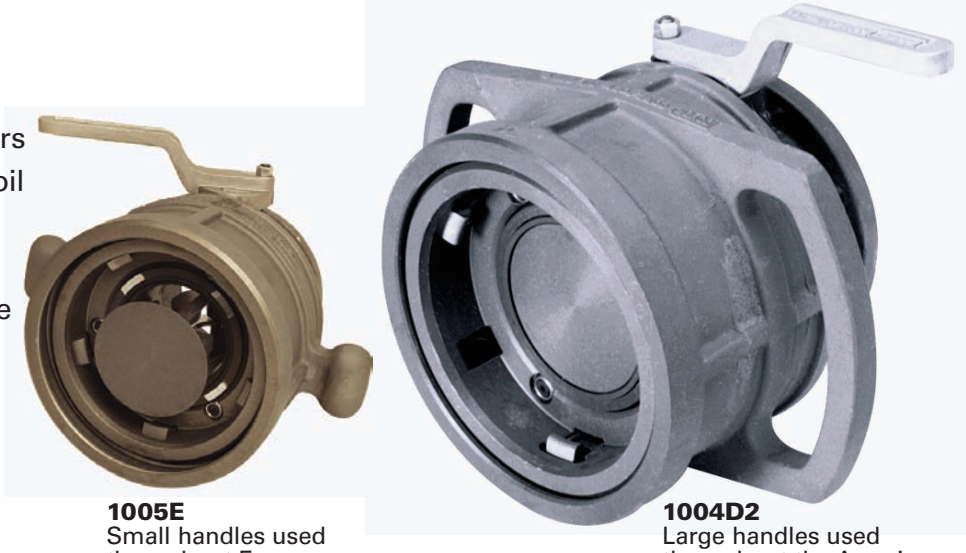
PART #H32183PA
February 2009

OPW® Engineered Systems
PART OF OPW FLUID TRANSFER GROUP
A DOVER™ COMPANY

1004D2/1005E API Bottom Loading Coupler

The 1004D2 is the standard in "drip-less" bottom loading couplers and a proven performer at major oil terminals worldwide. The 1004D2 mates with all 4" bottom loading adaptors and is built in accordance with API RP-1004 requirements to significantly reduce liquid loss at disconnect.



1005E
Small handles used throughout Europe

1004D2
Large handles used throughout the Americas

BENEFITS

5 Cam Design
Design insures easy alignment, tight connection and resists side forces during loading.

Fully Interlocked
The 1004D2 cannot be opened unless it is properly connected to an API adaptor nor can it be disconnected when the poppet is open.

Redundant Sealing
Simple and reliable, consisting of dual heavy-duty cross-section O-rings.

Smoother, Easier Operation
Built-in roller bearing handle and PTFE impregnated poppet and cylinder provide for smoother, easier movement.

Easy and inexpensive to maintain!

SELECTION GUIDE

1004D2 04 02

1004D2 = Large handles, U.S. version
1005E = Small handle, European version

04 = size (4" only)

02= Seal
01 - Buna-N
02 - Fluorocarbon GFLT
04 - EPDM

DESIGN PARAMETERS:		MATERIALS:	
*Max Allowable Working Pressure:	75 psi (g), 5 bar (g)	Body, Sleeve, Poppet	Aluminum (A356-T6)
Max Flow Rate:	600 GPM, 135 M3/H	Cam Arms, Interlock, Drive Link	Stainless Steel (ASTM A351 CF8M)
Max Temperature:	See seal options (page 3)	Cylinder	Aluminum (6061-T6)
Weight:	18.5 lbs (8.39 kg)	Shaft	Stainless Steel (17-4 PH)
Pressure Drop (At Max Flow Rate)	2-5 psi (g), .24 bar (g)	Seals	See Seal Options

***Unit tested to 300 psi (21 bar) in the closed position to withstand excessive thermal expansion. Reference API Standard RP-1004 for additional information.**

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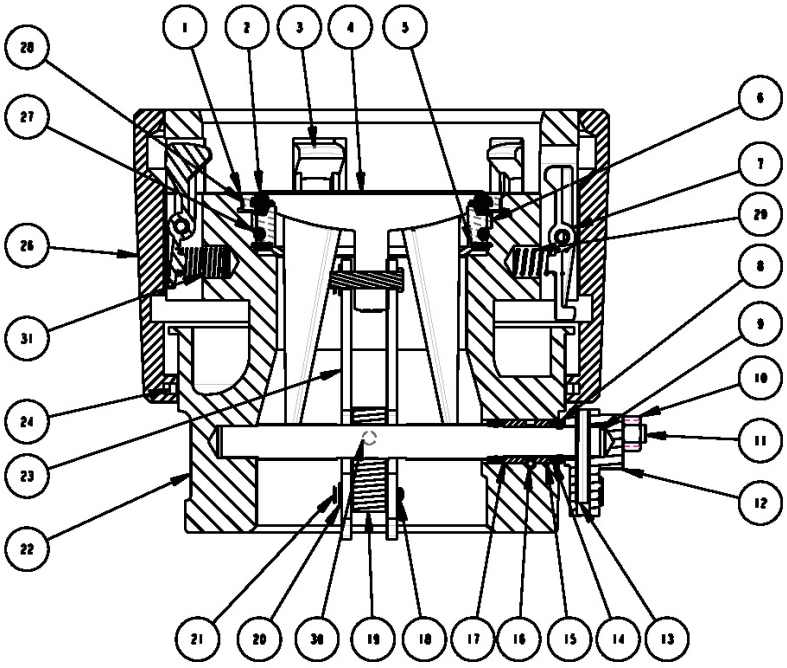


MAIN AND BACK-UP SEALS

#	Description	Qty	Material	Part #	
1	Screw	3	Carbon Steel	H30222M	
2	Nose seal	1	See Seal Option Chart	See Seal Options	*
3	Locking Cam Arm	5	316 SST ASTM A351 CF-8M	C20063M	
4	Poppet	1	Aluminum A356-T6 ASTM B26 Anodized	D20069AH	
5	Wave Spring	1	17-7 PH Stainless Steel	H31091M	
6	Cylinder	1	6061-T6 Aluminum Anodized	C20144RAH	
7	Interlock	1	316 SST ASTM A351 CF-8M	C20062M	
8	Shaft Dust Seal	1	Felt	H30228M	*
9	Shaft	1	17-4 PH SST Condition H1025 Hardened	C20145RE	
10	Nut, Hex	1	Carbon Steel, Zinc plated	H30220M	
11	Roller Bearing	1	Carbon Steel	H30219M	
12	Lever	1	Aluminum A356-T6 ASTM B26	D20037A	
13	Spiral Pin	7	Carbon Steel Zinc plated	H31396M	
14 a, b	Shaft O-Ring	2	See Seal Option Chart	See Seal Options	*
15	Bushing	1	Brass UNS C-36000	H30809RB	
16	Groove Pin	1	Carbon Steel Zinc plated	H30212M	*
17 a, b	Washer	2	18-8 SST	H30209M	
18	Clevis Pin	2	17-4 PH SST Condition H900 Hardened	H30610RE	
19	Drive Link	1	316 SST ASTM A351 CF-8M	H30207EW	
20	Washer	2	18-8 SST	H30206M	
21	E-Ring	2	15-7 PH SST	H30554M	*
22	Body	1	Aluminum A356-T6 ASTM B26 Anodized	E20038AH	
23	Bent Link	2	410 SST Hardened	H30552M	
24	Dust Seal	1	Felt	H30214M	
26	Sleeve	1	Aluminum A356-T6 ASTM B26 Anodized	E20013AH (1004D2) E20026AH (1005E)	
27	Cylinder O-Ring	1	See Seal Option Chart	See Seal Options	*
28	Keeper	3	18-8 SST	H30221M	
29	Spring, Interlock	1	Carbon Steel Zinc plated	H31743M	
30	Set screw	1	18-8 SST	H30602M	*
31	Spring, Cam Arm	5	18-8 SST	H06753M	

***Items included in seal replacement kits (1004D2SRK)**

SEAL OPTIONS

Seal Material	Coupler Model #	Nose Seal (2)	Shaft Seal (14)	Cylinder Seal (27)	Temp Rating
Fluorocarbon	1004D2-0402/1005E-0402	H30483M	H30808M	H30217M	-20°F - 400°F (-29°C - 204° C)
Buna	1004D2-0401/1005E-0401	H30482M	H30259M	H30258M	-20°F - 250°F (-29°C - 121° C)
EPT	1004D2-0404/1005E-0404	H31957M	H31955M	H31956M	-50°F - 225°F (-46°C - 107° C)

Consult factory for additional seal options.

SEAL REPLACEMENT KITS

OPW 1004D2SRK Seal Replacement Kits include everything needed to change the seals in the 1004D2/1005E Bottom Loading Coupler. **Seal Replacement Kits are always recommended as spare parts.**

Seal Material	Seal Replacement Kit Part #
Fluorocarbon	1004D2SRK-0402
Buna	1004D2SRK-0401
EPT	1004D2SRK-0404

ASSEMBLY

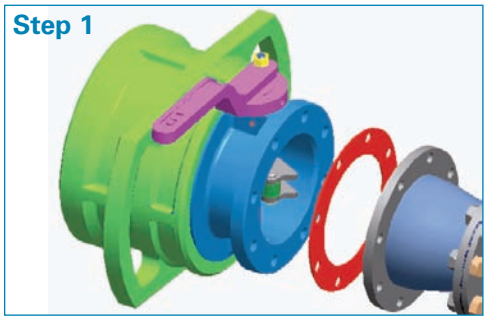
API Coupler Installation Preparations

Safety precautions

Warning: Read & understand this instruction before starting installation.

- Coupler to be used for its designated purpose only.
- Local regulations for (un)loading must be followed at all times.
- Product flow may result in static electricity; grounding of equipment is required.
- **Although the 1004D2/1005E is designed for higher pressures, proper measures must be taken within the system to allow for thermal expansion.**
- OPW instructions must be followed for installation.
- Make sure to use adequate personal protection at all times during operation.

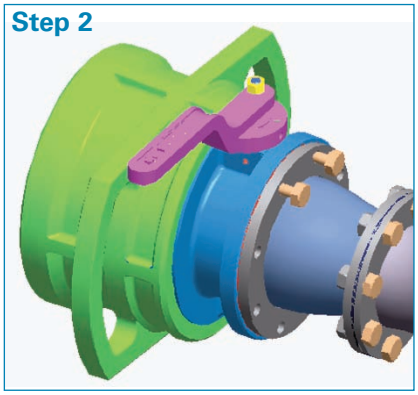
Step 1



- Secure whatever device Coupler will be mounted to (e.g., Loading Arm)
- Sandwich gasket between Coupler and Loading Device flanges.
- Align Coupler bolt holes with bolt holes on Loading Device.
- Insert two bolts into the highest bolt holes on the flange and hand tighten. This is to secure Coupler, and prevent damage due to bending as the remaining bolts are installed.

Note: All images depict the 1004D2 (large handles). The steps for 1005E Coupler (small handles) are the same as 1004D2.

Step 2

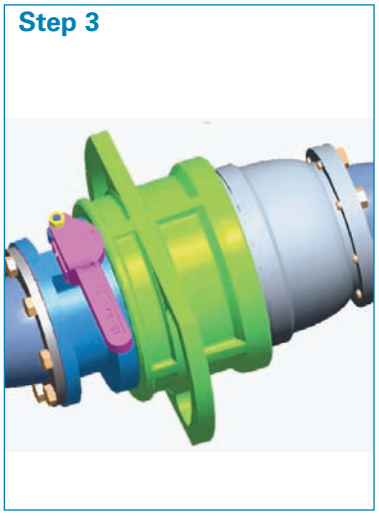


Install remaining bolts and tighten down to recommended torque value.

Note: Torque value is based on material and grade of bolts used.

Warning: Under pressure, poppet will cause handle to rotate violently if not restrained.

Step 3



Connect Coupler to adaptor and slide sleeve forward. Rotate the handle locking the sleeve in position and opening the poppet.

MAINTENANCE

Tools Needed:

- Hammer
- 1/4" Socket
- Torque Wrench
- Draft Pin
- Hex Key
- Screwdriver
- Silicon Spray (WD-40®)
- Loctite 242

Consider the following when servicing the Coupler:

- When Coupler is over pressurized, it must be inspected thoroughly
- After maintenance is performed, it must be tested before the next use (see Coupler Testing)
- Periodical inspection (every 3 months) for leakages (especially with toxic or hazardous mediums)
- Maintenance must be performed by authorized personnel
- Periodical maintenance (once a year) is required according to the maintenance instructions
- When any leakages are found, have seals replaced immediately to obtain a safe and correct use of the Coupler. If leakages continue contact the OPW distributor or OPW Engineered Systems for consultation

DISASSEMBLY INSTRUCTIONS

Step 1: Dismantle API Coupler

Attention: Dismantling must be performed by authorized and trained personnel only.

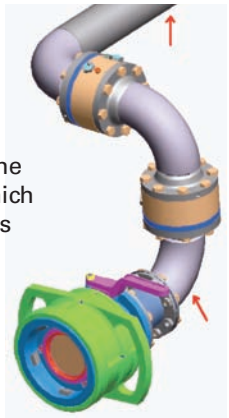
Attention: The same risks and procedures of initial installation apply.

Warning: Use caution and be aware of the service in which the Coupler has been used. When the medium is nuclear, hazardous or toxic, one is obligated to clean the parts with the help of specialized personnel, companies or governments.

Before dismantling Coupler, take some necessary precautions.

Figure A

- Secure from movement the device to which the coupler is attached (**Figure A**)



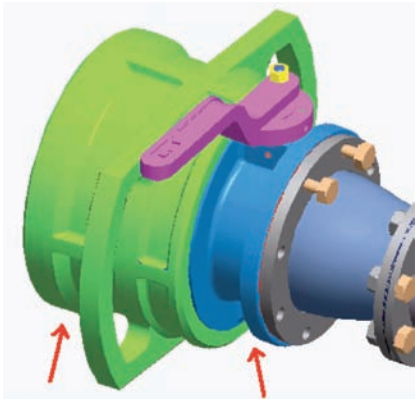


Figure B

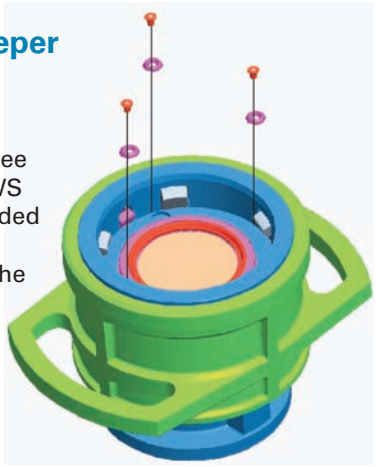
- **Make sure to use adequate personal protection at all times during the operation.**
- Clear surrounding areas and shut off any working devices
- Make sure the surrounding area is clear from obstacles
- Barricade surrounding area, so that no unauthorized persons can access work floor
- Arrange necessary permits or paperwork with plant holder, owners or local authorities, before taking any actions

When the Coupler is clean and dry and the necessary precautions have been taken, the Coupler can be disassembled from the device to which it is attached.

- With the corresponding Loading Arm secured from movement, loosen bolts mounting the Coupler to the Loading Arm. Support Coupler while removing all, except top two bolts. This is to prevent bending moments from causing damage to the flanges and bolts (**Figure B**).
- While supporting the loose Coupler, remove the final two bolts. Coupler should fall away.
- Remove gasket between both flanges.

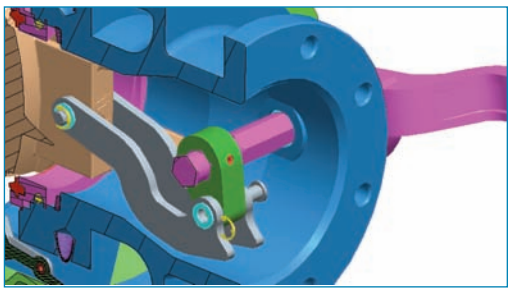
Step 2: Remove Keeper Screws

Using Hex Key, unscrew the three KEEPER SCREWS which are provided to secure the cylinder when the poppet is in the open position.



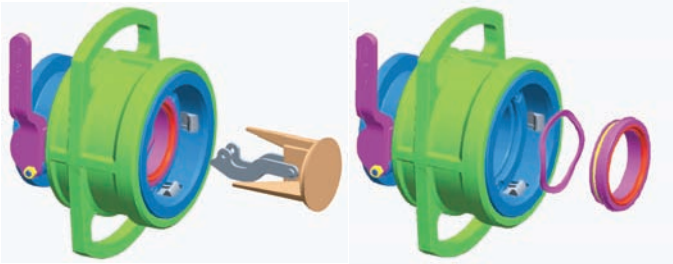
Step 3: Disassemble Poppet/Nose Seal Sub-Assembly:

To perform the next series of steps, it is required to rotate the handle to allow disassembly of poppet components. Simply depress the INTERLOCK (#7) and slide the sleeve forward and then rotate handle.



Step 3a: Once in position, remove E-CLIP (#21) and WASHER (#20) using small blade screwdriver. Remove CLEVIS PIN (#18) from DRIVE LINK (#19).

Step 3b: Remove DRIVE LINK SET SCREW (#30).



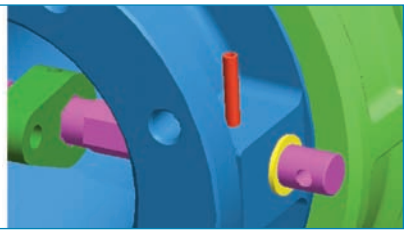
Step 3c: Feed poppet through nose seal sub-assembly. Remove cylinder and wave spring.

Step 4: Remove Handle:

With Handle in the open position, drive out Pin from the lever sub-assembly using Drift Pin & Hammer.

Step 5:

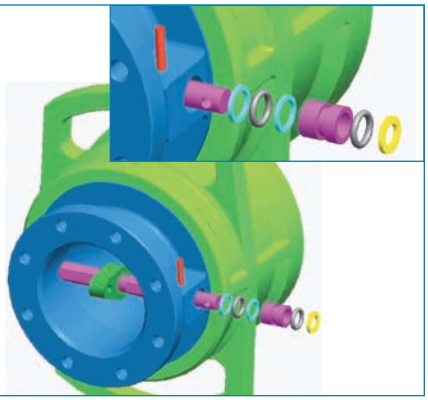
Drive out PIN (#16) from body.



Step 6:

Remove shaft seals from body, discard O-rings & felt environment seal and inspect other parts for wear. Thoughly clean shaft and sealing chamber.

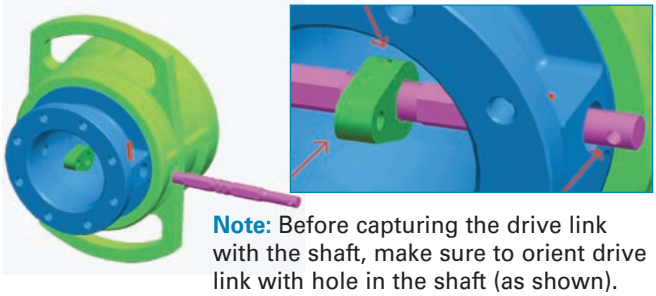
Disassembly Complete



Assembly Instructions:

Step 1:

Run shaft through body and drive link. Partially install groove pin into body.

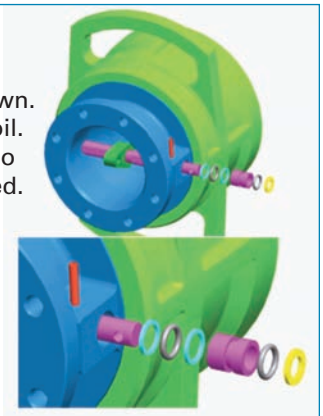


Note: Before capturing the drive link with the shaft, make sure to orient drive link with hole in the shaft (as shown).

Step 2:

Slide spacer & replacement seals over shaft in order shown. Lubricate O-rings with light oil. Gently slide seals/spacers into coupler body until fully seated.

Note:
Part list (shown below) is in order of picture (at right) from left to right.

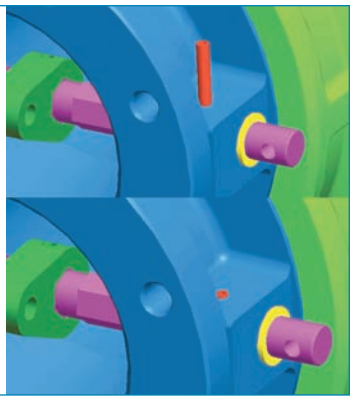


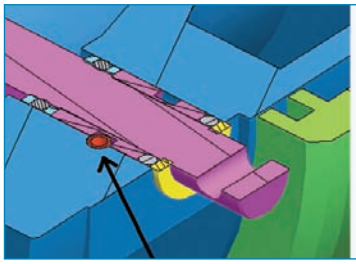
Description	Material	P/N	Qty.
Washer*	SST	H30209M	1
Shaft O-Ring	See Seal Options		1
Washer	SST	H30209M	1
Bushing	Brass	H30211RB	1
Shaft O-Ring	See Seal Options		1
Shaft Dust Seal	Felt	H30228M	1

*Smooth side of washers should face TOWARDS the shaft seal o-ring on both sides.

Step 3:

With shaft seals/spacer in place, fully seat pin into body/groove

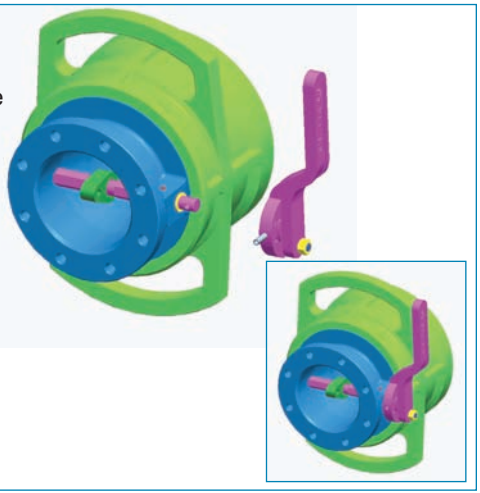




Note: Spring pin should fall within the groove of shaft bushing, locking shaft into coupler body.

Step 4:

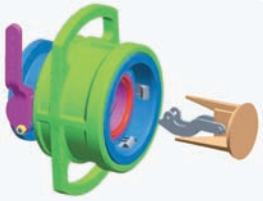
Install Handle. Orient the handle and drive link as shown and then press the handle onto shaft and secure with spring pin.



Step 5:
Replace Cylinder Sub-Assembly Seals (Nose Seal & Cylinder Seal): Remove & replace both seals and lubricate cylinder seal O-ring with light oil.

Step 6a:
Install Cylinder Sub-Assembly/ Poppet: Clean & inspect coupler body and remove any loose particulate prior to cylinder assembly. A light coating of WD-40® or silicone spray is recommended into body prior to this step. Drop wave spring into body followed by nose seal sub-assembly.

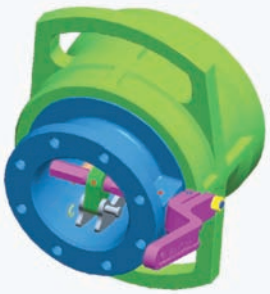
Step 6b:
Feed poppet through nose seal sub-assembly.



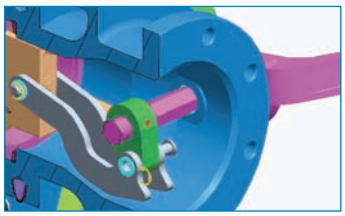
Step 6c:
It is necessary to rotate the handle back so that the poppet links can reach the drive link. Making sure the threads on the set screw are clean, apply a drop of Loctite 242 to threads. Install the set screw and tighten to 90 inch-pounds of torque.

Handle / Cam / Poppet Link orientation is critical (see section view below).

- With the handle on the right side, and in the middle position, the drive link should be facing down slightly.

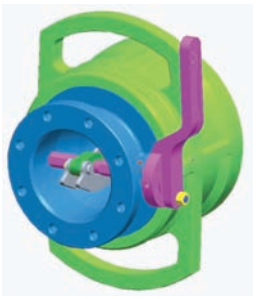


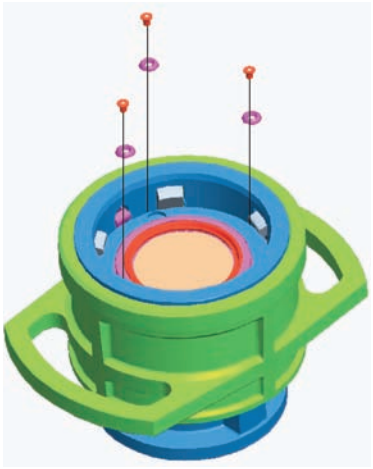
- Install poppet so that both poppet links attach to the drive link from below.
- Once in position, install clevis pin washer and E-clip. Then tighten drive link set screw.



- Rotate handle forward to the upright position to lock poppet up against nose seal.

Make sure that the orientation of the poppet link and handle match picture as shown.





Step 7:
Install Cylinder Keepers: With the nose seal still in the retracted position, screw in the three keepers which are provided to secure the nose seal when the poppet is in the open position.

Assembly Complete

Warning: With sleeve forward, operating handle is unlocked and can rotate. Do no apply pressure to handle unless trying to open valve. Use caution when working around handle when system is under pressure. Once handle starts moving, pressure can cause it to rotate violently.

⚠ WARNING

Failure to follow these warnings could result in serious personal injury, property damage or product failure.

1) Do not attempt any maintenance service while the equipment is in operation. System pressure must be relieved and the product drained before attempting any service on the unit. The line must be locked out while service is in progress. Proper thermal relief must be provided at all times while equipment is in service.

2) OPW products do not eliminate possible exposure to hazardous substances. The conditions of handling and use are beyond our control, and we make no guarantee and assume no liability for damages or injuries related to the use of our products. Follow the safety precautions outlined in the Material Safety Data Sheets for the material being used. It is the responsibility of the user to comply with all federal, state and local regulations. Always employ proper safety precautions and handling techniques.

3) Proper seal and wetted material part selection is critical for safe operation. To assure maximum life for the service intended, use only those materials compatible with the fluids being handled. Please note material being supplied and make certain that it is suited for the intended service.

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