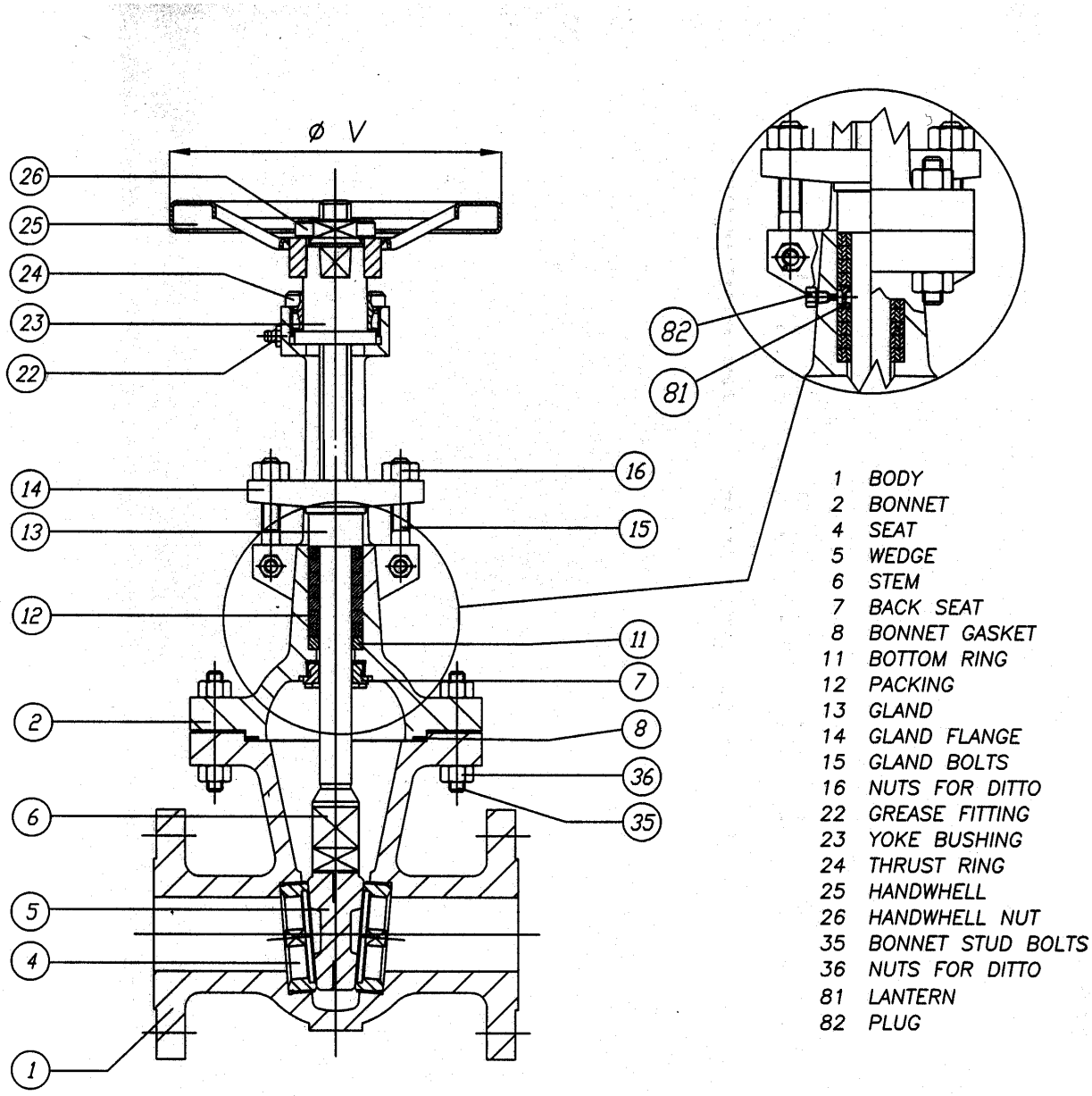
*If the problem persists contact VITAS Customer Service for further instructions.*

## *12.0 – HEALTH, SAFETY, AND THE ENVIRONMENT (HSE)*

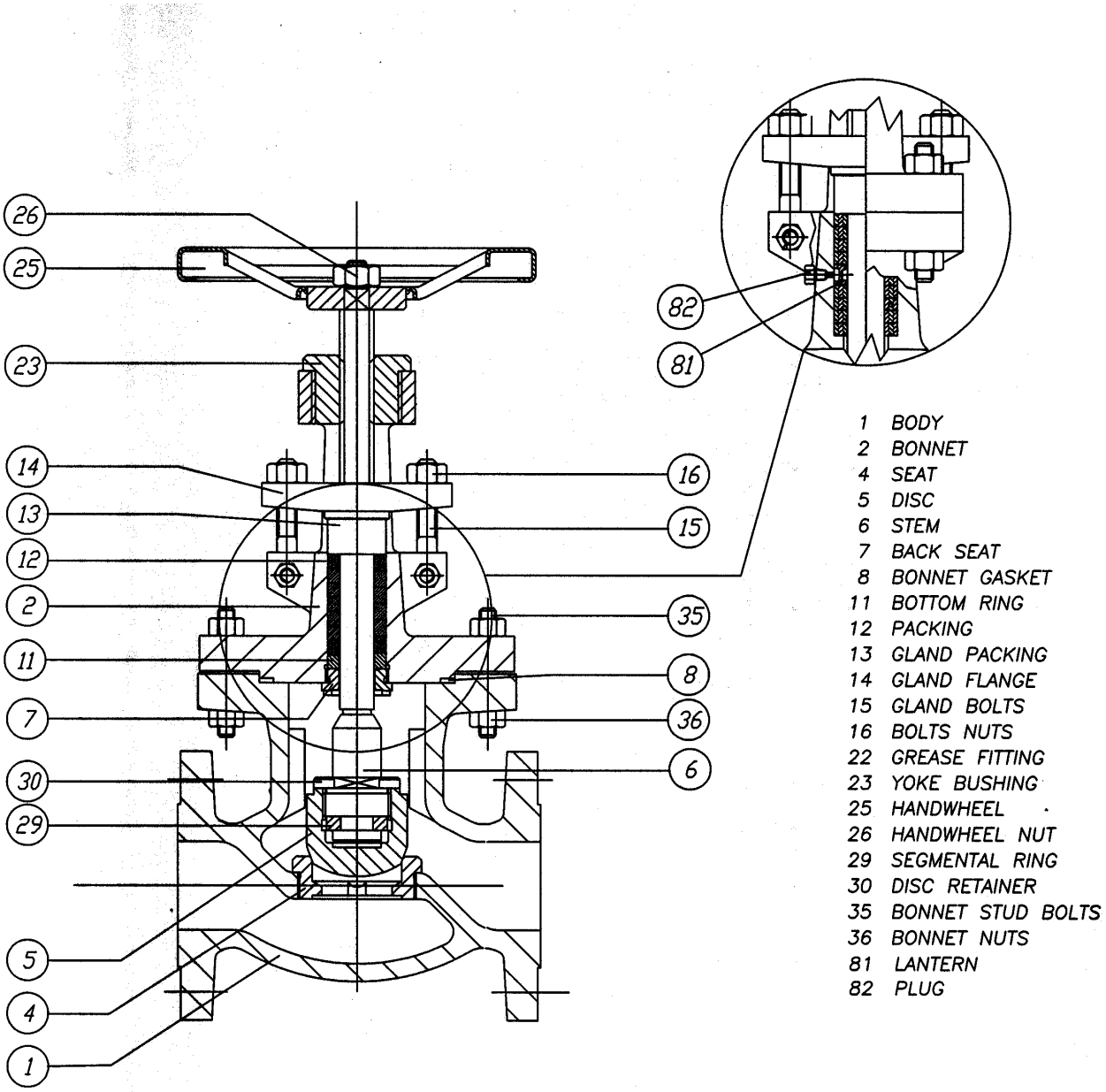
***PLEASE RESPECT THE ENVIRONMENT: the packaging of valves and spares parts, damaged or replaced components and disused valves must be disposed of in accordance with local and state regulations in force in the installation area***

## *13.0 - CROSS SECTIONAL DRAWINGS AND PARTS LIST.*

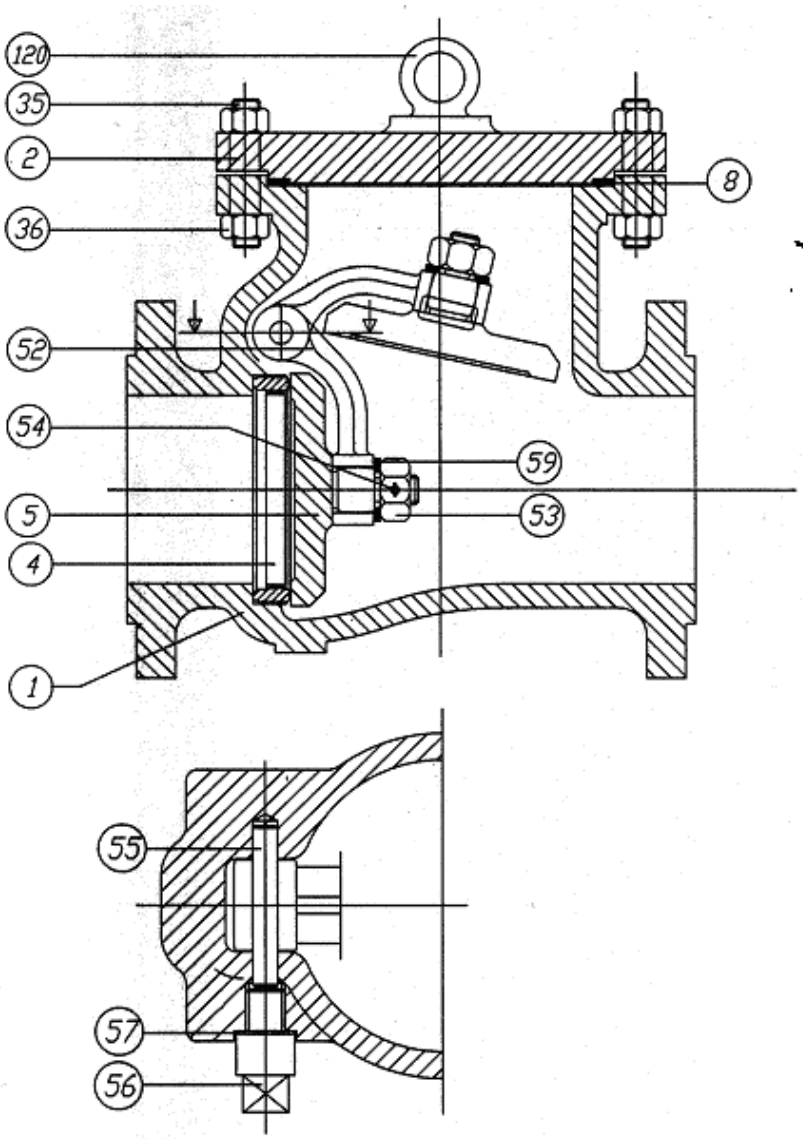
### *13.1 - Gate valve*

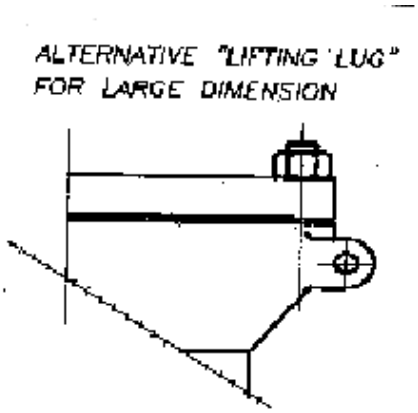


***13.2 - Globe valve***



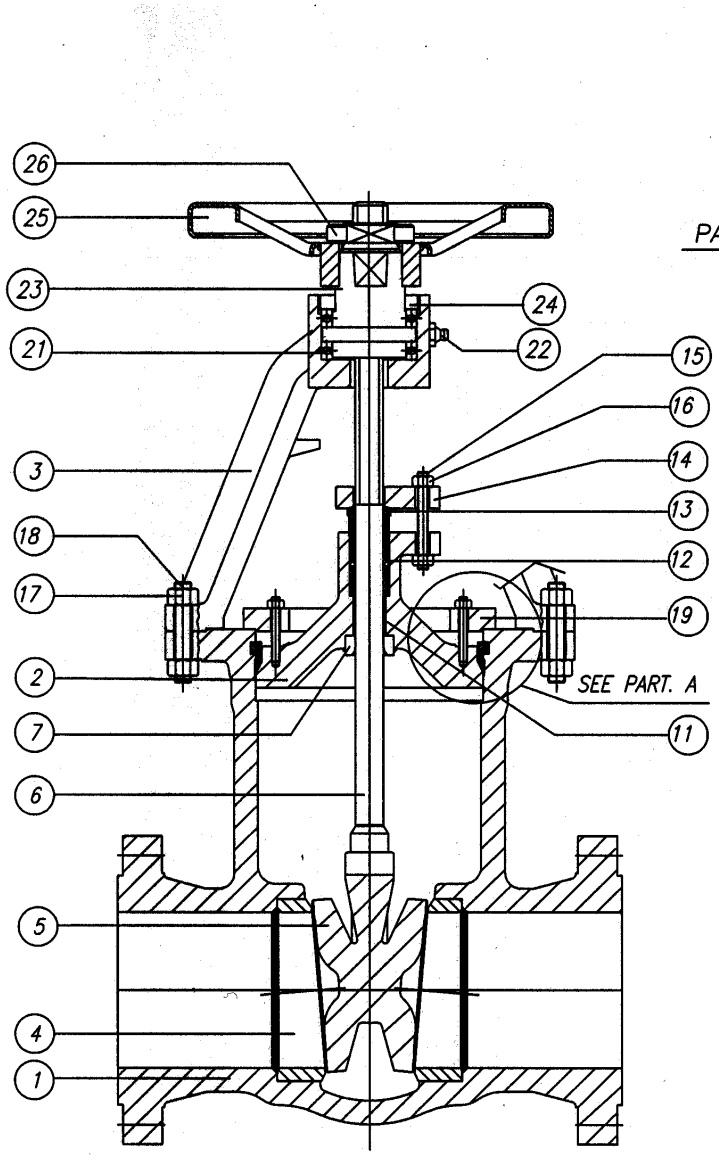
**13.3 - Check valve**

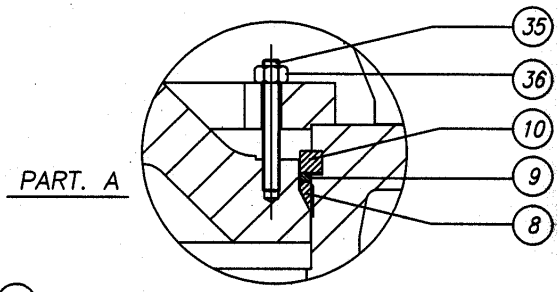



| | |
|---|---|
| 1 | BODY |
| 2 | BONNET |
| 4 | SEAT |
| 5 | DISC |
| 8 | BONNET GASKET |
| 35 | BONNET STUD BOLTS |
| 36 | NUTS FOR DITTO |
| 52 | HINGE |
| 53 | NUT FOR DISC |
| 54 | SPLIT PIN |
| 55 | HINGE PIN |
| 56 | PLUG |
| 57 | LATERAL GASKET |
| 59 | WASHER |
| 120 | LIFTING |

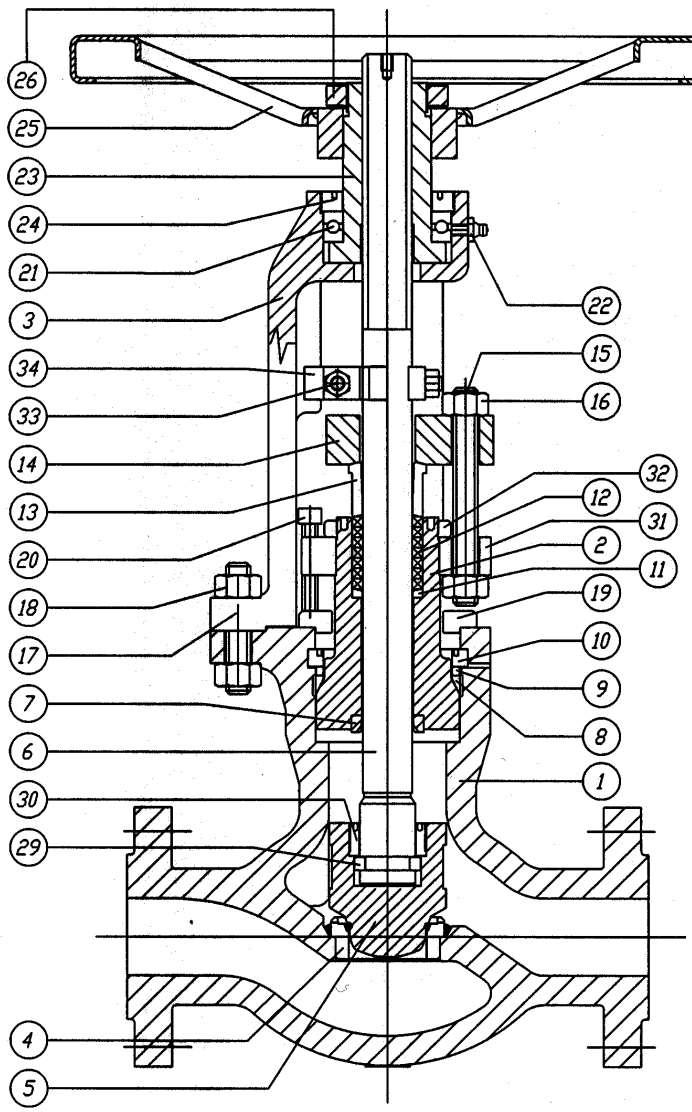
**13.4 – Pressure seal gate valve**



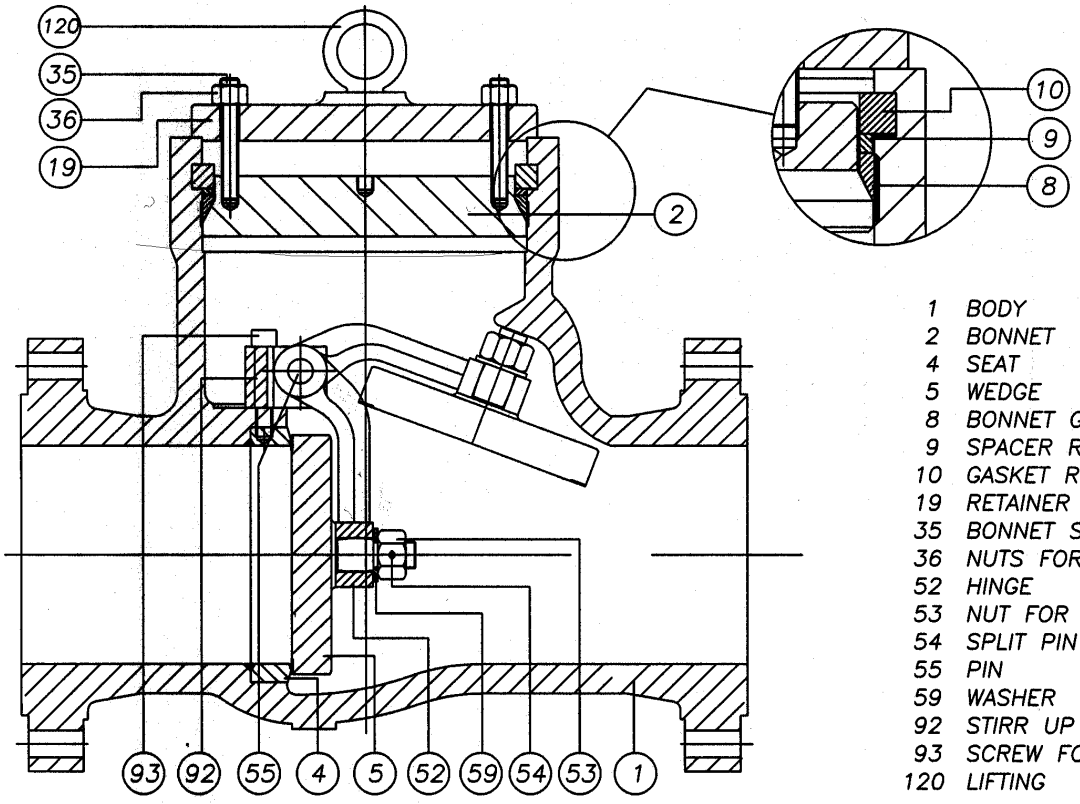

| | |
|---|---|
| 1 | BODY |
| 2 | BONNET |
| 3 | YOKE |
| 4 | SEAT |
| 5 | WEDGE |
| 6 | STEM |
| 7 | BACK SEAT |
| 8 | BONNET GASKET |
| 9 | SPACER RING |
| 10 | GASKET RETAINER |
| 11 | BOTTOM RING |
| 12 | PACKING |
| 13 | GLAND PACKING |
| 14 | GLAND FLANGE |
| 15 | GLAND BOLTS |
| 16 | BOLTS NUTS |
| 17 | YOKE STUD BOLTS |
| 18 | YOKE NUTS |
| 19 | RETAINER RING |
| 21 | BEARING |
| 22 | GREASE FITTING |
| 23 | YOKE BUSHING |
| 24 | THRUST RING |
| 25 | HANDWHEEL |
| 26 | HANDWHEEL NUT |
| 35 | BONNET STUD BOLTS |
| 36 | BONNET NUTS |

**13.5 – Pressure seal globe valve**




| | |
|---|---|
| 1 | BODY |
| 2 | BONNET |
| 3 | YOKE |
| 4 | SEAT |
| 5 | DISC |
| 6 | STEM |
| 7 | BACK SEAT |
| 8 | BONNET GASKET |
| 9 | SPACER RING |
| 10 | GASKET RETAINER |
| 11 | BOTTOM RING |
| 12 | PACKING |
| 13 | GLAND PACKING |
| 14 | GLAND FLANGE |
| 15 | GLAND BOLTS |
| 16 | BOLTS NUTS |
| 17 | YOKE STUD BOLTS |
| 18 | YOKE NUTS |
| 19 | RETAINER RING |
| 20 | BONNET STUD BOLTS & NUTS |
| 21 | BEARING |
| 22 | GREASE FITTING |
| 23 | YOKE BUSHING |
| 24 | THRUST RING |
| 25 | HANDWHEEL |
| 26 | HANDWHEEL NUT |
| 29 | SEGMENTAL RING |
| 30 | DISC RETAINER |
| 31 | CAP SCREW FLANGE |
| 32 | BONNET RETAINER |
| 33 | STEM BLOCK |
| 34 | SCREW FOR DITTO |

**13.6 – Pressure seal check valve**




| | |
|---|---|
| 1 | BODY |
| 2 | BONNET |
| 4 | SEAT |
| 5 | WEDGE |
| 8 | BONNET GASKET |
| 9 | SPACER RING |
| 10 | GASKET RETAINER |
| 19 | RETAINER RING |
| 35 | BONNET STUD BOLTS |
| 36 | NUTS FOR DITTO |
| 52 | HINGE |
| 53 | NUT FOR DISC |
| 54 | SPLIT PIN |
| 55 | PIN |
| 59 | WASHER |
| 92 | STIRR UP |
| 93 | SCREW FOR STIRR |
| 120 | LIFTING |