

KENNEDY VALVE

GENERAL SWING CHECK VALVES

OPERATION & MAINTENANCE **MANUAL**



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GENERAL

This manual is issued as a recommendation to the customer concerning the proper use of check valves. Valves should always be installed and operated by authorized personnel. For additional information on these valves, please reference the AWWA C508 standard.

RECEIPT AND INSPECTION

Valves should be inspected for damage before being removed from the delivery vehicle or signing the delivery receipt.

Care should be taken to ensure proper rigging of the valve for lifting and appropriate lifting equipment is being used. Valves should never be lifted by the hinge, lever arm, spring, weight, limit switch, and/or air cushion.

It is recommended that the following checks be made prior to installing this valve:

- Recheck the valve for damage
- Check all nuts and bolts to make sure they are properly tightened.
- Check flow direction for compliance with system flow requirements.
- Check to see that the valve end-joints and surfaces are clean.
- Check inside the valve to remove all contaminants that may affect water system purity, cause the valve not to operate properly or seal tightly.
- Open and close valve to make sure it functions properly.

Keep valve closed when installing in trench. Do not backfill around the valve prior to completion of the hydrostatic system test. Check to see that all valve joints and pressure containing bolts are tight. Leave the valve exposed while the pipeline is being pressurized.



CHECK VALVE RECOMMENDED STORAGE AND HANDLING

Whenever possible, Kennedy Valve check valves should be stored inside. However, when this is not possible or feasible, some outdoor protection must be provided. The valves must be stored in such a manner to protect them from weather, blowing dirt and debris. A tarp covering will minimize exterior coating damage from these elements and reduce fading or chalking due to exposure to the sun. The valves should also be placed in a location where they will not be damaged by collision from vehicles, lift trucks or falling items. Valves should be stored so that water does not stand in the body. In cold climates, if water is allowed to freeze in the valve, severe damage to the components could result. The valves are shipped in the closed position and should remain in the closed position during long term storage. Any packaging removed for inspection of the valves should be replaced prior to placing the valves into long term storage.

Proper slinging and handling methods should be used when moving valves. The valves should be handled only with apparatus that will safely support the full valve weight. Do not place slings or other devices around operating hinge, around the lever arm or air cushion cylinder, or through the valve port opening. Do not lift adjacent piping or components by lifting (or placing) the valve provided.

SELECTION

Check valves encourage flow in one direction. Particular check valves perform additional services as follows:

1. Wafer check valves reduce the effect of water hammer (FM approved for such service).
2. Outside lever check valves may be fitted with a limit switch to detect flow.

A. General Service by Product

1. Figure 106/1106 and 106A/1106A Check Valves

For service in other than fire protection lines and other than a connection to a potable water system where there is the possibility of a pollutant in the user's system back flowing into the potable water system. The 106/1106 and 106A/1106A check valves should not be used if water hammer is a known problem.

a. Standard Figure 106/ 1106 (brass to brass seating)



General service, cold water, non-shock up to 200 psi. Allows backflow (when new) up to 1 oz/ hr/ in nominal size at 200 psi back pressure (possibly more at low back pressure).

b. Figure 106A/ 1106A (resilient rubber to brass seating)

General service, cold water, non-shock at temperatures not exceeding 150°F. Provide drip tight sealing (when new). May allow some backflow at conditions of low backpressure (less than 5 ft. H₂O backpressure) preferred for service when water hammer check cannot be used. Not for steam service.

c. Outside lever (lever & spring/ lever & weight)

Occasionally used where water hammer might be a problem. Occasionally fitted with limit switches to detect flow. Rarely arranged to counter balance disc and reduce head loss at low flows. Levers may be a safety hazard for personnel if the valve opens suddenly.

2. Figure 126/1126 and 126A/1126A Check Valves – UL/FM

UL/FM approved for fire protection service. Differ from 106/ 1106, 106A/ 1106A, 126/ 1126 and 126A/ 1126A valves in body length and primary pressure rating. All other remarks for Figure 106/ 1106, 106A/ 1106A, 126/ 1126 and 126A/ 1126A valves apply.

3. Figure 806 Wafer Checks

UL/FM approved for service where hammer is a problem. Fit between standard ASME/ANSI B16.1, Class 125 flanges. Drip tight sealing at backpressures greater than 5 ft. H₂O. Recommended for service where water hammer is a problem. Not for steam service.

4. Figure 726 Grooved End Check Valves

UL/FM approved for service where an approved groove coupling is desired. This valve may be installed in either horizontal or vertical positions (flow up). All valves have a ½" NPT connection on the inlet side for installation of a ½" ball drip. Figure 426 has an access cover while Figure 726 is totally enclosed. See catalog/website for pressure ratings.

5. Figure 506 Resilient Hinged Check Valve (Kenflex Check Valve)



This valve eliminates most problems associated with swing check valves. It has benefits for dirty water applications. Design is simple requiring no maintenance other than standard cleaning/inspection programs.

6. Figure 1306 and 1306A Increasing Check Valve

Utilizes same components as used in the 106/ 1106 and 106A/ 1106A swing check valve. Used where you need to increase the size of outlet side pipe.

7. Figure 1206 and 1206A Cushion Increasing Check Valve

Utilizes same internal components as the 106/ 1106 and 106A/ 1106A swing check valves but additionally has an air cylinder, which retards the closing of the check valve. Customer hand adjusts the closing speed to their preference.

8. Figure 2106/2106A and 2126/2126A Check Valve with Stainless Steel Seats

Same as 1106/ 1106A (see above) with the exception that the seat is Stainless Steel Alloy. This option is available per customer request.

9. Figures 507 Patriot II valve

Threats to water supply can come from either accidental or deliberate acts. The Patriot Security Device is a low head sealing check valve that is installed upstream of the hydrant and therefore does not affect the functionality or maintenance of hydrant.

10. Figure 1107 and 1107A Modified End Length Check

AWWA Check Valve using a body length equal to the UL/FM lengths showing in the 1126/ 1126A sections. Components of 1107/ 1107A use the same internal parts as the 1106/ 1106A, but the body of 1126/ 1126A. This is not a UL/FM listed or recognized valve and those markings will not be apparent on the castings. Lever and weight or Lever and spring versions are available.

11. Figure 1606 and 1606A Oil Filled Cushion Check Valve

Similar to 1206 and 1206A but adapted to use of hydraulic retarding system instead of air. Customer adjusts closing speed to their preference.



B. General Selection Information

1. For swing check valves to function properly and not be a source of chatter and water hammer, there must be at least $\frac{1}{2}$ psi differential across the valve under normal flow conditions. When in doubt, undersize check valves.
2. For service in normal environments (clear water or dry air) at temperatures less than 100°F, resilient seated valves will allow less backflow and minimize water hammer versus metallic seated valves.
3. Levers may injure personnel and may be misused by persons to open the valve and allow backflow.



All Valves with outside levers or indicators may move suddenly causing injury by force or pinching action.



INSTALLATION

All Kennedy AWWA and UL/FM check valves bolt between ASME/ANSI B16.1 Class 125 flanges.

Safety: System Pressure to be de-energized prior to and during work.

A. Swing Check Valves

1. Orientation

Note: *May be installed horizontally or vertically (with the flow arrow pointing upward).*

- a. Swing check valves are always installed with the hinge pin perpendicular to water flow direction and above the pipe centerline. Incorrect installation may result in binding, high head loss, and/or hanging open.
- b. Figure 106/ 1106 & 126/ 1126 check valves must be installed with the flow horizontal or the flow vertical with the flow arrow up. The clapper must open with flow and close with no flow.
- c. Outside lever swing check valves must be installed with the end of the lever that is fixed to the hinge pin higher than the opposite end. Failure to do this will certainly void the function of the check and may result in backflow.

2. Lifting

Lift swing check valves with a sling around the body. Never lift valves by placing a bar or fork through the valve. Do not lift adjacent piping or components by lifting (or placing) the valve provided.

3. Clearances

- a. Allow two pipe diameters clearance minimum from the top of the cover for removal of the disc without removing the valve from line.
- b. Allow a minimum of one pipe diameter on one side of the valve and two and a-half (2½) pipe diameters on the opposite side for removal of the hinge pin.
- c. If space is limited, consult factory for space limitations with outside lever valves. Levers may be a safety hazard for personnel and lever



valves should be installed where personnel will not normally be in the area or guards should be installed. The system must be safely deactivated before service.

4. Start-up

- a. Bleed air from lines and valve.
- b. Stand safely back from outside levers and position indicators.
- c. Energize in safe manner while inspecting for sealed system and proper functions.

5. Gaskets/O-ring Seals

Refer to page 18 (**Recommended Spare Parts for Swing Check Valves**)

B. Wafer Check Valves – Figure 806

1. Orientation

- a. The hinge pin should be perpendicular to the water flow direction and above the centerline of the pipe.
- b. Wafer check may be installed horizontally or vertically with the flow up.

2. Gaskets

The wafer check valves bolt between ASME/ANSI B16.1 Class 125 flanges and do not require gaskets (O-rings being provided).

3. Fasteners

Threaded rods are usually used to secure the wafer check in line.



SERVICE LIMITATIONS (Pressure Temperatures)

All valves, all services 32°F minimum working temperature non-shock.

A. UL/FM (Figure 126/ 1126 and 126A/ 1126A) valves are for service at 175 psi maximum and 150° F maximum, water only.

B. Figure 106A/ 1106A (Resilient Seated Checks)

Cold water service (125° F maximum)

Sizes: 2" to 12" - 200 psi maximum
Sizes: 14" to 24" - 150 psi maximum

C. Figure 106/ 1106 (Metallic Seated Checks)

Cold water service (150° F maximum)

Sizes: 2" to 12" - 200 psi maximum
Sizes: 14" to 24" - 150 psi maximum



MAINTENANCE, CHECKING AND TESTING

Swing Checks

With the exception of misuse and severe service, maintenance should be limited to the following:

1. Seating surfaces
2. Bearing surfaces (hinge pins, hinges, and side plugs)
3. Replacement of parts subject to corrosion
4. Lubrication and repacking of hinge pin stuffing boxes and O-ring stuffing boxes for outside lever valves.

Replacement of resilient disc rings (item #1 above), lubrication and repacking of stuffing boxes for outside lever valves (item #4 above) are the only items subject to regular replacement, maintenance, or repair.


Replacement of parts subject to corrosion is unpredictable, as corrosion conditions are unknown and subject to many variables. Only the field service representative is qualified to judge when a part is corroded beyond use or safe limits and should be replaced. For replacement procedures see the section on replacing disc rings. For most conditions, an annual inspection is recommended.

The field service representative must decide what item has worn and replace it.

Resilient Disc Replacement

- A. When to replace
 1. Replace resilient disc rings whenever leakage is judged excessive or at scheduled intervals.
- B. Replacement parts (order from factory for correct size)
 1. Rubber Disc ring



2. Cover gasket or O-ring if old 106/ 106A or 126/ 126A (advisable, but not always required, Refer to page 18. Recommended Spare Parts for C.I. Check Valves).
 3. Anaerobic thread sealants low strength “Loctite” or equal.
 4. O-ring(s) or gasket for disc bolt (advisable, but not always required).
- C. Special tools
1. Conventional hand tools
- D. Procedure (Note: See 26 below for lever arm valves)
1. Remove cover.
 2. Remove side plugs. Use an appropriate size socket or box end wrench not an adjustable or pipe wrench.
 3. Drive hinge pin out with wooden dowel/ plastic tipped hammer.
 4. Retain two stainless steel washers, after removal of hinge pin (*sizes 2-12” only*).
 5. Lift hinge/ disc assembly from valve (“V” notches in side of valve provide clearance for disc assembly).
 6. Remove nut retaining disc plate. At this time, it might be advisable to remove the disc bolt and replace the O-ring(s) or gasket on the disc holder.
 7. Lift the disc plate off. If the disc plate sticks, try tapping the back of the disc assembly with a soft faced mallet. Pry it off only as a last resort.
 8. Remove the resilient disc ring.
 9. Clean the “pocket” where the disc ring seats in the disc holder.
 10. Replace the resilient disc ring (seat) with a new one, seating it flat and centered in the “pocket” in the disc holder.  *Do not use gasket sealant.*
 11. Clean the back of the disc plate.



12. Polish the seat ring in the valve body with crocus cloth or 600 grit wet/dry sandpaper (Refer to page 17 Maintenance, Checking and Testing, Subsection **Seat Rings/ Disc Rings**) or replace as required.
13. If the disc bolt has been removed, lubricate the hole in the disc holder and the disc bolt with clean grease. Then carefully insert the disc bolt through the hinge and disc holder taking care not to twist or cut the O-ring(s).
14. Install the disc plate by positioning it over the threaded portion of the disc bolt.
15. Install the disc bolt nut and use a low strength anaerobic thread sealant.



Do not over tighten the disc bolt nut. Tighten the nut only to the point that the disc plate makes a very slight impression into the resilient disc ring.

16. Carefully lower the Disc/Hinge assembly into the valve body.
17. Partially install side plug (hand tight) and then torque to 300 [lbs.in.].
18. Insert hinge pin partially through hinge.
19. Position one stainless steel washer over end of hinge pin and the installed side plug.
20. Install second washer over the opposite end of hinge pin, allow washer to be positioned against face of hinge.
21. Partially install second side plug (hand tight) and then torque to 300 [lbs.in.].
22. Inspect the cover sealing surfaces and clean if needed.
23. Inspect the cover gasket or O-ring on top flange and replace if needed (order from Kennedy Valve). Normally this can be reused unless damaged.
24. Install and hand tighten all cover fasteners. Using the proper sized wrenches, tighten/ snug the cover bolts in an alternating clock pattern (3, 9, 6, 12, etc.) applying equal/even torque until all fasteners are secured. (Refer to page 18 Recommended Spare Parts for C.I. Check Valves for specific torque).



25. Pressurize and bleed the valve of air, checking for any leaks and tighten joints as necessary as stated in step 24.
26. Procedure for outside lever valves; same as for valves without outside lever except:
 - a. Remove spring or weight before removing lever and cover.
 - b. Loosen set screw on lever and remove lever and key.
 - c. Remove cover.
 - d. Retain O-ring.
 - e. Remove packing gland.
 - f. Remove side plug opposite extended hinge pin.
 - g. Remove set screws on hinge (if present).
 - h. Lubricate exposed portion of extended hinge pin.
 - i. Holding hinge and disc securely, remove hinge pin through side plug opening (opposite the packing gland), pin may need to be driven out with hardwood dowel/ plastic tipped hammer.
 - j. Retain two stainless steel washers, after removal of hinge pin (sizes 2-12" only).
 - k. Lift hinge/ disc assembly from valve ("V" notches in side of valve provide clearance for disc assembly).
 - l. Remove side plug stuffing box.
 - m. Replace resilient disc ring (see section D6).
 - n. Lubricate hinge pin.
 - o. Partially install side plug opposite stuffing box (hand tight) and then torque to 300 [lbs.in.].



- p. Insert hinge pin from stuffing box side.
- q. Align hinge pin key with keyway in hinge.
- r. Position one stainless steel washer over end of hinge pin and the side plug (opposite stuffing box).
- s. Install the side plug, starting by hand, and then torque to 300 [lbs.in.].
- t. Install washer over hinge pin on stuffing box side, allow washer to be positioned against face of hinge.
- u. Install stuffing box side plug, starting by hand, and then torque to 300 [lbs.in.].
- v. Repack the stuffing box.
- w. Start packing gland into side plug stuffing box.
- x. Replace lever, lever key, and set screw on extended hinge pin.
- y. Tighten set screw.
- z. Tighten side plug stuffing box. Tighten slowly and move lever frequently so as to not over tighten and cause valve to hang open.
- aa. Inspect/ replace gasket/ O-ring.
- bb. Replace cover
- cc. Install and hand tighten all cover fasteners. Using the proper sized wrenches, tighten/ snug the cover bolts in an alternating clock pattern (3, 9, 6, 12, etc.) applying equal/even torque until all fasteners are secured. (Refer to page 18 Recommended Spare Parts for C.I. Check Valves for specific torque).
- dd. Replace spring or weight.
- ee. Pressurize and bleed the valve of air, checking for any leaks and tighten joints as necessary as stated in step (cc).



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ff. Tighten packing gland until sealed, while ensuring free movement of lever.



Seat Rings/ Disc Rings

A. When to polish

If leakage is considered excessive.

B. Replacement parts

Refer to page 18 (Recommended Spare Parts for C.I. Check Valves)

C. Supplies

Crocus cloth or very fine (600 grit maximum) wet/ dry sand paper or valve lapping compound.

D. Procedure

1. Refer to page 12 under Maintenance, Checking and Testing, Steps D1-D6.
2. Inspect seat ring and disc ring (on metal to metal valves). Polish away any scale and check for nicks and scratches.
3. For metal to metal valves – lay a piece of wet/ dry paper on a very flat surface and polish the disc ring (with a wiping and rotating motion) until the entire brass disc ring is smooth, flat and free of scratches.
4. Wipe the entire surface of the seat ring. It must be smooth, flat and free from radial scratches.
5. For a better than usual seal, use some valve lapping compound on the seat ring. Rub the disc on the seat ring with a rotating and wiping motion. Clean the compound from the seat and disc and replace it several times.
6. Refer to page 13 under Maintenance, Checking and Testing, Steps D13-D26.



RECOMMENDED SPARE PARTS FOR C.I. CHECK VALVES

Figure 106, 106A, 1106, 1106A, 126, 126A, 1126 and 1126A (also referred to as the 1100 series).

A. Necessary

1. Cap gasket (1100 series checks use O-rings)
2. Resilient disc (for rubber faced valves only)
3. Packing for lever & spring and lever & weight valves.

B. Useful

1. Hinge pin, hinge, and disc assembly
2. Bolts and nuts (1100 series valves do not require cover nuts)
3. Disc bolt O-ring(s) (106A, 1106A, 126, 1126, 126A and 1126A valves.
4. Disc bolt gasket (106/ 1106 valves).
5. Top Flange O-ring if damaged (Fig 1106, 1106A, 1126 and 1126A only).

C. 1106, 1106A, 1126, 1126A Cover Bolt Size and Torque

| SIZE [in.] | BOLT SIZE | TORQUE [lbs. ft.] |
|------------|-----------|-------------------|
| 2, 2½, 3 | 1/2 - 13 | 80 |
| 4 | 5/8 - 11 | 100 |
| 6, 8 | 3/4 - 10 | 150 |
| 10, 12 | 7/8 - 9 | 230 |

D. 106, 106A, 126, 126A Gaskets

2" to 12" valves use a gasket identical to the standard ASME B16.1 Class 125 end flange gasket.



SIZING OF SWING CHECK VALVES

To assure reliable, stable, chatter-free operation, it is recommended that swing check valves be sized to assure the disc will open full during normal flow conditions. The head loss during normal flow conditions should exceed (1) one psi for valves 4" and smaller and exceed (1/2) one-half psi for the remaining larger sizes. The data below provides an estimate of what should be the minimum design flow rates:

| SIZE [in.] | DESIGN MIN. FLOW [GPM] | REF. Cv* |
|------------|------------------------|----------|
| 2 | 150 | 141 |
| 2½ | 250 | 235 |
| 3 | 350 | 347 |
| 4 | 650 | 643 |
| 6 | 1100 | 1532 |
| 8 | 2100 | 2836 |
| 10 | 3300 | 4573 |
| 12 | 4800 | 6756 |

**Cv values are based partially on extrapolated data and in any case only apply to flows greater than the minimum flows specified.*



Troubleshooting

| Problem | Correction |
|---------------------------|--|
| Hinge pin leakage | Tighten packing gland |
| | Replace worn packing |
| Leakage past seat | Inspect seating surfaces. Clean, polish or replace |
| | Remove foreign material lodged in seating area |
| Leakage at cover | Tighten cover bolts |
| | Replace cover seal |
| Valve does not open fully | Check for debris lodged in the valve body |
| | Insufficient flow/pressure |
| | Move the weight closer to the hinge pin ⁽¹⁾ |
| | Decrease the spring tension ⁽¹⁾ |
| | <i>Note (1): May affect closing time</i> |