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GATE VALVE OPERATION MANUAL

1. Forewords

1.1 Thanks for your selection of Bonney Forge's gate 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

-Gate valve are designed as standard product, no consideration of each specific service condition since its too wide.

-Gate valve is designed to API 600, valve has adequate strength according to ASME B16.34 pressure-temperature rating. The gate valve was EC-type approved by European Notified Body.

-Valve has different sealing materials in accordance with API 600, 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 or electric actuator 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.

2.2.1.7 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 opened/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
	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 shut off or connection of pipeline.

3.2 Technical Parameters:

Design standard: API600, ASME B16.34
Flange dimension: ASME B16.5
Structure length: ASME B16.10
Nominal pipeline size: 50~600 mm (2~24")
Nominal pressure: 20~100 bars (150~600LB)
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

4. Valve Structure

Please refer to Figure 1, connection dimension and mainly outline dimension refer to Table 1 to 3 .

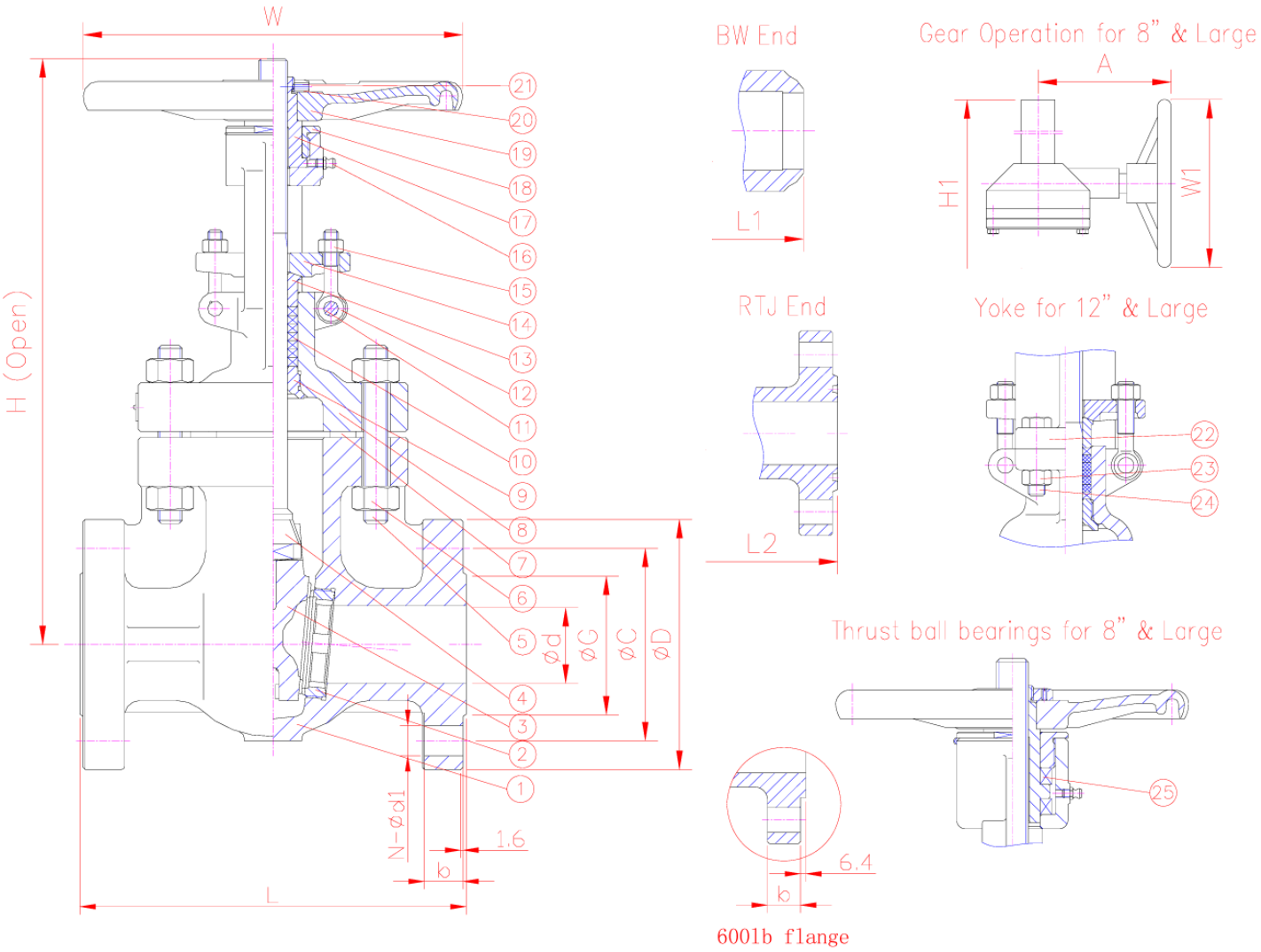

Figure1： gate valve structure

Table 1： DN50~650（2~24”） 20bars(150LB) gate valve connection and outline dimensions

1501b CLASS

NPS	L	L1	L2	W	W1	H	H1	A	WT(RF)
inch	inch	inch	inch	mm	mm	(open)	(gear)	mm	kg
2	7	8 1/2	7 1/2	200	-	423	-	-	21
2 1/2	7 1/2	9 1/2	8	200	-	495	-	-	28
3	8	11 1/8	8 1/2	250	-	520	-	-	36
4	9	12	9 1/2	250	-	596	-	-	53
5	10	15	10 1/2	250	-	711	-	-	60
6	10 1/2	15 7/8	11	300	-	759	-	-	84
8	11 1/2	16 1/2	12	350	305	995	1070	220	139
10	13	18	13 1/2	400	305	1180	1289	220	201

12	14	19 3/4	14 1/2	500	305	1432	1509	220	320
14	15	22 1/2	15 1/2	500	310	1535	1614	360	430
16	16	24	16 1/2	600	310	1811	1840	360	548
18	17	26	17 1/2	640	460	2009	2012	360	744
20	18	28	18 1/2	650	460	2230	2180	411	1117
24	20	32	20 1/2	750	460	2641	2560	411	1466

Table 1（Cont'd）

inch	L	d	G	C	D	b	N-d1
2	178	51	92	120.5	152	15.9	4-19
2 1/2	190	64	105	139.5	178	17.6	4-19
3	203	76	127	152.5	190	19.1	4-19
4	229	102	157	190.5	229	23.9	8-19
5	254	127	186	216	254	23.9	8-22
6	267	152	216	241.5	279	25.4	8-22
8	292	203	270	298.5	343	28.5	8-22
10	330	254	324	362	406	30.3	12-25
12	356	305	381	432	483	31.8	12-25
14	381	337	413	476	533	35.1	12-29
16	406	387	470	539.5	597	36.6	16-29
18	432	438	533	578	635	39.7	16-32
20	457	489	584	635	698	43	20-32
24	508	591	692	739.5	813	47.8	20-35

Table 2：DN50~650（2~24"） 50bars(300LB) gate valve connection and outline dimensions

300lb CLASS

NPS	L	L1	L2	W	W1	H	H1	A	WT(RF)
inch	inch	inch	inch	mm	mm	(open)	(gear)	mm	kg
2	8 1/2	8 1/2	9 1/8	200	-	430	-	-	28
2 1/2	9 1/2	9 1/2	10 1/8	200	-	525	-	-	36
3	11 1/8	11 1/8	11 3/4	250	-	555	-	-	51
4	12	12	12 5/8	250	305	620	647	220	78
5	15	15	15 5/8	350	-	790	-	-	107
6	15 7/8	15 7/8	16 1/2	350	305	805	835	220	144

8	16 1/2	16 1/2	17 1/8	400	305	1005	1035	220	228
10	18	18	18 5/8	450	305	1230	1272	220	320
12	19 3/4	19 3/4	20 3/8	500	460	1465	1479	267	450
14	30	30	30 5/8	640	460	1575	1630	360	694
16	33	33	33 5/8	640	460	1758	1815	360	1080
18	36	36	36 5/8	680	540	1974	2011	360	1235
20	39	39	39 3/4	760	540	2167	2225	411	1655
24	45	45	45 7/8	900	610	2837	2667	411	2320

Table 2（Cont'd）

inch	L	d	G	C	D	b	N-d1
2	216	51	92	127	165	22.4	8-19
2 1/2	241	64	105	149.5	190	25.4	8-22
3	283	76	127	168	210	28.5	8-22
4	305	102	157	200	254	31.8	8-22
5	381	127	186	235	279	35.1	8-22
6	403	152	216	270	318	36.6	12.22
8	419	203	270	330	381	41.2	12-25
10	457	254	324	387.5	444	47.8	16-29
12	502	305	381	451	521	50.8	22-25
14	762	337	413	514.5	584	53.9	20-32
16	838	387	470	571.5	648	57.2	20-35
18	914	432	533	628.5	711	60.5	24-35
20	991	483	584	686	775	63.5	24-35
24	1143	584	692	813	914	69.9	24-41

Table 3：DN50~250（2~10"） 100bars(600LB) gate valve connection and outline dimensions

6001b CLASS									
NPS	L	L1	L2	W	W1	H	H1	A	WT(RF)
inch	inch	inch	inch	mm	mm	(open)	(gear)	mm	kg
2	11 1/2	11 1/2	11 5/8	250	-	465	-	-	41
2 1/2	13	13	13 1/8	250	-	532	-	-	57
3	14	14	14 1/8	250	-	555	-	-	72
4	17	17	17 1/8	350	-	685	-	-	128
5	20	20	20 1/8	400	-	795	-	-	200
6	22	22	22 1/8	450	305	910	1155	240	266
8	26	26	26 1/8	500	460	1145	1175	260	419
10	31	31	31 1/8	600	610	1268	1330	320	754

Table 3（Cont'd）

inch	L	d	G	C	D	b	N-d1
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
10	787	248	324	432	508	63.5	16-35

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 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.

Table 5: Main parts and material of valve

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
5	Bolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8			
6	Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8			
7	gasket	150:316 GRAPHITE CORRUGATED; 300~600LB, SPIRAL S.S GRAPHITE ; 900LB, 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
10	Packing	GRAPHITE								
12	Eyebolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8			
13	Grand	ASTM A276 420								

14 Grand flange	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351 CF8
15 Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8
16 Grease fitting	CARBON STEEL					STAINLESS STEEL
17 Stem nut	ASTM A439-D2					
18 SLEEVE NUT	CARBON STEEL					ASTM A276 304
19 hand-wheel	DUCTILEIRON					
20 Hand-wheel nut	CARBON STEEL					ASTM A276 304
22 Yoke	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351 CF8
23 Bolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8
24 Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8
25 Thrust bearing	STEE					

Table 6: 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

Table 7：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	-29~427	-46~343	-46~343	-29~593	-29~593	-29~537	-29~537	-29~427	-29~454

TEMPERATURE LIMITS	(T2~T6) EN13463-2001(E)	(T2~T6) EN13463-2001(E)	(T2~T6) EN13463-2001(E)	(T1~T6) EN13463-2001(E)	(T1~T6) EN13463-2001(E)	(T1~T6) EN13463-2001(E)	(T1~T6) EN13463-2001(E)	(T2~T6) EN13463-2001(E)	(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.

6. Working Principle and Structure Description

6.1 Working principle

The series valve is straight pattern one. When hand-wheel rotate clockwise, the gate descends and the valve shuts off; when rotate counter clockwise, the gate 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 valves use a reinforced flexible graphite gasket while 300 to 600LB valves use spiral S.S graphite gasket and 900LB valves use loop metal gasket.

6.2.4 Wedge seal 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 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 rain and dust.

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.

9. Valve Installation

9.1 Carefully check valve identification against valve specifications before installation.

9.2 Check the inside of bore and the sealing surface before installation, any attached dirty shall be removed with clean soft cloth.

9.3 Check the sensibility of actuator to prevent block before installation.

9.4 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.

9.5 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.

9.6 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.

9.7 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.

9.8 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 wedge must be fully opened or fully closed. It is not recommended to partly open the valve for 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.

10.2 Usually gate valves have no heat insulation structure, never touch the surface of valves to prevent burn when the process fluid has a high/low working 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 to ensure safety operation at an interval of three months. Where the thickness is less than value in Table10, the valve must be scrapped.

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.

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	26.93	43.69	65.79
DN300(12”)	9.66	14.23	23.12	31.75	50.80	76.97
DN350(14”)	10.42	15.75	24.64	35.06	55.63	
DN400(16”)	11.18	17.53	27.69	39.63	63.50	
DN450(18”)	11.94	19.05	31.00			
DN500(20”)	12.70	20.58	34.04			
DN600(24”)	14.48	23.88	40.39			

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.

Table 9 Recommended torque for flange connection bolting

Thread size	Torque (kg.m)	Thread size	Torque (kg.m)
1/2-13UNC	9.7~11.6	1-1/8-8 UN	114.3~137.1
9/16-12 UNC	13.7~18.4	1-1/4 -8UN	161.2~193.5
5/8-11 UNC	19.4~23.3	1-3/8-8 UN	219.~263.3
3/4-10 UNC	32.7~39.2	1-1/2-8 UN	291.8~350.2
7/8-9 UNC	52~62.4	1-5/8-8 UN	379.6~455.5
1-8 UNC	79.6~95.5		

Table 10 Recommended torque for stuff box bolting

Thread size	Torque (kg.m)	Thread size	Torque (kg.m)
3/8	1.1~2.5	3/4	9.3~11.5
1/2	2.1~3.4	7/8	13.4~16.0
9/16	3.1~4.6	1	16.5~19.5
5/8	5.1~6.5	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.

10.12 The online valve shall not be knocked, walked on or used as weight support.

11. Potential Failure and Troubleshooting

Failure (risk)	Cause	Troubleshooting
Leakage of packing	1. Gland flange nuts loose 2. Rings of packing not enough 3. Packing aged or failure 4. Stem sealing damaged	1. Equally tighten eyebolt nuts 2. Add packing 3. Replace packing 4. Stem shall be maintained periodically
Leakage between sealing surfaces	1. Dirties between sealing surfaces 2. Sealing surfaces damaged	1. Clean sealing surface 2. Repair the sealing surfaces
Operation failure	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	1. Proper loose gland flange nuts 2. Replace stem nut 3. Rectify or replace stem 4. Clean foreign matter
Leakage between bonnet flanges	1. Bonnet bolts loose 2. Bonnet gasket failure	1. Proper tighten bonnet nuts 2. Replace bonnet gasket
Body and bonnet broken and leaked	1. Water hammer 2. Fatigue 3. Freezing broken	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
Disc failed to open	1.Disc blocked in the body. 2.Stem is overheated and blocks the disc.	1.Use proper torque 2.When the valve is closed and the pipeline is heated, rotate the hand-wheel some bit counter clockwise for unload at interval.

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.

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.

Bonney Forge will trace the quality of sold valve and provide service to customer requirements.