2020 Production Catalog

Edition 620.1

OILCO

LIQUID HANDLING SYSTEMS

Setting the standard for industry precision, reliability and performance since 1935.

Swivel Joints

Stainless Steel Insert • V-Ring *&* O-Rings
Low Torque "LT" • Tapered Roller Bearing
High Pressure • Heavy Duty • Split Flange

Loading Arms

Vapor Recovery • Bottom Loaders
Hose Supports • External Steam Jacket
Transfer Arms • Top Loaders • Accessories

Proudly manufactured in the U.S.A

Serving the Industry Since 1935

OILCO Liquid Handling Systems (A Division of Valeur Corporation) has designed the most extensive line of swivel joints available to heavy industry for over three quarters of a century. Units range from 2" through 24" and are available in carbon steel, stainless steel and aluminum with either o-ring or v-ring packing seals. Low torque, steam jacketed, high pressure and heavy-duty designs with incorporated tapered roller bearings completes the standard production catalog. OILCO also manufactures a large line of top and bottom loading assemblies, vapor recovery arms and floating suction units.

Blending quality assurance and manufacturing standards from ANSI, ISO, and Six Sigma techniques OILCO has the ability to remain fluid in the ever changing economic and technologically diversifying world. The entire product line can be modified to suit any project requirement and incorporated into either new or re-engineered systems. Based on traditional practice and adaptive innovation, OILCO maintains a constant position in the petroleum and manufacturing industries.

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OILCO is proud to associate with the following organizations:

NFIB The Voice of Small Business® — The National Federation of Independent Business

PEI — The Petroleum Equipment Institute

ILTA — Independent Liquid Terminals Association

NJBIA — New Jersey Business and Industry Association

WPMA — Western Petroleum Marketers Association

NAHAD — National Association for Hose & Accessories Distribution

Water Environment Federation the water quality people® — The Water Environment Federation

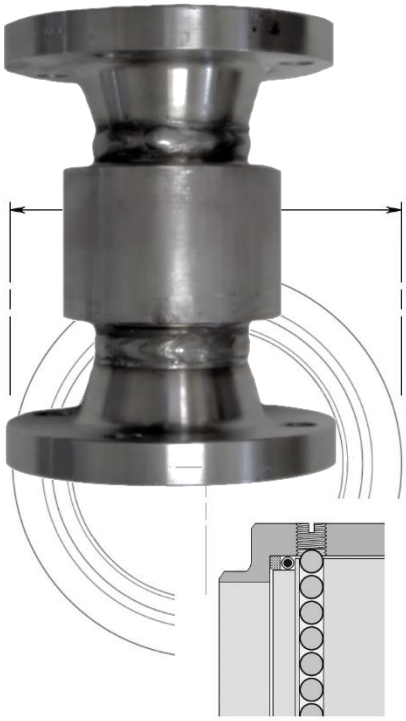
AIST Association for Iron & Steel Technology — Association for Iron & Steel Technology

Contents

80 Series O-Ring Swivel Joints

Single Point Main Pressure Seal

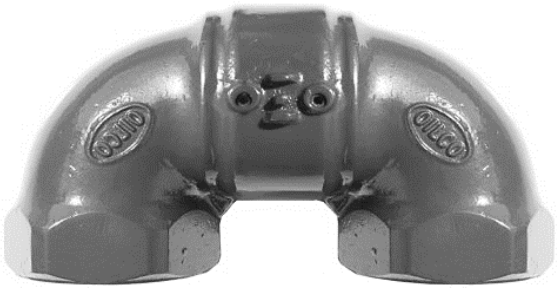
The 80 Series swivel joint is based on the original rotary union platform developed in the early half of the 20th century. It is a leak proof, low maintenance design. It has widely spaced ball races allowing for better alignment and the promotion of longer than average packing life. Flow restriction and internal turbulence are held to a minimum with a smooth bore design throughout the internal chamber. The robust single seal point will operate in various regulated pressure environments and the felt dust seal prevents foreign matter from entering the swivel chamber. A steadfast and reliable piece of liquid handling equipment, the 80 Series will fulfill project requirements for many years to come.



General Service Applications

Designed as the basic workhorse of the swivel joint world, the 80 Series is a ball bearing, single point 0-ring seal design with a low drag, felt dust seal backup that allows for an endless number of applications. The 80 Series is available in carbon steel, stainless steel T-316, and aluminum. Sizes range from 2" to 6" in all materials with flanges, threads or beveled end connections.

A primary design option for less critical projects or those requiring low to moderate operating pressures, the 80 Series is a well-suited and universal option. Available in all styles, the customer can select any configuration of flange, male / female threads, bevel for weld or even request a custom connection. Each 80 Series unit can support the addition of handle assemblies or a counterweight boss, along with having the availability of all secondary treatments like marine coating or oxygen service conditioning.



Aluminum Castings

In addition to the manufactured aluminum offering, an 880 Series cast aluminum variant is available which can help reduce overall cost yet maintain the primary o-ring series characteristics found in the traditional 80 Series production line. Although the overall moment load is reduced due to construction style, the cast 880 Series offers an excellent alternative for submerged systems as well as being a common outlet component to many loading arms.

90 Series V-Ring Swivel Joints

The Leader in Swivel Technology

The 90 Series swivel joint line is the performance and innovation leader in the OILCO catalog. Engineered in the late 1980's, the 90 Series began with the concept of manufacturing a superior swivel to replace simple o-ring units. Since, the 90 Series has grown to encompass four additional model variations, countless secondary applications, and has expanded to include 24" pipe size.

The 90 Series platform is designed with a three "V" ring seal configuration base that is spring loaded and self-adjusting for normal wear. The result translates into the "V" rings maintaining a constant optimal pressure, securing a reliable seal well beyond the service expectancy of any other conventional single seal.

A Low Torque "LT" Application

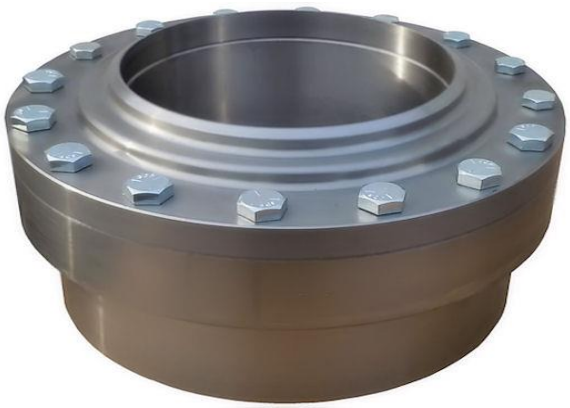
OILCO developed a secondary manufacturing process specifically for the 90 Series swivel joints, creating the low torque variant of the standard swivel. These extensively treated units reduce torque up to 65% as compared to conventional swivels. Friction in the mechanical chamber are dramatically reduced, providing a swivel joint that can instrumental in corrosive critical environments, testing systems and limited rotation cycle applications.

Oversized Production Line: *2" through 24"*

The 90 Series swivel joint covers the widest range of service and safety considerations in the petroleum and metal markets today. In 2016, OILCO launched the pinnacle size in this line, finalizing the availability of the carbon and stainless steel units at a 24" nominal pipe diameter. Built on the same platform and reliability characteristics, the 90 Series has grown to see consistent service in the standard petroleum industry, iron and steel mills, wastewater treatment facilities, aviation fuel handling and bulk and food storage with failure free reliability.

180 & 190 Series Split Flange

In critical maintenance areas, access to the packing chamber without mechanical disassembly can serve as equal importance to the actual unit performance. For this reason, both 80 Series and 90 Series swivel joints are offered in a split flange variant. The operation mechanics of the units remain unchanged, with the packing chamber accessed immediately under the collar of the two-part body construction, greatly reducing the risk of operator and maintenance error, while constantly assuring proper alignment as determined by the factory.



Seal Access and Field Replacement

A modified version of the OILCO 80 Series swivel joint line, the 180 Series Split Flange units adopt all the traditional criteria of the “O” ring swivel and offers it in a removable seal version. It is a ball bearing, single point seal design with a dust seal backup that allows for an endless number of applications. The split flange series is available in carbon steel, stainless steel T-316, and aluminum, with various seal configurations. Sizes range from 2" to 6" in all materials.

Like the 180 Series, the 190 Series offers the same maintenance advantage in seal access. By utilizing the identical packing components found in the 90 Series, repair parts and cost are held to a basic average. The 190 Series is available in carbon steel, stainless steel T-316, and aluminum, with various seal configurations. Sizes range from 2" to 24" in all materials. All OILCO swivel joints are available in flanged and butt-weld ends and up to 6” with NPT threaded connections.

Performance Advantages, Maintenance Savings

The 180 Series and 190 Series have widely spaced ball races allowing for better alignment and longer packing life. The single point seal utilized in the 180 Series and the spring energized triple chevron seals in the 190 Series will operate under both a range of vacuum and pressure environments. Packing seal material is Buna-N (standard), but Viton, Nitrile, Teflon®, Kalrez®, Chemrez®, EPDM and EPR are available.

The split design of the body cavity allows for easy in-field service without having to remove the ball bearings, both allowing for the notable time savings, but also the pressure seal has been positioned in the least intrusive position to reduce debris introduction and prevent marring via exposure.

The 90 Series "HP" High Pressure Design

Since its inception, the 90 Series design has performed flawlessly. As a result, multiple application alternatives have been incorporated into the production line to accommodate changing industry needs. After an accelerated research and development program in the summer of 2011, OILCO introduced a new option geared specifically toward prover arm engineers and manufacturers.

90 Series Performance Platform

The 90 Series High Pressure ("HP") line has increased the working pressure capabilities of OILCO swivel joints to allow for incorporation in various prover assemblies, testing facilities, and other critical loading and unloading procedures. Utilizing established engineering techniques and design specifications and performance requirements, the 90 Series adaptation "HP" line affords identical predictability with an improved level of effective range.

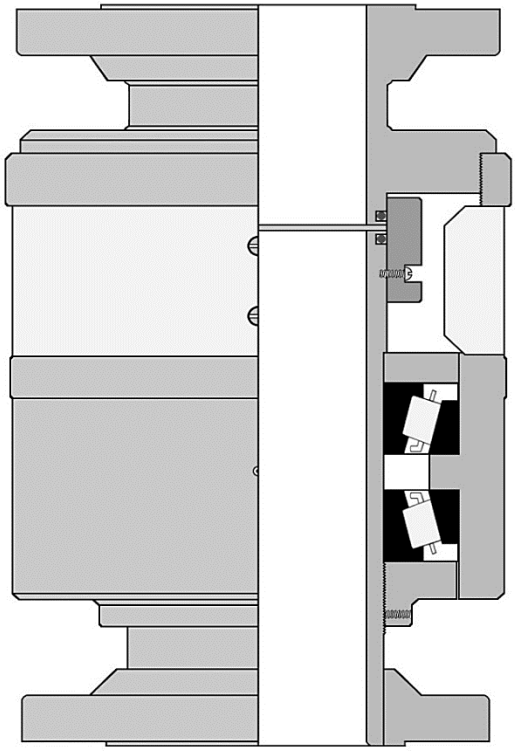
With a capacity more than doubling standard characteristics, the "HP" Series has operations and testing limits well north of 3000 psi. This ability has placed OILCO swivel joints in the forefront of complex prover arm manufacturing specifications for several U.S. design firms. Enhanced mechanical chambers, increased sealing surfaces, and an inflation of overall wall diameters, have all aided in catapulting the OILCO brand name into markets far outreaching the previous 80 years.

857 Series Removable Seal

Designed nearly five decades ago, the Model 857-F was engineered and manufactured to support the multitude of counterweighted hose loaders outfitting the west coast terminals throughout California. Due to the high moment loads on larger loading assemblies, the 857-F incorporated Timken® tapered roller bearings in the mechanical chamber. This allowed for the intense bending moment at the riser and resolved all associated fatiguing issues at the base.

Maintenance without Disassembly

Consideration was also given to the maintenance need of the arms in service at the terminal facilities. Due to the high unit weight of these counterweighted systems, removing them from service offered a lengthy disassembly operation along with the necessity of a maintenance team. To resolve this issue, the 857-F was constructed with a shielded removable seal. The dual o-ring compartment is enclosed with a heavy wall locking collar and successfully allows for the various flow rates required by the customers. With only standard tools, the main pressures seals can be removed and new o-rings installed in a matter of minutes. This innovation resulted in a maintenance plan that did not require any disassembly and only a single technician.



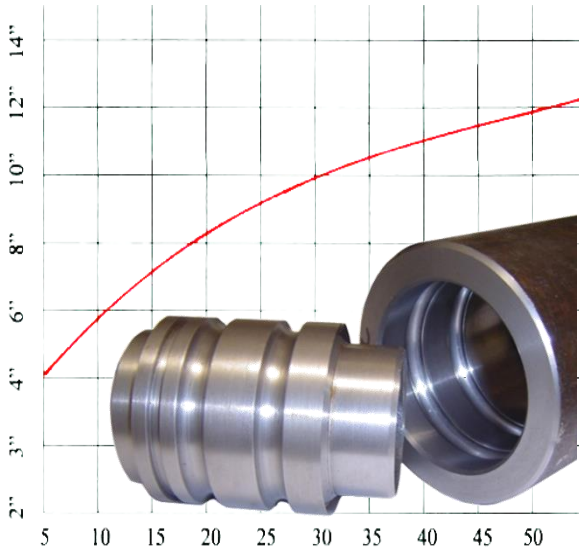
The Model 857-F has a reported minimal performance lifespan of 20 years and in cases where the unit was not taxed to its operation limits, more than 30 years. The Model 857-F was, and continues to be, a consistent, reliable, and efficient riser swivel joint design.

- High Moment Load
- Tapered Roller Bearings
- Extended Service Life
- Removable Main Seals
- Dual O-Ring Design
- On-Site Replacement

Low Torque "LT" Design

The Low Torque ("LT") model swivel joint is a specifically conditioned 90 Series swivel joint that reduces torque up to 65% more than any other conventional joint. The low torque option is a secondary procedure applied during the manufacturing process, prior to welding procedures. The 90 Series low torque swivel can be broken with a minimal amount of manual pressure, assisting in ease of use for the operator in critical operations areas.

The application of the low torque option for the 90 Series swivel joint is for the entire nominal size range. Following the CNC milling stage, the sleeve is polished and turned to an extra smooth surface. The body receives a specifically tailored honing. This process is not limited to carbon steel units, but can be applied to both aluminum and stainless steel assemblies as well.



Steam Jacketing

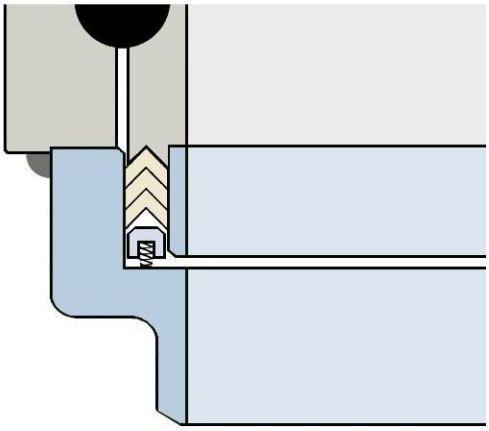
OILCO has an extensive 30+ year history in the development of steam jacketed equipment for custom applications. Drawing on this experience, almost any loading or unloading configuration can be made to serve as a steam jacketed assembly. Internal product lines can handle 500 psi while the steam chambers can work up to a range of 150 psi. The swivel joint packing chamber can withstand temperatures of up to 600ºF. All internal elbows are long radius and standard weight, allowing the assembly to be piggable when required. The incorporated joints are adaptable to suction or pressure lines with standard packing seals.

Constructed a of lighter gauge material on the exterior, a standard jacket will allow steam to circulate evenly in order to preclude binding of the product. The jacketing of OILCO's swivel joints not only covers the elbow, but also the entire ball race swivel area, providing positive rotation at all times. Utilized for such viscous materials as petroleum products, asphalt or tars, heavy oil, liquid sulphur and even food products, available ranges from 2" to 16" and are constructed from carbon steel or stainless steel. Research, design, and adaptability are all keys features for both the individual components and complete units required to service any given project.

90 Series Stainless Steel Insert – "SSI"

Originally inspired by the needs of the iron and steel mills, OILCO sought to understand the complex chemical problems for pumping vast quantities of on-site water through the lids of the melting pots. Due to the intense chemical treatment of the water, standard steel joints were suffering with extensive pitting and corrosion of the sealing surface. While traditional wisdom would warrant the use of stainless steel, the problem still arose, albeit in a slower timeline. Unfortunately, the use of upgraded stainless steel (especially in the larger 10" - 24" sizes) also became a huge cost consideration for the plant engineers.

By isolating the critical areas of the sealing service, OILCO managed to develop a process that mates the benefits of stainless steel, while keeping the cost of the unit down to a more manageable level. The result was the stainless steel insert swivel joint. These swivels are dimensionally identical to their carbon steel and stainless steel counterparts, but utilize the necessary aspects of each material to prolong the seal life and seal area integrity. This hybrid swivel joint meets several working concerns, cost efficiency issues and increased the life expectancy of the standard carbon steel units by 30-50%.



The SSI series has a complete packing chamber of stainless steel that includes the operational shelf

Where and why should you move to SSI?

The SSI dominates water re-use operations within domestic metal works facilities. Because of varying treatment levels, the upgraded packing chambers allow for 3x the service life over a steel unit while still accommodating the heavy moment load requirements necessary in the elaborate water piping systems.

The budgetary concern addressed by this "hybrid" unit allows for a more predictable life expectancy and controllable maintenance program schedule. Both of these being pivotal cost saving measures.

The Where:

Systems where chemical capability is a concern but not critical to corrosion or fatigue.

The Why:

The hybrid unit cost is 40-50% less than the equivalent swivel in all stainless steel T-316.

2000 Series Tapered Roller Bearing

The OILCO 2000 Series offers the best load carrying capacity in the industry. Unequalled in durability and overall moment ratings, combined with virtually friction free movement and minimal seal wear, there is simply no other swivel joint that measures up to its performance level.

Timken® roller bearings are proven stronger than any other conventional bearings. And put inside the precision CNC milled 2000 Series swivel joint spool, permanent alignment is assured. Such is the confidence in the manufacturing of the 2000 Series, the bearings are guaranteed by OILCO for the life of the joint. *Restrictions apply.*

The OILCO 2000 Series is offered in carbon steel, stainless steel T-316 and aluminum. Packing seal material is Buna-N (standard) but Viton, Teflon®, Nitrile, Kalrez®, Chemrez®, EPDM and EPR are available. The 2000 Series has a wide range of availability – 2" through 12". And all styles are available in threaded, flanged, and butt weld connections.

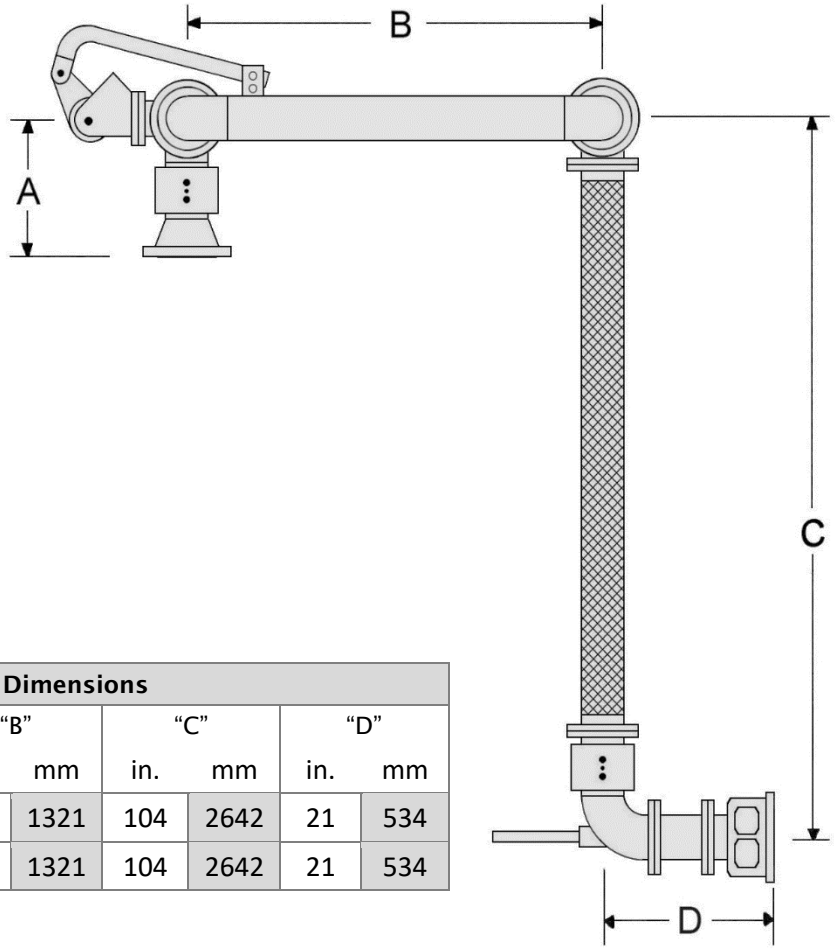
- GUARANTEED FOR LIFE
- UNPARALLELED RANGE
- EFFORTLESS TORQUE

Model 704-F

Horizontal Style Flexible Hose Bottom Loading Assembly

The Model 704-F is a horizontal bottom loader engineered for short range, cramped space. Staggering the hose length and inlet connection riser positioning can allow for crossover conditions. The limited 30º up or down angle is suited for less than adequate roof heights or vertical operational space. Standard equipment and common options include:

- Standard optional outlet swivel is a Style 30 with straight handle (upgrades available)
- Carbon steel, stainless steel & aluminum materials of construction
- Standard seals are Viton “A” - various rubber and rigid compounds available
- Offered with 80 Series “o” ring swivels (90 Series “v” ring upgrades available)
- Outlet swivel, spacer spool, and API coupler are additional optional equipment
- Stainless Steel braided hose standard, composite material available by request
- Custom dimensions and configurations can be manufactured per customer design



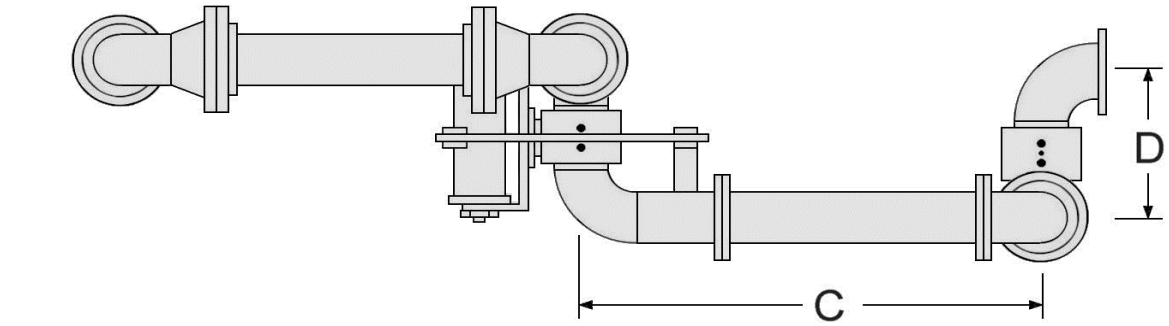
Standard Dimensions									
Size		“A”		“B”		“C”		“D”	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
3”	76	10.2	259	52	1321	104	2642	21	534
4”	102	11.6	295	52	1321	104	2642	21	534

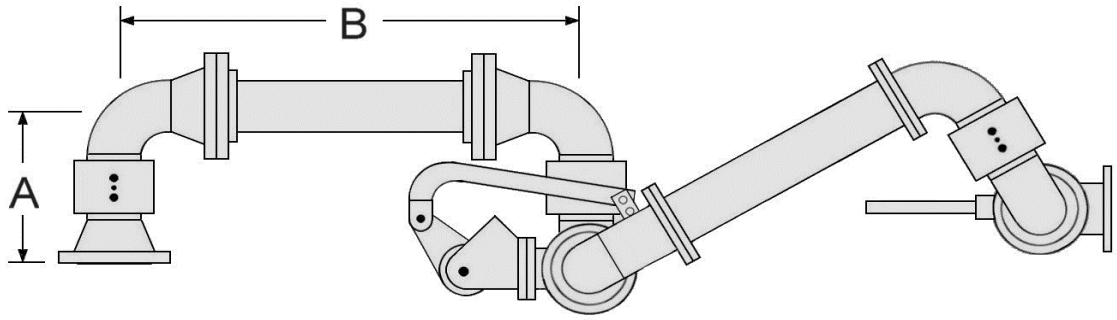
Model 752-F

Horizontal Bottom Transfer Loading Assembly

The Model 752-F is a low profile horizontal transfer system designed for railcar / aviation loading and unloading. It can also be utilized in compact spaces or as a replacement for ground based hose loading. Five planes of internal rotation allows for complete coverage in either up or downfeed intermediate swivel joint arrangements. Standard equipment and common options include:

- Carbon steel, stainless steel & aluminum materials of construction
- Standard seals are Viton “A” - various rubber and rigid compounds available
- Offered with 80 Series “o” ring swivels (90 Series “v” ring upgrades available)
- Outlet spacer spool, and API coupler are additional optional equipment
- The secondary arm can be mounted in an upfeed or downfeed position as required
- Multiple assemblies at varying heights can be used to maximize crossover conditions





Standard Dimensions									
Size		“A”		“B”		“C”		“D”	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
2”	51	9.4	239	66	1676	20	508	66	1676
3”	76	10.6	269	66	1676	24	610	66	1676
4”	102	13.8	351	66	1676	26	660	66	1676

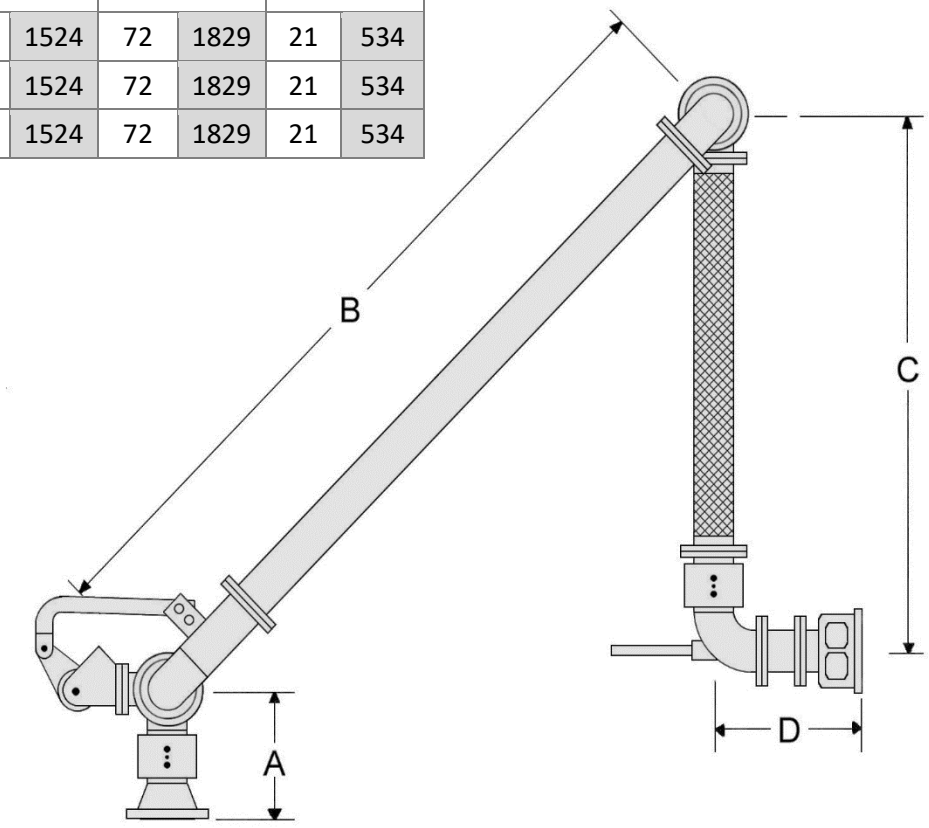
Model 754-F

Flexible Hose "A-Frame" Bottom Loading Assembly

The Model 754-F is the most common bottom loader in service across the globe. The design and configuration conforms to current API envelope standards, and the realization of varying riser heights allows for multiple loading assemblies in crossover conditions and can store in a limited out-of-service space. Standard equipment and common options include:

- Outlet swivel, spacer spool, and API coupler are additional optional equipment
- Standard optional outlet swivel is a Style 30 with straight handle (upgrades available)
- Carbon steel, stainless steel & aluminum materials of construction
- Standard seals are Viton "A" - various rubber and rigid compounds available
- Offered with 80 Series "o" ring swivels (90 Series "v" ring upgrades available)
- The 2" loader is standard with threaded connections beyond the inlet flange
- Stainless Steel braided hose standard, composite material available by request
- Custom dimensions and configurations can be manufactured per customer design

Standard Dimensions									
Size		"A"		"B"		"C"		"D"	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
2"	51	9.1	231	60	1524	72	1829	21	534
3"	76	10.2	259	60	1524	72	1829	21	534
4"	102	11.6	295	60	1524	72	1829	21	534



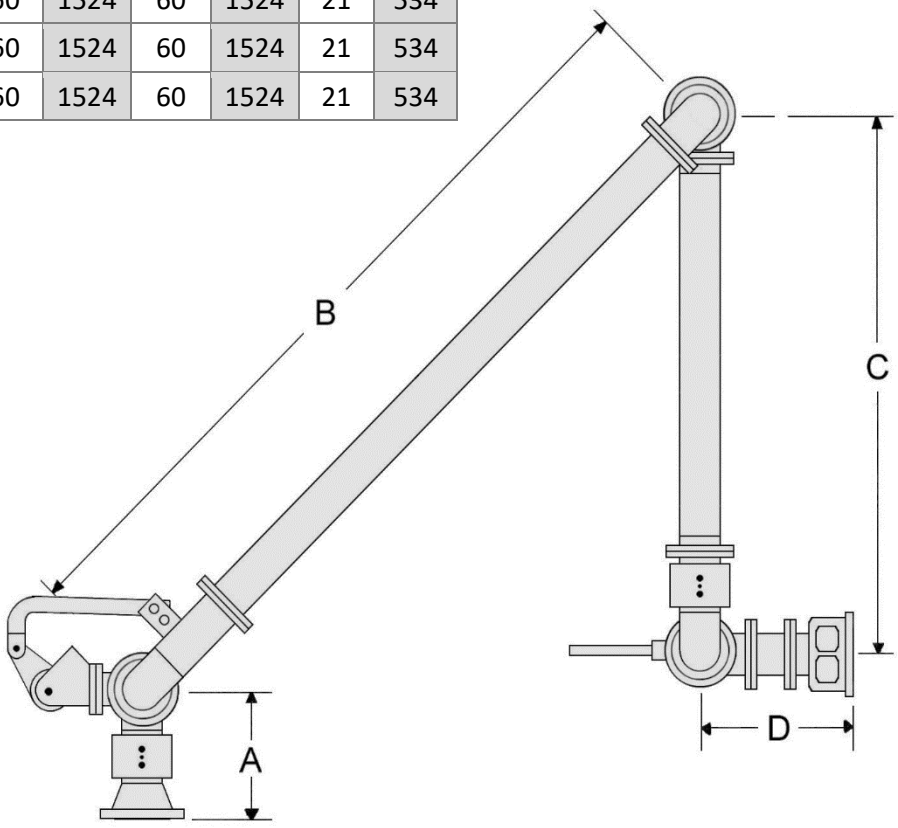
Model 754-FR

Rigid Style "A-Frame" Bottom Loading Assembly

The Model 754-FR is a rigid style bottom loader and conforms to current API envelope standards. Varying riser heights allows for multiple loading assemblies in crossover conditions. The loader can also be utilized as a redundant vapor return line. Standard equipment and common options include:

- Standard outlet swivel is a Style 50 with straight handle
- Carbon steel, stainless steel & aluminum materials of construction
- Standard seals are Viton "A" - various rubber and rigid compounds available
- Offered with 80 Series "o" ring swivels (90 Series "v" ring upgrades available)
- Outlet spacer spool, and API coupler are additional optional equipment
- The 2" loader is standard with threaded connections beyond the riser swivel joint
- Custom dimensions and configurations can be manufactured per customer design

Standard Dimensions									
Size		"A"		"B"		"C"		"D"	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
2"	51	9.1	231	60	1524	60	1524	21	534
3"	76	10.2	259	60	1524	60	1524	21	534
4"	102	11.6	295	60	1524	60	1524	21	534

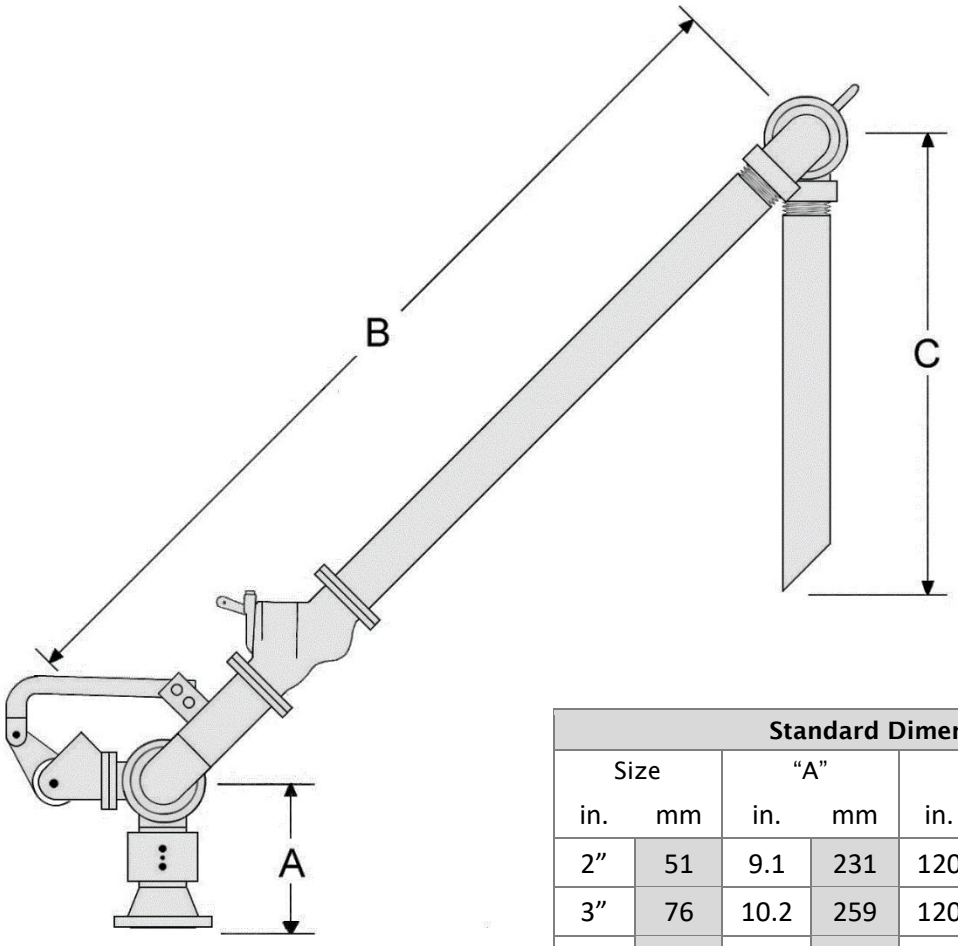


Model 755-F

Fixed Reach Top Loading Assembly

The Model 755-F is the most basic top loading arm available in the standard production line. A fixed position arm, this top loader can be used with or without a deadman valve to further simplify the project. Standard equipment and common options include:

- Standard seals are Viton “A” - various rubber and rigid compounds available
- Carbon steel, stainless steel & aluminum materials of construction
- Offered with 80 Series “o” ring swivels (90 Series “v” ring upgrades available)
- The outboard drop tube can be replaced with a stainless steel braided hose and union
- A remote control handle assembly for apex manipulation is available
- Custom dimensions and configurations can be manufactured per customer design



Standard Dimensions							
Size		“A”		“B”		“C”	
in.	mm	in.	mm	in.	mm	in.	mm
2”	51	9.1	231	120	3048	48	1219
3”	76	10.2	259	120	3048	48	1219
4”	102	11.6	295	120	3048	48	1219

Model 756-F

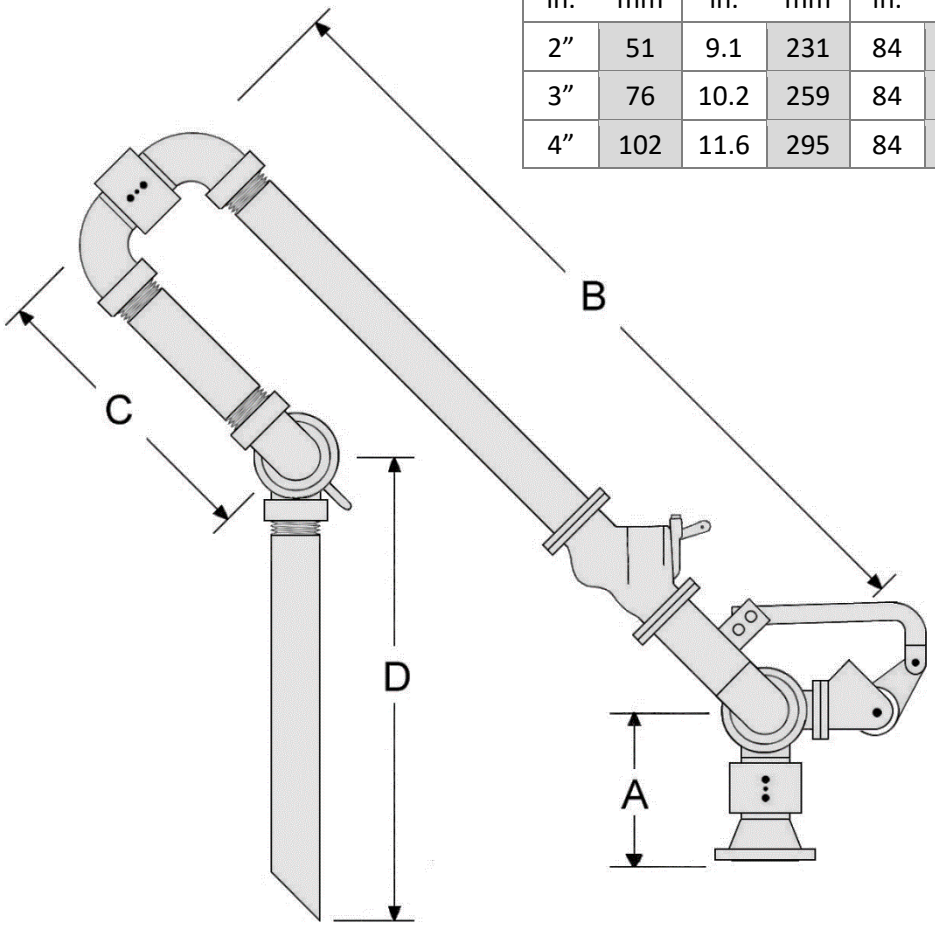
Pantograph Style Top Loading Assembly

The Model 756-F is the most versatile dry line top loading assembly offered to the petroleum industry. With a multi-point rotation configuration, the extension range can be up to 9' 6" on standard equipment. Should additional reach be required, the customer can upgrade to the Model 1156-F. Standard equipment and common options include:

- Standard seals are Viton "A" - various rubber and rigid compounds available
- Carbon steel, stainless steel & aluminum materials of construction
- Offered with 80 Series "o" ring swivels (90 Series "v" ring upgrades available)
- The outboard drop tube can be replaced with a stainless steel braided hose and union
- A remote control handle assembly for apex manipulation is available
- Custom dimensions and configurations can be manufactured per customer design

Standard Dimensions

Size		"A"		"B"		"C"		"D"	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
2"	51	9.1	231	84	2134	24	610	48	1219
3"	76	10.2	259	84	2134	24	610	48	1219
4"	102	11.6	295	84	2134	24	610	48	1219



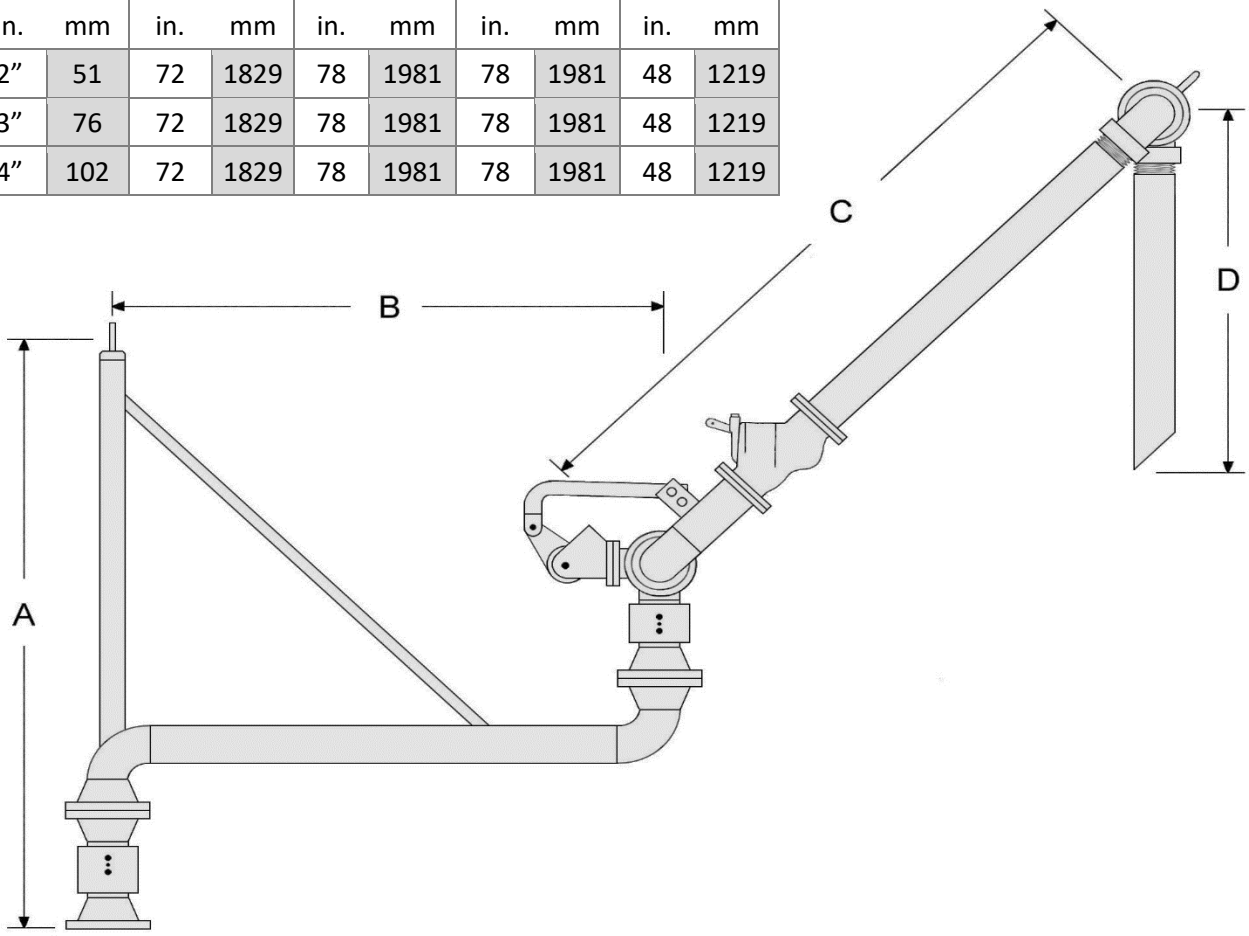
Model 762-F

Supported Boom Type Top Loading Assembly

The Model 762-F is a boom style loading arm design with a fixed-point support system perpendicular to the riser connection point. Utilizing the rigid frame boom arrangement, the Model 762-F can be used to reached extended range tank lids. Due to the pillow block tie-in, this loading arm can carry addition moment loads for heavy duty operation. Standard equipment and common options include:

- Standard seals are Viton “A” - various rubber and rigid compounds available
- Carbon steel, stainless steel & aluminum materials of construction
- A 90 Series “v” ring riser is standard, but tapered bearing and split flanges are available
- The outboard drop tube can be replaced with a stainless steel braided hose and union
- A remote control handle assembly for apex manipulation is available
- Custom dimensions and configurations can be manufactured per customer design

Standard Dimensions									
Size		“A”		“B”		“C”		“D”	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
2”	51	72	1829	78	1981	78	1981	48	1219
3”	76	72	1829	78	1981	78	1981	48	1219
4”	102	72	1829	78	1981	78	1981	48	1219



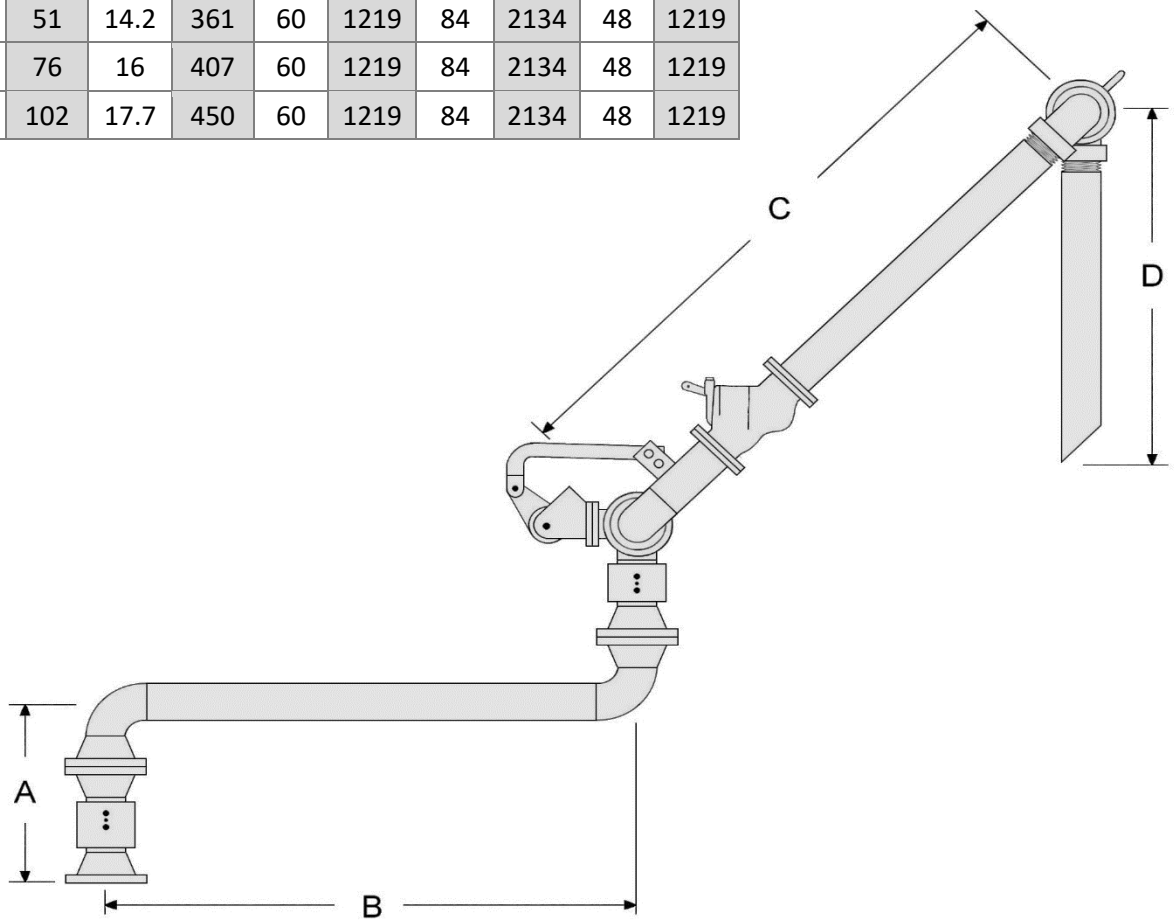
Model 763-F

Unsupported Boom Type Top Loading Assembly

The Model 763-F is the long-range option where a fully supported structure is beyond the design scope. Utilizing heavy duty riser upgrades, the Model 763-F carries near equal moment loads and span a coverage area similar to the fixed boom. Standard equipment and common options include:

- Standard seals are Viton “A” - various rubber and rigid compounds available
- Carbon steel, stainless steel & aluminum materials of construction
- Offered with 90 Series “v” ring riser swivel joint as standard
- The riser can be upgraded to either the 857 or 2000 Series units for higher load carrying
- A remote control handle assembly and hose outlet options are available
- Custom dimensions and configurations can be manufactured per customer design

Standard Dimensions									
Size		“A”		“B”		“C”		“D”	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
2”	51	14.2	361	60	1219	84	2134	48	1219
3”	76	16	407	60	1219	84	2134	48	1219
4”	102	17.7	450	60	1219	84	2134	48	1219



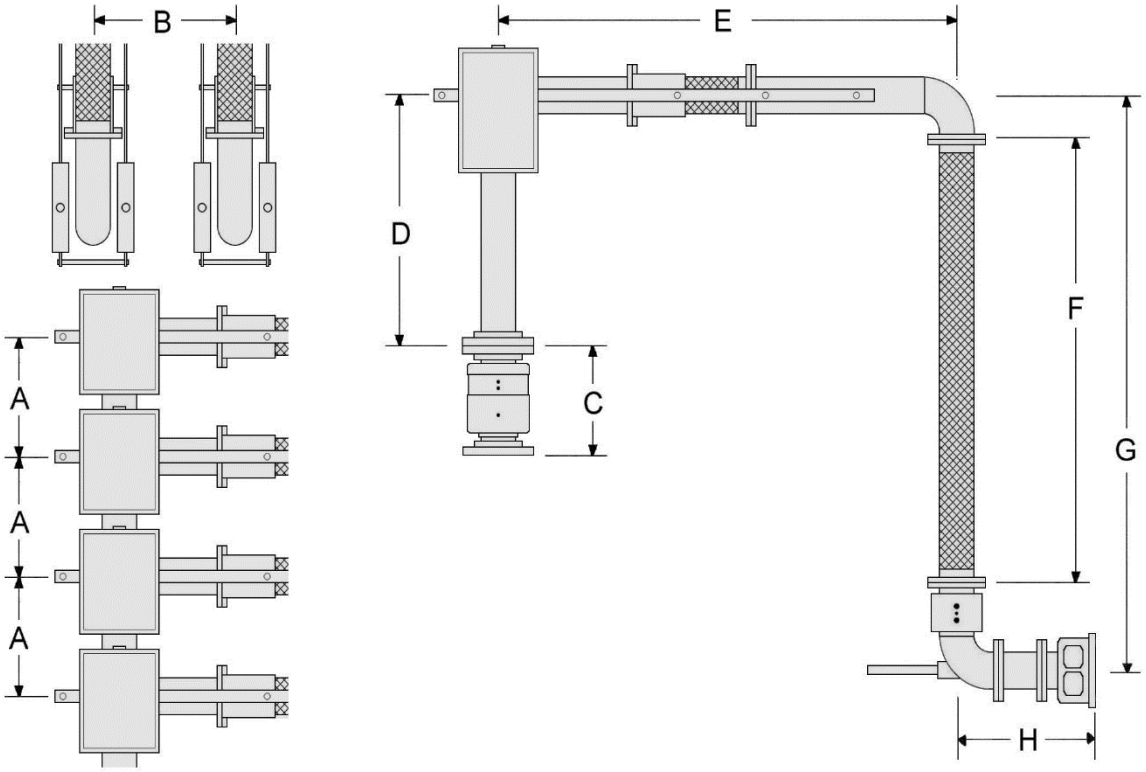
Model 773-F

Sliding Weight Overhead Reach Bottom Loading Assembly

The Model 773-FCW is a flexible hose bottom loader utilizing traditional ballast-type balancing slide weights. This design allows for close riser spacing and minimal rear bulk. Vertical heights can be staggered for crossover and the 114" reach conforms to the API RP-1004 operation envelope, all within a slim horizontal orientation geometry. Standard equipment and common options include:

- Standard seals are Viton "A" - various rubber and rigid compounds available
- Carbon steel, stainless steel braided hose & aluminum materials of construction
- Drop hoses can be replaced to meet various waterway regulations
- The hollow shell counterweight uses lead shot and a sliding lock to place the weights in a forward or rear position to insure greater coupling ability and operation.
- The Model 857-F is the recommended riser swivel, but can be upgraded to a 2000 Series

Standard Dimensions								
	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"
in.	14.38	38	114	80	98.63	21	18	16
mm	365	965	2896	2032	2505	533	457	406

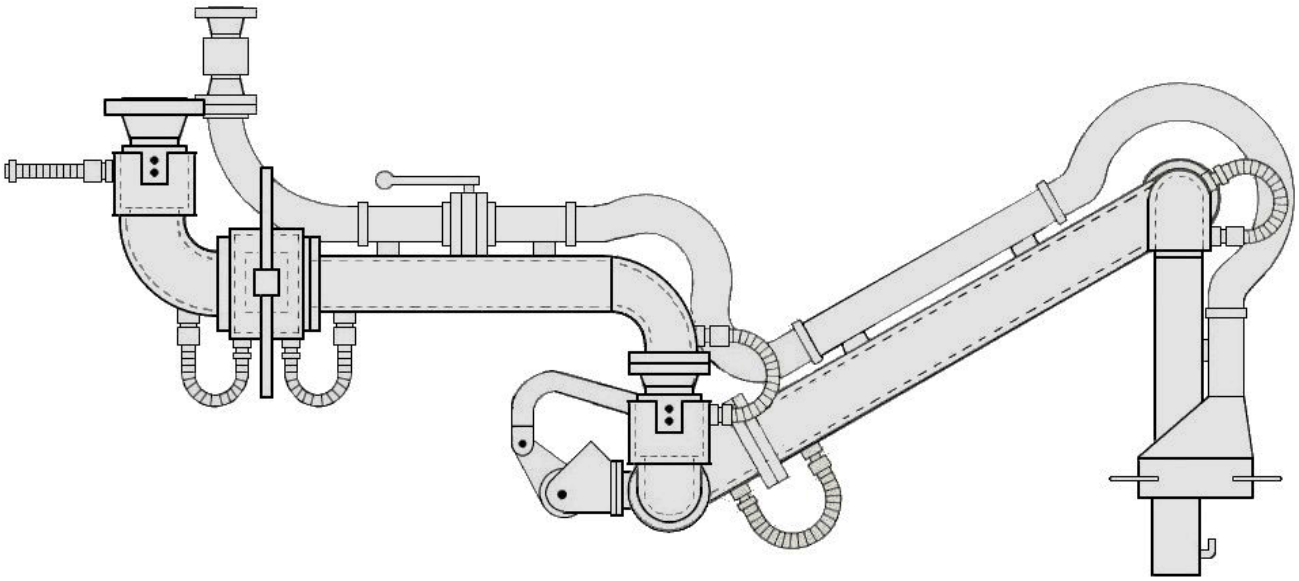


Model 774-FSJ

Steam Jacketed Top Loading Assembly

The Model 774-FSJ is the only production line loading assembly offered to the industry with a standard 100% coverage jacketing system offered by petroleum equipment manufacturers. It can be designed as a short range unsupported boom or employ a pillow block connection and increase range with a supported structure. The fittings are long radius with obstruction free internals to allow the unit to be piggable for cleaning procedures. Standard equipment and common options include:

- Carbon steel construction with stainless steel braided jump hoses are standard
- Packing chambers are all triple v-ring and spring energized for normal wear
- Viton “A” packing seals are standard with higher temperature rated seals available
- Incorporated product and steam valves can be included where required
- Plan and orientation can be adjusted for riser position and alignment needs
- Custom dimensions and configurations can be manufactured per customer design



Steam Chamber Pressure Rating	150 p.s.i.
Packing Seal Pressure Rating	500 p.s.i.
Packing Seal Temperature Rating	600°F max.

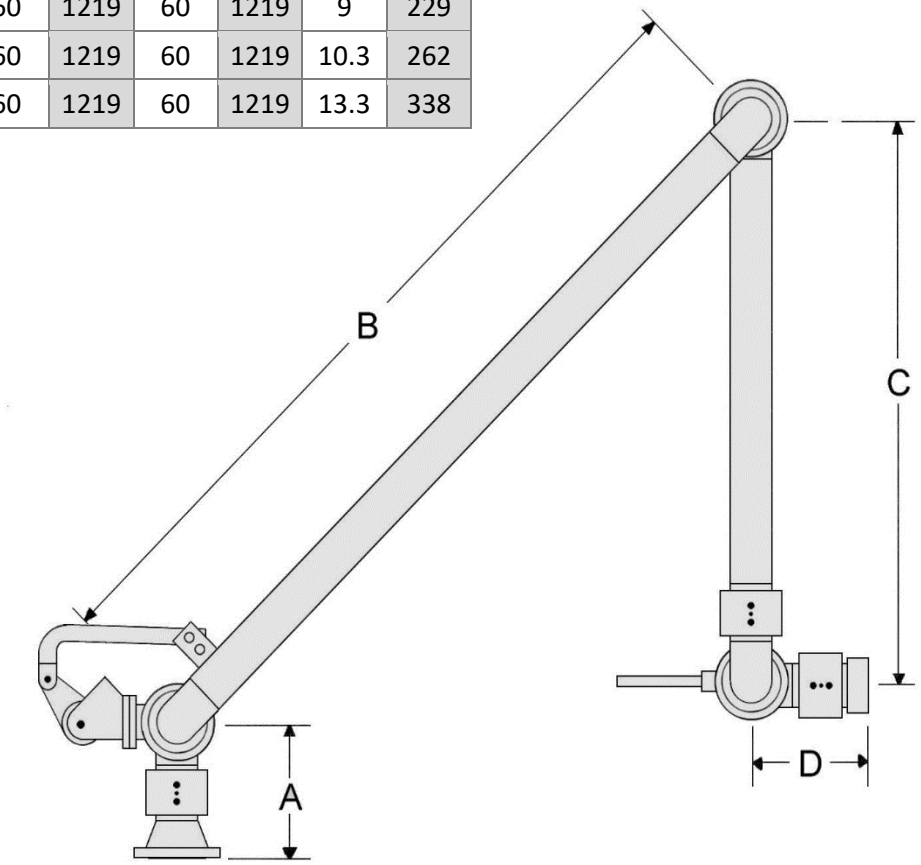
Model 786-LPG

Liquefied Petroleum Gas Bottom Loading Assembly

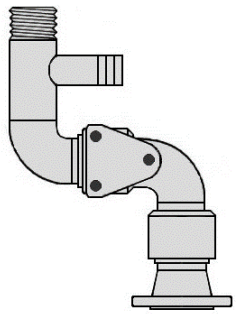
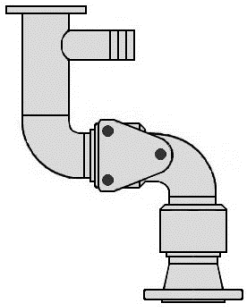
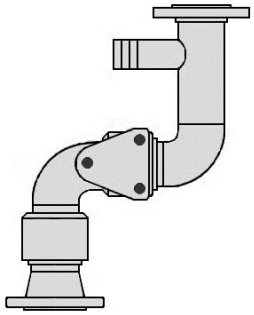
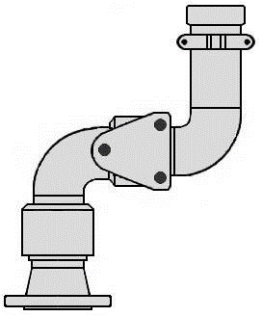
The Model 786-LPG is a traditionally designed loader for liquid petroleum gas operations. Engineered specifically for its service, the 786-LPG is manufactured with seamless schedule 40 pipe, 300# ANSI inlet and 3000# NPT outlet. Standard equipment and common options include:

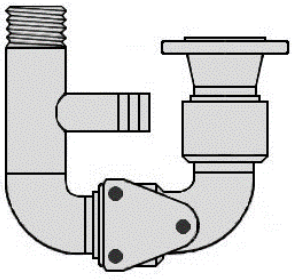
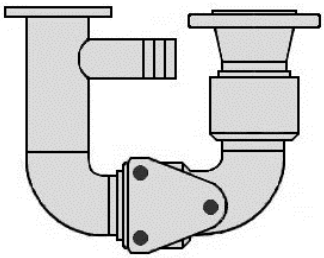
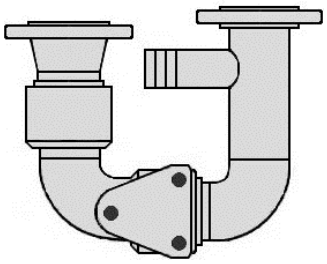
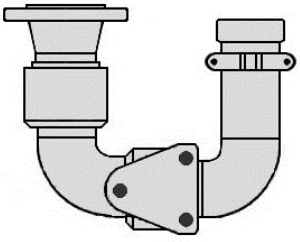
- Factory standard 100% full penetration on all weld points
- Standard seals are Viton “A” - various rubber and rigid compounds available
- Materials of construction are either carbon steel or stainless steel
- Incorporated 90 Series “V” ring swivel joints provide maximum seal surface contact
- Custom dimensions and configurations can be manufactured per customer design

Standard Dimensions									
Size		“A”		“B”		“C”		“D”	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
2”	51	14.2	361	60	1219	60	1219	9	229
3”	76	16	407	60	1219	60	1219	10.3	262
4”	102	17.7	450	60	1219	60	1219	13.3	338

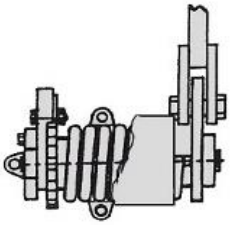


OILCO Liquid Handling Systems manufactures each of the major base configurations of swivel joints in conjunction with the torsion spring counterbalance. Each unit (the Model 641, the Model 640, and the Model 645) is available for mounting on every style 50 or style 70 swivel joint. Every swivel joint configuration is also available with any number of inlet and outlet combinations; male threaded, flanged, or female half coupling. OILCO can design the counterbalance swivel joint units to be piggable (as seen to the right in the steam jacketed model), welded construction, or engineered to required specifications by the customer to meet project needs. The versatility of the OILCO 600 Series torsion spring counterbalance is undeniable.

UPFEED COUNTERBALANCE SWIVEL JOINTS			
			
LEFT HAND PLAN 150# RF INLET X MALE NPT 640/645 MOUNTING	LEFT HAND PLAN 150# RF INLET X TTMA 640/645 MOUNTING	RIGHT HAND PLAN 150# RF INLET X 150# RF 640/645 MOUNTING	RIGHT HAND PLAN 150# RF INLET X FEMALE NPT 641 MOUNTING

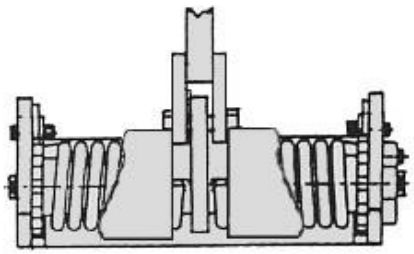
DOWNFEED COUNTERBALANCE SWIVEL JOINTS			
			
LEFT HAND PLAN 150# RF INLET X MALE NPT 640/645 MOUNTING	LEFT HAND PLAN 150# RF INLET X TTMA 640/645 MOUNTING	RIGHT HAND PLAN 150# RF INLET X 150# RF 640/645 MOUNTING	RIGHT HAND PLAN 150# RF INLET X FEMALE NPT 641 MOUNTING

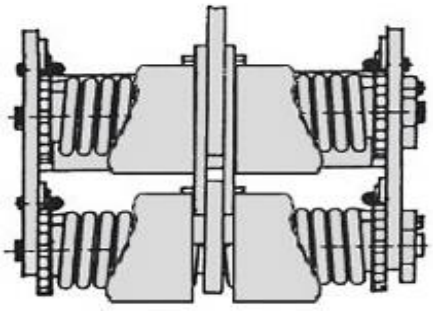
Each counterbalance riser swivel joint is associated with a torsion spring counterbalance assembly.
Consult factory regarding configuration requirements and project specifications.



The **Model 641 Torsion Spring Counterbalance** is a single spring balance design suited for smaller diameter or shorter reach loading assemblies to be easily lowered to the loading position. The unit automatically stays down when moved below the horizontal position and can then be raised easily to the horizontal position from where it will return to the desired out of service position. The Model 641 is built as a dedicated left or right hand profile, depending upon the project orientation and can be utilized with either an upfeed or downfeed riser position.

The **Model 640 Torsion Spring Counterbalance** double spring balance design is the workhorse of the torsion offerings. As with all 600 Series counterbalances, the unit can be adjusted to regulate the speed and return to the vertical or semi-vertical position by a unique internal snubber springs. The Model 640 has a 10,000 in/lbs moment load rating in its beefiest form allowing it to cover all extended reach 3" and a gallery of 4" configurations. Utilizing a center mount position, the 640 will operate on left or right hand plans without any change over.





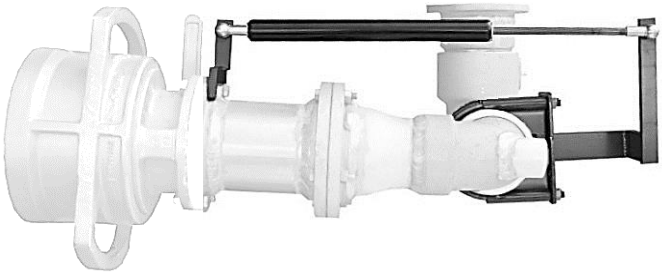
The **Model 645 Torsion Spring Counterbalance** is a 'double-over-double' spring balance design employing a twin bank of torsion springs. The Model 645 offers the maximum counterbalancing capability in the series. To accommodate varying heavy weight assemblies the uppers and lowers can be constructed with combination sets of "D" or "P" springs in order to carry the operational load in a balanced condition.

Model	Torque Output (at 100º deflection)
641-DC	*3,000 in / lbs.*
641-PC	*5,000 in / lbs.*
640-DC	*6,000 in / lbs.*
640-PC	*10,000 in / lbs.*
645-DC	*12,000 in / lbs.*
645-D/PC	*16,000 in / lbs.*
645-PC	*20,000 in / lbs.*

Model 5300-B

Snap-On Type, API Dry Break Coupler

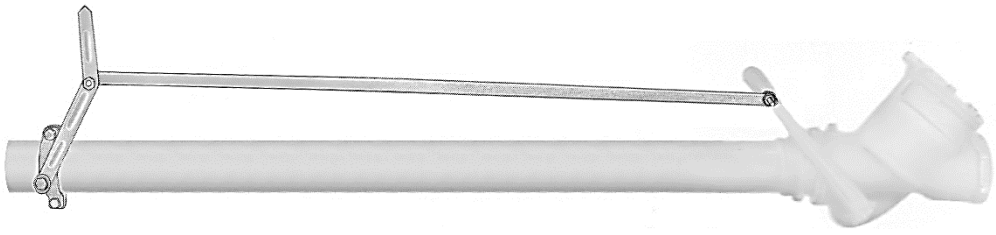
A 4” TTMA, five cam design for simple alignment and peak performance, RP-1004:2003 compliant. Removable seal offers Buna-N, Viton-B or Viton GFLT options. Easy ball type main handle for simple operation. Flow rate offers up to 600 GPM and 150 psi maximum working pressure. Hard coat anodized aluminum (AL 356 T6)



Model 258-GS

Outboard Horizontal Leveling Assembly

An optional outboard leveling assembly designed to assist bottom loading. In the out of service resting position, the coupler is maintained in a relatively secure horizontal position, effectively preventing any portion of the loading assembly to come in contact with the service island.



Model ‘A’ Valve Control Lever

This remote-control assembly may be supplied on any standard top loading assembly to provide valve control at the load point by the operator. The assembly can be adapted to 2”, 3” and 4” pipe sizes.

O-Ring Repair Kits

All OILCO o-ring series swivel joints have available replacement seals and repair kits for units in 2” through 4” sizes.

V-Ring Repair Kits

All OILCO v-ring series swivel joints have available replacement seals and complete repair kits for units in 2” through 24” sizes in standard or split flange versions.

Model 883-ANF-X

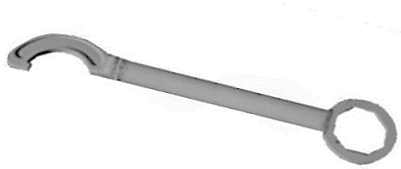
The Model 883-ANF-X is the long radius version of the standard 4” aluminum cast unit with a center elbow mounted boss for handles. TTMA flanged ends.

Model 40-A

The Model 40-A drop pipe is the most commonly used outboard option for top loaders. Available in 2”, 3” and 4” sizes. Male NPT threaded end with 45º cutoff . 48” overall length standard.

Model 40-AM

The Model 40-AM drop pipe is used both as a drop leg or secondary tube. Available in 2”, 3” and 4” sizes. Male NPT threaded end connections. 48” overall length standard.



Model 640-W

The Model 640-W adjustment wrench is utilized for all OILCO designed torsion spring counter-balance assemblies.

Model 66-ANF

The Model 66-ANF is an aluminum spacer spool designed for the outboard end of a load arm. Overall length is 6” with TTMA flanged connections.

Model 66-ANFG

The Model 66-ANFG is an aluminum spacer spool with sheer groove designed for the outboard end of a load arm. Overall length is 6” with TTMA flanged connections.

Type ‘D’ Handle

The type ‘D’ handle is a shovel style version replacement for the straight pipe connections offered as standard equipment on loading assemblies.

Model 18

The Model 18 elbow handle assembly is designed for ease of use where shot downspouts are required. Available in aluminum in 2”, 3” and 4” female NPT.

Model 19

The Model 19 vacuum breaker is 3/8” NPT brass with a Viton disc or chrome plated brass with Kalrez disc. The Model 19-A is an aluminum version with a Viton disc available with 1/2" NPT.

Model 25

The aluminum Model 25 circular flow deflector can be bored to fit or threaded to either 2”, 3” or 4” drop pipe sizes.

Model 26

The aluminum Model 26 strainer type end cap can be bored to fit or threaded to either 2”, 3” or 4” drop pipe sizes.

Model 33

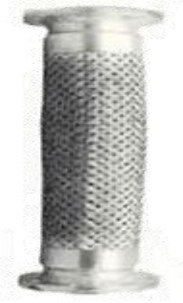
The aluminum Model 33 tee deflector can be bored to fit or threaded to either 2”, 3” or 4” drop pipe sizes.

Model 88T

The vertical support pillow block and cap is available for loading assemblies utilizing 3” and 4” boom structures.

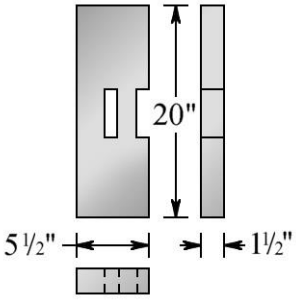
Model 89T

The horizontal support pillow block and cap is available for loading assemblies utilizing 3” and 4” boom structures.



Model 773-HJ

A flexible stainless steel hinge hose with carbon steel TTMA flanged connections. Designed and tested for a 200,000 motion duty cycle. Available in 4” size.

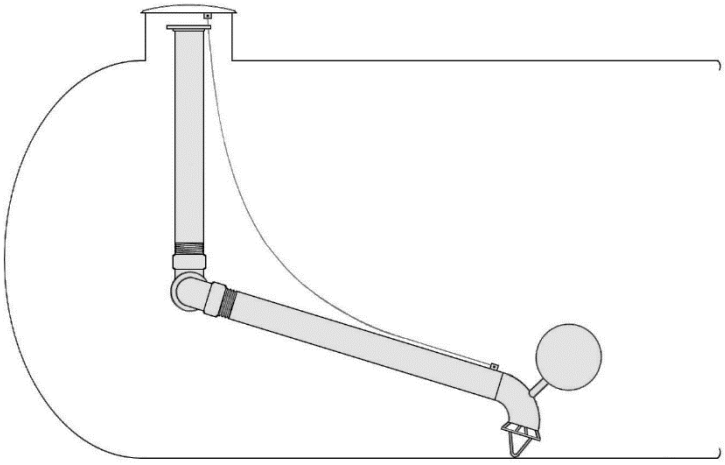


Model CWT-S1

The horizontal support pillow block and cap is available for loading assemblies utilizing 3” and 4” boom structures.

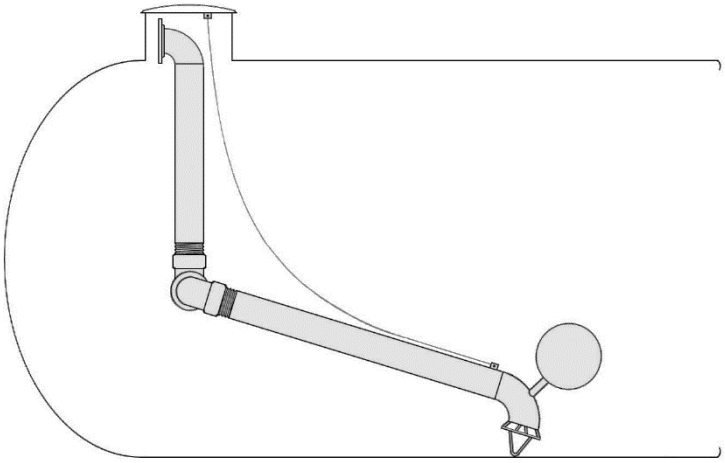
Type “A” Floating Suction Assembly

- Ensures clean product delivery by drawing from near the surface of the tank.
- Utilized in either buried or above ground tanks.
- Permanently sealed dual raceway swivel joints.
- Available in aluminum, carbon steel and stainless steel construction materials.
- Packing seal material is standard Buna-N
- All connections are flanged and/or threaded
- Primary arm is 69” long for a standard 10’ 6” diameter tank configuration. Straight inlet and vertical pipe. Single Float Design.



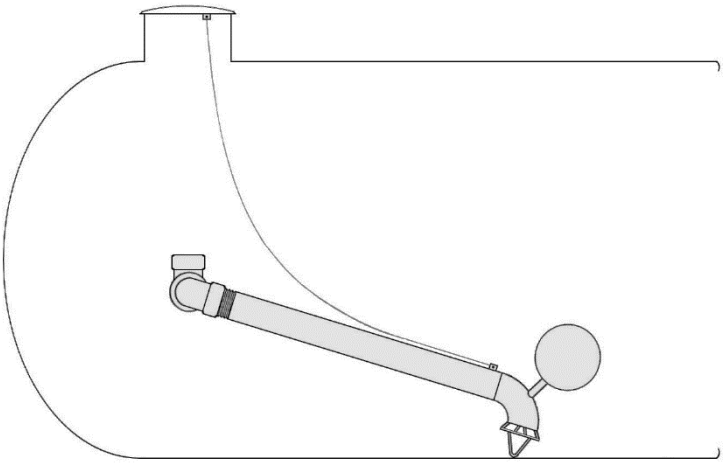
Type “B” Floating Suction Assembly

- Ensures clean product delivery by drawing from near the surface of the tank.
- Utilized in either buried or above ground tanks.
- Permanently sealed dual raceway swivel joints.
- Available in aluminum, carbon steel and stainless steel construction materials.
- Packing seal material is standard Buna-N
- All connections are flanged and/or threaded, per customer specifications.
- Primary arm is 69” long for a standard 10’ 6” diameter tank configuration. 90º inlet and vertical pipe. Single Float Design.



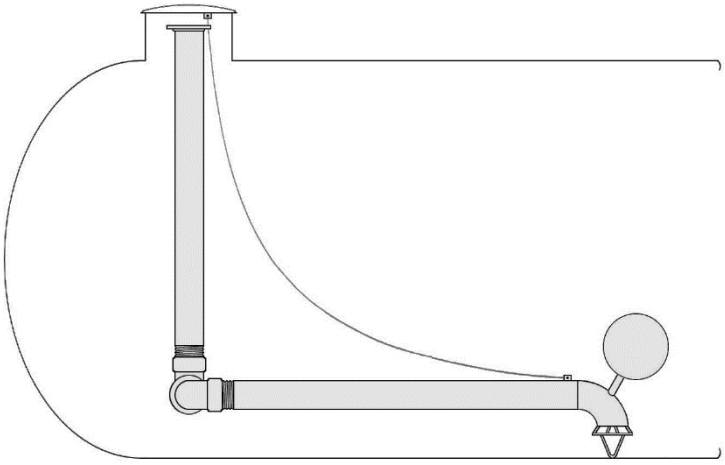
Type “C” Floating Suction Assembly

- Ensures clean product delivery by drawing from near the surface of the tank.
- Utilized in either buried or above ground tanks.
- Permanently sealed dual raceway swivel joints.
- Available in aluminum, carbon steel and stainless steel construction materials.
- Packing seal material is standard Buna-N
- All connections are flanged and/or threaded, per customer specifications.
- Primary arm is 69” long for a standard 10’ 6” diameter tank configuration. No vertical pipe. Single Float Design.



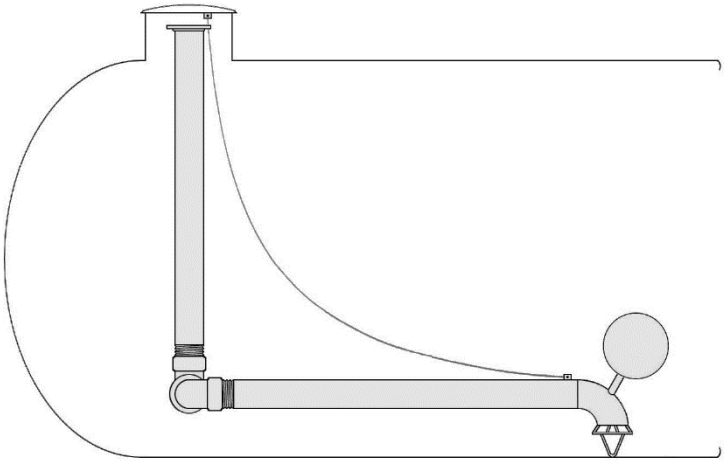
Type “D” Floating Suction Assembly

- Ensures clean product delivery by drawing from near the surface of the tank.
- Utilized in either buried or above ground tanks.
- Permanently sealed dual raceway swivel joints.
- Available in aluminum, carbon steel and stainless steel construction materials.
- Packing seal material is standard Buna-N
- All connections are flanged and/or threaded
- Primary arm is 120” long for a standard 10’ 6” diameter tank configuration. Straight inlet and vertical pipe. Single Float Design.



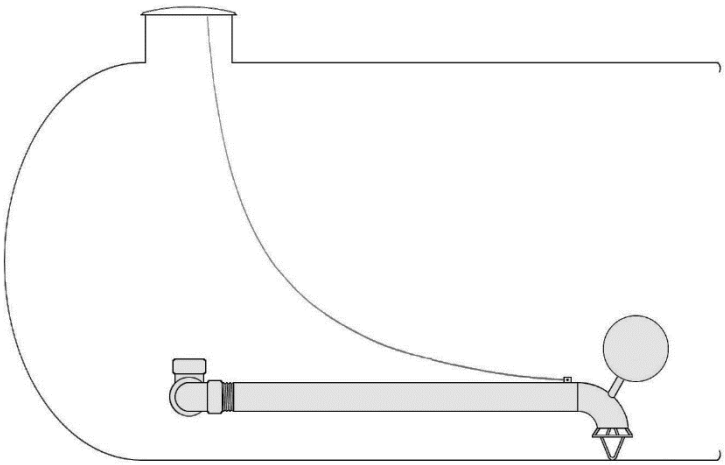
Type “E” Floating Suction Assembly

- Ensures clean product delivery by drawing from near the surface of the tank.
- Utilized in either buried or above ground tanks.
- Permanently sealed dual raceway swivel joints.
- Available in aluminum, carbon steel and stainless steel construction materials.
- Packing seal material is standard Buna-N
- All connections are flanged and/or threaded, per customer specifications.
- Primary arm is 120” long for a standard 10’ 6” diameter tank configuration. 90º inlet and vertical pipe. Single Float Design.



Type “F” Floating Suction Assembly

- Ensures clean product delivery by drawing from near the surface of the tank.
- Utilized in either buried or above ground tanks.
- Permanently sealed dual raceway swivel joints.
- Available in aluminum, carbon steel and stainless steel construction materials.
- Packing seal material is standard Buna-N
- All connections are flanged and/or threaded, per customer specifications.
- Primary arm is 120” long for a standard 10’ 6” diameter tank configuration. No vertical pipe. Single Float Design.



Fluid	Metal			Seal Material				
Key: A = Excellent B = Good C = Fair / Poor D = Not Recommended Blank = Insufficient Data	Aluminum	Carbon Steel	Stainless Steel	Buna-N	Viton	EPR Rubber	Butyl	Teflon
Acetate Solvents	A	A	A	D	D	D	D	A
Acetic Acid, aerated	B	D	A	C	C	B		A
Acetic Acid, Air Free	B	D	B	C	D	B		A
Acetic Acid, crude	C	C	B	D	D	B	B	A
Acetic Acid, glacial	A	D	A	B	D	B	B	A
Acetic Acid, pure	B	D	B	D	D	B	B	A
Acetic Acid, 10%	B	C	B	D	D	B	B	A
Acetic Acid, 80%	B	C	B	D	D	C		A
Acetic Acid Vapors	B		D	D	D	C	D	A
Acetone	A	A	A	D	D	A	A	A
Acetylene	A	A	A	B	A	A	A	A
Acrylonite	B	B	A	D	C	D	D	A
Alcohol, Amyl	A	B	A	B	B	A	A	A
Alcohol, Butyl	A	B	A	A	A	B	B	A
Alcohol, Ethyl	B	B	A	B	B	A	A	A
Alcohol, Isopropyl	B	B	B	B	A	A	A	A
Alcohol, Methyl	B	C	A	B	D	B	B	A
Alcohol, Propyl	A	B	A	B	A	A	A	A
Aluminum Chloride	C	C	B	A	A	A	A	A
Aluminum Flouride	C	D	C	A	A	A	A	A
Aluminum Potassium Sulfate	D		B	B	B	B		A
Aluminum Sulfate	C	D	B	A	A	A		A
Ammonia, Anhydrous Liquid	B	A	A	B	D	A	A	A
Ammonia, Aqueous	B	A	A	B	B	B	B	A
Ammonia, Gas, hot	B		A	C	D	B	B	A
Ammonia Solutions	B	B	A	B	D	A	A	A
Ammonium Chloride	C	C	B	B	A	A	A	A
Ammonium Hydroxide 28%	C	B	B	B	C	B	B	A
Ammonium Hydroxide (concentrate)	C	C	B	D	C	B	B	A
Ammonium Nitrate	B	D	A	A	B	A	A	A
Ammonium Phosphate	C	D	B	A	A	A	A	A
Ammonium Phosphate, Di-basic	B	D	B	A	D	A	A	A
Ammonium Sulfate	C	C	B	A	D	A	A	A
Aniline	C	C	B	D	C	B	B	A
Asphalt Liquid	C	B	A	C	A	D	D	A
Barium Chloride	D	C	B	A	A	A	A	A
Barium Hydroxide	D	C	B	A	A		A	A
Barium Sulfide	D	C	B	A	A	A	A	A
Benzene (Benzol)	B	B	B	D	B	D	D	A
Benzine	*See Petroleum Ether*							
Borax (Sodium Borate)	C	C	A	B	A	A	A	A
Boric Acid	B	D	B	B	A	B		A
Butadiene	B	B	A	C	B	D	D	A
Butane	A	B	B	B	B	D	D	D
Butyl Acetate	B	B	B	D	D	B	B	A
Butyl Stearate	B		B	B	A	D	D	A
Butylcellosolve	A	A	A	D	D	B	B	A
Butylene	A	A	A	C	B	D	D	A
Calcium Acetate	C		A	B	D	A	A	A
Calcium Bisulfite	C	D	B	A	A	D	D	A
Calcium Chloride	C	C	B	A	A	A	B	A
Calcium Hydroxide	D	C	B	A	A	A	A	A
Calcium Nitrate	C	B	A	B	B	B	B	A
Carbonic Acid	A	D	A	D	B	B	B	A
Carbonic Acid (Phenol)	A	D	B	D	B	C	C	A
Carbon Dioxide Dry	A	A	A	A	B	B	B	A
Carbon Disulphide	A	B	A	A	A	D	D	A
Carbon Tetrachloride, dry	B	B	A	B	A	D	D	A
Carbon Tetrachloride, Wet	D	D	B	C	B	D	D	A
Caustic Potash	D	D	B	B		B	B	A
Caustic Soda	D	B	A	C	B	B	B	A
Cellosolve	B	B	B	D	D	B	B	A
Cellulose Acetate	B		B	D	D	B	B	A
Chlorine Gas, dry	C	B	B	D	B	B	C	A
Chlorobromomethane		B	A	D	A	C	C	A

Fluid	Metal			Seal Material				
Key: A = Excellent B = Good C = Fair / Poor D = Not Recommended Blank = Insufficient Data	Aluminum	Carbon Steel	Stainless Steel	Buna-N	Viton	EPR Rubber	Butyl	Teflon
Chloroform, dry	D	B	A	D	B	D	D	A
Chromic Acid 50%	D	C	C	C	B	D	D	A
Citric Acid	B	D	A	B	A	A	A	A
Copper Acetate	D	C	A	B	D	A	A	A
Copper Cyanide	D		A	A	B	B		A
Copper Nitrite	D	D	B	A	A	B	B	A
Copper Sulfate	C	D	B	A	A	A	C	A
Cresote	B	B	A	A	A	D	D	A
Cresote Oil	B	B	B	C	A	D	D	A
Cresylic Acid	C	C	B	D	B	D	D	A
Cyclohexane	A	A	A	A	A	D	D	A
DDT	B	D	B	B	A	D	D	A
Detergents, synthetic	B		B	B	A	C		A
Dichloroethyl Ether (Chlorex)	B	B	B	D	C	C	C	A
Dowtherm	A	B	A	D	A	D		A
Ethane	A	C	B	A	A	D	D	A
Ethanol Amine	A	B	A	B	D	B	B	A
Ethers	A	A	A	D	C	C	C	A
Ethyl Acetate	A	B	B	D	D	B	B	A
Ethyl Cellulose	A	C	A	B	D	B	B	A
Ethyl Chloride, dry	B	B	A	B	B	B	B	B
Ethyl Chloride, wet	D	D	B	B	B	B	B	A
Ethylene Chloride	C		A	D	B	D	D	A
Ethylene Diamine	C	B	A	A	D	A	A	A
Ethylene Dichloride	D	B	A	D	B	C	C	A
Ethylene Glycol	A	B	B	A	A	A	A	A
Ethylene Oxide	B	B	B	D	C	C	C	A
Fatty Acids	B	D	A	B	A	C	C	A
Ferric Chloride	D	D	D	C	B	C	C	A
Ferric Sulfate	D	D	B	A	A	B	B	A
Formaldehyde, cold (Formalin)	A	A	A	B	D	B	B	A
Formaldehyde, hot (Formalin)	B	D	C	B	D	B	B	A
Formic Acid, cold	B	D	B	C	C	B	B	A
Formic Acid, hot	D	D	B	C	C	B	B	A
Freon Gas, dry	B	B	A	B	B	D	D	A
Freon 11, MF, 112, BF, 12, 13	B		A	B	B	D	D	A
Freon 21	B		A	D	D	D	D	A
Freon 22	A		A	D	D	B	B	A
Freon 113, TF	B		A	B	C	D	D	A
Fuel Oil	A	B	A	A	A	D	D	A
Furfural	A	A	A	D	D	B	B	A
Gas, Manufactured	B	B	B	A	A	C		A
Gas, Natural	B	B	A	A	A	C		A
Gas, Odorizers	A	B	B	B	A			A
Gasoline, Aviation	A	A	A	C	A	D	D	A
Gasoline, Leaded	A	A	A	B	A	D	D	A
Gasoline, Sour	A	B	A	B	A	D	D	A
Gasoline, Unleaded	A	A	A	B	A	D	D	A
Gelatin	A	D	A	A	A	A		A
Glucose	A	B	A	A	A	A	A	A
Glue	A	A	B	A	A	B		A
Glycerine (Glycerol)	A	C	A	A	A	A	A	A
Herbicides	*See specific chemical listing*							
Hexane	A	B	B	A	A	D		A
Hydraulic Oil, Petroleum Base	A	A	A	A	A	D	D	A
Hydrocyanic Acid	A	D	A	B	A	A	A	A
Hydrogen Gas, cold	A	B	A	B	A	A	A	A
Hydrogen Gas, hot	C	B	B	B		A	A	A
Hydrogen Peroxide, Concentrate	A	D	B	D	A	C	C	A
Hydrogen Peroxide, Dilute	A	D	B	B	A	B		A
Hydrogen Sulfide, Dry	A	B	A	C	D	A	A	A
Hydrogen Sulfide, Wet	B	C	B	D	D	A	A	A
Hypo (Sodium Thiosulfate)	B	D	A	A	A	B		A
Isobutyl Acetate	B	B	A	B	D	B	B	A
Isobutyl Alcohol	B	B	A	D	B	A	A	A

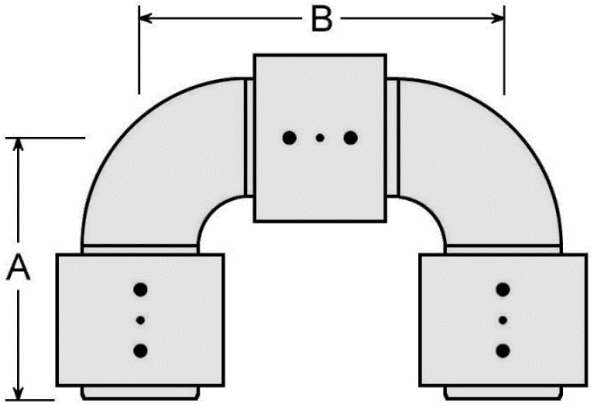
Fluid	Metal			Seal Material				
Key: A = Excellent B = Good C = Fair / Poor D = Not Recommended Blank = Insufficient Data	Aluminum	Carbon Steel	Stainless Steel	Buna-N	Viton	EPR Rubber	Butyl	Teflon
Iso-Butane	A	A	A	A	D	D	D	A
Iso-Butanol	A	B	A	A	B	B	B	A
Iso-Propanol	B	B	B	B	A	A	A	A
Iso-Propylamine	A	B	A		A	A	A	A
Isopropyl Acetate	A	B	B	D	B	B	B	A
Jet Fuels, P-4, P-5 and P-6	A	A	A	B	A	D	D	A
Kerosene	A	B	A	A	A	D	D	A
Lacquer (and solvent)	A	C	A	D	D	D	D	A
Lactic Acid, concentrated hot	C	D	B	D	B	D	D	A
Lactic Acid Dilute, cold	A	D	A	B	A	B	B	A
Lactic Acid Dilute, hot	B	D	A	C	D	C	C	A
Lime Sulphur Solutions	C	B	A	D	A	A	A	A
LPG	A	B	A	A	A	D	D	A
Magnesium Chloride	D	C	B	A	A	A		A
Magnesium Hydroxide	D	B	A	B	A	B		A
Magnesium Sulfate	D	B	A	A	A	B	B	A
Mercury	B	A	A	A	A	A	A	A
Methane	A	B	B	A	A	D	D	A
Methanol	B	C	A	B	D	B	B	A
Methyl Cellosolve	A	B	A	C	D	B		A
Methyl Chloride	D	B	A	D	B	D	D	A
Methyl Ethyl Keytone	A	A	A	D	D	A	A	A
Methyl Isobutyle Ketone	A	A	A	D	D	A	A	A
Mineral Oils	A	B	A	A	A	D	D	A
Naptha	A	B	B	B	A	D	D	A
Napthalene	B	B	B	D	A	D		A
Napthenic Acid	B	B	A	C	A	D	D	A
Natural Gas, Sour	B	B	A	A	A	D		A
Nickel Chloride	D	D	B	A	A	B	B	A
Nickel Sulfate	D	D	B	A	A	A	A	A
Nitric Acid 30%	D	D	A	C	B	B	B	A
Nitric Acid 80%	B	D	B	D	C	D	D	A
Nitric Acid 100%	B	D	A	D	C	D	D	A
Nitrobenzene	B	B	A	D	C	D	C	A
Nitrogen	A	A	A	A	A	A	A	A
Nitrogen Fertilizer Solutions	B		A	B	A	B	B	A
N. Octane	A	A	A	B	A	D	D	A
Octyl Alcohol	B	B	A	B	B	B	B	A
Oils, Petroleum Refined	A	A	A	A	A	D	D	A
Oils, Petroleum Sour	A	B	A	B	A	D	D	A
Oils, Water Mixture	A	B	A	A	A	D	D	A
Oleic Acid	B	C	B	C	B	D	D	A
Oleum	B	B	B	D	B	D	D	A
Oxalic Acid	C	D	B	C	A	B	B	A
Palmitric Acid	B	C	B	B	A	D	D	A
Perchlorethylene, dry	B	B	A	C	A	D	D	A
Pesticides	*See specific chemical listing*							
Petroleum Ether (Naptha)	A	A	A	A	A	D	D	A
Phenol	A	D	A	D	B	D		A
Phosphoric Acid 10%	D	D	B	B	B	B	B	A
Phosphoric Acid 50%	D	D	B	C	B	B	B	A
Phosphoric Acid 80%	D	B	A	C	B	B	B	A
Phosphoric Acid 85%	D	C	B	D	B	B	B	A
Phthalic Anhydride	B	C	B	C	A	C	C	A
Picric Acid	C	D	B	C	B	B	B	A
Potassium Acetate Solutions	D	B	A	B	D	A	B	A
Potassium Carbonate	D	B	B	A	A	B		A
Potassium Chloride	D	C	B	A	A	A	A	A
Potassium Cynate Solutions	B	D	A			B	B	A
Potassium Cyanide	D	B	B	A	A	A	A	A
Potassium Hydroxide, Dilute Cold	D	A	A	B	D	A	A	A
Potassium Hydroxide, Dilute Hot	D	B	A	B	D	A	A	A
Potassium Nitrite	A	B	B	A	A	A	A	A
Potassium Sulfate	A	B	A	A	A	A	A	A
Producer Gas	B	B	B	A	A	D	D	A

Fluid	Metal			Seal Material				
Key: A = Excellent B = Good C = Fair / Poor D = Not Recommended Blank = Insufficient Data	Aluminum	Carbon Steel	Stainless Steel	Buna-N	Viton	EPR Rubber	Butyl	Teflon
Propionic Acid 20%	B	D	B			A	A	A
Propylene	A	A	A	D	A	D	D	A
Propylene Diamine	B	B	A	D	D	D	D	A
Propylene Dichloride	C	B	B	D	B	D	D	A
Propylene Glycol	A	B	B	A	A	B	B	A
Propylene Oxide	B	B	B	D	D	B	B	A
Resins & Rosins	A	C	A	C	A			A
Rubber or Latex Emulsions	A	B	A		A			A
Shellac – bleached & orange	A	A	A	A	C	B		A
Silicone Fluids	B		B	B	B	B		A
Soap Solutions (Stearates)	C	A	A	A	A	A	A	A
Sodium Aluminate	D	C	B	A	A	A	A	A
Sodium Bicarboate	C	C	B	A	A	A	A	A
Sodium Bisulfate 10%	D	D	A	A	A	A	A	A
Sodium Borate	B	C	B	A	A	A	A	A
Sodium Carbonate (Soda Ash)	D	B	A	A	A	A	A	A
Sodium Chloride	D	C	B	A	A	B	B	A
Sodium Chronate	D	B	A	A	A	A	A	A
Sodium Cyanide	D	C	B	A	D	A	A	A
Sodium Hydroxide 20% Cold	D	A	A	B	B	A	A	A
Sodium Hydroxide 20% Hot	D	B	A	B	C	B	B	A
Sodium Hydroxide 50% Cold	D	A	A	B	C	A	A	A
Sodium Hydroxide 50% Hot	D	B	A	B	C	B	B	A
Sodium Hydroxide70% Cold	D	C	A	B	C	A	A	A
Sodium Hydroxide 70% Hot	D	C	B	C	C	B	B	A
Sodium Metaphosphate	D	D	A	A	B	B	B	A
Sodium Nitrate	A	B	A	B	D	A	A	A
Sodium Peroxide	C	C	A	B	A	A	A	A
Sodium Phosphate	D	C	A	B	A	A	A	A
Sodium Phosphate Di-basic	D	C	B	A	A	A	A	A
Sodium Phosphate Tri-basic	B	B	A	A	A	A	A	A
Sodium Silicate	D	B	B	A	A	A	A	A
Sodium Sulfate	B	B	A	A	A	A	A	A
Sodium Sulfide	C	C	B	A	A	A	A	A
Sodium Thiosulfate	B	C	A	B	A	A	A	A
Stearic Acid	A	C	B	A	A	B	B	A
Stoddard's Solvent	A	A	A	A	A	D	D	A
Styrene	A	A	A	D	B	D	D	A
Sulfate, Liquors	C	C	B	C	B	B	B	A
Sulfuric Acid 0 to 77%	D	D	B	D	A	C	C	A
Sulfuric Acid 100%	D	C	A	D	B	D	D	A
Sulfurous Acid	C	D	B	C	A	C	C	A
Tall Oil	C	B	B	B	A	D	D	A
Tar & Tar Oils	B	B	A	B	A	D	D	A
Tartaric Acid	B	D	A	B	A	C	C	A
Toluol (Toluene) (Methyl Benzene)	A	A	A	D	B	D	D	A
Trichlorethylene	A	B	B	C	B	D	D	A
Varnish	A	C	A	C	B	D	D	A
Vinyl Chloride	D	A	D	B	C	C	A	A
Water, Distilled	A	D	A	A	C	A	A	A
Water, Fresh	A	C	A	A	C	A	A	A
Water, Sea	C	D	A	A	C	A	A	A
Xylene (Zylol), Dry	A	B	A	D	B	D	D	A

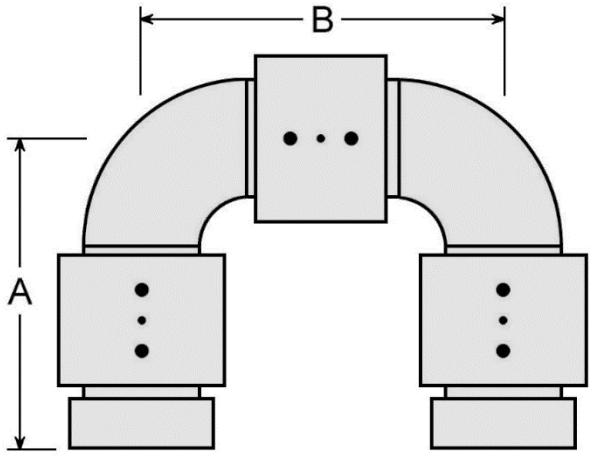
All ratings are based on media at room temperature unless otherwise specified. This chart is a guide. Please be advised that in any given case many factors such as solution, concentration, temperature, degree of agitation and presence of impurities influence the rate of corrosion. The information contained herein is general in nature and while drawn from sources deemed to be reliable and presumed accurate, is not guaranteed in any way by OILCO. Any application requires the use of qualified experts and subject to limitations normally present.

80 Series O-Ring Swivel Joint

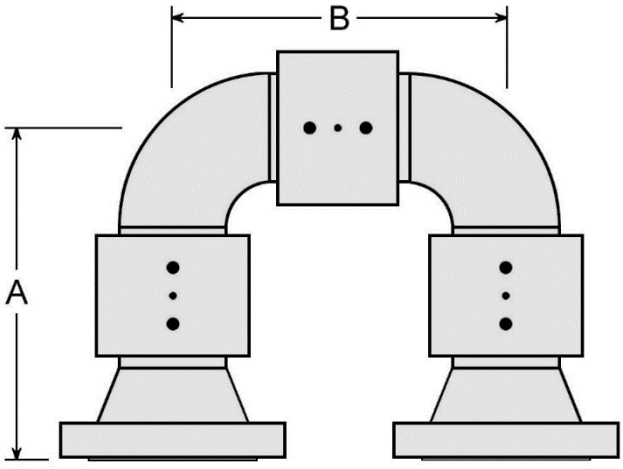
Style 10 Configurations



Style 10-W, Bevel for Weld Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	6 5/8	7 5/8	8 5/8	13 3/8



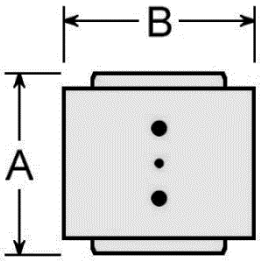
Style 10, Threaded Female NPT Ends				
Size	2”	3”	4”	6”
A	8 5/16	9 3/4	11	15 7/8
B	7 5/8	9 1/8	10 5/16	15 1/4



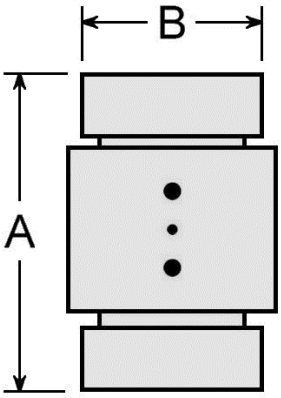
Style 10-F, 150# RF ANSI Flanged Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	9 1/8	10 3/8	11 5/8	16 7/8

80 Series O-Ring Swivel Joint

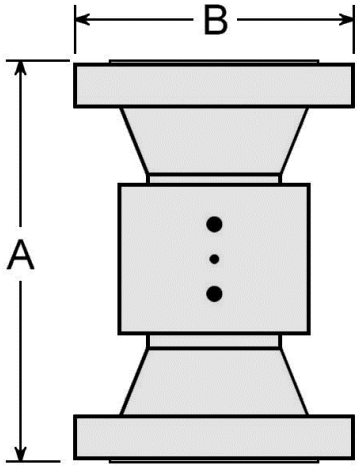
Style 20 Configurations



Style 20-W, Bevel for Weld Ends				
Size	2”	3”	4”	6”
A	4 5/8	4 5/8	4 5/8	7 3/8
B	4	5	6	9



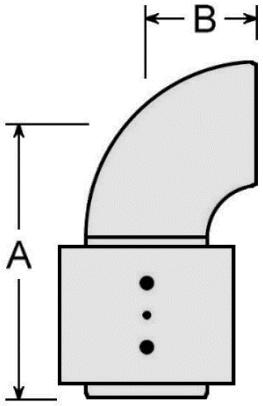
Style 20, Threaded Female NPT Ends				
Size	2”	3”	4”	6”
A	8	8 7/8	9 3/8	12 3/8
B	4	5	6	8 3/4



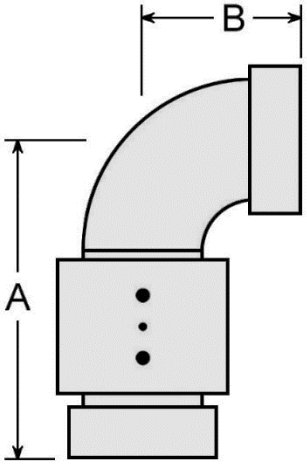
Style 20-F, 150# RF ANSI Flanged Ends				
Size	2”	3”	4”	6”
A	9 5/8	10 1/8	10 5/8	14 3/8
B	6	7 1/2	9	11

80 Series O-Ring Swivel Joint

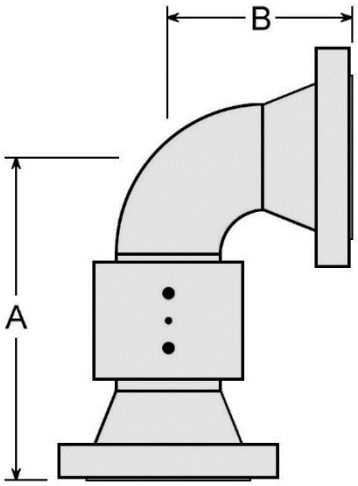
Style 30 Configurations



Style 30-W, Bevel for Weld Ends				
Size	2”	3”	4”	6”
A	6 5/8	7 5/8	8 5/8	13 3/8
B	2	3	4	6



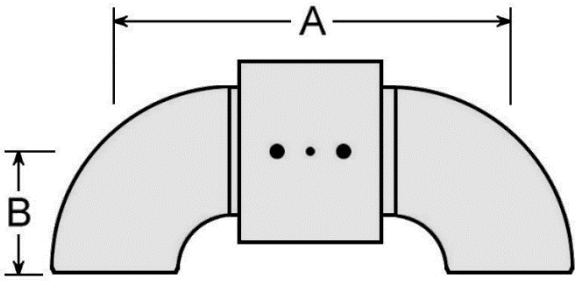
Style 30, Threaded Female NPT Ends				
Size	2”	3”	4”	6”
A	8 5/16	9 3/4	11	15 7/8
B	3 11/16	5 1/8	6 3/8	8 1/2



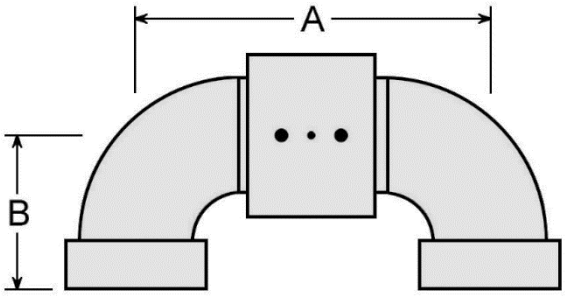
Style 30-F, 150# RF ANSI Flanged Ends				
Size	2”	3”	4”	6”
A	9 1/8	10 3/8	11 5/8	16 7/8
B	4 1/2	5 3/4	7	9 1/2

80 Series O-Ring Swivel Joint

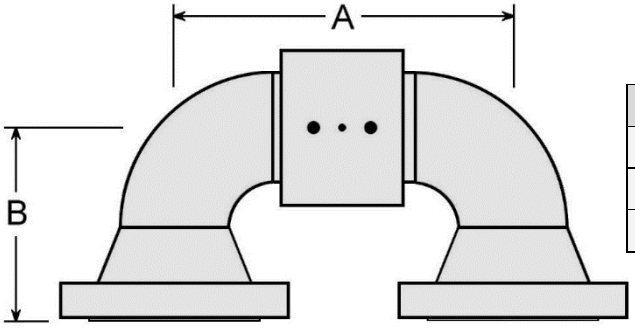
Style 40 Configurations



Style 40-W, Bevel for Weld Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	2	3	4	6



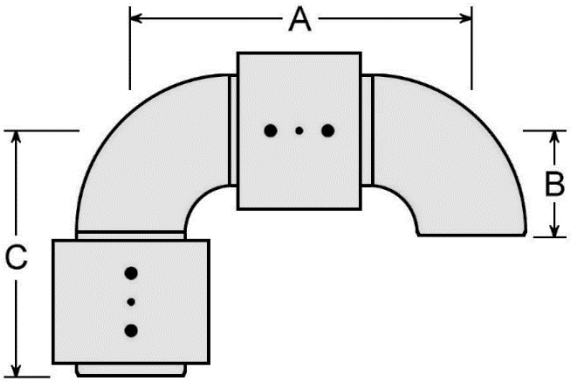
Style 40, Threaded Female NPT Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	3 11/16	5 1/8	6 3/8	8 1/2



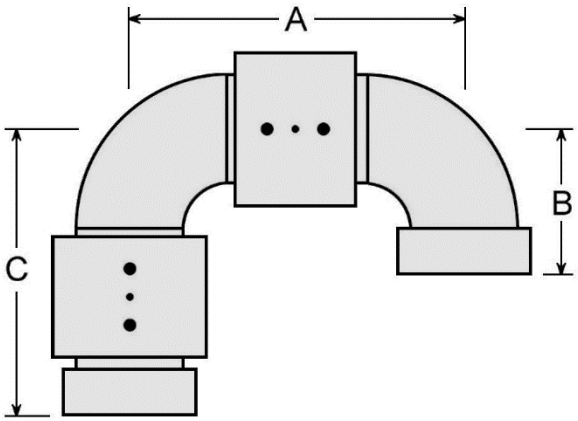
Style 40-F, 150# RF ANSI Flanged Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	4 1/2	5 3/4	7	9 1/2

80 Series O-Ring Swivel Joint

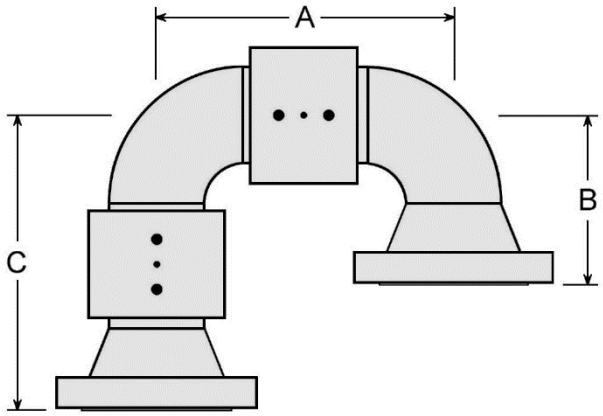
Style 50 Configurations



Style 50-W, Bevel for Weld Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	2	3	4	6
C	6 5/8	7 5/8	8 5/8	13 3/8



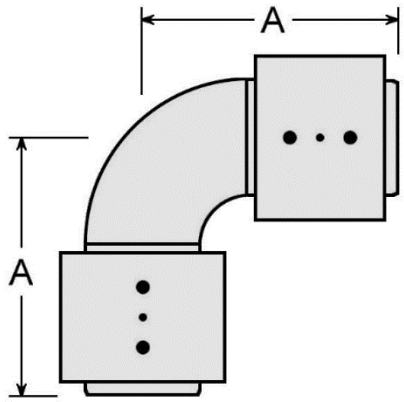
Style 50, Threaded Female NPT Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	3 11/16	5 1/8	6 3/8	8 1/2
C	8 5/16	9 3/4	11	15 7/8



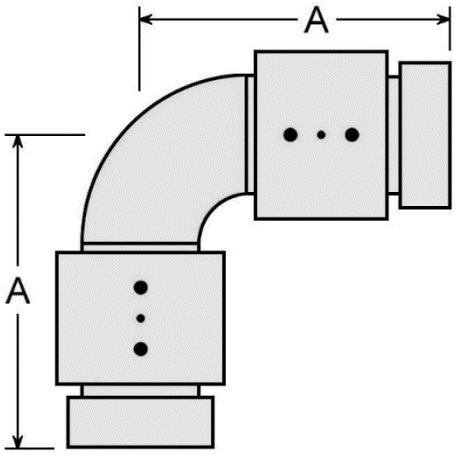
Style 50-F, 150# RF ANSI Flanged Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	4 1/2	5 3/4	7	9 1/2
C	9 1/8	10 3/8	11 5/8	16 7/8

80 Series O-Ring Swivel Joint

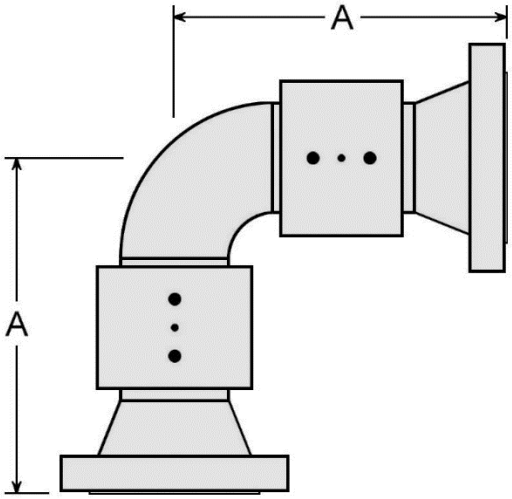
Style 60 Configurations



Style 60-W, Bevel for Weld Ends				
Size	2”	3”	4”	6”
A	6 5/8	7 5/8	8 5/8	13 3/8



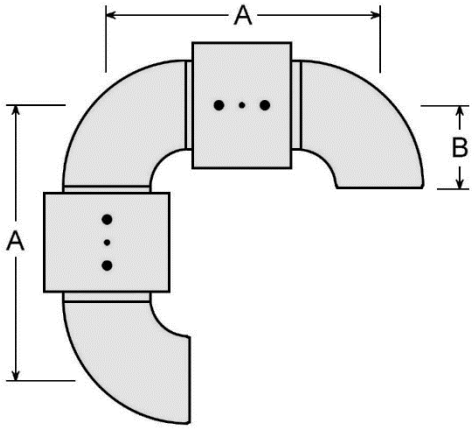
Style 60, Threaded Female NPT Ends				
Size	2”	3”	4”	6”
A	8 5/16	9 3/4	11	15 7/8



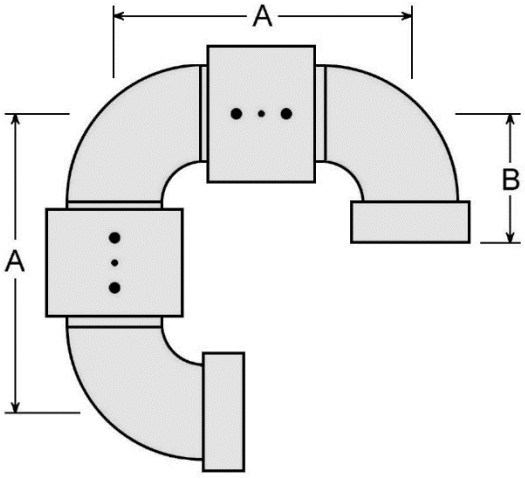
Style 60-F, 150# RF ANSI Flanged Ends				
Size	2”	3”	4”	6”
A	9 1/8	10 3/8	11 5/8	16 7/8

80 Series O-Ring Swivel Joint

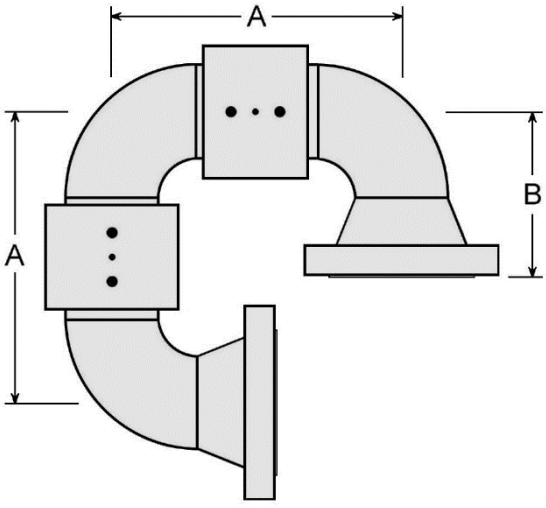
Style 70 Configurations



Style 70-W, Bevel for Weld Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	2	3	4	6



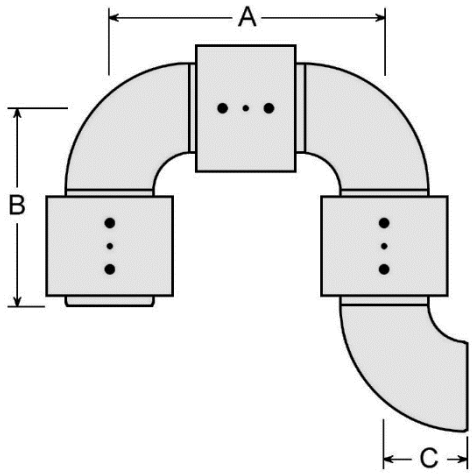
Style 70, Threaded Female NPT Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	3 11/16	5 1/8	6 3/8	8 1/2



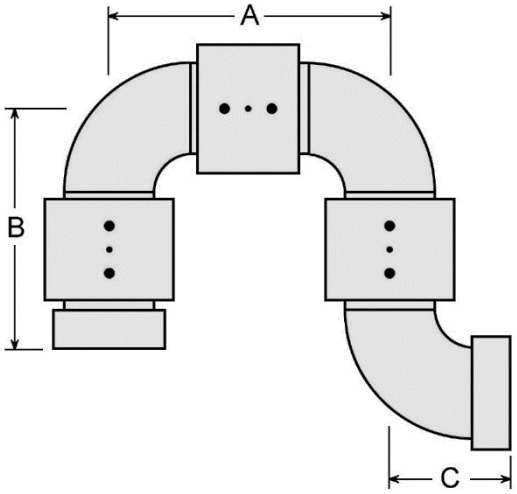
Style 70-F, 150# RF ANSI Flanged Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	4 1/2	5 3/4	7	9 1/2

80 Series O-Ring Swivel Joint

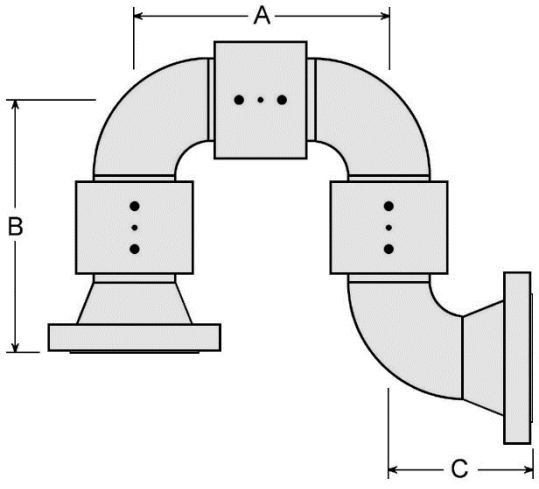
Style 80 Configurations



Style 80-W, Bevel for Weld Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	6 5/8	7 5/8	8 5/8	13 3/8
C	2	3	4	6



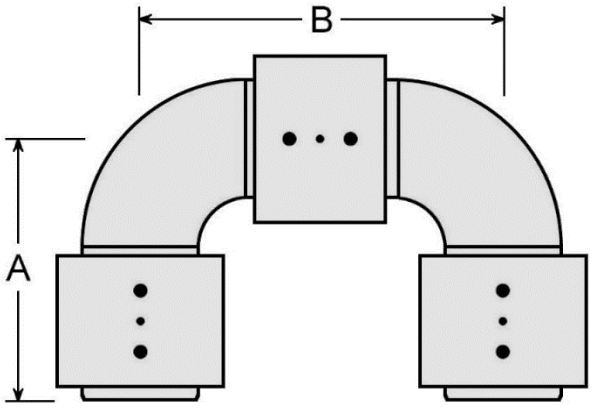
Style 80, Threaded Female NPT Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	8 5/16	9 3/4	11	15 7/8
C	3 11/16	5 1/8	6 3/8	8 1/2



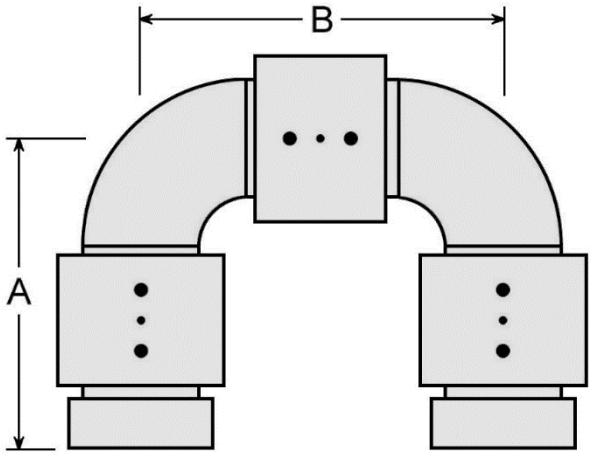
Style 80-F, 150# RF ANSI Flanged Ends				
Size	2”	3”	4”	6”
A	8 5/8	10 5/8	12 5/8	19 3/8
B	9 1/8	10 3/8	11 5/8	16 7/8
C	4 1/2	5 3/4	7	9 1/2

90 Series V-Ring Swivel Joint

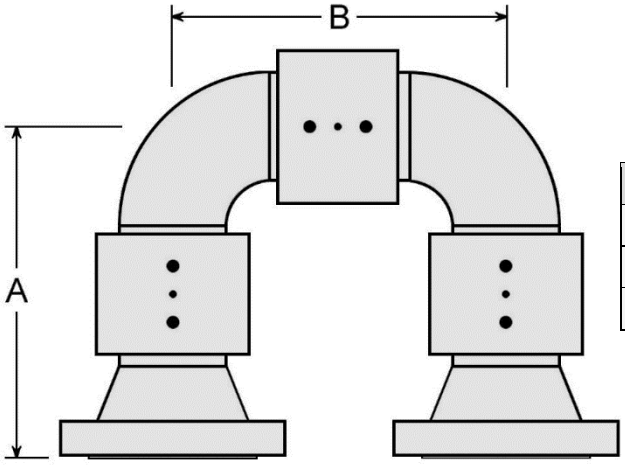
Style 10 Configurations



Style 10-W, Bevel for Weld Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	6 7/8	8 1/8	10 3/4	14 3/8	16 3/4	21 1/16	25 1/2
B	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2



Style 10, Threaded Female NPT Ends					
Size	2”	3”	4”	6”	8”
A	8 9/16	10 1/4	13 1/8	16 7/8	19 1/4
B	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4

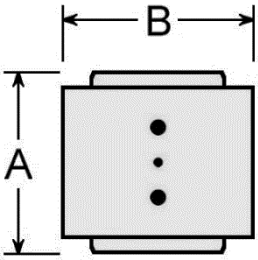


Style 10-F, 150# RF ANSI Flanged Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	9 3/8	10 7/8	13 3/4	17 7/8	20 3/4	25 1/16	30
B	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2

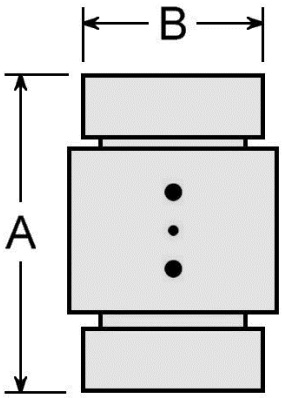
* *For larger diameter 90 Series units, please request dimensions from factory* *

90 Series V-Ring Swivel Joint

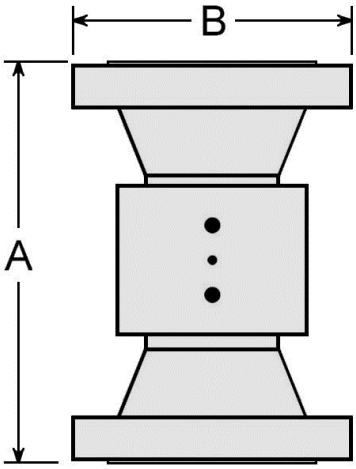
Style 20 Configurations



Style 20-W, Bevel for Weld Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	4 7/8	5 1/8	6 3/4	8 3/8	8 3/4	11 1/16	17 1/2
B	4	5	6	9 1/2	11 1/2	14	16



Style 20, Threaded Female NPT Ends					
Size	2”	3”	4”	6”	8”
A	8 3/8	9 3/8	11 1/2	13 3/8	13 3/4
B	4	5	6	9 1/4	11

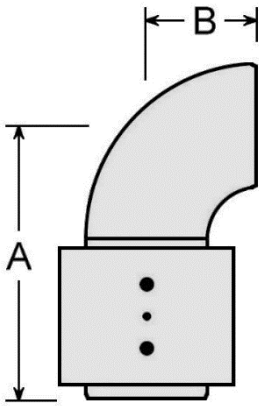


Style 20-F, 150# RF ANSI Flanged Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	9 7/8	10 5/8	12 3/4	15 3/8	16 3/4	19 1/16	22 1/2
B	6	7 1/2	9	11	13 1/2	16	19

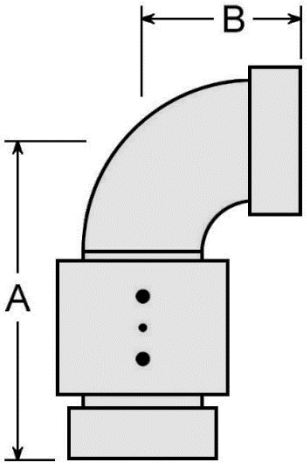
* *For larger diameter 90 Series units, please request dimensions from factory* *

90 Series V-Ring Swivel Joint

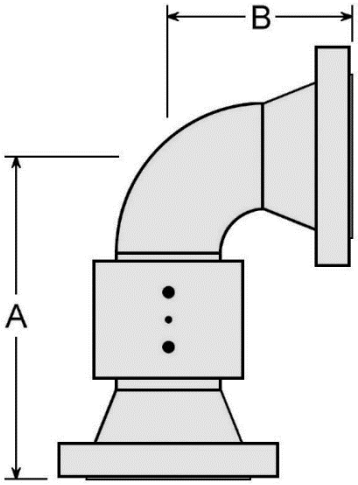
Style 30 Configurations



Style 30-W, Bevel for Weld Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	6 7/8	8 1/8	10 3/4	14 3/8	16 3/4	21 1/16	25 1/2
B	2	3	4	6	8	10	12



Style 30, Threaded Female NPT Ends					
Size	2”	3”	4”	6”	8”
A	8 9/16	10 1/4	13 1/8	16 7/8	19 1/4
B	3 11/16	5 1/8	6 3/8	8 1/2	10 1/2

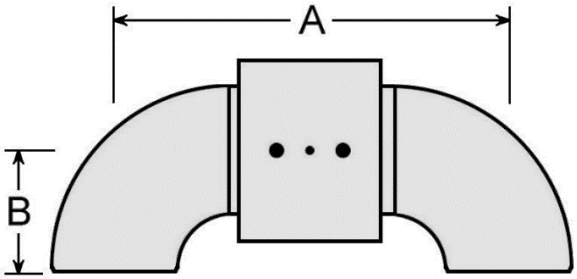


Style 30-F, 150# RF ANSI Flanged Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	9 3/8	10 7/8	13 3/4	17 7/8	20 3/4	25 1/16	30
B	4 1/2	5 3/4	7	9 1/2	12	14	16 1/2

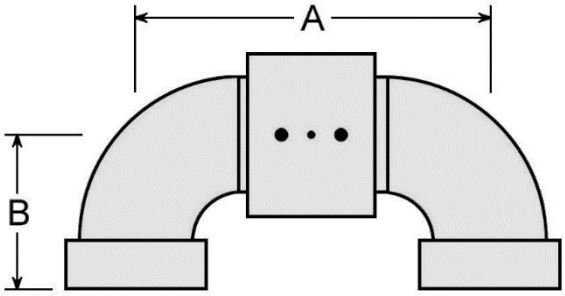
* *For larger diameter 90 Series units, please request dimensions from factory* *

90 Series V-Ring Swivel Joint

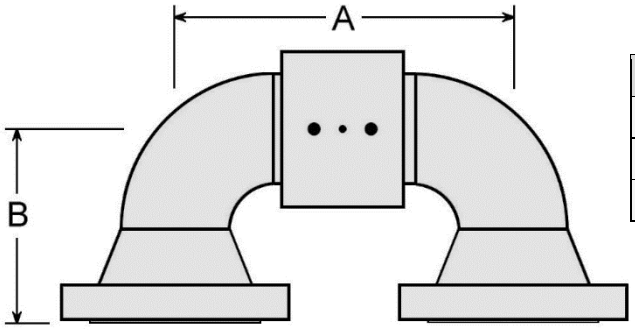
Style 40 Configurations



Style 40-W, Bevel for Weld Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2
B	2	3	4	6	8	10	12



Style 40, Threaded Female NPT Ends					
Size	2”	3”	4”	6”	8”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4
B	3 11/16	5 1/8	6 3/8	8 1/2	10 1/2

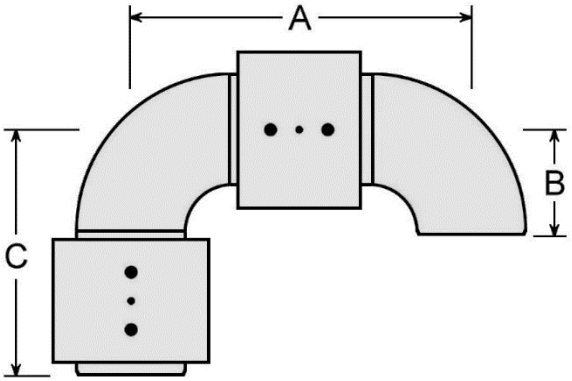


Style 40-F, 150# RF ANSI Flanged Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2
B	4 1/2	5 3/4	7	9 1/2	12	14	16 1/2

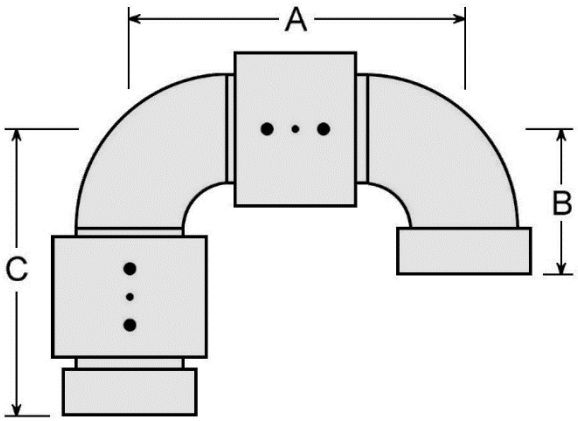
* *For larger diameter 90 Series units, please request dimensions from factory* *

90 Series V-Ring Swivel Joint

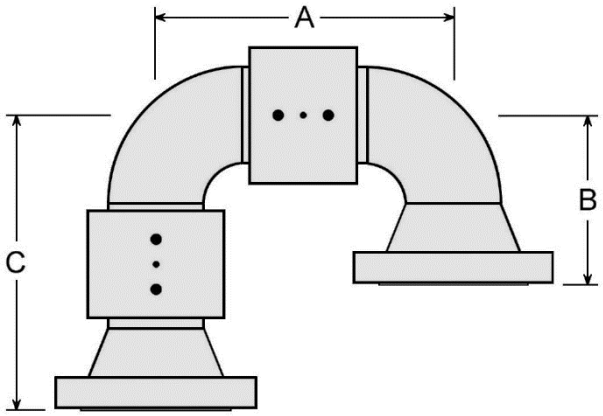
Style 50 Configurations



Style 50-W, Bevel for Weld Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2
B	2	3	4	6	8	10	12



Style 50, Threaded Female NPT Ends					
Size	2”	3”	4”	6”	8”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4
B	3 11/16	5 1/8	6 3/8	8 1/2	10 1/2
C	8 9/16	10 1/4	13 1/8	16 7/8	19 1/4

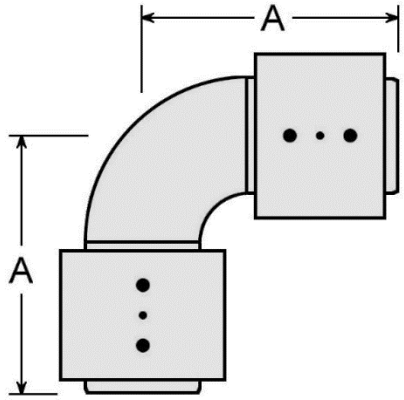


Style 50-F, 150# RF ANSI Flanged Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2
B	4 1/2	5 3/4	7	9 1/2	12	14	16 1/2
C	9 3/8	10 7/8	13 3/4	17 7/8	20 3/4	25 1/16	30

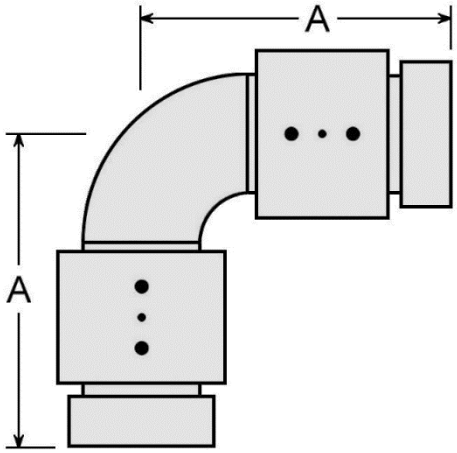
* *For larger diameter 90 Series units, please request dimensions from factory* *

90 Series V-Ring Swivel Joint

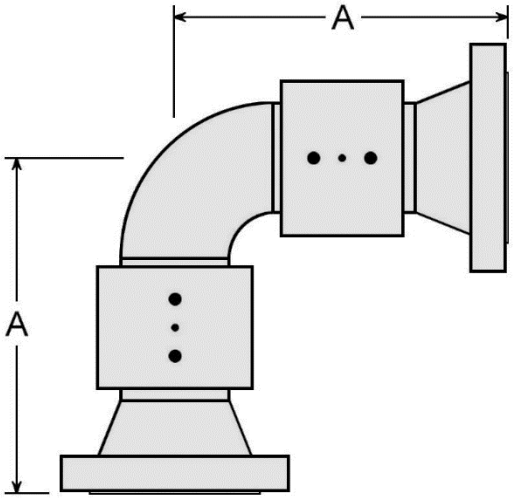
Style 60 Configurations



Style 60-W, Bevel for Weld Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	6 7/8	8 1/8	10 3/4	14 3/8	16 3/4	21 1/16	25 1/2



Style 60, Threaded Female NPT Ends					
Size	2”	3”	4”	6”	8”
A	8 9/16	10 1/4	13 1/8	16 7/8	19 1/4

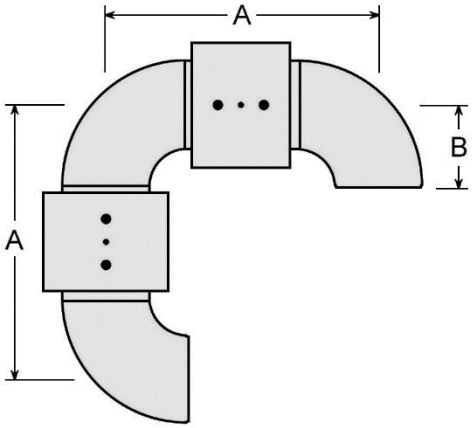


Style 60-F, 150# RF ANSI Flanged Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	9 3/8	10 7/8	13 3/4	17 7/8	20 3/4	25 1/16	30

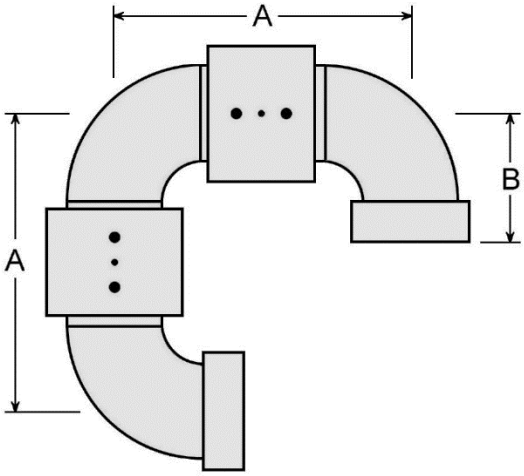
* *For larger diameter 90 Series units, please request dimensions from factory* *

90 Series V-Ring Swivel Joint

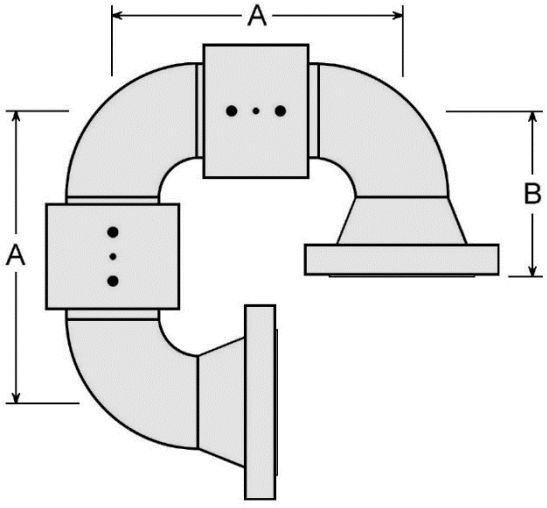
Style 70 Configurations



Style 70-W, Bevel for Weld Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2
B	2	3	4	6	8	10	12



Style 70, Threaded Female NPT Ends					
Size	2”	3”	4”	6”	8”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4
B	3 11/16	5 1/8	6 3/8	8 1/2	10 1/2

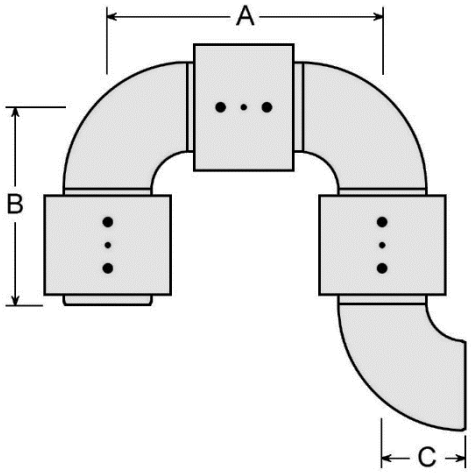


Style 70-F, 150# RF ANSI Flanged Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2
B	4 1/2	5 3/4	7	9 1/2	12	14	16 1/2

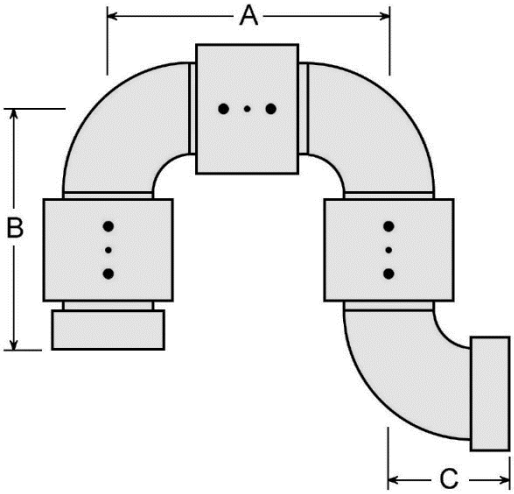
* *For larger diameter 90 Series units, please request dimensions from factory* *

90 Series V-Ring Swivel Joint

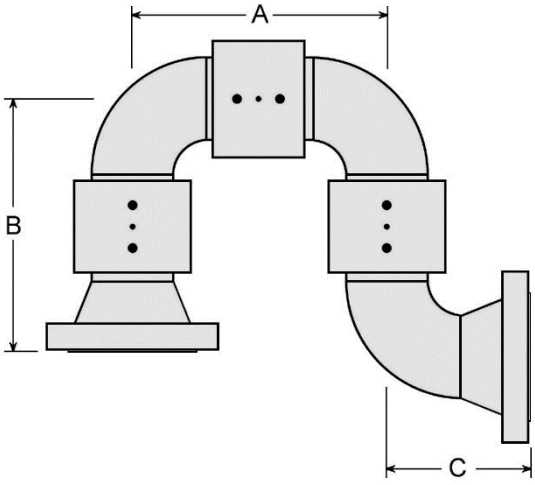
Style 80 Configurations



Style 80-W, Bevel for Weld Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2
B	6 7/8	8 1/8	10 3/4	14 3/8	16 3/4	21 1/16	25 1/2
C	2	3	4	6	8	10	12



Style 80, Threaded Female NPT Ends					
Size	2”	3”	4”	6”	8”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4
B	8 9/16	10 1/4	13 1/8	16 7/8	19 1/4
C	3 11/16	5 1/8	6 3/8	8 1/2	10 1/2



Style 80-F, 150# RF ANSI Flanged Ends							
Size	2”	3”	4”	6”	8”	10”	12”
A	8 7/8	11 1/8	14 3/4	20 3/8	24 3/4	31 1/16	37 1/2
B	9 3/8	10 7/8	13 3/4	17 7/8	20 3/4	25 1/16	30
C	4 1/2	5 3/4	7	9 1/2	12	14	16 1/2

* *For larger diameter 90 Series units, please request dimensions from factory* *

80 & 880 Series Swivel Joints

O-Ring Replacement & Maintenance Information

Reference the following guide to assist in general maintenance and seal replacement for all OILCO Liquid Handling Systems o-ring design swivel joints. Take all due safety precautions when assembling and operating these units. Handle all components with care. If there is something unique to the assembly not covered in this form, contact the factory.

Lubrication: All OILCO swivel joints are supplied with a grease fitting at each plane of rotation. General lubrication should be performed on a programmed basis (e.g. bi-annually, quarterly or monthly), depending on service and operating conditions. When service is severe, such as high temperatures, heavy loads or constant rotation, daily lubrication may be required. Consult factory.

Inject grease and rotate the unit (as allowed by installation) as it is applied to ensure an even application throughout the raceway. Do not over-lubricate, as this may displace the seals and result in leakage. The table below offers a suggested volume for servicing based on a bi-annual program (where operational conditions are fair). Note that the volumes suggested are for vacant mechanical cavities – should lubricant be present and at a good viscosity level, less can be applied during the maintenance procedure.

Swivel Size	Volume
2”	1.5 ounces
3”	2 ounces
4”	3 ounces

The general recommended lubrication for use with Buna “N”, Viton “A”, neoprene, and Teflon seals is a grease containing a minimum of 5% Molybdenum Disulfide (Molylube SP Lubricant 5). [Note – This grease should not be used with EPT or butyl seals.]

- Recommended grease for oxygen service swivel joints is Halocarbon No. 25-10M.
- Recommended grease for ethylene-propylene-terpolymer (EPT) butyl and silicone seals is Silicone No. 1023 grease (also manufactured by Bel-Ray), or any other non-petroleum based lubricant.

Components:

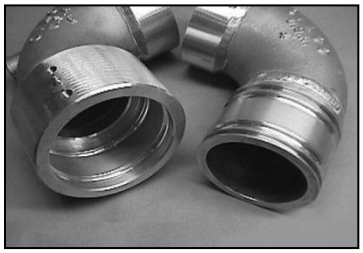
80 Series Complete Repair Kit	
Main Pressure Seal	(1) large o-ring
Environmental Dust Seal	(1) low drag felt
Radial Ball Bearings *Standard Dual Raceway*	(46) 2” unit size (64) 3” unit size (78) 4” unit size
Ball Bearing Cap Screws	(2) threaded cap screw
Grease Port Fitting	(1) standard fitting

880 Series Complete Repair Kit	
Main Pressure Seal	(1) large o-ring
Environmental Dust Seal	(1) rubber o-ring
Radial Ball Bearings *Standard Dual Raceway*	(46) 2” unit size (64) 3” unit size (78) 4” unit size
Ball Bearing Cap Screws	(2) threaded cap screw
Grease Port Fitting	(1) standard fitting

Note: Additional components and considerations may be required for “HD” (heavy duty) swivel joint models or those with secondary applications (e.g. sealed for submerged service).

Caution: Any improper handling or disregard for both onsite safety and operational procedures or factory recommendations could cause unnecessary damage to the unit and severe personal injury

Warning: Never exceed the rated working pressure of the unit. Never modify or alter a unit beyond that to which it has been designed. Should any unit appear damaged, remove it from service immediately and contact the factory.



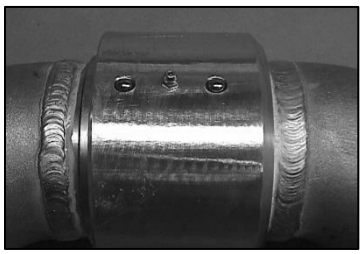
STEP 1: Remove the ball retainer screws. Add a sufficient amount of solvent into each raceway to flush out the lubricant. Rotate the sleeve, catching the balls as they fall out. When all the balls have been removed, the body and sleeve may be separated. Discard old seals. Thoroughly clean both body and sleeve.

STEP 2: Install the new "O" ring on the sleeve (this is the product/pressure seal to be place up front – the initial contact of the body and sleeve). Then install the dust seal at the rear of the sleeve. For 80 Series, dust seal is felt material. For 880 Series, dust seal is rubber material.

STEP 3: Lubricate the body and sleeve with Molylube® grease or an equivalent.

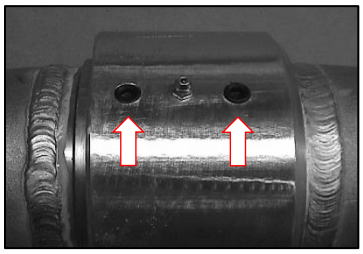
Note: *See front page for lubricant information and recommendations.*

STEP 4: Insert the sleeve into the body while slowly rotating it into position. Take caution while applying force to pass the radial ball bearing grooves and seat the main pressure seal properly. If the sleeve becomes hung up, remove and re-insert , careful to maintain even pressure and plumb alignment.



STEP 5: When the sleeve is fully inserted, feed the ball bearings into the raceways. Insert a flathead screwdriver (or bearing tool) and rotate the joint to make space for the balls (be careful not to damage the threads or scratch the raceway surface). Then reverse rotation to insert remaining balls.

Note: There will be a slight gap between the last and first bearing, do not attempt to over-fill the unit.



STEP 6: Reinstall the ball retainer screw until tight. If this prevents smooth rotation, back off 1/8 turn. A thread locking sealant is recommended to prevent screws from backing off. After pressure testing, the unit is ready for installation.

90 Series Swivel Joints

V-Ring Replacement & Maintenance Information

Reference the following guide to assist in general maintenance and seal replacement for all OILCO Liquid Handling Systems v-ring design swivel joints. Take all due safety precautions when assembling and operating these units. Handle all components with care. If there is something unique to the assembly not covered in this form, contact the factory.

Lubrication: All OILCO swivel joints are supplied with a grease fitting at each plane of rotation. General lubrication should be performed on a programmed basis (e.g. bi-annually, quarterly or monthly), depending on service and operating conditions. When service is severe, such as high temperatures, heavy loads or constant rotation, daily lubrication may be required. Consult factory.

Inject grease and rotate the unit (as allowed by installation) as it is applied to ensure an even application throughout the raceway. Do not over-lubricate, as this may displace the seals and result in leakage. The table below offers a suggested volume for servicing based on a bi-annual program (where operational conditions are fair). Note that the volumes suggested are for vacant mechanical cavities – should lubricant be present and at a good viscosity level, less can be applied during the maintenance procedure.

Swivel Size	Volume
2”	2 ounces
3”	3 ounces
4”	4 ounces
6”	7 ounces
8”	12 ounces

Swivel Size	Volume
10”	20 ounces
12”	30 ounces
14”	9 ounces per raceway
16”	10 ounces per raceway
18”	12 ounces per raceway

The general recommended lubrication for use with Buna “N”, Viton “A”, neoprene, and Teflon seals is a grease containing a minimum of 5% Molybdenum Disulfide (Molylube SP Lubricant 5). [Note – This grease should not be used with EPT or butyl seals.]

- Recommended grease for oxygen service swivel joints is Halocarbon No. 25-10M.
- Recommended grease for ethylene-propylene-terpolymer (EPT) butyl and silicone seals is Silicone No. 1023 grease (also manufactured by Bel-Ray), or any other non-petroleum based lubricant.

Components:

90 Series Complete Repair Kit	
Main Pressure Seal	(3) chevron v-rings
Environmental Dust Seal	(1) slim o-ring
Radial Ball Bearings *Standard Dual Raceway*	(46) 2” unit size (66) 3” unit size (84) 4” unit size (76) 6” unit size (80) 8” unit size (82) 10” unit size (86) 12” unit size (100) 14” unit size (112) 16” unit size

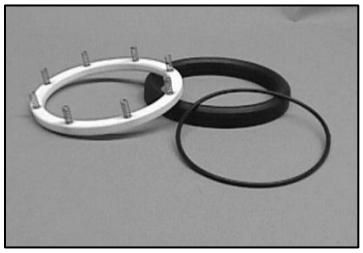
90 Series Complete Repair Kit	
Ball Bearing Cap Screws	(2) threaded cap screw
Grease Port Fitting	(1) standard fitting
Compression Springs *Standard Soft Seals* (Double Count for Teflon Main Pressure Seal)	(6) 2” unit size (6) 3” unit size (8) 4” unit size (12) 6” unit size (16) 8” unit size (18) 10” unit size (24) 12” unit size (24) 14” unit size (24) 16” unit size
Teflon Spring Adapter	(1) pre-drilled

Note: Additional components and considerations may be required for “HD” (heavy duty) swivel joint models or those with secondary applications (e.g. sealed for submerged service).

Caution: Any improper handling or disregard for both onsite safety and operational procedures or factory recommendations could cause unnecessary damage to the unit and severe personal injury

Warning: Never exceed the rated working pressure of the unit. Never modify or alter a unit beyond that to which it has been designed. Should any unit appear damaged, remove it from service immediately and contact the factory.

STEP 1: Remove the ball retainer screws. Add a sufficient amount of solvent into each raceway to flush out the lubricant. Rotate the sleeve, catching the balls as they fall out. When all the balls have been removed, the body and sleeve may be separated. Discard old seals. Thoroughly clean both body and sleeve.



STEP 2: Assemble spring adapter, collect three v-rings and appropriate dust seal. Main packing seal arrangement is compression springs down on the shelf of the swivel joint body and chevron seals in a stack with the point facing upward.

Note: *Teflon compounds require additional springs for proper installation. With included Teflon seals, the Teflon v-rings rest on the spring adapter and the soft seal is placed on top.*

STEP 3: Lubricate packing seal area of body and then insert spring adapter and three v-ring seals.

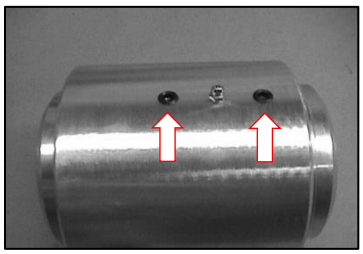
Note: *See front page for lubricant information and recommendations.*

STEP 4: Place dust seal on sleeve and grease remaining body and sleeve with Molylube® grease or equivalent.

Note: *See front page for lubricant information and recommendations.*

STEP 5: When the sleeve is fully inserted, feed the ball bearings into the raceways. Insert a flathead screwdriver (or bearing tool) and rotate the joint to make space for the balls (be careful not to damage the threads or scratch the raceway surface). Then reverse rotation to insert remaining balls.

Note: *There will be a slight gap between the last and first bearing, do not attempt to over-fill the unit.*



STEP 6: Reinstall the ball retainer screw until tight. If this prevents smooth rotation, back off 1/8 turn. A thread locking sealant is recommended to prevent screws from backing off. After pressure testing, the unit is ready for installation.

857 Series Swivel Joints

O-Ring Replacement & Maintenance Information

Reference the following guide to assist in general maintenance and seal replacement for all OILCO Liquid Handling Systems o-ring design swivel joints. Take all due safety precautions when assembling and operating these units. Handle all components with care. If there is something unique to the assembly not covered in this form, contact the factory.

Lubrication: All OILCO swivel joints are supplied with a grease fitting at each plane of rotation. General lubrication should be performed on a programmed basis (e.g. bi-annually, quarterly or monthly), depending on service and operating conditions. When service is severe, such as high temperatures, heavy loads or constant rotation, daily lubrication may be required. Consult factory.

Inject grease and rotate the unit (as allowed by installation) as it is applied to ensure an even application throughout the raceway. Do not over-lubricate, as this may displace the seals and result in leakage. The table below offers a suggested volume for servicing based on a bi-annual program (where operational conditions are fair). Note that the volumes suggested are for vacant mechanical cavities – should lubricant be present and at a good viscosity level, less can be applied during the maintenance procedure.

Swivel Size	Volume
4”	8 ounces
6”	12 ounces

The general recommended lubrication for use with Buna “N”, Viton “A”, neoprene, and Teflon seals is a grease containing a minimum of 5% Molybdenum Disulfide. [Note – This grease should not be used with EPT or butyl seals.]

Recommended grease: Molylube SP Lubricant 5
Bel-Ray Company Inc.
Farmingdale, NJ 07727

- Recommended grease for oxygen service swivel joints is Halocarbon No. 25-10M.
- Recommended grease for ethylene-propylene-terpolymer (EPT) butyl and silicone seals is Silicone No. 1023 grease (also manufactured by Bel-Ray), or any other non-petroleum based lubricant.

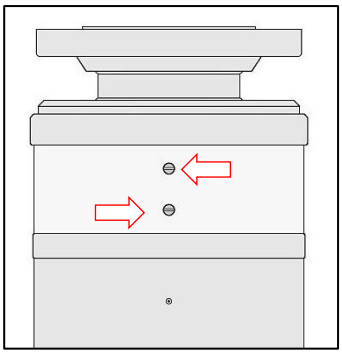
Components:

Model 857 Removable Seal Swivel Joint	
Protective Outer Band	(1) standard
Band Locking Screws	(2) threaded pan head
Collar Set Screws	(2) threaded pan head
Slide Collar	(1) standard / unit matched
Main Pressure Seals	(2) standard o-ring type
Grease Port Fitting	(1) standard fitting
Timken Roller Bearings	(2) tapered / non-removable

Note: Additional components may be required for those units with secondary applications (e.g. submerged service).

Caution: Any improper handling or disregard for both onsite safety and operational procedures or factory recommendations could cause unnecessary damage to the unit and severe personal injury

Warning: Never exceed the rated working pressure of the unit. Never modify or alter a unit beyond that to which it has been designed. Should any unit appear damaged, remove it from service immediately and contact the factory.



STEP 1: Remove the protective outer band of the swivel joint cage by loosening the two screws (it may be necessary to remove the screws completely for accessibility). Clean and retain protective band for reinstallation following seal replacement and maintenance.

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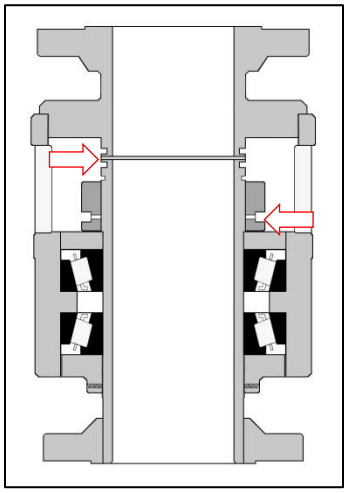
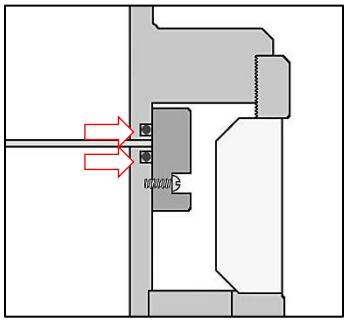
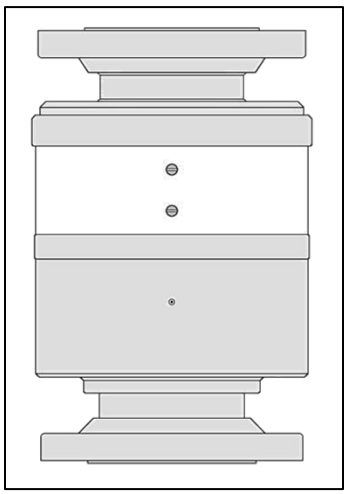


STEP 2: Remove the screws from the collar and then slide the collar down. This will expose the sealing surface of the sleeve and the dual o-rings. Remove and discard fatigued o-rings. Retain collar set screws for reuse. Be careful to remove all surface debris from sleeve and the seal grooves.



STEP 3: Lubricate sleeve and upper receiver head with approved grease. Insert new o-rings into seal grooves. Carefully slide collar up into position with an even motion. Be sure to keep the collar straight (this will prevent unnecessary scraping of the o-ring). When in position, insert and tighten the two collar set screws previously removed.

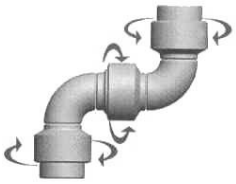
Note: *See front page for lubricant information and recommendations.*



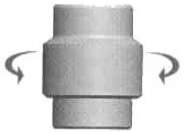
STEP 4: Re-install protective outer band. After pressure testing, the unit is ready for installation.

Swivel Joint Selection Survey

1. What is the product used for ? _____
2. What size line (inches) ? _____
3. Material of construction required ? _____
4. Preferred seal material and type ? _____
5. Minimum operating temperature ? _____
6. Maximum operating temperature ? _____
7. Minimum operating pressure ? _____
8. Maximum operating pressure ? _____
9. Configuration style ? _____



□ Style 10



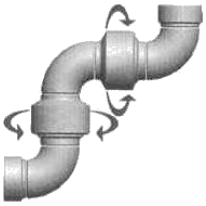
□ Style 20

□ Style 30

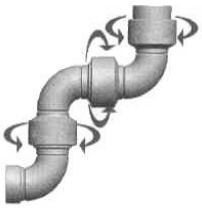
□ Style 40

□ Style 50

□ Style 60



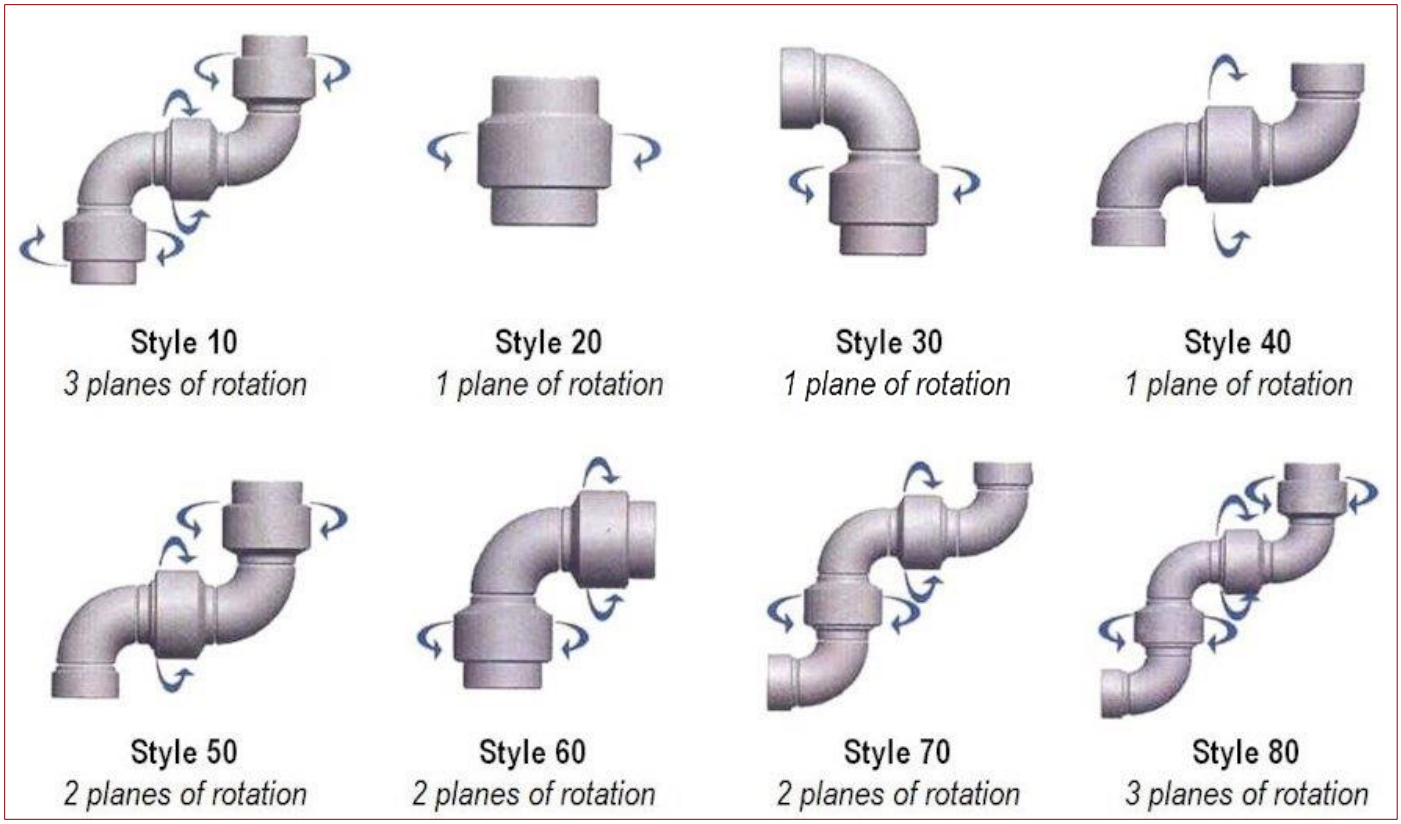
□ Style 70



□ Style 80

10. Connection type (flange, NPT, etc.) ? _____
11. Submerged service unit ? _____
12. Is steam jacketing required ? _____
13. Specialized testing required ? _____
14. Removable seal / split flange type ? _____
15. Rotation requirements (RPM) ? _____
16. Special coating (epoxy, etc.) ? _____
17. Other requirements ? _____

Swivel Joint Configuration & Identification



Indicates unit size → **12" MODEL 92-FSS-V** ← Seal compound

Series and overall configuration style (e.g. 90 Series, style 20)

Identifies the connection type and the material of construction

Connection end & material descriptions

F – 150# RF ANSI Flanges
NF – TTMA Tank Truck Flanges
O – NPT Female Threads
M – NPT Male Threads
S – Carbon Steel
SS – Stainless Steel
A – Aluminum

Seal Compounds

V – Viton
T – Teflon
EPR - EPR
EPDM – EPDM
K – Kalrez
C – Chemraz
No indicator is Buna-N (STD)

Special Extension Notes & Extras

LT – Low Torque
P – Submerged Service
H – Straight Handle
SH – Shovel Handle
OXY – Oxygen Service
EPXY – Epoxy Paint Exterior
FG – Food Grade Lubricant

Spring Balance Adjustment Procedures

General Precautions:

Do Not Attempt Alone

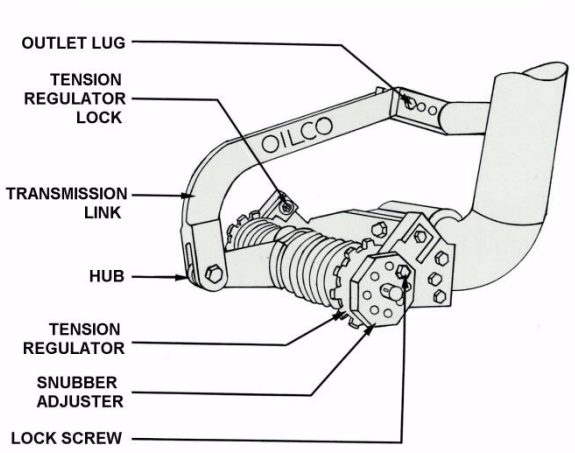
All OILCO spring balance assemblies are manufactured with spring covers for added safety to the operator. (*For illustration purposes, the covers have been removed*)

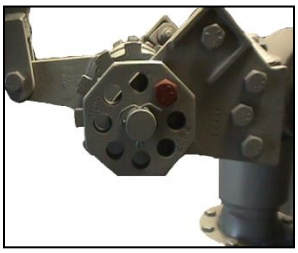
Springs are under high tension. To avoid personal injury or damage to the unit observe the following:

Block loader in a parked (up) position before attempting adjustment on the torsion springs.

Hold snubber adjuster and tension regulator with a wrench while removing and tightening bolts.

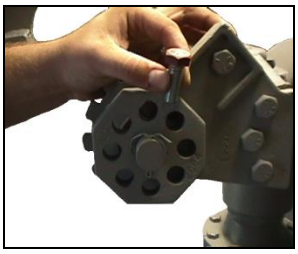
▪ Spring balance adjustment is always a two-man operation ▪



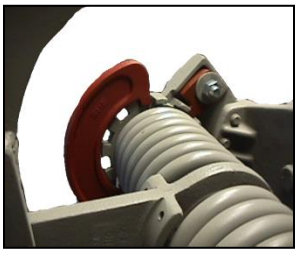


Single Spring (Model 641):
The snubber spring is tightened by rotating the snubber adjuster on the single unit, counter clock-wise

Double Spring (Model 640 & 645):
The snubber springs are tightened by rotating the snubber adjuster clockwise

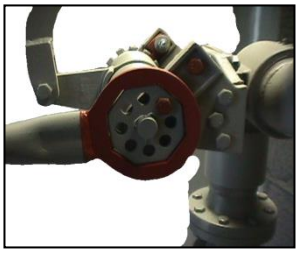


STEP 1: Remove the snubber adjuster lock screw and carefully remove the tension from the snubber spring by allowing the snubber adjuster to unwind to a relaxed position.



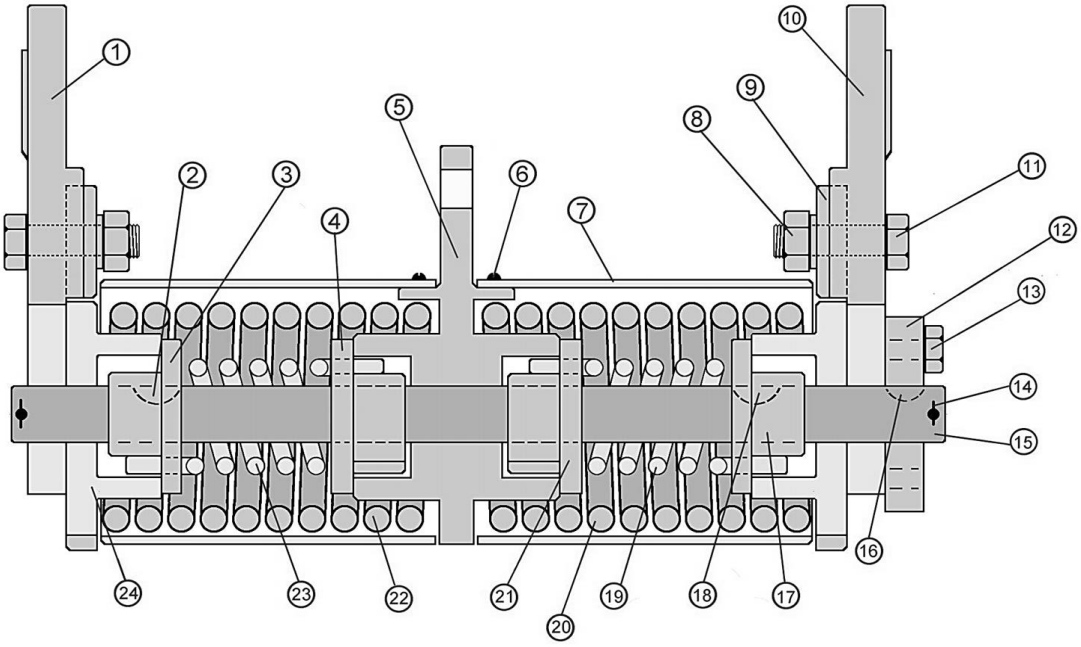
STEP 2: Loosen the tension regulator lock. It is not necessary to remove the bolt completely. Increase or decrease the spring tension as desired. And then tighten lock securely.

STEP 3: Check the return action of the loader and continue adjustment until the proper balance is obtained. (A half notch adjustment can be made by removing the nut and washer and reversing the tension regulator lock.)



STEP 4: Increase tension on the snubber adjuster one hole at a time until the snubber absorbs the return momentum of the loader, and the unit parks itself at the necessary angle. Tighten

General Parts Listing		
Item Number	Description	Part Number
1	Left Support Bracket (640)	2212
1	Left Support Bracket (645)	2328
2	Snubber Connector Key	5061
3	Outer Snubber Connector	2067
4	Inner Snubber Connector	2066
5	Torque Transmission Lever (640,645)	2047
5	Torque Transmission Lever (641)	2267
6	Spring Cover Screw (4)	2058
7	Spring Cover (2)	2057
8	Nut/Washer for Tension Regulator Lock (2)	5065
9	Tension Regulator Lock (2)	2068
10	Right Support Bracket (640)	2212
10	Right Support Bracket (645)	2328
11	Bolt for Tension Regulator Lock (2)	2068
12	Snubber Adjuster	2064
13	Snubber Adjuster Bolt	5064
14	Cotter Pin (2)	5069
15	Center Support Shaft (640,645)	2243
15	Center Support Shaft (641)	2052
16	Snubber Connector Key	5061
17	Outer Snubber Connector	2067
18	Snubber Adjuster Connector Key	5062
19	Left Hand Wound Snubber Spring (Right Side)	2017
20	Right Hand Wound Torsion Spring (Right Side)	2147(P), 2011 (D)
21	Inner Snubber Connector	2066
22	Left Hand Wound Torsion Spring (Left Side)	2148 (P), 2010 (D)
23	Right Hand Wound Snubber Spring (Left Side)	2016



Tank Truck Top Loading Data Survey

Completion of the data survey will allow the factory to properly confirm loader engineering and design.

a. Overhead clearance, platform or grade to canopy: _____

b. Rack platform height from grade: _____

c. Riser connection height from platform (supply from above): _____

d. Riser connection height from platform (supply from below): _____

e. Platform width, centerline of riser to the loading side edge: _____

f. Maximum clearance distance of tank truck to platform: _____

g. Vertical riser centerline to hatch opening centerline: _____

h. Riser connection height from platform (horizontal supply): _____

k. Distance, centerline of riser to centerline of tank truck: Max _____ Min _____

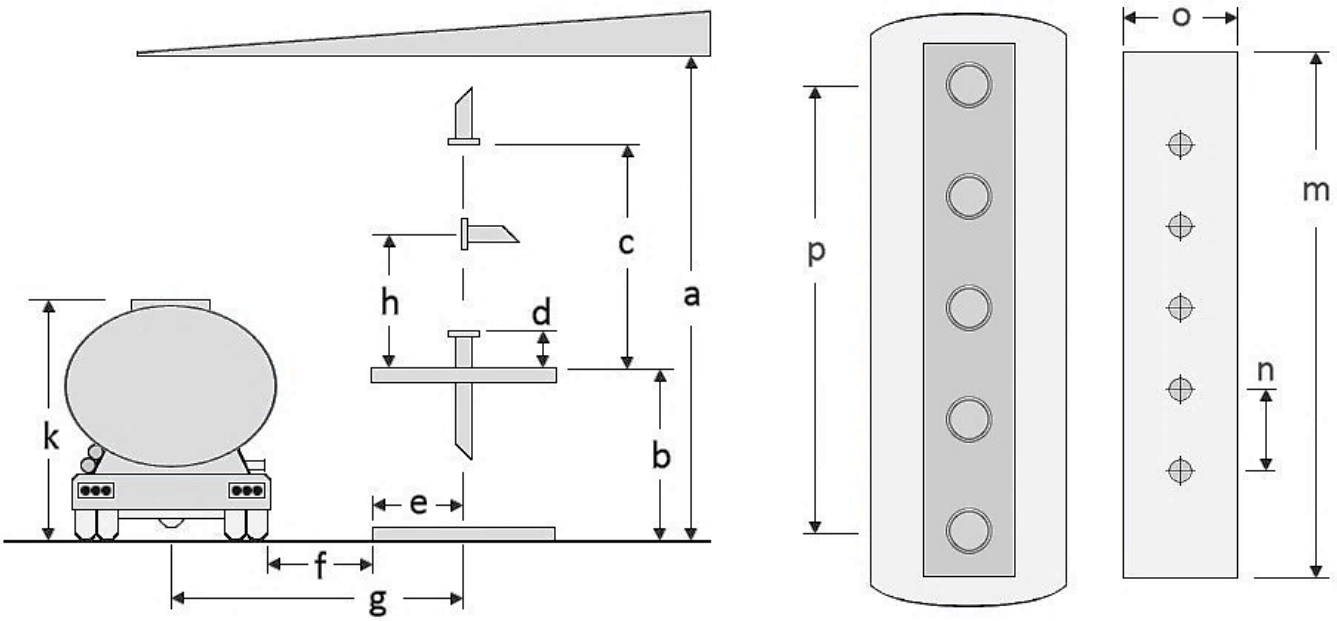
m. Platform overall length (including curbing and safety rail): _____

n. Number of risers and centerline spacing per location: _____

o. Platform overall width (including curbing and safety rail): _____

p. Overall range of hatch opening(s): _____

Note: *Indicate location of any possible obstruction on platform, such as roof supports, equipment between risers, safety equipment, etc.*



Tank Truck Bottom Loading Data Survey

a. Platform overall length (including curbing and safety rail): _____

b. Number of risers and centerline spacing per location: _____

c. Platform overall width (including curbing and safety rail): _____

d. Tank truck connection(s) centerline to centerline spacing: _____

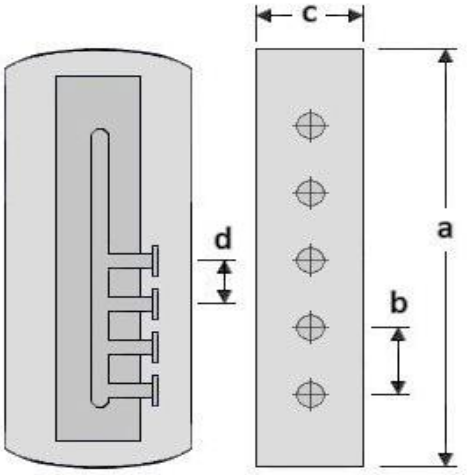
e. Overhead clearance, platform or grade to canopy: _____

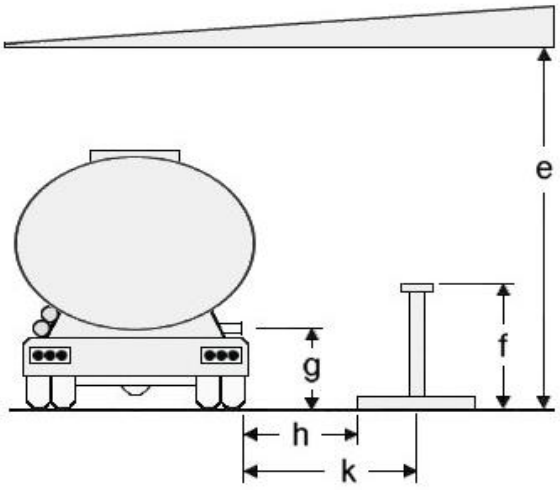
f. Riser connection height from island / grade line: _____

g. Tank truck adapter / coupling connection height: _____

h. Maximum clearance distance of tank truck to platform: _____

k. Vertical riser centerline to adapter / coupling face: _____





Tank Truck Bottom Loading Data Survey

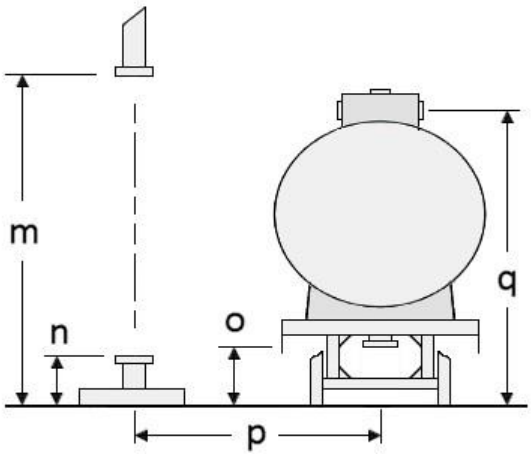
m. Riser connection height for downfeed: _____

n. Riser connection height for upfeed: _____

o. Bottom connection or clearance height: _____

p. Reach from riser centerline to tank center: _____

q. Dome opening connection height above rail: _____



1. Agreement. These *Terms and Conditions,* together with any information or documents incorporated in by reference or attached to the formal sales order, contain the entire and exclusive agreement ("Agreement") between OILCO and its Customer and supersedes any other understandings or agreements, verbal or otherwise, except as expressly set forth here. By receipt of goods and/or services, or by performing hereunder, Customer agrees to the exclusive application of these *Terms and Conditions*, although its agreement to such *Terms and Conditions* is not limited to the foregoing methods. Notwithstanding anything in foregoing to the contrary, if Customer has heretofore made OILCO an offer with respect to any goods and/or services ("Goods") to be provided hereunder, this agreement shall not operate as an acceptance of the Customer's offer, but shall be deemed a counteroffer. OILCO expressly limits and make conditional any acceptance by Customer, regardless of its form or substance, of an offer to these *Terms and Conditions*. Reference to any form or communication of Customer, including but not limited to OILCO noting Customer's purchase order number shall not be deemed to be an acceptance of any terms and conditions therein, and any different or additional terms or conditions in any proposal, acknowledgement form or any other document of the Customer are hereby objected to and superseded in their entirety by these *Terms and Conditions*.

2. Law. This Agreement shall be governed by and interpreted in accordance with the substantive (and not conflicts) laws of the State of NJ, USA. and shall not be governed by the provisions of the 1980 U.N. Conventions on Contracts for the International Sale of Goods or the related Convention on the Limitation Period in the International Sale of Goods. Other than for collection or equitable actions against Customer, any cause of action arising hereunder or related in any way hereto shall be brought only in the federal or state courts in or nearest Trenton, NJ and Customer hereby irrevocably submits to the jurisdiction of such courts. Any action arising out of or related to this Agreement against OILCO must be commenced within (1) year from the date the right, claim, demand or cause of action shall first occur, or be barred forever.

3. Cancellations. In the event an order is cancelled after it has been accepted, a cancellation charge based on the percentage of work performed by OILCO will be assessed. The minimum cancellation charge for any cancelled order is 20% of the net price. All cancellation requests must be submitted in writing and are at the discretion of OILCO.

4. Product Designs. Product designs are subject to change in OILCO's sole discretion without notice to Customer.

5. Published Prices and Terms. The published prices for all OILCO products are quoted in US dollars and are subject to change without notice. OILCO reserves the option to invoice at its prices in effect at the time of shipment. All prices and amounts due hereunder exclude all US and foreign federal, state, local, municipal or other sales, excise, use, value-added, stamp, property or other taxes and fees and all export or import fees, customs duties, tariffs or consular fees, now in force or enacted in the future. All such costs, duties, tariffs, taxes and fees shall be paid by Customer unless Customer provides a certificate of exemption or similar document exempting a payment from an applicable tax. If any government or body or similar authority determines that OILCO is liable for any such costs, duties, tariffs, taxes and fees, then the Customer shall promptly reimburse OILCO for any such liabilities paid by OILCO. Prices are F.O.B. Monmouth Jct., NJ. Minimum total purchase order amount for each order is $100.00 Net, F.O.B. factory. Orders for less that $100.00 will only be accepted with payment in advance, and/or at the full discretion of OILCO. Special quotations may be obtained from OILCO for products not covered by published prices. Such item quotations are firm for 30 days after the date of the quotation, unless otherwise indicated. Typographical errors subject to correction.

6. Payment Terms. All shipments are made with terms of the net 30 days from the date of invoice payable in US dollars. An account with is delinquent may be subject to a finance charge of 1.5% per month or the maximum allowable by law on past due invoices. If, during the period of performance of an order, the financial condition of the Customer is determined by OILCO not to justify the terms of payment specified, OILCO may demand full or partial payment in advance before proceeding with the work, or satisfactory security or guarantees that invoices will be promptly paid when due, or, at its option without prejudice to other lawful remedies, OILCO may defer delivery or cancel this contract. If Customer defaults in any payment when due, or in the event any voluntary or involuntary bankruptcy or insolvency proceedings involving Customer are initiated by or against Customer, then the whole contract price shall be immediately become due and payable on demand, or OILCO, at its option without prejudice to its other lawful remedies, may defer, deliver or cancel this contract.

7. Delivery and Title. OILCO attempts to ship all orders as promptly and efficiently as possible. However, orders are accepted with the express understanding that OILCO will not be liable for any losses or damages resulting from any delays in shipment or delivery due to any cause whatsoever. OILCO reserves the right to make delivery in installments, unless otherwise expressly stipulated in the formal sales order; and all such installments, when separately invoiced, shall be paid for when due per invoice, without regard to subsequent deliveries. Delay in delivery of nay installment shall not relieve Customer of its obligations to accept remaining deliveries. OILCO reserves the right to charge for an expediting fee where special delivery circumstances might apply. Title to the Goods, and all accessories to or products or proceeds of the Goods, shall remain with OILCO until payment in full of the purchase price and of other amounts owing by Customer. To the extent legal title to the Goods shall be deemed by law to pass to Customer at the time of delivery and prior to performance of all of Customer's obligations hereunder, equitable title shall remain in OILCO until payment in full of the purchase price. Customer shall grant, and by acceptance of the Goods shall be deemed to have granted, to OILCO, at first security, purchase money security, interest in all Goods to secure payment of the purchase price and other amounts owing by Customer and performance of all Customer's obligations hereunder. Customer shall permit OILCO to file this Agreement or financing statement(s) pursuant to the applicable Uniform Commercial Code or other applicable laws to evidence and/or perfect OILCO's security interest in the Goods. On request, Customer shall execute any and all documents and agreements in this regard and assist OILCO in any filing thereof. OILCO may reclaim any goods delivered to Customer or in transit if Customer shall fail to make payments when due.

8. Shipment and Risk of Loss. All shipments (to established OILCO customers) are F.O.B. Monmouth Jct. Full freight is allowed on surface transportation within the continental US for orders of $5000.00 net or more. This allowance only pertains to those products deemed as 'standard product line' and not oversized. Any orders not meeting OILCO's freight allowed policy will shipped collect or prepaid and added to the invoice. OILCO reserves the right to select freight routing. All freight claims and tracers are Customer's responsibility. During shipment and during any return shipment to OILCO, Customer shall bear all risk of loss thereto, and carry adequate insurance, for any and all loss, damage or destruction.

9. Shortages. Claims for shortages in shipment and errors in freight charges must be reported to OILCO within 15 days of the invoice date.

10. Instructions and Partial Lists. Where needed, one copy of the OILCO standard instructions and parts list is packaged and shipped with each product. When special instructions or parts lists are required with complete specifications must be submitted to the OILCO Sales Department for quotation.

11. Factory Inspection and Tests. Each OILCO product is required to pass standard factory inspections and tests prior to shipment. When certified tests are required, OILCO will test equipment performance under simulated conditions agreed upon with the customer (or those practices determined as standard operating tolerances by factory, if none such conditions are specifically required). All special factory inspections, certified performance tests, or other similar tests must be submitted to the OILCO Sales Department for quotation.

12. Product Return.

12.1 Return Procedure. Customer must obtain authorization from the OILCO Sales Department prior to the return of items to the factory by calling and obtaining a Return of Goods Authorization (RGA). Customer must provide the reason of the return, invoice date, and invoice number of item to be returned. All returns must be shipped freight prepaid. The RGA number must be marked on the outside of the box to be returned. Failure to have this number on the box will result in the item being returned to sender.

12.2 Returns due to Customer Error. OILCO allows 30 days from the date of receipt to return standard items purchased in error. The return will be subject to a minimum handling and restocking fee to be determined by OILCO Sales Department subject to a $100.00 minimum plus any charge for necessary reconditioning of the item. Returns after 30 days must be approved in advance by the OILCO Sales Department.

12.3 Returned due to OILCO error. All requests to return items due to errors by OILCO must be made within 30 days of the receipt date. Upon receipt and acceptance of the items by OILCO, full credit will be issued.

12.4 Returns under warranty. Goods returned under warranty are inspected at the factory to determine the nature of the defect. If after such inspection OILCO confirms that a defect exists that is covered by the applicable warranty and that such has not become invalid, OILCO will repair or replace the items subject to the conditions set forth in this Agreement. If OILCO determines during the inspection that the applicable warranty has become invalid, Customer will be contacted for the returned items salvage instructions. If salvage instructions are not received within 30 days after notice has been given, the returned items will be scrapped.

12.5 Specialized Goods. Custom and assembled loading arms, special swivel joints and other special products are made to order and not returnable. Parts, repair kits, and seal replacement kits will not be accepted for return.

13. Warranties.

13.1 Standard Warranty. Except as otherwise set forth in this Agreement and subjected to the terms and conditions herein, OILCO warrants that all items will meet the specifications from the products as published by OILCO for a period of 12 months after shipment from the factory. Subject to the terms and conditions set forth in this Agreement, if within the warranty period such items shall be proved to OILCO's satisfaction to be non-conforming, OILCO will either, its sole discretion, repair or replace the defective product without charge. Customer must notify OILCO in writing within the warranty period of any such alleged defects. OILCO, in it sole discretion, may require Customer to return the allegedly defective parts or items to its factory for verification of any claim.

13.2 Limitations of Warranties. The limited warranties contained in this Section 13 shall be valid and remain in effect only if: (a) the items are used, maintained, installed, stored and repaired by Customer as required by all applicable documentation; (b) Customer has paid OILCO all sums due hereunder; (c) Customer has not in any way modified the items; (d) the claim is unrelated to normal wear and tear, corrosion or erosion, or to any good normally consumed in operation or that has a normal life inherently shorted that the applicable warranty period; (e) the claim is unrelated to the failure by Customer to follow the most current instructions issued by OILCO with respect to the proper use of the items; (f) the claim is unrelated to Customer's provided materials, assembly, specification(s) or design(s) or to the negligence or act of Customer or any third party; (g) there has been no operation or use of the items under conditions more severe that those for which the items were specified; or (h) the claim is unrelated to force majeure.

14. Exclusion of Consequential Damages and Disclaimer of Liability. The foregoing sections 12.4 and 13 shall provide Customer's sole and exclusive remedy under this Agreement for any claim whatsoever. The exclusive remedy shall not be deemed to have failed its essential purpose so long as OILCO is willing and able to repair or replace non-conforming items within a reasonable time after Customer proved to OILCO that a non-conformity is involved. Except as warranted in Section 13, the *goods are sold hereunder as is, and no warranty of any kind, express, implied or statutory, whether in relation to merchantability, hidden defects, fitness for particular purpose, course of performance, course of dealing, usage of trade, non-infringement or otherwise is given by OILCO to Customer or any other party. OILCO shall not under any circumstance be responsible for any loss or damage, indirect, special, ordinary, exemplary, consequential, or otherwise (including, but not limited to, loss of revenue, profit or use or cost of capital or of substitute use or performance), arising out of the transactions contemplated hereunder. Under no circumstances shall OILCO's total liability of all kinds arising out of or related to this Agreement (including, but not limited to any warranty claims hereunder), regardless of the forum and regardless of whether any action or claim is based on contract, tort, strict liability or otherwise, exceed the total amount paid by Customer to OILCO hereunder (determined as of the date of any final judgment in such action).* The warranties set forth in Section 13 do not cover any expense incurred in repairs or alteration made outside the OILCO factory without prior authorization, nor do they cover in any way the performance of equipment, which has been revised or altered by others. Customer is wholly responsible for establishing the suitability of the product for his or her particular application and operating conditions, which do not exceed product limitations.

15. Force Majeure. Other than a party's payment obligations under this contract, neither party shall be liable for any default or delay in delivery due to causes beyond its reasonable control, such as acts of God, acts of the other party that cause delay, acts of civil or military authority, fires, strikes, floods, delays in transportation, government regulation (whether valid or not), or inability due to causes beyond the control of Seller to obtain necessary engineering talent, labor or materials. In the event of such delay, the delivery shall be extended for a period equal to the time lost thereby.

16. Safety and Indemnification. Customer in its use of the product shall comply with all statutes, laws, ordinances, regulations and/or guidelines of any applicable jurisdiction or agency, including without limitation, the Occupational Safety and Health Act of 1970, as amended. Customer shall ensure that its personnel are, at all times, trained in the proper use and/or operation of items and that the items are in accordance with applicable manuals, documentation and instructions. Customer shall indemnify, defend and hold OILCO harmless from and against all claims, damages, losses, judgments, fees, expenses and costs, including attorney's fees, as incurred, arising out of or resulting from Customer's failure to comply with or in any way related to its breach of this Agreement and or to the matters contained in Sections, 3, 5, 7, 8 and 18.6.

17. Severability. If any provision or portion thereof of this Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, such illegality or unenforceability shall not effect the validity and enforceability of any legal and enforceable provisions hereof. *It is expressly understood and agreed that each and every provision of this Agreement that provides for a limitation of liability, disclaimer of warranties or exclusion of damages, is intended by the parties to be severable and independent of any other provision and to be enforced as such.* The remaining provisions shall be construed as if such illegal and unenforceable provision or provisions had not been inserted herein, unless such illegality or unenforceability shall destroy the underlying business purpose of the Agreement. Customer waives any governmental immunity, if applicable, to any and all causes of action.

18. Miscellaneous.

18.1 None of the provisions of this Agreement shall be deemed to have been waived by any act of or acquiescence on the part of OILCO, its agents, subcontractors, or employees, or by any subsequent Customer correspondence, purchase order or the like, but only by an instrument in writing signed by an authorized representative of OILCO. No waiver by OILCO of any provisions of this Agreement shall constitute a waiver of any other provision or of the same provision on another occasion.

18.2 It is expressly declared that this Agreement and the relationship between the parties hereby established do not constitute a partnership, joint venture or agency arrangement between them.

18.3 This Agreement shall be binding upon and inure to the benefit if the parties hereto and their respective successors and assigns. Customer may not assign its rights or obligations under this Agreement in any way without written consent of OILCO. OILCO may use subcontractors as it deems necessary.

18.4 This Agreement may be amended only in writing signed by each of the parties hereto.

18.5 All notices required to be given hereunder shall be in writing. Notices shall be considered delivered and effective upon receipt when electronically with proof of transmission or by registered or certified mail postage pre-paid, return receipt requested, addressed to the parties. Either party, upon written notice to the other, may change the address to which future notices shall be sent.

18.6 Buyer shall not, directly or indirectly, export or transmit any items covered by this Agreement to any country to which export or transmission is restricted by applicable regulations or statutes of the United States or any agency thereof, without the prior written consent of the US Department of Commerce, Washington D.C. 20230 and of any other required governmental agency. Customer covenants that that items are not intended for any nuclear use or chemical or biological weapons production.

Effective February 1, 2017

Worldwide Innovation Since 1935

OILCO

LIQUID HANDLING SYSTEMS

Advanced Swivel Joint Technology

Top & Bottom Loading Arm Design

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