



B.F.E S.p.A.
BONNEY FORGE
VALVE LICENSEE

USER'S MANUAL

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GLOBE VALVE OPERATION MANUAL

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1. Forewords

- 1.1 Thanks for your selection of Bonney Forge's globe valve. As a type of pressure equipment, valve has potential hazards of pressure and creation of explosive atmosphere resulting from leakage of process fluid. For the safety purpose, user shall read this instruction to know what Bonney Forge has already taken into account in our design and manufacture, and what action shall be taken by user according to essential health and safety requirements of European Directive 97/23/EC(PED) and 94/9/EC (Atex).

2. Essential health & safety requirements of PED/Atex and solution

- 2.1 What's Bonney Forge design idea
- Globe valve is designed as standard product, no consideration of each specific service condition since its too wide.
 - Globe valve is designed to BS1873, valve has adequate strength according to ASME B16.34 pressure-temperature rating. The globe valve was EC-type approved by European Notified Body.
 - Valve has different sealing materials in accordance with BS1873, which are corrosion/wear resistance to certain type of fluid.
 - Valve contains no light metal (such as Mg) and all parts are electricity conductive and connected together to prevent ignite resource.
 - Valve is designed with hand wheel, or gear operator according to its size and torque, and operation requirements.
- 2.2 Important Notice for users.
- 2.2.1 General
- 2.2.1.1 In any occurrence, first ensure personnel safety.
- 2.2.1.2 Use the valves in accordance with ASME B16.34 pressure-temperature rating.
- 2.2.1.3 Make sure that the selected valve materials are corrosion/wear resistance to the service fluid.
- 2.2.1.4 Where the service fluid is flammable/explosive, to limit the working temperature.
- 2.2.1.5 When performing Repair/maintenance operations, make sure that the valves are always depressurized, vented and drained.
- 2.2.1.6 For actuator operated valves, make sure all supply lines (Electrical, hydraulic, Air) are disconnected before starting any operation.
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2.2.1.7 When performing Repair/maintenance operations, always use appropriate protection e.g. protective clothing, (oxygen) masks, gloves, etc.

2.2.1.8 When performing Repair/maintenance operations, do not smoke, do not use any portable no-Ex-proof electrical device in the area and do not use open fire without a valid work permit.

2.2.1.9 Valve must periodically checked on:
 -Tightness of bolted connection (body/bonnet, gland, flange connection).
 -Corrosion/wear damages (crack, pitting, thickness of the valve).
 -Make sure the valves are in fully open/fully closed position.

2.2.2 Specifics

Risk	Preventive Action
Accidental contact with dangerous service fluid* Due to: Gasket or Packing Blow out	1. See 2.2.1 General
	2. Immediately replace Gasket and packing after a Blow-out (use approved/suitable materials only)
	3. Use recommended torque as in Table 11 and Table 12
Accidental contact with dangerous service fluid* during disassembly or maintenance operations	1. See 2.2.1 General
	2. After removal from the production line, open and close valve to guarantee depressurized cavity.
	3. Drain any remainder fluid or substances with suitable devices before disassembly.
Structural yielding of valves body with consequent risk of contact with dangerous service medium*, explosion or fire	1. See 2.2.1 General
	2. Create precautions to avoid additional forces on the valves
	3. Avoid absolutely water hammer: install precaution devices if necessary (e.g. brakes, anti shock devices, etc.)
	4. Avoid submitting excessive vibrations to the valves.
	5. Avoid quick Pressure and/or Temperature deviations.
Accidental contact with High or Low temperature parts	1. See 2.2.1 General
	2. Predispose apposite insulation on the valve.
	3. Alert by means of warning signs about risk of burns.
	4. For Cryogenic-/High Temperature service use only valves equipped with Cryogenic-/High Temp. Extension.
Fire or explosion in case of service with flammable fluids	1. See 2.2.1 General
	2. Install only Ex-proof electrical devices in the area

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	3. While performing maintenance in the area, shut down all electrical devices.
Explosion in case of oxygen service	1. See 2.2.1 General
	2. Install only Ex-proof electrical devices in the area
	3. Install and use only valves completely degreased.
	4. Use valves only made with materials suitable for oxygen service (see EN 1797-1)

* Dangerous service fluid as there are: Toxic-, Corrosive-, Flammable-, High- or Low temperature etc. fluid

3. Scope and Technical Parameters

3.1 Scope

The series valves are widely used in petroleum, chemical, power plant and allied industries for normal operation of pipeline system by cut off or connect the pipeline.

3.2 Technical Parameters:

Design standard: BS1873, ASME B16.34

Flange dimension: ASME B16.5

Structure length: ASME B16.10

Nominal pipeline size: 50~400 mm (2~16")

Nominal pressure: 20~150 bars (150~900LB)

Temperature range: see Table 7

Medium: see Table 7

Body material: ASTM material, see Table 5

Trim material: API 600 trim material, see Table 6

Valve testing: API598

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4.

Valve Structure

Please refer to Figure 1, Table 1 to 4 for connection and main outline dimensions.

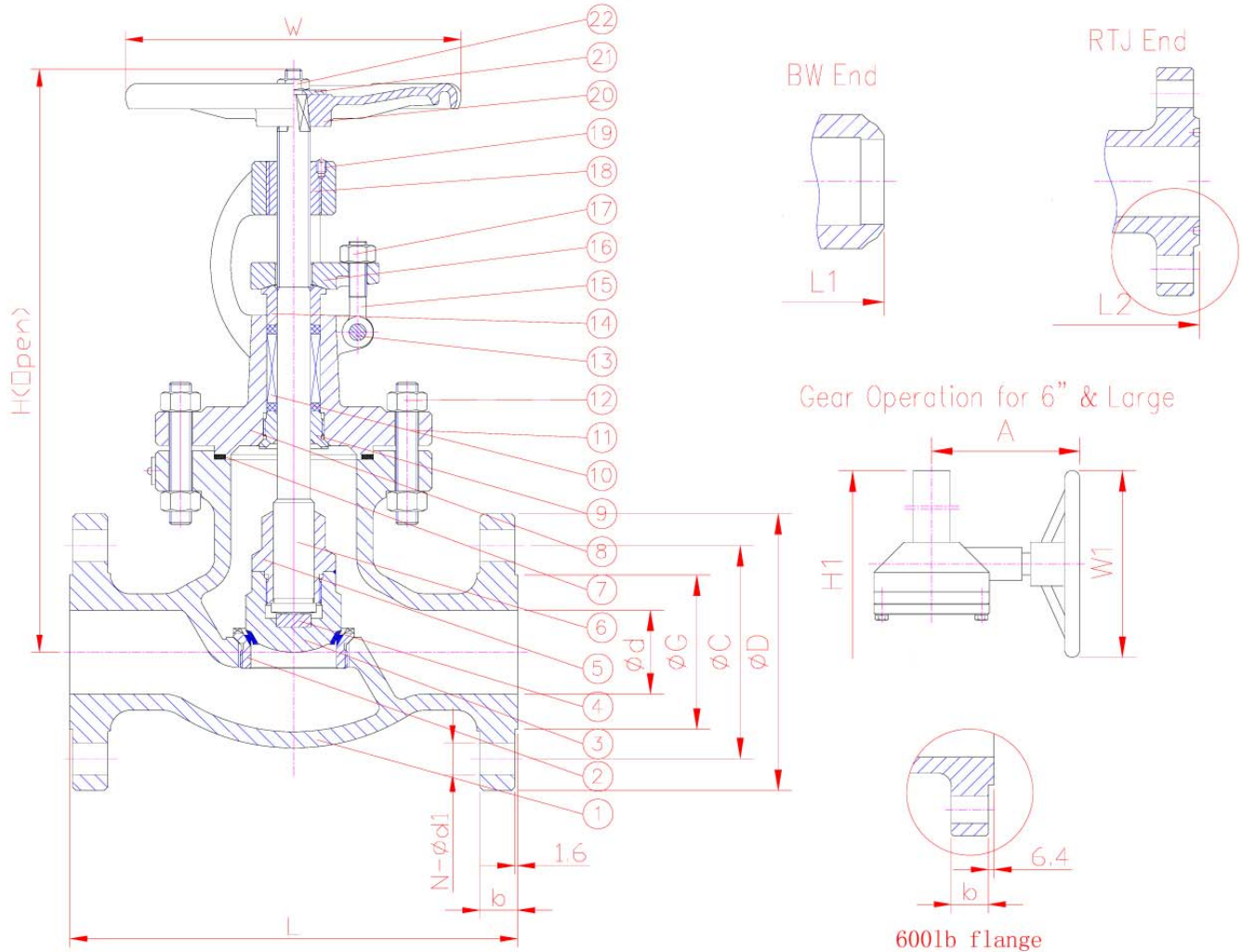


Figure 1: GLOBE STRUCTURE

Table 1 DN50~400 (2~12") 20bars(150LB) globe valve connection and outline dimensions

1501b CLASS									
NPS inch	L inch	L1 inch	L2 inch	W mm	W1 mm	H (open)	H1 (gear)	A mm	WT (RF) kg
2	8	8	8 1/2	200	—	356	—	—	21
2 1/2	8 1/2	8 1/2	9	250	—	420	—	—	30
3	9 1/2	9 1/2	10	250	—	411	—	—	37
4	11 1/2	11 1/2	12	300	—	475	—	—	57
5	14	14	14 1/2	350	—	540	—	—	78
6	16	16	16 1/2	400	305	550	580	240	100

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8	19 1/2	19 1/2	20	450	460	615	557	360	156
10	24 1/2	24 1/2	25	450	460	749	669	360	261
12	27 1/2	27 1/2	28	640	460	922	860	360	308

Table 1(Cont'd)

inch	L (mm)	d (mm)	G (mm)	C (mm)	D (mm)	b (mm)	N-d1 (mm)
2	203	51	92	120.5	152	15.9	4-19
2 1/2	216	64	105	139.5	178	17.6	4-19
3	241	76	127	152.5	190	19.1	4-19
4	292	102	157	190.5	229	23.9	8-19
5	356	127	186	216	254	23.9	8-22
6	406	152	216	241.5	279	25.4	8-22
8	495	203	270	298.5	343	28.5	8-22
10	622	254	324	362	406	30.3	12-25
12	698	305	381	432	483	31.8	12-25

Table 2: DN50~300 (2~10") 50bars(300LB) globe valve connection and outline dimensions
3001b CLASS

NPS inch	L Inch	L1 inch	L2 inch	W mm	W1 mm	H (open)	H1 (gear)	A mm	WT (RF) kg
2	10 1/2	10 1/2	11 1/8	200	—	384	—	—	31
2 1/2	11 1/2	11 1/2	12 1/8	250	—	460	—	—	44
3	12 1/2	12 1/2	13 1/8	300	305	450	480	240	55
4	14	14	14 5/8	350	305	515	545	240	84
5	15 3/4	15 3/4	16 3/8	400	—	570	—	—	110
6	17 1/2	17 1/2	18 1/8	450	305	618	648	240	150
8	22	22	22 5/8	500	460	740	770	360	225
10	24 1/2	24 1/2	25 1/8	610	610	1049	1078	411	385

Table 2(Cont'd)

inch	L (mm)	d (mm)	G (mm)	C (mm)	D (mm)	b (mm)	N-d1 (mm)
2	267	51	92	127	165	22.4	8-19
2 1/2	292	64	105	149.5	190	25.4	8-22
3	318	76	127	168	210	28.5	8-22
4	356	102	157	200	254	31.8	8-22

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5	400	127	186	235	279	35.1	8-22
6	444	152	216	270	318	36.6	12.22
8	559	203	270	330	381	41.2	12-25
10	622	254	324	387.5	444	47.8	16-29

Table 3: DN50~300 (2~8") 100bars(600LB) globe valve connection and outline dimensions

6001b CLASS									
NPS inch	L inch	L1 inch	L2 inch	W mm	W1 mm	H (open)	H1 (gear)	A mm	WT (RF) kg
2	11 1/2	11 1/2	11 5/8	250	—	453	—	—	45
2 1/2	13	13	13 1/8	300	—	546	—	—	64
3	14	14	14 1/8	350	—	563	—	—	78
4	17	17	17 1/8	400	305	658	688	240	135
5	20	20	20 1/8	500	—	715	—	—	212
6	22	22	22 1/8	560	460	788	870	240	327
8	26	26	26 1/8	—	610	—	940	413	434

Table 3(Cont'd)

inch	L (mm)	d (mm)	G (mm)	C (mm)	D (mm)	b (mm)	N-d1 (mm)
2	292	51	92	127	165	25.4	8-19
2 1/2	330	64	105	149.5	190	28.5	8-22
3	356	76	127	168	210	31.8	8-22
4	432	102	157	216	273	38.1	8-25
5	508	127	186	266.5	330	44.5	8-29
6	559	152	216	292	356	47.8	12-29
8	660	200	270	349	419	55.7	12-32

5. Main Parts and Material

The user or the pipeline system designer must select valve body material and the class according to the working temperature, working pressure, the type of fluid and standard temperature-pressure rating as specified in ASME B16.34. The manufacturer takes only the responsibilities for use the order material and the valve class, no responsibility for incoherence of user selected material and valve class with the working condition.

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Table5: Valve main parts and material

No Parts Name	Materials								
1 Body	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351 CF8	ASTM A351 CF8M	ASTM A351 CF3	ASTM A351 CF3M
7 Gasket	150~600LB, STAINLESS STEEL WINDING GASKET 900~1500LB, METAL GASKET								
8 Bonnet	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351 CF8	ASTM A351 CF8M	ASTM A351 CF3	ASTM A351 CF3M
	GRAPHITE								
10 Packing									
11 Bolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8			
12 Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8			
14 packing Grand	ASTM A276 420								
15 Eyebolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8			
16 Grand flange	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351 CF8			
17 Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8			
18 Stem nut	ASTM A439-D2								
20 Hand-wheel	DUCTILEIRON								

Table6: Common used trim material

API 600 Trim No.	Seat ring	Disc sealing	Stem	Back seat	Lantern ring
1	ER410	ER410	ASTM A182 F6a	ASTM A182 F6a	ASTM A182 F6a
2	304	304	ASTM A182 F304	ASTM A182 F304	ASTM A182 F304
5	STL	STL	ASTM A182 F6a	ASTM A182 F6a	ASTM A182 F6a
8	STL	ER410	ASTM A182 F6a	ASTM A182 F6a	ASTM A182 F6a
9	Monel	Monel	Monel	Monel	Monel
10	316	316	ASTM A182 F316	ASTM A182 F316	ASTM A182 F316
12	STL	316	ASTM A182 F316	ASTM A182 F316	ASTM A182 F316

Table7: body material suitable for fluid and temperature range

	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351-CF8	ASTM A351-CF8M	ASTM A351-CF3	ASTM A351-CF3M
RECOMMEND TEMPERATURE LIMITS	-29~427 (T2~T6) EN13463-2001(E)	-46~343 (T2~T6) EN13463-2001(E)	-46~343 (T2~T6) EN13463-2001(E)	-29~593 (T1~T6) EN13463-2001(E)	-29~593 (T1~T6) EN13463-2001(E)	-29~537 (T1~T6) EN13463-2001(E)	-29~537 (T1~T6) EN13463-2001(E)	-29~427 (T2~T6) EN13463-2001(E)	-29~454 (T1~T6) EN13463-2001(E)
APPLICATION	STEAM, WATER, OIL VAPOUR, GAS and GENERAL SERVICE	LOW TEMPERATURE SERVICE STEAM, WATER, OIL VAPOUR, GAS		HIGH TEMPERATURE SERVICE STEAM, WATER, OIL VAPOUR, GAS		HIGH and LOW TEMPERATURE SERVICE CORROSION RESISTANCE			

Note: where the process fluid is flammable/explosive, it must limit the working temperature of the pipeline system.

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6. **Working Principle and Structure Description**

6.1 Working principle

The series is globe valves. When hand-wheel rotate clockwise, the disc descends and the valve shuts off; when rotate counter clockwise, the disc ascends and the valve opens.

6.2 Structure description

6.2.1 Flange end or but welding end may be selected as to purchaser optimum.

6.2.2 Packing seal structure and flexible graphite combination packing is used for the series valve.

6.2.3 Class 150LB to 600LB valves use stainless steel graphite winding gasket and 900LB valves use loop metal gasket.

6.2.4 Cone sealing is used for the valve and the seal material is selected to API 600 or to the customer requirements.

6.2.5 For big valve, hand-wheel is replaced by gear operator, electric actuator, hydraulic or pneumatic actuator that shall conform to associated EC Directive and bear CE marking.

7. **Valve Transportation**

Valves are heavy and metal products, care shall be taken to avoid physical injury during transportation. Cord and lift device and transportation tool shall be ready, valve package inspected and broken package repaired. Packaging shall conform to specification requirements, it is forbidden to rotate the hand-wheel when valve is packaged. Valve shall be in full-close status. For mis-opened valve, the sealing surface shall be cleaned and valve re-closed and ends of bore blocked. Actuator and valve shall be packaged separately.

During transportation or lifting, cord shall be tied to the yoke, no tied to the hand-wheel or stem. Valve shall be handled with care, no bump to other thing.

The paint, nameplate and flange sealing surface shall be protected during transportation, no drag valve on the ground especially with the end sealing surface contacted the ground.

Don't unpack when the valve is not ready for installation at the construction field. The valve shall be placed at a safety location against weather.

8. **Valve Storage**

8.1 Valve shall be stored in air and dry room with bore blanked for protection.

8.2 Long-time-stored valve shall be re-inspected prior to use. Close attention shall be paid against sealing damage when removal of dirties for the cleanness of sealing surface. Of necessary, valve shall be pressure tested once more.

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9. Valve Installation

Carefully check valve identification against valve specifications before installation. Always keep the fluid flow direction with the arrow identified on the body.

- 9.1 Check the inside of bore and the sealing surface before installation, any attached dirty shall be removed with clean soft cloth.
- 9.2 Check the operational of actuator to prevent block before installation.
- 9.3 Valve operation device is recommended to be installed at location 1.2m from the ground for convenient of operation. Where the center of valve and the hand-wheel is over 1.8m from the ground, a platform shall be built for the frequently operated valve. For pipeline with numbers of valves, valves shall be installed on the same platform as likely as possible for convenient of operation.
For single valve installed at location over 1.8m and less operated, apparatus may be used such as chain-wheel, extension bar, move platform and move ladder etc. Where valve is installed underground, extension bar or ground-well shall be set. For safety reason, the ground-well shall be covered.
- 9.4 For valve installed on horizontal pipeline, the stem is suitable at uprightness position; or, the downward stem shall be inconvenience for operation and maintenance, as well the valve is liable to corrosion. If the ground valve slant installed, operation and maintenance shall also be inconvenience.
- 9.5 When valves are installed in pipeline side by side, enough space shall be considerate for operation, maintenance and dismantle. The clearance of hand-wheels shall not less than 100mm; in case of narrow clearance, valves shall be installed interleaving.
- 9.6 For valve with flange end, user shall select proper bolt, gasket according to the working temperature, working pressure and fluid, equally fasten the bolts and nuts. Bolt shall be with full thread and 8UN serial thread shall be used for bolt over 1 inch in diameter.
- 9.7 For valve with butt-welding end, user shall perform welding and post welding heat treatment using qualified WPS and welder in accordance with the requirements of ASME B31.3.

10. Valve Operation and Maintenance

- 10.1 After installation and for the pressure test of the pipeline or the system, the disc must be fully opened. It is not recommended to use the valve as adjustment of flow rate or emergent pressure relief blow-off. Bonney Forge is not responsible for damage, loss or expense arising out of such usage.
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- 10.2 Usually globe valves have no heat insulation structure, never touch the surface of valves to prevent burn when the valve has a high/low surface temperature.
- 10.3 Dust, grease and medium residual trend to accumulate at the surfaces of body, and moving parts such as stem, gearbox, the guide of yoke etc., wear and erode the valve, and even generate friction heat that is dangerous in explosive atmosphere, and shall be cleaned frequently according to the working conditions.
- 10.4 The thickness of body and bonnet must be checked at an interval of every three months. Where the thickness is less than value in Table8, the valve must be scrapped.

Table 8: Body minimum wall thickness

	20bars 150lb	50bars 300lb	100bars 600lb	150bars 900lb	250bars 1500lb	420bars 2500lb
DN50(2")	5.59	6.35	6.35	7.88	11.18	15.75
DN65(2-1/2")	5.59	6.35	7.12	8.64	12.70	19.05
DN80(3")	5.59	7.12	7.88	10.42	15.75	22.36
DN100(4")	6.35	7.88	9.40	12.70	20.58	27.69
DN125(5")	7.12	8.64	11.18	15.00	23.12	34.04
DN150(6")	7.12	9.66	12.70	18.29	27.69	40.39
DN200(8")	7.88	11.18	15.75	22.36	35.82	52.33
DN250(10")	8.64	12.70	19.05			
DN300(12")	9.66	14.23	23.12			
DN350(14")	10.42	15.75	24.64			
DN400(16")	11.18	17.53	27.69			
DN450(18")	11.94					

- 10.5 After put into service, valve shall be checked and maintained periodically especially for the situation of sealing surfaces and worn, the age of packing and the corrosion of body. In case of such situation, valve shall be repaired or replaced. It is suggested that inspection and maintenance of valve shall be perform every three months provided the fluid is water or oil, every month or to local law provided the fluid is strong corrosive.
- 10.6 After reparation, valve shall be re-assembled and adjusted using recommended torque as listed in Table 9 and Table 10. After reassembly, valve shall be pressure tested.

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Table 9: Recommended torque for flange connection bolting

Thread size	Torque (N.M)	Thread size	Torque (N.M)
1/2-13UNC	50~60	1-1/4 -8UN	850~1000
9/16-12 UNC	70~80	1-3/8-8 UN	1100~1300
5/8-11 UNC	100~130	1-1/2-8 UN	1400~1800
3/4-10 UNC	160~210	1-5/8-8 UN	1800~2200
7/8-9 UNC	280~330	1-3/4-8 UN	2200~2600
1-8 UNC	420~500	1-7/8-8 UN	2800~3300
1-1/8-8 UN	500~600	2-8 UN	3500~4200

Table 10: Recommended torque for stuff box bolting

Thread size	Torque (kg.m)	Torque (N.M)	Thread size	Torque (kg.m)
3/8	1.1~2.5	10~20	3/4	9.3~11.5
1/2	2.1~3.4	20~30	7/8	13.4~16.0
9/16	3.1~4.6	30~40	1	16.5~19.5
5/8	5.1~6.5	50~60	1-1/8	22.5~26.5

- 10.7 When performing Repair/maintenance operations, user shall use valve packing, gasket, bolt and nut of the same size and material as the original one. Valve packing and gasket may be ordered as spare parts for maintenance and replacement. It is forbidden to open the bonnet or replace the bolt, nut or packing when the valve contains pressure. After replacement of packing, gasket, bolt and nut, valve shall be closure test prior to reuse.
- 10.8 User may repair the valve-sealing surface providing a successful closure test is performed and the sealing is ok.
- 10.9 Generally valve trim prefers replacement to reparation. It is better to use provided part as replacement. If part produced by valve manufacturer is not available due to emergency, user shall produce the part to Bonney Forge's technical documentation. Bonney Forge takes no responsibility for loss caused out of part produced other than Bonney Forge.
- 10.10 It is not recommended for reparation of valve pressure-containing part by user. If the pressure-containing part is used for a long time and consequently defection occurs and affect safety use, user shall replace the valve with a new one.
- 10.11 Welding repair on valve online is forbidden.
The online valve shall not be knocked, walked on or used as weight support.
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11. Potential Failure and Troubleshooting

Failure (risk)	Cause	Troubleshooting
Leakage of packing	<ol style="list-style-type: none"> 1. Gland flange nuts loose 2. Rings of packing not enough 3. Packing aged or failure 4. Stem sealing damaged 	<ol style="list-style-type: none"> 1. Equally tighten eyebolt nuts 2. Add packing 3. Replace packing 4. Stem shall be maintained periodically by reparation or replacement conjunction with the maintenance of pipeline facilities
Leakage between sealing surfaces	<ol style="list-style-type: none"> 1. Dirties between sealing surfaces 2. Sealing surfaces damaged 	<ol style="list-style-type: none"> 1. Clean sealing surface 2. Repair the sealing surfaces
Operation failure	<ol style="list-style-type: none"> 1. Packing too tight 2. Thread of stem nut over worn 3. Stem bent 4. Foreigner existence between stem and stem nut or gland or gland flange 	<ol style="list-style-type: none"> 1. Proper loose gland flange nuts 2. Replace stem nut 3. Rectify or replace stem 4. Clean foreign matter
Leakage between bonnet flanges	<ol style="list-style-type: none"> 1. Bonnet bolts loose 2. Bonnet gasket failure 	<ol style="list-style-type: none"> 1. Proper tighten bonnet nuts 2. Replace bonnet gasket
Body and bonnet broken and leaked	<ol style="list-style-type: none"> 1. Water hammer 2. Fatigue 3. Freezing broken 	<ol style="list-style-type: none"> 1. Carefully operation to prevent suddenly stopping pumping and rapidly shutting. 2. Replace valve that exceeds guarantee period or is found with early fatigue defection 3. Drain away water in winter when valve is not used

12. Quality Warrant

- 12.1 Bonney Forge warrants its valves to the original purchaser for a period of 18 months from and after the date of delivery to the original customer, against defects in material and workmanship under proper and normal use and service and not caused of resulting from improper application or usage, improper installations, improper maintenance and repairs, modifications or alterations.
- 12.2 Purchaser shall give notice to Bonney Forge upon finding of any defect or assuming defect, Bonney Forge has privilege to check the facts of the defect.
- 12.3 Bonney Forge sole obligation under this warranty shall be limited to the follows:
- repair of the material or,
 - replacement of the parts and materials or,
 - refund the purchase price or collect the defected products from the original purchaser.
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- 12.4 Bonney Forge is not responsible to claims caused from unexpected natural disaster such as earthquake, typhoon of any kind arising out of the defect.
- 12.5 The scope and limitation of warranty can be changed through the agreement between Bonney Forge and purchaser.
- 13. Servicing**
- 1.1 Where contractually specified, Bonney Forge may provide field installation and adjustment.
- 13.2 Bonney Forge will trace the quality of sold valve and provide service to customer requirements..
-