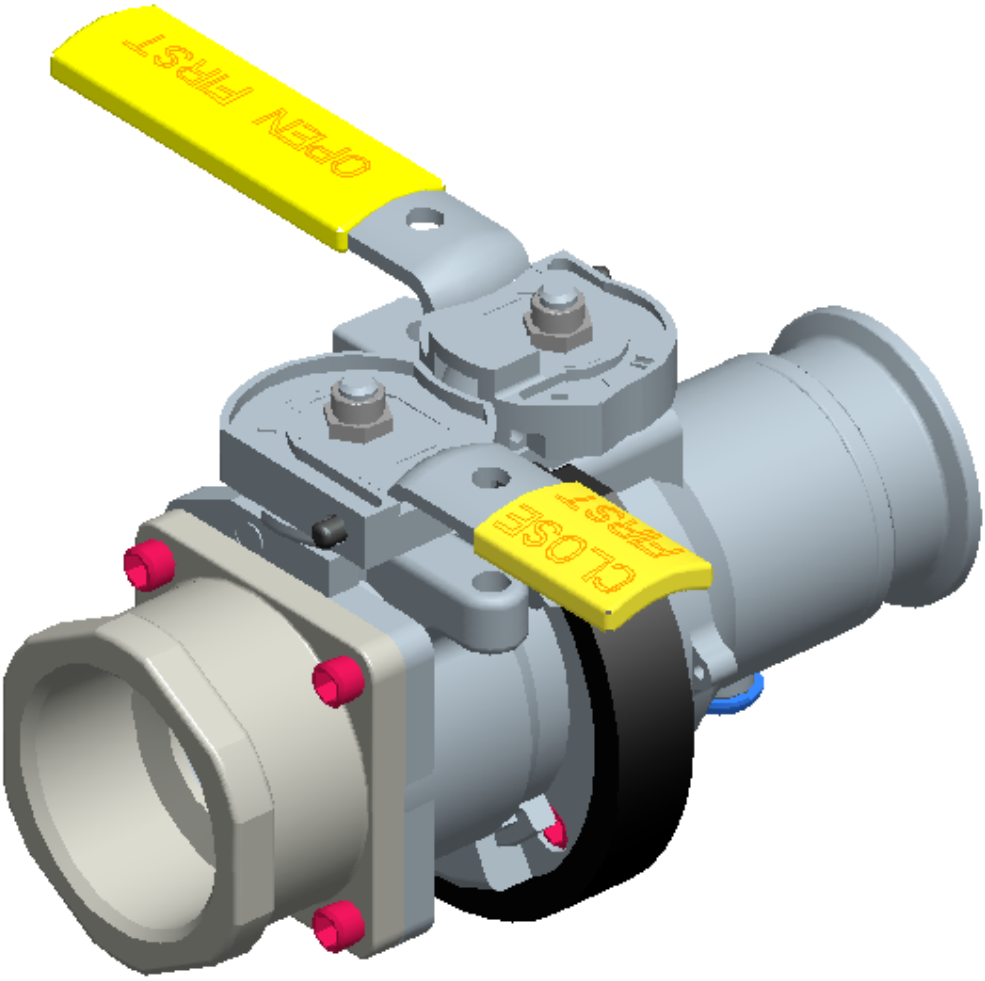
OPW Engineered Systems

Instruction and Operation Manual



Epsilon COUPLER

Date *02 August 2008*
Serial number *20xxx*

Table of Contents

1	*Product description*	*6*
1.1	*Design parameters*	*6*
1.2	*Load Capacities*	*6*
1.3	*Materials*	*6*
1.4	*Surface treatment(s)*	*8*
1.5	*Operation, Pressure and Conductivity*	*9*
1.6	*Design Testing Detail*	*10*
1.7	*General Warnings / Specific Warnings*	*11*
1.8	*Maintenance*	*12*
1.9	*Seal Replacement*	*13*
1.10	*Part Numbers*	*15*
	Adapter	*15*
	Coupler	*27*
1.11	*Seal Kit Part Numbers*	*41*
1.12	*Cavity Filler Part Numbers*	*41*
1.13	*Testing after service*	*42*
2	*Installation*	*44*
2.1	*Welded Unit Installation*	*44*
2.2	*Threaded Unit Installation*	*45*
2.3	*Flange Unit Installation*	*46*
3	*Dismantling Coupler*	*47*
3.1	*Dismantling Welded Unit*	*48*
3.2	*Dismantling Threaded Unit*	*48*
3.3	*Dismantling Flange Unit*	*49*
3.4	*Detailed Disassembly (for seal replacement)*	*50*
4	*Detailed Rebuild*	*56*
5	*Supplemental Installation Instructions*	
5.1	*Cavity Filler Installation*	*71*

Disclaimer

In this document a manual is presented of the **OPW** Epsilon coupler.
It is important that the end user (in many cases the operator) of the **OPW** Epsilon Coupler is of an adult age, is trained for the job of operating the Coupler, reads and understands this manual (and therefore has knowledge of the English language), understands the hazards involved with operating the Coupler, and understands the emergency procedures for the chemicals used within the Coupler, otherwise **OPW** does not recommended using the Coupler.

OPW Engineered Systems can not be held responsible for incorrect use of the Coupler.

If this Coupler is used in another location other than mentioned in the initial quotation, is abused or used with a different medium or pressure all guarantees will be declined.

When there are intentions to relocate the Coupler, due to e.g. a restructuring of the infrastructure, it is recommended to contact **OPW Engineered Systems** for consultation.

This is an **OPW Engineered Systems** product, for information and/or complaints contact:

OPW Engineered Systems

Address:
2726 Henkle Drive
Lebanon, OH 45036
USA

T: +01 513-932-9114
F: +01 513-932-9245
E: sales@opw-es.com
W: http://www.opw-es.com

1.7 Warnings

A. General Warnings

⚠ CAUTION

All OPW products have literature that indicates the maximum service conditions for the unit. This information must be reviewed prior to installation and start-up. If there is any doubt of applicability for operation in a system under actual service conditions, consult the factory before placing in service.

⚠ CAUTION

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. Read the operating instructions in the maintenance manual before using or servicing this product. Failure to do so could result in serious personal injury, property damage or product failure.

⚠ CAUTION

Do not drop OPW products onto hard surfaces. Chipping and deformation of the product may occur. Repeated mishandling of the product could result in personal injury, property damage or product failure.

⚠ WARNING

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. Failure to do so could result in serious personal injury, property damage or product failure.

⚠ WARNING

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 fluidsbeing handled. Please note material being supplied and make certain that it is suited for the intended service. Failure to do so could result in serious personal injury, property damage or product failure.

B. Specific Warnings

- Remove pressure from the system before attempting to remove coupler
- Secure piping before attempting to remove coupler

1.8 Maintenance

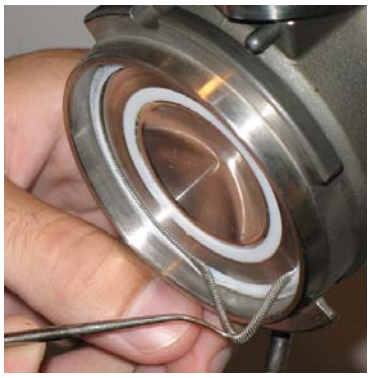
Think of the following when servicing Epsilon:

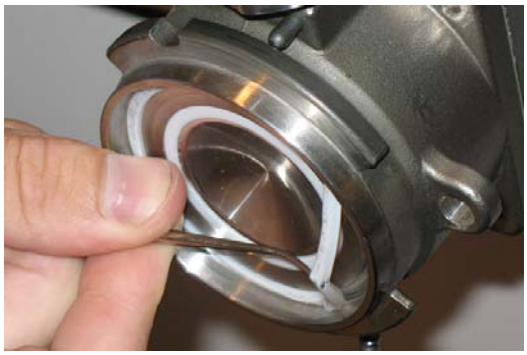
- When Epsilon is overloaded, it must be inspected thoroughly
- After maintenance is performed, it must be tested before the next use
- Periodical inspection (every 3 months) for leakages (especially with toxic or hazardous mediums)
- Maintenance must be performed by authorized personnel
- Periodical maintenance (once a year) is required according to the maintenance instructions
- In case of (parts of) Couplers being redirected, the initiator must provide information about the mediums, which have been in contact with (parts of) Epsilon
- During maintenance (partial) dismantling could be necessary, the same risks and procedures apply

1.9 Seal Replacement

For replacement of the adapter / process / manifold half face seal. If leakage is seen between the connected coupling interfaces, complete the following steps:

Warning:
The adapter/process/manifold half must be locked-out of service during maintenance





Using an OPW Engineered Systems spark resistant hook & pick (or equivalent made of soft brass or aluminum), pull out the face seal, careful so as **not** to scratch the bottom of the seal groove (sealing surface) in the body. For ease of disassembly you may need to remove the spring inside the seal first (hook the spring and remove it from the jacket).

The seal will be damaged when removed. Promptly discard the removed seal with spring. A new seal is supplied in the maintenance kit.

Using a suitable solvent (e.g. isopropyl alcohol or acetone), clean the seal groove in the body and the face of flange, by gently wiping it with a soft cotton swab. Inspect the sealing surfaces to make sure they are clean, scratch and gouge free. If sealing surface is damaged, the part must be replaced.

Note: Seal orientation required. One edge of seal has a retention rib extended from it that holds the seal in place once installed. Carefully press new seal, rib end first, into the body seal groove. Start at one location by pressing seal into groove and then work around the entire circumference[1]. Do not scratch or damage the seal jacket during assembly, as this may cause leakage and possible exposure to hazardous materials.

For complete seal replacement

- Dismantle coupler / adapter from piping (see section 3 for details)
- Disassemble coupler / adapter (see section 3.4 for detailed disassembly instructions)
- Clean all sealing surfaces and inspect for damage
- Replace seals (see section 4 for detailed rebuild instructions)
- Re-attach coupler / adapter to piping (see section 2 for installation details)

[1] – For alternate installation technique, a spare coupler may be used to seat the seal. With the adapter body vertical and seal surface upward, lay the seal in the groove as specified above. Lightly set the coupler on top of it and rotate the coupler 90° (3/4 – 2") or 60° (3"). Rotate the coupler on the adapter 3-5 times and remove. This will help provide even pressure on the seal face during installation and help protect seal integrity.

1.10 Part Numbers

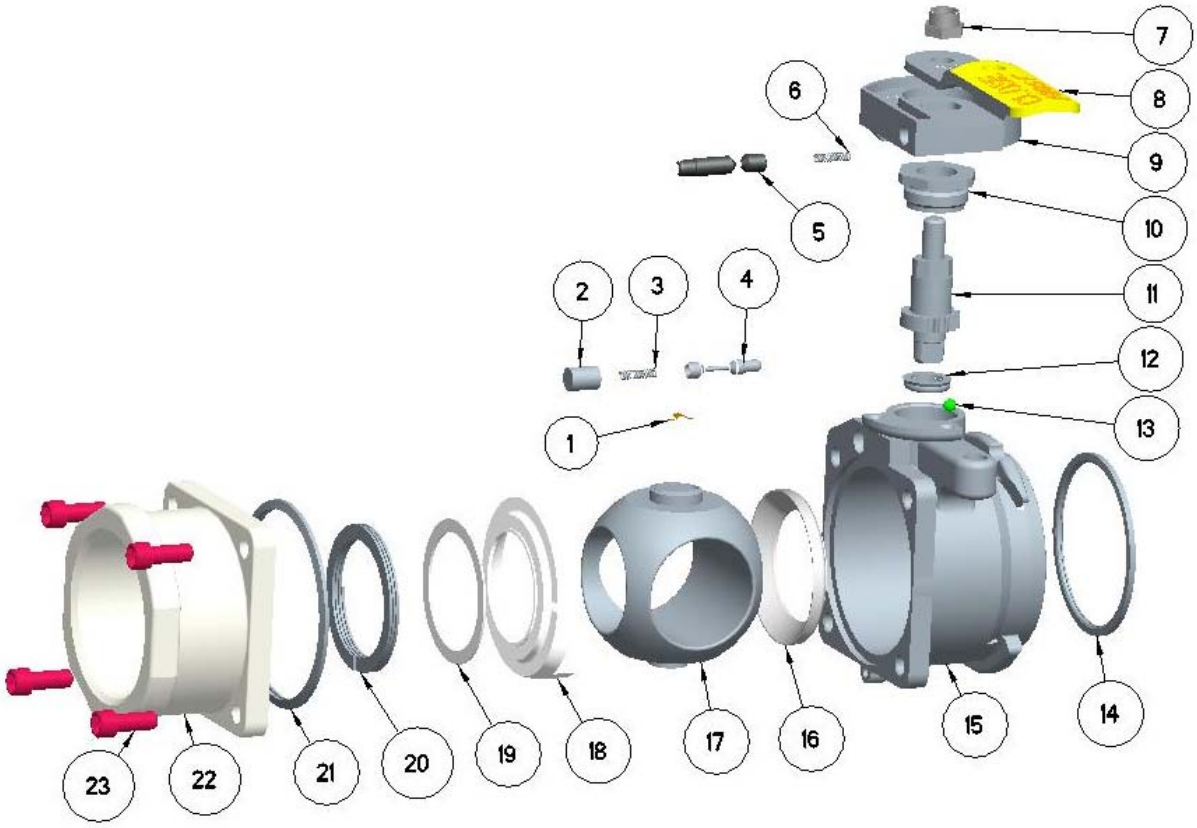


Figure 1
3/4, through 3 inch Adapter Half (Items 1-23)

Epsilon Adapter Parts List

#	Item Description	SIZE	Qty.	Material	Part Number
1	SPRING, CONDUCTIVITY (INCLUDED IN SEAL KIT)	3/4"	1	HASTELLOY	H31951M
		1"			H31951M
		1-1/2"			H32017M
		2"			H32017M
		3"			H31952M
		3"		316 SST	H32140M
2	RETAINER, BODY, INTERLOCK PIN	3/4"	1	316 SST	CTL107A32-14
		1"			CTL107A32-14
		1-1/2"			CTL107A32-14
		2"			CTL107A32-14
		3"			ZE100112-001
		3/4"		HASTELLOY	CTL107A32-14H
		1"			CTL107A32-14H
		1-1/2"			CTL107A32-14H
		2"			CTL107A32-14H
		3"			NA

3	SPRING, INTERLOCK, BODY	3/4"	1	302 SST	ZE100171-018
		1"			ZE100171-018
		1-1/2"			CTL107A32-26
		2"			CTL107A32-26
		3"			ZE100119-018
		3/4"		HASTELLOY	ZE100171-004
		1"			ZE100171-004
		1-1/2"			ZE100171-004
		2"			ZE100171-004
		3"			NA
4	PIN, INTERLOCK, BODY	3/4"	1	17-4 PH	CTL107A16-09
		1"			CTL107A16-09
		1-1/2"			CTL107A32-09
		2"			CTL107A32-09
		3"			ZE100111-021
		3/4"		HASTELLOY	CTL107A16-09H
		1"			CTL107A16-09H
		1-1/2"			CTL107A32-09H
		2"			CTL107A32-09H
		3"			NA
5	PIN, INTERLOCK, HUB	3/4"	1	15-5 PH	ZE100167-022
		1"			ZE100167-022
		1-1/2"			CTL107A32-15
		2"			CTL107A32-15
		3"			ZE100113-022
		3/4"		HASTELLOY	ZE100167-004
		1"			ZE100167-004
		1-1/2"			CTL107A32-15H
		2"			CTL107A32-15H
		3"			NA
6	SPRING, INTERLOCK, HUB	3/4"	1	302 SST	ZE100171-018
		1"			ZE100171-018
		1-1/2"			CTL107A32-26
		2"			CTL107A32-26
		3"			ZE100119-018
		3/4"		HASTELLOY	ZE100171-004
		1"			ZE100171-004
		1-1/2"			ZE100171-004
		2"			ZE100171-004
		3"			NA

7	HANDLE NUT, SELF LOCKING, 1/4-20 UNC	3/4"	1	316 SST	CTL107A16-96
		1"			CTL107A16-96
	HANDLE NUT, SELF LOCKING, 5/16-18 UNC	1-1/2"			CTL107A32-96
		2"			CTL107A32-96
	HANDLE NUT, SELF LOCKING, 7/16-20 UNF	3"			ZE100117-001
	HANDLENUT, SELF LOCKING, 1/4-20 UNC	3/4"	1	HASTELLOY	ZE100168-004
		1"			ZE100168-004
	HANDLE NUT, SELF LOCKING, 5/16-18 UNC	1-1/2"			ZE100172-004
		2"			ZE100172-004
	HANDLE NUT, SELF LOCKING, 7/16-20 UNF	3"			NA
8	HANDLE, YELLOW COVER - STD	3/4"	1	301 SST	ZE100201-030
		1"			ZE100201-030
		1-1/2"			ZE100204-030
		2"			ZE100204-030
		3"			ZE100104-003
	HANDLE, YELLOW COVER - RAISED	3/4"			ZE100202-030
		1"			ZE100202-030
		1-1/2"			ZE100266-030
		2"			ZE100266-030
		3"			ZE100228-003
9	HUB, EPSILON ADPT	3/4"	1	316 SST	ZE100161-001
		1"			ZE100161-001
		1-1/2"			ZE100316-001
		2"			ZE100316-001
		3"			ZE100094-002
		3/4"		HASTELLOY	ZE100161-004
		1"			ZE100161-004
		1-1/2"			ZE100316-004
		2"			ZE100316-004
		3"			NA
10	BEARING, STEM	3/4"	1	ILLIUM 8	ZE100177-007
		1"			ZE100177-007
		1-1/2"			ZE100176-007
		2"			ZE100176-007
		3"			ZE100086-007
		3/4"		HASTELLOY	ZE100177-004
		1"			ZE100177-004
		1-1/2"			ZE100176-004
		2"			ZE100176-004
		3"			NA

11	STEM, ADPT	3/4"	1	316 SST	ZE100060-002
		1"			ZE100060-002
		1-1/2"			ZE100313-001
		2"			ZE100313-001
		3"			ZE100105-001
		3/4"		HASTELLOY	ZE100060-004
		1"			ZE100060-004
		1-1/2"			ZE100313-004
		2"			ZE100313-004
		3"			NA
12	SEAL, STEM	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
13	BALL, DETENT (SST INCLUDED IN SEAL KIT)	3/4"	1	440 SST	ZE100170-039
		1"			ZE100170-039
		1-1/2"			ZE100170-039
		2"			ZE100170-039
		3"			CTL107A32-25
		3/4"		HASTELLOY	ZE100170-004
		1"			ZE100170-004
		1-1/2"			ZE100170-004
		2"			ZE100170-004
		3"			CTL10732-25H
14	SEAL, TRANSFER	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
15	BODY	3/4"	1	316 SST	CTL107A16-02
		1"			CTL107A16-02
		1-1/2"			ZE100150-002
		2"			ZE100150-002
		3"			ZE100147-002
		3/4"		HASTELLOY	CTL107A16-02H
		1"			CTL107A16-02H
		1-1/2"			ZE100150-004
		2"			ZE100150-004
		3"			NA
16	SEAL, BALL	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			

17	BALL, VALVE, CONCAVE, T-BORE	3/4"	1	316 SST	ZE100279-002
		1"			ZE100279-002
		1-1/2"			ZE100244-002
		2"			ZE100244-002
		3"			ZE100301-002
		3/4"		HASTELLOY	ZE100279-004
		1"			ZE100279-004
		1-1/2"			ZE100244-004
		2"			ZE100244-004
		3"			NA
18	RETAINER, VALVE BALL	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
19	WASHER, WAVE SPRING TO RETAINER	3/4"	1	316 SST	NA
		1"			NA
		1-1/2"			CTL107A32-54
		2"			CTL107A32-54
		3"			ZE100118-001
		3/4"		HASTELLOY	CTL107A16-54H
		1"			CTL107A16-54H
		1-1/2"			CTL107A32-54H
		2"			CTL107A32-54H
		3"			NA
20	WAVE SPRING	3/4"	1	HASTELLOY	CTL107A16-38H
		1"			CTL107A16-38H
		1-1/2"			ZE100191-004
		2"			ZE100191-004
		3"		316 SST	ZE100084-001
21	SEAL, FLANGE	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
22	ADAPTER, ADPT	3/4"	1	SEE END CONNECTION CHART	SEE END CONNECTION CHART
		1"			
		1-1/2"			
		2"			
		3"			

23	SCREW, SH CAP	3/4"	4	302 SST	ZE100179-018
		1"			ZE100179-018
		1-1/2"			H20625M
		2"			H20625M
		3"			ZE100120-024
		3/4"		HASTELLOY	ZE100179-004
		1"			ZE100179-004
		1-1/2"			ZE100169-004
		2"			ZE100169-004
		3"			NA
NOT SHOWN	DUST CAP ASSEMBLY	3/4"	1	POLYETHYLENE	ZE00078
		1"			ZE00078
		1-1/2"			ZE00052
		2"			ZE00052
		3"			ZE00094
NOT SHOWN	PRESSURE CAP ASSEMBLY	3/4"	1	316 SST	ZE00089-002
		1"			ZE00089-002
		1-1/2"			ZE00090-002
		2"			ZE00090-002
		3"			ZE00095-011

Epsilon Adapter End Connection Parts List

#	Item Description	SIZE	Qty.	Material	Part Number
A	FNPT	3/4"	1	316 SST	CTL107A16-90
		1"			CTL107A16-21
		1-1/2"			CTL107A32-90
		2"			CTL107A32-21
		3"			ZE100100-002
		3/4"		HASTELLOY	CTL107A16-90H
		1"			CTL107A16-21H
		1-1/2"			ZE100042
		2"			CTL107A32-21H
		3"			NA
B	BSPP	3/4"	1	316 SST	ZE100224-001
		1"			ZE100076-001
		1-1/2"			ZE100281-002
		2"			ZE100080-002
		3"			ZE100220-002
		3/4"		HASTELLOY	NA
		1"			ZE100076-004
		1-1/2"			ZE100281-004
		2"			ZE100080-004
		3"			NA

C	SCH 40 BUTT WELD	3/4"	1	316 SST	ZE100040-002
		1"			CTL107A16-89
		1-1/2"			ZE100037-002
		2"			CTL107A32-89
		3"			ZE00060-001
		3/4"		HASTELLOY	ZE100040-004
		1"			CTL107A16-89H
		1-1/2"			ZE100037-004
		2"			CTL107A32-89H
		3"			NA
D	ANSI 150 FLANGE	3/4"	1	316 SST	ZE00081-001
		1"			CTL107A16-88
		1-1/2"			ZE100502-002
		2"			ZE100504-002
		3"			ZE00061-001
		3/4"		HASTELLOY	ZE00081-004
		1"			CTL107A16-88H
		1-1/2"			ZE100502-004
		2"			ZE100504-004
		3"			NA
E	ANSI 300 FLANGE	3/4"	1	316 SST	ZE100382-001
		1"			ZE100553-002
		1-1/2"			ZE100507-002
		2"			ZE100508-002
		3"			ZE100522-001
		3/4"		HASTELLOY	ZE100382-004
		1"			NA
		1-1/2"			ZE100507-004
		2"			ZE100508-004
		3"			NA
F	SANITARY FLANGE	3/4"	1	316 SST	ZE100304-002
		1"			ZE100283-002
		1-1/2"			ZE100248-002
		2"			ZE100075-002
		3"			NA
		3/4"		HASTELLOY	ZE100304-004
		1"			ZE100283-004
		1-1/2"			ZE100248-004
		2"			ZE100075-004
		3"			NA

J	DIN EN 1092 B1 PN 40 FORM C	3/4"	1	316 SST	ZE00092-001
		1"			ZE00051-002
		1-1/2"			ZE00116-002
		2"			ZE00043-002
		3"			ZE00069-001
		3/4"		HASTELLOY	ZE00092-004
		1"			ZE00051-004
		1-1/2"			ZE00116-004
		2"			ZE00043-004
		3"			ZE00069-004
K	DIN EN 1092 B2 PN 40 FORM E	3/4"	1	316 SST	ZE00115-002
		1"			ZE00035-001
		1-1/2"			ZE00057-002
		2"			ZE00034-002
		3"			ZE00099-001
		3/4"		HASTELLOY	ZE00115-004
		1"			ZE00035-004
		1-1/2"			ZE00057-004
		2"			ZE00034-004
		3"			NA
N	JIS 10K ISO BUTT WELD	1	1	316 SST	H31965M
P	DIN 11850 BUTT WELD RANGE 2	2"	1	316 SST	ZE100362-002
				HASTELLOY	ZE100362-004
Q	DIN 11850 BUTT WELD RANGE 3	3/4"	1	316 SST	NA
		1"			ZE100365-001
		1-1/2"			NA
		2"			H31961M
		3"			NA
		3/4"		HASTELLOY	NA
		1"			ZE100365-004
		1-1/2"			NA
		2"			H31962M
		3"			NA

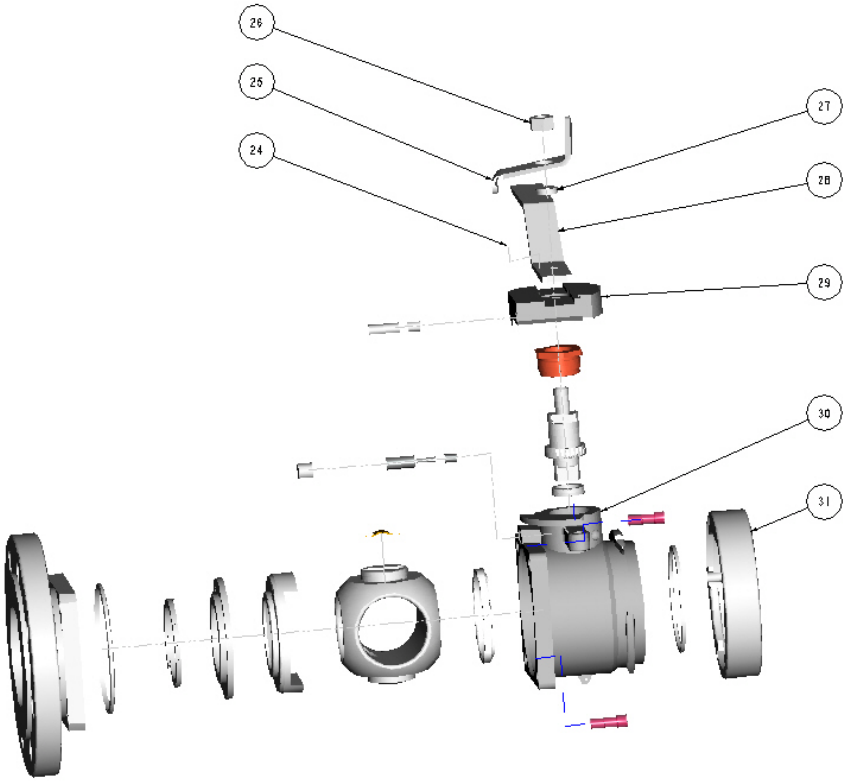
Epsilon Adapter Seal Parts List

#	Item Description	SIZE	Qty.	Material	Part Number
12	SEAL, STEM	3/4"	1	TFM/HASC	ZE100194-040
		1"			ZE100194-040
		1-1/2"			ZE100012-040
		2"			ZE100012-040
		3"			ZE100096-040
		3/4"		PFA/HASC	ZE100194-029
		1"			ZE100194-029
		1-1/2"			ZE100012-029
		2"			ZE100012-029
		3"			ZE100096-029

14	SEAL, TRANSFER	3/4"	1	TFM/HASC	ZE100195-040
		1"			ZE100195-040
		1-1/2"			ZE100011-040
		2"			ZE100011-040
		3"			ZE100097-040
		3/4"		PFA/HASC	ZE100195-029
		1"			ZE100195-029
		1-1/2"			ZE100011-029
		2"			ZE100011-029
		3"			ZE100097-029
	SEAL, TRANSFER, KEYED	2"		TFM/HASC	ZE100397-040
				PFA/HASC	ZE100397-029
	SEAL, TRANSFER, ULTRALOW SPILL	3/4"	1	TFM/HASC	ZE100064-040
		1"			ZE100064-040
		1-1/2"			ZE100125-040
		2"			ZE100125-040
		3"			ZE100225-040
		3/4"		PFA/HASC	ZE100064-029
		1"			ZE100064-029
		1-1/2"			ZE100125-029
		2"			ZE100125-029
		3"			ZE100225-029
16	SEAL, BALL	3/4"	1	TFM	ZE100068-038
		1"			ZE100068-038
		1-1/2"			ZE100146-038
		2"			ZE100146-038
		3"			ZE100092-038
		3/4"		PFA	ZE100068-028
		1"			ZE100068-028
		1-1/2"			ZE100146-028
		2"			ZE100146-028
		3"			ZE100092-028
18	SEAL, RETAINER	3/4"	1	TFM	ZE100211-038
		1"			ZE100211-038
		1-1/2"			ZE100008-038
		2"			ZE100008-038
		3"			ZE100142-038
		3/4"		PFA	ZE100211-028
		1"			ZE100211-028
		1-1/2"			ZE100008-028
		2"			ZE100008-028
		3"			ZE100142-028

21	SEAL, FLANGE	3/4"	1	TFM/HASC	ZE100182-040
		1"			ZE100182-040
		1-1/2"			ZE100079-040
		2"			ZE100079-040
		3"			ZE100098-040
		3/4"		PFA/HASC	ZE100182-029
		1"			ZE100182-029
		1-1/2"			ZE100079-029
		2"			ZE100079-029
		3"			ZE100098-029

2” to 3” TCS Adapter – ZExxTASxx-12--
(Railcar and Isotainer)



24	DRIVE SCREW, TCS	2"	1	18-8 SST	ZE100331-024
		3"			
25	LEVER, TCS	2"	1	304 SST	ZE100340-003
		3"			ZE100328-003
26	NUT, SELF LOCKING, 7/16-20	2"	1	18-8 SST	ZE100338-024
		3"			ZE100327-024
27	BUSHING, TCS	2"	1	17-4 SST	ZE100339-021
		3"			ZE100330-021
28	HANDLE, TCS	2"	1	304 SST	ZE100341-003
		3"			ZE100329-003
29	HUB, TCS	2"	1	316 SST	ZE100342-001
		3"			ZE100326-002
30	BODY, TCS	2"	1	316 SST	ZE100150-002
		3"			ZE100325-002
31	PRESSURE CAP	2"	1	316 SST	ZE100026-001
		3"		316L SST	ZE100114-002

Epsilon Transportation Coupling Low-rise Adapter Parts List

#	Item Description	SIZE	Qty.	Material	Part Number
22	ADAPTER, TCS, LOW-RISE ANSI CLASS 150 RF FLANGE	2"	1	316 SST	ZE100398-001
		3"			ZE100346-001
	ADAPTER, TCS, LOW-RISE DIN EN 1092-1:2007 21B1 PN 40	2"			ZE100543-002
		3"			ZE100542-002
	ADAPTER, TCS, LOW-RISE DIN EN 1092-1:2007 21B2 PN 40	2"			NA
		3"			ZE100324-002

			Assembly Overall Length	
			inch	mm
22 REF	ADAPTER, TCS, LOW-RISE ANSI CLASS 150 RF FLANGE	2"	4.25	108
		3"	6.11	155
	ADAPTER, TCS, LOW-RISE DIN EN 1092-1:2007 21B1 PN 40	2"	4.25	108
		3"	5.64	143
	ADAPTER, TCS, LOW-RISE DIN EN 1092-1:2007 21B2 PN 40	2"	NA	NA
		3"	5.64	143

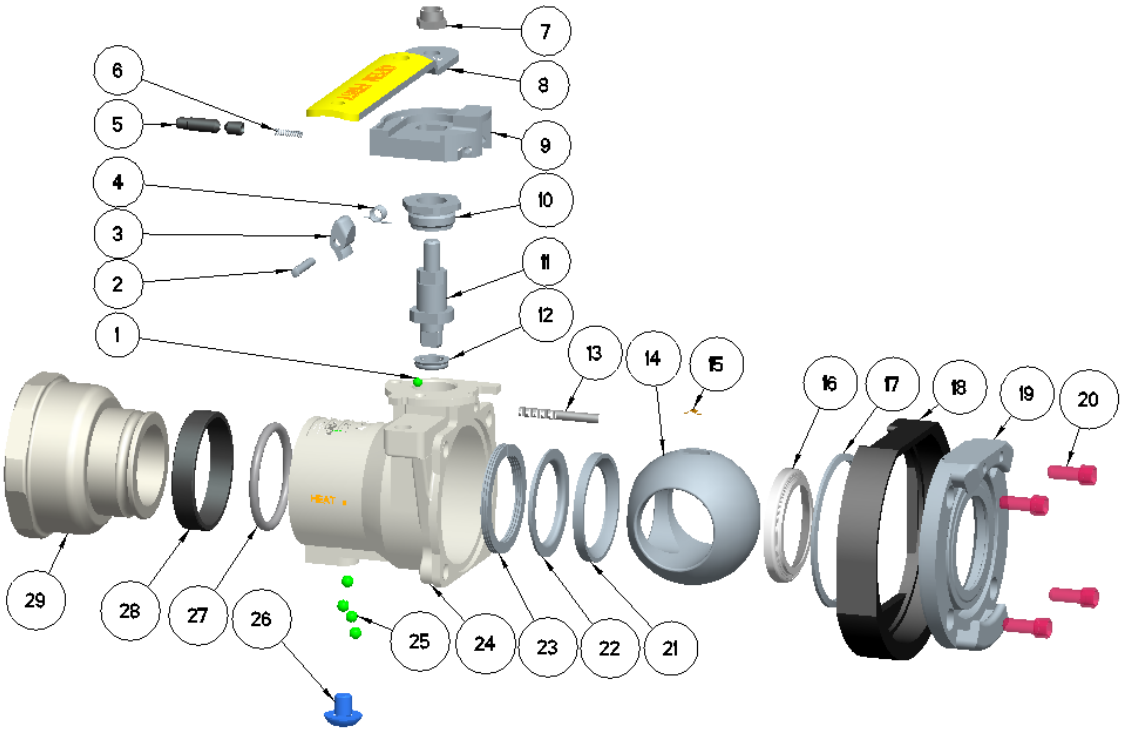


Figure 2
3/4, through 2 inch Coupler Half

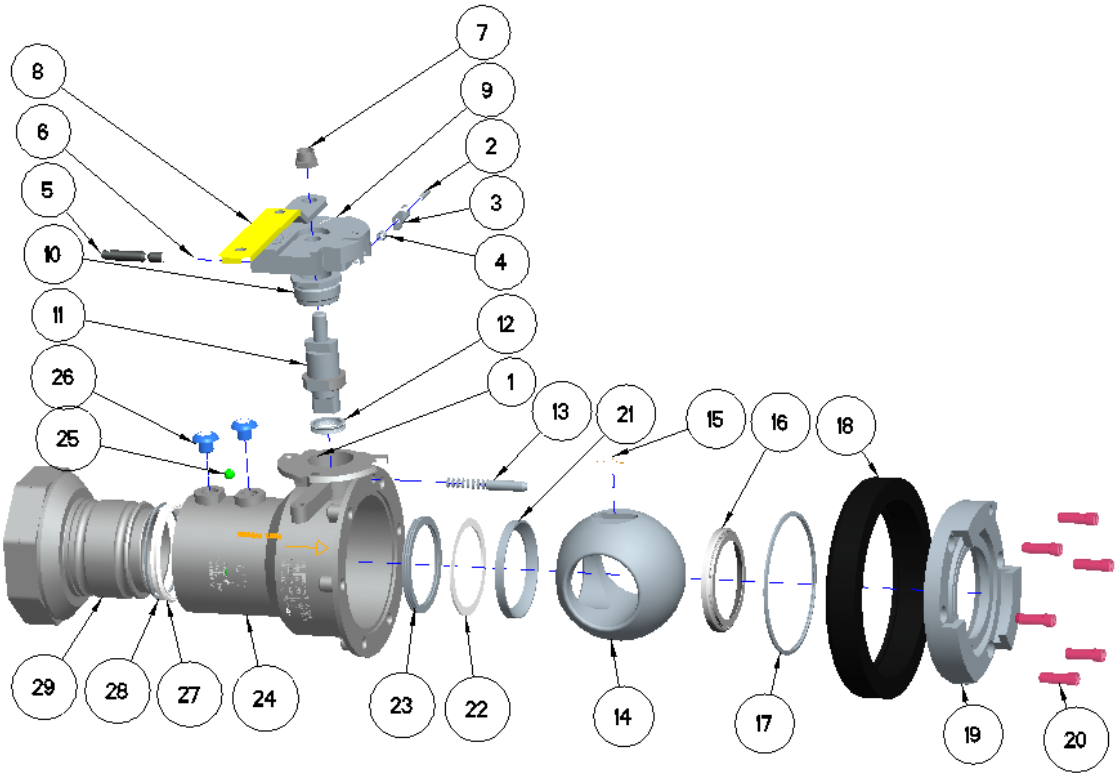


Figure 3
3 inch Coupler Half

3/4 - 3 Inch Epsilon Coupler Parts List

#	Item Description	SIZE	Qty.	Material	Part Number
1	BALL, DETENT (SST INCLUDED IN SEAL KIT)	3/4"	1	440 SST	ZE100170-039
		1"			ZE100170-039
		1-1/2"			ZE100170-039
		2"			ZE100170-039
		3"			CTL107A32-25
		3/4"		HASTELLOY	ZE100170-004
		1"			ZE100170-004
		1-1/2"			ZE100170-004
		2"			ZE100170-004
		3"			CTL107A32-25H
2	PIN, HUB LATCH	3/4"	1	316 SST	ZE100184-001
		1"			ZE100184-001
		1-1/2"			ZE100184-001
		2"			ZE100184-001
		3"			ZE100184-001
		3/4"		HASTELLOY	ZE100184-004
		1"			ZE100184-004
		1-1/2"			ZE100184-004
		2"			ZE100184-004
		3"			ZE100184-004
3	LATCH, HUB	3/4"	1	NITRONIC 60	ZE100187-041
		1"			ZE100187-041
		1-1/2"			ZE100187-041
		2"			ZE100187-041
		3"			ZE100187-041
		3/4"		HASTELLOY	ZE100187-004
		1"			ZE100187-004
		1-1/2"			ZE100187-004
		2"			ZE100187-004
		3"			ZE100187-004
4	SPRING, LATCH	3/4"	1	302 SST	CTL107A32-45
		1"			
		1-1/2"			
		2"			
		3"			
		3/4"		HASTELLOY	ZE100181-004
		1"			
		1-1/2"			
		2"			
		3"			

5	PIN, INTERLOCK, HUB	3/4"	1	15-5 PH	ZE100167-022
		1"			ZE100167-022
		1-1/2"			CTL107A32-15
		2"			CTL107A32-15
		3"			ZE100113-022
		3/4"		HASTELLOY	ZE100167-004
		1"			ZE100167-004
		1-1/2"			CTL107A32-15H
		2"			CTL107A32-15H
		3"			NA
6	SPRING, INTERLOCK, HUB	3/4"	1	302 SST	ZE100171-018
		1"			ZE100171-018
		1-1/2"			CTL107A32-26
		2"			CTL107A32-26
		3"			ZE100119-018
		3/4"		HASTELLOY	ZE100171-004
		1"			ZE100171-004
		1-1/2"			ZE100171-004
		2"			ZE100171-004
		3"			NA
7	HANDLE NUT, SELF LOCKING, 1/4-20 UNC	3/4"	1	316 SST	CTL107A16-96
		1"			CTL107A16-96
	HANDLE NUT, SELF LOCKING, 5/16-18 UNC	1-1/2"			CTL107A32-96
		2"			CTL107A32-96
		3"			ZE100117-001
	HANDLE NUT, SELF LOCKING, 1/4-20 UNC	3/4"	1	HASTELLOY	ZE100168-004
		1"			ZE100168-004
	HANDLE NUT, SELF LOCKING, 5/16-18 UNC	1-1/2"			ZE100172-004
		2"			ZE100172-004
		3"			NA
8	HANDLE, YELLOW COVER - STD	3/4"	1	301 SST	ZE100201-030
		1"			ZE100201-030
		1-1/2"			ZE100203-030
		2"			ZE100203-030
		3"			ZE100104-003
	HANDLE, YELLOW COVER - RAISED	3/4"			ZE100202-030
		1"			ZE100202-030
		1-1/2"			ZE100266-030
		2"			ZE100266-030
		3"			ZE100228-003

9	HUB, EPSILON CPLR	3/4"	1	316 SST	CTL107A16-47
		1"			CTL107A16-47
		1-1/2"			ZE100315-001
		2"			ZE100315-001
		3"			ZE100103-002
		3/4"		HASTELLOY	ZE100163-004
		1"			ZE100163-004
		1-1/2"			ZE100315-004
		2"			ZE100315-004
		3"			NA
10	BEARING, STEM	3/4"	1	ILLIUM 8	ZE100177-007
		1"			ZE100177-007
		1-1/2"			ZE100176-007
		2"			ZE100176-007
		3"			ZE100086-007
		3/4"		HASTELLOY	ZE100177-004
		1"			ZE100177-004
		1-1/2"			ZE100176-004
		2"			ZE100176-004
		3"			NA
11	STEM, CPLR	3/4"	1	316 SST	ZE100060-002
		1"			ZE100060-002
		1-1/2"			ZE100313-001
		2"			ZE100313-001
		3"			ZE100105-001
		3/4"		HASTELLOY	ZE100060-004
		1"			ZE100060-004
		1-1/2"			ZE100313-004
		2"			ZE100313-004
		3"			NA
12	SEAL, STEM	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
13	RACK, INTERLOCK, BODY	3/4"	1	17-4 PH	ZE100183-021
		1"			ZE100183-021
		1-1/2"			CTL107A32-18
		2"			CTL107A32-18
		3"			ZE100106-021
		3/4"		HASTELLOY	ZE100183-004
		1"			ZE100183-004
		1-1/2"			CTL107A32-18H
		2"			CTL107A32-18H
		3"			NA

14	BALL, VALVE, CONVEX, T-BORE	3/4"	1	316 SST	ZE100280-002
		1"			ZE100280-002
		1-1/2"			ZE100245-002
		2"			ZE100245-002
		3"			ZE100302-002
		3/4"		HASTELLOY	ZE100280-004
		1"			ZE100280-004
		1-1/2"			ZE100245-004
		2"			ZE100245-004
		3"			NA
15	SPRING, CONDUCTIVITY (INCLUDED IN SEAL KIT)	3/4"	1	HASTELLOY	H31951M
		1"			H31951M
		1-1/2"			H32017M
		2"			H32017M
		3"			H31952M
		3"		316 SST	H32140M
16	SEAL, BALL	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
17	SEAL, FLANGE	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
18	BUMPER, CPLR	3/4"	1	NEOPRENE	CTL107A16-66
		1"			CTL107A16-66
		1-1/2"			ZE100322-020
		2"			ZE100322-021
		3"			ZE100122-020

19	STANDARD FLANGE	3/4"	1	ILLIUM 8	CTL107A16-59
		1"			CTL107A16-59
		1-1/2"			ZE100323-007
		2"			ZE100323-007
		3"			ZE100262-007
	FLANGE, KEY 2-3	1-1/2"			ZE100349-007
		2"			ZE100349-007
	FLANGE, KEY 2-3-4	1-1/2"			ZE100350-007
		2"			ZE100350-007
	FLANGE, KEY 3-4	1-1/2"			ZE100351-007
		2"			ZE100351-007
	STANDARD FLANGE	3/4"		HASTELLOY	CTL107A16-59H
		1"			CTL107A16-59H
		1-1/2"			ZE100323-004
		2"			ZE100323-004
		3"			NA
	FLANGE, KEY 2-3	1-1/2"			ZE100349-004
		2"			ZE100349-004
	FLANGE, KEY 2-3-4	1-1/2"			ZE100350-004
		2"			ZE100350-004
	FLANGE, KEY 3-4	1-1/2"			ZE100351-004
		2"			ZE100351-004
20	SCREW, SH CAP	3/4"	4	302 SST	ZE100179-018
		1"			ZE100179-018
		1-1/2"			H20625M
		2"			H20625M
		3"	6		ZE100120-024
		3/4"	4	HASTELLOY	ZE100179-004
		1"			ZE100179-004
		1-1/2"			ZE100169-004
		2"			ZE100169-004
		3"	-		NA
21	RETAINER, VALVE BALL	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
22	WASHER, WAVE SPRING TO RETAINER	3/4"	1	316 SST	NA
		1"			NA
		1-1/2"			CTL107A32-76
		2"			CTL107A32-76
		3"			ZE100109-001
		3/4"		HASTELLOY	CTL107A16-54H
		1"			CTL107A16-54H
		1-1/2"			CTL107A32-76H
		2"			CTL107A32-76H
		3"			NA

23	WAVE SPRING	3/4"	1	HASTELLOY	CTL107A16-38H
		1"			CTL107A16-38H
		1-1/2"			ZE100191-004
		2"			ZE100191-004
		3"			ZE100084-001
24	BODY, CPLR	3/4"	1	316 SST	ZE100540-002
		1"			ZE100540-002
		1-1/2"			CTL107A32-41
		2"			CTL107A32-41
		3"			ZE100091-002
		3/4"		HASTELLOY	ZE100540-004
		1"			ZE100540-004
		1-1/2"			CTL107A32-41H
		2"			CTL107A32-41H
		3"			NA
25	BALL, SWIVEL (INCLUDED IN SEAL KIT)	3/4"	18	316 SST	CTL107A32-25
		1"			CTL107A32-25
		1-1/2"	28		CTL107A32-25
		2"			CTL107A32-25
		3"	58		22710-5
		3/4"	18	HASTELLOY	CTL107A32-25H
		1"			CTL107A32-25H
		1-1/2"	28		CTL107A32-25H
		2"			CTL107A32-25H
		3"	-		NA
26	SCREW, BALL PLUG	3/4"	1	18-8 SST	CTL107A32-10
		1"			CTL107A32-10
		1-1/2"			CTL107A32-10
		2"			CTL107A32-10
		3"			ZE100123-024
		3/4"		HASTELLOY	ZE100185-004
		1"			ZE100185-004
		1-1/2"			ZE100185-004
		2"			ZE100185-004
		3"			NA
27	SEAL, SWIVEL	3/4"	1	SEE SEAL CHART	SEE SEAL CHART
		1"			
		1-1/2"			
		2"			
		3"			
28	BEARING, SLEEVE	3/4"	1	PTFE/ GRAPHITE	CTL107A16-12
		1"			CTL107A16-12
		1-1/2"			CTL107A32-12
		2"			CTL107A32-12
	DUST SEAL	3"	1	PTFE	ZE100137-015

29	ADAPTER, CPLR	3/4"	1	SEE END CONNECTION CHART	SEE END CONNECTION CHART
		1"			
		1-1/2"			
		2"			
		3"			
NOT SHOWN	DUST CAP ASSEMBLY	3/4"	1	POLYETHYLENE	ZE00080
		1"			ZE00080
		1-1/2"			ZE00079
		2"			ZE00079
		3"			ZE00068-023
NOT SHOWN	PRESSURE CAP ASSEMBLY	3/4"	1	316 SST	ZE00040-011
		1"			ZE00040-011
		1-1/2"			ZE00010-011
		2"			ZE00010-011
		3"			ZE00068-011

Epsilon Coupler End Connection Parts List

#	Item Description	SIZE	Qty.	Material	Part Number
A	FNPT	3/4"	1	316 SST	CTL107A16-91
		1"			CTL107A16-23
		1-1/2"			CTL107A32-91
		2"			CTL107A32-23
		3"			ZE100108-002
		3/4"		HASTELLOY	CTL107A16-91H
		1"			CTL107A16-23H
		1-1/2"			CTL107A32-91H
		2"			CTL107A32-23H
		3"			NA
B	BSPP	3/4"	1	316 SST	ZE100252-001
		1"			ZE100077-002
		1-1/2"			ZE100221-002
		2"			ZE100081-002
		3"			ZE100219-002
		3/4"		HASTELLOY	ZE100252-004
		1"			ZE100077-004
		1-1/2"			ZE100221-004
		2"			ZE100081-004
		3"			NA

C	SCH 40 BUTT WELD	3/4"	1	316 SST	ZE100039-002
		1"			ZE100038-002
		1-1/2"			ZE100335-002
		2"			ZE100034-002
		3"			ZE100227-002
		3/4"		HASTELLOY	ZE100039-004
		1"			ZE100038-004
		1-1/2"			ZE100335-004
		2"			ZE100034-004
		3"			ZE100227-004
D	ANSI 150 FLANGE	3/4"	1	316 SST	ZE100035-002
		1"			ZE100027-002
		1-1/2"			ZE100503-002
		2"			ZE100505-002
		3"			ZE00074-001
		3/4"		HASTELLOY	ZE100035-004
		1"			ZE100027-004
		1-1/2"			ZE100503-004
		2"			ZE100505-004
		3"			NA
E	ANSI 300 FLANGE	3/4"	1	316 SST	NA
		1"			NA
		1-1/2"			ZE100507-002
		2"			ZE100509-002
		3"			ZE100520-001
		3/4"		HASTELLOY	NA
		1"			ZE100554-002
		1-1/2"			ZE100507-004
		2"			ZE100509-004
		3"			NA
F	SANITARY FLANGE	3/4"	1	316 SST	ZE100303-002
		1"			ZE100282-002
		1-1/2"			ZE100061-002
		2"			ZE100267-002
		3"			ZE100402-002
		3/4"		HASTELLOY	ZE100303-004
		1"			ZE100282-004
		1-1/2"			ZE100061-004
		2"			ZE100267-004
		3"			NA

J	DIN EN 1092 B1 PN 40 FORM C	3/4"	1	316 SST	ZE00093-001
		1"			ZE00059-002
		1-1/2"			ZE100500-002
		2"			ZE00048-002
		3"			ZE00096-001
		3/4"		HASTELLOY	ZE00093-004
		1"			ZE00059-004
		1-1/2"			ZE100500-004
		2"			ZE00048-004
		3"			NA
K	DIN EN 1092 B2 PN 40 FORM E	3/4"	1	316 SST	ZE00112-001
		1"			ZE00037-001
		1-1/2"			ZE100501-002
		2"			ZE00036-002
		3"			ZE00107-001
		3/4"		HASTELLOY	ZE00112-004
		1"			ZE00037-004
		1-1/2"			ZE100501-004
		2"			ZE00036-004
		3"			NA
M2	DIN 11850 BUTT WELD RANGE 2	2"	1	316 SST	ZE100363-001
				HASTELLOY	ZE100363-004
M3	DIN 11850 BUTT WELD RANGE 3	3/4"	1	316 SST	NA
		1"			ZE100366-001
		1-1/2"			ZE100264-002
		2"			H31963M
		3"			NA
		3/4"		HASTELLOY	NA
		1"			ZE100366-004
		1-1/2"			ZE100264-004
		2"			H31964M
		3"			NA
N	JIS 10K ISO BUTT WELD	1	1	316 SST	ZE100371-002

Epsilon Coupler Seal Parts List					
#	Item Description	SIZE	Qty.	Material	Part Number
12	SEAL, STEM (INCLUDED IN SEAL KIT)	3/4"	1	TFM/HASC	ZE100194-040
		1"			ZE100194-040
		1-1/2"			ZE100012-040
		2"			ZE100012-040
		3"			ZE100096-040
		3/4"		PFA/HASC	ZE100194-029
		1"			ZE100194-029
		1-1/2"			ZE100012-029
		2"			ZE100012-029
		3"			ZE100096-029
16	SEAL, BALL (INCLUDED IN SEAL KIT)	3/4"	1	TFM	ZE100068-038
		1"			ZE100068-038
		1-1/2"			ZE100146-038
		2"			ZE100146-038
		3"			ZE100092-038
		3/4"		PFA	ZE100068-028
		1"			ZE100068-028
		1-1/2"			ZE100146-028
		2"			ZE100146-028
		3"			ZE100092-028
17	SEAL, FLANGE (INCLUDED IN SEAL KIT)	3/4"	1	TFM	ZE100182-040
		1"			ZE1001182-040
		1-1/2"			ZE100079-040
		2"			ZE100079-040
		3"			ZE100098-040
		3/4"		PFA	ZE100182-029
		1"			ZE100182-029
		1-1/2"			ZE100079-029
		2"			ZE100079-029
		3"			ZE100098-029
21	SEAL, RETAINER (INCLUDED IN SEAL KIT)	3/4"	1	TFM	ZE100210-038
		1"			ZE100210-038
		1-1/2"			ZE100209-038
		2"			ZE100209-038
		3"			ZE100101-038
		3/4"		PFA	ZE100210-028
		1"			ZE100210-028
		1-1/2"			ZE100209-028
		2"			ZE100209-028
		3"			ZE100101-028

27	SEAL, SWIVEL (INCLUDED IN SEAL KIT)	3/4"	1	TFM	ZE100144-040
		1"			ZE100144-040
		1-1/2"			ZE100143-040
		2"			ZE100143-040
		3"			ZE100095-040
		3/4"		PFA	ZE100144-029
		1"			ZE100144-029
		1-1/2"			ZE100143-029
		2"			ZE100143-029
		3"			ZE10009-029
		3/4"		PFA ENCAPSULATED SILICONE	NA
		1"			NA
		1-1/2"			H31960M
		2"			H31960M
		3"			NA

3 Inch Epsilon Coupler Parts List

#	Item Description	Qty.	Material	Part Number
1	BALL, DETENT (INCLUDED IN SEAL KIT)	1	440 SST	CTL107A32-25
2	PIN, HUB LATCH	1	316 SST	ZE100178-001
			HASTELLOY	ZE100178-004
3	LATCH, HUB	1	NITRONIC 60	ZE100187-041
			HASTELLOY	ZE100187-004
4	SPRING, LATCH	1	302 SST	CTL107A32-45
5	PIN, INTERLOCK, HUB	1	15-5 PH	ZE100113-022
6	SPRING, INTERLOCK, HUB	1	302 SST	ZE100119-018
7	NUT, SELF LOCKING, 5/16-18	1	316 SST	ZE100117-001
8	HANDLE, YELLOW COVER - STD	1	301 SST	ZE100104-003
9	HUB, EPSILON CPLR	1	316 SST	ZE100103-002
10	BEARING, STEM	1	ILLIUM 8	ZE100086-007
11	STEM	1	316 SST	ZE100105-001
12	SEAL, STEM (INCLUDED IN SEAL KIT)	1	SEE SEAL CHART	SEE SEAL CHART
13	RACK, INTERLOCK, BODY	1	17-4 PH	ZE100106-021
14	BALL, VALVE, CONVEX, T-BORE	1	316 SST	ZE100302-001
			316L SST	ZE100302-002
15	SPRING, CONDUCTIVITY (INCLUDED IN SEAL KIT)	1	316 SST	H32140M
			HASTELLOY	H31952M
16	SEAL, BALL (INCLUDED IN SEAL KIT)	1	SEE SEAL CHART	SEE SEAL CHART
17	SEAL, FLANGE (INCLUDED IN SEAL KIT)	1	SEE SEAL CHART	SEE SEAL CHART
18	BUMPER, CPLR	1	NEOPRENE	ZE100122-020
19	STANDARD FLANGE	1	ILLIUM 8	ZE100262-007
20	SCREW, SH CAP	6	302 SST	ZE100120-024

21	RETAINER, VALVE BALL (INCLUDED IN SEAL KIT)	1	SEE SEAL CHART	SEE SEAL CHART
22	WASHER, WAVE SPRING TO RETAINER	1	316 SST	ZE100109-001
23	WAVE SPRING	1	316 SST	ZE100084-001
24	BODY, CPLR	1	316 SST	ZE100091-002
25	BALL, SWIVEL (INCLUDED IN SEAL KIT)	56	440 SST	22710-5
26	SCREW, BALL PLUG	1	18-8 SST	ZE100123-024
27	SEAL, SWIVEL (INCLUDED IN SEAL KIT)	1	SEE SEAL CHART	SEE SEAL CHART
28	RING, BACK-UP (INCLUDED IN SEAL KIT)	1	PTFE	ZE100137-015
29	ADAPTER, CPLR	1	SEE END CONNECTION CHART	SEE END CONNECTION CHART

THIS PAGE IS INTENTIONALLY LEFT BLANK FOR THE TCS COUPLER HALF

1.11 SEAL KIT PART NUMBERS

		ADAPTER HALF				COUPLER HALF	
		STANDARD		ULTRA LOW SPILL		STANDARD	
		TFM	PFA	TFM	PFA	TFM	PFA
SIZE	3/4 (DN20)	ZK16AM001	ZK16AP001	ZK16UM001	ZK16UP001	ZK16HM001	ZK16HP001
	1 (DN25)						
	1-1/2 (DN40)	ZK32AM001	ZK32AP001	ZK32UM001	ZK32UP001	ZK32HM001	ZK32HP001
	2 (DN50)						
	3 (DN80)	ZK48AM001	ZK48AP001	ZK48UM001	ZK48UP001	ZK48HM001	ZK48HP001

1.12 CAVITY FILLER KIT PART NUMBERS

		CAVITY FILLER KITS					
		ADAPTER HALF			COUPLER HALF		
		PTFE	TFM	PFA	PTFE	TFM	PFA
SIZE	3/4 (DN20)	ZK16AF001	-	-	ZK16HF001	-	-
	1 (DN25)						
	1-1/2 (DN40)	ZK32AF001	-	-	ZK32HF001	-	-
	2 (DN50)						
	3 (DN80)	ZK48AF001	-	-	ZK48HF001	-	-

1.13 Testing After Servicing

When servicing has occurred and parts have been replaced, it is necessary to test Epsilon for a safe and secure use.

The test procedure consists of:

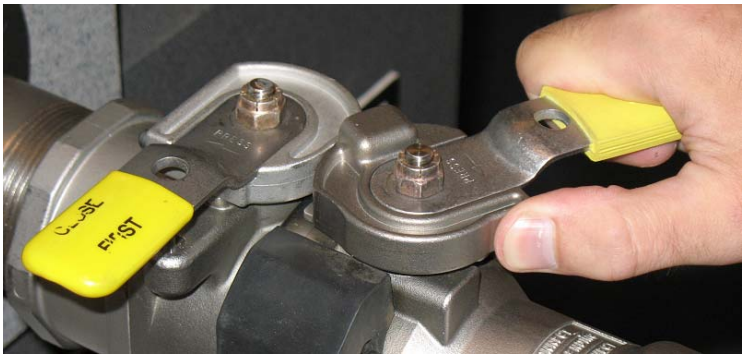
- A Coupler / Adapter lockup test
- A helium leak detection test

Lock adapter onto coupler

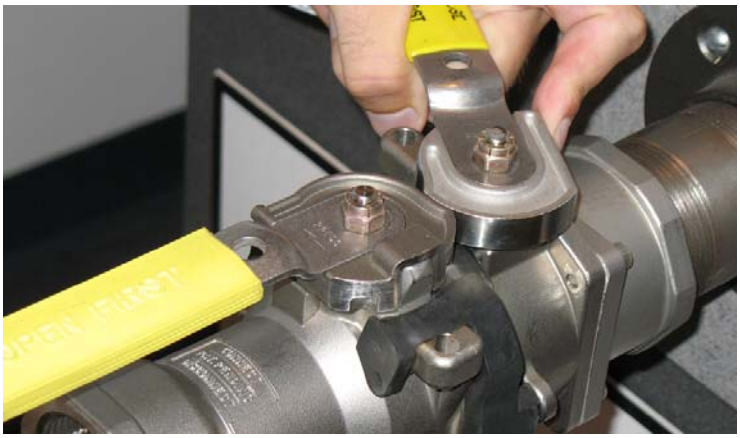
- Remove dust cap and/or pressure cap from each half by turning 90˚ (1” and 2” units) or 60˚ (3” units) in a counter-clockwise direction



- Orient the coupler half handle 90˚ (1” and 2” units) or 60˚ (3” units) counter-clockwise to the adapter half handle
- Insert the coupler half interface into the adapter interface and rotate 90˚ (1” and 2” units) or 60˚ (3” units) clockwise until positive stop. Note: the handles must be rotated to where both handles are parallel to each other (see picture above)



- First, open the coupler half by depressing the coupler half hub pin and rotating handle 90˚ clockwise



- Second, open the adapter half by depressing the adapter half hub pin and rotating the handle 90° clockwise
- When handles are parallel to each other and the flow axis, coupler separation should not be possible

It is strongly recommended that the coupling be pressure tested prior to returning to service following any maintenance procedure. To pressure test the coupling, use the following procedure. With the coupling halves connected and the valves in the open position, slowly pressurize the coupling with air to 100 PSIG / 6.9 Bar with one end plugged and the other connected to the pressure source. Submerge the coupling under water and lightly shake to remove all surface air bubbles. The coupling should maintain pressure for one minute. Less than 0.54 cc/min leakage is allowed.

OPW Engineered Systems also recommends periodically checking the Coupler for proper functioning.
Leakages could occur due to several errors, for solutions see chapter 0 first.

When any leakages are found, have seals replaced immediately to maintain safe operation. If leakages continue, contact the OPW distributor or the **OPW Engineered Systems** for consultation.

2 Installation

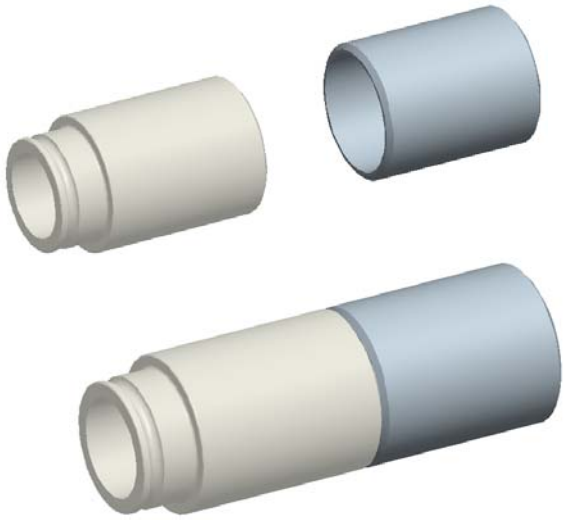
Attention: Installation to be performed by authorized and trained personnel only

Warning: Read & understand these instructions before starting installation.

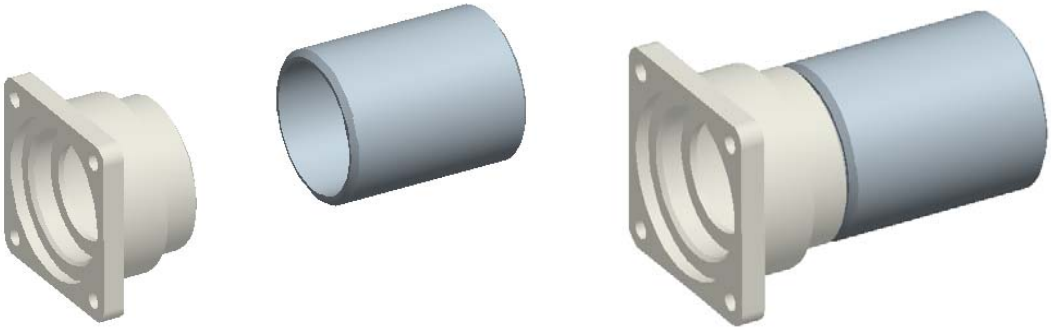
- Epsilon to be used for its designated purpose only
- Local regulations for (un)loading must be followed at all times
- Product flow may result in static electricity; grounding of equipment is required
- OPW instructions must be followed for installation
- **Make sure to use adequate personal protection at all times during operation**

2.1 Installation of a weld mounted unit

- Separate Tail Swivel from Coupler Body and Flanged end from Adapter (see section 3.4 for detailed disassembly instructions)



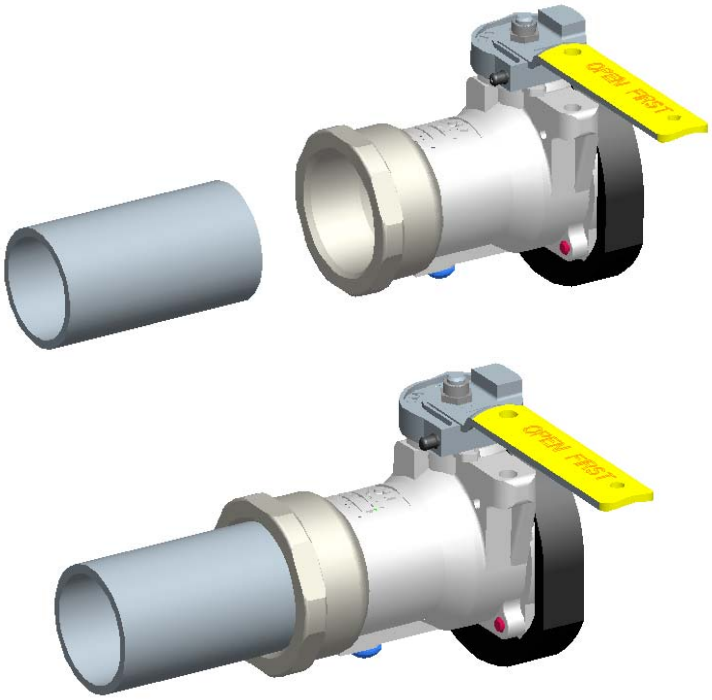
- Weld Tail Swivel to piping



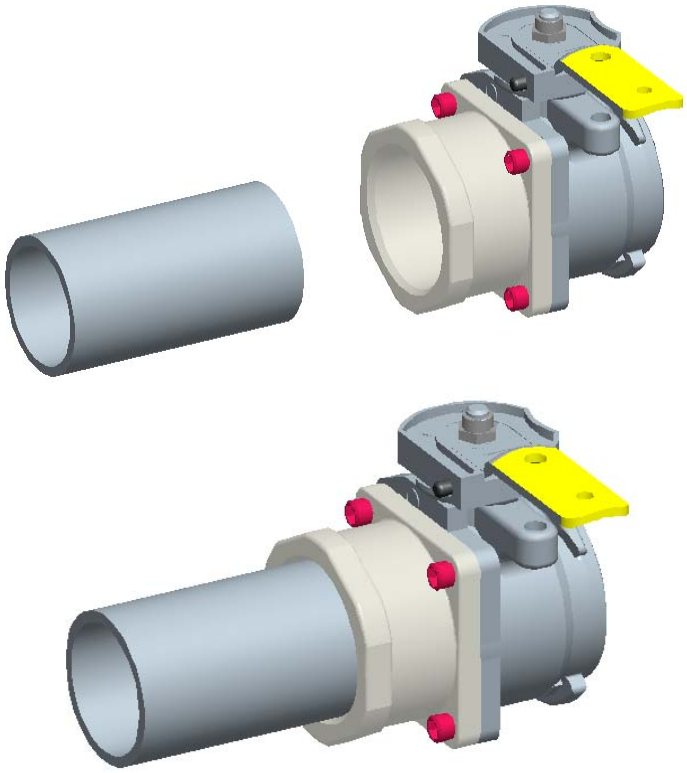
- Weld Flanged end to piping

Reassembly Coupler / Adapter (see section 4 for details)

2.2 Installation of a threaded unit

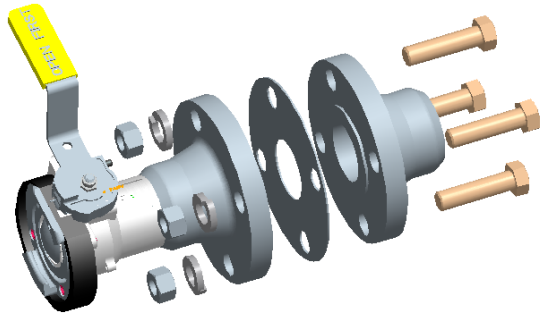


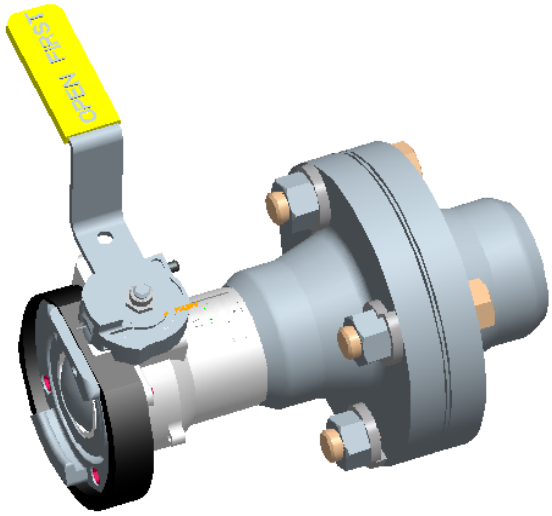
- Secure piping and thread coupler onto pipe
- Apply wrench to swivel tail and tighten down.



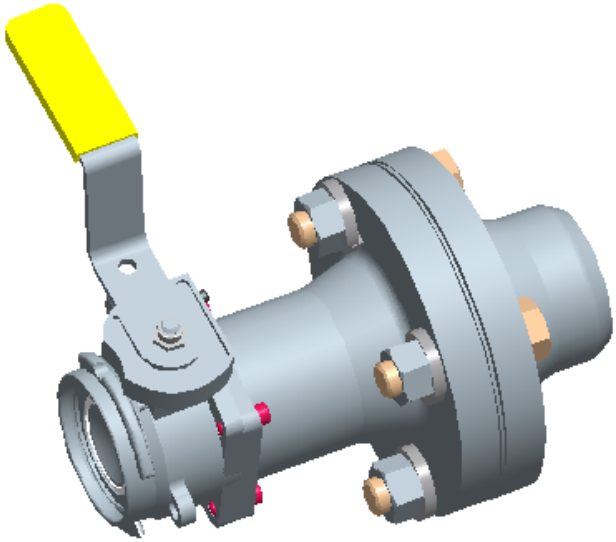
- Secure piping and thread adapter onto pipe
- Apply wrench to adapter and tighten down.

2.3 Installation of a flange mounted unit





- Place gasket between both flanges
- Align bolt holes and press flanges together
- Install bolts on one side and lock washers and nuts on the other
- Tighten down in a criss-cross pattern
- For torque value refer to bolt manufacturers recommendations
- Repeat process for adapter half



3 Dismantling Coupler

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

At some time (at the end of its lifetime) it may become necessary to remove the Coupler, or possibly relocate it from one loading mechanism to another.

Coupler removal can be achieved easily when coupler is attached through flanges or is threaded on.

If the coupler is welded directly to the piping then the approach would be to disassembly the entire unit.

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

Warning: Verify what kind of medium is loaded with this Coupler reading the manuals provided. When the medium is nuclear, hazardous or toxic, one is obligated to clean parts with the help of specialized personnel, companies or governments.

Before dismantling Coupler take some necessary preparations:

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

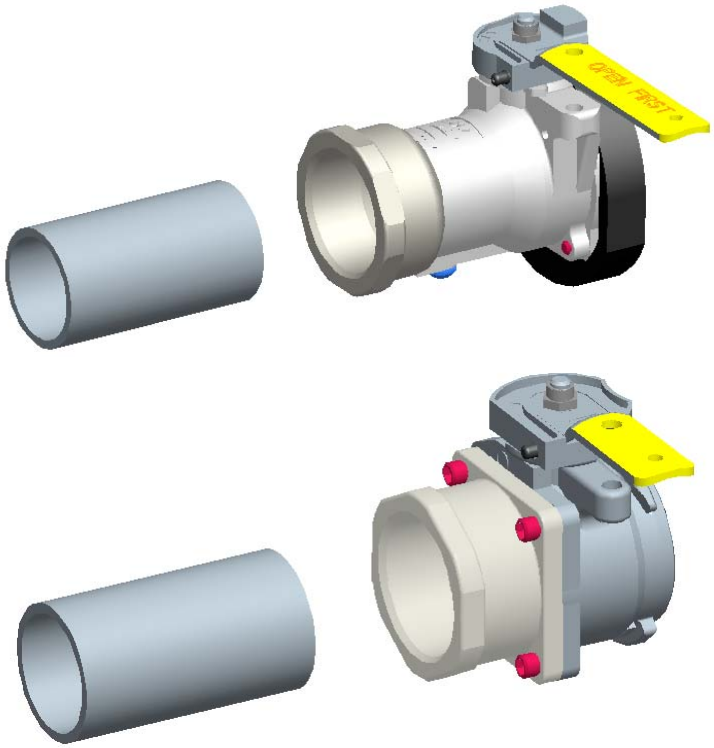
When the Coupler is clean and dry and the necessary preparations have been made, the Coupler can be disassembled from the device it is attached to.

3.1 Dismantling a welded unit

- With whatever device the coupler is attached to secured from movement
- See section 3.4 for detailed disassembly instructions (note: section 3.4 shows a threaded unit for visual purposes only, and the same procedure applies to this type of unit)

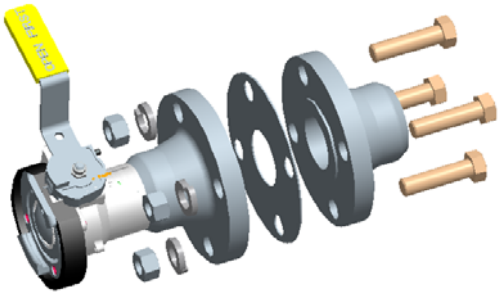
3.2 Dismantling a threaded unit

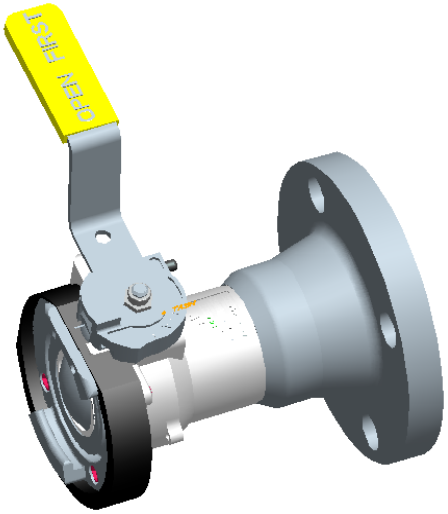
- With whatever device the coupler is attached to secured from movement, apply a wrench to the hex end, and unthread



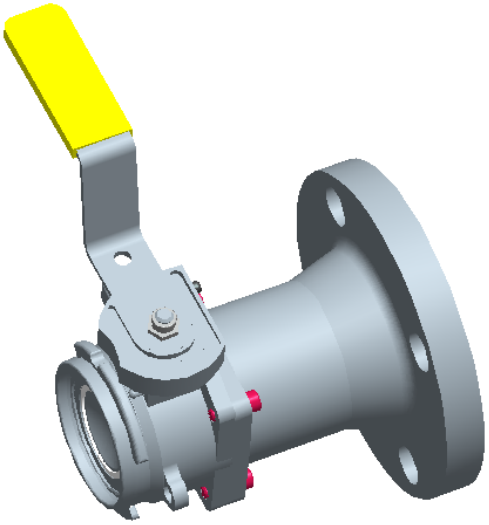
3.3 Dismantling a flange mounted unit

- With whatever device the coupler is attached to secured from movement, loosen the nuts and bolts
- With the bolts loose make sure both sides are supported
- Begin removing bolts, but do not allow flange to separate until all bolts have been removed



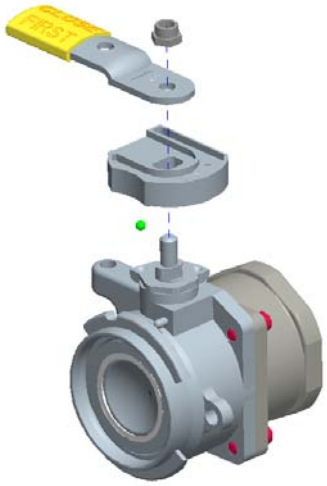


- The flange should separate easily once all bolts have been removed
- Remove gasket and place it along with the bolts, washers, and nuts into an appropriate container
- Place coupler into proper crate for storage or transport
- Repeat process for adapter half

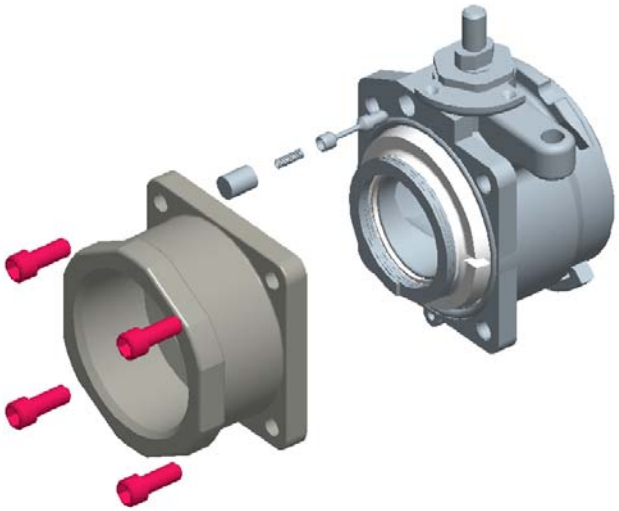


3.4 Detailed Disassembly (for seal replacement)

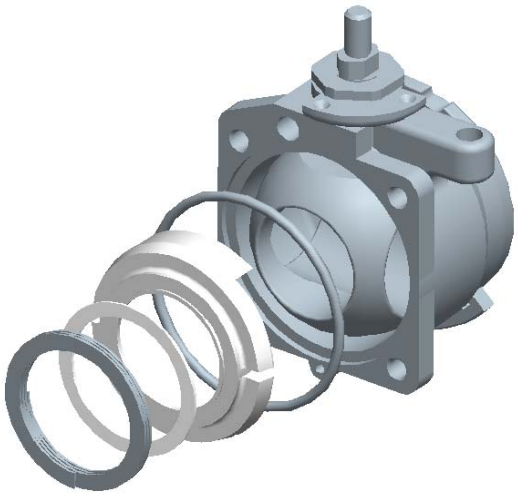
Disassembly of the Adapter/Process/Manifold Adapter Half

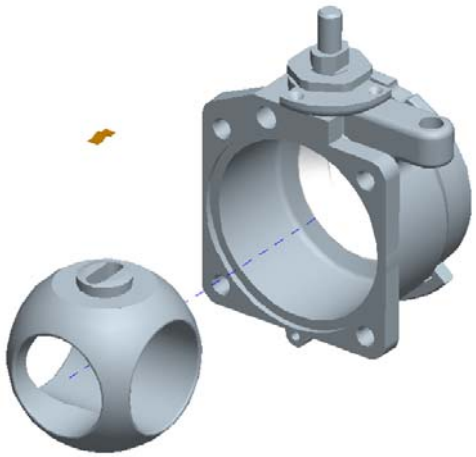


- Loosen handle nut and remove handle, handle hub assembly and detent ball

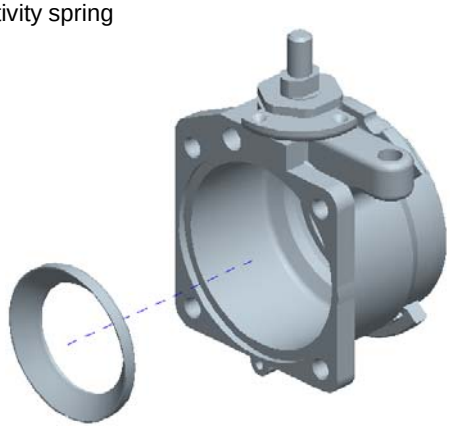


- Loosen flange bolts and remove flange, followed by interlock components
- Then remove ball seal / spring / washer / flange seal

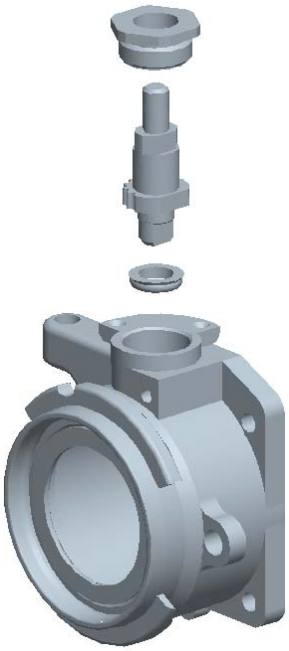




- Remove ball and conductivity spring

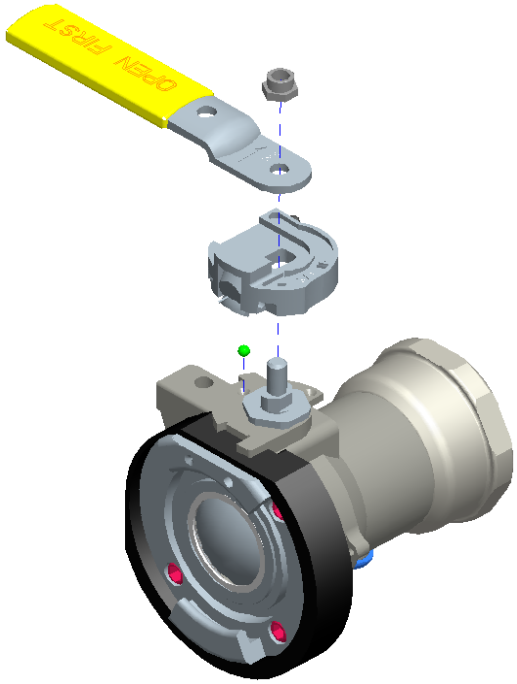


- Pop ball seal out of body

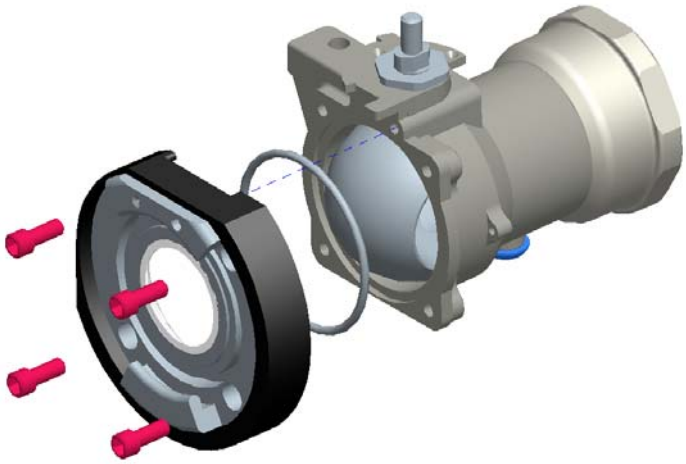


- Unthread stem bearing and remove stem and stem seal
- Stem seal may hang up in the body. For removal, simply place thumb inside of body cavity underneath of spring seal and press seal out of the body through the stem bore.

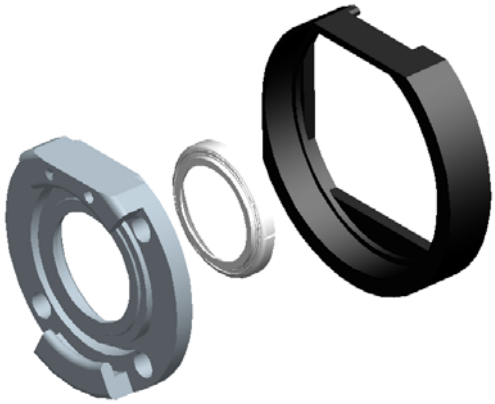
Disassembly of the Hose/Coupler Half



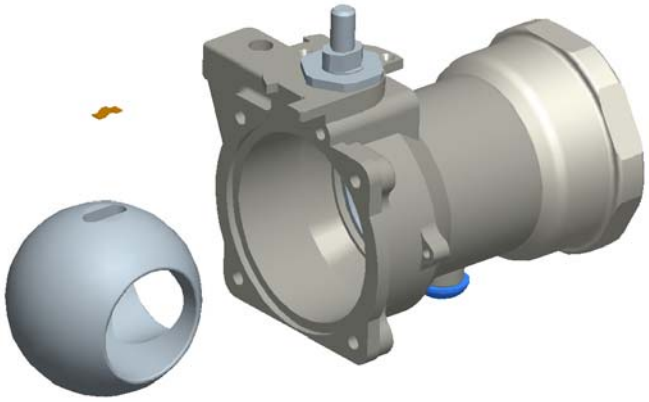
- Loosen handle nut and remove handle, handle hub assembly and detent ball



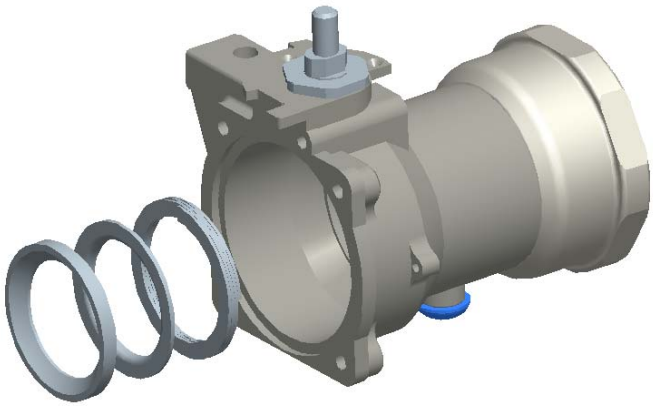
- Loosen flange bolts and remove flange / ball seal assembly and flange seal



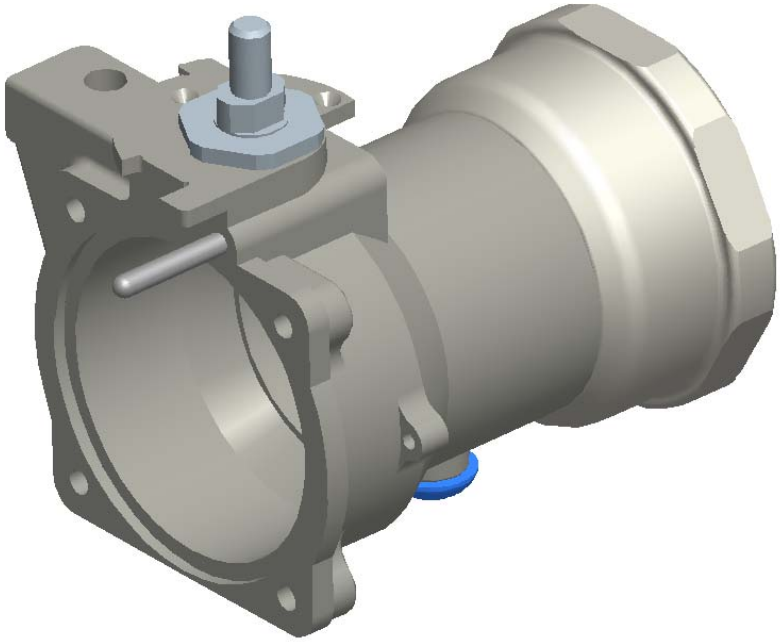
- Pop ball seal (16) out of flange, remove flange from rubber bumper



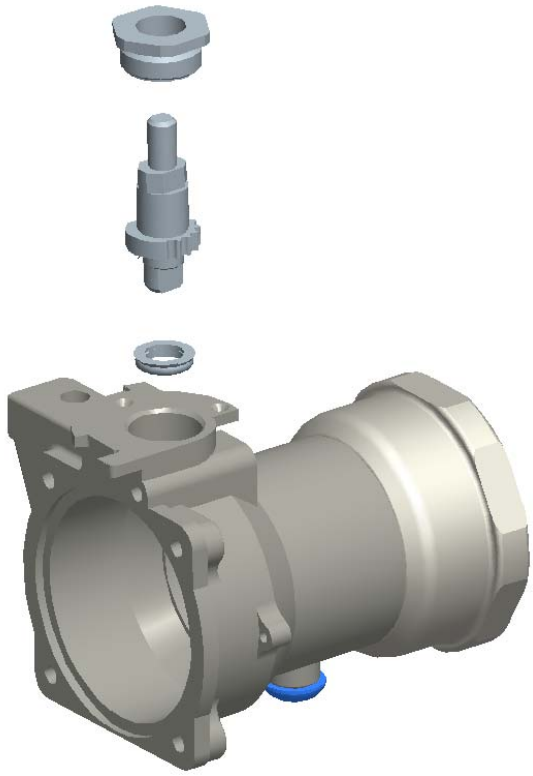
- Rotate ball out of socket, be sure to secure conductivity spring located in blind slot



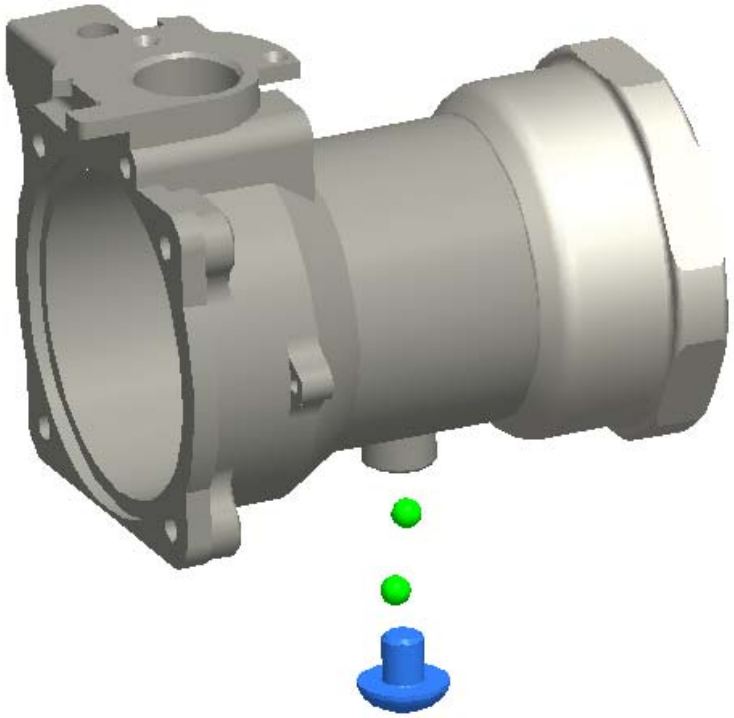
- Pull ball seal along with washer and spring out of body



- Rotate stem with wrench, clockwise, until interlock rack falls out

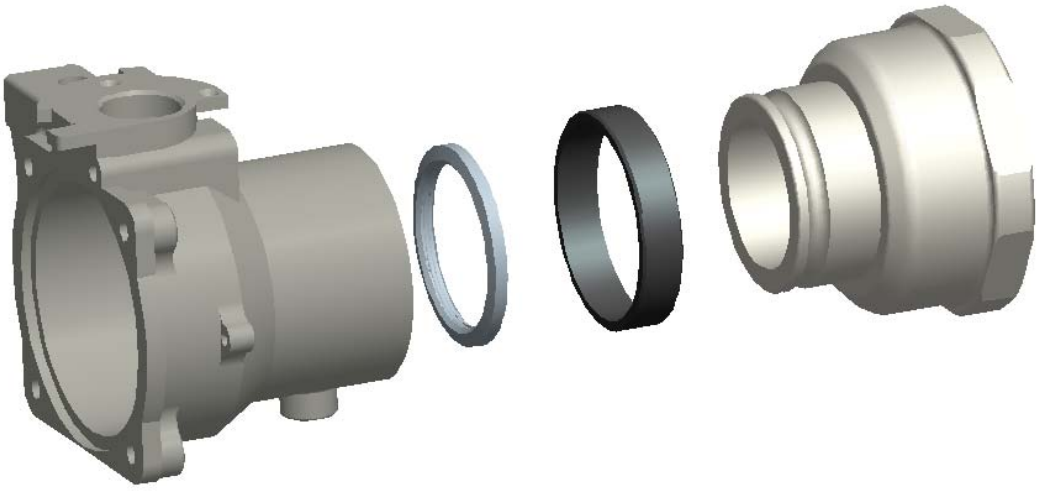


- Unthread stem bearing and remove stem with seal
- Stem seal may hang up in the body. For removal, simply place thumb inside of body cavity underneath of spring seal and press seal out of the body through the stem bore.



- Remove ball plugs and rotate swivel and body so bearings can fall out (1 and 2 inch unit shown)

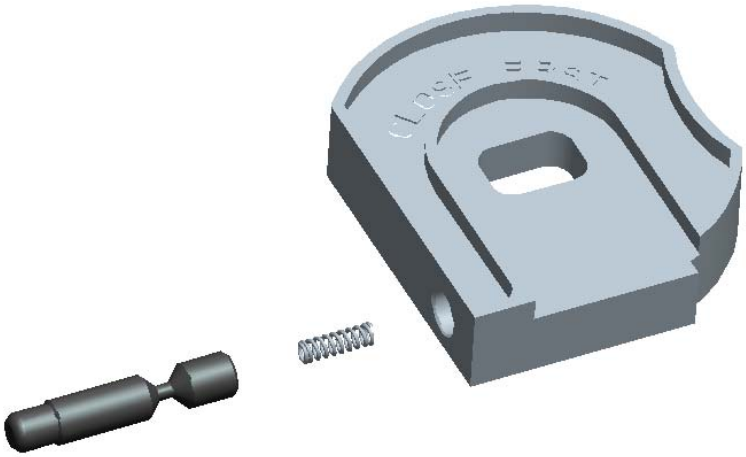
- With all bearings removed, separate the swivel end from the body and remove the swivel seal (all units), and sleeve bearing (1 & 2 inch units), and dust seal (3 inch units)



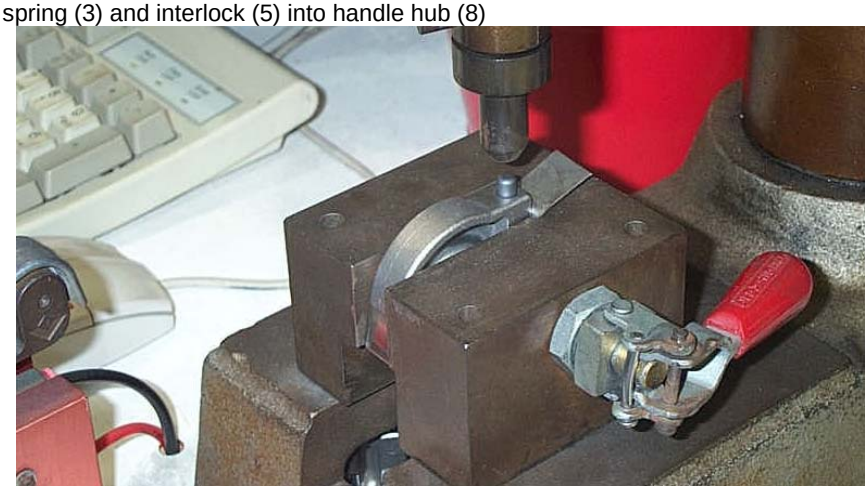
- Note: 2 inch unit shown

4 Detailed Rebuild

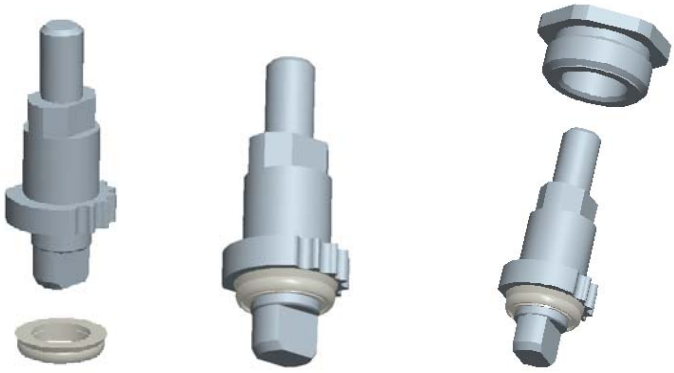
Assembly of the Adapter/Process/Manifold Adapter Half
(See figure 1 for part numbers)



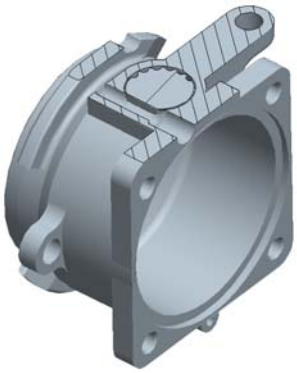
- Drop spring (3) and interlock (5) into handle hub (8)



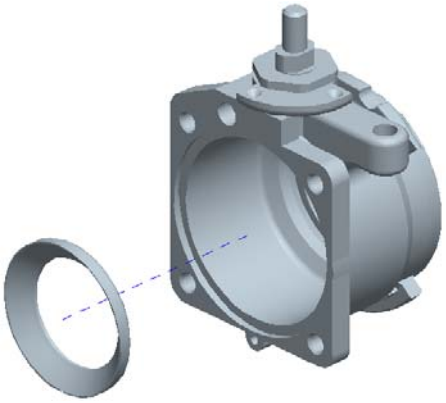
- Permanently capture interlock by crimping hub with pneumatic press
- Valve stem
- Note: Seal orientation required



- Carefully slide the stem seal (11) heel first over the stem (10)
- Drop bearing (9) onto stem
- Place one drop of Loctite 242 onto the threads of the stem bearing (9)

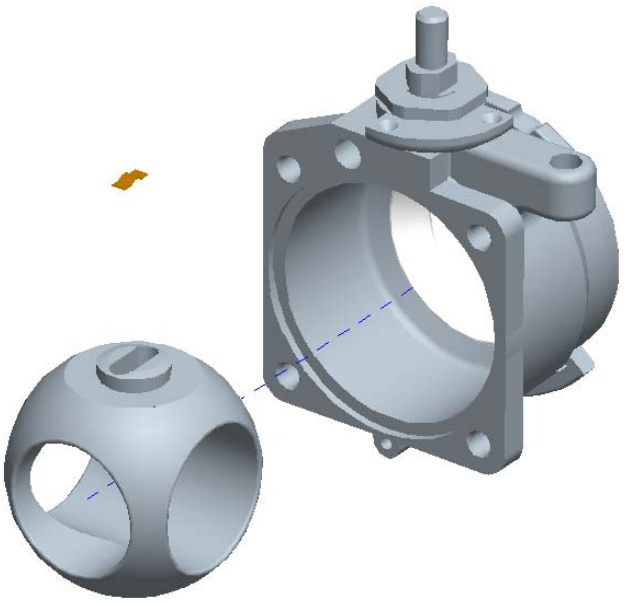


- Thread stem/seal subassembly into the body (14) until bearing is fully seated
- Torque to a value of 175 to 185 in-lb_f (19.8 to 21.0 Nm) for 1-inch Coupling, 180 to 200 in-lb_f (20.3 to 22.6 Nm) for 2-inch coupling and 75 to 85 ft-lb_f (101.7 to 115.2 Nm) for 3-inch coupling
- Turn stem so flat on stem is in line with pin interlock hole

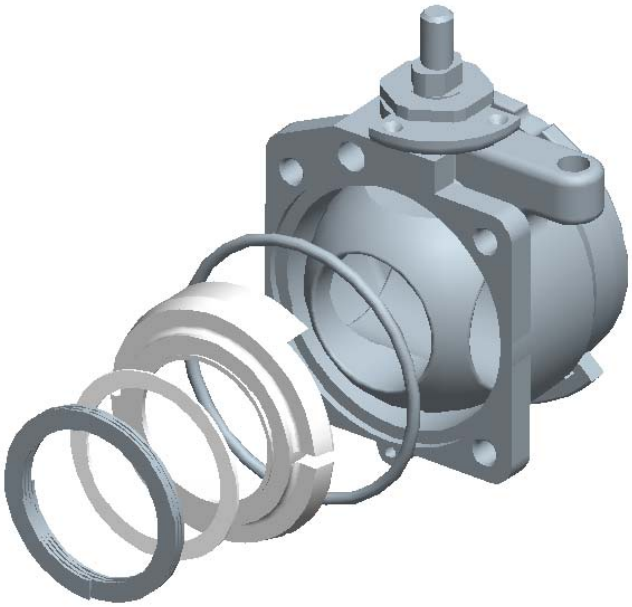


- Install the ball seal (15) into its groove in the body (14). The 3-inch adapter ball seal (15) must be forced into the seal groove beyond the retaining lip using fingertips

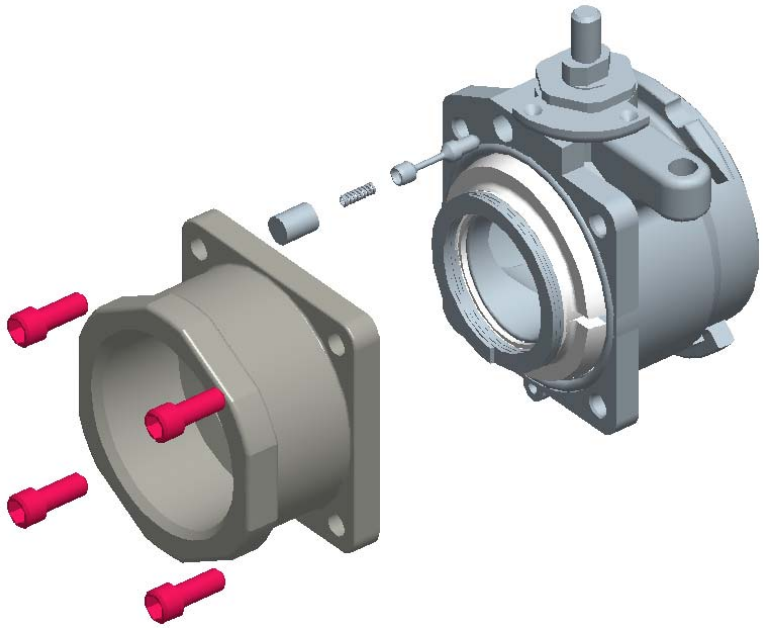
⚠CAUTION
Use fingertips only. Avoid fingernails or other objects. Anything other than fingertips will damage the Teflon seal which may cause leakage and possible exposure to hazardous materials.



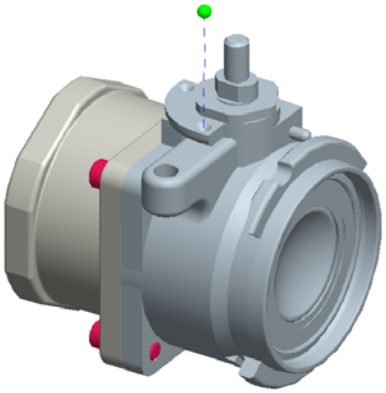
- Drop the conductivity spring (1) into the blind slot on the ball (16) (hump facing up) then install the ball into the body with the concave face of the ball in the closed position



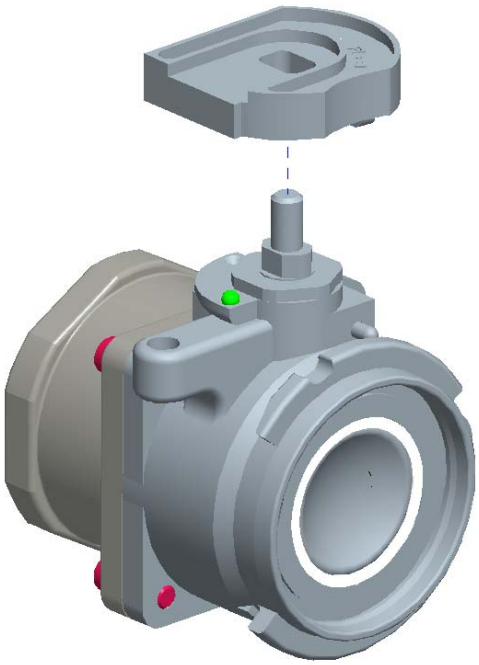
- Place the retainer (17) over the ball with the legs in line vertically with the stem as shown
- Place the washer (18) onto the retainer (17)
- Place the wave spring (19) over the washer (18)
- Place the flange seal (20) into its groove in the body (14)



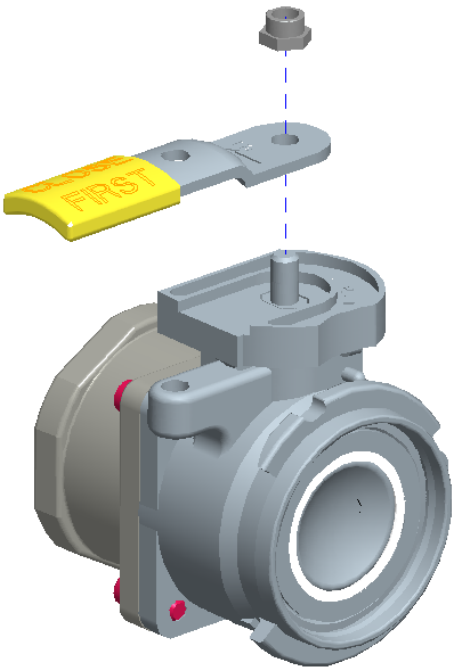
- Drop the interlock pin (4) followed by the spring (3) and end cap (2) into the interlock hole
- Place the flange (21) over the wave spring (19) capturing all components listed above
- Place one drop of Loctite 242 onto the lead threads of each of the 4 screws (22)
- Thread the screws through the adapter and into the body and tighten evenly in cross pattern to a torque value of 40 to 45 in-lb_f (4.5 to 5.1 Nm) for 1-inch coupling 85 to 90 in-lb_f (9.6 to10.2 Nm) for 2-inch coupling and 165 to 170 in-lb_f (18.6 to 19.2 Nm) for 3-inch coupling



- Place the detent ball (12) into “closed position” detent hole of body
- Do not forget to install the detent ball; failure to replace it could lead to accidental opening of the coupling half



- Place the hub handle assembly (8-5-3) onto the stem and detent ball

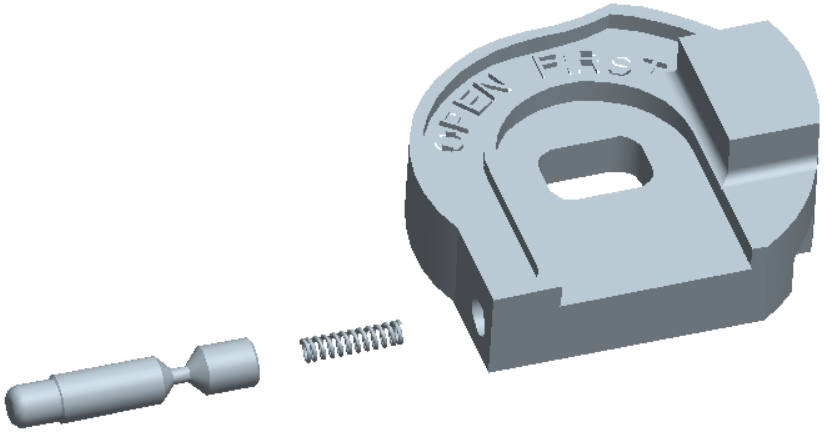


- Place the handle (7) into the slot of the hub
- Secure handle to the hub by threading the self locking nut (6) into the stem and tighten to a torque value of 90 to 100 in-lb_f (10.2 to 11.3 Nm) for the 1-inch coupling, 130 to 135 in-lb_f (14.7 to 15.3 Nm) for the 2-inch coupling and 20 to 30 ft-lb_f (27.1 to 40.7 Nm) for the 3-inch coupling

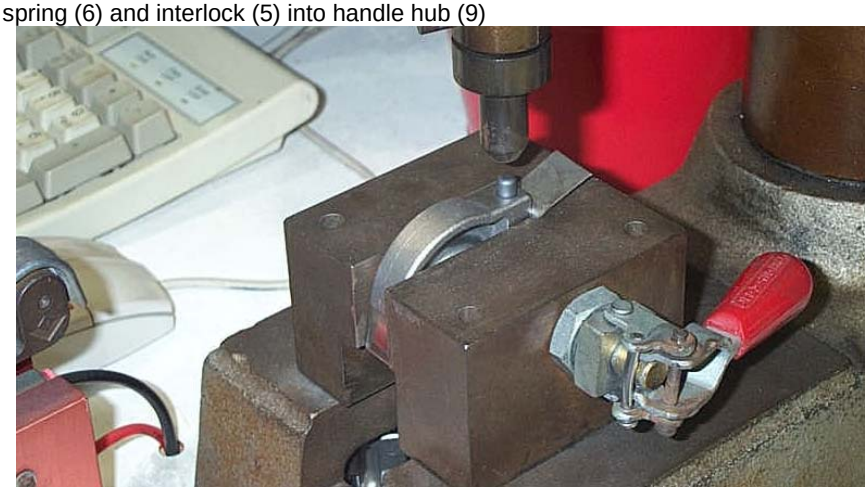
- Carefully press the face seal (13), rib first, into the seal groove on the face of the body
- Start at one location by pressing seal into groove and then work around the entire circumference

⚠ CAUTION
Use fingertips only. Avoid fingernails or other objects. Anything other than fingertips will damage the Teflon seal which may cause leakage and possible exposure to hazardous materials.

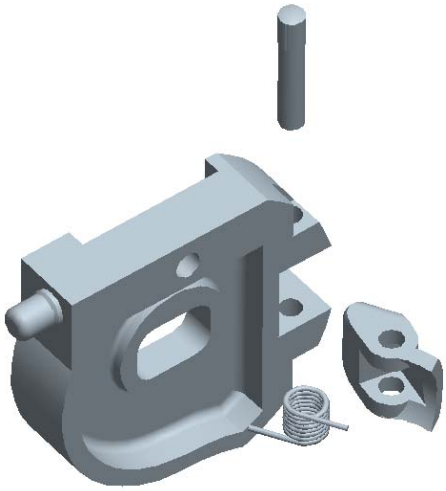
Assembly of the Hose/Coupler Half
(See figure 2 & 3 for part number)



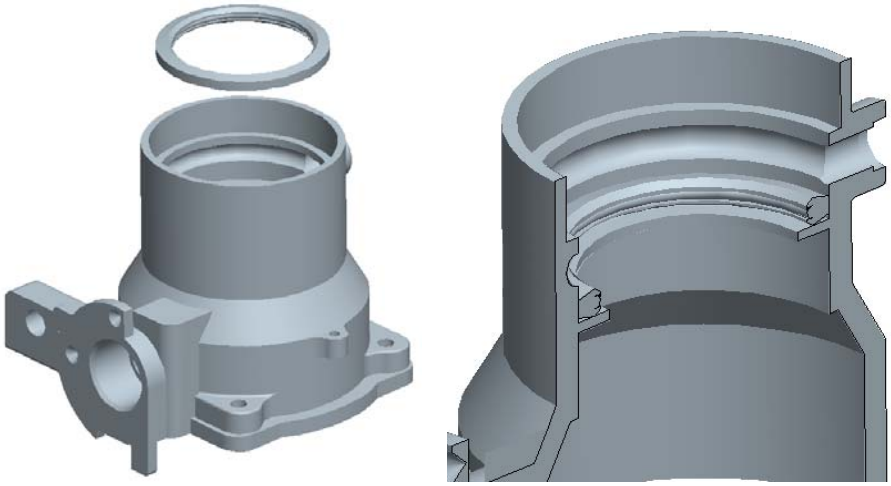
- Drop spring (6) and interlock (5) into handle hub (9)



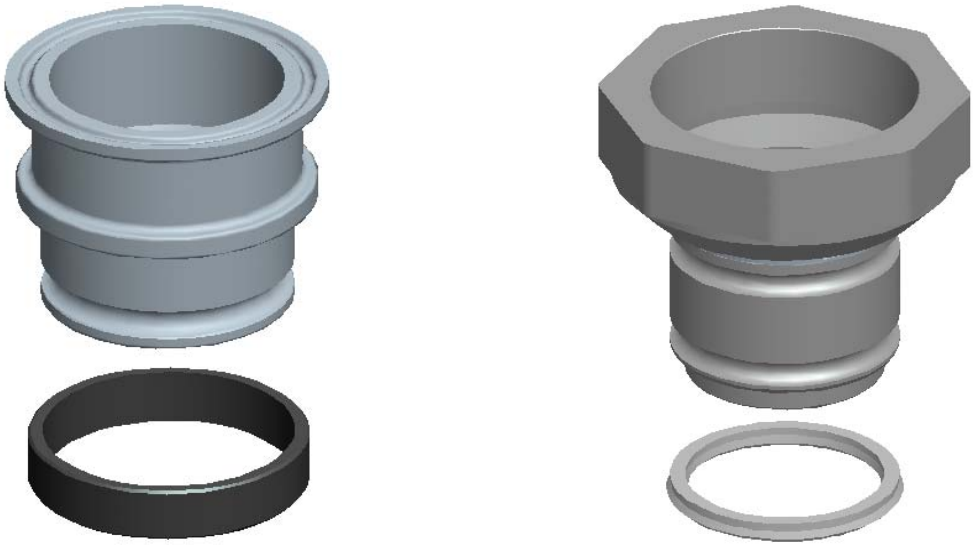
- Permanently capture interlock by crimping hub with pneumatic press



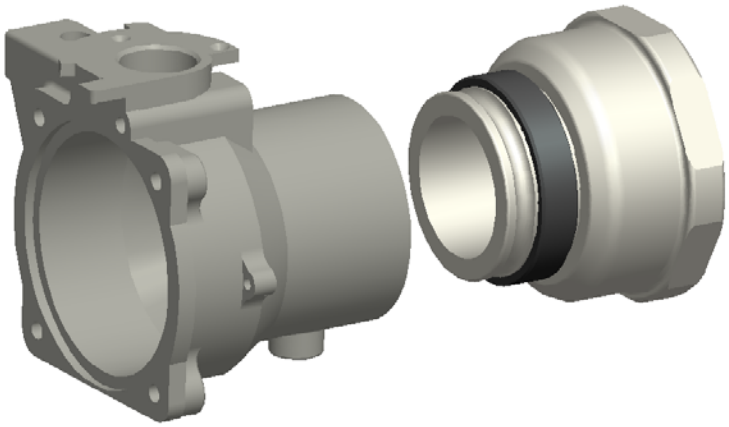
- Align spring (4), latch (3), and pin (2) with hub assembly as shown
- Drive pin through components
- Latch should spring inward when spring is installed correctly



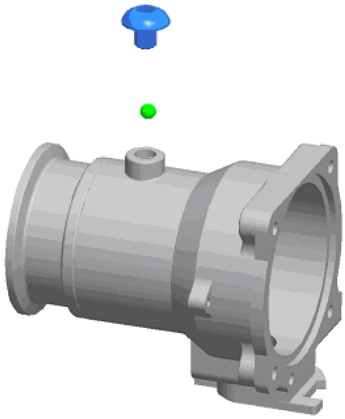
- Install the swivel seal (27) into the body (24)

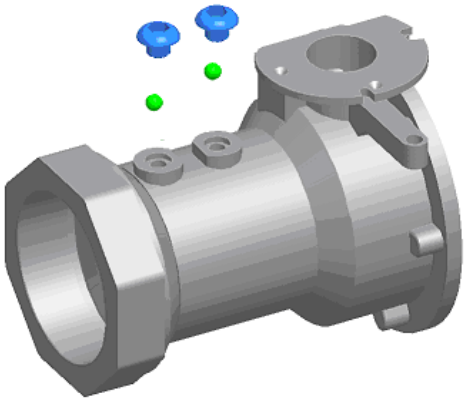


- Install the sleeve bearing (28) over the adapter (29) for 1-inch and 2-inch coupling or install dust seal (28) over the adapter (29) for 3-inch coupling



- Install the adapter subassembly into the body (24) (note: 2 inch unit shown)

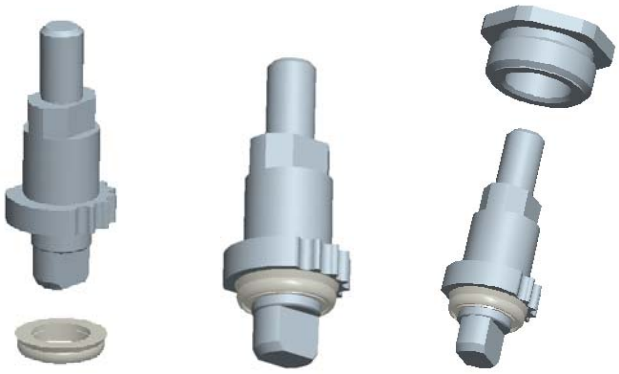




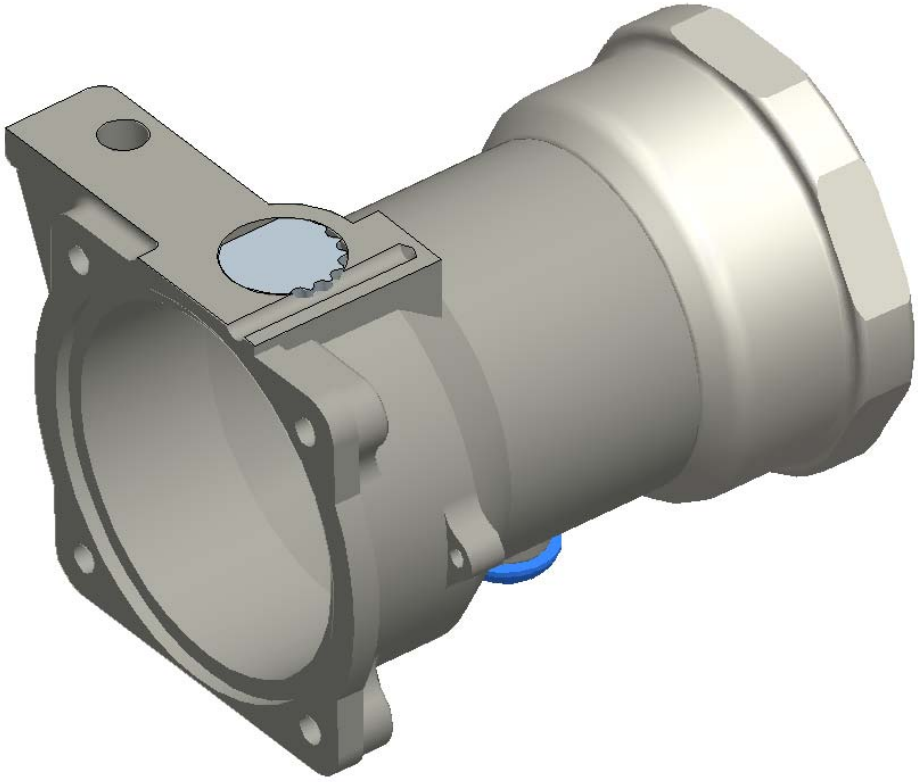
- With the small threaded hole on the body in an upright position, drop one ball (25) into the threaded port(s)
- Place the adapter/body assembly into a padded vise (ensure even compression) and slowly tighten the vise until the ball in the port(s) falls freely into the bearing groove

⚠CAUTION
Make sure the vise is padded so as not to damage the surface finish
Do not over tighten vise which can cause seal damage, resulting in leakage and possible exposure to hazardous materials.

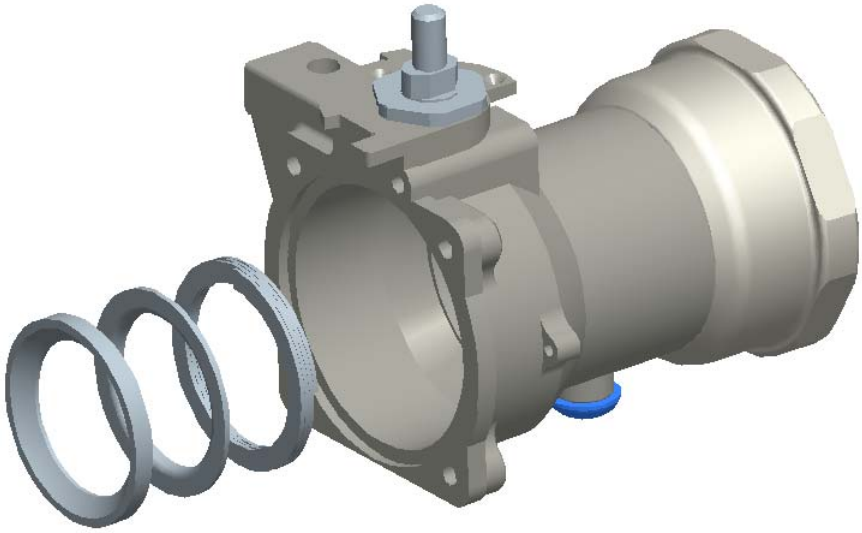
- Drop the remaining balls (25) into the port(s) (rotating the swivel may be necessary to distribute the balls)
- Place one drop of Loctite 242 on the plug(s) (26) threads
- Thread the plug(s) into the body port and tighten to a torque value of 85 to 90 in-lb_f (9.6 to 10.2 Nm) for 1-inch and 2-inch units. Torque 3-inch coupling to 170 in-lb_f (19.2 Nm).
- Check the swiveling action of the adapter. Any binding or other malfunction which prevents the adapter from being freely rotated 360 indicates a problem
- If so the adapter/body assembly should be disassembled and inspected and any damaged parts should be replaced
- Note: Valve stem seal orientation required



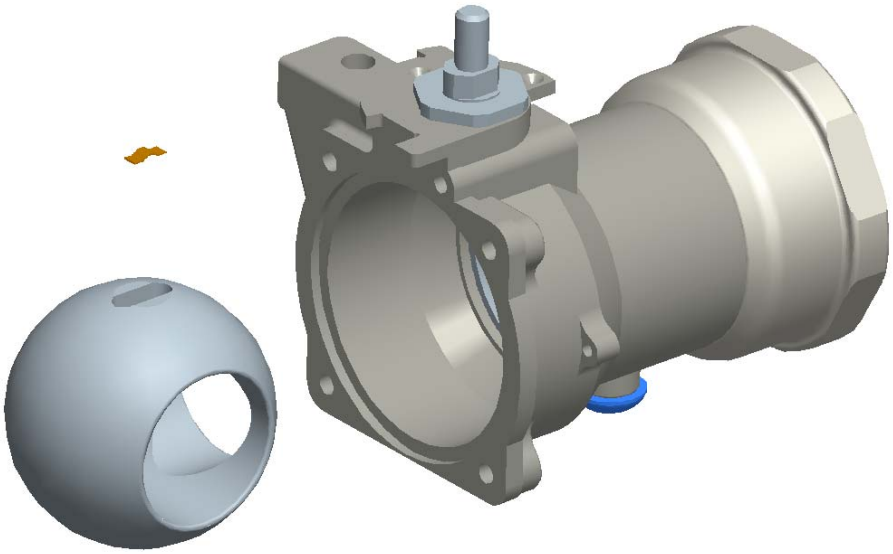
- Carefully slide the stem seal (12) heel first over the stem (11)
- Drop bearing (10) onto stem
- Place one drop of Loctite 242 onto the threads of the stem bearing (10)



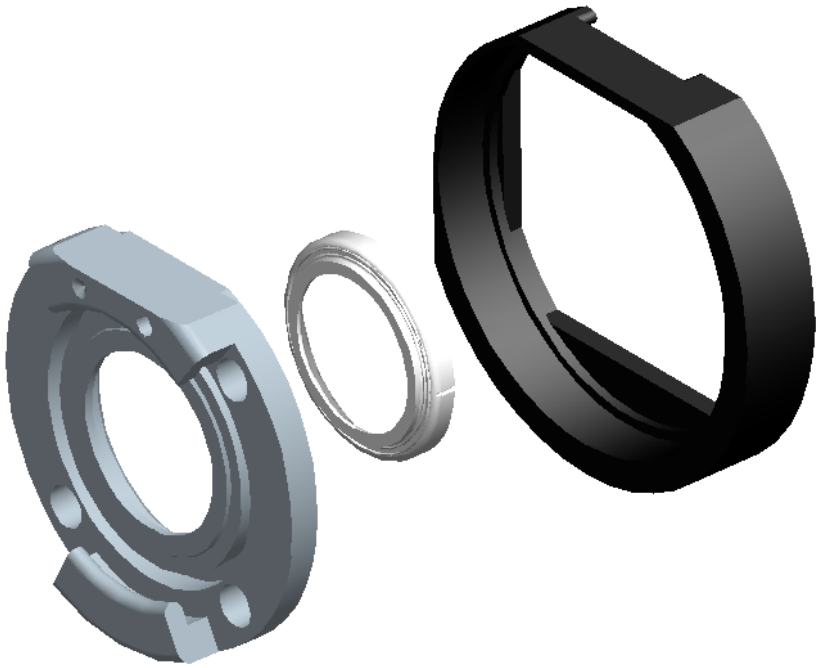
- Place one drop of Loctite 242 onto the threads of the stem bearing (10)
- Thread stem/seal subassembly into the body until bearing is fully seated against body and torque to a value of 175 to 185 in lb_f (19.8 to 20.9 Nm) for 1-inch Coupling, 180 to 200 in-lb_f (20.3 to 22.6 Nm) for 2-inch coupling and 75 to 85 ft- lb_f (101.7 to 115.2 Nm) for 3-inch coupling
- Rotate stem so the threads are on the side of the interlock hole (see section view above)



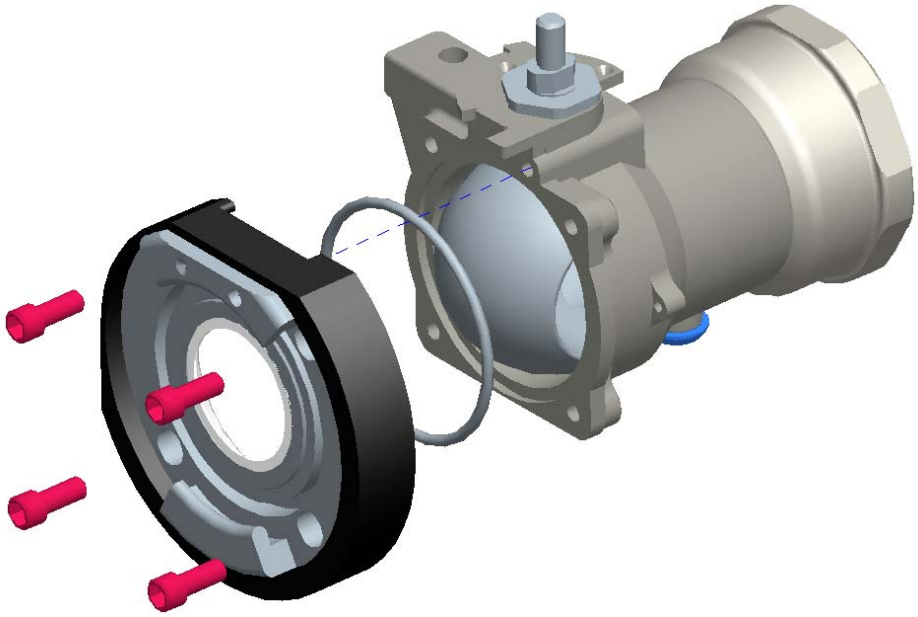
- Install the wave spring (23) into the body
- Place the washer (22) over the wave spring
- Install the retainer (21) over the washer



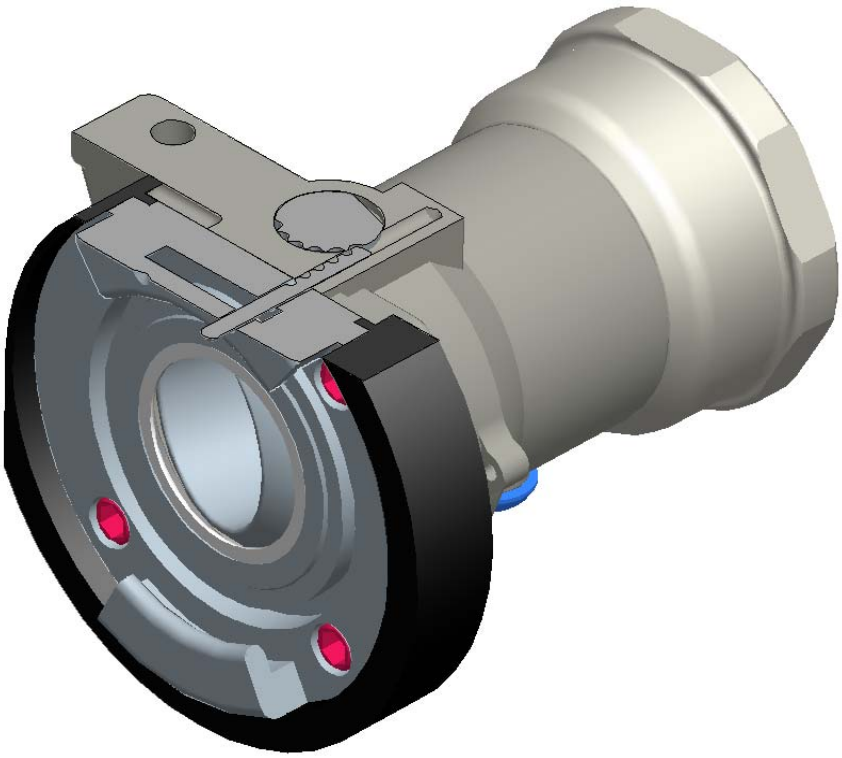
- Drop Conductivity Spring (15) into blind slot perpendicular to flow axis of valve ball
- Install the convex ball (14) by sliding the stem (11) into the slot and onto the retainer (16). Ball should be inserted with the convex surface facing outward from the body and the flow axis through the ball should be perpendicular to the flow axis of the body. For T-bore balls, the T-bore shall be installed facing the Teflon retainer, wave spring, and washer. If installed correctly, the ball should be in the closed position.



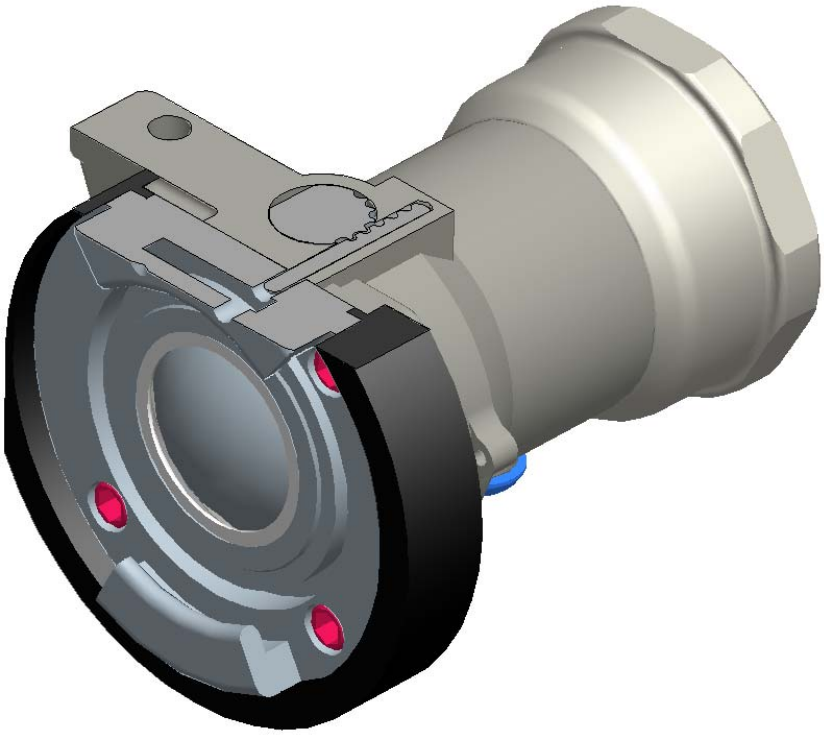
- Install bumper (18) onto the flange (19). When installing the bumper for the 3-inch hose/coupler half, align the notch in bumper with the flange lug near interlock pin (13) hole.
- Press the ball seal (16) into the flange (19)



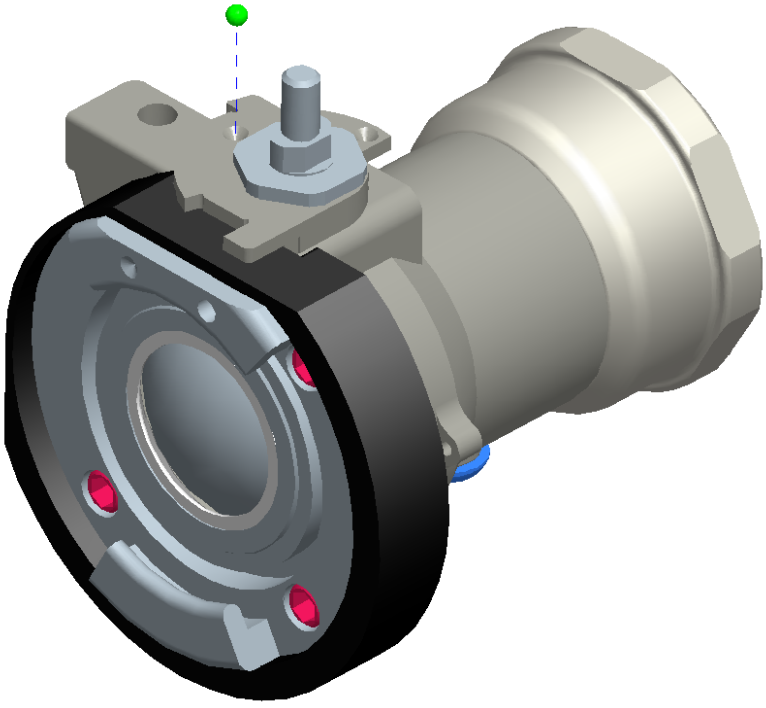
- Place the flange seal (17) into the seal groove of the body (24)
- Press the bumper/flange/ball seal subassembly into body aligning the interlock pin (13) holes
- Place one drop of Loctite 242 on the lead thread of each of the screws (20)
- Thread the screws through the flanges and into the body and tighten evenly, in a cross pattern, to a torque value of 75 to 80 in lbf (8.5 to 9.0 Nm) for 1-inch coupling, 85 to 90 in lb_f (9.6 to 10.2 Nm) for 2-inch coupling and 165 to 175 in lb_f (18.6 to 19.8 Nm) for 3-inch coupling
- Turn stem clockwise 90° to open valve, using a wrench



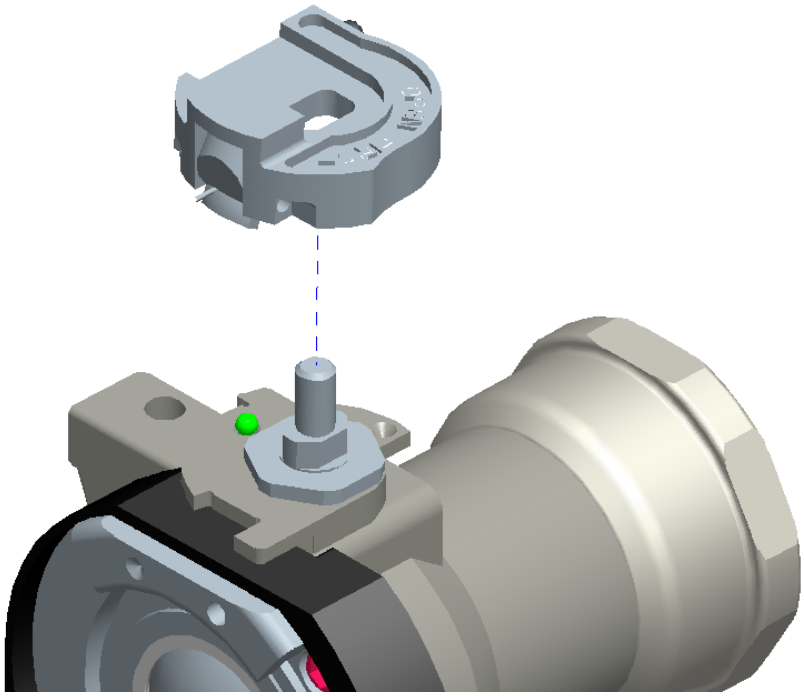
- Over-rotate the stem (11) in a clockwise direction, approximately 15°, to allow insertion of pin (13). Align the first tooth of the stem with the first tooth of the pin (see section view above).



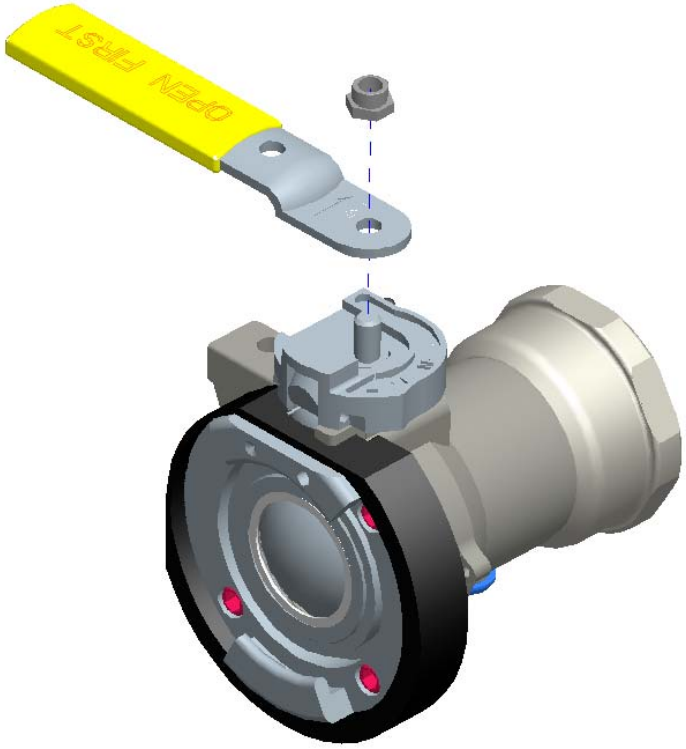
- Check for proper installation by turning the stem back to the closed position. The pin should be below the surface of the flange face when in this position (see section view above).



- Place the detent ball (1) into “closed position” detent hole of body (i.e., hole perpendicular to flow axis) as shown above. Do not forget to install the detent ball; failure to replace it could lead to accidental opening of the coupling half.



- Press the finger latch (3) in while placing the hub assembly onto the stem



- Place the handle (8) into the slot of the hub
- Secure with self clenching nut (7)
- Tighten to a torque value of 90 to 100 in-lbf (10.2 to 11.3 Nm) for 1-inch coupling, 85 to 90 in-lbf (9.6 to 10.2 Nm) for 2-inch coupling and 20 to 30 ft-lbf (27.1-40.7 Nm) for 3-inch coupling

Cavity Filler Installation

Installation of Adapter Cavity Fillers

Tools needed:

	1 inch units	2 inch units	3 inch units
Handle nut	7/16 inch socket or wrench	1/2 inch socket or wrench	5/8 inch socket or wrench
Stem bearing	13/16 inch socket	1 inch socket	1-7/16 inch socket
Adapter body	5/32 inch Allen wrench	3/16 inch Allen wrench	1/4 inch Allen wrench

Torque values:

Torque			
Handle nut	10-11 Nm (90-100 in*lb)	14-15 Nm (130-135 in*lb)	33-35 Nm (24-26 ft*lb)
Stem bearing	19-20 Nm (175-185 in*lb)	20-23 Nm (180-200 in*lb)	102-115 Nm (75-80 ft*lb)
Adapter body	8-9 Nm (75-80 in*lb)	9-10 Nm (85-90 in*lb)	19-20 Nm (165-175 in*lb)

Parts needed:

Adapter half	QTY	1 inch units	2 inch units	3 inch units
Front cavity filler	1	ZE100285-015	ZE100239-015	ZE100318-015
Top/Bottom cavity fillers	2	ZE100284-015	ZE100238-015	ZE100317-015
Side cavity fillers	2	ZE100286-015	ZE100240-015	ZE100319-015
Ball Retainer (cavity filled)	1	NA	ZE100246-038	NA

Dismantle Adapter half:

1. Remove handle nut from the top of the handle with a socket or wrench.
2. Remove handle, hub assembly and detent ball.
3. Remove stem bearing with socket. Wrenches tend to round off the anti-galling metal, increasing the difficulty of future repair.
4. With care, wiggle the stem out of the body. It may or may not come with the stem seal.
5. Remove the four socket head cap screws joining the end connection to the body with an Allen head wrench.
6. **Remove the end connection with the adapter body face down so that the parts do not fall out.**
    a. **Optionally, you may remove the pin retainer, spring and interlock pin from the body which is easily noticed by looking at the front of the body behind the top lug as the metallic coated pin protruding from the body.**
7. Remove the wave spring, wave spring washer and ball retainer and place into the end connection as it was assembled.
8. Hold the body upright and rotate the bottom of the ball outward from the body to remove it. In the stem slot, is the conductivity spring, be sure not to lose it and place parts aside.
9. If stem seal did not come out on the stem removal of Step 4, stick your finger in the body and pop it out of the stem boss on the body. Assemble it over the stem and set aside. The heel of the seal will mate against the underside of the stem gear. The heel is opposite of the spring showing inside of the seal.

Installation and assembly of Adapter half:

1. With ball seal (see balloon 1) retained inside of the body, slide the front cavity filler in (see balloon 2) with stem cutout vertical opening up to the hole through the stem boss. See Figure 1 for orientation of cavity filler and notch.
2. Place the stem and stem seal into the stem boss with the flat side of the gear aligned to the interlock hole axis and with care torque down the stem bearing to seat the stem bearing, stem and stem seal.
3. Place both top/bottom cavity fillers (see balloon 4) on ball with the flat aligned to the body end connection flange and toward the rear of the ball.
    a. Note that the front of the ball has the concave surface.

4. If the conductivity spring (see balloon 3) fell out of the slot, place back in slot with center hump being in the highest position. Hold body vertical and the ball with the concave surface forward and carefully slide the ball in rolled forward underneath and onto the stem and rotate the bottom of the ball inward.

With the body laying face down, insert both side fillers (see balloon 6). One on the left and one on the right, spherical face on the ball and centered on 0° and 180°. The flats on the top and bottom of each should align to the flats on the top and bottom of the valve ball. See orientation in figure below.

5. Insert the ball retainer (see balloon 7; see Figure 1 for orientation) last with tabs at the top and bottom aligned with the flats on the top and bottom of the ball. The side fillers should sit within the gaps of the tabs on the left and right of the ball retainer while the tabs of the ball retainer slide over the flats on the ball.
6. Lay the rounded face of the wave spring washer onto ball retainer.
7. Lay the wave spring on the wave spring washer.
8. Place the end fitting on top of the wave spring and torque down the four socket head cap screws.
9. Hold body with stem boss face is upright. Place the detent ball in the detent hole adjacent to the lock-out rib.
10. Place hub and handle over top of the stem with the handle over top of the lock-out rib.
11. Thread on 1/4-20 handle nut and torque down.
12. See Figure 2 for assembled ball and cavity fillers. Not shown is the ball retainer (see balloon 7) and far side filler (see balloon 6) for clarity.

Note: 1 inch unit shown. 2 inch and 3 inch are similar.

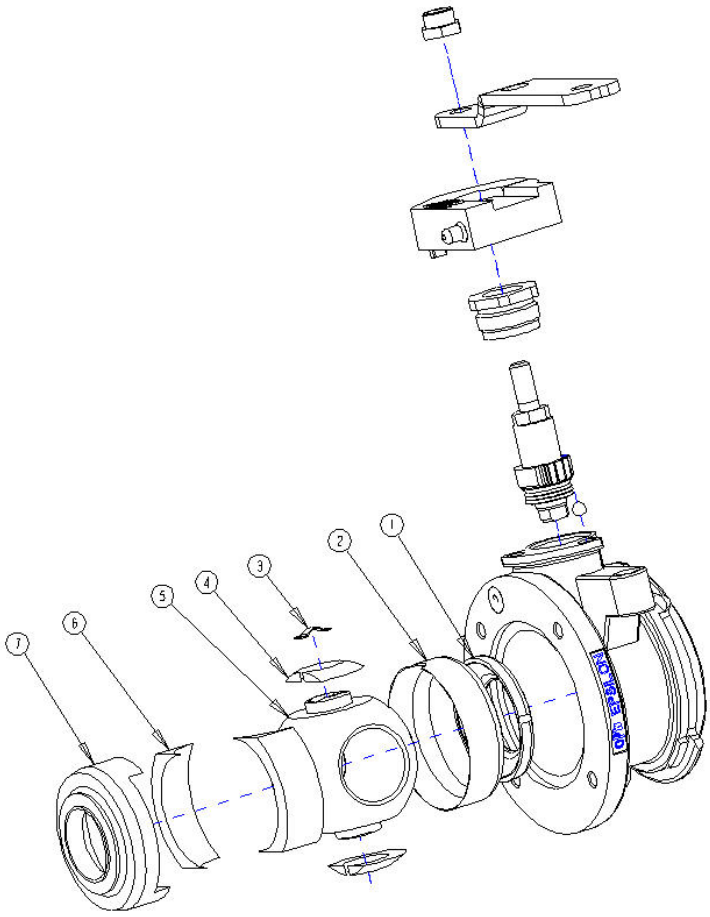


Figure 1

Figure 2

Installation of Coupler Cavity Fillers

Tools needed:

	1 inch units	2 inch units	3 inch units
Handle nut	7/16 inch socket or wrench	1/2 inch socket or wrench	5/8 inch socket or wrench
Stem bearing	13/16 inch socket	1 inch socket	1-7/16 inch socket
Flange screws	5/32 inch Allen wrench	3/16 inch Allen wrench	1/4 inch Allen wrench
Stem wrench	1/4 inch open end wrench	5/16 inch open end wrench	1/2 inch open end wrench

Torque values:

	1 inch units	2 inch units	3 inch units
Handle nut	10-11 Nm (90-100 in*lb)	14-15 Nm (130-135 in*lb)	33-35 Nm (24-26 ft*lb)
Stem bearing	19-20 Nm (175-185 in*lb)	20-23 Nm (180-200 in*lb)	102-115 Nm (75-80 ft*lb)
Flange screws	8-9 Nm (75-80 in*lb)	9-10 Nm (85-90 in*lb)	19-21 Nm (170-190 in*lb)

Parts needed:

Coupler half	QTY	1 inch units	2 inch units	3 inch units
Front cavity filler	1	ZE100278-015	ZE100241-015	ZE100320-015
Rear cavity filler	1	ZE100288-015	ZE100242-015	ZE100321-015

Dismantle Coupler half:

1. Remove handle nut from the top of the handle with a socket or wrench.
2. Remove handle, hub assembly and detent ball.
3. Remove stem bearing with socket. Wrenches tend to round off the anti-galling metal, increasing the difficulty of future repair.
4. With care, wiggle the stem out of the body. It may or may not come with the stem seal.
5. Remove the interlock rack (see balloon 6) from the body.
6. Remove the socket head cap screws joining the flange to the body with an Allen head wrench.
7. Remove the flange with ball seal.
8. Slide the ball (see balloon 2) out from the body to remove it. In the stem slot, is the conductivity spring (see balloon 5), be sure not to lose it and place parts aside.
9. If stem seal did not come out on the stem removal of Step 4, stick your finger in the body and pop it out of the stem boss on the body. Assemble it over the stem and set aside. The heel of the seal will mate against the underside of the stem gear. The heel is opposite of the spring showing inside of the seal.

Installation and assembly of Coupler half:

10. With wave spring, wave spring washer and ball retainer inside of the body, slide the rear cavity filler in (see balloon 1) with stem cutout vertical opening up to the hole through the stem boss.
11. Place the stem and stem seal into the stem boss with the flat side of the gear aligned to the interlock hole axis and with care torque down the stem bearing to seat the stem bearing, stem and stem seal. Rotate the rear cavity filler as necessary to clear the stem, see figure 3 for orientation. Torque down.
12. Note orientation in Figure 3. Slide interlock rack teeth first into the interlock rack hole. Apply light force with finger to keep in place and with open end wrench, turn the stem clockwise until the ratcheting stops. While applying light force, rotate the stem counterclockwise to retract the interlock pin into the body.
    a. Note: if you rotate the stem past the teeth and the interlock rack goes in, you will effectively lock the unit. Be sure that the stem operates and the interlock rack extends and retracts. If the interlock rack does not retract far enough with the flange on to clear the undercut for the adapter body lugs, it is at least one tooth off and must be reinstalled.

13. If the conductivity spring (see balloon 5) fell out of the slot, place back in slot with center hump being in the highest position. Hold body upright and carefully slide the ball in rolled forward underneath and onto the stem and rotate the bottom of the ball inward.
14. With the body standing on the end fitting, place the front cavity filler (see balloon 3) into the body and over the ball and the stem. See Figure 3 for orientation.
15. Align the flange and ball seal over the ball and with the screw holes. Rotate the flange so that the interlock rack will move through the flange hole as necessary. See Figure 3 for orientation.
16. Torque down the socket head cap screws.
17. Hold body with stem boss face is upright. Place the detent ball in the detent hole adjacent to the lock-out rib.
18. Pinch the latch on the hub to the hub and place hub and handle over top of the stem with the handle over top of the lock-out rib.
19. Thread on handle nut and torque down.

Note: 1 inch unit shown. 2 inch and 3 inch are similar.

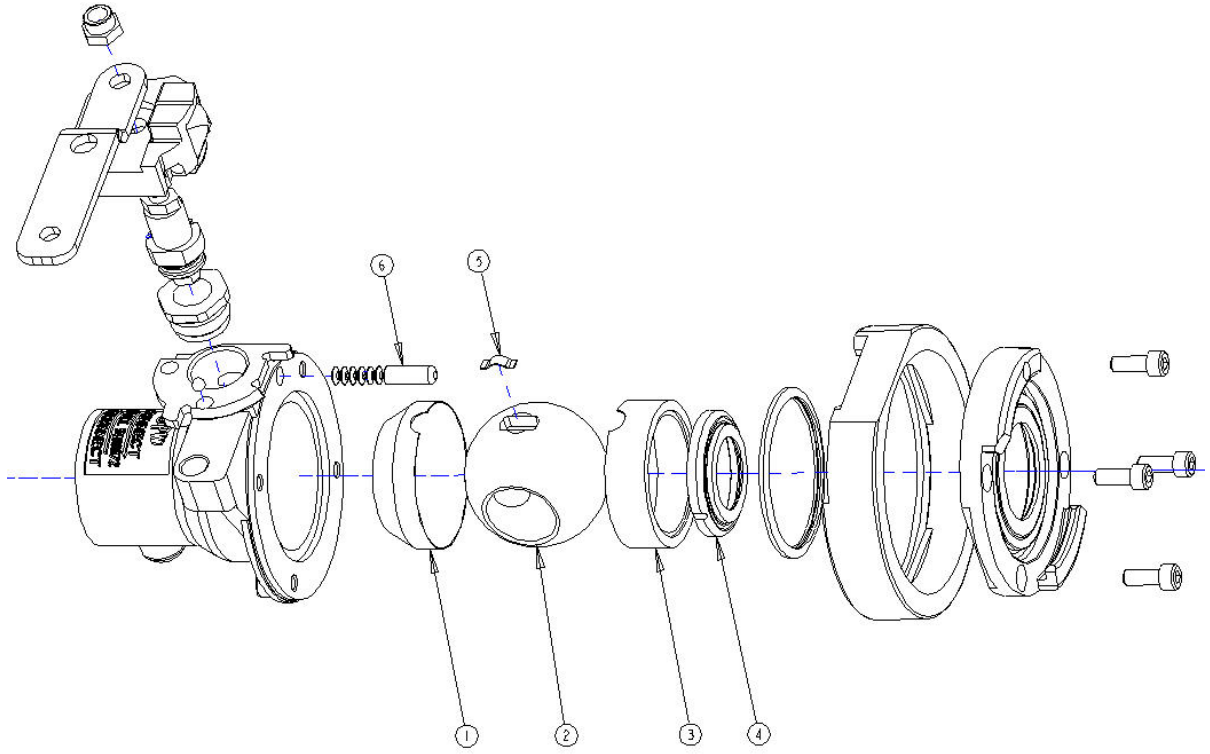


Figure 3

Appendix E - Recommended Spare Parts

With the purchase of an Epsilon **OPW Engineered Systems** recommends some spare parts to be purchased.

When using the Coupler for its intended use and under the normal environments it was designed to operate in, these spare parts can extend the useful lifecycle of the Coupler.

Drawing Item *	Description of Component	Quantity recommended
16	Ball Seal, Coupler and Adapter	2
17	Flange Seal, Coupler	1
21	Flange Seal, Adapter	1
12	Stem Seal, Coupler and Adapter	2
21	Ball Retainer, Coupler Half	1
18	Ball Retainer, Adapter Half	1
27	Swivel Seal, Coupler Half	1
14	Transfer Seal, Adapter Half	1

*See pages 24 (coupler) and 15 (adapter) for “Drawing Item” figures.
Coupler and Adapter seal kits contain one of each of the above listed parts, respective to the coupling half.
Consult factory for specific part numbers.