

# **INSTALLATION OPERATION MAINTENANCE**

**FOR  
FORGED/CAST CHECK VALVE  
LIFT & SWING TYPE**



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## **PREFACE**

This Manual applies to the Excel Check valves manually operated made of Cast carbon steel Gr.WCB and A105 only.

To ensure safe and trouble free function and performance, please read all the contents of this manual before handling, transportation, mounting, operation and maintenance of valves. Keep this manual in convenient place for your valve operator's easy access.

Caution indicates a "potentially hazardous situation which if not avoided could result in minor or major injuries and loss of life, properties etc."

This manual covers the normal usage of the product. Technical data and instructions for operation, maintenance and inspection of the product are prepared in consideration of safety. However they are good only to cover typical applications and provided as a general guideline to users. If technical assistance is required, Please contact manufacturer's Executive.

The illustrations given in this manual do not introduce all details. If more detailed data is needed, refer to the relevant valve assembly drawings.

Note: Any information this operation provided in this operation manual is subject to revision at any time without notice. This edition cancels all previous issues.

## TABLE OF CONTENTS

DESCRIPTION	PAGE NO.
1. INTRODUCTION	4
2. RESPONSIBILITY FOR VALVE APPLICATION	4
3. RECEIVING INSPECTION AND HANDLING	4
4. STORAGE	5
5. CONSTRUCTION	6
6. INSTALLATION	7
7. OPERATION	9
8. MAINTENANCE	9
9. REPAIRS	10

## 1. INTRODUCTION

When properly installed in applications for which they were designed, EXCEL VALVES will give long reliable service. This instruction is only a guide for installation and operation on standard service and cover general maintenance and minor repairs.

### Note:

We recommend that this entire document be read prior to proceeding with any installation or repair. Take no responsibility for damage or injury to people, Property or equipment. It is the sole responsibility of the user to ensure only specially trained valve repair experts perform repairs under the supervision of a qualified supervisor.

## 2. RESPONSIBILITY FOR VALVE APPLICATION:

The User is responsible for ordering the correct valves. The user is responsible for ensuring valves are selected and installed in conformance with the current pressure rating and design temperature requirements. Prior to installation, the valves and nameplates should be checked for proper identification to ensure the valve is of the proper type, material and is of a suitable pressure class and temperature rating to satisfy the requirements of the service application.

**CAUTION:** Do not use valves in applications where either the pressure or temperature is higher than the allowable working values. Also valves should not be used in service media if not compatible with the valve material of construction, as this will cause chemical attacks, leakage and valve failure.

## 3. RECEIVING INSPECTION AND HANDLING:

Valves should be inspected upon receipt to ensure:

- Conformance with all purchase order requirements.
- Correct type, pressure class, size, body and trim materials and end connections.
- Any damage caused during shipping and handling to end connections, hand wheel or stem.

**CAUTION:** The user is advised that specifying an incorrect valve for application may result in injuries or property damage. Selecting the correct valve type, rating, material and connections, in conformance with the required performance requirements is important for proper application and is the sole responsibility of the user.

### 3.1 SAFETY INFORMATION:

The following general safety information should be taken in account in addition to the specific warnings and cautions specified in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered in this I.O.M.

#### CAUTION:

- Never attempt to disassemble a valve while there is pressure in the line. Ensure both upstream and downstream pressures are removed. Disassemble with caution in case all pressures are not relieved. Even when replacing stem packing, caution is necessary to avoid possible injury.
- To prevent valve bending, damage, inefficient operation, or early maintenance problems, support piping on each side of the valve. When handling gases/fluids that could cause damage to human health, the environment or property, the necessary safety precautions to prevent risk must be taken.
- A valve is a pressurised mechanism containing energised fluids under pressure and consequently should be handled with appropriate care.
- Valve surface temperature may be dangerously too hot or too cold for skin contact. Upon disassembly, attention should be paid to the possibility of releasing dangerous and or ignitable accumulated fluids. Ensure adequate ventilation is available for service.

## 4. STORAGE:

### 4.1 Temporary Storage:

If Valves are to be stored before installation, the following should be observed

- Keep valves wrapped and protected as shipped from the manufacture
- Do not remove the protective end covering until the valve is ready for installation. This will reduce possibility of foreign material damaging the internal valve components.
- C) Valves stored outdoors should be positioned such that water does not accumulate in the valve body.

#### 4.2 Long Term Storage:

If Valves to be stored more than a year, they should be prepared in the following manner

- Remove the packing and apply a preservative to the packing chamber.
- Do not remove the protective end covering.
- Do not store valves outside.

## 5. CONSTRUCTION:

The following is a typical assembled of an EXCEL Check Valve. The number of parts will slightly vary in each size and class but the principal components are same as per figure.

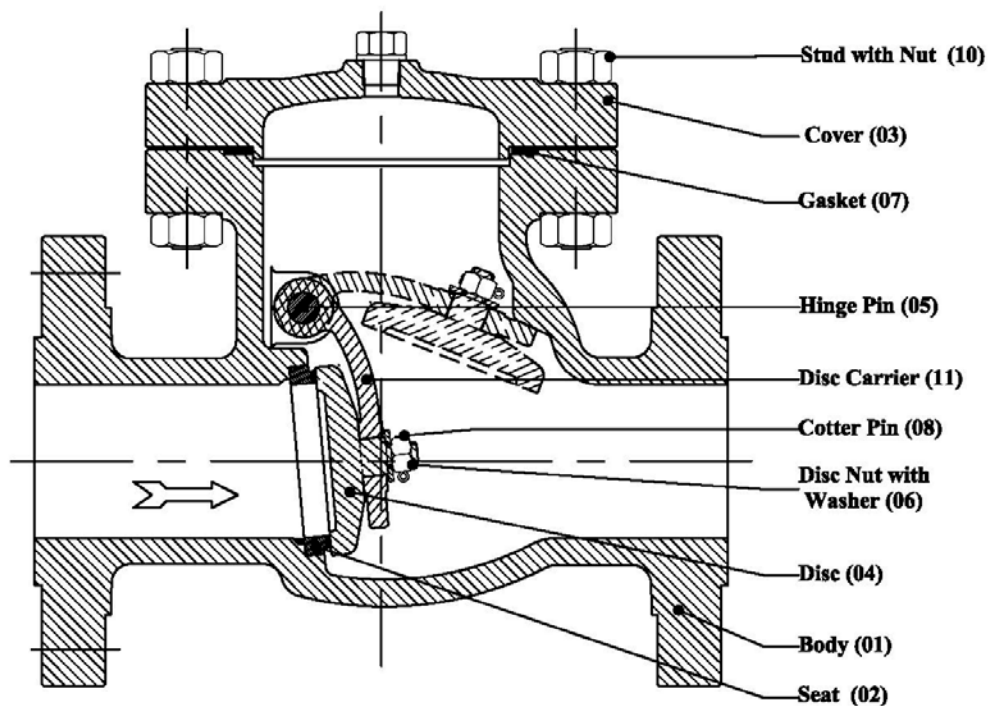
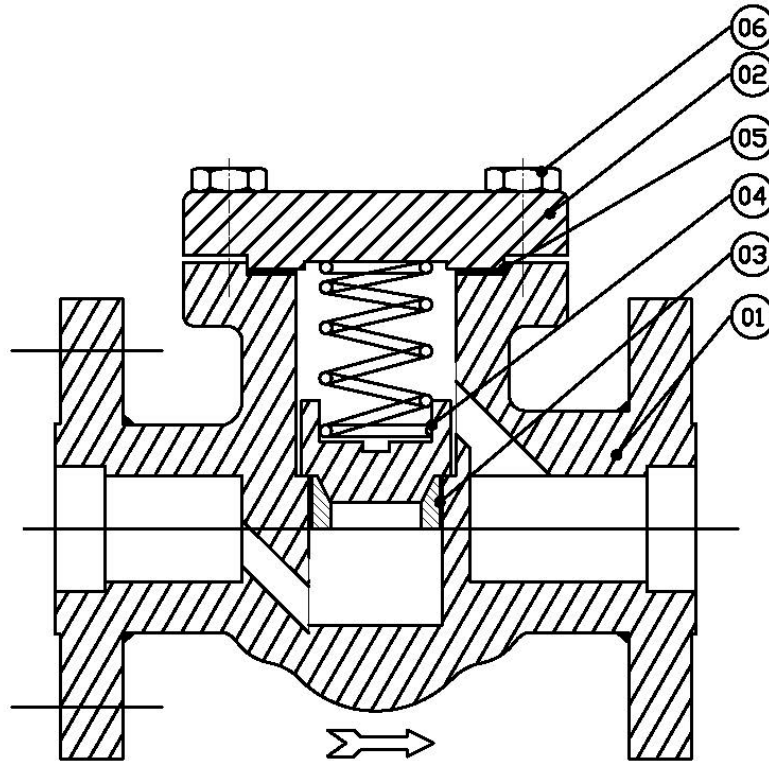


Fig.: 1.1 General Sectional Drawing- Assembled Swing Check Valve



PART NO	DESCRIPTION	MATERIAL
1	BODY	FORGED STEEL TO
2	BONNET	ASTM A105
3	SEAT	ANSI 410
4	DISC	
5	GASKET	SS 304 SPRIAL WOUND WITH GRAPHITE
6	FASTNERS	HIGH TENSILE

Fig.: 1.1 General Sectional Drawing- Assembled Lift Check Valve

(The above is indicative only; design depends on size, class and trims etc., Refer to as-built drawing)

## 6. INSTALLATION:

Check valves are unidirectional and have the direction of flow indicated on the valve body.

Lift Check valves are recommended for use in horizontal lines with bonnet facing up. Swing check valves may be installed in horizontal lines or vertical lines where the direction of flow as indicated on the valve body upwards.

### Preparation for installation:

- Remove protective end caps or plugs and inspect valve ends for damage to threads, weld ends or flange faces
- Thoroughly clean adjacent piping systems to remove any foreign material that could cause damage to seating surfaces during valve operation.
- Verify that the space available for installation is adequate to allow the valve to be installed.

### 6.1 END CONNECTIONS:

#### Threaded Ends:

Check the condition of thread on mating pipe. Apply joint compound to the male end of joint only. This will prevent compound from entering the valve flow path.

#### Flanged Ends:

Check to see that mating flanges are dimensionally compatible with the flanges on the valve body ensures sealing surfaces are free of debris. Install the correct studs and nuts for the application and place the gasket between the flange facings.

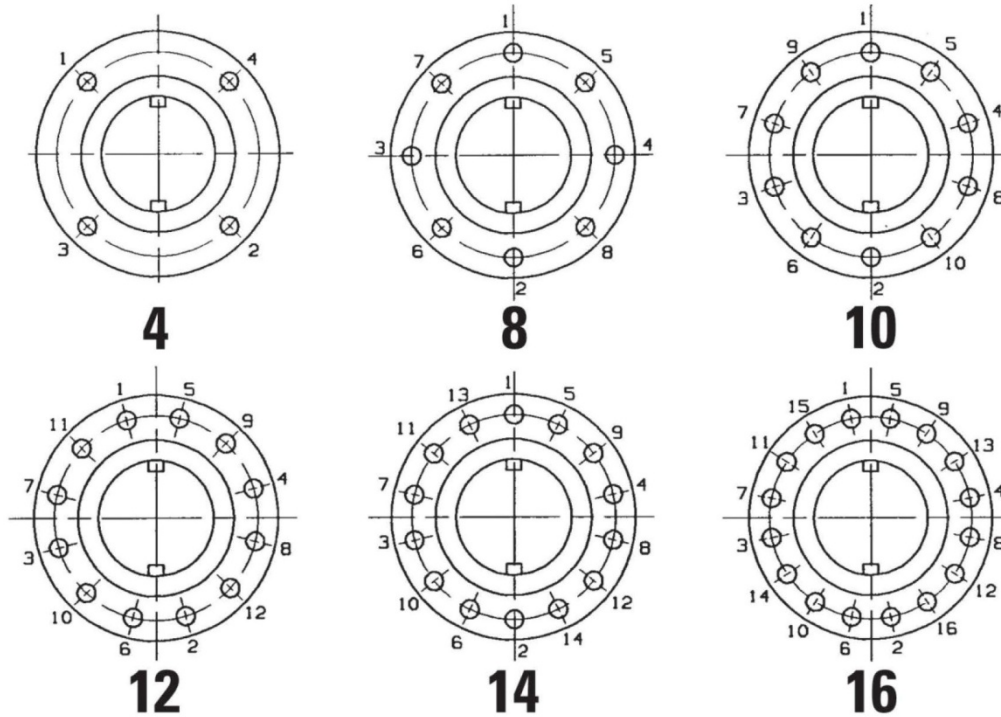
Caution: Stud nuts should be tightened in an opposing criss-cross pattern in equal increments to ensure even gasket compression

#### Socket Weld Ends:

Remove all debris, grease, oil, paint, etc., from the pipe that is to be welded into the valve and from the valve end connections. Insert the pipe into the valve end connection until it bottoms out in the socket weld bore. Withdraw the pipe 1/16" So that a gap remains between the pipe and the bottom of the socket weld bore to prevent cracks (ASME B16.11). Tack the pipe into the valve and complete the fillet weld.



## Bolt Tightening Sequence

**6.2 POST-INSTALLATION PROCEDURES:**

After installation, the line should be cleaned by flushing to remove any foreign material. When caustics are to be used to flush the line, additional flushing with clean water is required. The valve should be opened and closed after installation to ensure proper operating function. With the line pressurized, check the valve end connections, body to bonnet/cover joints and stem packing area for leaks.

**7. OPERATION:**

The check valve operation is automatic and requires no assistance. When the flow exerts sufficient pressure against the disc to overcome the disc's weight, the disc allows the flow to continue through the piping system. As pressure decreases, the disc lowers until it's own weight forces it to seat. This prevents the possibility of a reversal in the flow. Piston check valves should not be used in applications where rusting or rust particles are present or anticipated. Swing check valves more tolerant for applications of this nature.

Metal seated check valves are not zero leak devices and may seep in service. This type of valve should always be backed up with an isolation valve (either gate or ball Valve). Check valves are designed to prevent reverse flow. Leakage rates for check valves with metal to metal seats are dependent on the amount of back pressure and the viscosity of the flowing medium. Soft seat check valves can offer improved leak tightness provided there is sufficient back pressure. Check valves should not be used in gas or low back pressure liquid applications if zero leakage is desired.

## 8. MAINTENANCE:

No periodic maintenance is necessary unless special external accessories are fitted.

## 9. REPAIRS:

Proper safety equipment and apparel should be worn when preparing to service a valve. Observe the followings general warnings:

### Caution:

- A valve is a pressurised device containing energised fluids and should be handled with care.
- Valve surface temperature may be dangerously too hot or too cold for skin contact.
- Upon disassembling, attention should be paid to the possibility of releasing dangerous and ignitable fluids.
- Adequate ventilation should be available for service.

### 9.1 REPAIR INSTRUCTIONS

Due to the relatively low replacement cost of small diameter standard carbon steel valves especially under 80 NB (3"), it is usually less expensive to replace the complete valve than to have maintenance personnel effect repairs. Generally, the only viable repairs are replacement of bonnet gasket. However, see Section 9.3 and 9.4 below for further extraordinary repairs. Always replace the bonnet gasket whenever a valve is disassembled. Gasket seating surfaces should be scraped clean (avoid radial marks). Bonnet bolts should be tightened in a diagonal pattern at several different increasing torque settings in accordance with the recommended torque value

### 9.2 DISASSEMBLY & GASKET REPLACEMENT: Before disassembling:

1. Check that the line is in a complete shutdown phase and then remove the valve from pipeline.
2. Pre-order all necessary spare parts and joining gaskets.

3. Put identification markings on valve body, disc and bonnet. This helps to avoid mismatching of parts at the time of re-assembly.
4. If the bolts and nuts are too tight, apply deep penetrating oil and then unscrew.
5. . Disassemble all cover bolts and nuts.
6. Clean gasket surface areas, replace gasket and refit bonnet as detailed above.

### 9.3 VALVE INTERNALS DISASSEMBLY INSPECTION AND REPAIR:

- Check that the (where applicable) hinge, nut and pin are in good condition and firmly connected.
- Replace damaged parts as necessary.
- For *swing check valves*, lift and remove the disc hinge assembly. Movement should be free and not hindered by any malfunction of the hinge pin. Where disc travel is not sufficiently smooth, remove plugs or blind flanges and then remove hinge pin. Check surface for seizure or scraping marks. If marks are deeper than 1.5mm, re-machine hinge pin and reassemble hinge pin and re-assemble. If defect depth is greater than 1.5 mm , a new hinge pin is necessary. When reassembling hinge pin, it is recommended that the disc be removed by loosening the nut. For *piston check valves* , if there is a spring ensure it is functioning properly and is sufficiently energised. The spring should hold the disc/ball tightly against the seat no matter what position the valve is in.
- When leakage is due to deterioration of seal surfaces caused by corrosion, erosion or foreign substances, it must be determined whether the disc or seal seat are the cause. Where special soft seat inserts are supplied, consult factory.

**Deterioration of disc surfaces:** Swing check valves: - Disassemble disc by removing nut and washer.(Ball/Piston check valves have a free floating disc) . Repair surface by grinding and re-lapping using a fine grade abrasive paste.

**Deterioration of seat seal surfaces:** When seal surfaces are damaged and defects are confined to a small area but are not deeper than 0.4mm the seal surface can be re-lapped. For smaller sizes the recommended method is to use a cast iron strap with an outside diameter matching the valve's raceway. If the seat surfaces cannot be re-lapped an approved repairer will decide if the surface has to be reground/re-machined or replaced. When defects are deeper than 0.4mm and found on the entire surface, re-metalizing or a new seat is required. For threaded-in seats it is recommended that an anti seizure compound be used when installing the replacement seat to make threading it in the body easier.