

LOGAN

COMPLETIONS & PRODUCTION



MULTISTIM® FRACTURE ISOLATION SYSTEM

- Frac isolation liner and tie back string deployable in a single trip
- Dual & Single Element Hydro mechanical open hole packers
- Custom Swellable Packers available
- Control sand and water issues with selective shiftable frac sleeves
- Full bore ID clean out allows for easy access during refrac



"3J" SEAL ASSEMBLY

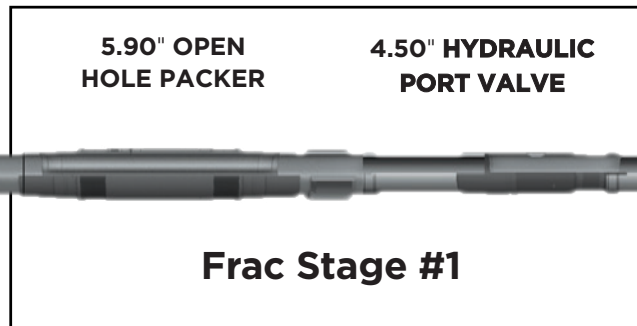
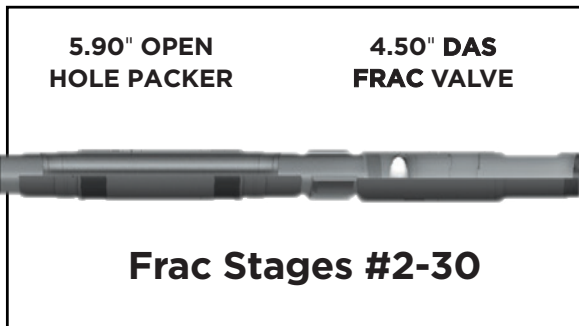
Male Receptacle

Female Receptacle



LINER TOP PACKER

**5.90" DUAL ELEMENT
OPEN HOLE PACKER**



**4.50"
FLOW LOCK
COLLAR**

Make it an open and shut case with
Logan Completion's MultiStim® Fracture Isolation System

MultiStim® 6.080" Open Hole Reamer

DESCRIPTION

The MultiStim 6.080" Open Hole Reamer is an essential component to the successful installation of the MultiStim Fracture Isolation System. The 6.080" Open Hole Reamer is run immediately prior to the liner installation to ensure clean installation of the liner without the need for circulation and/or rotation. The 6.080" Open Hole Reamer effectively builds a smooth transition in the wellbore by evening out dog legs and tight spots.

HELIX DESIGN

The 6.080" Open Hole Reamer features two sets of three-bladed left-hand helixes. The first helix has a 120° offset and the second has a 180° degree offset.

EXTENDED-LIFE CUTTING SURFACE

The two-inch-wide helix blades are dressed with tungsten carbide shard matrix. This matrix continually exposes new carbide shards as the blades wear to maintain an effective cutting surface.

DESIGN AND MANUFACTURING STANDARDS

The MultiStim 6.080" Open Hole Reamer and MultiStim Fracturing Isolation System components are designed and manufactured to API Q1 standards at our certified manufacturing facility.



Dim	(in)	(mm)
A	4.75	120.65
B	NC 38	
C	17.30	438.20
D	11.50	292.10
E	37.30	946.20
F	66.30	1684.10
G	70.20	1784.10
H	6.08	154.43
J	2.70	68.58
K	NC 38	

TOOL RATINGS		
Rating	Value	
Tensile	596,000 lbs	265,100 daN
Torque	20,879 ft-lbs	28,300 N-m

MultiStim® 3J Seal Assembly and Receptacle

- Simple Design and Operation
- Full Bore Inside Diameter
- 3J Seal Assembly is used as the Liner Running Tool and Tie Back Seal
- Chevron Seal Design rated at 300°F and 10,000 psi
- 2 tieback lengths available:
 - 5' (*1.52m) Seal Assembly
 - 10' (3.0m) Seal Assembly.

DESCRIPTION

The "3J" Running Tool is composed of two robust components; the "3J" seal assembly and the "3J" receptacle. The retrievable-reusable "3J" seal assembly features external high load rated lugs and high performance V-seal assembly for elevated bottom hole temperatures and multiple fluids compatibility. The "3J" receptacle is a one piece design to facilitate high torque, tensile and pressure ratings. The "3J" receptacle incorporates a stab-in guide, internal jslot and polished seal bore.

SIMPLE DESIGN

The "3J" Running Tool is designed for ease of down hole operation. The "3J" Running Tool is designed to enable rotation during the liner installation. Once the liner has been installed, open hole packers and liner hanger packer have been set and tested, simply apply compression to the run-in string, apply ¼ right hand turn and pick up to disconnect. A tie-back fracturing string can be reconnected with a straight stab-in 3J Receptacle with the 3J Seal Assembly.

FULL BORE DESIGN

The minimum ID through the "3J" Running Tool is equal to the minimum liner casing.

DESIGN AND MANUFACTURING STANDARDS

All MultiStim Fracture Isolation System's components are designed and manufactured to API Q1 standards at our certified manufacturing facility.

Size (in/mm)	Connections (8RL)	Max O.D. (in/mm)	Tensile (lbs/daN)	Pressure (psikPa)
4 -1/2	4.500	6.00	125,000	10,000
114.30	4.500	152.40	55,600	68,950





MultiStim® PermaPak Liner Top Packer

- Works in conjunction with 3J Seal Bore Receptacle
- Full bore design
- No special setting tools required

DESCRIPTION

The MultiStim PermaPak Hydraulic Packer is a large seal bore packer. The hydraulic setting chamber is built into the packer; there is no need for additional setting tools in the string.

SIMPLE OPERATIONS

Pressure enters the setting chamber via holes in the internal mandrel of the packer. When the frac liner is spaced out in the proper location of the well, a ball is dropped to start the setting activation process. The ball lands in the Flow Lock Sub sealing off communication from tubing to annulus. Pressure is increased until the initial setting process starts (1,376 psi). The packer is completely set with 3,500 psi.

Packer Size (in/mm)	Weight (lbs/ft - kg/m)	Recommended Hole Size (in/mm)	Tool OD (in/mm)	Seal Bore (in/mm)	Setting Area (in ² /cm ²)	Setting Initiation (psi/mpa)	Min Setting Pressure (psi/mpa)	Max Setting Pressure (psi/mpa)
4.0 x 7.0	23 - 32	6.094 - 6.366	5.875	4.00	5.809	1.375	3,500	4,500
101.60x177.80	34.2 - 47.6	154.79 - 161.70	149.23	101.60	37.48	9.48	24.13	31.02



MultiStim® MegaSeal Open Hole Packer

- Dual-Element Design
- Hydraulic Setting
- Selective Setting
- Exceeds API Q1 Standards

DESCRIPTION

The MultiStim MegaSeal Open Hole Packer is used to straddle the Drill-a-Seat (DAS) Valve for fracture zone isolation. Any number of packers may be installed for any open hole isolation application.

PERFORMANCE DUAL-ELEMENT DESIGN

The MegaSeal Open Hole Packer increases open isolation performance with a recessed dual packing element design. The recessed packing element run in diameter reduces potential damage during installation. The dual-element system creates a dual barrier in the open hole to ensure zonal isolation.

HYDRAULIC SETTING

Hydraulic setting enables well fluid circulation and well displacement without risk of premature packer setting.

SELECTIVE SETTING

The complete liner isolation string of packers can all be set with a single pressure cycle or can be set at staged pressure cycles if desired.

DESIGN AND MANUFACTURING STANDARDS

The MultiStim MegaSeal Open Hole Packer is designed with performance specifications that equal the liner casing. MultiStim Fracturing Isolation System components are designed and manufactured to API Q1 standards at our certified manufacturing facility.

Size (in/mm)	Connections (8BL)	O.D. (in/mm)	Activation Pressure (psi/kPa)	Tensile (lbs/daN)	Burst (psi/kPa)	Collapse (psi/kPa)
4 -1/2	4.500 8RL	5.80	1,425 – 1,575	250,000	9,000	5,750
114.30	4.500 8RL	139.7	9,825 – 10,850	111,200	73,800	39,640



MultiStim® DAS Frac Sleeve

- Full bore access after seats are milled
- Selective Isolation
- Selective Refracturing
- Shiftable Fully Open/Close
- The Drill-a-Seat (DAS) valve is ball-activated

DESCRIPTION

The Drill-a-Seat (DAS) valve is a ball-activated sleeve used to divert fluids to a defined interval of a wellbore. The valves can be utilized in vertical or horizontal wellbore as a liner monobore system in an open-hole application. Multiple valves can be installed in a well design and the seat sizing can be set up to meet the ID desired.

The activation balls are launched from the surface and travel with the fluid to land on the appropriate seat. Once the ball has seated, the area below the DAS is isolated, and applied pressure will shift the ball, the seat, and the inner sleeve into the open position.

The wellbore stimulation process can now be initiated, and the fluid will be diverted through the now open side ports. The opening pressure of the DAS is adjustable, and can be set up to adhere to the needs of the well program. Upon completion of the well program, cleanup of the well can be completed and the activation balls can be flowed back into a downhole ball catch sub, or the balls can be flowed back to the surface. The balls and seats can also be milled out to return the wellbore to a uniform inner diameter.

The DAS has a unique feature, in that once the well program has been completed and the seats have been milled out, the shiftable sleeve is able to be repositioned back into the fully closed state, isolating the once open ports. This can be completed early on in the life of the well, or at a later date, should zonal isolation be required for production.

Size	Tool OD	Mill - Out ID	Mill OD	Shear Pins (10 max)	Material	Flow Area
4 -1/2 in	5.420 in	3.875 in	3.920 in	268 psi/ea	P-110	20 in ²
114.3 mm	137.67 mm	98.43 mm	99.570 mm	1.85 mpa/ea	P-110	20 cm ²

MultiStim DAS Frac Sleeve Ball Seat Guide			
	4-1/2" 11.6-13.5 ppf		
	114.3mm 17.3-20.1 kg/m		
Description	Frac Sub #	Ball Seat ID	Ball OD
Flow Lock Collar		0.740	0.800
Hydraulic Port Valve	1	Pressure Actuated - No Ball	
Frac Valves	2	0.815	0.900
	3	0.915	1.000
	4	1.015	1.100
	5	1.115	1.200
	6	1.215	1.300
	7	1.315	1.400
	8	1.415	1.500
	9	1.515	1.600
	10	1.615	1.700
	11	1.715	1.800
	12	1.815	1.900
	13	1.915	2.000
	14	2.015	2.100
	15	2.115	2.200
	16	2.215	2.300
	17	2.315	2.400
	18	2.415	2.500
	19	2.515	2.600
	20	2.615	2.700
	21	2.715	2.800
	22	2.815	2.900
	23	2.915	3.000
	24	3.015	3.100
	25	3.115	3.200
	26	3.215	3.300
	27	3.315	3.400
	28	3.415	3.525
	29	3.540	3.655
	30	3.670	3.790

Size	Weight	Thread	Tensile	Burst	Collapse
4 -1/2 in	11.6 lbs/ft	Optional	278,000 lbs	10,690 psi	7,580 psi
4 -1/2 in	13.5 lbs/ft	Optional	337,000 lbs	12,410 psi	10,690 psi
114.3 mm	17.3 kg/m	Optional	624971 daN	73.71 mpa	52.30 mpa
114.3 mm	20.1 kg/m	Optional	757609 daN	85.57 mpa	73.71 mpa



Logan Dissolvable Balls:

Customizable Dissolvable balls, Reservoir specific. Eliminates the need for drilling out seats and lodged balls on seat.



MultiStim® Hydraulic Port Valve

DESCRIPTION

The MultiStim Hydraulic Port Valve is strategically placed as the toe or first frac zone port when used in the ball actuated Drill-A-Seat (DAS valve system). Multiple valves can also be used in a non-ball hydraulic actuated frac port system in conjunction with the MultiStim Cup Frac Tool System.

FULL BORE INSIDE DIAMETER

Shifting components eliminate any ID reduction and any drill out requirements to gain lower access of the liner.

ADJUSTABLE ACTUATION PRESSURE

The hydraulic opening pressure can be adjusted prior to installation.

PERMANENTLY LOCKS OPEN

Once actuated, the valve is permanently locked open.

EXCEEDS DESIGN AND MANUFACTURING STANDARDS

The MultiStim Hydraulic Port Valve is designed with performance specifications exceeding that of the liner casing. MultiStim Fracturing Isolation System components are designed and manufactured to API Q1 standards at our certified manufacturing facility.

Size (in/mm)	Connections (8RL)	Max O.D. (in/mm)	Tensile (lbs/daN)	Collapse (psi/kPa)	Activation Pressure (psi/kPa)	Burst (psi/kPa)
4 -1/2"	4.500	5.50	269,000	5,000	2,850-3,150	5,000
114.30	4.500	139.70	120,100	34,500	19,650 – 20,685	34,500



MultiStim® Flow Lock Collar

DESCRIPTION

The MultiStim Flow Lock Collar is lowermost component above the liner shoe track. The Flow Lock Collar allows well fluid to fill up during liner installation. Circulation for well fluid displacement once the line is at depth and when closed, provides liner pressure integrity for setting of the MegaSeal Open Hole Packers, the liner hanger packer and opening of the MultiStim Hydraulic Port Valve.

BALL ACTUATED

The Flow Lock Collar remains open for circulation until the corresponding ball is circulated to the collar.

ADJUSTABLE ACTUATION PRESSURE

The hydraulic closing pressure can be adjusted prior to installation.

LOCKING SHUT OFF

Once the Flow Lock Collar has been shifted closed, it remains permanently locked.

DESIGN AND MANUFACTURING STANDARDS

The MultiStim Flow Lock Collar is designed with performance specifications equal to that of the liner casing. The MultiStim Flow Lock Collar and all components are designed to API Q1 standards at our certified manufacturing facility.

Size (in/mm)	Connections (8RL)	Max O.D. (in/mm)	Tensile (lbs/daN)	Collapse (psi/kPa)	Activation Pressure (psi/kPa)	Burst (psi/kPa)
4 -1/2"	4.500	5.00	123,100	7,580	900 – 1000	10,6900
114.30	4.500	127.00	54,760	52,260	6,205 – 6,900	73,705



MultiStim® Bi-Directional Hydraulic Shifting Tool

- Shifts Valves to Open or Closed Position
- Flow Actuated — No Drop Balls Needed
- Self Draining — No Wet Strings
- Compatible With Threaded or Coiled Tubing

DESCRIPTION

The MultiStim Bi-Directional Hydraulic Shifting Tool is able to open or close any number of valves in a single trip. It works with threaded or coiled tubing and is compatible with or without jars or bumper subs. The tool is easy to locate with Logan Completion Systems' Mechanical Collar Locator.

SHIFTS VALVES OPEN OR CLOSED

The MultiStim Bi-Directional Shifting Tool is used to shift the internal piston sleeve of the MultiStim Drill-a-Seat (DAS) Valve to either the open or closed position. Individual or multiple valves can be repeatedly opened or closed in a single trip. The MultiStim Bi-Directional Shifting Tool works with threaded or coiled tubing. When used in conjunction with the Logan Completion Systems' Mechanical Collar Locator, the need for complicated space out calculations is eliminated.

FLOW ACTUATED

The MultiStim Bi-Directional Shifting Tool is a flow-actuated tool that can be cycled repeatedly downhole without affecting the reservoir characteristics and with activation pressures less than the frac gradient.

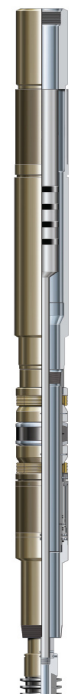
SELF DRAINING

The MultiStim Bi-Directional Shifting Tool is designed to fail safe with the slips in the retracted position. However, should there be the need, there is a secondary release mechanism. To activate the secondary release mechanism, a ball is pumped down to an internal seat, pressure is applied to the string bursting a rupture disk. This will release any internal pressure that could be trapped in the tool and retract the slip mechanism.

DESIGN AND MANUFACTURING STANDARDS

MultiStim Bi-Directional Hydraulic Shifting Tool and MultiStim Fracturing Isolation System components are designed and manufactured to API Q1 standards at our certified manufacturing facility.

Size	Max Free Flow Rate	Activation Flow Rate	Max Pull/ Push	Contingency Ball Size	Ball Drop Contingency Pressure	Contingency Flow Rate	Tensile (lbs)
4 -1/2"	3 bbl/min	5 – 6 bbl/min	100,000 lbs	Ø 0.88 in	4,000 psi	7 bbl/min	128,000 lbs
4 -1/2"	0.477 m3/min	0.795 – 0.954 m3/min	44,480 daN	22.35 mm	22,579 kPa	1.11 m3/min	56,937 daN



MultiStim® Cement Seal Liner Top Packer

- Works in conjunction with 3J Seal Bore Receptacle
- Full bore design
- No special setting tools required
- Dual stage hydraulic release & set
- Stage Tool/Debris Sub compatible
- Anti-Pre-set mechanism
- Top & Bottom Slips

DESCRIPTION

The MultiStim Cement Seal Liner Top Packer is a large seal bore packer. The hydraulic setting chamber is built into the packer. There is no need for additional setting tools in the string. Run in conjunction with the Logan 3J Running Tool, which provides a 10,000psi/69MPA pressure rated Tie-Back. The Cement Seal Packer can also be run with a Stage Tool & Debris sub below the Packer. Once the cement job is complete the user can release from the liner top seal receptacle with a ¼ turn. Tie-Back frac string can be run with a straight sting in/mechanical release, or straight sting in/sting out.

Packer Size (in/mm)	Weight (lbs/ft - kg/m)	Recommended Hole Size (in/mm)	Tool OD (in/mm)	Seal Bore (in/mm)	Setting Area (in ² /cm ²)	Setting Initiation (psi/mpa)	Min Setting Pressure (psi/mpa)	Max Setting Pressure (psi/mpa)
4.0 x 7.0	23 - 32	6.094 - 6.366	5.875	4.00	5.809	1.375	3,500	4,500
101.60x177.80	34.2 - 47.6	154.79 - 161.70	149.23	101.60	37.48	9.48	24.13	31.02