



Wolf Oil Tools Inc

Inflatable Products and Accessories

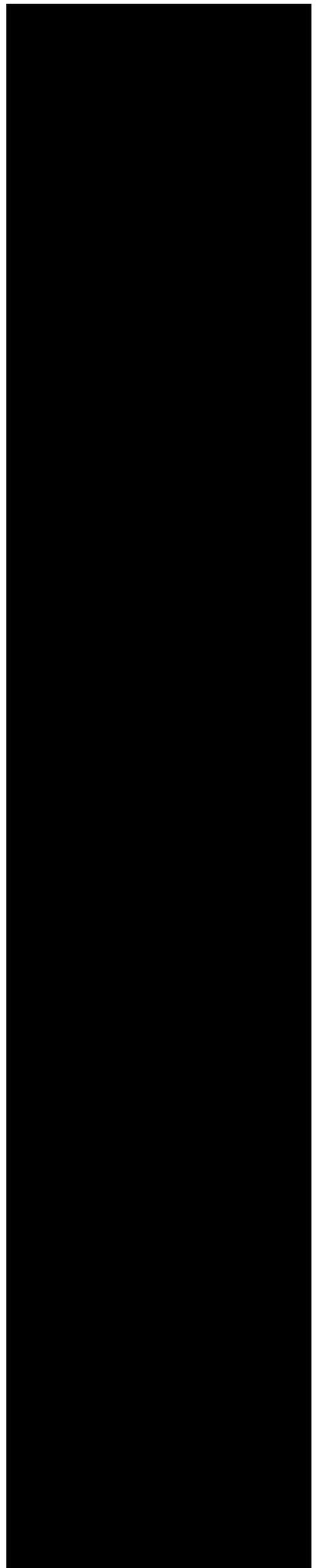




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Introduction to Wolf Oil Tools:

Wolf Oil Tools Inc. is a Canadian based manufacturing company specialized in manufacturing and marketing Inflatable Packers and Tubing Accessories.

Our company offers advanced, proven product lines which meet exacting quality assurance standards to ensure maximum equipment performance and customer satisfaction.

Our customers both domestic and international-have come to expect excellence from Wolf Oil Tools personnel. That excellence is what we are individually and as an organization committed to.

High quality Inflatable Packers begins with careful material selection for the particular well environment. Varied well conditions dictate suitability of equipment from standard service to H₂S, CO₂ service, including extremely corrosive service.

Premium rubber elastomer is sourced from the highest quality raw materials and blended with an advanced proprietary technique. Wolf Inflatable Packer Elements are manufactured with a robust construction for the most demanding downhole conditions.

The ultimate result is maximum equipment operation performance and long-term cost savings during the life of your well.

Wolf Oil Tools Extensive Inflatable Packer product line and accessories are designed and built to deliver innovative solutions when it counts most.



Excellence through innovation for the life cycle of the Well Bore:

Drilling:

- **Stage Cementing**
- **Formation Evolution**
- **Sidetracking**
- **Abandonment Plug Back**
- **Temporary Zonal Suspension**

Completion:

- **Barefoot Completion**
- **Isolate Oil/Water Contact**



Intervention:

- **Water Shut Off**
- **Plug back**
- **Leak detection**
- **Acid stimulation**
- **Swab Evaluation**

Abandonment:

- **P&A end-of-life**
- **Wellhead Change Out**
- **Cement Plug**



External Casing Packers

Introduction

Continuous Mandrel ECP assemblies are designed with packer elements in 1-meter (3.28 feet), and 3-meter (9.84 feet) lengths. Wolf Oil Tools packer elements soundly conform to irregular or washed-out hole diameters. Steel reinforcement slats are used within the elements to ensure that the ECP self-centers itself in vertical, deviated, or horizontal wellbores.

Tools are available in special clearance models. Special clearance tools are used for applications where restricted hole diameters may occur.

Continuous Mandrel ECP assemblies are typically inflated with cement displacement fluid. An integral screen prevents coarse particles from entering the valve system. The valves are designed with high quality materials, which will not erode when abrasive materials are pumped through the system.

The Wolf Oil Tools lock out valve system provides positive closing, after the element has been fully inflated to pre-determined pressure. After the shear valve has shifted to the final closed position, a mechanical locking device ensures that no further movement will occur.

Wolf Oil Tools inflatable elements are made with advanced elastomer compounds. The proprietary Wolf Oil Tools advanced elastomer compounds may be used for temperatures up to 350° F (180° C).

Applications

- Support Primary Cement
- Isolate Lower Zones during Multi-Stage Cementing
- Isolate Lost-Circulation Zones during Cementing
- Segregate Production Zone
- Isolate Lost-Circulation, Gas, or Water Zones
- Plug and Abandonment

Design Features

- Constructed on a continuous joint of casing
- Special Clearance models for restrictive wellbores
- Inflatable Packer Element seal lengths available in 1m, 3m, or 6m
- Rated for up to 350°F (180°C) applications





Customer Benefits

- No hidden internal connections
- No welding to the ECP mandrel
- Redundant Inflation Valve Seals
- Opening Valve provides delayed setting
- ECP's are fully customizable to match casing and customer requirements

Specifications

Available ECP Sizes

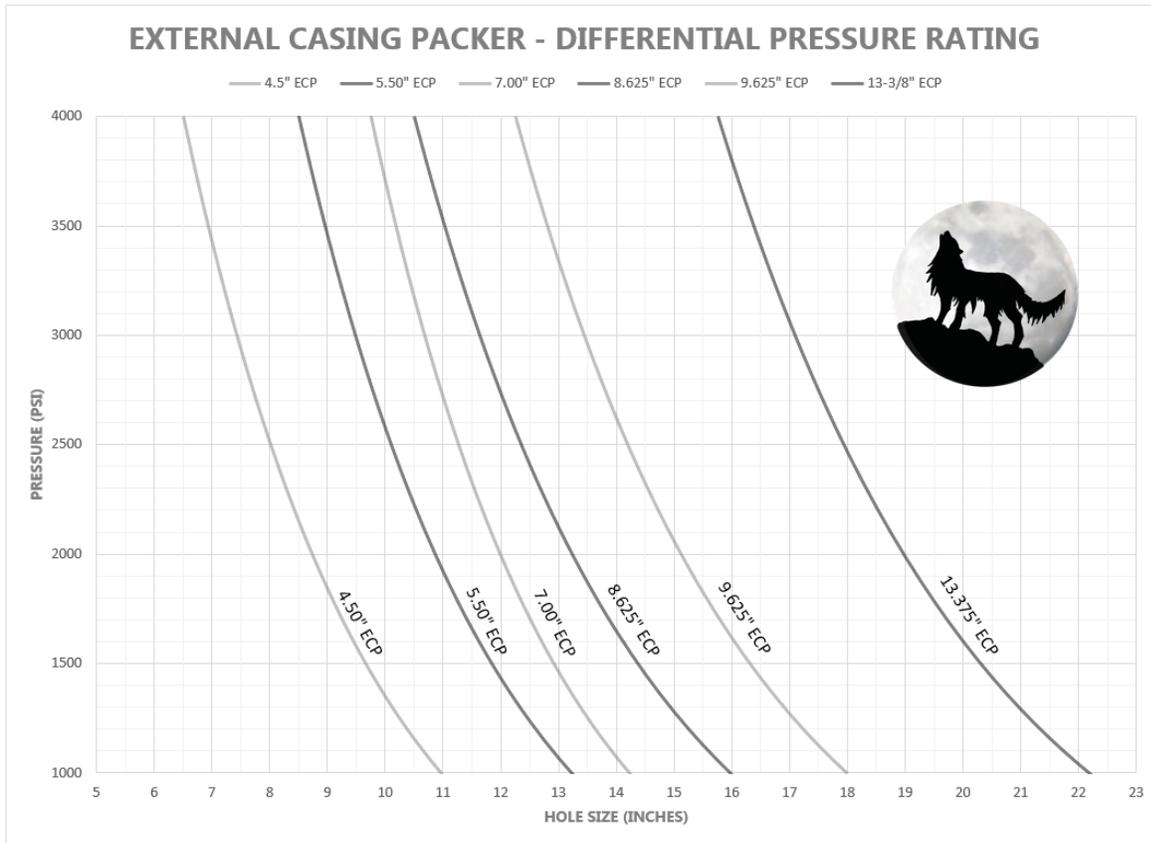
External Casing Packer Size			
Casing Size		Element Outside Diameter	
inches	mm	inches	mm
4.50	114	5.50	140
5.50	140	6.50	165
7.00	178	8.06	205
8.625	219	10.25	260
9.625	244	11.25	286
13.375	340	15.25	387



Differential Pressure Chart



Use the chart by identifying the relevant curve for the ECP Casing Size being used. Draw a vertical line from the relevant setting Hole Size Axis (X-Axis) until it intersects with the relevant ECP Casing Size curve. Draw a horizontal line from the intersection point to the Pressure Axis (Y-Axis); this pressure value defines the Differential Pressure Capability of the ECP.

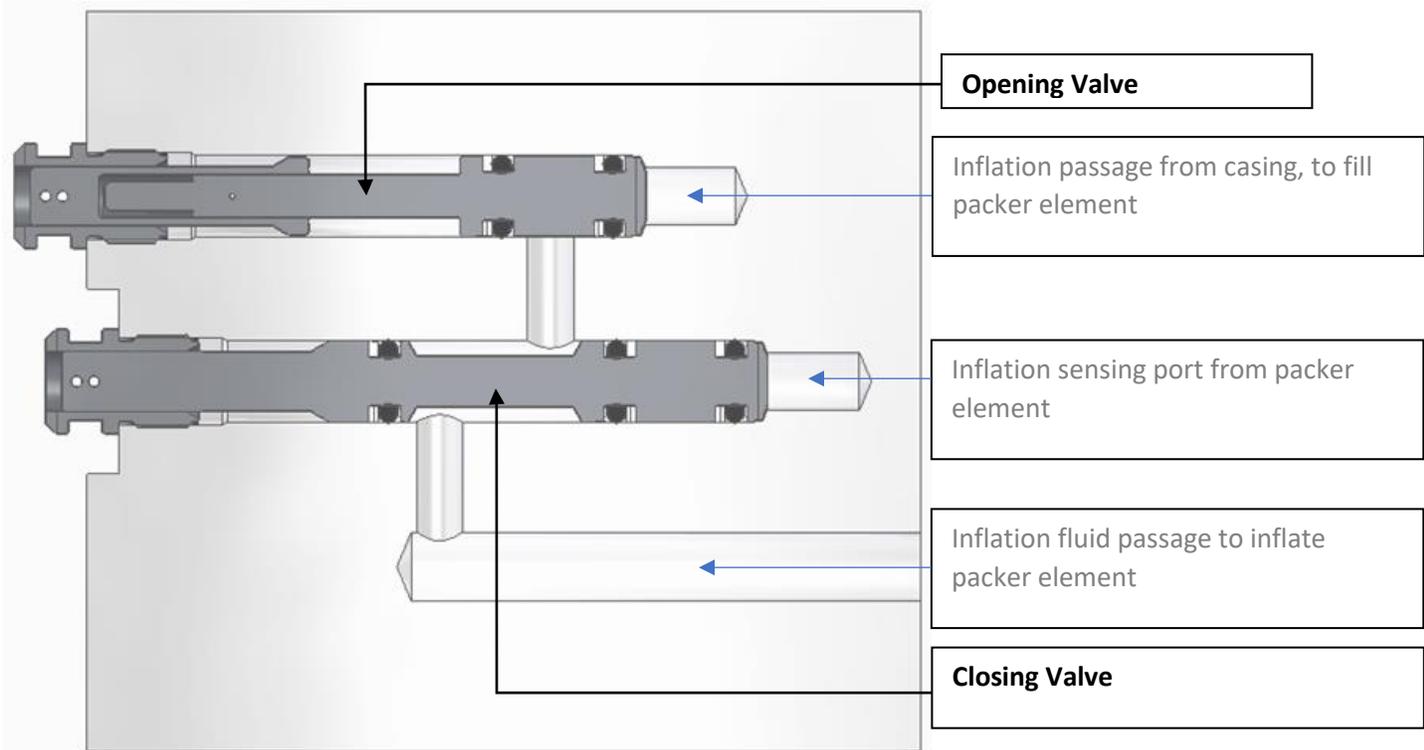




ECP Valve Operation

Wolf Oil Tools ECP's are designed with a minimum two valves per assembly, depending on size. The valves allow the ECP to be inflated and ensure that once inflated the pressure is maintained inside the element. The opening valve prevents any fluid from entering the packer element until a pre-determined pressure is reached inside the casing. The closing valve is sheared to the closed position once the inflate packer is fully expanded, and a pre-determined pressure is reached inside the element. Once internal casing pressure is bled off, the opening valve then moves into a positively locked closed position. This is a safety feature that maintains casing integrity in the unlikely event that the packer element was to rupture.

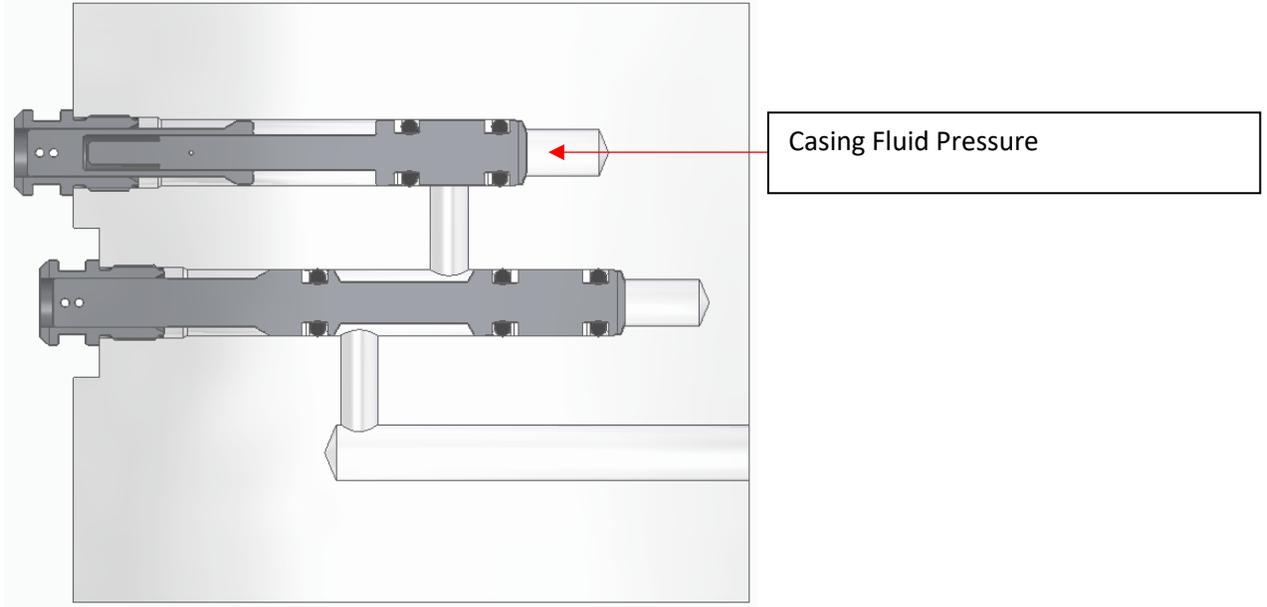
Each Wolf Oil Tools valve is specially hardened for erosion. Testing shows, that when inflating using large inflation volumes, which can be encountered on larger assemblies, severe washing and erosion is possible in ECP valves. The Wolf Oil Tools treatment provides a surface hardness in excess of Rockwell (Rc) 80, which minimizes the effects of abrasives. ECP valve pressure settings may be easily changed on location, just prior to running the tool using the supplied shear pin cards.



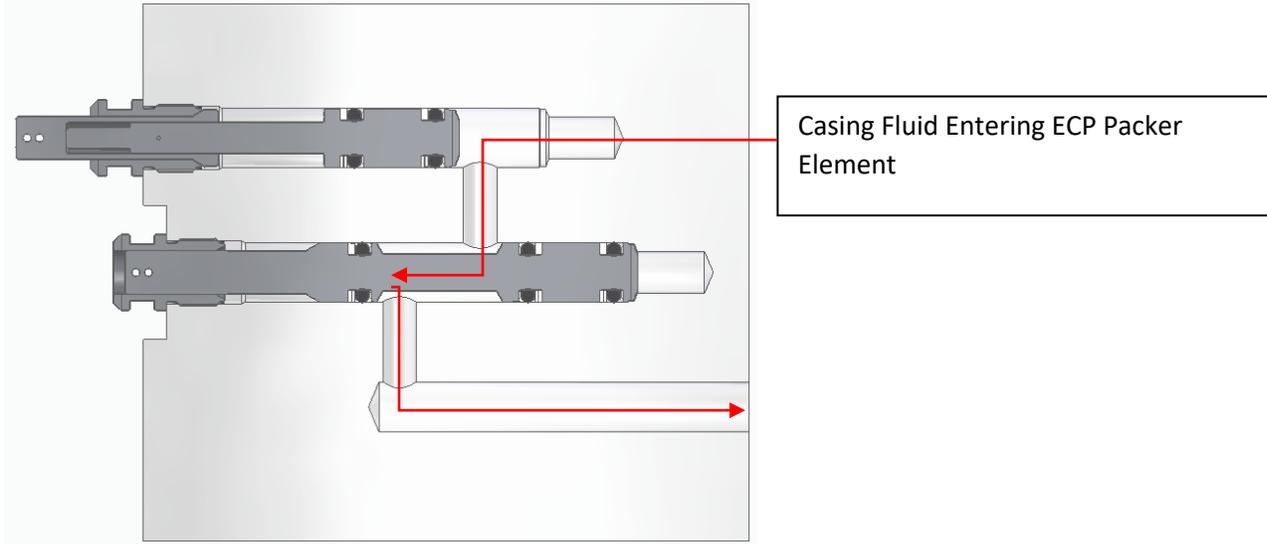
Step 1:



Running In
Opening valve closed



Step 2:
Opening Valve Sheared
Element inflating opening valve in open position

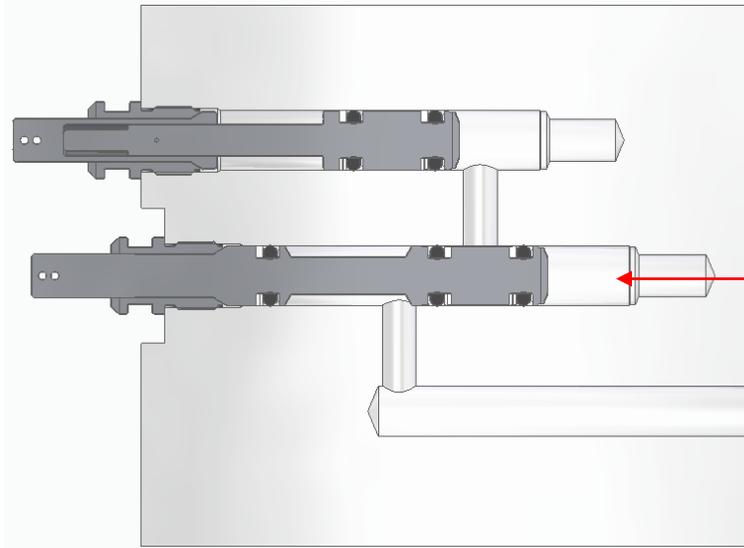


Step 3:



Element Fully Inflated

Closing valve sheared close in closed position

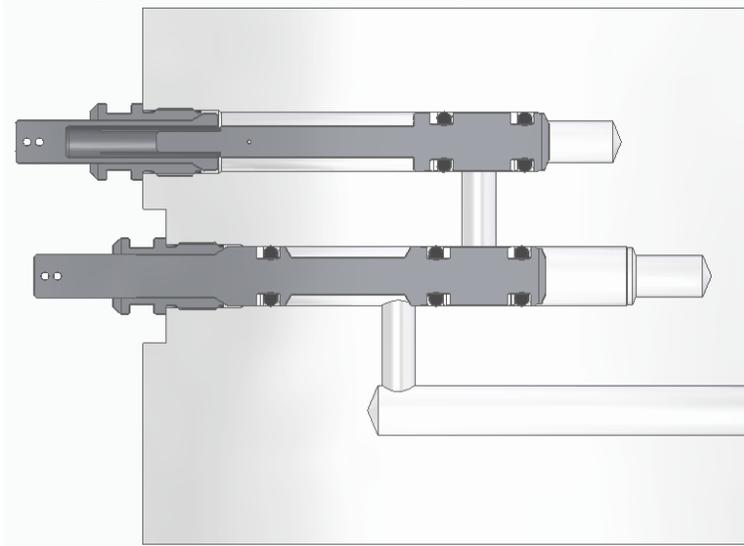


Inflation sensing port, closing valve shear value exceeded inflation pressure trapped inside packer element

Step 4:

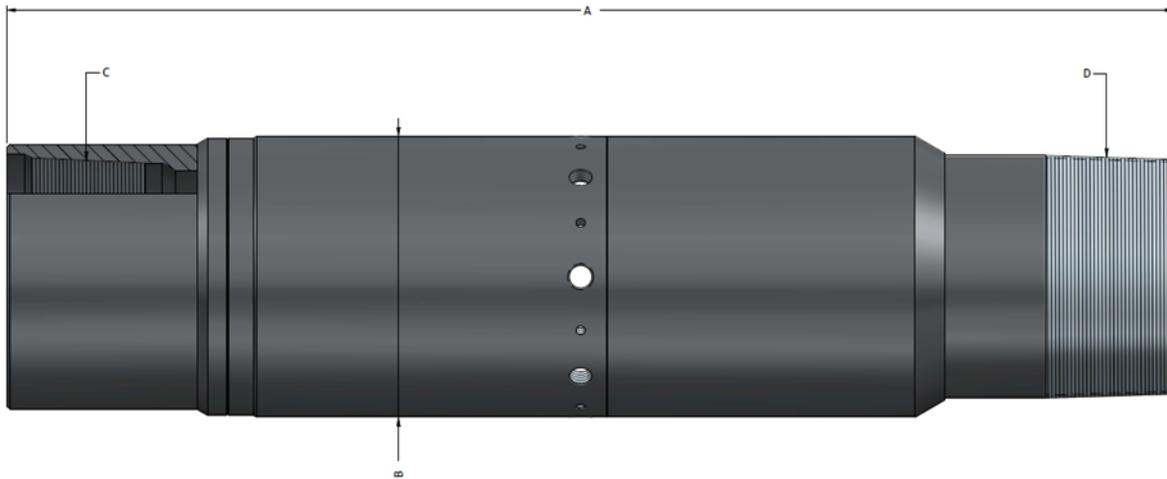
Pressure Bled off Casing

Opening valve locked in the closed position





Wolf Oil Tools Hydraulic Stage Collar



Introduction:

The Hydraulic Stage Collar is used to effectively cement an upper section of the casing string above an External Casing Packer (ECP) assembly. In some cases, a lead slurry is circulated around the lower section of the casing string. For other applications, slotted liners or bare-foot completions make cementing below the ECP unnecessary, or undesirable.

The stage collar is hydraulic opening. Circulating ports are opened by continuing to apply internal casing pressure after the ECP is set. Normally, pressure required for opening the circulating ports is adjusted to about 500 PSI (3.5 MPa) greater than the ECP operating pressure. Circulating ports are closed by the cement displacement plug. The port closing sleeve is positively locked in position after cementing. Internal parts are easily drilled to provide a full opening bore through the port collar assembly.

Features:

- Hydraulic Stage Collar may be used in vertical, deviated or horizontal wells. No free-fall plugs are required to operate the system
- The tool body is manufactured from alloy grade steel that is able to resist high bending forces in the well radius
- When run above an ECP assembly, system is very effective for blocking gas migration through cement, and for minimizing cement losses to thief zones
- Hydraulic Stage Collars are manufactured with the same thread specifications as customer installed casing strings
- A latch ring positively locks closing sleeve in closed position
- Optional composite seats allow for quick drill out



Stage Tool Specifications:

Casing Size		Casing Weight	
Inches	mm	lb./ft	kg/m
4-1/2"	114.3	9.5-11.6	14.14-17.26
		13.5-15.1	20.09-22.47
5-1/2"	139.7	14-15.5	20.83-23.07
		17-20	25.30-29.76
7.00"	177.8	20-26	29.76-38.69
		29-32	43.16-47.62
9-5/8"	244.48	32.3-36	48.07-53.57
		40-53.5	59.53-79.62
13-3/8"	339.7	54.5-61	81.10-90.78
		68-72	101.20-107.15

Standard Plug Set:





Operating Principles:

While running the casing string in the hole and during the cementing of the first stage, the stage collar remains in the closed position. The first-stage flexible plug passes through the stage collar without actuating the sleeves. To open the stage collar cementing ports, pressure is applied in the casing to shear the opening sleeve shear screws and to move the sleeve down to expose cementing ports.

Second-stage cement is then pumped and displaced with the closing plug. The closing plug lands on the closing sleeve seat and pressure is applied to shear the closing sleeve shear pins and force the sleeve down to close the cementing ports. The closing sleeve is permanently latched in the closed position.



Production Injection Packers

Cable Element Construction:

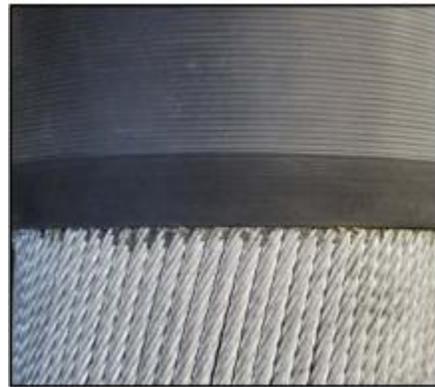
The Wolf Oil Tools Inc. Cable elements are available in two different configurations.

- 1) The first configuration is a full rubber cover element which is primarily used in open-hole applications to provide sealing capabilities inside washed-out or irregular wellbores.
- 2) The second configuration utilizes exposed aircraft cables section that provides superior anchoring inside casing.

Both cable elements are manufactured with a robust construction for demanding downhole conditions. This includes aircraft cable reinforcement which gives the cable elements excellent shape-memory characteristics for retrievability. Superior bonding techniques are used during the manufacturing process which leads to less rubber being left downhole.

Applications Include

- Water Shut-Off
- Production
- Injection-Squeeze Cementing
- Drill Stem Testing
- Abandonments
- Formation Integrity Testing
- Water Well Grouting
- Mining Industry



Aircraft Cable for anchoring Element in casing

Element Specifications

Available Sizes & Dimensions

Element O.D.		Element I.D.		Element Thread Connections
Inches	mm	Inches	mm	Inches
4.25	108	2.50	63	3.875-6 Stub Acme
5.50	140	3.25	82	4.875-6 Stub Acme
6.75	171	3.375	85	4.875-6 Stub Acme
7.50	191	4.25	108	6.250-6 Stub Acme
9.50	241	6.00	152	8.250-6 Stub Acme

* All cable element seal lengths 48" (1.22 m) long

* Overall cable element length is 66" (1.68 m)



General Characteristics

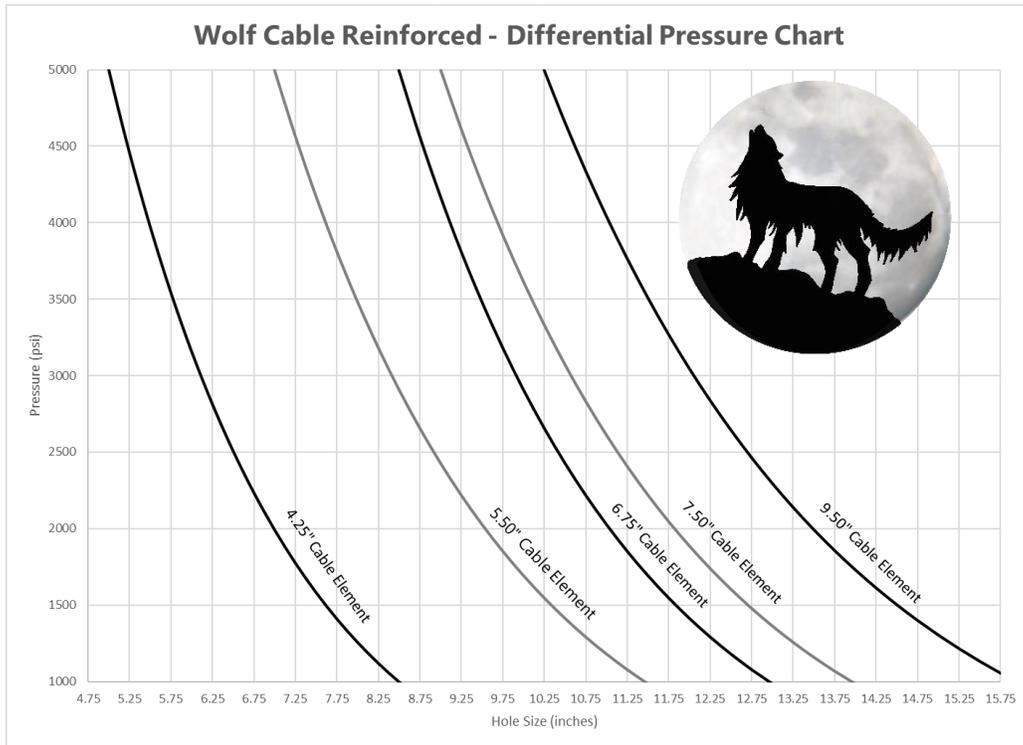
Common Name	HNBR 70
Durometer	70
Tensile Strength	2875
Elongation (Maximum %)	690
Compression Set	Good
Resilience – Rebound	Good
Abrasion Resistance	Excellent
Tear Resistance	Excellent
Solvent Resistance	Excellent
Oil Resistance	Excellent
H2S Resistance	Excellent
CO2 Resistance	Excellent
Life Expectancy vs. Temperature	
194°F (90°C)	40 Years
250°F (121°C)	10 to 20 Years
300°F (150°C)	5 to 10 Years
392°F (200°C)	2 to 5 Years
482°F (250°C)	3 Months
600°F (315°C)	Hours

Element Construction





Differential Pressure Chart



Single Set Inflatable Production Injection Packer



Introduction:

The Inflatable Single Set Production-Injection Packer is used for isolating zones in open-hole or in casing. The tool is retrievable and may be used for testing, treating, production, or injection. The tool may also be used as a retrievable bridge plug. For horizontal wells, two tools may be spaced with blank tubing to provide a scab liner system. Production may then take place from above and/or below the scab liner system.

The Wolf Oil Tools Inc. Cable elements are available in two different configurations;



- 1) The first configuration is a full rubber cover element which is primarily used in open-hole applications to provide sealing capabilities inside washed-out or irregular wellbores.
- 2) The second configuration utilizes exposed aircraft cables or steel strip section that provides superior anchoring inside casing.

Both style of element is manufactured with a robust construction for demanding downhole conditions. This includes aircraft cable reinforcement which gives the cable elements excellent shape-memory characteristics for retrievability. Superior bonding techniques are used during the manufacturing process which leads to less rubber being left downhole

Features:

Wolf Oil Tools Single-Set Packers are designed and built to provide optimum performance with maximum running ease.

- Wolf Single-Set Packers can be run on wireline, coil tubing and conventional jointed pipe
- Wolf Single-Set Packers are built with high quality materials to client well specifications.
- No rotation required to set the packers.
- Superior expansion versus mechanical packers of similar size.
- Ideal for open hole environments and where mechanical packers can't be used.
- Pressure is equalized across element during inflation.

Applications:

Water Shut-Off

Single-Set packers may be used for long term production to block water encroachment zones in a well. As the life of a well increases, water coning may occur. Also, water production may start occurring from fractures or channels. Inflatable packers provide an effective seal in open hole or in casing, to block this unwanted water production.

Production

Single Set Inflatable Packers are also very effective for production applications. The packer serves two purposes when used for these applications. Firstly, the inflatable packer element provides a very effective seal in open hole or in casing. Secondly, the element anchors solidly in open hole or in casing, to prevent tubing reciprocating or rotational movement at the tool.

For production applications, flow of oil or gas may occur from below the tool. A pum-pout sub enables the flow passage through the tool to be opened for production, after the packer has been set. Alternatively, flow of oil or gas may take place from the production zone above the packer. A circulating valve (hydraulic, rotational type, or impact plug type) enables the flow passage above the tool to be opened, after the packer has been set



Injection

Single Set Inflatable Packers may be used for injection of fluids in disposal wells. A large internal bore, equivalent to the running string, is provided through the tool. For long term disposal applications, it is very important that materials used in manufacturing these tools, are able to resist highly corrosive environments typically associated with disposal wells.

For disposal applications, fluid is normally injected to the zone located below the tool. A pump-out sub enables the injection passage through the tool to be opened for injection, after the packer has been set.

Testing

Single Set Inflatable Packers may be used for testing zones in open hole or in casing. Zones may be isolated to determine oil, gas, or water production from certain sections. Testing of each zone will determine which fluid is produced from that section. Also, testing will determine flow rates the zone. Electronic Pressure-Temperature Recorders as well as Shut-In Tools may be used with the system to provide additional subsurface data from zones being tested.

For testing applications, flow of well fluids may take place from the zone located above the packer. It is recommended that a rotational circulating valve be used directly above the tool. After the packer has been set, this valve may be rotated to open the flow ports. Once the required information from that zone is obtained, the valve may be rotated to close the flow ports.

Testing may then take place from the zone located below the tool. A pump-out sub enables the flow passage through the tool to be opened for testing.

Treating

Single Set Inflatable Packers may be used for treating zones in open hole or in casing. A large internal bore equivalent to the running string is provided through the tool. This large bore minimizes frictional effects and does not provide restrictions for treatment at high pump rates.

Typical treatments performed through the tool would be fracturing, acidizing, polymer injection for water shut-off, and acid washes.

For treating applications, a circulating valve is used above the tool. This valve is opened to allow treatment fluid to be pumped from surface, to the tool. Once the treatment fluid is spotted to the tool, the circulating valve is closed, and treatment fluid is then injected to the zone located below the packer.

Squeeze Cementing



Single Set Inflatable Packers may be used for squeeze cementing zones in open hole or in casing. These packers provide greater clearance for running tools into a well where there are restrictions such as casing patches. In addition, the long seal section provided with an inflatable element is more effective in older wells where casing may be partially corroded. These packers are particularly effective for squeeze cementing required to abandon old wells.

For squeeze cementing applications, a circulating valve is used above the tool. This valve is opened to allow cement to be circulated from surface, to the tool. Once the cement is spotted at the tool, the circulating valve is closed, and cement is then squeezed into the zone located below the packer

Bridge Plug

Single Set Inflatable Packers may be used as Bridge Plugs in a well, to isolate oil-water or gas-water contacts. These packers provide effective isolation in open hole or in casing. The long seal section provides additional assurance that good isolation will be provided where fractures or channels are present.

For bridge plug applications, a bull plug is typically used below the tool. Also, an on-off seal assembly is used directly above the tool. Once the packer has been set, manipulation of the work string allows tubing to be disconnected from the tool. In horizontal wells, a hydraulic disconnect unit is typically used. Additional pressure applied after setting the packer, disconnects the tubing string from the packer.

Scab Liner System

For horizontal wells, two Single Set Inflatable Packers may be spaced with blank tubing to provide a scab liner system. Blank tubing used between the two packers may be adjusted to any required length, based on well conditions. For this application, production may take place from the zone located below the lower packer. Also, production may take place from the zone located above the upper packer. In addition, production may take place simultaneously from the zone located below the lower packer, and from the zone located above the upper packer.

Scab liner systems are used extensively in horizontal wells where open hole carbonate or limestone formations are present. These liner systems are retrievable, making it possible to re-complete the well if subsurface conditions change.

Pressure Testing Casing Patches

Single Set Inflatable Packers are very effective for testing casing patches. Run-in diameter is reduced when a casing patch is set. An inflatable packer is designed with a reduced Outer Diameter (O.D.), which makes it possible to pass through a casing patch.



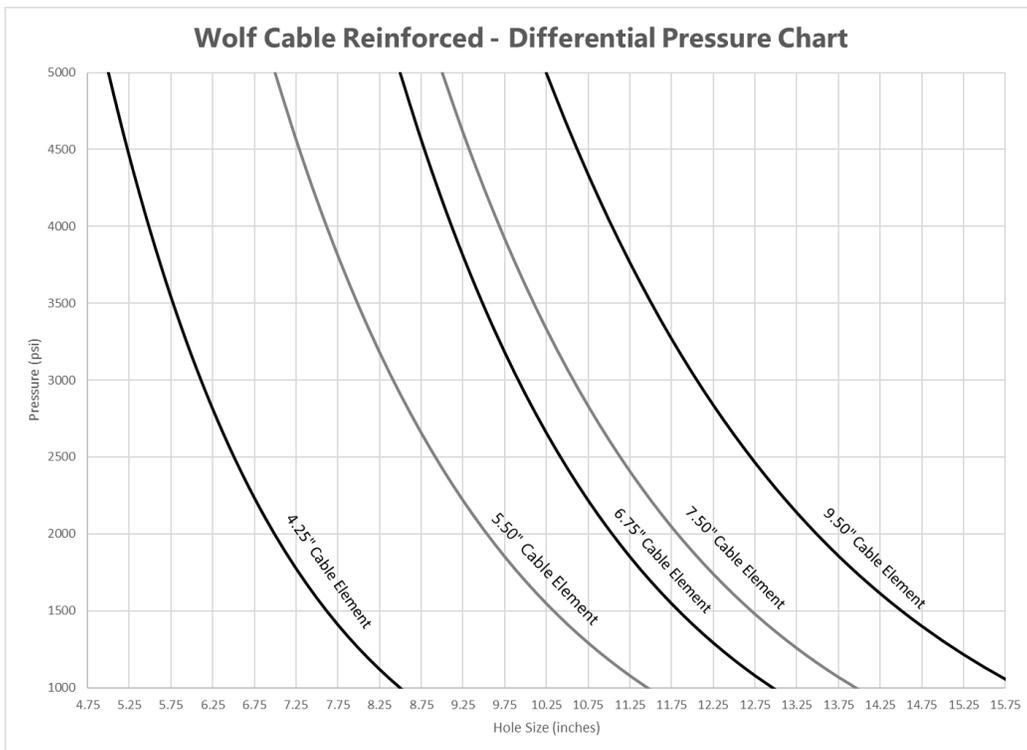
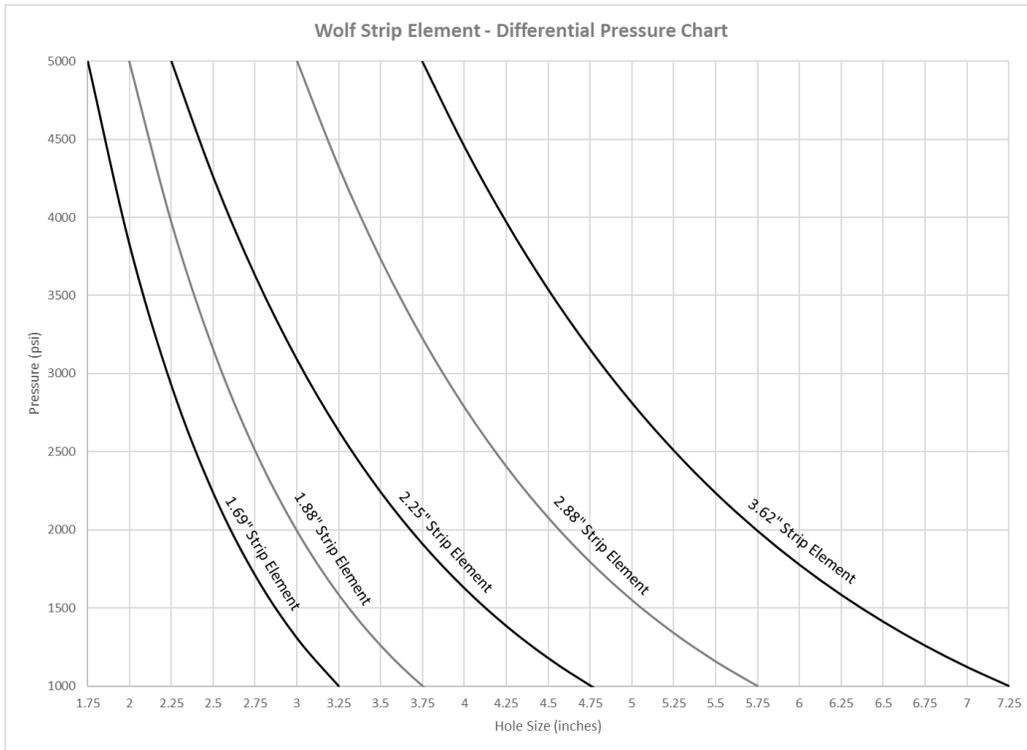
For testing a casing patch, the single set inflatable packer is normally set directly below the patch. After the packer has been set, pressure is applied to the annulus above the packer.

Single Set PIP Specifications:

Single Set O.D.		Single Set I.D.		Inflation Valve		Deflate Mechanism	
Inches	mm	Inches	mm	Poppet	Shear	Rotate	Pull
1.69	43	n/a	n/a		✓		✓
1.88	48	0.25	6		✓		✓
2.25	57	0.50	12		✓		✓
2.88	73	0.75	19		✓	✓	✓
3.62	92	1.75	42		✓	✓	✓
4.25	108	2.25	58		✓	✓	✓
5.50	140	2.50	63	✓	✓	✓	✓
6.75	171	2.50	63	✓	✓	✓	✓
7.50	191	2.50	63	✓	✓	✓	✓
9.50	241	2.50	63	✓	✓	✓	✓



Wolf Packer Element Differential Pressure Chart





Multi-Set Inflatable Production Injection Packer



Introduction:

The Inflatable Multi-Set Production-Injection Packer is used for isolating zones in open-hole or in casing. The tool is re-settable and may be used for testing, treating, production, or injection of several zones with each trip into the well. This tool is designed for long-term downhole production or injection applications.

The Inflatable Multi-Set Production-Injection Packer may be used in vertical, deviated, or horizontal wells. No rotation is required to set the packer, however right-hand rotation is required to unset the packer.

There are several options available for re-setting multi-set packers. These include:

- Re-set Darts along with a perforated plug catcher are used when pumping or testing must take place through the tool.
- An expendable ball may be used.
- A standing valve may be used.
- A Wireline plug may be used.
- A solid pump-out plug or bull plug may be used when no pumping or testing through the packer is required.

The Wolf Oil Tools Inc. Cable elements are available in two different configurations;

- 1) The first configuration is a full rubber cover element which is primarily used in open-hole applications to provide sealing capabilities inside washed-out or irregular wellbores.
- 2) The second configuration utilizes exposed aircraft cables or steel strip section that provides superior anchoring inside casing.

Inflatable packer elements for these tools are 1.67 m (66 inches) in length. Cable packer elements are manufactured with a robust construction for demanding downhole conditions. This includes aircraft cable reinforcement which gives the cable elements excellent shape-memory characteristics for retrievability. Superior bonding techniques are used during the manufacturing process which leads to less rubber being left downhole



Features:

Wolf Oil Tools Multi-Set Packers are designed and built to provide optimum performance with maximum running ease.

- Wolf Multi-Set Packers can be run on conventional jointed pipe where rotation can be applied
- Wolf Multi-Set Packers are built with high quality materials to client well specifications.
- No rotation required to set the packers.
- Superior expansion versus mechanical packers of similar size.
- Ideal for open hole environments and where mechanical packers can't be used.
- Pressure is equalized across element during inflation.

Applications:

Water Shut-off

Multi-Set packers may be used for short-term or long-term production to block water encroachment zones in a well. As the life of a well increases, water coning may occur. Also, water production may start occurring from fractures or channels. Inflatable packers provide an effective seal in open hole or in casing, to block this unwanted water production.

Production

Multi-Set Inflatable Packers are also very effective for production applications. The packer serves two purposes when used for these applications. Firstly, the inflatable packer element provides a very effective seal in open hole or in casing. Secondly, the element anchors solidly in open hole or in casing, to prevent tubing rotation or reciprocation at the tool.

Injection

Multi-Set Inflatable Packers may be used for injection of fluids in disposal wells. A large internal bore is provided through the tool. For long term disposal applications, it is very important that materials used in manufacturing these tools, are able to resist highly corrosive environments typically associated with disposal wells.

Testing

Multi-Set Inflatable Packers may be used for testing zones in open hole or in casing. Zones may be isolated to determine oil, gas, or water production from certain sections. Testing of each zone will determine which fluid is produced from that section. Also, testing will determine flow rates the zone. Electronic Pressure-Temperature Recorders as well as Shut-In Tools, may be used with the system to provide additional subsurface data from zones being tested.



Treating

Multi-Set Inflatable Packers may be used for treating zones in open hole or in casing. Typical treatments performed through the tool would be fracturing, acidizing, polymer injection for water shut-off, and acid washes.

For treating applications, a circulating valve is used above the tool. This valve is opened to allow treatment fluid to be pumped from surface, to the tool. Once the treatment fluid is spotted to the tool, the circulating valve is closed, and treatment fluid is then injected to the zone located below the packer.

Squeeze Cementing

Multi-Set Inflatable Packers may be used for squeeze cementing zones in open hole or in casing. These packers provide greater clearance for running tools into a well where there are restrictions such as casing patches. In addition, the long seal section provided with an inflatable element is more effective in older wells where casing may be partially corroded. These packers are particularly effective for squeeze cementing required to abandon old wells.

For squeeze cementing applications, a circulating valve is used above the tool. This valve is opened to allow cement to be circulated from surface, to the tool. Once the cement is spotted at the tool, the circulating valve is closed, and cement is then squeezed into the zone located below the packer.

Pressure Testing Casing Patches

Multi-Set Inflatable Packers are very effective for testing casing patches. Run-in diameter is reduced when a casing patch is set. An inflatable packer is designed with a reduced Outer Diameter (O.D.), which makes it possible to pass through a casing patch.

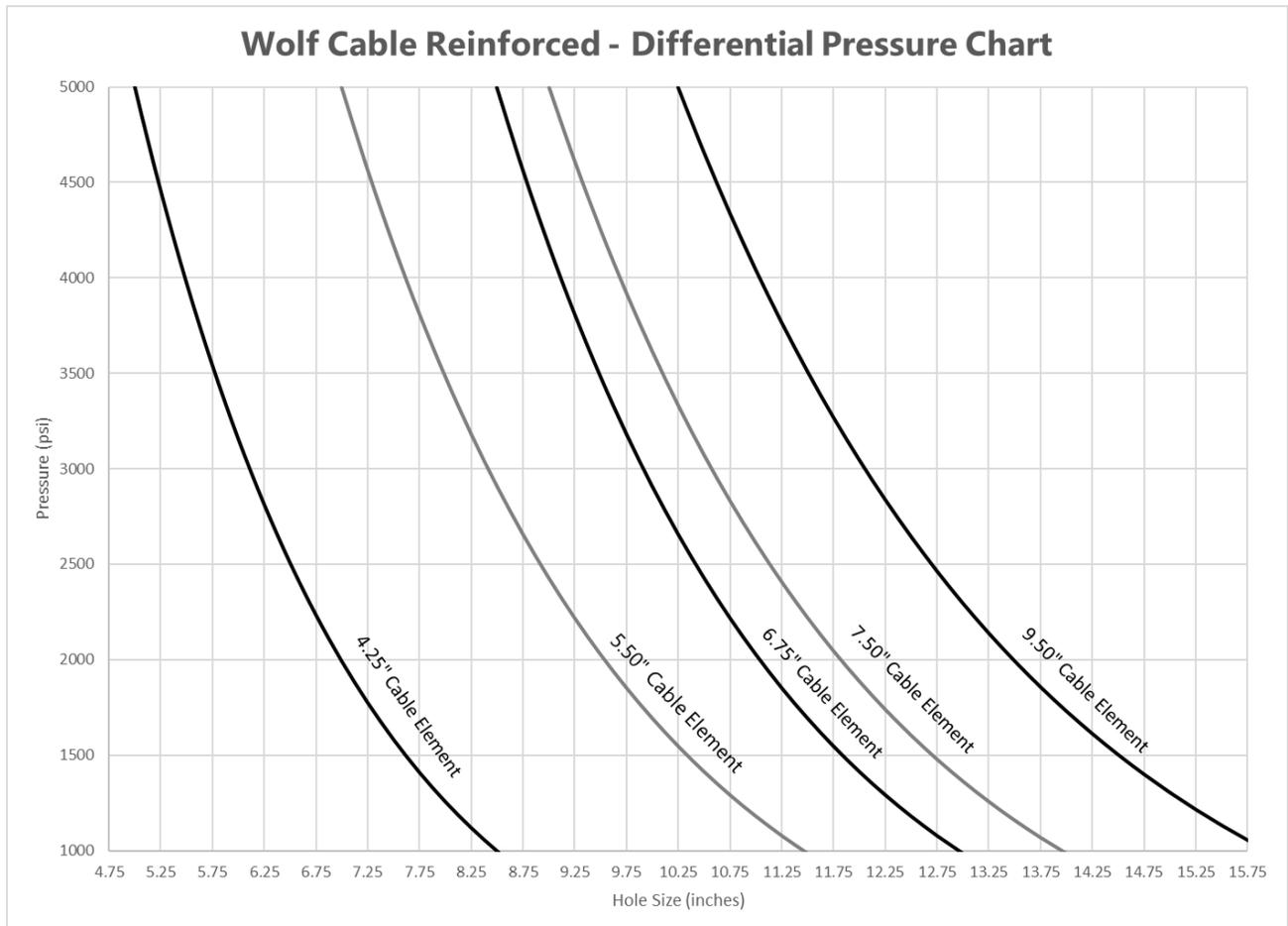
For testing a casing patch, the single set inflatable packer is normally set directly below the patch. After the packer has been set, pressure is applied to the annulus above the packer.



Multi SET PIP Specifications:

Multi-Set O.D.		Multi-Set I.D.		Element Style		Thread Connections	
Inches	mm	Inches	mm	Full	Exposed	Top	Bottom
3.50	88.9	1.25	31	✓	✓	2-3/8" EUE	2-3/8" EUE
4.25	108	2.00	50	✓	✓	2-3/8" EUE	2-7/8" EUE
5.50	140	2.50	63	✓	✓	2-7/8" EUE	3-1/2" EUE
6.75	171	2.50	63	✓	✓	2-7/8" EUE	3-1/2" EUE
7.50	191	2.50	63	✓	✓	2-7/8" EUE	3-1/2" EUE
9.50	241	2.50	63	✓	✓	2-7/8" EUE	3-1/2" EUE

Multi-Set Packer Differential Pressure Chart





Thru-Tubing Inflatable Packer:

Introduction:

The Inflatable Thru-Tubing Packer is used for isolating zones in open-hole or in casing. The tool is retrievable and can be used for testing, treating, production, or injection. The tool may also be used as a retrievable or permanent bridge plug. For horizontal wells, two tools may be spaced with blank tubing to provide a scab liner system. Production may then take place from above and/or below the scab liner system.

The Thru-Tubing Packer offers slim profile which allows a minimum of a 2:1 expansion rate.

Inflatable packer elements for this tool provide a 2 foot (0.75 m.) seal length. High strength stainless steel strips are used to provide good expansion characteristics in washed out or irregular well bores, as well as to provide high differential pressure capabilities across the packer element.

Applications:

Water Shut-Off:

Single Set packers may be used for long term production to block water encroachment zones in a well. As the life of the well increases, water coning may occur. Also, water production may start occurring from fractures or channels. Inflatable packers provide an effective seal in open hole or in casing, to block this unwanted water production.

Production:

Single Set Inflatable Packers are also very effective for production applications. The packer serves two purposes when used for these applications. Firstly, the inflatable packer element provides a very effective seal in open hole or in casing. Secondly, the element anchors solidly in open hole or in casing, to prevent tubing reciprocating or rotational movement at the tool.

For production applications, flow of oil or gas may occur from below the tool. A pump-out sub enables the flow passage through the tool to be opened for production, after the packer has been set. Alternatively, flow of oil or gas may take place from the production zone above the packer. A circulating valve (hydraulic, rotational, or impact plug type) enables the flow passage above the tool to be opened, after the packer has been set.

Injection:

Single Set Inflatable Packers may be used for injection of fluids in disposal wells. A large internal bore, equivalent to the running string, is provided through the tool. For long term disposal



applications, it is very important that materials used in manufacturing these tools, are able to resist highly corrosive environments typically associated with disposal wells.

For disposal applications, fluid is normally injected to the zone located below the tool. A pump-out sub enables the injection passage through the tool to be opened for injection, after the packer has been set.

Testing:

Single Set Inflatable Packers may be used for testing zones in open hole or in casing. Zones may be isolated to determine oil, gas, or water production from certain sections. Testing of each zone will determine which fluid is produced from that section. Also, testing will determine flowrates of the zone. Electronic Pressure-Temperature Recorders as well as Shut-In Tools may be used with the system to provide additional subsurface data from zones being tested.

For testing applications, flow of well fluids may take place from the zone located above the packer. It is recommended that a rotational circulating valve be used directly above the tool. After the packer has been set, this valve may be rotated to open the flow ports. Once the required information from that zone is obtained, the valve may be rotated to close the flow ports.

Testing may then take place from the zone located below the tool. A pump-out sub enables the flow passage through the tool to be opened for testing.

Treating:

Single Set Inflatable Packers may be used for treating zones in open hole or in casing. A large internal bore equivalent to the running string is provided through the tool. This large bore minimizes frictional effects and does not provide restrictions for treatment at high pump rates. Typical treatments performed through the tool would be fracturing, acidizing, polymer injection for water shut-off, and acid washes.

For treating applications, a circulating valve is used above the tool. This valve is opened to allow treatment fluid to be pumped from surface, to the tool. Once the treatment fluid is spotted to the tool, the circulating valve is closed, and treatment fluid is then injected to the zone located below the packer.

Squeeze Cementing:

Single Set Inflatable Packers may be used for squeeze cementing zones in open hole or in casing. These packers provide greater clearance for running tools into a well where there are restrictions such as casing patches. In addition, the long seal section provided with an inflatable element is more effective in older wells where casing may be partially corroded. These packers are particularly effective for squeeze cementing required to abandon old wells.



For squeeze cementing applications, a circulating valve is used above the tool. This valve is opened to allow cement to be circulated from surface, to the tool. Once the cement is spotted at the tool, the circulating valve is closed, and cement is then squeezed into the zone located below the packer.

Bridge Plug:

Single Set Inflatable Packers may be used as Bridge Plugs in a well, to isolate oil-water or gas-water contacts. These packers provide effective isolation in open hole or in casing. The long seal section provides additional assurance that good isolation will be provided where fractures or channels are present.

For bridge plug applications, a bull plug is typically used below the tool. Also, an on-off seal assembly is used directly above the tool. Once the packer has been set, manipulation of the work string allows tubing to be disconnected from the tool. In horizontal wells, a hydraulic disconnect unit is typically used. Additional pressure applied after setting the packer, disconnects the tubing string from the packer.

Scab Liner System:

For horizontal wells, two Single Set Inflatable Packers may be spaced with blank tubing to provide a scab liner system. Blank tubing used between the two packers may be adjusted to any required length, based on well conditions. For this application, production may take place from the zone located below the lower packer. Also, production may take place from the zone located above the upper packer. In addition, production may take place simultaneously from the zone located below the lower packer, and from the zone located above the upper packer.

Scab liner systems are used extensively in horizontal wells where open hole carbonate or limestone formations are present. These liner systems are retrievable, making it possible to re-complete the well if subsurface conditions change.

Pressure Testing Casing patches:

Single Set Inflatable Packers are very effective for testing casing patches. Run-in diameter is reduced when a casing patch is set. An inflatable packer is designed with a reduced Outer Diameter (O.D.), which makes it possible to pass through a casing patch.

For testing a casing patch, the single set inflatable packer is normally set directly below the patch. After the packer has been set, pressure is applied to the annulus above the packer.



Design Specifications:

The design specifications for the Thru-Tubing Packers are as follows:

1.69" Thru-Tubing Packer	
Maximum Outside Diameter:	1.69" (42.9 mm)
Maximum Inside Diameter:	Solid
Top Thread Connection:	1.0" AMMT
Bottom Thread Connection:	N/A

1.88" Thru-Tubing Packer	
Maximum Outside Diameter:	1.88" (45.7 mm)
Maximum Inside Diameter:	Solid
Top Thread Connection:	1.0" AMMT
Bottom Thread Connection:	N/A

2.25" Thru-Tubing Packer	
Maximum Outside Diameter:	2.25" (57.1 mm)
Maximum Inside Diameter:	0.50" (12.7 mm)
Top Thread Connection:	1.5" AMMT
Bottom Thread Connection:	N/A

2.88" Thru-Tubing Packer	
Maximum Outside Diameter:	2.88" (73.1 mm)
Maximum Inside Diameter:	0.75" (19 mm)
Top Thread Connection:	1.5" AMMT
Bottom Thread Connection:	N/A

3.12" Thru-Tubing Packer	
Maximum Outside Diameter:	3.12" (79.2 mm)
Maximum Inside Diameter:	0.75" (19 mm)
Top Thread Connection:	1.5" AMMT
Bottom Thread Connection:	N/A



Wolf Oil Tools Multi-Set Open Hole Inflatable Straddle Packer System:

Introduction:

Wolf Oil Tools Inc. is pleased to introduce our newly developed Inflatable Open Hole Straddle Packer System. The Open Hole Straddle Packer System is designed for treating, testing, or injecting of single or multiple intervals in a well-bore without the requirement of tripping between operations. The system can be operated via a single packer or a straddle packer configuration. Full bore capabilities permit maximum pumping rates with reduced horsepower requirements.

The Open Hole Inflatable Multi-Set Straddle Packer is used for selectively isolating zones in open-hole or in casing. The Inflatable Open Multi-Set Production-Injection Packer may be used in vertical, deviated, or horizontal wells. No rotation is required to set the packer or release the packer.

The Wolf Multi-Set Inflatable Straddle Packer utilizes high strength cable elements that are manufactured with a robust construction for demanding downhole conditions. This includes aircraft cable reinforcement which gives the cable elements excellent shape-memory characteristics for retrievability. Superior bonding techniques are used during the manufacturing process which leads to less rubber being left downhole. The Inflatable Packer Elements are 1.67 m. (66 Inches) in length for effective open hole zonal isolation.

Well Applications:

- Multi-Zone Fracturing using Sand and Gelled Fluids
- Acidizing and Remedial Treatment
- Open-Hole Formation Evaluation for Exploration
- Swab Evaluations
- Can be Used to set Expandable Liners

For Multi-Zone Fracturing operations, treating interval length may be determined and set prior to run-in. Typically, this could be anywhere from 10 m. (~30 Feet) to 50 m. (~150 Feet). An expendable ball is released from surface for each zone treated, however it lands into a ball catcher sub and is recovered when tools are retrieved from the well. Inflatable Packer Elements used for isolation ensure positive sealing in open-hole because seal length is 1.26 m. (4 Feet), and packers conform well to irregular or washed out wellbores.



When treatment is done, tools are recovered, leaving a full-bore wellbore for subsequent re-completions. Tools may be used for Swab Evaluation to determine which sections in a horizontal well are producing water.

For exploration wells, the Open Hole Straddle Packer System is commonly used for isolating zones in open-hole sections to determine commercial productivity of formations. This eliminates the need for running casing, cementing, perforating, and squeeze cementing in cases where zones are not commercially productive.

The Open Hole Packer System may also be used for setting Expandable Liners in wells. High pressure is applied into intervals between the packers, and this energizes expandable liner material, causing it to conform to wellbore diameters.

Wolf Straddle Packer Components Overview:

- 1) Running Tool
- 2) Upper Packer
- 3) Ported Interval Spacing
- 4) Recorder Carrier (Optional, Not Shown)
- 5) Interval Spacing
- 6) Lower Packer





Wolf Running Tool:

The Wolf Straddle Packer System can be run with different types of running tools. This is dependant on what setting mechanism is required.

Features of the Straddle Packer Running Tool:

- Circulation port allows tubing to auto fill and reverse circulation while running in hole.
- New Ball and Ball design is pressure volume balanced. (no upward force when treating).
- Can be set multiple times without tripping out of hole.
- After setting, the Ball or Dart is pumped into a catcher leaving the running tool with full bore ID (Excludes Ball and Prong Running Tool).
- Available in EUE or IF Connections.
- No need for rotation to operate.

Ball and Ball/Pin Running Tool

- Requires a Ball dropped from surface for each set
- Setting ball seats on balls or pins to create a restricted flow path which inflates packers
- After the packers are set, the is compressed and the setting ball is expelled to the below ported interval spacing

Ball and Prong Running Tool

- Does not require a setting ball to be dropped from surface
- Uses a ball on a seat to set packer
- Once the straddle packer system is set, tool is compressed, and a prong pushes the ball off the seat allowing communication to the formation

Dart Running Tool Running Tool

- A Wolf Reset Dart is pumped into a dart seat to set packers
- Once the packers are set, the reset dart is sheared out and pumped into a dart catcher below the ported interval spacing



Wolf Upper Packer Assembly:

- Equipped with high strength cable reinforced inflatable packer element
- Bypass ports inflate element and provide inflation passage to lower packer
- Full Bore ID for maximum injection rates

Wolf Interval Spacing:

- Ported interval spacing for communication for injection (1)
- Interval spacing also provides passage to inflate channel to the inflate lower packer (2)
- Ball Catcher with cross over to lower packer is assembled on the bottom of the interval spacing (3)

Wolf Lower Packer Assembly:

- Equipped with high strength cable reinforced inflatable packer element
- Bull Plug or pump-out sub on bottom

Optional Wolf Straddle Packer Components:

Tension Shear Release Sub:

- Emergency release from the Wolf Straddle Packers System
- Tension (Pull) Release 50,000 lbs over pull required

Rotational Release Sub:

- Emergency Rotate release from the Wolf Straddle Packer System if required
- Right hand rotation required to operate



Electronic Recorder/Gauge Carrier:

- Holds up to four downhole electronic gauges
- Two external gauge pockets
- Two internal gauge pockets

Drag Spring:

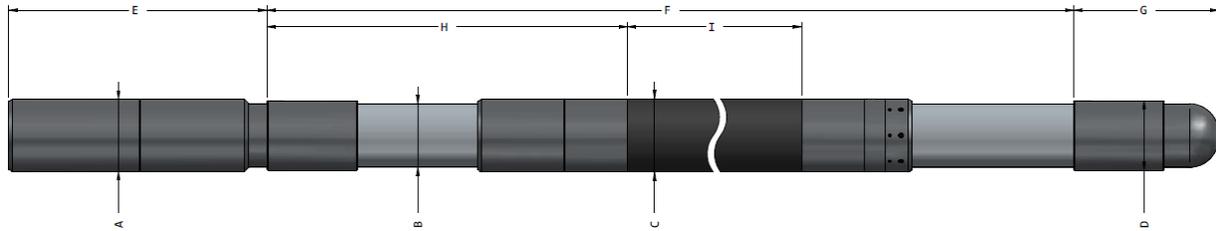
- Run at bottom of string
- Ensure there is sufficient drag in horizontal well bores to stroke open Wolf Straddle Packer System

Wolf Straddle Packer Available Sizes

Chassis Tool OD:	Element OD:	Element Seal Length	Top Thread Connection
2.75" (70 mm)	2.75" (70 mm)	48" (1.22 m)	1.5" AMMT
	3.12" (79 mm)		
3.62" (92 mm)	3.62" (92 mm)	48" (1.22 m)	2-3/8" EUE
4.25" (108 mm)	4.25" (108 mm)	48" (1.22 m)	2-7/8" EUE
	4.62" (117 mm)		
	5.06" (129 mm)		
	5.50" (140 mm)		
5.06" (128 mm)	6.75" (171 mm)	48" (1.22 m)	3-1/2" IF5.06
	7.50" (191 mm)		
	9.50" (241 mm)		



Wolf Plug & Abandonment Combination Kits:



Introduction:

The Wolf Oil Tools Inflatable Plug & Abandonment Combination is the perfect solution to properly plug and abandon wells that are no longer commercially viable. The Wolf P&A Combination is an inflatable bridge plug that is specifically built for today's tough and challenging economical times. With a large two to one expansion ratio the Wolf P&A Combination is ideal for several P&A open hole and cased hole applications.

Application:

- Well Decommissioning
- Permanent Zonal Isolation

Benefits:

- Complete P&A Package
- Modular Design, easily accommodates additional tools such as stage cement collars, mechanical on/off tools, check valves and darts

Wolf P&A Combination Package Includes:

- **Bull Plug** the bull plug is used to pressure up against and set the packer and isolates the string to create a permanent barrier)
- **Abandonment Packer** The abandonment packer would effectively create an annulus seal to isolate above and below the packer
- **Hydraulic Disconnect** the hydraulic disconnect is used to hydraulically disconnect from the plug and abandonment packer
- **Pup Joint** to handle BHA at Surface
- **One Joint** of Tubing to space out BHA
- **Right Hand Release Disconnect Tool** (redundancy release option to mechanically release from the BHA if hydraulic disconnect does not function. Six Right hand rotations to disconnect)
- **Wye Sub** (well control, allows string to self-fill while running in hole. Can be circulated through in case well control is required)



Tubing Accessories

Hydraulic Disconnect:



Introduction:

The Hydraulic Disconnect Assembly allows the tubing string to be disconnected from permanent or retrievable tools, which must be left in the well. These tools are typically used in highly deviated or horizontal wells where tubing rotation is very difficult. In addition, these tools are used for coil tubing operations. Hydraulic pressure is applied to disconnect. No tubing rotation is required to operate this tool.

The Hydraulic Disconnect Assembly consists of two primary components. The lower portion of the tool is a lug nipple, threaded onto the packer assembly. This nipple is disconnected from the running tool and remains down hole attached to the packer. The upper portion of the running tool is the release coupling. This coupling remains latched to the lug nipple until pressure is applied to disconnect the tubing string from the packer. When internal string pressure reaches a pre-determined value, based on the number of shear screws used, screws in the running tool are sheared. This causes the Shear Valve to shift, and the tubing string is disconnected at that point.

Operating Principles:

Disconnect Procedure:

To disconnect the Lug Nipple from the Disconnect Coupling, apply pressure slowly to the tubing until the specified shear screw values are reached. Once separation has taken place, the tubing sting may be pulled freely upward, and retrieved from the well, if necessary.

Retrieval Procedure:

To latch onto the Lug Nipple, it is necessary to run in with a retrieval overshoot threaded to the bottom of the tubing string. As the overshoot is lowered to the Lug Nipple, it is good practice to circulate fluid down the tubing in order to remove debris and settled particles located directly above the Lug Nipple.

Continue to lower the retrieval overshoot until a weight decrease of 500 to 1,000 DaN (1,000 to 2,000 pounds) occurs. This will be an indication that the retrieval overshoot has latched onto the Lug Nipple. No tubing string rotation is required at this point. Simply apply a slight upward pull to confirm the retrieval overshoot is latched. A weight increase will be evident at this point. Proceed with the specified procedure required to unset the tool located directly below the Lug



Nipple.

Pre-Job Planning:

Prior to running the Hydraulic Disconnect Assembly into the well, a decision must be made concerning the hydraulic pressure required to disconnect the tubing string from the packer. Normally, this pressure is set at 500 to 1,000 psi higher than the required packer setting pressure.

Changing Shear Screws

1. Place the Hydraulic Disconnect Assembly in a vise, clamped on the Top Sub (1).
2. Unthread the Valve Housing (5) from the Top Sub (1).
3. Install or remove the required number of Shear Screws (302) from the Shear Valve (4).
4. Re-apply low friction grease (WOT Blue) to any bare valve surfaces.
5. Thread the Valve Housing (5) onto the Top Sub (1).

Once the correct shear screw setting is obtained, the next step is to thread the Lug Nipple tightly to the tool connected to the Hydraulic Disconnect Assembly. The entire assembly is then run into the well.

At the setting depth, the packer is set according to procedures specified for that tool. After the packer is set, some tubing weight of 1 to 2 DaN (1,000 to 2,000 pounds) may be set on the tool to ensure the packer is properly set. Similarly, and upward pull 1 to 2 DaN (1,000 to 2,000 pounds) may be applied to the tool to check that the packer is properly set.

Available Sizes:

Tool OD inches (mm):	Tool ID inches (mm)	Thread Connections
2.12" (54)	0.50 (13)	1" AMMT
2.88" (73)	0.75 (19)	1.5" AMMT
3.12" (79)	1.00 (32)	2-3/8" EUE
3.62" (92)	1.94 (49)	2-3/8" EUE
4.25" (108)	2.25 (57)	2-7/8" EUE
5.25" (133)	3.00 (76)	3-1/2" EUE



Right Hand Mechanical Release Disconnect

Overview:

The Right-Hand Mechanical Release Disconnect is typically run in an abandonment string to mechanically disconnect from the abandonment packer for zonal isolation. The tool has two basic components the release adapter (which is recovered with the work string) and the release coupling which is let downhole. The release adapter disengages from the release coupling when six-right-hand rotations are applied at the tool. The release adapter is shear pinned to the release coupling and requires 700 ft/lbs of torque to activate the release sequence.

The Right-Hand Mechanical Release Disconnect can be run in conjunction with a hydraulic disconnect to provide redundancy and an alternative release mechanism in case of well conditions changing during workover operations.

Applications:

- Permanent Completions
- Well Decommissioning



Tool Size	Thread Top & Bottom
3.00"	2-3/8" EUE
4.25"	2-7/8" EUE
5.25"	3-1/2" EUE

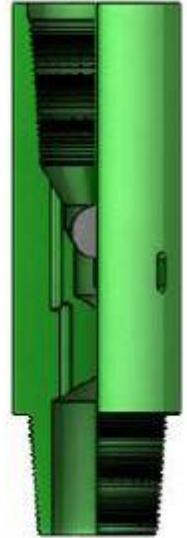


WYE Circulating Sub

OVERVIEW

The Wye Sub is run above the packer and allows tubing or drill pipe to fill automatically while running in hole. Once setting depth is reached a ball is dropped, allowing the packer to be set. Its simple one-piece design and low profile make it ideal autofill is desired and filling from surface is not possible.

There are two sets of ports machined into the Wye sub, the Annulus (auto-fill) and Tubing ports; prior to dropping the ball both sets of ports are open. Once the ball is dropped it lands on a seat located above the Annulus ports, blocking them and diverting all fluid above the ball through the Tubing ports. The Tubing ports bypass the Ball & Seat, allowing any packer or accessory located below the Wye Sub to be functioned hydraulically.



FEATURES

- One Piece Design
- Can be run with permanent bridge plugs
- Can be used as a circulating device for well control while running in hole

Wye Sub Size In. (mm)	Flow Area	Drop Ball Size	Thread Connection
2-1/8" (54 mm)	0.25"	1/2"	1.50" AMMT
2-3/8" (60 mm)	0.44"	1-1/2"	2-3/8" EUE
2-7/8" (69.8 mm)	0.44"	1-1/2"	2-7/8" EUE
3-1/2" (88.9 mm)	0.79	2	3-1/2" EUE



J Circulating Valve:

Description:

The J Circulating Valve is a locked-open/locked-closed valve that serves as both a circulating valve and a bypass. This valve was designed for use with the RTTS Packer. The J Circulating Valve is automatically locked in the closed position when the packer is set. During testing and squeezing operations, the lock helps prevent the valve from being pumped open.

A straight J-slot is provided in the locked-open position so that it can be used with the straight J-slot in the packer body. This combination eliminates the need to turn the tubing to close the circulating valve or to reset the packer after the tubing has been displaced with cement.

Operating Principles:

The J Circulating Valve may be run directly above the packer body or farther up the work string. The operating principle is based on lug movements in a J-slot. The lugs move with work string manipulation. When the lug is in the upper position, the circulating valve is open; when the lug is in the lower position, the circulating valve is closed. The Jay Circulating Valve is normally used in the following sequence:

Minimum Flow Areas

The Below Table lists the minimum flow areas of RTTS Circulating Valves.



Assembly Part No.	Size (in)	Area of Flow Ports		Location
		(in.2)	(cm2)	
936-108-A01	4.25"	2.50	16.13	Ports
936-127-A01	5.00"	2.784	17.96	Slots
936-178-A01	7.00"	2.784	17.96	Slots