

***FLEU***

**OPERATION MANUAL**

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# Swing Check Valve

# Lift Check Valve

Design: Wanghuanyu Checked: Wangtianyuan Approved: Shiyongbin Date: 2014.8.12

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### 1. Generalities

The following operation instructions are valid for FLEU-lift check valves, swing check valves of the Fig.XXX•282/451/491, which are installed in pipelines and serve to let through the flow of liquids (gases and steams) in only one direction.

By a correct assembling, maintenance or repair we guarantee an activity free of troubles.

The manufacturer carries no responsibility for efficiency and safety of the valves, whenever these operating instructions are not observed and followed accurately.

#### **ATTENTION!**

The valves must not be activated beyond the limits and rules indicated in the different documents (such as operation rules, purchase documents, datasheets). Operations beyond the indicated limits lead to overstrain which cannot be sustained by the valves.



A non-observance of this warning can cause injuries to persons and defects of the machines, such as:

- Injuries caused by escaped medium (cold/hot, toxic, under pressure),
- Affect in activity or damage of the valve.

The descriptions and rules included in this operation instruction refer to standard types but are also valid for alternatives.

These operation instructions do not take into consideration:

- Any accident and incident which can arise by assembling, operation or commissioning of the valves.
- Any safety rule in relation with the place where the valve is installed. The operator is responsible for the observation of the safety rules, - also by the assembling staff.

#### **ATTENTION!**

It is essential that the valves are handled by skilled staff that must be aware

of the interactions between the valves and the system in which they are installed.

An incorrect use of a valve may cause strong consequences to the complete system, such as:

- escape of medium
- stop of the unit
- affects, decreases or increases of operation or work of a system or unit.

For any further inquiries or in case of damage, please contact SUZHOU FLEU VALVE CO.,LTD

In case of local inquiries or orders, especially for spare parts, please indicate the production or factory serial number, the type, the model version and possibly also the year of construction.

The technical data referring to the valves can be found in their technical documentations (paragraph 4).

In case of a return transport it has to be proceeded as explained in paragraph 3 <Transport>.

## 2. Safety

These operation instructions contain essential information that has to be observed by assembling, operation and commissioning of the valves.

For this reason they have to be read by the assembling staff, by the skilled staff and by the operator before the valve is assembled and put into operation and they should always be kept in the proximity of the valve.

Not only the general safety rules indicated in this main paragraph have to be observed, but also the other ones indicated in other paragraphs.

### 2.1 Indication of notes in the operation instructions

The safety warnings contained in this operation instruction, which have to be observed in order to avoid injuries to persons, are indicated by the following general and particular pictographs:

Warning!



Security signal acc. to DIN 4844 W 9

In order to avoid defects of valve efficiency and of its accessories the following warning mark has to be observed:

**ATTENTION!**

The signs marked directly on the valve (such as DN) have absolutely to be considered and kept in a readable condition.

## **2.2 Dangers that can result if safety instructions are not observed.**

If the safety instructions are not observed injuries to persons, environment and valve, or system can arise and the indemnity rights get lost.

In particular the non-observance of the safety notes can cause dangers such as:

- break down of important functions of the valve or unit
- failure of prescribed methods of commissioning and handling
- danger to persons caused by electrical, mechanical and chemical impacts.
- environmental injuries caused by a leakage of dangerous materials.

## **2.3 Working with safety consciousness**

The safety instructions included in this paper, the national regulations for prevention of accidents, as well as the internal regulations referring to work, operation and safety have to be observed by the operator.

## **2.4 Safety instructions for the operator / user**

- When ever some hot or cold valve parts (f. ex. Casing parts) may cause any danger, these parts have to be constructed in a way that they are protected from contacts.
- The contact protection for moving parts must not be taken away while the machine is working.
- Leakages (f. ex. in shaft sealing) of dangerous conveyed materials (explosive, toxic, hot) have to be removed in a way that no danger to persons or environment can arise. Legal determinations must be respected.
- Injuries by electrical energy have to be excluded (please find details to this point in the local power supply enterprise regulations).

## **2.5 Safety instructions for commissioning, inspection and assembly works.**

It must be provided that all commissioning, inspection and assembly works are executed by skilled staff, who must have previously studied these operation instructions.

Basically when any kind of work on a valve is executed, the valve has to be cooled down and free of pressure and the evaporation temperature of the medium must be lower than the temperature of all parts it gets in contact with.

Also basically, works on a valve have to be executed when it is stopped. The procedure to stop a valve operation is described in this paper and has absolutely to be observed.

Valves which get in touch with health injuring media have to be decontaminated.

Immediately after the work is done, all safety and protection devices have to be put into position or operation again. Before putting the valve into operation again, the points referring to paragraph 6 <putting into operation> have to be observed.

## **2.6 Arbitrary reconstruction and manufacture of spare parts**

Reconstructions or modifications of the valve are only accept-able under agreement with the manufacturer. The use of original spare parts and by the manufacturer authorized accessories promotes safety. If any damage is caused by using other parts the liability for

the consequences can be cancelled.

### 2.7 Inadmissible operation modes

A safe operation is only guaranteed if the valve is used according to the determinations included in the “generalities” of this operation instruction. The limits included in the technical documentation must not be exceeded.

## 3. Transport and storage

### 3.1 Corrosion protection

#### 3.1.1 Carbon steel valves

Valves made out of unalloyed or low alloyed cast steel are painted with a hard sticking primer made of a 2-components colour based on epoxy resin paint. The minimum film thickness is 70 µm. The inner surfaces are free of paint and only coated with a temporary corrosion protection (e.g. oil). Machined flange facings are protected against outside influences with a strippable vanish.

#### 3.1.2 Stainless steel valves

Valves made out of stainless steel will be delivered without coating.

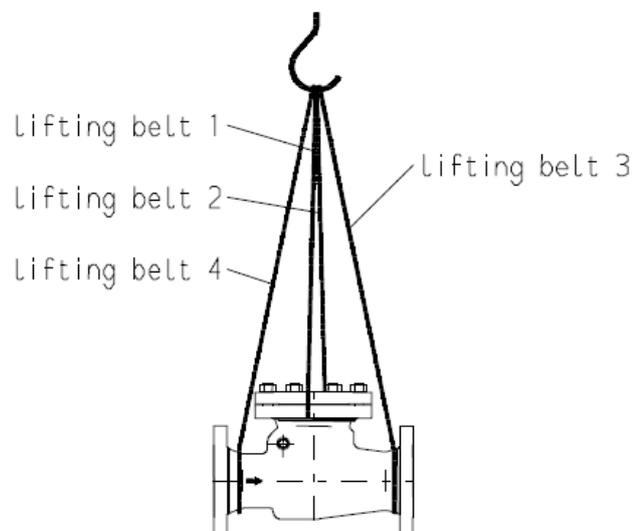
### 3.2 Transport

The valves are delivered with its connecting holes are shut up by cover caps.

Valves will be supplied as ready for operation.

**ATTENTION!** During transportation and storage valve have to be closed. Connecting holes have to be shut up by suitable means (cover caps, foils) in order to avoid any damage to the valve seats.

**ATTENTION!** Transport or lifting a valve for installation in horizontal pipe lines as picture 1



**Pic.1**

After delivery, respectively before assembly the valves have to be inspected in order to exclude any transportation damage.

### **3.3 Storage**

The storage has to be effected in a way that it can work perfectly even after a longer storage period.

For this purpose it is necessary

- to keep the valve closed (in order to protect the seat facings)
- to take measures against soiling (dust, sand, mortar, respectively building materials), frost and corrosion using plastic foils.

When storing valves with soft gaskets (of elastomer) the storage regulations for elastomer have to be observed:

- the store must be dry, free of dust and moderately ventilated. Store temperature should not go over 25°C.,
- stocks on hand have to be used up in order to avoid long storage periods,
- as already mentioned above, the valves have to be in “closed” position during the storage. However the soft closure elements should be shut with little power, in order to avoid a rush aging of the elastomer.

## **4. Description / documents**

### **4.1 Structure and standards**

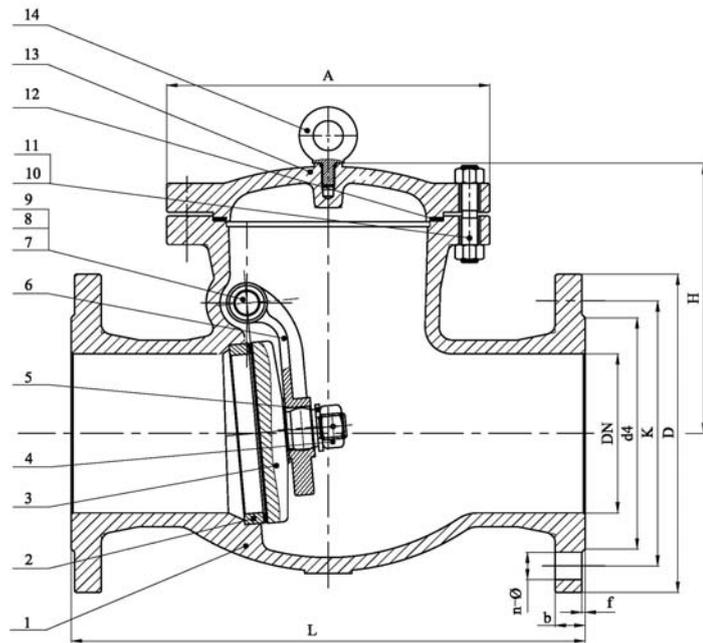
Basic design acc. to BS1868

Flanges acc. to EN 1092-1 (for ANSI valves, acc. to ASME B16.5)

Face to face acc. to EN 558-1 (for ANSI valves, acc. to ASME B16.10)

Test acc. to EN 12266-1 (for ANSI valves, acc. to API 598)

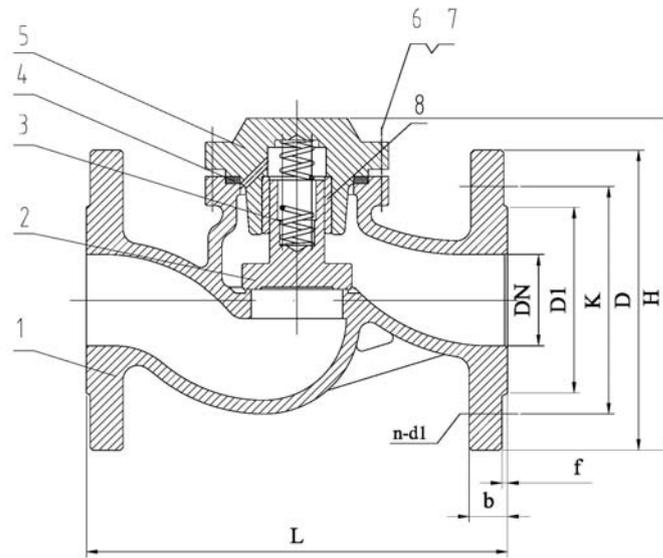
### **4.2 General view and parts list**



**Fig.1 Swing check valve**

**Parts list of swing check valve**

NO.	Part	Material	
1	Body	1.4408	1.0619
2	Seat	1.4408	C22.8
3	Flap	1.4408	1.0619
4	Nut	A4	35
5	Gasket	1.4401	35
6	Flap lever	1.4408	1.0619
7	Shaft	1.4401	1.4021
8	Plug	1.4401	1.4021
9	Gasket	1.4401	1.4401
10	Stud bolt	A4	G
11	Nut	A4	G
12	Gasket	1.4401+graphite	1.4301+graphite
13	Cover	1.4408	1.0619
14	Bolt	A2	G



**Fig.2 Lift check valve**

**Parts list of lift check valve**

NO.	Part	Material	
1	Body	1.4408	1.0619
2	Plug	1.4571	1.4021
3	Spring	1.4401	1.6900
4	Body seal	1.4401+graphite	1.4301+graphite
5	Cover	1.4408	1.0619
6	Bolts	A4	G
7	Nuts	A4	YK
8	Bush	1.4401	1.4021

**4.3 Temperature**

4.3.1 Body material suitable for Temperature as follow:

- a. Carbon steel 1.0619:  $-29^{\circ}\text{C} \sim +425^{\circ}\text{C}$
- b. Carbon steel WCB:  $-29^{\circ}\text{C} \sim +425^{\circ}\text{C}$
- c. Stainless steel 1.4408:  $-196^{\circ}\text{C} \sim +540^{\circ}\text{C}$  ( for flanged connection valves )  
 $+815^{\circ}\text{C}$  ( for carbon content  $\geq 0.04\%$  )
- d. Stainless steel CF8M:  $-196^{\circ}\text{C} \sim +540^{\circ}\text{C}$  ( for flanged connection valves )  
 $+815^{\circ}\text{C}$  ( for carbon content  $\geq 0.04\%$  )

4.3.2 Gasket material suitable for Temperature as follows:

- a. Flexible graphite:  $-200^{\circ}\text{C} \sim +570^{\circ}\text{C}$  (Oxidizing medium)  
 $+800^{\circ}\text{C}$  (Non-oxidizing medium)
- b. Metal sealing circle the same as 4.3.1

**4.4 Medium**

For carbon steel valves: non-corrosive, such as water, steam, and oil.

For stainless steel valves: can be corrosive,  $4.0 \leq \text{PH} \leq 10.0$



The valves should be operated during the limits range refer to par. 4.3 and 4.4.

## 5. Installation

### 5.1 Generalities

#### **ATTENTION!**

The pipeline has to be installed in a way that injurious shearing and bending forces during installation and activity are kept away from the valve bodies . This is to avoid leakiness and destruction of the body.

#### **ATTENTION!**

Before installation the cover caps have to be removed from the connecting holes.

The flange facings must be clean and undamaged.

The flange gaskets must be well centralized.

Only bolts and gaskets of admissible materials may be used.

For the flange connection all flange drill holes have to be used.



When varnishing the pipelines, no bolts and nuts, stems, stuffing boxes and accessories must be painted (function affects). During any construction work the valves have to be protected from dust, sand and any other construction material. (Please cover with suitable means).

Valve handwheels, by-passes and all other adjacent parts must not be used as steps.



Valves and pipe lines working in high temperatures ( $>50^{\circ}\text{C}$ ) or low ( $<0^{\circ}\text{C}$ ) must be protect from touch by insulating. Alternatively the danger must be indicated by warning boards on the valve side.

#### **ATTENTION!**

If in air-conditioning, cooling and refrigerating systems any condensation water, respectively danger of icing appears, a specialistic and diffusion-tight insulation of the whole valve. Icing causes a blocking of the valve operation capabilities.

### 5.2 Installation position

Check valves are preferably installed in horizontally laid pipelines. Here, the cover must face upwards, in order to ensure the hanging direction of the valve disc.

## 6. Operation / putting into and out of operation

### 6.1 Operation/putting into operation

#### 6.1.1 Generalities

Before putting the valve into operation its material, pressure and temperature data have to be compared with the operation terms of the pipe line.



Eventually appearing shock pressures (water hammer) should not exceed the maximal admissible pressure. Protective measures have to be provided.

The line system of new plants and especially after repair works has to be flushed in order to remove harmful solid matters, respectively bead of weld.

### **6.2 Operation**

Check valves are automatic valves, which are opened by the flow medium (stream) or closed in opposite direction. When the valve swings(lifts) open, it is limited by a block in the body to such an extent that the valve can fall back into its seat due to its own weight or spring force.

### **6.3 Function check up**

The following functions have to be checked up:

The shutting function of the installed valve must be checked up opening and closing it several times.

The stuffing box packing efficiency has to be checked up before the first loading by full operation pressure and temperature. If necessary the nuts on the stuffing box glands, respectively the stuffing box have to be evenly tightened.

The sealing efficiency of the bolted bonnet connections with the flat seal must be examined after the first loading/warming up of the valve. (Maintenance-free valves too!) If necessary the bolts connections have to be gently, crosswise and evenly tightened.

### **6.4 Putting out of operation**

During longer standstill periods liquids whose form can change in concentration due to polymerization, crystallization, solidification or the like, have to be let out of the line system. If necessary the line system has to be rinsed by completely open valve.

## **7. Commissioning / maintenance**

### **7.1 Safety notes**

During all commissioning and maintenance works on the valves the following safety notes as well as the general indications under paragraph 2 <safety> must be observed.

#### **ATTENTION!**

In any case, also in emergency, only suitable spare parts and tools have to be used, otherwise a perfect function is not guaranteed.

### **7.2 Valve disassembly**

Before dismounting from the pipe line or before commissioning and repair works are made directly on the valve, more precisely:

- before loosening the bolted bonnet
- before loosening the bolts of the stuffing box gland, respectively the packing bolts or the stem nuts

- before loosening shutting, opening and pressure release threaded plugs the valve has to be completely discharged from pressure and has to be cooled up until the evaporation temperature of the medium is lower than all the chambers getting in contact with it. Then any scald can be excluded.



Opening a valve under pressure is a lethal danger!

In case those toxic or easily inflammable mediums are conveyed, or mediums the residues of which in contact with humidity of the air can lead to corrosion damages, the valve has to be drained and flushed, respectively ventilated.

If necessary protecting clothes and protective masks have to be worn.

Due to the installation position the residual liquid possibly remained in the valve have to be drained off and correctly disposed.

Before a possible transportation, the valves have to be carefully emptied and flushed.

### 7.3 Maintenance

The valves are constructed in almost all of their parts maintenance-free. Materials for sliding parts are chosen which cause a very minimal wear. In order to improve operation safety and to minimize repair costs, all valves, specially those ones which are seldom put into operation or are hard to get to, should be regularly tested, that means, put into operation (OPEN – CLOSED) at least once or twice a year.

The operator is responsible to determine the convenient test and maintenance intervals depending on the application of the valve.

The durability of maintenance-free valves and not can be extended if:

- the shaft and stuffing chamber surfaces are kept clean and undamaged;
- the mobile parts, such as stuffing box bolts are greased (except oxygen valves) by using standard lubricants.
- the stuffing box is punctually additionally packed or the packing is renewed;
- the gasket is punctually renewed;

The safety warnings in par. 2, 7.1 and in par. 8 must be observed.

## 8. Troubleshooting

### 8.1 Generalities

All repair and maintenance works have to be done with suitable tools and original spare parts.

The safety notes in par.2 and 7 have to be observed.

### 8.2 Troubleshooting table

Description of trouble	Probable cause	Solution
Leakage at the sealing surface	1.Dirt on the sealing surface. 2.Damage of sealing surface	1.Clean the dirt 2.repair the sealing surface of replace the disc and seat ring.
Leakage at the connection	1.Untightening of connecting	1.Tighten the bolts

of body and bonnet	of it . 2. Damage of the sealing surface of the body-bonnet flange or that of the bonnet and body of valve sealed by pressure. 3. Failure of gasket or damage of metal sealing ring	uniformly . 2. Repair the sealing surface of the body-bonnet flange or the body-bonnet flange or the of the bonnet and body of valve sealed by pressure. 3. Replace gasket or repair the metal sealing ring.
Leakage at the plug screw of arm axle	1.Untightening of the plug screw. 2.Failure of the gasket.	1.Retighten the plug screws. 2.Replace the gasket
The disc can not open or close	1.Overfitted the arm and arm axle 2.Being hampered by foreign mater 3.Too hard or soft spring	1.Check the fitting condition, and adjust the fit clearance. 2.Clear the foreign mater. 3.Replace the spring
Sound and vibration of valve	1.Valve is installed too closely to pump. 2.The flow pressure of medium is unstable.	1.Re-Install it in a suitable. 2.Eliminate the fluctuation of pressure.

For any further information please contact SUZHOU FLEU VALVE CO., LTD

## 9. Guarantee

The warrantee for our product is one year after commissioning date, or 18 Months from shipment whichever happens earlier. In this period, If there is any damage caused by material defect, improper manufacture, and unreasonable design, or it takes place under the normal condition. Repair and replacement of part is free of charge.