

USE & MAINTENANCE MANUAL OF BONETTI® VALVES TYPE : BBT-L BELLOWS SEALED

GENERAL SAFETY INFORMATION

FOREWORD

To have proper working of Valftek/Bonetti products, any installation, start up, control and maintenance must be performed by qualified and duly instructed personnel, following prescription stated by maintenance manual.

To minimize any risk for people, goods and environment, those general instruction must be respected.

Valftek A.Ş. is not responsible for damages outcoming from:

- use of product by non qualified personnel;
- incorrect installation;
- incorrect maintenance;
- product alteration or tampering;
- use of spares not original by Bonetti;
- non-performance of instruction stated in maintenance manual;
- extraordinary occurrence.

Any responsibility regarding correct selection of product and its proper material, depending on technical characteristic, application and purchasing standards and rules, belong to the system or plant engineer.

PRESSURE

Before starting maintenance operation, be sure that pressure inside product is reduced to atmospheric value and be sure that product connection piping has been correctly isolated.

Do not trust on the Pressure Gage only to assume that pressure has been discharged.

TEMPERATURE

To avoid burning, wait until product temperature cools down completely, and use protecting gloves, eye glasses and dressing, if necessary.

DISPOSAL

Product can be recycled. No environment pollution risk occurs if proper procedure has been respected.

Warning: if product contains residue of process fluid, disposal and/or recycling prescribed procedures for such fluid must be respected.

In case PTFE sealing or gaskets is fitted on product, such material must be recycled separately, according to proper and/or prescribed procedures.

DANGEROUS GAS OR FLUID INSIDE PIPING

Be sure that any dangerous or flammable or explosive gas or fluid has been discharged from product and connected piping, to avoid any danger to maintenance people due to contact or inhalation.

ENVIRONMENT DANGER

Evaluate carefully: explosion risk, oxygen leakages, dangerous gas leakages, fire risk due to maintenance operation or welding.

SEALING GASKETS

Graphite sealing gaskets to be removed or handled during maintenance, as spares, could contain thin steel layers able to injure, if non handled with care.

MAINTENANCE WORK

Maintenance work must be performed or supervised by qualified, duly instructed and skilled people. Personnel in charge of products maintenance, installation or exercise must be trained to carry out procedures according to use and maintenance manual.

Verify that tools to be used for maintenance are within their scope and that they are in good condition.

If special tools are requested, verify their availability and condition.

STORAGE

If products that are non self-draining are stored in low temperature, be careful to avoid or protect them from inside fluid freezing.

Good condition of stored products must be periodically verified.

PRODUCTS SENT BACK TO VALFTEK COMPANY

According to laws and rules for safety, health and environment preservation, if any product is sent back to Valftek A.Ş. for maintenance or any other reason, the sender must inform by written notice about risk and warning to be used depending on product mechanical damages or inside and/or outside product fluid residue and/or contamination that could be dangerous for health, safety or environment.

Such information must be completed with any useful safety instruction and safety data sheet regarding substances classified as dangerous or potentially dangerous.

This manual is exclusive property of Valftek A.Ş., under Copyright and any not authorized reproduction, in part or in total, shall be prosecuted.
Shown products are according to the current production.
Valftek A.Ş. reserves to modify product characteristics according to technical evolution or customer special request.
Verify if manual comply with used product.

GENERAL USE AND MAINTENANCE PRESCRIPTION

1.0 SCOPE

This manual states safety criteria, check and controls, installation, use and maintenance instruction for BONETTI® Bellows sealed globe valves type BBT-L valves, in cast iron, nodular cast iron and cast steel materials, manufactured by Valftek A.Ş.

2.0 PRODUCT DESCRIPTION

BONETTI BBT-L bellows sealed globe valve is a device useful to intercept a fluid, liquid or gas.
Standard materials normally used for pressure containing part are Cast Iron (5.1301), Nodular cast Iron (5.3103) and Cast steel (1.0619).
Sealing to atmosphere through stem is achieved by stainless steel bellows and security packing rings.
DN250 valve has a balanced disc for easy operation and must be installed in pipeline with flow towards top of disc in arrow direction.

3.0 RATING

Max.rating condition (pressure and temperature) and group fluid classification is stated by 2014/68/CE Directive (PED), annex II, and are shown in following Table 1 :

Table 1					
Material	Pressure rating	Tmin	Gr.	Art.4.3	Cat. / Mod.
5.1301	PN16	-10°C	2	DN15-50	DN 65-200 (Cat.I, Mod.H) DN 250 (Cat.II, Mod. H)
5.3103	PN16	-20°C	1	DN15-25	DN 32-50 (Cat. I, Mod.H) DN 65-200 (Cat.II,Mod.H) DN 250 (Cat.III, Mod.H)
5.3103	PN25	-20°C	1	DN15-25	DN 32-40 (Cat. I, Mod.H) DN 50-125 (Cat. II, Mod.H) DN 150-250 (Cat.III, Mod.H)
1.0619	PN40	-20°C	1	DN15-25	DN 32-100 (Cat. II, Mod.H) DN 125-250 (Cat. III, Mod.H)
* Max. allowable differential pressures : PN16 DN200 (14 bar), DN250 (9 bar) PN25 DN150 (21 bar), DN200 (14 bar), DN250 (9 bar) PN40 DN125 (33 bar), DN150 (21 bar), DN200 (14 bar), DN250 (9 bar)					

WARNING: For "soft seated" valves (with PTFE insert in the disk), maximum allowable temperature is limited to 200 °C.

Nodular cast iron and cast steel valves can be used with thermal oil only if the application does not exceed maximum admissible limit stated by Cat. I, Table 6 for Group 1 fluids in the PED Directive. To verify if such limit is respected make following calculation: multiplying working pressure (PS) in bar for the valve ND (nominal diameter) in millimeters the result must be ≤ 1.000 .

WARNING:

Cast iron valves can not be used for "Lethal service". Lethal service is the use of valves with "Lethal Substances" as defined in ASME Section VIII Part UW:

By "lethal substances" are meant poisonous gases or liquids of such a nature that very small amount of the gas or of the vapour of the liquid mixed or unmixed with air is dangerous to life when inhaled. For purpose of this Division, this class includes substances of this nature which are stored under pressure or may generate a pressure if stored in a closed vessel.

4.0 SAFETY CRITERIA

Proper working of valves can be obtained if all steps regarding installation, start up, control and maintenance are managed by duly instructed, qualified and skilled personnel.

Therefore this use and maintenance manual, together with the use and maintenance manual of each valve type, must be deeply considered by such personnel.

If use and/or maintenance instruction are not applied, product may be damaged or work badly, generating risk of damage to people, plant or environment.

Prescription stated in section "GENERAL SAFETY INFORMATION" must be respected.

5.0 INSPECTION AT RECEIPT

When receiving goods, check carefully to verify that no damage has been suffered during transportation.

Check also that valve type, rating pressure/temperature as shown on Table 1 and valve material, as indicated on body, bonnet and/or label, comply with application.

Never exceed limits stated by such rating.

Verify and be sure that valve material is suitable for process fluid and surrounding atmosphere.

6.0 STORAGE

Valves must be stored protected from weather or contamination arising from dirt, mud and so on. If valves have to be stored for a while, we suggest to maintain them in the original packing. If storage is very long, check valves periodically (not less than twice an year) and verify surface and internal condition, removing any dirt, rust and/or corrosion from inside and outside.

7.0 INSTALLATION

Installation must be done by qualified and skilled personnel.

Before installing, to avoid structure deformation or any other damage that could cause leakage or bad valve working, check carefully to:

- remove protection caps from valve end connections,
- verify absence of dirt inside valve,
- be sure that upstream and downstream piping is clean and without any dirt coming from drilling or welding (as metal shaving or slag) or corrosion and so on,
- install single way valves according arrows indication on body;
- install valve so that it does not sustain piping weight and sustain valve if its weight could stress or danger flanges or piping, also considering vibrations, seismic stress or wind,
- avoid misalignment between piping and valve ends. Check if face to face valve dimension fits correctly with distance between piping ends,
- avoid valve or piping thermal expansion able to stress the structure. To minimize thermal expansion effect insert an expansion joint or use other systems able to minimize such deformation,
- for flanged valves check correct position and dimension of gaskets between valve flange and piping flange, apply the proper bolting torque to stay bolts. For screwed valves verify compatibility between valve and piping screw thread,
- in the sketch assembly always install systems able to section and interrupt upstream and downstream flow with a draining system for said sectioned plant parts.

Those section and draining systems give also a good help when maintaining valves in safety conditions.

8.0 OPERATION

Valftek/Bonetti's bellows sealed valves, usually, do not require maintenance.

Verify periodically that moving items - as stem or bushing - are properly greased, using graphite grease suitable for the operating temperature.

If the valve can be corroded or oxidated by external atmospherical agents or by internal plant environment atmosphere, protect the valve using painting able to avoid or minimize such corrosion.

Bellows valve sealing to environment is assured by metallic bellows between fluid process and environment. Packing is a subsidiary sealing element providing safety second sealing in case of bellows breakage. This second safety sealing must be used only up to an immediate valve maintenance.

WARNING: If there is any leakage from the packing, this indicates the bellows breakage: valve must be immediately maintained. To stop such leakage operating with the packing gland must be considered as emergency and valve must be maintained as soon as possible. The sole packing sealing can not guarantee proper use of the valve according the valve design safety condition.

If the packing leakage is not immediately stopped, packing can be damaged very soon, so requiring its complete change. A long time leakage can also irreparably damage metallic surfaces contacting the packing (as stem and stuffing box).

On line sealing of BONETTI bellows valves is obtained with a metal to metal contact between seat and disk. For "soft seat" bellows valves, the sealing is obtained with a metallic seat and a PTFE insert in the valve disc.

If sealing is not obtained with a proper handweel closing torque, that is equal to a maximum force of 370 N for each hand, **do not force such limit using lever or other instruments to increase closing torque:** this could provoke irreparably damage to valve parts. If sealing can not be obtained with proper closing torque, valve must be immediately maintained.

Damage to sealing surfaces could arise from:

- scratching on seat or disk surface due to some dirt between them while closing
- corrosion or erosion on seat or disk
- seat or disk deformation due to an abnormal overheating

9.0 BEFORE MAINTENANCE OR DISMANTLING

Valve maintenance or dismantling must be always performed by qualified and skilled personnel aware of all safety prescription as stated in this manual or stated by plant regulation or by law .

WARNING :

Do not perform any valve maintenance or dismantling of valves from piping unless:

- valve and piping has been isolated, intercepted, pressure discharged and drained. Do not trust on the pressure gauge only to assume that pressure has been discharged,
- valve and piping temperature cools down to ambient temperature to avoid burnings,
- previous check that valve and piping upstream and downstream has been isolated and does not contain any process fluid,
- use protective gloves and eyeglasses, if useful or necessary.

User must generate inspection and maintenance charts.

Such charts can be properly generated only with a perfect knowledge of plant, service, process fluid, pressure and temperature, ambient and environment atmosphere.

Before starting maintenance, be sure to have any useful tools, checking tools good condition, and needed any spare part, checking their suitability.

Particularly, check to have:

- lapping tool for seat,
- spare stem/bell/bellows assembly, in case of bellows damage,
- disk PTFE insert, for soft seat valves with no bellows problem,
- spare disc in case of irreparable disc,
- damage for metal to metal sealing valves,
- complete packing set for stuffing box and gaskets for body/bonnet sealing.

9.1 DISASSEMBLING

After checking all safety caution as in point 9.0, valve can be disassembled without dismantling valve from piping.

- Operate on handweel for opening the valve,
- Unscrew body/bonnet nuts (10) or bolts,
- Remove bonnet (2) from body (1) with care to avoid any damage to lapped disk (3) surface,
- Check seat (1.1) condition: seat surface must look uniform, without any scratch or shadow effect.
- Check inside body and remove any dirt or particles able to damage sealing surfaces,
- Check disc, that must look without damages or wear. For "soft seat" valves anyway change PTFE insert.
- Check carefully bellows: any damage, notwithstanding minimal, requires an immediate complete bellows replacement.

Avoiding any disc damage, disassemble stem/disk/bellows from bonnet as follows:

- Remove retaining ring (42) from its housing to remove Indicator /Antirotation from its housing,
- Unscrew gland packing (13),
- Operating handweel, turn it clockwise until the stem (4) is free from bushing (11) and extract stem from bottom side of bonnet,
- Check carefully stem and bushing thread,
- Check and if necessary change any wear or damaged item.

"Soft Seat" disc

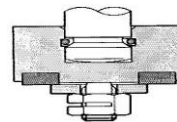


Fig. 1

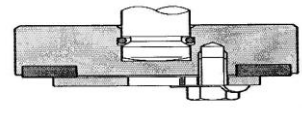


Fig. 2

Table 2			
No.	Part	No.	Part
1	Body	11	Yoke bushing
1.1	Seat	13	Packing gland
2	Bonnet	23	Stroke indicator
3	Disc / Balanced disc	42	Retaining ring
4	Threaded stem	43	Antifriction washer
6	Packing	60	Bellows/Bell
7	Handweel	61	Gaskets
8	Handweel nut	70	Connecting pin
10	Stud and bolt		

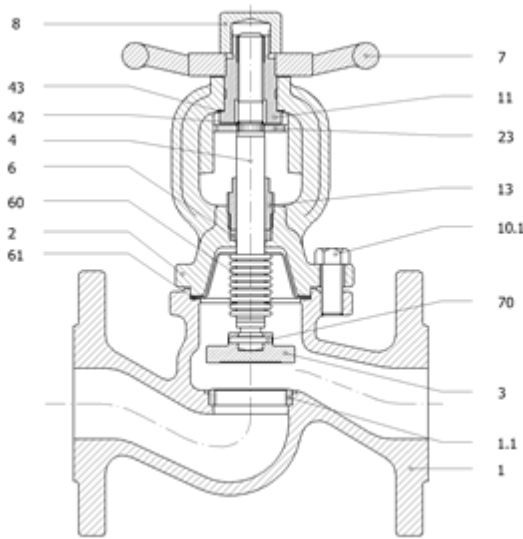


Fig. : 3

9.2 "SOFT SEAT" VALVES

"Soft seat" valves usually can be renewed to the perfect sealing on line, only changing the PTFE insert of the disc.

To perform such maintenance, operate as follows: after checking absence of damages on seat (as indicated in point 9.1), unscrew split nut or screws fixing round washer retaining PTFE insert (Fig. 1 - 2), change PTFE insert with an original spare part and replace retaining round washer and split nut or screws, stopping screws with lock washers.

If damages to seat are checked, go on as stated in point 9.3; vice versa assemble the valve as stated in point 9.4.

9.3 METAL TO METAL SEALING VALVES

If the seat inspection shows only small defects, it is possible to renew seat sealing surface lapping the seat with the special tool, suitable on request, operating as follows:

- using a 300 grit polishing paste, alternately turn clockwise and counterclockwise about 90°, softly pressing. Lift up often and turn the tool, changing its contact position with seat. Go on with lapping until any defects disappears, adding polishing paste if necessary. Clean the seat and repeat operation using a 600-800 grit polishing paste.
- remove lapping tool and clean carefully the seat, using a detergent.
- perform a test with Prussian blue, to check the perfect uniformity of the contact between seat and disc, with disc not damaged or a new disc.
- If such contact is not uniform, repeat points a), b) and c) until perfect contact is obtained.

Same procedure can be applied to repair small disc defects, lapping the disc on a perfectly flat cast iron surface.

Such lapping must be performed using a circular and spiral movement, softly and uniformly pressing the disc, repeating point from a) to d), as for seat.

If disc defect is greater, a trial to repair it can be performed machining the sealing surface of the disc on a lathe, carefully paying attention to avoid any damage to bellows or to stem.

After machining perform lapping as indicated above.

If disc defect is particularly relevant, we suggest to change disc.

9.4 BONNET AND VALVE ASSEMBLING

- Disassemble bushing(11) from bonnet (2) removing handweel nut (8) and handweel (7). Extract bushing and verify that there is no wear or damage on sliding surfaces, clean sliding surfaces and lubricate surfaces with grease suitable for valve operating condition temperature. Replace bushing, handweel and handweel nut.
- Remove from stuffing box any old packing residual and after cleaning it, check absence of any damage.
- Place a new packing and stop it screwing threaded packing gland (13): **do not screw tight it**,
- Perfectly clean surfaces housing body/bonnet sealing joints, as in bonnet side, as in the upper and lower part of the bellows flange (or bell), as on the body.

WARNING: As graphite sealing could contain metallic reinforcement, be careful to avoid any injury while handling.

e) Check stem (4) to verify:

- absence of damages to thread
- absence of scrapes or damages to the stem surface contacting packing;
- absence of damages to bushing thread.

f) Place a new sealing joint (61) between upper part of bellows flange (or bell) and bonnet,

WARNING: Used or second hand sealing joints are deformed by compression and if again used, could provoke leakages with damages to people or environment.

g) Insert stem (4) in the bonnet, carefully avoiding to damage packing when passing through with stem screwed part,

h) as stem appears on the upper part of stuffing box, insert indicator / antirotation (23) so that its notches are correctly placed in bonnet stanchion guide,

i) lift up more the stem and fit indicator antirotation hole in its stem splined housing, then fix it with the retaining ring (42),

l) lift the stem up to bushing, than start to operate on handweel, counterclockwise (opening sense) until the bellows flange (bell) reaches bonnet flange: **be careful that gasket between bellows bell and bonnet flange stays in its proper position**. Continue to operate handweel counterclockwise until indicator/antirotation reaches its "fully open" position,

m) Check cleanness of the gasket (61) housing surfaces between lower part of bellows flange (bell) and body and cleanness of body internal. Place gasket in its position and couple bonnet with body,

n) screw crossing stud nuts (10) (or screws) between body and bonnet, using a torque wrench until bolting torque stated in Table 4 is reached:

WARNING: lower bolting torque could generate leakages between body and bonnet; higher bolting torque could generate damages to gaskets and/or stress able to damage valve structure.

o) tight screw packing gland (13), open and close valve few times and again screw packing gland.

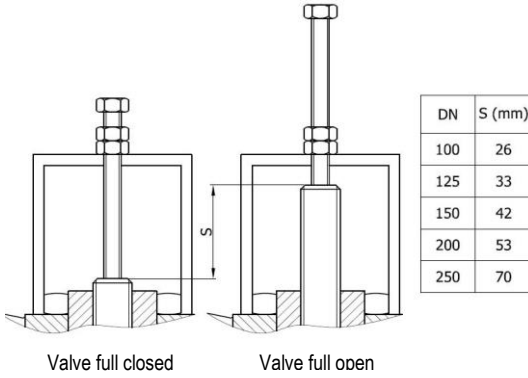
10.0 STROKE LIMITER

For sizes from DN100 to DN250 ,valves are equipped with stroke limiters as standard , shown in Fig. 4 .

By adjusting this device located on top of handwheel, stroke of stem can be adjusted and limited .

In this way, valve can be locked in closed position or adjusted at any opening ratio and any indeliberate attempt to operate valve is eliminated. Moreover, with limiter adjusted at valve full open position, valve components are protected against damage in case of handwheel is forced to further open valve.

Fig. : 4



Note : To be sure valve is full open, limiting bolt shown above should be adjusted to max. stroke (S) seen in the above table, lock nut should be tightened and never exceed this value .

Warning : When stem touches bolt, do not force handwheel excessively.

11.0 WORKING LIFE

Metal bellows sealing has been designed, tested and is granted suitable for a cycle operating life as stated by MSS-SP-117 standard, in standard operating conditions and provided that rating condition (pressure and temperature) of the valve have been respected.

Valve contains items that are subject to fair and normal wear. Therefore valve must be periodically inspected by user. Inspection time scheduling and interval must be performed by user according plant working condition, process fluid and plant knowledge and/or experience.

Always avoid any valve improper use able to generate unfair valve wear as:

- do not use a stop valve or an on-off valve as regulating valve,
- avoid in process fluid abrasive particles or piping sandblasting residual or swarf or welding dross,
- avoid water freezing in cast iron or nodular iron valves,
- do not use bellows sealed valves with fluid that can crystallize or granulate, or leaving residue sticking between bellow convolutions: this could reduce bellow stroke and/or bellow damage,
- avoid water freezing inside bellows sealed valves.

12.0 MAXIMUM ADMITTABLE WORKING TEMPERATURE

If valve has to be used in low temperature working condition, customer or end user must verify valve material fitness.

13.0 SPARES

To grant proper working of Bonetti ® BBT-L bellows valves, **only original spare parts must be used.**

Standard sealing material of BBT-L bellows valves is graphite under customer request PTFE material or other can be fitted.

14.0 WELDING AND QUALITY CONTROL

No welding is admitted on cast iron valves.

Any non destructive test must be performed by qualified personnel according to EN 473 o SNT-TC-1A.

Table 4
Bolting torque in Nm for Body/Bonnet bolting of BBT-L valves

DN	PN 16	PN 25	PN 40
15	25	30	30
20	25	30	35
25	30	35	40
32	30	35	40
40	45	45	45
50	50	50	50
65	60	70	150
80	70	80	135
100	80	80	120
125	90	100	150
150	100	100	200
200	130	130	200
250	150	150	150

15.0 FINAL WARNINGS

Preserve valve specific maintenance manual together with this manual and let them consultable by maintenance personnel.

Be sure that maintenance personnel read any part of those manuals before any use or maintenance operation.

If you have lost the manuals, please contact Valftek A.Ş. to obtain a copy.

Valftek A.Ş. shall be happy to give you any further technical information.

WARNING:

If an actuator (electrical, pneumatic or hydraulic) is fitted to operate the valve, strictly follow instructions stated by actuator manufacturer in its operation and maintenance manual.

16.0 WARRANTY

Valves are under warranty for 2 year period from invoice date against material, assembly and workmanship defects provided that they are selected, installed and used according to the instructions given in this manual.

The warranty condition is not valid if problem arises from commissioning and usage mistakes and system conditions.

Warranty condition for valves returned to Valftek with problems and complaints is decided by Valftek's technicians after inspection and tests after getting all necessary information from customers .

After sales service and spare part needs for valves sold directly and indirectly by Valftek® are provided by Valftek® .

17.0 MANUFACTURER AND SERVICE ADDRESS :

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In following Table 5 are listed residual dangers and stresses and useful skills to avoid such danger or stresses.

TABLE 5

STRESS	DANGER	CURE
Internal pressure	Internal overpressure, stated on usemechanical instability	End user must avoid to exceed pressure limits and maintenance manual
Maximum and minimum temperature	Limit exceeding	End user must avoid to exceed limit as stated on use andmaintenance manual
Fatigue	Mechanical instability.	To be analysed and calculated by end user. Under request,suitable data to calculate can be disclosed to end user.
Corrosion characteristic.	Mechanical instability. Possible fluid leakage. Bolting corrosion	End user must select proper material according fluid Under request, data concerning overthickness can be disclosedto end user Bolting is not in contact with process fluid. If standard bolting material is not suitable for the atmosphere, Customer must indicatea different material or a suitable protective surface coating (as zinc, nickel or other)
Erosion	Chemical etching while washing plantby plant washing fluid Mechanical instability. material suitablePossible fluid leakage. concerning	Avoid valve use End user must select valve type and trim in for operating condition. Under request, data overthickness can be disclosed to end user
Wear	Sealing surfaces wear and fluid containingconsequent leakages. Thickness reduction damage valve of pressure containing parts with material resistance reduction and working life reduction.	Do not partialize an on/off valve. Avoid process abrasive particles, residuals or anything able to sealing.
Fluid static pressure	Mechanical instability..	Must be analyzed and calculated by end user. Under request, suitable data to calculate can be disclosed to end user.Avoid water freezing inside bellows sealed valves Avoid bellows sealed valves use with fluid leaving crystallizing substances, deposits, scale, fouling between bellows convolutions. Such residual could limit bellows correct moving limiting the bellowsstroke.
Stress due to traffic, wind Under request,snow, hearthquake or end user. dynamic solicitation	Mechanical instability.	Must be analyzed and calculated by end user. suitable data to calculate can be disclosed to
Stress due to constraint, Under request,support, rest or other to end user.	Mechanical instability.	Must be avoided or calculated by end user. suitable data to calculate can be disclosed
External fire	Mechanical instability..	Must be avoided or prevented by end user
Shock	Breakage Water or condensate hammer steam traps and consequent damage of pressure hammer) containing parts	Must be avoided or prevented by end user (as installing in the proper plant position to avoid condensate
Low or high or not correct maintenance manualbolting torque	Leakages between body and bonnet	Strictly follow bolting torque values stated in
Thermal shock	Differential thermal expansion	Must be avoided or prevented by end user
Structure deformation prevented by end userdue to not proper stresses (absence of sustain, stressed assembling due to incorrect face to face distance or flatness)	Breakage, fluid process leakage	Must be avoided or
Use of not original spare jointsdue to not proper stresses (or used joint installation)	Process fluid leakages to environment	Must be avoided by end user
Uncleaness of housing surfaces of sealing joints after disassembling	Process fluid leakages to environment	Must be avoided by end user Carefully clean housing surfaces ofsealing joints before assembling
Mastic or glue used betweenbody and bonnet or joints	Process fluid leakages to environment	Must be avoided by end user
Housing surfaces of sealing joints corroded by chemical etching	Process fluid leakages to environment	Must be avoided by end user Carefully clean housing surfaces of sealing joints before assembling
Sealing joints not complying or useful for operating condition	Not correct sealing joints materialor dimension	Must be avoided by end user