

Check Valves

Operation Instruction

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PREPARED BY _____ DATE _____

REVIEWED BY _____ DATE _____

APPROVED BY _____ DATE _____

Document change records

Rev. No.	Rev. Page/ Section	Change Description	Effect. Date	Rev. Sheet No.
A/0	All	First issue	2018/3/19	

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1. General

- 1.1 Thanks for your selection of Geko's check 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 Geko 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 Geko design idea
- Check valve are designed as standard product, no consideration of each specific service condition since its too wide.
 - Check valve is designed to BS1868, valve has adequate strength according to ASME B16.34 pressure-temperature rating. The check valve was EC-type approved by European Notified Body.
 - Valve has different sealing materials in accordance with BS1868, 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.
- 2.2 What action user shall taken
- 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 When performing Repair/maintenance operations, always use appropriate protection e.g. protective clothing, (oxygen) masks, gloves, etc.
- 2.2.1.7 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.
- 2.2.1.8 Valve must periodically checked on:
- Tightness of bolted connection (body/bonnet, flange connection).
 - Corrosion/wear damages (crack, pitting, thickness of the valve).

2.2.2

Specifics

Risk	Preventive Action
Accidental contact with dangerous service fluid* Due to: Gasket Blow out	1. See 2.2.1 General
	2. Immediately replace Gasket after a Blow-out (use approved/suitable materials only)
	3. Use recommended torque as in Table 11
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 normal operation of pipeline system against converse movement of fluid

3.2 Technical Parameters:

Design standard: BS1868, ASME B16.34
 Flange dimension: ASME B16.5
 Structure length: ASME B16.10
 Nominal pipeline size: 50~750 mm (2~30")
 Nominal pressure: 20~420 bars (150~2500LB)

Temperature range: see Table 9

Medium: see Table 9

Body material: ASTM material, see Table 7

Trim material: API 600 trim material, see Table 8

Valve testing: API598

4. Valve Structure

Please refer to Figure 1 and 2 for valve structure, Table 1 to 6 for connection and main outline dimensions.

Table1 DN50~750(2~30") 20bars(150LB) check valve connection and outline dimensions

DN	L	d	G	C	D	B	n-d1	H	Weigh kg
50	203	51	92	120.5	152	15.9	4-19	151	14
65	216	64	105	139.5	178	17.6	4-19	168	20
80	241	76	127	152.5	190	19.1	4-19	171	25
100	292	102	157	190.5	229	23.9	8-19	204	40
125	330	127	186	216	254	23.9	8-22	230	56
150	356	152	216	241.5	279	25.4	8-22	297	71
200	495	203	270	298.5	343	28.5	8-22	352	118
250	622	254	324	362	406	30.3	12-25	390	177
300	699	305	381	432	483	31.8	12-25	438	263
350	787	337	413	476	533	35.1	12-29	477	353
400	864	387	470	539.5	597	36.6	16-29	525	542
450	978	438	533	578	635	39.7	16-32	582	632
500	978	489	584	635	698	43	20-32	627	855
550	1067	540	641	692	750	46	20-35	751	914
600	1295	591	692	739.5	813	47.8	20-35	880	970
700	1448	692	800	863.5	927	71.4	24-35	935	1600
750	1524	743	857	914.5	984	74.7	28-35	970	1990

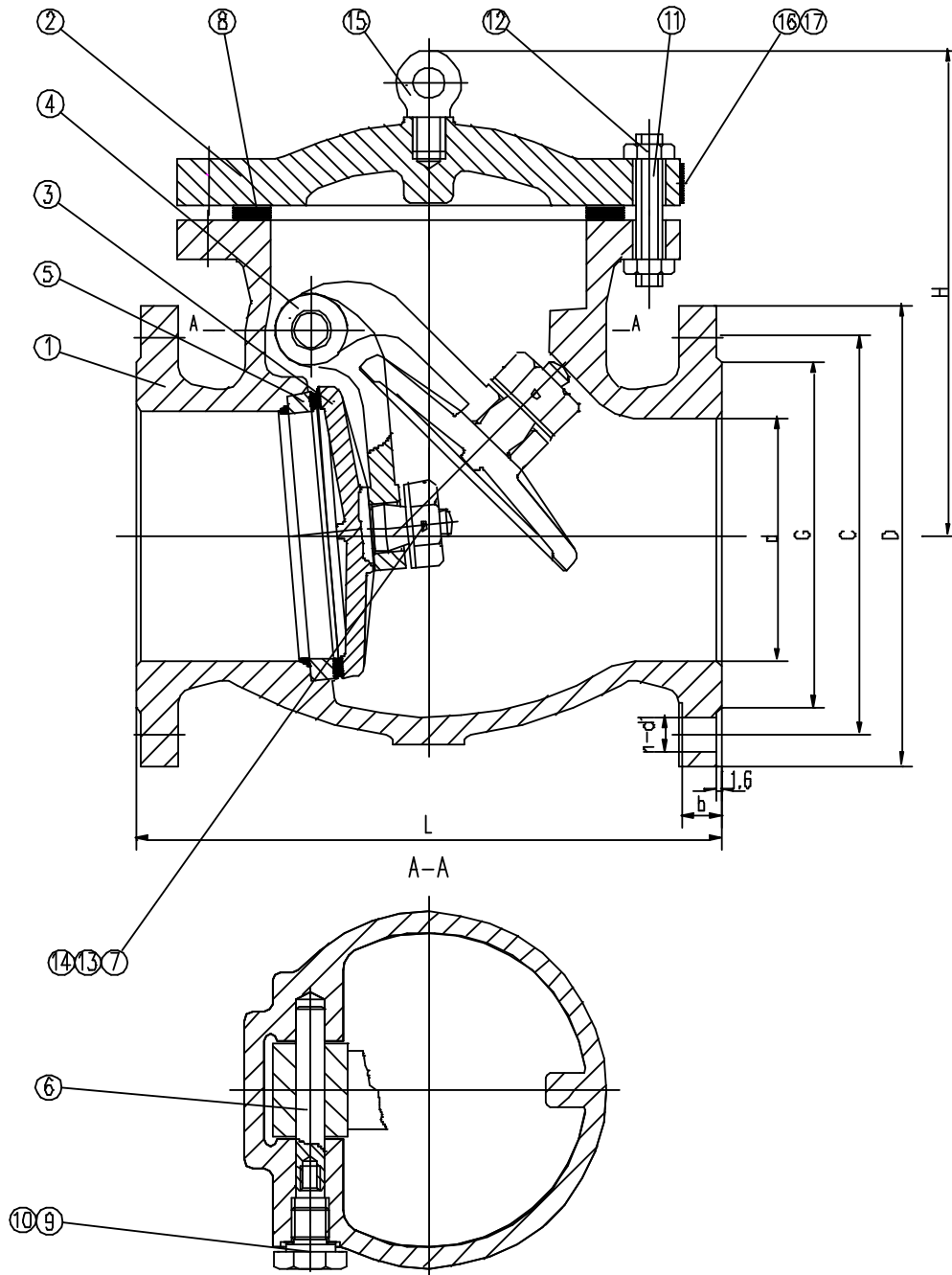


Fig 1: 20,50,100bars(150,300,600LB) check valve structure

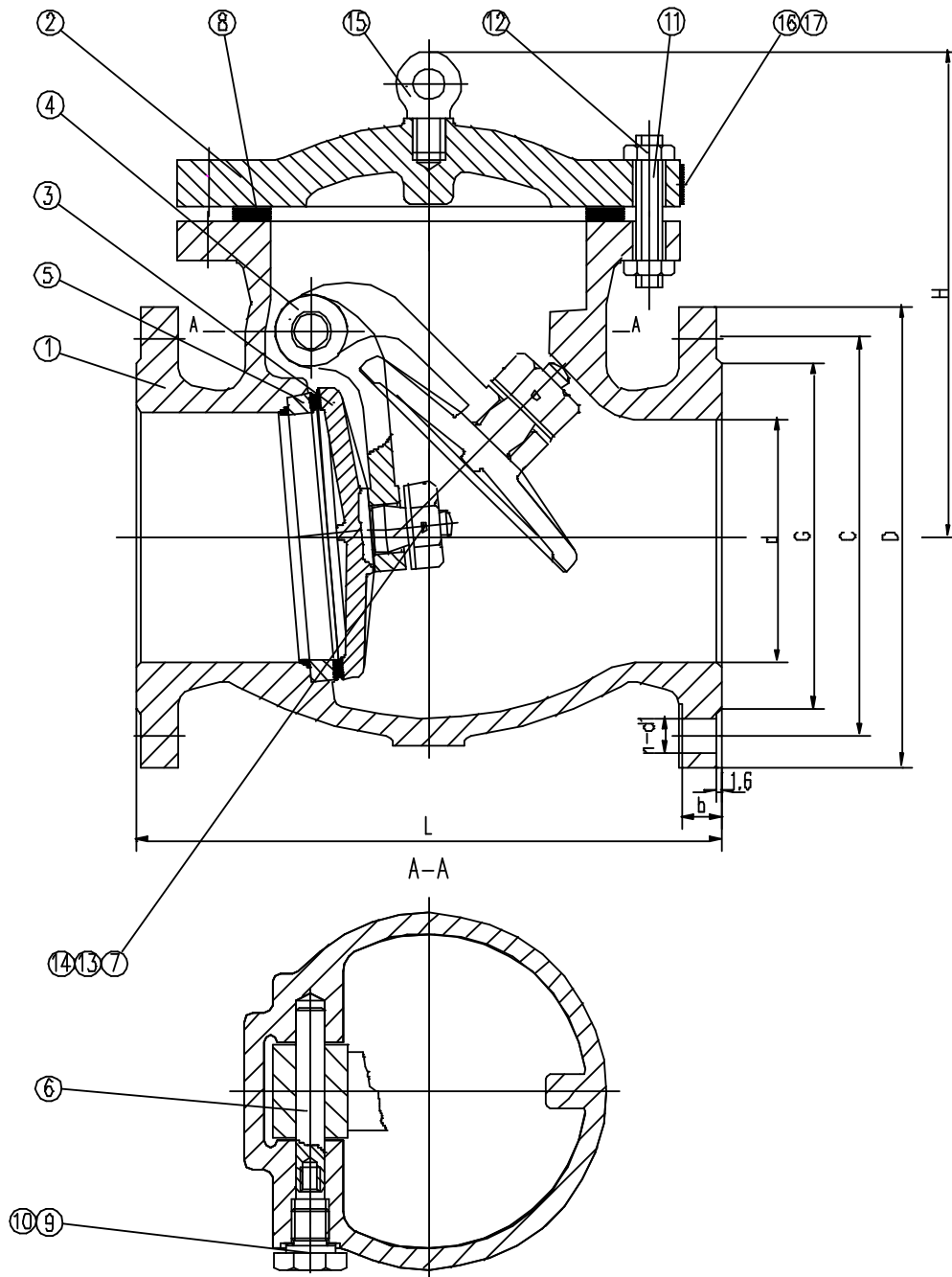


Fig 2: 150,250,420bars(900,1500,2500LB) check valve structure

Table2 DN50~750(2~30") 50bars(300LB) check valve connection and outline dimensions

DN	L	d	G	C	D	b	n-d1	H	Weigh kg
50	267	51	92	127	165	22.4	8-19	176	20
65	292	64	105	149.5	190	25.4	8-22	185	30
80	318	76	127	168	210	28.5	8-22	216	38
100	356	102	157	200	254	31.8	8-22	259	64
125	400	127	186	235	279	35.1	8-22	304	84
150	445	152	216	270	318	36.6	12-22	317	115
200	533	203	270	330	381	41.2	12-25	380	191
250	622	254	324	387.5	444	47.8	16-29	434	310
300	711	305	381	451	521	50.8	22-25	511	450
350	838	337	413	514.5	584	53.9	20-32	561	644
400	864	387	470	571.5	648	57.2	20-35	596	840
450	978	432	533	628.5	711	60.5	24-35	675	1025
500	1016	483	584	686	775	63.5	24-35	730	1320
550	1118	533	641	743	840	66.6	24-41	796	1615
600	1346	584	692	813	914	69.9	24-41	860	1931
700	1499	686	800	940	1035	90.5	28-45	1163	2660
750	1594	737	857	997	1092	92	28-48	1270	3230

Table3 DN50~600(2~24") 100bars(600LB) check valve connection and outline dimensions

DN	L	d	G	C	D	b	n-d1	H	Weigh kg
50	292	51	92	127	165	25.4	8-19	184	28
65	330	64	105	149.5	190	28.5	8-22	210	45
80	356	76	127	168	210	31.8	8-22	232	56
100	432	102	157	216	273	38.1	8-25	263	93
125	508	127	186	266.5	330	44.5	8-29	295	160
150	559	152	216	292	356	47.8	12-29	374	202
200	660	200	270	349	419	55.7	12-32	426	339
250	787	248	324	432	508	63.5	16-35	517	513
300	838	298	381	489	559	66.6	20-35	569	750
350	889	327	413	527	603	69.9	20-38	622	885
400	991	375	470	603	686	76.2	20-41	680	1220
450	1092	419	533	654	743	82.6	20-45	752	1620
500	1194	464	584	724	813	88.9	24-45	975	2120
550	1295	511	641	778	870	95.3	24-47	1015	2562
600	1397	559	692	838	940	102.0	24-51	1111	3100

Table4 DN50~400(2~16") 150bars(900LB) check valve connection and outline dimensions

DN	L	d	G	C	D	b	n-d1	H	Weigh kg
50	368	47	92	165.0	216	38.1	8-25	296	70
65	419	57	105	190.5	244	41.2	8-29	300	100
80	381	73	127	190.5	241	38.1	8-25	300	91
100	457	98	157	235.0	292	44.5	8-32	327	150
125	559	121	186	279.5	349	50.8	8-35	482	225
150	610	146	216	317.5	381	55.7	12-32	441	305
200	737	191	270	393.5	470	63.5	12-38	502	510
250	838	238	324	470.0	546	69.9	16-38	664	810
300	965	282	381	533.5	610	79.3	20-38	775	1120
350	1029	311	413	559.0	641	85.9	20-41	782	1380
400	1130	356	470	616.0	705	88.9	20-45	838	1900

Table5 DN50~400(2~16") 250bars(1500LB) check valve connection and outline dimensions

DN	L	d	G	C	D	b	n-d1	H	Weigh kg
50	368	47.5	92	165.0	216	38.1	8-25	296	70
65	419	57	105	190.5	244	41.2	8-29	300	100
80	470	70	127	203.0	267	47.8	8-32	341	150
100	546	92	157	241.5	311	53.9	8-35	412	245
125	673	111	186	292.0	375	73.2	8-41	460	402
150	705	136	216	317.5	394	82.6	12-38	511	550
200	832	178	270	393.5	483	92.0	12-45	680	1010
250	991	222	324	482.5	584	108.0	12-51	756	1550
300	1130	263	381	571.5	673	124.0	16-54	857	2280
350	1257	289	413	635.0	749	133.4	16-60	950	3060
400	1384	330	470	705.0	826	146.1	16-67	1020	4500

Table6 DN50~300(2~12") 420bars(2500LB) check valve connection and outline dimensions

DN	L	d	G	C	D	b	n-d1	H	Weigh kg
50	451	38.1	92	171.5	235	50.8	8-29	416	145
65	508	47.0	105	197.0	267	57.2	8-32	419	240
80	578	57.0	127	228.5	305	66.6	8-35	441	330
100	673	73.0	157	273.0	356	76.2	8-41	479	650
125	794	92.0	186	324.0	419	92.0	8-48	495	1050
150	914	111.0	216	368.0	483	108.0	8-54	511	1400
200	1022	146.0	270	438.0	552	127.0	12-54	711	2420
250	1270	184.0	324	540.0	673	165.1	12-67	851	3750
300	1422	219.0	381	619.5	962	184.2	12-73	1000	5500

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.

Table7 Valve main parts and material

No Parts Name	Materials								
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
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
Arm	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351 CF8			
Gasket	150~600LB, STAINLESS STEEL WINDING GASKET					900~1500LB, METAL GASKET			
Bolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8			
Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8			

Table8 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

Table9 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	-46~343	-46~343	-29~593	-29~593	-29~537	-29~537	-29~427	-29~454
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

This serial is sole direction check valve, when fluid flows at normal direction, the disc opens to fluid pressure; when fluid flows converse, the disc closes to the gravity and converse fluid pressure and cut off the bore.

6.2 Structure description

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

6.2.2 Class 150LB valves use a reinforced flexible graphite gasket while 300 to 600LB valves use stainless steel graphite winding gasket and 900 to 1500LB valves use loop metal gasket.

6.2.3 The 5⁰ bevel seal is used for the valve and the seal material is applied to API 600 or to the customer requirements.

7. Valve Transportation

Valves are heavy and metal products, care shall be taken to avoid physical injury during transportation. Before transportation, cord and lift device and transportation tool shall be ready, valve package inspected and broken package repaired. Packaging shall conform to specification requirements.

Valve shall be handled with care, no damage the flange end or butt welding end.

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 whether.

8. Valve Storage

8.1 Valve shall be stored in air and dry room with bore blanked and flange sealing surface protected.

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. The fluid flow direction in pipeline must be consistent with the arrow direction indicated on the body.

9.2 If there is pressure pulse/surge source, the check valve shall be installed far away from the source.

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

9.4 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.

- 9.5 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 The online valve shall not be knocked, walked on or used as weight support.
- 10.2 Usually check 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 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.

Table 10 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			
DN700(28")	15.75	27.18				
DN750(30")	16.77	28.96				

- 10.4 After put into service, valve shall be checked and maintained periodically especially for the condition of sealing surfaces and worn, 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
- 10.5 After reparation, valve shall be re-assembled using recommended torque as listed in Table 11. After reassembly, valve shall be pressure tested.

Table 11 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
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- 10.6 When performing Repair/maintenance operations, user shall use valve gasket, bolt and nut of the same size and material as the original one. Valve gasket may be ordered as spare parts for maintenance and replacement. It is forbidden to open the bonnet or replace the bolt or nut when the valve contains pressure. After replacement of gasket, bolt and nut, valve shall be pressure tested prior to reuse.
- 10.7 User may repair the valve-sealing surface providing a successful closure test is performed and the sealing is ok.
- 10.8 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 Geko 's technical documentation . Geko takes no responsibility for loss caused out of part produced from outsourcing.
- 10.9 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.
- 10.10 Welding repair on valve online is forbidden.

11. Potential Failure and Troubleshooting

Failure	Cause	Troubleshooting
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. Arm device in a wrong position. 2. The wear of arm, disc and pin connection. 3. Arm deformation or rupture	Cut off the fluid and dismount the valve, repair the valve or replace part
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. Replace valve that exceeds guarantee period or is found with early fatigue defection 2. Drain away water in winter when valve is not used

12. Quality Warrant

- 12.1 Geko 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 Geko upon finding of any defect or assuming defect, Geko has privilege to check the facts of the defect.

- 12.3 Hondel 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 Geko 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 Geko and purchaser.

13. Servicing

- 13.1 Where contractually specified, Geko may provide field installation and adjustment.
- 13.2 Geko will trace the quality of sold valve and provide service to customer requirements..

Service Contact:

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