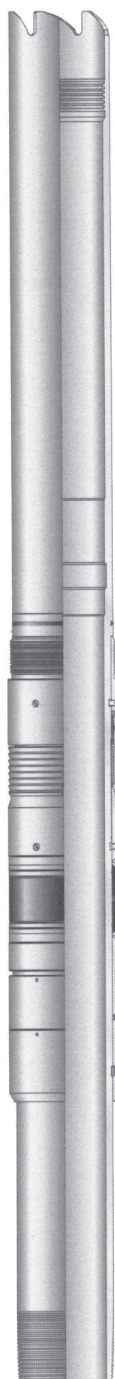


LLPH-R Liner Lap Packer, Rotational



The LLPH Liner Lap Packer, Rotational with hold downs is a versatile liner packer which can be used in an number of different applications. It is most often placed at the top of a liner which is to be cemented. Setting the type LLPH Packer after cementing allows the operator to reverse excess cement out of the hole without exerting pressure on formations below the top of the liner.

This liner packer prevents gas migration through the cement as it is setting up.

The type LLPH Packer is available with or without hold-down slips, and comes standard with reinforced HNBR Rubber Pack-Off or with special high-temperature pack-offs. TWL Premium Seal Pack-Off is also available for this packer.

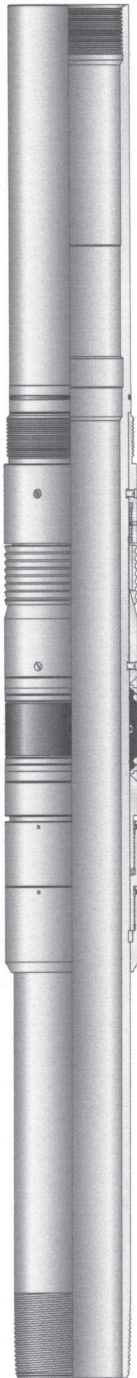
The type LLPH Packer is run with a type MR Setting Tool screwed into its barrel using a left-hand thread and floating nut. When setting the packer, the setting tool is released by right-hand rotation and picked up allowing the setting dogs to expand and catch the top sleeve of the LLPH Packer. Then, the setting tool is lowered, forcing the sleeve downward and expanding the pack-off to set the packer. A ratchet ring in the LLPH holds the pack-off in the expanded position.

When used to set a screen, the type LLP Packer (without hold-down slips) may be retrieved by running a spear to catch the inner barrel.

SPECIFICATIONS

LINER SIZE		CASING SIZE				MAX. BODY		SEALING BORE	
O.D.		O.D.		WEIGHT RANGE		O.D.		I.D.	
(in.)	(mm)	(in.)	(mm)	(lbs/ft)	(kg/m)	(in.)	(mm)	(in.)	(mm)
3 1/2	88.9	5 1/2	139.7	14.0 - 17.0	20.8 - 25.3	4 5/8	117.5	3.75	95.25
4	101.6	5 1/2	139.7	14.0 - 17.0	20.8 - 25.3	4 11/16	119.1	4.188	106.38
4 1/2	114.3	7	177.8	23.0 - 26.0	34.2 - 38.7	6	152.4	5.25	133.5
				29.0 - 32.0	43.1 - 47.6	5 27/32	148.4		
5	127.0	7	177.8	23.0 - 26.0	34.2 - 38.7	6	152.4	5.25	133.5
				29.0 - 32.0	43.2 - 47.6	5 27/32	148.4		
5 1/2	139.7	7 5/8	193.7	33.7 - 39.0	50.2 - 58.1	6 3/8	161.9	5.25	146.05
				26.0 - 29.7	38.7 - 44.2	6 5/8	168.3		
7	177.8	9 5/8	244.5	40.0 - 43.5	59.5 - 64.7	8 3/8	212.7	7.375	187.33
				47.0 - 53.5	69.6 - 79.6	8 1/4	209.6		
7 5/8	193.7	9 5/8	244.5	40.0 - 43.5	59.5 - 64.7	8 3/8	212.7	7.75	196.85
				47.0 - 53.5	69.9 - 79.6	8 9/32	210.3		
9 5/8	244.5	11 3/4	298.5	60.0 - 65.0	89.3 - 96.7	10 3/8	263.5	9.75	247.7
		13 3/8	327.7	68.0 - 72.0	101.2 - 107.1	11 15/16	303.2	9.813	249.25
11 3/4	298.5	13 3/8	327.7	68.0 - 72.0	101.2 - 107.1	12 1/16	306.4	11.563	293.7

LLPH-NR Liner Lap Packer, Non-Rotational



The LLPH-NR Liner Lap Packer, Non-Rotational with hold downs is a versatile liner packer which can be used in a number of different applications. It is most often placed at the top of a liner which is to be cemented. Setting the type LLPH-NR Packer after cementing allows the operator to reverse excess cement out of the hole without exerting pressure of formations below the top of the liner.

This liner packer prevents gas migration through the cement as it is setting up.

The type LLPH-NR Packer is available with or without hold-down slips, and comes standard with reinforced HNBR Rubber Pack-Off, or with special high-temperature pack-offs. TWL premium Seal Pack-Off is also available for this packer.

The type LLPH-NR Packer is run with a type MR setting tool screwed into its barrel using a left-hand thread and floating nut. When setting the packer, the setting tool is released by right-hand rotation and picked up allowing the setting dogs to expand and catch the top sleeve of the LLPH-NR Packer. Then the setting tool is lowered, forcing the sleeve downward and expanding the pack-off to set the packer. A ratchet ring in the LLPH-NR holds the pack-off in the expanded position.

When used to set a screen, the type LLPH-NR Packer (without hold-down slips) may be retrieved by running a spear to catch the inner barrel.

LTBPR Tie-Back Packer, Rotational



The LTBPR Liner Tie-Back Packer is a high-pressure seal at the top of a cemented or uncemented liner. It is run on drill pipe and / or casing, and landed in a receptacle at the top of the liner. In most applications a type Tie-Back Receptacle is run with the packer providing for future tie-back.

The LTBPR Packer is run after the liner is set, so that maximum annular flow is achieved at the liner top during cementing. This is possible because there is no restriction like that associated with a conventional liner-top packer.

The packer and accompanying hold-down slips are set by applying weight. The setting tool is retrieved with the drill pipe. When set this packer will seal in the liner receptacle and Pack-Off in the casing to isolate the liner top, holding securely against pressures from above or below. The Premium Seal Pack-Off provides a seal against high pressure and high temperatures.

FEATURES & BENEFITS

The LTBPR Liner Tie-Back Packer successfully performs a number of important functions in liner top applications:

- * Provides a high-pressure seal at the liner top
- * Safely seals micro-annular leaks at the liner top caused by high-pressure gas
- * Extends a liner to the surface when it is not desirable to cement the tie-back
- * Allows a PBR-type completion after the liner has been set and cemented by mounting a PBR above it.

LTBPR Tie-Back Packer, Rotational

PRODUCT SPECIFICATIONS

LINER		TOOL SIZE	CASING		PRESSURE RATING TYPE	* DIFFERENTIAL PRESSURE RATINGS AS PER PACKER GRADE (psi / MPa)				
O.D. (in. / mm)	WEIGHT (in. / mm)		O.D. (in. / mm)	WEIGHT RANGE (in. / mm)		55 Kpsi 379 MPa	80 Kpsi 552 MPa	95 Kpsi 655 MPa	110 Kpsi 758 MPa	125 Kpsi 862 MPa
5 127.0	15.0 22.3	725	7 177.8	17 - 26 25.3 - 38.7	Barrel	3,410	4,970	5,900	6,830	7,760
					Burst	23.6	34.3	40.7	47.1	53.6
					Barrel	1,900	2,200	2,260	2,260	2,260
					Collapse	13.1	15.2	15.6	15.6	15.6
					Seal Stack	10,000 69.0				
		735	7 177.8	26 - 32 38.7 - 47.6	Barrel	3,410	4,970	5,900	6,830	7,760
					Burst	23.6	34.3	40.7	47.1	53.6
					Barrel	1,900	2,200	2,260	2,260	2,260
					Collapse	13.1	15.2	15.6	15.6	15.6
7 177.8	26 38.7	937	9 5/8 244.5	32.3 - 43.5 48.1 - 64.7	Barrel	4,000	5,820	6,910	8,000	9,090
					Burst	27.6	40.1	47.7	55.2	62.7
					Barrel	2,660	3,170	3,430	3,590	3,670
					Collapse	18.3	21.9	23.7	24.8	25.3
					Seal Stack	10,000 69.0				
		947	9 5/8 244.5	43.5 - 53.5 64.6 - 79.6	Barrel	4,000	5,820	6,910	8,000	9,090
					Burst	27.6	40.1	47.7	55.2	62.7
					Barrel	2,660	3,170	3,430	3,590	3,670
					Collapse	18.3	21.9	23.7	24.8	25.3
					Seal Stack	10,000 69.0				
		957	9 5/8 244.5	58.4 86.9	Barrel	4,000	5,820	6,910	8,000	9,090
					Burst	27.6	40.1	47.7	55.2	62.7
					Barrel	2,660	3,170	3,430	3,590	3,670
					Collapse	18.3	21.9	23.7	24.8	25.3
					Seal Stack	10,000 69.0				

SCR Setting Collar, Rotational

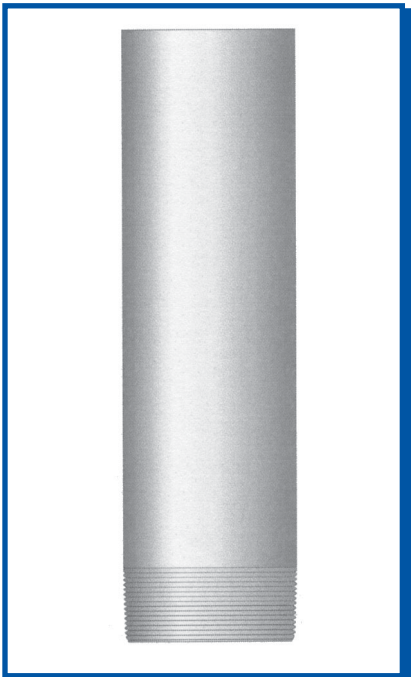


The SCR Setting Collar is designed for use with either rotating and / or all right-hand set liner assemblies. The SCR Setting Collar can also be used to carry sit on bottom liners in to place and then set on bottom.

FEATURES & BENEFITS

- * Top clutch allows for right hand set hangers to be set.
- * Top clutch allows operator to work liner into place in a deviated well bore, as well as work the casing into place if hole fill is encountered.

SCNR Setting Collar, Non-Rotational

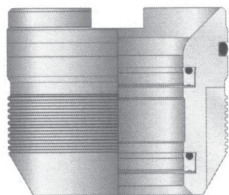


The SCR Setting Collar Non-Rotational is used to carry short drop off liner or screens on bottom where it is not necessary to use a liner hanger to suspend the liner weight.

APPLICATIONS

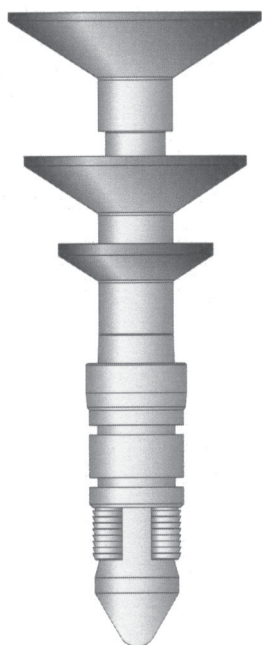
- * Drop of liner in open hole to keep the hole open.
- * Drop of liner screens where liner top packer or hangers are not needed.

DPOB Drillable Pack-Off Bushing



The Drillable Pack-Off Bushing is a high pressure, high temperature pack-off used when working with high angle well bores. The DPOB has Chevron-type packing that seal tightly around the polished stinger of the MR setting tool. The DPB holds pressure from above and below, and is not damaged from rotation during setting or releasing of liners.

PDP Pump Down Plug

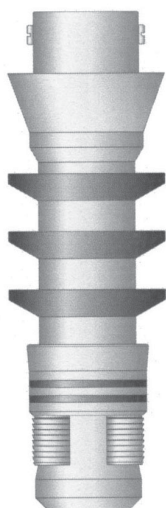


The PDP Pump Down Plug with Rotation Prevention Clutch on the nose of the plug lands, and locks in place in the seat of the liner wiper plug. The plugs then land, latch and seal in the PLC landing collar.

SPECIFICATIONS

SIZE		RANGE SIZE		MINIMUM SEAL JOINT I.D.		MAXIMUM METAL O.D.	
(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
4 1/2	114.3	3 1/2	88.9	2.00	50.8	1.90	48.26
5	127.0						
7	177.8	3 1/2 - 5 1/2	88.9 - 139.7	3.00	76.20	2.40	60.967

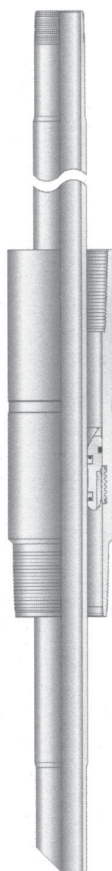
LWP Liner Wiper Plug



The LWP Liner Wiper Plug with Rotation Prevention Clutch on the nose of the plug lands and locks in place in the seat of the landing collar. Both the Pump Down Plug and the Liner Wiper Plug act to hold pressure from above and below.

SPECIFICATIONS

SIZE		WEIGHT		O.D.		I.D.	
(in.)	(mm)	(lb/ft)	(kg/m)	(in.)	(mm)	(in.)	(mm)
4 1/2	114.3	9.50 - 11.6	14.0 - 17.0	4.18	106.2	1.70	43.2
5	127.0	15.0 - 18.0	22.3 - 26.8	4.66	118.4		
5 1/2	139.7	17.0 - 23.0	25.0 - 34.0	5.13	130.3		
7	177.8	17.0 - 29.0	25.0 - 43.0	6.75	171.45	2.20	55.88
		29.0 - 38.0	43.0 - 27.0	6.25	158.75		



RCC Recirculating Collar

The RCC Recirculating Collar is used with inner string circulating strings to circulate screens and slotted casing into place. The pack-off is easily drilled out with PDC bits, if necessary.

FEATURES & BENEFITS

- * Compact high pressure pack-off design.
- * Easily drilled out with PDC bits.

HLC Hydraulic Landing Collar



The HLC Hydraulic Landing Collar has an internal ball seat, and is run with Hydraulic Liner Hangers. The HLC Hydraulic Landing Collar is run two or three joints from the shoe, and is used to land the Liner Wiper Plugs. The plugs provide a pressure seal from above and below. The plugs are easily PDC drillable.



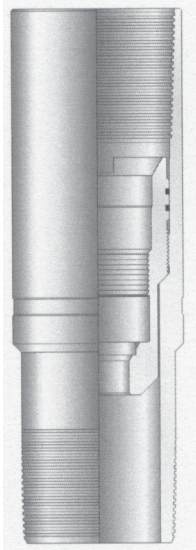
TWL Mechanical Set Liner Hanger

The TWL Mechanical Set Liner Hangers are used to suspend cemented and uncemented liners off bottom. Designed for heavy duty service, they are capable of successfully suspending long liners.

The TWL Mechanical Set Liner Hanger is available with a one-piece integral barrel for maximum pressure integrity. Large bypass lessens pressure build-up during run-in and cementing operations.

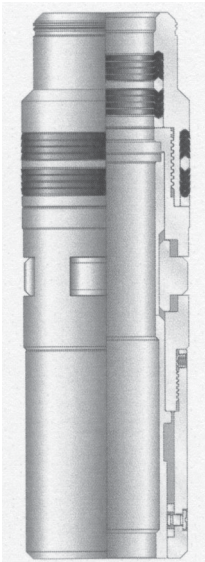
TWL Liner Hangers are set by picking up on the liner and rotating to disengage the J-slot. When the liner is lowered the springs hold the cage stationary. This allows the barrel to move downward engaging the cone against the slips. This action moves the slips outward against the casing wall. TWL Hangers are available in right-hand set only.

MPLC Mechanical Plug Landing Collar



The MPLC Mechanical Plug Landing Collar is run two or three joints from bottom, and is used to land the Liner Wiper Plug. The plugs provide a pressure seal that holds pressure from above and below. The plugs are PDC drillable.

RPOB Retrievable Pack-Off Bushing



The RPOB Retrievable Pack-Off Bushing is used to pack off and maintain a high pressure seal inside the SSR receptacle for cementing and circulating operations.

CSJ Cementing Seal Joint



The RPOB Pack-Off Bushing is made up with the liner setting tool using a Cementing Seal Joint polished nipple to extend down through its I.D. A profile to receive and hold the bushing in place is machined into the I.D. of the setting collar, or the packer. After cementing, the Cementing Seal Joint and bushing is retrieved with the setting tool.



TBR Tieback Receptacle

The TBR Tie Back Receptacle is run as an integral part of the liner or casing string. It is a honed and / or coated receptacle that allows the tubing string to contract and / or expand in response to the pressure and temperature, while maintaining the high degree of sealing capability. The honed inside surface of the TBR can be coated to prevent cement or other material from adhering. This coating minimizes corrosion caused by metal-to-metal contact and well effluents.

HDLH Hydraulic Dovetail Liner Hanger



The Hydraulic Dovetail Liner Hanger is a premium hanger with an integral body. The hanger mandrel is machined from heavy wall mechanical tubing and treated to the required grade. Integral construction eliminates all internal connections which provide maximum pressure ratings and liner hanging capacity.

FEATURES & BENEFITS

- * Enhanced fluid bypass with pocket slip design.
- * Long pocket type dovetail slip for long heavy liners.
- * Faster running speed with pocket slip design.
- * Castellated clutch in setting collar allows for rotating of liner through tight hole spots
- * Manufactured from mechanical tubing of equivalent liner grade, 80,000 psi is standard, other yield strengths and materials available by special order.
- * Slips manufactured to 55 - 60 Rockwell "C" hardness for high-grade casing compatibility.

HDRLH Hydraulic Dovetail Rotating Liner Hanger

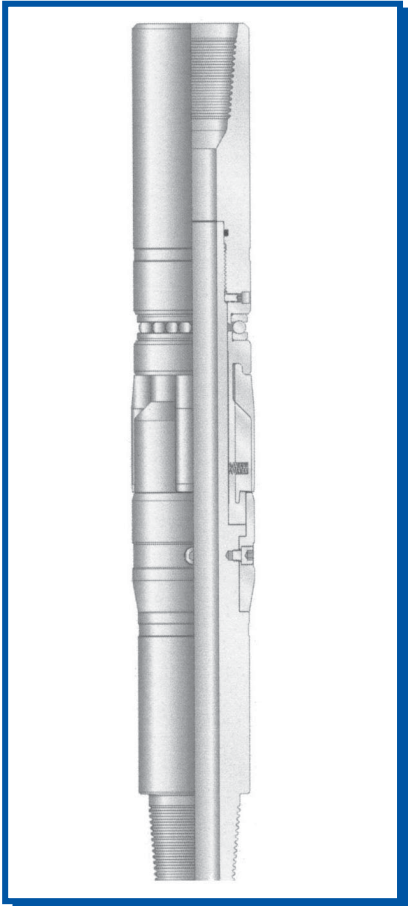


The Hydraulic Dovetail Rotating Liner Hanger is a premium hanger with an integral body. The hanger mandrel is machined from heavy wall mechanical tubing and treated to the required grade. Integral construction eliminates all internal connections which provide maximum pressure ratings and liner hanging capacity. This premium liner hanger can be rotated into place, set and then rotated through the liner cementing operation.

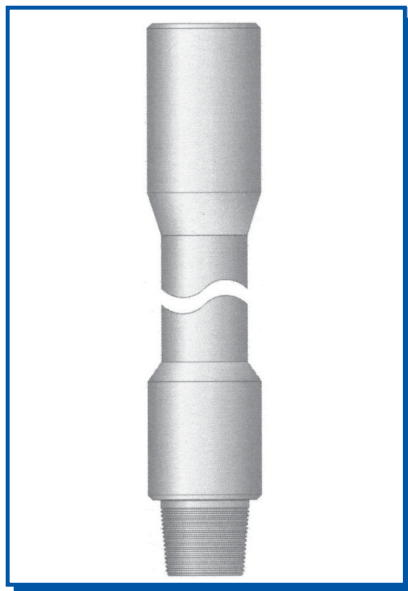
FEATURES & BENEFITS

- * Enhanced fluid bypass with pocket slip design.
- * Long pocket type dovetail slip for long heavy liners.
- * Faster running speed with pocket slip design.
- * Castellated clutch in setting collar allows for rotating of liner through tight hole spots and rotating of liner after hanger is set throughout the cementing operation.
- * Manufactured from mechanical tubing of equivalent liner grade; 80,000 psi is standard, other yield strengths and materials available by special order.
- * Slips manufactured to 55 - 60 Rockwell "C" hardness for high-grade casing compatibility.

RSD Rotating Setting Dog



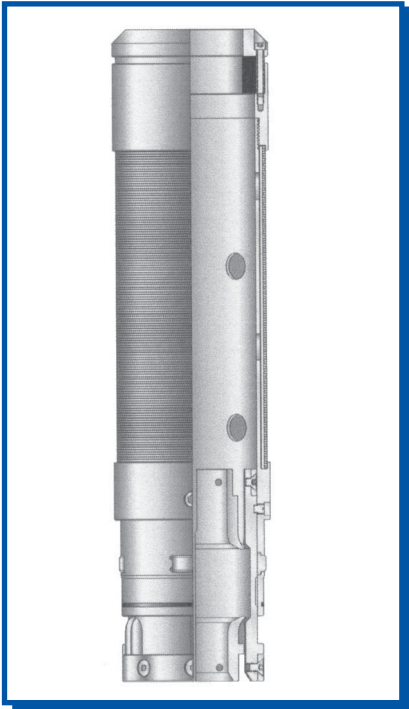
The Rotating Setting Dog is used whenever compressions set liner packers are run. The dogs are spring loaded in the collapsed position while the liner is being run and cemented. When released from the setting sleeve, set down weight is applied to compress the liner packer. Bearing race in the RSD tool is used to transfer additional weight in high angle well bores.



HJ Handling Joint

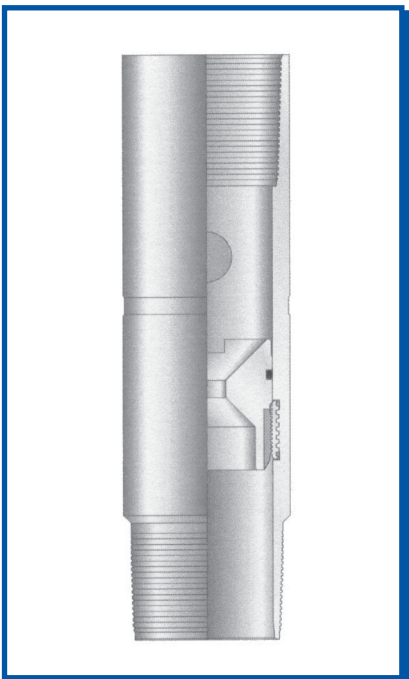
The HJ Handling Joint is used with the setting tool and the setting dogs. It is made up to the setting tools and consists of either 3.500" or 4.500" drill pipe, with IF connections. The handling joint transitions the liner over to the drill pipe that is used to run the liner into position.

SDB Screened Debris Barrier



The SDB Screened Debris Barrier is latched to the top of a TBR to prevent debris from entering the polished bore. Typically the debris screen is connected to a tieback receptacle of a liner hanger assembly. The debris screen is connected to a setting tool and is moveable on the setting tool permitting the setting tool to be stroked inside the liner hanger assembly during normal operations, such as cementing while retaining the debris screen at the top of the tieback receptacle at all times except during the final stages of retrieval.

DBSC Drillable Ball Seat Collar



The Drillable Ball Seat Collar can be used anywhere where it is desired to plug the bottom of the casing for any reason to either set hydraulic equipment above or inflate packers that requires the plugging of the casing string.

APPLICATIONS

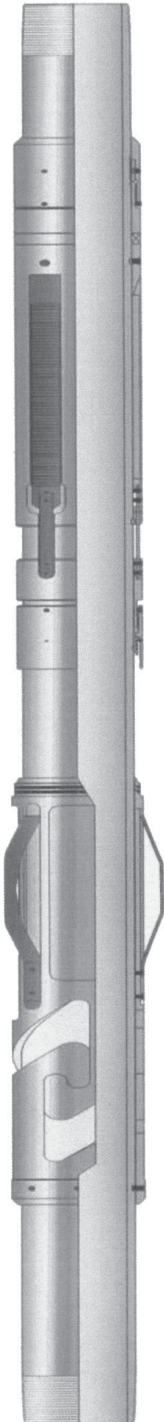
- * The setting of inflatable packers.
- * The opening of hydraulic stage tools.
- * The setting of most hydraulic equipment.

TBSN Tie-Back Seal Nipple



The Tie-Back Seal Nipple TBSN has proven to be a superior method of extending the liner to the surface of the well. Using the polished bore receptacle of the Setting Collar or the LLP H Packer, this assembly facilitates the entry and subsequent seal of the nipple into the bore. The TBSN Seal Nipple is run at the bottom of the liner extension. Depending on the application, it employs either a premium Aflas or Chevron-type unitized seal assembly, or a series of O-rings. Both designs deliver a solid seat and permanent seal. The orifice collar normally included in the Liner Extension Assembly is positioned one joint above the seal nipple. This prevents hydraulic blockage as the seal is engaged in the receptacle, and allows the liner extension to fill at a predetermined rate as it is run. The orifice collar also serves as a stop for the cement plug and is constructed of drillable materials.

MDLH - MRDLH Mechanical Dove Tail Liner Hanger



“MDLH” MECHANICAL DOVE TAIL SLIP HANGER

“MDLH” Mechanical Dove Tail Slip Hanger is a premium hanger with an integral body. The hanger mandrel is machined from heavy wall mechanical tubing and treated to the required grade. Integral construction eliminates all internal connections which provide maximum pressure ratings and liner hanging capacity.

FEATURES & BENEFITS

- * Enhanced fluid bypass with pocket type slip design.
- * Long pocket type dove tail slip for long heavy liners.
- * Faster running speed with pocket slip design.
- * Manufactured from mechanical tubing of equivalent liner grade; 80,000 psi is standard, other yield strengths and materials available by special order.
- * Slips manufactured to 55 - 60 rockwell “C” hardness for high-grade casing compatibility.

“MDRLH” HYDRAULIC DOVE TAIL ROTATING SLIP HANGER

The “MDRLH” Mechanical Dove Tail Rotating Slip Hanger is a premium hanger with an integral body. The Hanger mandrel is machined from heavy wall mechanical tubing and treated to the required grade. Integral construction eliminates all internal connections which provide maximum pressure ratings and liner hanging capacity. This premium liner hanger once in position can be rotated through the liner cementing operation.

FEATURES & BENEFITS

- * Enhanced fluid bypass with pocket slip design.
- * Long pocket type dove tail slip for long heavy liners.
- * Faster running speed with pocket type slip design.
- * Manufactured from mechanical tubing of equivalent liner grade; 80,000 psi is standard, other yield strengths and materials available by special order.
- * Slips manufactured to 55 - 60 rockwell “C” hardness for high-grade casing compatibility.

MLRT Mechanical Liner Running Tool



The MLRT Mechanical Liner Running Tool is used to run and set liner into the well bore. It is used to set left hand mechanical liner hangers and hydraulic liner systems. Right hand rotation releases the tool from the liner and is retrieved with the drill pipe at the end of the cementing, or dropping off of the liner.



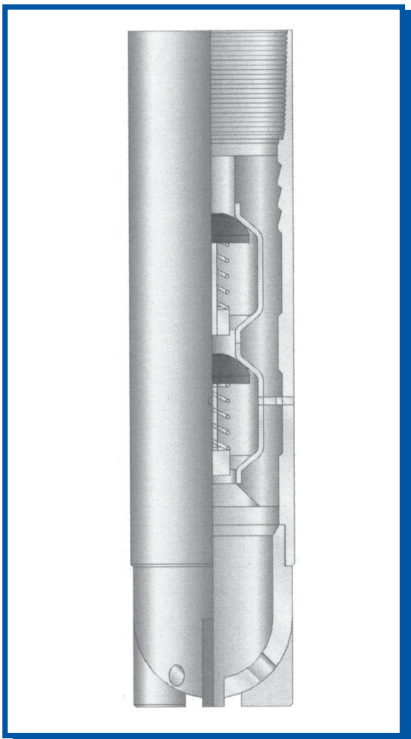
The MLRWD Mechanical Liner Running Tool with Dogs will set all compression-set Liner Packers. It combines the features of the type MLRT Running Tool with a spring-loaded, rotatable setting-dog section that allows the setting force to be transmitted to the packer. When activated, the spring-loaded setting-dog section permits setting the force to be transmitted to the packer, while the bearing allows the work string to be rotated at the surface, thus transmitting additional weight to the packer. Both of these features can be beneficial in high angle, or horizontal well bores when attempting to weight-set a liner-top packer.

SVFS-SN Single Valve Float Shoe, Spaded Nose



The Single Valve Float Shoe, Spaded Nose, features a back pressure valve and a spaded nose with circulating side ports. The side ports are used when liners are set on bottom, this improves cementing operations. The Single Valve Float Shoe, Spaded Nose is PDC drillable.

DVFS-SN Double Valve Float Shoe, Spaded Nose



The Double Valve Float Shoe, Spaded Nose, features back pressure valves and a spaded nose with circulating side ports. The side ports are used when liners are set on bottom, this improves cementing operations. The Double Valve Float Shoe, Spaded Nose is PDC drillable.