



# Oil Tools

PRODUCT CATALOGUE

STANDING APART IN QUALITY LEADERSHIP

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# PRODUCT RANGE

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Float equipment  
Reamer Shoe  
Cement plug  
DV Tools

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Expandable Liner hanger system  
Hydraulic Set  
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## PACKER SYSTEMS

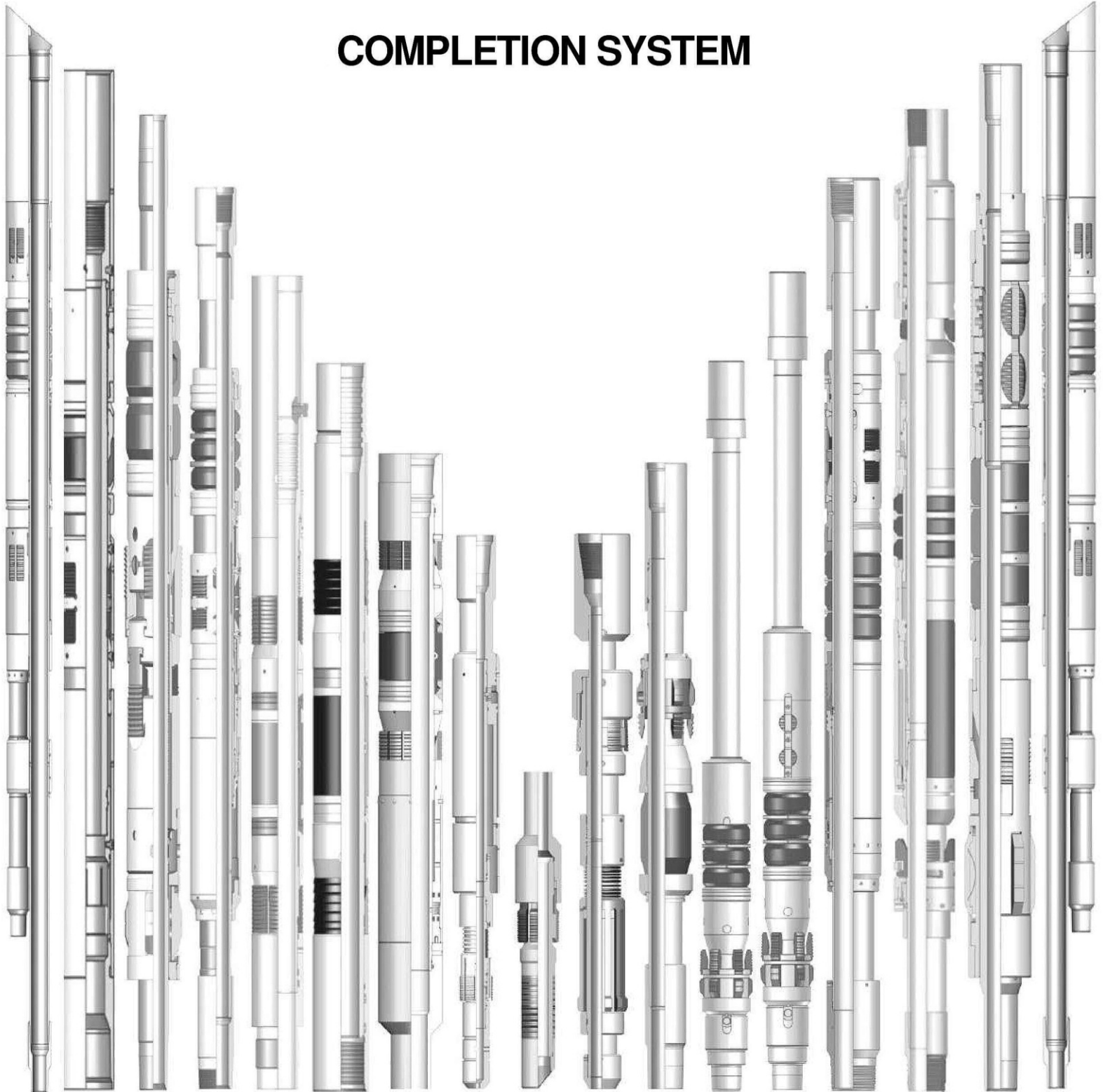
Hydraulic Set Packer  
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## LOWER COMPLETION TOOLS

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Lock Mandrel  
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WHIPSTOCK & ACCESSORIES  
DRILL BITS/DRILLING JARS

# COMPLETION SYSTEM



## WBP Wireline Set Bridge Plug (Top / Bottom Set)

WBP Bridge Plug is designed to have excellent running characteristics and securely sets in any grade casing including P-110.

WBP Bridge Plug could be set using various available wireline pressure setting tools and could also be run and set using hydraulic setting tool however utilizing the available wireline adaptor kit.

The grey cast iron construction allows rapid drill-out while maintaining sufficient strength when set.

WBP Bridge Plug is rated to 10,000 Psi., suitable up to 350 F temperature rating.

Assorted elastomers i.e. Viton, Aflas are also available for high temperature applications.

### FEATURES:

- Field-proven design
- Constructed of drillable materials
- Standard packing element rated at 300°F
- One-piece slips
- Top set with shear stud

### APPLICATIONS:

- Well abandonment
- Temporary and permanent zonal isolation
- Squeeze cementing
- Fracturing



## WBP Wireline Set Bridge Plug

### (Top / Bottom Set) : Product Specification

CASING				PLUG		
SIZE (IN)	WEIGHT (LB/FT)	MIN. I.D. (IN.)	MAX. I.D. (IN)	PRESSUE RATING (PSI)	O.D. (IN.)	SET FORCE (LB-kg)
2-3/8	4.0 - 5.8	1.780	2.074	10,000	1.750	9,000
2-7/8	6.4 - 6.5	2.340	2.525	10,000	2.220	9,000
3-1/2	5.75 - 10.3	2.867	3.258	10,000	2.750	9,000
4	5.6 - 14.0	3.340	3.732	10,000	3.140	20,000
4-1/2	9.5 - 15.1	3.826	4.090	10,000	3.562	33,000
5	11.5 - 20.8	4.154	4.560	10,000	3.937	33,000
5-1/2	13.0 - 23.0	4.580	5.044	10,000	4.312	33,000
5-3/4	14.0 - 25.2	4.890	5.290	10,000	4.700	33,000
6-5/8	17.0 - 32.0	5.595	6.135	10,000	5.375	50,000
7	17.0 - 35.0	6.000	6.538	10,000	5.687	50,000
7	17.0 - 29.0	6.088	6.629	10,000	5.900	50,000
7-5/8	20.0 - 39.0	6.625	7.125	10,000	6.312	50,000
8-5/8	24.0 - 49.0	7.310	8.097	10,000	7.144	50,000
9-5/8	29.3 - 58.4	8.297	9.083	8,000	8.125	50,000
10-3/4	32.7 - 60.7	9.525	10.325	5,000	9.440	50,000
11-3/4	38.0 - 60.0	10.641	11.284	4,000	10.437	50,000
	60.0 - 83.0	10.368	10.935	4,000	9.937	50,000
13-3/8	48.0 - 84.5	12.202	12.879	3,000	11.880	50,000
16.0	65.0 - 118.0	14.576	15.444	2,000	14.125	50,000
18-5/8	87.5	17.480	18.000	2000	17.125	50,000
20.0	94.0 - 133.0	18.537	19.364	2,000	18.375	50,000



## Cement Retainer CR

Cement Retainer can also be set on tubing/drill pipe/coil tubing using Hydraulic Setting Tool.

Opposing slips are carburized wicker type One-piece slips located above and below the rubber packing elements. The slips keep the cement retainer securely set-in high hardness alloy grade casings including P-110.

The packing elements are contained by brass back-up rings that eliminate extrusion of the elements at high temperatures and pressures.

Cement Retainer utilizes a wireline adapter kit (WLAK) to connect to Baker PST and run-in hole.

Once set, a stringer is run on tubing/drill pipe or coil tubing in second trip and stung into the Cement Retainer.

Squeeze operation can now begin, and the operator controls the two-way valve from the surface to hold the final squeeze pressure under the retainer or test tubing or keep hydrostatic pressure off the squeeze by manipulating the stringer assembly.

Straight pick up closes the valve and set down weight opens the valve. This retainer is ideal for where squeeze cementing operations are being performed

### FEATURES:

Cast iron drillable design

- Simple, surface-controlled valve automatically closes when the stinger is removed
- Converts between mechanical or wireline set by changing top slips
- Components rotationally locked for easy drill out
- Converts to a PBP Bridge Plug
- Temperature rating to 400 ° Fahrenheit
- Differential pressure rating to 10,000 psi thru 8-5/8"



## Cement Retainer CR : Product Specification

CASING				TOOL
O.D. (IN)	WEIGHT (LB/FT)	MIN. I.D. (IN)	MAX. O.D. (IN)	MAX. O.D. (IN.)
4-1/2	9.5 - 15.1	3.826	4.090	3.593
5	11.5 - 18.0	4.276	4.560	3.937
5-1/2	13.0 - 23.0	4.670	5.118	4.312
5-3/4	14.0 - 25.2	4.890	5.290	4.700
6-5/8	17.0 - 34.5	5.575	6.135	5.375
7	17.0 - 35.0	6.004	6.538	5.688
7-5/8	20.0 - 39.0	6.625	7.125	6.312
8-5/8	24.0 - 49.0	7.511	8.097	7.125
9-5/8	29.3 - 61.1	8.375	9.063	8.125
10-3/4	32.75 - 60.7	9.660	10.192	9.440
11-3/4	60.0 - 83.0	10.192	10.772	9.937
11-3/4	38.0 - 60.0	10.772	11.150	10.440
13-3/8	48.0 - 72.0	12.347	12.715	12.000
16	65.0 - 128.0	14.438	15.250	14.125
18	70.58 - 87.5	17.088	17.250	16.650
18-5/8	87.5	17.480	18.000	17.125
20	94.0 - 133.0	18.330	19.124	18.375
30	157.73 - 310.0	28.000	29.000	27.500



# Wireline Adapter Kit ( WLAK)

## Product Specification

Wireline Adapter Kit ( WLAK) for Cement Retainers and CR Bridge Plugs is used to set Cement Retainers and CR Bridge Plugs on electric wireline or with a hydraulic setting assembly on tubing.

The WLAK is designed to be used on a Baker E-4 wireline powder charge or hydraulic setting assembly or any setting assembly with the same configuration.

The WLAK automatically disconnects from the Bridge Plug during packer setting to be easily retrieved and prepared to run again.

Sizes (inches)	Tool OD (inches)	Wireline Setting Tool Box Up
4-1/2	3.500	BAKER E-4, #10
5-1/2	4.000	BAKER E-4, #20
7	5.688	BAKER E-4, #20
9-5/8	8.125	BAKER E-4, #20





## Mechanical Setting Tool (MST)

Mechanical Setting Tool (MST) is designed to run and mechanically set a Cement Retainer or converted Bridge Plug at any depth on tubing or drill pipe.

MST is used anytime it is advantageous to run a Cement Retainer or Bridge Plug on tubing or drill pipe. Cement Retainers can be set, pressure tested and squeezed in a single trip.

MST and Cement Retainer or Bridge Plug are shear pinned together and the slips are held in a retracted position for safer running.

### FEATURES:

- Allows single run for squeeze cementing
- Locked to cement retainer or bridge plug to avoid premature setting or loss
- Top slips partially covered to protect from accidental damage and pre-set
- Will set other manufactures cement retainer or bridge plug

### APPLICATIONS:

- Setting cement retainers or bridge plugs on tubing or drill pipe
- Squeeze cementing
- Well abandonment
- Temporary and permanent zone isolation



## Mechanical Setting Tool (MST) Product Specification

CASING		DRAG BLOCK		MST SETTING TOOL	
SIZE (IN)	WEIGHT (LB/FT)	EXPANDED (IN.)	COLLAPSED (IN.)	MIN. I.D. (IN.)	THREAD CONNECTIO BOX UP
4-1/2	9.5 - 13.5	4.283	3.750	.75	2-3/8" EU 8 RD
5.00	18.0 - 21.0	4.375	3.815	.75	2-3/8" EU 8 RD
	15.0 - 18.0	4.490	4.015	.75	2-3/8" EU 8 RD
	11.5 - 15.0	4.660	4.230	.75	2-3/8" EU 8 RD
5-1/2	17.0 - 234.0	5.150	4.500	.75	2-3/8" EU 8 RD
	13.0 - 17.0	5.250	4.600	.75	2-3/8" EU 8 RD
6-5/8	24.0 - 32.0	6.355	5.500	1.250	2-7/8" EU 8 RD
7.00	29.0 - 38.0	6.355	5.500	1.250	2-7/8" EU 8 RD
	17.0 - 32.0	6.930	5.920	1.250	2-7/8" EU 8 RD
7-5/8	24.0 - 45.3	7.325	6.370	1.250	2-7/8" EU 8 RD
8-5/8	28,0 - 52.0	8.190	7.235	1.250	2-7/8" EU 8 RD
9-5/8	32.0 - 61.0	9.190	8.235	1.250	2-7/8" EU 8 RD
10-3/4	51.0 - 81.0	10.065	9.110	1.250	2-7/8" EU 8 RD
	32.75 - 60.7	10.425	9.470	1.250	2-7/8" EU 8 RD
11-3/4	38.0 - 65.0	11.500	10.545	1.250	2-7/8" EU 8 RD
13-3/8	48.0 - 72.0	13.450	12.110	1.250	2-7/8" EU 8 RD
16.000	84.0 - 118.0	15.190	14.000	1.250	4-1/2" IF



## Composite Bridge Plug CBP

Composite Bridge Plug is a non metallic high-quality tool primarily used for temporary isolation in Intervention wells (thru tubing), multi-stage vertical or horizontal completion operations.

Comprised of proprietary composite material for use in high temperature applications, the bridge plug can be quickly and easily milled and circulated back to surface.

### Features and Benefits

- Consistent drill times of 30 minutes or less
- Can be set on wireline or coiled tubing using conventional setting tools
- Can be milled or drilled with coiled tubing or a rig
- Positive seal after setting
- Maximum surge potential of formation after perforating
- High differential pressure rating
- Low temp and high temp materials conducive to a wide range of environments
- Setting is done via a universal setting sleeve and adapter

### Application

- Temporary or Permanent well abandonment
- Temporary or Permanent zonal isolation
- Operations where rapid removal is desired
- High-Pressure/High-Temperature wells



Casing		Maximum	Tool Details		
OD (In)	Weight (Lbs./ft.)	Tool OD (in)	Setting Tool	Maximum Temperature (°F)	Maximum Pressure (PSI)
4-1/2	18.8 - 20.0	3.38	#10 WLAK/ Long Stroke or Multistage Setting Tool	300/400	10,000
	15.1 - 17.1	3.44			
	9.5 - 13.5	3.57			
5-1/2	23.0 - 26.8	4.13	#20 WLAK / Long Stroke or Multistage Setting Tool	300/400	10,000
	15.5 - 20.0	4.3			
	14.00	4.6			
7	23.0 - 32.0	3.562			
	17.0 - 20.0				

## Retrievable Bridge Plug RBP

Retrievable Bridge Plug is a high pressure plug for multiple zone and selective single zone operations such as acidizing, fracturing, cementing, and testing.

It features a large internal by-pass to reduce swabbing when running and retrieving. The by-pass closes during the setting of the plug and opens prior to releasing the upper slips to equalize pressure when unsetting. The by-pass is located directly below the upper slips to help wash debris when the by-pass is open.

This tool can be set in tension and compression. It can be set shallow in unsupported casing to contain pressure while working on wellhead equipment. It can be set in tension making it ideal for setting shallow to test wellhead equipment and also deep, high pressure wells.

The Wireline Retrievable Bridge Plug is a version of the Retrievable Bridge Plug that allows the plug to be set on wireline or with a hydraulic setting tool, and retrieved with tubing. It cannot be reset in the wellbore once it is unset, but it can be pulled, re-dressed and run again. A Wireline Adapter Kit is required for this version.

### FEATURES:

- Heavy-duty mandrel supports high hang-off weights
- Backup rings on O-rings seal for high pressure and temperature
- Tool joint connections are standard
- Rotationally locked end connections for torque transmission
- Quarter-turn set, pickup unset
- Standard automatic jay mechanism

### APPLICATION:

- High-pressure and high-temperature testing and treating operations
- Storm packer applications
- Drillstem and production testing



## Retrievable Bridge Plug RBP: Product Specification

Casing				Bridge Plug
OD	Weight	Min. I.D.	Max ID	Tool OD
(In)	(Lbs./ft.)	(in)	(in)	(in)
4-1/2	9.5 - 13.5	3.920	4.090	3.750
5	11.5 - 15.0	4.408	4.560	4.280
	18.0 - 20.8	4.156	4.276	4.000
5-1/2	20.0 - 23.0	4.670	4.778	4.500
	14.0 - 20.0	4.778	5.004	4.625
6-5/8	24.0 - 32.0	5.675	5.921	5.500
7	26.0 - 32.0	6.094	6.276	5.875
	20.0 - 26.0	6.276	6.456	5.969
7-5/8	24.0 - 29.7	6.875	7.025	6.672
	33.7 - 39.0	6.625	6.765	6.453
8-5/8	28.0 - 40.0	7.725	8.017	7.531
9-5/8	32.3 - 43.5	8.755	9.001	8.500
	43.5 - 53.5	8.535	8.755	8.250
10-3/4	32.75-51.0	9.850	10.192	9.625
	51.0-65.7	9.560	9.850	9.312
11-3/4	42.0-71.0	10.586	11.084	10.375
13-3/8	54.5-77.0	12.275	12.615	12.00
14	82.5-101.5	12.688	12.876	12.438
16	65.0-109.0	14.688	15.250	14.438
18-5/8	87.5-117.5	17.439	17.775	17.00
20	133.0-169.0	18.376	18.730	18.00



## Retrievable Packer RP

Retrievable Packer consists is a compression set packer with hydraulic hold down that is designed to provide an extra measure of dependability for rugged service.

The hydraulic actuated upper hold down provides more than the usual surface area to assure the packer will not move up the hole.

It is ideally suited for high pressure, high temperature service work.

Some unique features of the Retrievable Packer include positive rotational lock on all internal connections, which allow for extreme values of torque (left-and or right-hand) to be transmitted through the packer. Backup rings on all the o-rings provide for more reliable sealing at high temperature and pressure.

Retrievable Packer also come with extra long top and bottom subs, which allow for hydraulic tong make-up and break out.

### FEATURES:

- Hydraulic actuated upper hold down slips
- Positive rotational locks on all internal connections
- Back-up rings on all the O-rings provide for more reliable sealing at high temperature and high pressure
- Available with extra-long top and bottom subs allowing hydraulic tong make-up and break-out



## Retrievable Packer RP : Product Specification

Casing				Packer		
OD (in)	Weight (Lbs.)	Min. I.D. (in)	Max ID (in)	Max OD (in)	Min OD (in)	Standard Thread Connections
4-1/2	15.1-17.7	3.696	3.826	3.593	1.750	2-3/8" I.F.
	11.6-13.5	3.920	4.000	3.781	1.750	2-3/8" I.F.
5	15-18	4.276	4.408	4.125	1.750	2-3/8" I.F.
	11.5-15	4.408	4.560	4.250	1.750	2-3/8" I.F.
5-1/2	17-23	4.670	4.892	4.500	1.750	2-3/8" I.F.
	13-17	4.892	5.044	4.641	1.750	2-3/8" I.F.
7	38-46.4	5.626	5.920	5.525	2.688	3-1/2" I.F.
	32-38	5.920	6.094	5.781	2.688	3-1/2" I.F.
	26-32	6.094	6.276	5.954	2.688	3-1/2" I.F.
	17-23	6.366	6.538	6.188	2.688	3-1/2" I.F.
7-5/8	33.7-39	6.625	6.765	6.453	2.688	3-1/2" I.F.
	24-29.7	6.875	7.025	6.670	2.688	3-1/2" I.F.
9-5/8	58.4-59.4	8.407	8.435	8.250	3.750	4-1/2" I.F.
	43.5-53.5	8.535	8.755	8.365	3.750	4-1/2" I.F.
	32.3-43.5	8.755	9.001	8.584	3.750	4-1/2" I.F.
10-3/4	71.1-73.2	9.406	9.450	9.125	3.750	4-1/2" I.F.
	51-55.5	9.760	9.850	9.500	3.750	4-1/2" I.F.
11-3/4	60-71	10.586	10.772	10.406	3.750	4-1/2" I.F.
13-3/8	48-77	12.275	12.715	12.000	3.750	4-1/2" I.F.



## V-III Unloader Valve UV-III

V-III Unloader Valve is a high-pressure accessory tool for a compression-set service packer. V-III allows pressure to equalize above and below the packer before the packer is unset and permits fluid bypass during running in or out of the hole.

It can be locked in the open or closed position by a quarter-turn of the pipe. The valve can be equipped with tool joint connections, making it compatible with the DLT packer.

### FEATURES:

- Can be locked in open or closed position
- Large bypass area for fluid circulation
- Tool joint or tubing connections available
- Top connection keyed to prevent torque overload
- Unloader seals protected from fluid flow in open position
- High-strength alloy steel construction

### BENEFITS:

- Torque rating compatible with DLT Packer
- High-pressure and high-temperature rating for severe service
- Allows high circulation rates
- High hanging weight capacity for long tailpipe below packer
- Simple, rig-friendly operation

### APPLICATION:

- High-pressure and high-temperature testing and treating operations
- Drillstem and production testing

Size (in)	Max OD (In)	Min ID (In)	Standard Thread Connections
2-3/8	3.750	1.750	2-3/8" EU 8 RD
			2-3/8" I.F.
2-7/8	4.118	2.125	2-7/8" EU 8 RD
3-1/2	5.500	2.688	3-1/2" I.F.
4-1/2	7.250	3.750	4-1/2" I.F.





## Storm Valve SV

Storm Valve, which is run above the DLT Compression-Set Packer, provides a means to isolate the tubing below the packer and disconnect the running string by 22 turns of left-hand rotation. The running string can be reconnected, and the valve opened to equalize pressure for packer retrieval. The Storm Valve features an expendable plug that provides through-bore access for circulation or wireline passage.

### FEATURES:

- Valve closes automatically when disconnecting the running string
- Valve equalizes automatically when reconnecting running string
- Expendable plug for through-bore access
- Rugged alloy-steel construction
- Tool-joint connections

### BENEFITS:

- Simple to operate
- Compatible with compression packer operation
- Dependable design
- Easy to redress

### APPLICATION:

- Weather-related emergencies
- Wellhead repair

Valve Size (In)	Max. O.D. (in.)	Min. I.D. (in.)	Standard Thread Connections
4-3/4	4.750	1.490	3-1/2" IF
6-1/8	6.125	2.000	4-1/2" IF
	7.160	2.000	5-1/2" HT55-375



## Spring Loaded Retrieving Tool SLRT

Spring Loaded Retrieving Tool is used to run and retrieve TSU Retrievable Bridge Plug

### FEATURES

- Mill-toothed shoe
- Sturdy design
- Left-hand release standard
- Straight set down to re-attach
- Right-hand release available

Sizes (In)	Tool OD (inches)	Tool Thread Connection (Box Up)
3-1/2	2.75	1.900 EUE
4	3.125	1.900 EUE
4-1/2	3.625	2-3/8 EUE
	3.656	2-3/8 EUE
	3.75	2-3/8 EUE
5	4.125	2-3/8 EUE
	4	2-3/8 EUE
5-1/2	4.50	2-3/8 EUE
		2-7/8 EUE
6	5	2-3/8 EUE
6-5/8	5.437	2-7/8 EUE
7	5.875	2-7/8 EUE
7-5/8	6.375	2-7/8 EUE
8-5/8	7.5	3-1/2 EUE
9-5/8	8.250	3-1/2 EUE
		4-1/2 EUE
10-3/4	9.312	2-7/8 EUE
		3-1/2 EUE
11-3/4	10.37	4-1/2 EUE
13-3/8	11.75	4-1/2 EUE



## Premium Hydraulic Set Retrievable Packer

Hydraulic-Set Retrievable Packer is a compact, economical, packer designed for low- to medium-pressure applications.

The short body length makes it ideal for tight radius deviations and horizontal applications. The packer requires no downward mandrel movement for setting, allowing stacked applications. Straight pull releases the packer, and built-in bypass ports equalize pressure across the packer for ease in retrieval. The shear-release mechanism is isolated from the packer hydraulics to allow low release forces, even at full pressure differential.

### Features & Benefits

- No downward mandrel movement for setting
- Low setting pressure: 3,500 psi minimum
- Straight-pull release, adjustable up to 55,000 lb
- Shear screws isolated from hydraulic pressure
- Short overall length
- Pressure differential rating: 6,000 psi
- Material: L-80 or equivalent for H<sub>2</sub>S service
- Temperature rating: 275°F (standard trim)

### Application

- Offshore oil and gas completions
- Highly deviated wells and doglegs
- Stacked packer completions
- Coiled tubing completions

CASING		SETTING PRESSURE MINIMUM (PSI)	MAX. O.D.	MIN. I.D.	END CONNECTION
SIZE (IN )	WEIGHT (LB/FT.)				
5.500	14.0 - 17.0	3,500	4.625	1.940	2-3/8" EUE
	20.0 - 23.0	3,500	4.500	1.940	2-3/8" EUE
6.625	20.0 - 24.0	3,500	5.661	2.375	2-7/8" EUE
	24.0 - 28.0	3,500	5.625	2.375	2-7/8" EUE
	28.0 - 32.0	3,500	5.438	2.375	2-7/8" EUE
7.000	17.0 - 20.0	3,500	6.250	2.375	2-7/8" EUE
	17.0 - 20.0	3,500	6.250	2.900	3-1/2" EUE
	20.0 - 26.0	3,500	6.000	2.375	2-7/8" EUE
	20.0 - 26.0	3,500	6.000	2.900	3-1/2" EUE
	23.0 - 29.0	3,500	6.000	2.375	2-7/8" EUE
	23.0 - 29.0	3,500	6.000	2.900	3-1/2" EUE
	26.0 - 32.0	3,500	5.891	2.375	2-7/8" EUE
26.0 - 32.0	3,500	5.891	2.900	3-1/2" EUE	



## RETRIEVABLE HYDRAULIC SEAL BORE PACKER: RSB

Retrieval Hydraulic Seal Bore Packer is a Retrieval Packer, Hydraulically set by pressure in the Tubing. It is run with WS Hydraulic Setting Tool and the retrieving is done independently from the Tubing, using a Retrieval Tool manipulated on a work string. This packer is ideally suited for highly deviated well both onshore and offshore.

### Features & Benefits

- Hydraulic setting eliminates the requirements for spacing out and opening and closing with the help of Sliding Sleeves for the displacement of fluids.
- Effects on the tubing (compression and tension) are transmitted to slips-there is no shear ring which limits these stresses.
- Retrieval Independent of the Tubing using a Retrieval Tool. It can be left at the bottom of the well with a By-pass Blanking Plug in a Nipple to isolate the formation.
- Opposed slips (without hold down) positioned
- Short overall length
- Available for standard H<sub>2</sub>S (or CO<sub>2</sub>) Service, NACE MR 01-75.
- Temperature rating: 275°F (standard trim)

### Application

- Retrieval Hydraulic Seal Bore Packer can be used in oil production wells or in water or gas injection wells. It is also called "ERD" Packer.

RETRIEVABLE HYDRAULIC SEAL BORE PACKER						
Casing		Tubing	RSB Packer			
O.D In	Weight PPF	O.D In	Seal Bore In	Outside Diameter In	Thread Down In	Typical I.D Thru Seals In
5-1/2	17-20	2.688	2.690	4.552	As Req.	As Req.
7	23-29	3-1/2	4.000	5.955	4-1/2	2.992
	32-35	4-1/2	4.000	5.800	As Req.	2.992
9-5/8	40-47	3-1/2	4.000	8.425	4-1/2	2.992
		4-1/2	4.875		5-1/2	3.958

I.D will vary with tubing weight.



## HYDRAULIC SETTING TOOL WITH ADAPTER KIT FOR MODEL "RSB" PACKER

Hydraulic Setting Tool is a single chamber, tubing pressure actuated setting tool used in gravel pack operations in conjunction with the Gravel Pack Crossover Tool or Hydro-Set Adapter Kit to run and set Drillable Type Production Packers on tubing.

### Features & Benefits

- Short and Compact- Increases the efficiency of handling, shipping, and storing as well as operations on the rig.
- Simple Construction- Constructed of a minimum number of working parts, making it economical to maintain.

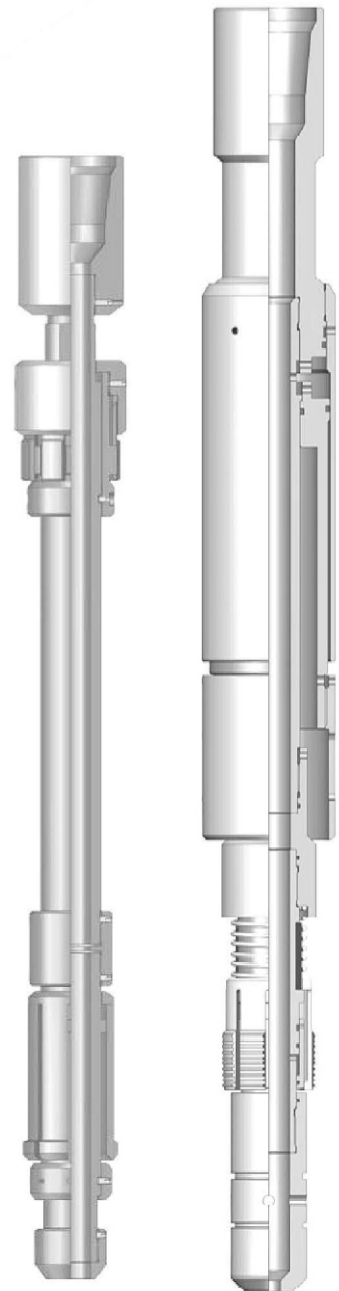
### Operation

- The WS Hydraulic Setting Tool, with the appropriate Setting Sleeve, Adapter Sleeve, is made up above the Gravel Pack Crossover Tool or Hydro-Set Adapter Kit. This unit is stabbed into the gravel pack assembly and run in place into the well.

### RETRIEVING TOOL FOR RSB PACKER

The WS Retrieving Tool is used for retrieving RSB Retrievable Hydraulic Seal Bore Packer. The latch of the Retrieving Tool is engaged in the Top Box Thread of the Seal Bore Packer, which is a left hand sq. thread. Put Set down weight 3000-5000 Lbs. on the Packer and turn to the right to engage the collet of the Retrieving Tool under the supporting sleeve of the Packer.

**PULL!** In principle the Packer should release with a pull of 5-10 tons. Once the screws have sheared the support sleeve moves upwards freeing the support beneath the finger of the collet the latter can then flex and detach itself from the thread linking it to the base of the Housing. On upward movement of the body of the packer the compression of the packing element are Released and the slips retracted. The Setting Sleeve is supported by the Ring, which rests on the top of the Piston above the O-ring.



## Retrievable Casing Packer Double Grip RDCP

RDCP hydraulic set single-string retrievable packer and may be used in virtually any production application. Tubing pump pressure is used to set the packer and the setting force is locked into the packer by a body lock ring.

A large internal by-pass reduces swabbing when running and retrieving. The by-pass closes when the packer is set, and opens during the releasing process to allow pressure equalization.

Shear screws are used to control the packer release. The standard RDCP Packer is designed for differential pressures up to 7,500 PSI.

### Features & Benefits

- Hydraulic button-type holds down located below the by-pass valve.
- Unique, built-in, —differential lock helps keep the by-pass valve closed.
- Effective by - pass design speeds equalization and resists swab-off.
- Field-proven, three-element packing system and rocker-type slips.
- Adjustable setting initiation pressure
- Adjustable shear release
- Straight pull release

### Application

- Production
- Stimulation
- Testing



## Retrievable Casing Packer Double Grip RDCP

Specification Guide Retrievable Casing Packer Double Grip RDCP						
Casing				Packer		
O. D. (Inch.)	Weight (ppf) (A)	ID Range in which Packer may be run		Nominal ID (Inch.)	Gage & Guide Ring OD (Inch.)	Thread specification Box Up & Pin Down (Inch.)
		Min (Inch.)	Max (Inch.)			
4-1/2	9.5-13.5	3.910	4.090	1.89	3.771	2-3/8 OD EUE 8RD
5	15-18	4.408	4.560		4.125	
	11.5-15				4.250	
5-1/2	26			4.625	4.777	1.96
	20-23	2.38	4.641			2-3/8 OD EUE 8RD
	15.5-20	1.96		2-7/8 OD EUE 8RD		
	14-20	4.778		2.38	2-7/8 OD EUE 8RD	
	17-20	4.778	4.892	2.38	2-7/8 OD EUE 8RD	
5-3/4	13-15.5	4.950	5.190	1.96	4.781	2-3/8 OD EUE 8RD
		4.893	5.044	2.38		2-7/8 OD EUE 8RD
	22.5	4.950	5.190	1.96		2-3/8 OD EUE 8RD
		4.893	5.044	2.38		2-7/8 OD EUE 8RD
6-5/8	34	5.561	5.609	1.96	5.405	2-3/8 OD EUE 8RD
		5.610	5.791	2.41	5.484	2-7/8 OD EUE 8RD
	28-32	5.600			5.475	
	24-28	5.791	5.921	1.96	5.484	2-3/8 OD EUE 8RD
				2.41	5.588	2-7/8 OD EUE 8RD
	24	5.830	5.937	2.41	5.656	
	17-20	5.938	6.135	2.41	5.812	
7	26-29	6.136	6.276	2.41	5.968	2-7/8 OD EUE 8RD
	20-26	6.276	6.456	2.41	6.078	2-7/8 OD EUE 8RD
	17-20	6.456	6.578	2.41	6.266	2-7/8 OD EUE 8RD
9-5/8	47-53.5	8.343	8.681	3.96	8.281	3-1/2 OD EUE 8RD
	40-47	8.681	8.835		8.437	



## TENSION PACKERS TP

Tension Packer is compact, economical Retrievable Packer. Primarily used in water flood applications, this Packer can also be used for production and/or treating operations. It is used where a set down Packer is impractical. Because the Model TP is tension set, it is ideally suited for shallow wells where set down weight is not available.

### Features & Benefits

- Utilizes WS rugged rocker type slips.
- Bore through the Packer mandrel is large than drift.
- Simple, low-cost Packer for fluid injection.
- Three release methods ensure retrievability.
- Uses proven one-piece packing element.

### To Set Packer:

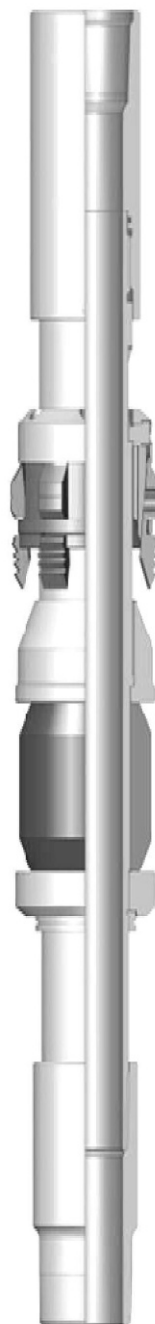
Run Packer to desired setting depth, making the last movement downward. Rotate the tubing to the left one quarter turn at the tool. Then, pick up and pack-off.

### To Retrieve Packer:

Lower the tubing at least one foot (0.31m) more than is needed to remove applied tension so that the J-pin will move fully to the top of the J-slot. Rotate the tubing to the right one-quarter turn at the Packer so slips will now be in the running position. Packer can be moved to a new position and reset or it can be retrieved. An optional J-slot, which provides for auto-release of the Packer by lowering of the Tubing String, is provided on special request.

### To Shear Release Packer:

As an alternate release method, the Tension Packer has shear rings designed to part at tension varying from 13,000-100,000 lbs. (5,89 to 45,35 t). The Cone Packing Element and Guide drop down are carried out of hole by the Bottom Sub.





## TENSION PACKERS TP

Specification Guide TENSION PACKERS TP						
Casing				Packer		
O. D. (Inch.)	Weight (ppf) (A)	ID Range in which Packer may be run		Nominal ID (Inch.)	Gage & Guide Ring OD (Inch.)	Thread specification Box Up & Pin Down (Inch.)
		Min (Inch.)	Max (Inch.)			
5-1/2	20-23	4.625	4.778	1.97	4.500	2-3/8 OD EUE 8RD
	15.5-20	4.778	4.950		4.641	
	13-15.5	4.950	5.190		4.781	
5-3/4	22.5				5.062	
6	26	5.191	5.390		5.156	
	20-23				5.405	
	15-18			5.484	2-7/8 OD EUE 8RD	
6-5/8	34	5.561	5.609	2.42	5.475	2-7/8 OD EUE 8RD
	28-32	5.610	5.791		5.656	2-7/8 OD EUE 8RD
		5.600			5.812	
	24	5.830	5.937		5.968	2-7/8 OD EUE 8RD
	17-20	5.938	6.135		6.078	2-7/8 OD EUE 8RD
7	26-29	6.136	6.276	6.266	2-7/8 OD EUE 8RD	
	20-26	6.276	6.456		2-7/8 OD EUE 8RD	
	17-20	6.456	6.578		2-7/8 OD EUE 8RD	
9-5/8	47-53.5	8.343	8.681	4.00	8.281	3-1/2 OD EUE 8RD
	40-47	8.681	8.835		8.437	



## SNAP SET COMPRESSION PACKER SSCP

Snap set Compression Packer, SSCP is Retrievable Set Down Packer featuring a bypass area through the Packer and an integral unloaded. It is used as the upper Packer in a single string two-Packer installation for zone isolation, injection, or productions. The SSCP Packer (without slips) is used above either Retainer Production Packers or Retrievable Packers.

### Features & Benefits

- Reliable Multiple Packing Element system that has been proven on the Model SSCP Retrievable Casing Packer.
- Simple Operation-No tubing rotation is required. Application of approximately 7000 lbs. set down (against a lower Packer) will set and pack-off the packer. A straight up-stain releases the Packer.
- Simple collet type Snap-latch prevents the Packer from setting before landing the seal assembly (or setting a lower Retrievable Packer). The lower portion of the tool is rotationally locked in order to deliver torque in either direction, through the Packer.
- Versatile - the two models available can fulfil a variety of requirements. The SSCP Compression Packer (without slips) are more economical than the SSCP Packers and may be used where differentials from and above are not severe.

### To Set Packer

- Run and set a Retainer Production Packer.
- Make up the Snap Set Packer in Tubing at a desired location and run the Tubing String into the well until the Locator Sub of the Tubing Seal Assembly lands in the Retainer Production Packer.
- Apply set-down weight to set and pack-off the Packer.
- Make up both Packers on the Tubing String and run them into the well.
- Rotate the Tubing as required to prepare the lower Packer for setting, and apply set down weight to set and pack-off both the Packers.

### To Release The Packer

To release the Packer simply pick up on the tubing string. If the weight of the Tubing String below the Packer is less than 1,500 lbs., the snap latch will not recock, and any attempt to lower the tool back down the hole during retrieving may not be successful. The unloaded will not be locked open. However, if the weight of the Tubing below the Packer is greater than 1,500 lbs., the snap-latch will recock to the running-in position. The Packer can then be raised or lowered during the retrieving operation



## SNAP SET COMPRESSION PACKER SSCP

Specification Guide Snap Set Compression Packer							
Casing				Packer			
O. D. (Inch.)	Weight (ppf) (A)	ID Range in which Packer may be run		Nominal ID (Inch.)	Gage & Guide Ring OD (Inch.)	Thread specification Box Up & Pin Down (Inch.)	
		Min (Inch.)	Max (Inch.)				
4-1/2	9.5-13.5	3.910	4.090	1.89	3.771	2-3/8 OD EUE 8RD	
5	15-18	4.408	4.560		4.125		
	11.5-15				4.250		
5-1/2	26	4.625	4.777	1.96	4.500	2-7/8 OD EUE 8RD	
	20-23			2.38	4.641	2-3/8 OD EUE 8RD	
	15.5-20	1.96	2-3/8 OD EUE 8RD				
	14-20	4.778	2-7/8 OD EUE 8RD				
	17-20	4.778	4.892	2.38	2-7/8 OD EUE 8RD		
5-3/4	13-15.5	4.950	5.190	1.96	4.781	2-3/8 OD EUE 8RD	
		4.893	5.044	2.38		2-7/8 OD EUE 8RD	
	22.5	4.950	5.190	1.96		2-3/8 OD EUE 8RD	
		4.893	5.044	2.38		2-7/8 OD EUE 8RD	
6-5/8	34	5.561	5.609	1.96	5.405	2-3/8 OD EUE 8RD	
		5.610	5.791	2.41	5.484	2-7/8 OD EUE 8RD	
	28-32	5.600			5.475		
	24-28	5.791	5.921	2.41	1.96	5.484	2-3/8 OD EUE 8RD
					5.588	2-7/8 OD EUE 8RD	
					5.656		
	24	5.830	5.937	2.41	5.812	2-7/8 OD EUE 8RD	
17-20	5.938	6.135	1.96	5.968			
7	26-29	6.136	6.276	2.41	5.968	2-7/8 OD EUE 8RD	
	20-26	6.276	6.456	2.41	6.078	2-7/8 OD EUE 8RD	
	17-20	6.456	6.578	2.41	6.266	2-7/8 OD EUE 8RD	
9-5/8	47-53.5	8.343	8.681	3.96	8.281	3-1/2 OD EUE 8RD	
	40-47	8.681	8.835		8.437		



## RETRIVABLE MECHANICAL SET PRODUCTION PACKER RMPP

Single String Double-Grip Production Packer is the most versatile of the mechanically set retrievable packers and may be used in any production application. This packer is suited for treating, testing, or injection applications, in pumping or flowing wells, either deep or shallow. This packer can be left in tension or compression depending on well conditions and the required application.

A large internal by-pass reduces swabbing when running and retrieving. The by-pass closes when the packer is set and opens prior to releasing the upper slips when retrieving to allow pressure equalization. The J-slot design allows easy setting and releasing; 1/4 turn right-hand set, 1/4 turn right-hand release. The standard ASI-X Packer is designed for differential pressures up to 7,000 PSI (unless noted otherwise).

This packer is also available in an HT version which is designed for differential pressures up to 10,000 PSI (unless noted otherwise). The HT version allows this packer to be utilized in completions where high pressure treating operations are performed and it is desirable to leave the tool in the well for production.

### Features & Benefits

- By-pass below upper slips to wash debris when valve is opened
- By-pass is opened before upper slips are released
- Can be set with tension for shallow well applications
- Can be left in tension, compression or neutral
- 1/4 turn right-hand set, 1/4 turn right-hand release
- Additional J-Slot arrangements available



# RETRIVABLE MECHANICAL SET PRODUCTION PACKER RMPP

Size In	Casing		Recommended Hole Size In	Tool ID In	Thread
	Weight (lbs/ft)				
2-7/8	6.4 - 6.5		2.375 - 2.441	0.63	1.050 EUE
	8.6		2.259	0.63	1.050 EUE
3-1/2	7.5 - 7.7		3.068 - 3.250	1.25	1.900 NUE
	7.7 - 10.2		2.922 - 3.068	1.25	1.900 NUE
	12.95		2.750	1.00	1.315 EUE / 1.660 EUE
4	9.5 - 11.0		3.476 - 3.548	1.50	1.900 EUE
	10.46 - 12.95		3.340 - 3.476	1.50	1.900 EUE
4-1/2	9.5 - 13.5		3.920 - 4.090	1.94	2-3/8 EUE
	13.5 - 15.1		3.826 - 3.920	1.94	2-3/8 EUE
	15.1		3.826	1.94	2-3/8 EUE
	15.1 - 16.6		3.754 - 3.826	1.50	1.900 EUE
	18.8		3.640	1.50	1.900 EUE
5	11.5 - 15.0		4.408 - 4.560	1.94	2-3/8 EUE
	15.0 - 18.0		4.276 - 4.408	1.94	2-3/8 EUE
	18.0 - 20.8		4.156 - 4.276	1.94	2-3/8 EUE
	21.4		4.126	1.94	2-3/8 EUE
5-1/2	13.0 - 14.0		5.012	2.38	2-7/8 EUE
	14.0 - 20.0		4.778 - 5.012	2.00	2-3/8 EUE
				2.38	2-7/8 EUE
	20.0 - 23.0		4.670 - 4.778	2.00	2-3/8 EUE
				2.38	2-7/8 EUE
	23.0 - 26.0		4.548 - 4.670	1.94	2-3/8 EUE
			2.38	2-7/8 EUE	
6	10.0		5.672	2.50	2-7/8 EUE
	12.0 - 20.0		5.352 - 5.620	2.38	2-7/8 EUE
6-5/8	17.0 - 24.0		5.921 - 6.135	2.50	2-7/8 EUE
	20.0 - 24.0		5.921 - 6.049	3.00	3-1/2 EUE
	24.0 - 32.0		5.675 - 5.921	2.50	2-7/8 EUE
				3.00	3-1/2 EUE
32.0 - 34.5		5.575 - 5.675	2.50	2-7/8 EUE	



## PERMANENT PRODUCTION PACKER: PPPA

Retainer Production Packers are the most widely used, most versatile, high performance Permanent Production Packers available. They are frequently used as a permanent squeeze or testing Packer or as a permanent or temporary Bridge Plug.

PPPA Packers and their guides can also be ordered separately by those interested in maximum inventory flexibility.

### **Packer Setting:**

Electric Line  
Wire Line Adapter Kit Tubing

### **Packer Accessories:**

Tubing Seal Assemblies Perforated Spacer Tubes

### **Features / Benefits:**

- Proven reliability
- Slim-line design
- Solid construction that makes possible a significant savings in rig time by providing a 50% faster run-in without fear of impact damage or premature setting.
- Two opposed sets of full-circle, full strength slips.
- A packing element that resists swab-off but packs-off securely when the Packer is set.
- Unique inter locked expandable metal back-up rings that contact the casing creating positive Packing Element extrusion barrier.



## PERMANENT PRODUCTION PACKER: PPPB

Retainer Production Packer is large bore version of Model PPPB Retainer Production Packer. They combine the features of the PPPB with the largest bore through any drillable Packer.

### Packer Setting:

Electric Line Tubing

### Packer Accessories:

Tubing Seal Assemblies

Seal Bore Extensions

Mill-out Extensions

Packer Plugs

Expansion Joints

### Features / Benefits:

- Solid, slim-line construction and a packing element system that resists swab-off. This provides a faster run-in time without fear of impact damage or premature setting, yet packs-off securely and permanently when the Packer is set.
- Two opposed sets of full-circle; full strength slips assure that the Packer will stay where it is set.
- Unique interlocked, expandable metal back-up rings contact the casing and create a positive barrier to Packing Element extrusion.
- The largest possible opening through a drillable Packer.



## HYDRAULIC SETTING TOOL FOR PPPA & RSB

Hydraulic Setting Tool is used to set PPPA Permanent Packer and Model RSB Retrievable Hydraulic Seal Bore Packer.

The Packer is run in the model PPPA Wire Line Adapter Kit, attached to the model PPPB Hydraulic setting tool on the drill pipe and lower to setting depth.

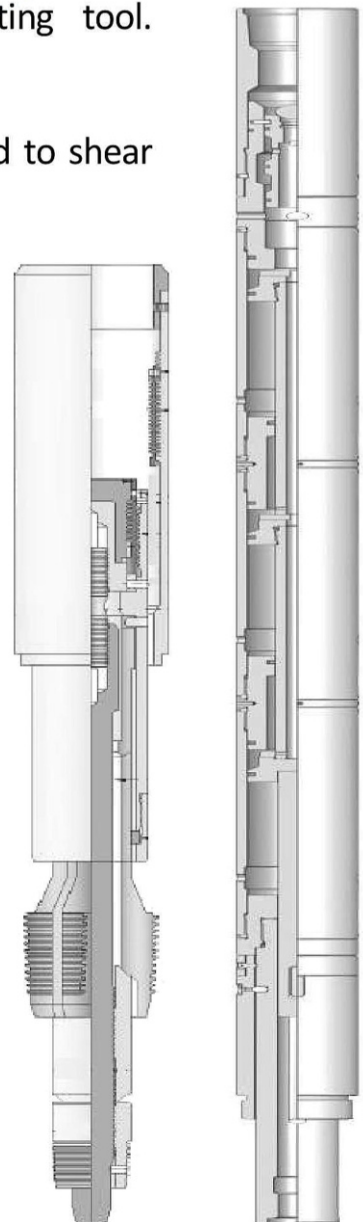
The tubing fills automatically as it is run in, though a ported top sub in the setting assembly. The ports also permit circulation at any time. A 1 7/16 Brass Ball is pumped down to seat in the hydraulic setting tool. Approximately 1500 psi is applied to set the packer slips.

Following which the pressure is released and / or tension applied to shear the release stud of the Wire line Adapter Kit.

The Hydraulic Setting Tool along with wire line adapter kit can then be retrieved leaving the packer set in hole.

Following which the pressure is released and / or tension applied to shear the release stud of the Wire line Adapter Kit.

The Hydraulic Setting Tool along with wire line adapter kit can then be retrieved leaving the packer set in hole.





## RETAINER PRODUCTION PACKER HYDRO-SET RPPHS

RPPHS Retainer Production Packer is the hydraulically set version of the Model PPPA Packer.

### Features / Benefits:

- Solid, slim-line construction and a packing element system that resists swab-off. This provides fast run-in time without fear of impact damage or premature setting, yet packs-off securely and permanently when the Packer is set.
- Two opposed sets of full-circle; full strength slips assure that the Packer will stay where it is set.
- Unique interlocked, expandable metal back-up rings contact the casing and create a positive barrier to packing element extrusion.
- Safety of flanged-up completions.
- Setting requires no rotation or reciprocation, thereby eliminating the problems of spacing out, landing, etc.
- All O-Rings supported by back-up rings to improve long term seal integrity.
- All —BSB-3 Packers are designed to withstand pressure differentials up to 10,000 psi.
- Guide furnished standard allowing attaching of a Mill out Extension or other component below the Packer. A blank bottom guide or guide for Seal Bore Extension can be furnished if required.
- All alloy materials within the Packer are suitable f/H<sub>2</sub>S service.
- The shear release seal assembly on which the Packer is run serves as a Seal Nipple after the Packer is set.



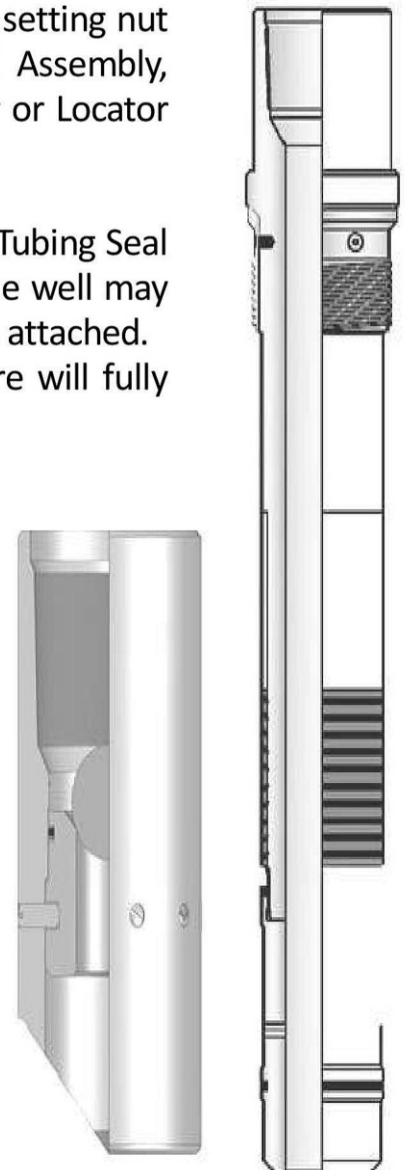
## SHEAR RELEASE ASSEMBLY SRA

### Packer Setting:

Shear Release Seal Assembly or the Model RPPHS Shear Release Snap Out Seal Assembly is used to set the Model RPPHS Packer with tubing pressure. A pump-out ball seat near the bottom of the tubing provides a means of applying setting pressure. After the Packer is set and the ball and seat are pumped out. Seal Assembly functions as a Tubing Seal Assembly.

If some time later the Shear Release Seal Assembly is removed from the Packer, standard locator seal assemblies can then be used. The setting nut is left in the Packer threads. A Shear Release Snap Out Seal Assembly, however, leaves the packer threads clear so that either Anchor or Locator Type Seal Assemblies can be used after it is removed.

Alternatively the Packer may be RIH attached below an Anchor Tubing Seal Nipple and set by pressurizing against a pump-out Ball Seat .The well may then be produced through the same tubing to which the ATSN is attached. Pressure required to set and pack-off: 2500 psi tubing pressure will fully pack-off all sizes of the RPPHS Packer.



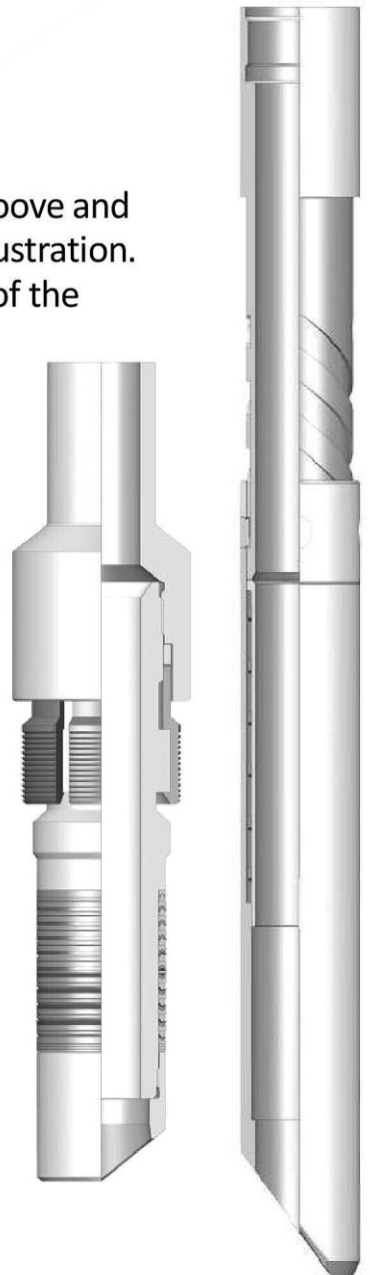
## PACKER ACCESSORIES

### Anchor Tubing Seal Nipple : ATSN

Used for sealing in the upper bore of Model PPPA, PPPB, RPPHS Packers. Supplied with one Seal Stack and blank or half Mule Shoe Bottom Sub which will not accommodate tail pipe of production tubes. The Seal Stack can be provided suiting to the specific well conditions. The **ATSN** Anchor features metal-to metal internal connections for hostile environments. The Top connection can be specified as requested.

### Auto Oriented Mule Shoe: AOMS

The bottom sub of AOMS is provided with double- start helical groove and two Guide Pins. Half Mule Shoe as shown in the accompanying illustration. The double-start helix provides for uniform self- orienting action of the Half Mule Shoe to permit easy entry in the Packer bore.



## EXTERNAL CASING PACKER: ECP

External Casing Packers (ECPs) are Inflatable Packers designed to be run as an integral component in the casing string or liner. Once inflated they provide permanent impermeable annular External Casing Packers (ECPs) are Inflatable Packers designed to be run as an integral barriers between casing strings or between casing and openhole. ECPs seal in vertical, deviated, and irregular wellbores.

Every ECP features a fully continuous mandrel that forms part of the casing or liner, and serves as the main support for the ECP Valve and Inflatable Packer Element components.

ECPs are inflated by pressurizing the entire casing, or by straddling the inflation port.

### Applications

- Support Primary Cement
- Isolate Lower Zones during Multi-Stage Cementing
- Isolate Lost-Circulation Zones during Cementing
- Segregate Production Zones
- 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 4ft, 10ft, or 20ft
- Rated for up to 300°F (150°C) applications

### Customer Benefits

- No hidden internal connections
- No welding to the ECP mandrel
- Redundant Inflation Valve Seals
- Opening Valve provides delayed setting



## EXTERNAL CASING PACKER

Casing Size		Standard Clearance Maximum O.D.		Special Clearance Maximum O.D.	
in	mm	in	mm	in	mm
2-3/8	60	3.62	92	3.39	86
2-7/8	73	4.25	108	3.81	97
3-1/2	89	4.75	121	4.31	109
4	102	5.18	132	4.77	121
4-1/2	114	5.75	146	5.50	140
5	127	6.25	159	5.95	151
5-1/2	140	7.00	178	6.50	165
6-5/8	168	7.94	202	7.69	195
7	178	8.25	210	8.06	205
7-5/8	194	9.00	229	8.75	222
8-5/8	219	10.25	260	10.00	254
9-5/8	244	11.25	286	10.88	276
10-3/4	273	12.75	324	12.38	314
11-3/4	298	13.75	349	13.38	340
13-3/8	340	15.75	400	14.75	375
16	406	18.25	464	18.06	459
18-5/8	473	21.63	549	21.00	533
20	508	23.00	584	22.50	572



## Tubing-Retrievable Safety Valve

Tubing-Retrievable Safety Valve (TRSV) is a flapper-type, equalizing or non-equalizing, surface-controlled subsurface safety valve (SCSSV) installed in the production string. The valve is designed to provide subsurface isolation to minimize loss of production and protect human life.

It also reduces the potential for environmental discharge or damage to production equipment resulting from an uncontrolled surface or subsurface event.

The TRSCSSV is hydraulically controlled from the surface through a control line connected to the well control/emergency shutdown system. The TRSCSSV is designed to facilitate easy installation of secondary WRSCSSV Insert Safety Valve to provide continuous fail-safe operation.

### FEATURES AND BENEFITS

- Hydraulically controlled
- Single rod piston design
- Certified per API 14A specifications
- Maximized flow-through ID design
- Self-equalized through flapper option
- Non-elastomeric seals
- Metal-to-metal body joints
- Secondary lockout/communication
- Inverted dual ferrule control line connection
- Optimized design helps eliminate sand fouling
- Compact design and minimal number of parts increases reliability
- Minimized number of potential leak paths
- Premium metallurgies available for varied environments



## Tubing-Retrievable Safety Valve

### TECHNICAL DATA

Size	OD	Polished Bores	Working Pressure	Tensile Strength
2-3/8	3.625	1.875	5000	198,485
2-7/8	4.610	2.313	5000	282,132
3-1/2	5.175	2.813	5000	374,733
4-1/2	6.908	3.813	5000-7500	374,733
4-1/2	6.550	3.813	5000-10000	468,509
5-1/2	7.686	4.563	5000-10000	780,264
7	9.203	5.963	5000-18000	1,455,058



## Wireline-Retrievable Safety Valve

WRSSSV is a flapper-type, equalizing or non-equalizing, surface-controlled subsurface safety valve (SCSSV). The valve is designed to provide subsurface isolation to minimize loss of production and protect human life. It also reduces the potential for environmental discharge or damage to production equipment resulting from an uncontrolled surface or subsurface event.

The WRSSSV can be installed as a primary safety valve landed in a hydraulic nipple. It can also be used to remediate a failed Tubing-Retrievable as an Insert Wireline Safety Valve.

### FEATURES AND BENEFITS

- Hydraulically controlled
- Certified per API 14A specifications
- Maximized flow-through ID design
- Self-equalized through flapper option
- Optimized design helps eliminate sand fouling
- Compact design and minimal number of parts increases reliability
- Replacement for an existing TR safety valve
- Facilitates flow assurance well design criteria
- Minimized number of potential leak paths
- Premium metallurgies available for varied environments





# Wireline-Retrievable Safety Valve

## TECHNICAL DATA

Size	ID	Polished Bores	Working Pressure	Tensile Strength
2-3/8	0.810	1.875	5000	198,485
2-7/8	1.25	2.313	5000	282,132
3-1/2	1.500	2.813	5000	374,733
4-1/2	2.125	3.813	5000-7500	374,733
5-1/2	2.600	4.563	5000-10000	780,264
7	3.500	6.000	5000-10000	1,455,058



# FLOW CONTROL EQUIPMENTS

## X and R Landing Nipples and Lock Mandrels

X and R landing nipples are run into the well on the completion tubing to provide a specific landing location for subsurface flow control equipment. The common internal profiles of these landing nipples make them universal. X landing nipple is used in standard weight tubing. R landing nipple is typically used with heavyweight tubing.

The completion can have as many selective nipples with the same ID in any sequence as desired on the tubing string. This versatility results in an unlimited number of positions for setting and locking subsurface flow controls. The flow control, which is attached to the required X or R lock mandrel, is run in the well via the selective running tool on slickline.

The slickline operator using the selective running tool can set the flow control in any one of the landing nipples at the desired depth. If this location is unsatisfactory or if well conditions change, the flow control may be moved up or down the tubing string to another nipple location. These operations can be done by slickline under pressure without killing the well.

### Features

#### Landing nipples

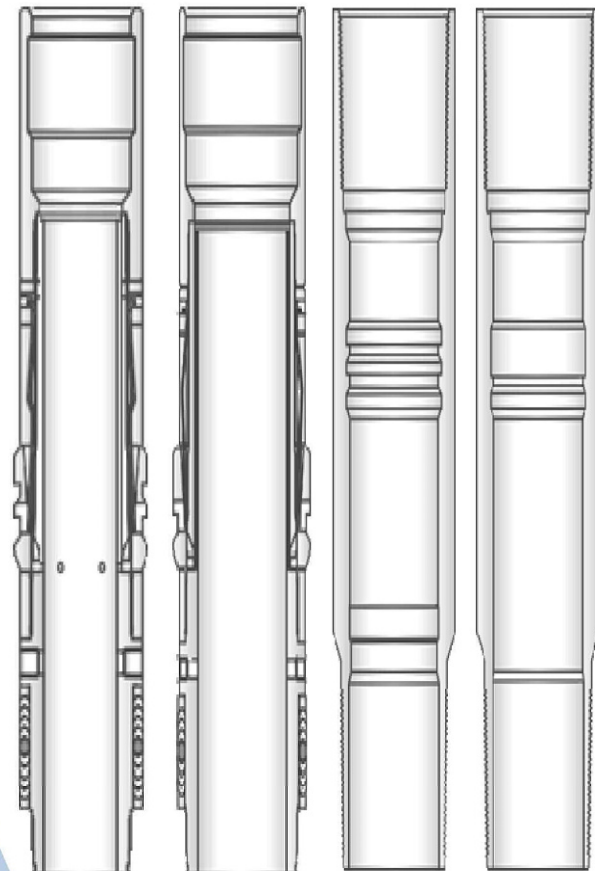
- Large bore for minimum restriction
- Universal nipple with one internal profile

#### Lock Mandrels

- Retractable locking keys
- Locks designed to hold pressure from above or below from sudden reversals

#### Optional hold down

- Interference hold down for smaller locks
- Shear pin hold down for larger locks



## FLOW CONTROL EQUIPMENTS

### XN and RN No-Go Landing Nipples and Lock Mandrels

This equipment is designed for use in single nipple installations or as the bottom nipple in a series of X or R landing nipples.

These landing nipples have the same packing bore ID for a particular tubing size and weight. X and XN landing nipples are designed for use with standard weight tubing.

R and RN landing nipples are designed for use with heavy weight tubing.

### Features

#### Landing nipples

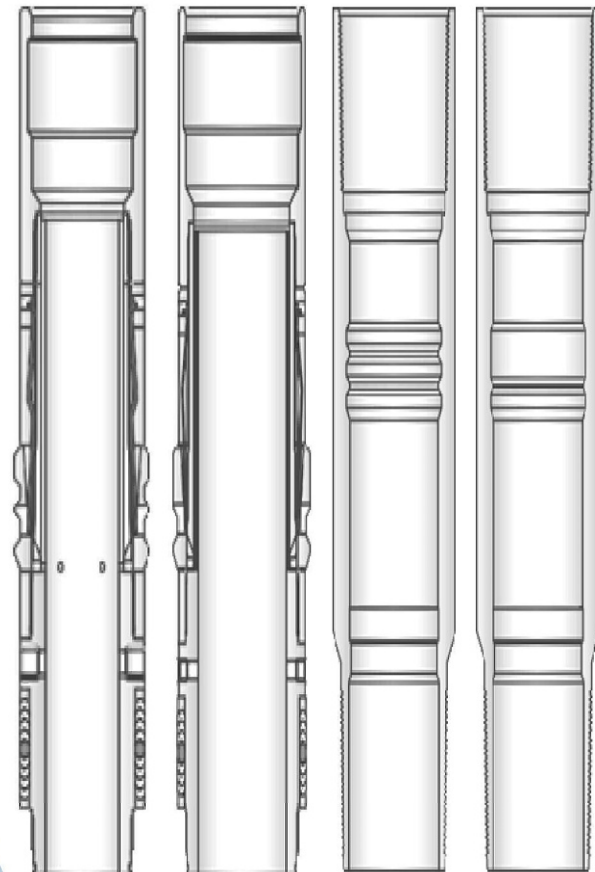
- Large bore for minimum restriction
- Universal nipple with one internal profile

#### Lock Mandrels

- Retractable locking keys
- Locks designed to hold pressure from above or below from sudden reversals

#### Optional hold down

- Interference hold down for smaller locks
- Shear pin hold down for larger locks



## FLOW CONTROL EQUIPMENTS

### SLIDING SLEEVE WS-SS

Sliding Sleeve is a Downhole flow control device mounted in the Production Tubing. It effectively controls flow between the tubing and casing annulus, by means of an internal sleeve that is opened or closed by standard wire-line methods.

### Applications:

Sliding Sleeves may be used to establish Tubing to annulus communication for following operations:

- Displacing the Tubing or annulus fluid after X-mas tree installation.
- For testing, treating and production of individual zones in a multi- zone selective well & For producing more than one zone through a single Tubing String. For killing a well by circulation.
- For Gas Lift.
- For landing a Blanking Plug in Nipple profile to shut in well or when testing Tubing.
- For landing comingling chokes in nipple profile.
- For circulating Inhibitors for corrosion control.

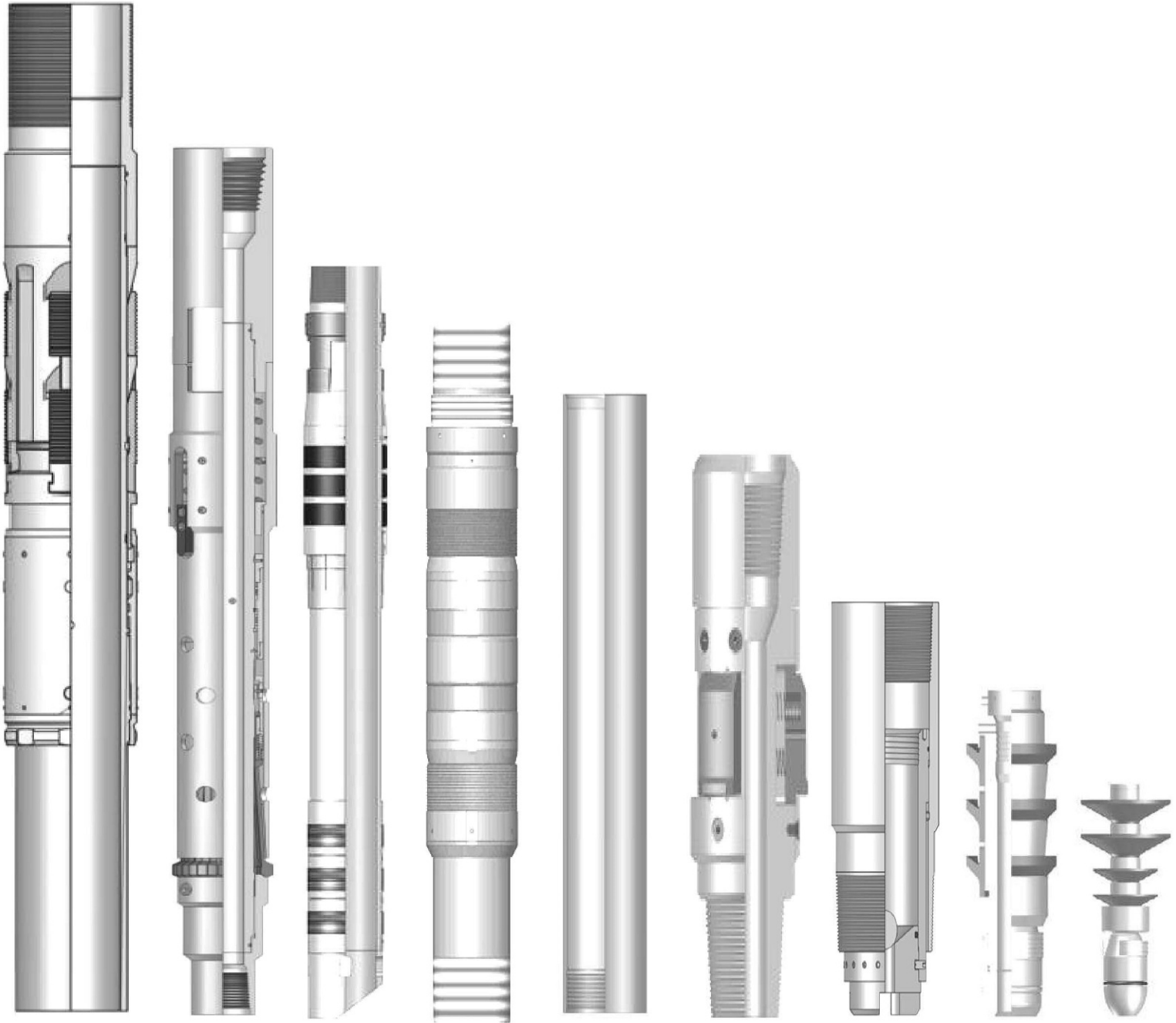
### Features:

- Simple, Positive Control - With a Model WS-SS Sliding Sleeve, establishing or closing off tubing-to-casing annulus communication is simple, dependable and quick. This type of product makes it possible to close the ports without leaving any obstruction in the Tubing once the shifting operation is completed.
- Protected Closing Sleeve - The closing sleeve is recessed so that there is no danger of opening or closing the sleeve by mistake while running Wire-line Tools through or while seating a Flow Control device in the Sliding Sleeve.
- Additional Seating Nipple - The Upper Sub of the Model WS-SS Sleeve has a Seating Nipple profile to land selective or Top No-Go Locking Flow Control devices.
- The lower seal sub has a honed bore that in combination with the upper seating nipple can be utilized to land Separation Sleeves, Chokes or Blanking Plugs.



# CEMENTING SYSTEM

## LINER HANGER SYSTEM



## HYDRAULIC SET ROTATING LINER HANGER WS-HSRL

### DESCRIPTION & APPLICATION:-

Hydraulic set Single Cone Rotating Liner Hangers WS-HSRL provides a means to rotate the liner during cementing operations insuring a more complete cement bond. It initially hangs the liner in tension .Its design is based on the hydraulic setting of slip segments, which distribute the liner weight evenly on the tapered swivel cone. The Hydraulic liner hanger may be set before or after cementing by applying pressure to running-in string. The Hydraulic liner hanger may be reciprocated during cementing and set after cementing by applying pressure against the liner wiper plug after it is landed in Landing Collar .To set the Hanger before cementing . A Landing Collar with setting ball must be run.

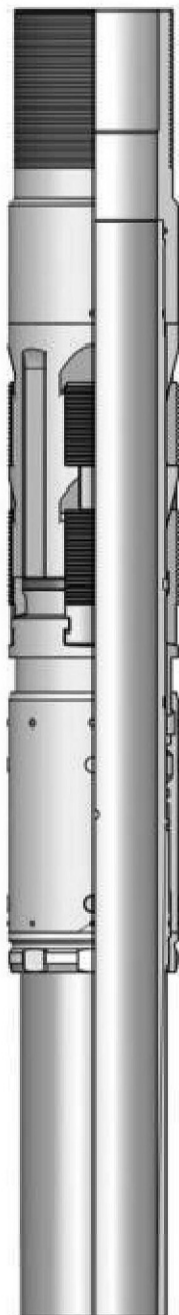
### FEATURES:-

Body is manufactured from mechanical tubing to equivalent grade of liner 80,000 psi to 110,000 psi yield strengths are standard. Other yield strengths and materials available on request.

Hydraulic cylinder manufactured from material matching yield strength of liner Hanger.

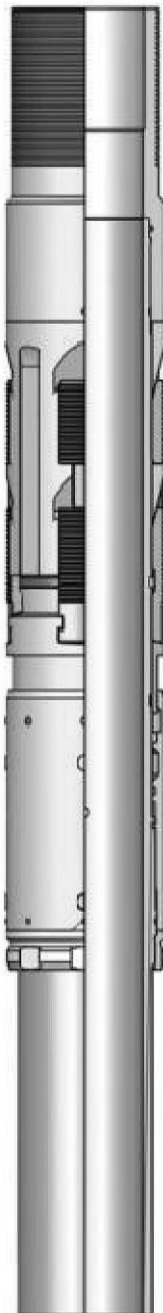
Slips are manufactured to Rockwell "C" scale hardness of 57-64 for use in the highest grade casing strings.

Incorporated with high compressive strength thermo plastic bearing which is contacted by bearing surfaces on the cone and top collar. Bearing design is very efficient and economical and well suited for rotating moderate liner loads with normal torque during cementing operation.



## HYDRAULIC SET ROTATING LINER HANGER WS-HSRL

Liner Hanger Size (Casing X Liner)		Casing Weight (lbs/ft)	Max.	Total Length Approx. (in)
in	mm		OD (in)	
5 X 3 1/2	127 X 88.9	13 – 15	4.188	60.1 25
		18	4.062	
5 1/2 - 3 1/2	139.7 X 88.9	14 – 15.5	4.625	60.1 25
		17	4.500	
		20 – 23	4.375	
5 1/2 X 4	139.7 X 101.6	14 – 15.5	4.750	60.1 25
		17	4.625	
		23	4.460	
6 5/8 X 4 1/2	168.275 X 114.3	28 – 32	5.375	61.3 75
		35	5.350	
7 X 4 1/2	177.8 X 114.3	20 - 26	6.000	63.2 50
		26 - 32	5.875	
		35	5.750	
		38-41	5.625	
7 X 5	177.8 X 127	17 -20	6.125	63.2 50
		23	6.000	
		26-32	5.875	
		35	5.750	
		38-41	5.625	
7 X 5 1/2	177.8 X 139.7	23	6.156	63.2 50
		23 – 26	6.062	
		29	5.970	
7 5/8 X 5	193.7 X 127	20 – 26.4	6.688	64.3 13
		29.7 – 33.7	6.500	
		39	6.375	
		39 – 45.3	6.250	
		42.8-45.3	6.125	
7 5/8 X 5 1/2	193.7 X 139.7	20 – 26.4	6.688	64.3 13
		29.7 – 33.7	6.500	
		39	6.375	
		42.8 – 45.3	6.250	
8 5/8 X 5 1/2	225.107 X 139.7	32 -36	7.562	65.6 88



## HYDRAULIC SET NON-ROTATING LINER HANGER WS-HNRL

### DESCRIPTION & APPLICATION

Hydraulic Liner Hanger are used to hang a liner in well without rotating the work string to set the hanger in deviated or horizontal wells and can be used for applications such as setting new liner through existing liners or on floating rigs. The Hanger provides full bypass in the set position during cementing operations. The hanger body is furnished with higher group of API 5CT standard materials as well as with the end connections in compliance to API standards or any premium threads as per the customer's requirement/demand. The Hanger is provided with stub acme threads at the upper end for assembling with Tie Back Receptacle. The hanger consist of double or multiple cone on which the slips move to bite into the casing.

### OPERATION:-

If pipe movement is not required hydraulic liner hangers may be set prior to cementing. This is set hydraulically by applying pressure through the running string. A setting ball is circulated or dropped to a ball seat built in the landing collar. Applied pressure acts on the internal piston, moving slips up the cone to the set position. This is done by releasing a setting ball from that surface this seats in a hydraulic latch landing collar. Applying internal hydraulic pressure to shear the hanger setting piston will force the slips upward Between the cone and casing allowing the liner hanger to support the liner weight. Increasing Pressure will shear out the ball seat of the landing collar allowing circulation for cementing. The running tool may now be released with right hand rotation.

If reciprocal pipe movement is required to enhance bonding, the hanger may be set after cementing by pressuring against landed plugs and then releasing the running tool with right hand rotation.





## HYDRAULIC SET NON-ROTATING LINER HANGER WS-HNRL

Liner Hanger Size (Casing X Liner)		Casing Weight (lbs/ft)	Max. OD	Length Approx. TC	Length Approx. SC
			in	in	in
in	mm		in	in	in
4 1/2 X 2 7/8	1114.3 X	10.5-12.60	3.750	60.141	40.1 25
		13-15.5	4.625		
5 1/2 - 3 1/2	139.7 X 88.9	17	4.500	63.313	43.625
		20 - 23	4.375		
		17-19.5	4.900		
5 3/4 X 4	146.04 X 101.6	17-19.5	4.900	63.313	43.6 25
6 5/8 X 4 1/2	168.275 X 114.3	20 - 24	5.750	68.500	48.813
		28-32	5.375		
7 X 4 1/2	177.8 X 114.3	23 - 26	6.000	73.813	53.938
		26 - 32	5.875		
		35	5.750		
		38-41	5.625		
7 X 5	177.8 X 127	17 -20	6.250	73.813	53.938
		23-26	6.000		
		26-32	5.875		
		35	5.800		
		38	5.625		
7 X 5 1/2	177.8 X 139.7	23	6.156	73.813	53.938
		23 - 26	6.125		
		26-29	6.030		
7 5/8 X 5	193.675 X 127	20 - 26.4	6.688	74.469	54.469
		29.7 - 33.7	6.500		
		39	6.375		
7 5/8 X 5 1/2	193.7 X 139.7	20 - 26.4	6.688	74.469	54.469
		29.7 - 33.7	6.500		
		39	6.375		
		42.8 - 45.3	6.250		
8 5/8 X 5 1/2	219.075 X 139.7	24-28	7.750	78.125	58.438
		32-36	7.562		



## HYDRAULIC SET NON-ROTATING LINER HANGER WS-HNRL

8 5/8 X 6 5/8	219.075 X 168.275	40-44	7.375	78.125	58.438
9 5/8 X 7	244.5 X 177.8	32 - 36	8.500	80.000	60.000
		40 - 47	8.375		
		47 - 53.5	8.313		
		53.5 - 61.1	8.125		
9 5/8 X 7 5/8	244.5 X 193.675	43.5 - 47	8.437	80.000	60.000
		53.5	8.313		
10 3/4 X 7 5/8	273.05 X 193.675	45.5 - 55.5	9.500	82.313	62.438
		60.7	9.375		
		65.7 - 71.1	9.188		
11 3/4 X 7 5/8	298.45 X 193.675	60-66.7	10.375	83.625	63.500
11 3/4 X 9 5/8	298.45 X 244.5	60 - 66.7	10.438	83.625	63.500
		66.7-71	10.375		
11 7/8 X 9 5/8	301.625x244.5	71.8	10.438	83.938	63.813
13 3/8 X 9 5/8	339.725 X 244.475	61 - 68	11.875	85.188	65.203
		72 -86	11.750		
13 3/8 X 10 3/4	339.725 X 273.050	61 - 68	12.125	85.188	65.203
		72 - 77	12.000		
13 3/8 X 11 3/4	339.725 X 298.45	54.5 - 68	12.200	85.188	65.203
		68 - 72	12.130		
		77	12.070		
16 x 13 3/8	406.400 X 339.725	95-97	14.625	87.625	67.750
20 X 16	508 X 406.400	131	18.000	90.500	70.063



## MECHANICAL SET ROTATING DOUBLE SLIP LINER HANGER WS-MDSL

### DESCRIPTION & APPLICATION:-

Mechanical Set Rotating Liner Hanger WS-MDSL is very efficient and economical choice for shallow to medium depth wells. Liner Hanger consist of a bearing which allows rotation. It initially hangs the liner in tension and then provides a means to rotate the liner during cementing operations insuring a more complete cement bond.

It consist of an enclosed jay ("J") within a one piece sleeve with friction springs manufactured from spring steel material. This "J" allows the hanger to return to run-in position, if the hanger sets prematurely. The jay slot holds the slips in place below the taper cone while running in the well. The simple jay mechanism are allows the operator to set and release the hanger any number of times if necessary. The hanger consist of single cone and single set of slips. It is incorporated with high compressive strength thermo plastic bearing which is contacted by bearing surfaces on the cone and top collar. Bearing design is very efficient and economical and well suited for rotating moderate liner loads with normal torque during cementing operation. It allows large bypass area in run-in and set conditions.

### OPERATION:

When Setting depth is reached the hanger is picked up couple feet and 1/4 rotation is applied (either right hand or left hand depending upon application) . As the Hanger is lowered, the slips will be held stationary by the friction springs. Apply Slack-off and this will make the taper cone contact the slips and force them out- ward into the casing . The hanger is run integral with setting collar or Liner Top Packer. The Hanger provides full bypass in the set position during cementing operations. The pin on the Body comes out of the J-Slot cage after setting of Hanger, which makes mandrel free to rotate after setting while cementing.

Slips are manufactured to Rockwell "C" scale hardness of 57-64 for use in the highest grade casing strings.



## MECHANICAL SET NR SINGLE SLIP LINER HANGER WS-MSSL

### DESCRIPTION & APPLICATION:-

Mechanical Set Non-Rotating Liner Hanger is a versatile and economical completion Tool. The hanger is set mechanically (manipulating the work string) with either right or left hand rotation, depending on the setting tool or design. It consist of an enclosed jay ("J") within a one piece sleeve with friction springs manufactured from spring steel material. This "J" allows the hanger to return to run-in position, if the hanger sets prematurely. The jay slot holds the slips in place below the taper cone while running in the well. The simple jay mechanism are allows the operator to set and release the hanger any number of times if necessary. The hanger consist of single cone and single set of slips. It allows large bypass area in run-in and set conditions.

### OPERATION:

When Setting depth is reached the hanger is picked up couple feet and 1/4 rotation is applied (either right hand or left hand depending upon application)

. As the Hanger is lowered , the slips will be held stationary by the friction springs. Apply Slack-off and this will make the taper cone contact the slips and force them out- ward into the casing . The hanger is run integral with setting collar or Liner Top Packer. The Hanger provides full bypass in the set position during cementing operations. The pin on the Body comes out of the J-Slot cage after setting of Hanger, which makes mandrel free to rotate after setting while cementing.

The Hanger slips are hardness controlled to assure their biting and hanging capacity even in the highest strength casing. Slips are manufactured to Rockwell "C" scale hardness of 57-64 for use in the highest grade casing strings.



# MECHANICAL SET ROTATING DOUBLE SLIP LINER HANGER WS-MDSL

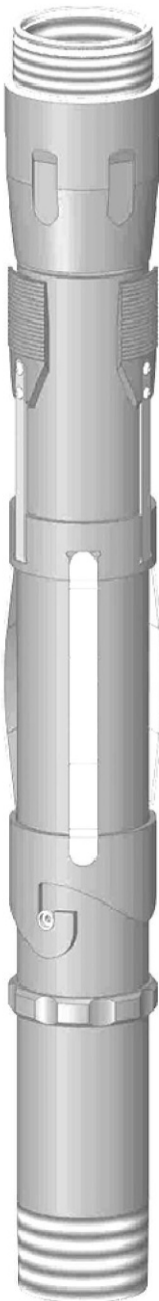
## SPECIFICATIONS:

Liner Hanger Size (Casing X Liner)		Casing Weight t Lbf	Max.	Length Approx.	Length Approx.
			OD	MDSL	MSSL
in	mm		In	in	in
5 X 3 1/2	127 X 88.9	13 – 15	4.188	68.438	55.063
		18	4.062		
5 1/2 - 3 1/2	139.7 X 88.9	14 – 15.5	4.625	68.438	55.063
		17	4.500		
		20 – 23	4.375		
5 1/2 X 4	139.7 X 101.6	14 – 15.5	4.750	68.438	55.063
		17	4.625		
		23	4.460		
6 5/8 X 4 1/2	168.275 X 114.3	28 – 32	5.375	71.125	57.125
		35	5.350		
7 X 4 1/2	177.8 X 114.3	20 - 26	6.000	71.125	62.125
		26 - 32	5.875		
		35	5.750		
7 X 5	177.8 X 127	17 -20	6.125	71.125	62.688
		23	6.000		
		26-32	5.875		
		35	5.750		
7 X 5 1/2	177.8 X 139.7	23	6.156	71.125	62.688
		23 – 26	6.062		
		29	5.970		
7 5/8 X 5	193.7 X 127	20 – 26.4	6.688	71.125	62.688
		29.7 – 33.7	6.500		
		39 – 45.3	6.250		
7 5/8 X 5 1/2	193.7 X 139.7	20 – 26.4	6.688	71.125	62.688
		29.7 – 33.7	6.500		
		39	6.375		
		42.8 – 45.3	6.250		
8 5/8 X 5 1/2	219.075 X 139.7	32 -36	7.562	72.625	65.375
8 5/8 X 6 5/8	219.075 X 168.275	40-44	7.375	72.625	5.375
8 5/8 X 7	219.075 X 177.8	24	7.875	72.625	65.375
9 5/8 X 7	244.5 X 177.8	32.3 - 36	8.500	77.344	68.313



## MECHANICAL SET ROTATING DOUBLE SLIP LINER HANGER WS-MDSL

		40 - 47	8.375		
		47 - 53.5	8.313		
		53.5 - 61.1	8.125		
		70.3	7.875		
9 5/8 X 7 5/8	244.5 X 193.675	36 - 40	8.600	77.344	69.063
		43.5 - 47	8.437		
		53.5	8.313		
		58.4	8.250		
10 3/4 X 7	273.050 X 177.8	45.5 - 55.5	9.500	79.063	70.500
		60.7 - 71.1	9.250		
10 3/4 X 7 5/8	273.05 X 193.675	60.7	9.375	79.063	70.500
		65.7 - 71.1	9.188		
10 3/4 X 8 5/8	273.050 X 219.075	45.5 - 55.5	9.500	79.63	70.500
11 3/4 X 8 5/8	298.45 X 219.075	66.7 - 75	10.250	80.188	71.813
11 3/4 X 9 5/8	298.45 X 244.5	60 - 66.7	10.438	80.188	71.813
		71.1 - 73.6	10.313		
		80.5	10.188		
13 3/8 X 9 5/8	339.725 X 244.475	48 - 54.5	12.000	82.500	73.625
		62 - 68	11.875		
		72 - 85	11.750		
13 3/8 X 10 3/4	339.725 X 273.050	61 - 68	12.125	82.500	73.969
		72 - 77	12.000		
13 3/8 X 11 - 3/4	339.725 X 298.45	54.5 - 68	12.2	82.500	74.188
		68 - 72	12.1		
		77	12.0		
16 x 11-7/8	406.400 X 301.625	146	13.875	83.688	75.250
20 X 16	508 X 406.400	133 - 169	18.1	85.438	76.938



\*Note: Products can be manufactured as per customer requirement

## COMPRESSION SET LINER TOP PACKER CSTP

Compression Set : WS-WCSTP

Compression Set : WS-SCSTP

Compression Set : WS-DCSTP

### DESCRIPTION & APPLICATION:-

Compression Liner Top Packers are set by applying set-down weight by the setting dogs of the packer setting tool through the setting collar or Tie back Receptacle after cementing using the packer setting dogs on the liner running tool. It provide an excellent secondary seal that can be used to control annular gas migration or protect sensitive zones from well hydrostatics after cementing. These Liner Packer can be run independently as set on bottom liner Packers, as the top pack- off on a scab liner assembly or with most Liner Hangers to assist in sealing the liner to the casing. The liner top packers are available with and without hold down slips depending on customer requirement. Weight is applied by the work string to energize the element which is then locked in place with the internal ratchet assembly.

The packing element provide the required sealing effect and consist of a internal ratchet assembly which locks the element and does not allow the elements to deflate from its position once set.

If the Packer is run with hold down slips, the slips are set by compression after the cone has been sheared. The slips prevent light liners from moving.

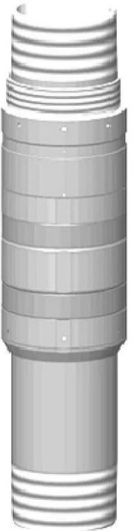
### USES:

To isolate the liner top after the hanger is set and cementing operations are completed.

Isolate formation pressure below the liner top from the casing ID above.

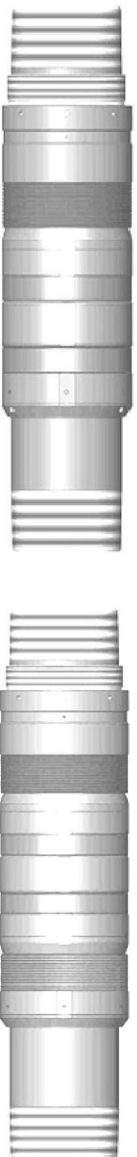
Isolate treating pressures below the liner-top during fracture or acid work.

It can be used as a tie-back completion or production packer.



## LINER TOP PACKER -COMPRESSION SET

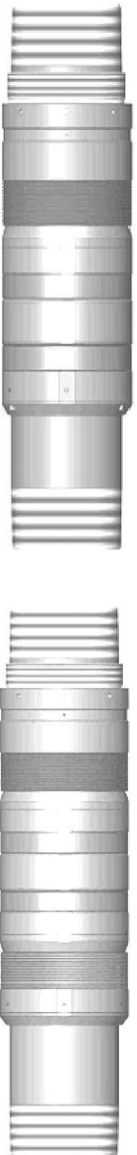
Liner Hanger Size (Casing X Liner)		Casing Weight (lbs/ft)	Max . OD	Length Approx		
				No Slip	(Single Slip)	(Double Slip)
in	mm		In	in	in	in
5 1/2 X 4	139.7 X 101.6	15.5-17	4.678	32.313	34.875	38.937
		20	4.563			
5 3/4 X 4	146.05 X 101.6	18	4.910	32.750	35.313	39.375
7 X 4 1/2	177.8 X 114.3	23.0-26.0	6.061	36.375	38.938	43.000
		29.0-32.0	5.879			
		32.0-35.0	5.789			
		35.0-38.0	5.705			
		38.0-41.0	5.605			
		42.7	5.560			
7 X 5	177.8 X 127	17 -20	6.220	36.375	38.938	43.000
		23-26	6.061			
		26-29	5.969			
		29-32	5.879			
		32-35	5.789			
		38	5.705			
7 5/8 X 5	193.7 X 127	24-26.4	6.754	36.625	39.188	43.313
		29.7-33.7	6.550			
		39	6.410			
		42	6.300			
7 5/8 X 5 1/2	193.7 X 139.7	45	6.250	36.625	39.188	43.313
		24-26.4	6.625			
		29.7 -	6.500			
9 5/8 X 7	244.5 X 177.8	39	6.375	36.625	39.188	43.313
		40-47	8.435			
9 5/8 X 7	244.5 X 177.8	47-53.5	8.312	37.391	40.500	45.403
		53.5-58.4	8.234			
		58.4-61.1	8.125			
		70.3	7.911			
		75.6	7.815			





## LINER TOP PACKER - COMPRESSION SET

9 5/8 X 7 5/8	244.5 X 193.67	32.3-40	8.634	37.391	40.500	45.503
		43.5 - 47	8.480			
		47-	8.359			
10 3/4 X 7	273.050 X 177.8	55.5-60.7	9.438	38.415	41.125	46.128
		65.7-73.2	9.160			
10 3/4 X 7 5/8	273.05 X 193.67	45.1-51	9.625	38.415	41.125	46.128
		55.5-60.7	9.438			
		65.7-73.2	9.160			
		79.2-	8.937			
11 3/4 X 9 5/8	298.45 X 244.5	47-54	10.438	38.915	41.625	46.628
		60-66	10.313			
13 3/8 X 9 5/8	339.725 X 44.47	54.5-72	12.000	40.938	43.625	48.625
		48-98	11.875			
13 3/8 X 9 7/8	339.72 X 250.82	61-72	12	40.938	43.625	48.625
13 3/8 X 10 3/4	339.72 X 273.05	48-72	12.146	40.938	43.625	48.625
13 3/8 X 11-3/4	339.72 X 298.45	54.5 - 68	12.200	40.938	43.625	48.625
		68 - 72	12.130			
		77	12.070			
16 x 13-3/8	406.400 X 339.72	75-84	14.700	42.626	45.313	50.313
		84-109	14.375			
20 X 16	508 X 406.40	163-187	17.4	43.813	46.500	51.500



## LINER TIE BACK SEAL PACKER FOR LINER HANGER: LTP

### DESCRIPTION & APPLICATION:-

Liner Tie Back Packer LTP is used mostly in vertical well application. It can be used as Liner Top isolation Packer in case of annulus leakage. It commonly used when there is a leak in the existing packer or casing. It provides secondary seal to prevent annular gas migration and protect sensitive zones. It is a weight set packer and packing elements are locked in place by the internal ratchet .

The mandrel of the tie back packer seals into the polished bore receptacle of an existing liner top packer or liner. The seal mandrel provides a pressure competent sealing by engaging in the tie back receptacle. There are different seal material available for different well conditions. The Seal O.D is compatible with Tie back Receptacle. It is provided with a bottom mule shoe with circulation ports for circulation and cementing if required.

### USES:

To isolate the liner top after the hanger is set and cementing operations are completed

Isolate formation pressure below the liner top from the casing ID above

Isolate treating pressures below the liner-top during fracture or acid work

It can be used as a tie-back completion or production packer.



## LINER TIE BACK SEAL NIPPLE: TSN

### DESCRIPTION & APPLICATION:-

The tie-back seal nipple is designed for high pressure liner tieback completions. The "TSN" consist of Glass filled Teflon Chevron seal rated to 10,000 psi and 400 deg F and honed bore, one-piece mandrel which is constructed of high strength material. It is constructed of material that matches the grade of the liner casing, when it is landed provides a continuous bore diameter to that of the liner. The" TSN" also consist of mule shoe bottom, locator sub for easy entry into the existing liner and circulation ports for cementing operations.

Tie Back Seal Nipple seals into the honed ID of the polished bore receptacle of an existing Liner. It is used to tie back to surface or some point above the Liner. The mandrel of "TSN" has seals which pressure competent sealing in the ID of the tie back receptacle.

The "TSN" is manufactured as per API 5CT standards and can be provided with premium seals, CRA Material and premium threads as per customer requirement. It is available in lengths from 6ft to 40 ft.



# HYDRAULIC LANDING COLLAR: HLC

## DESCRIPTION & APPLICATION:-

'HLC' Hydraulic Landing Collar is used when setting liner hanger prior to cementing. It is also used to catch and lock (rotationally) the liner wiper plug. A ball is dropped from surface which seats on the ball seat in the Landing Collar and allows the hydraulic tool to actuate by applied pressure. The ball and seat are then sheared. A setting ball seat in the shear seat allows pressure to be applied to the hanger to set the slips. Increasing the pressure after setting the hanger shears the ball seat allowing full circulation for cementing operations. The shear rating of the ball seat is adjustable to meet the requirements of the hanger. It incorporates a latch with Non-rotational Mechanism to accept, lock and seal the Liner Wiper Plug upon completion of cementing.

## Features/Benefits

### Drillable Ceramic Ball Seat

The Ball seat is made of ceramic material in order to eliminate erosion of the critical sealing area during high rates of circulation. These inserts are made of drillable cast aluminum for easy drill out and are compatible with all bit types including PDC.

### Anti-Rotation Feature

It has anti rotation feature and rotationally locks the plug for easy drilling.

### Positive Latch

It consist of a buttress latch thread which assures that the wipe plug will not move after it has bumped.

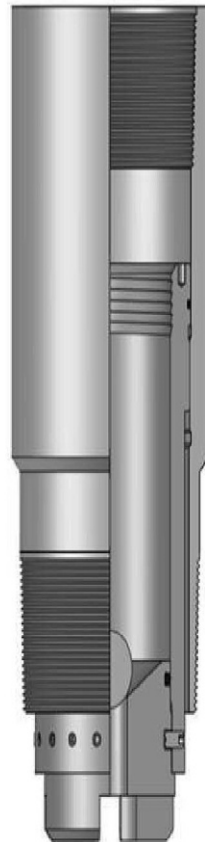
### Integrity

The Burst, collapse, tensile, and torsional ratings are typically equal to or better than casing specifications.



## HYDRAULIC LANDING COLLAR: HLC

Specification Guide HYDRAULIC LANDING COLLAR									
Sizes	4"	4-1/2"	5"	5-1/2"	7"	7-5/8"	9-5/8"	11-3/4"	16"
Max O.D (Inch.)	5	5	5.562	5.880	7.875	8.500	10.625	12.750	17.00
Ball Seat I.D (Inch.)	3/4	1.093	1.093	1.093	1.375	1.375	1.375	1.375	1.375
Effective Pressure Area (in <sup>2</sup> )	4.677	6.20	7.068	7.068	16.98	16.98	16.98	16.98	16.98
Ball O.D (Inch.)	1.250	1.250	1.250	1.250	1.750	1.750	1.750	1.750	1.750
Burst Pressure (psi)	9170	9020	10140	1045	8160	9100	6830	6900	5720
Collapse Pressure (psi)	8800	8540	10490	1116	7030	8820	4750	4880	3080
Shear Pressure (psi)	3000 (6)	3120 (8)	3060 (9)	3060 (9)	2940 (14)	2940 (14)	2100 (10)	2100 (10)	2100 (10)



## MECHANICAL LANDING COLLAR: MLC

### DESCRIPTION & APPLICATION:

Mechanical Landing Collar consist of Latch down seat and seal with anti-rotation profile and latch assembly to receive the liner wiper plug, lock it and seal it after cementing is completed. It provides an additional back up to the float collar and / or shoe to ensure that cement remains in place after displacement. The landing collar is normally run one or two joints above the float shoe or just above the float collar. It is majorly used while running a mechanical set liner hanger.

It is internally constructed with aluminum alloy for easy drill ability. Its body is manufactured of material with equivalent properties of the liner casing.

### SPECIFICATIONS:

Size	Max. OD (in.)	Length (in.)
4 1/2	5.000	14.125
5	5.380	14.500
7	7.875	16.000
9 5/8	10.625	17.000
13 3/8	14.375	18.500
16	17	21.000



## TIE BACK RECEPTACLE : WS-TBR

### DESCRIPTION & APPLICATION:-

Tie Back Receptacle TBR provides a high integrity honed seal bore above the liner hanger which provides landing, sealing and extending additional liner to the point further up the hole or the surface. It also provides the extension which is later used for setting tie back liner top packer. It is also used for protecting the running tool assembly during running in of hook-up in the hole. Junk Screen can be used to enhance the debris protection system.

### FEATURES AND ADVANTAGE:-

- Honed ID provides reliable seal bore that allows Tie back seal mandrel and Tie back packer to form an effective seal against it
- The covering the running tool assembly during the running in, it works as a shield for the running tool preventing damage.
- This is threaded with Liner Top Packer or with the Setting Collar this feature prevents the backing of.
- Chamfer provided on the top to facilitate the easy entry of running tool, minimize the risk of damaging the liner top.

TBR Size		Casing Weight (lbs/ft)	Max. OD In	Length (ft)
in	mm			
7	177.8	20-23	6.116	6-10
		26-29	5.955	6-10
		32-35	5.844	6-10
9 5/8	244.5	43.5-53.5	8.250	8-12
		58.5	8.187	8-12
13 3/8	339.7	54.5-68	11.875	10-14
		68-72	11.75	10-14



# RETRIEVABLE & DRILLABLE CEMENTING PACK OFF BUSHING RPB & DPB

## RETRIEVABLE PACK OFF BUSHING: RPB

### DESCRIPTION & APPLICATION:-

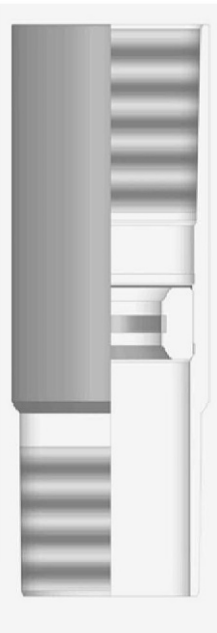
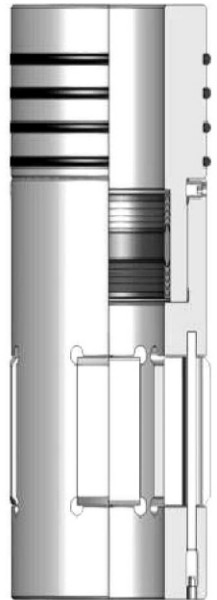
Retrievable Pack off Bushing RPB provides a positive seal between the setting tool and the liner, securely holding all cementing and plugs bumping pressures. It features temperature and pressure resistant seals which are designed to hold differential pressure from either direction. It also reduces piston force on the drill pipe during cementing operations. After the completion of the cementing, it is retrieved with the setting tool, leaving the liner top unrestricted.

The Retrievable Pack off Bushing RPB with polished nipple is installed in the setting collar and then the setting tool can be made up. When installed, the polished extension nipple locks the retaining dogs into the Retrievable Pack off Bushing Profile.

## DRILLABLE PACK OFF BUSHING: DPB

### DESCRIPTION & APPLICATION:-

The Drillable Pack off Bushing provides a positive seal between the setting tool and the liner, securely holding all cementing and plugs bumping pressures. It features temperature and pressure resistant seals which are designed to hold differential pressure from either direction. A close tolerance seal against drillable cementing seal joint ensures no communication between the liner casing and upper annular areas. All seals are HNBR material. It is designed for easy removal with tooth or bits and its unique cutaway design ensures that no residual bushing material will be left after drill out to interfere with re-entry into, or passage through, the liner assembly.





## TOP DRESS MILL TDM

### CLEAN OUT BLADE MILL CBM

#### TOP DRESS MILL : TDM

##### DESCRIPTION & APPLICATION:

Top dress mill is used to dress the top chamfered edge of the tie back receptacle to allow easy entry of the tie back assembly without damaging the seal units. The polishing mill is a soft-bodied mill and removes deposited material from its highly polished surface to allow easy entry of tie back assembly without damaging the seals.

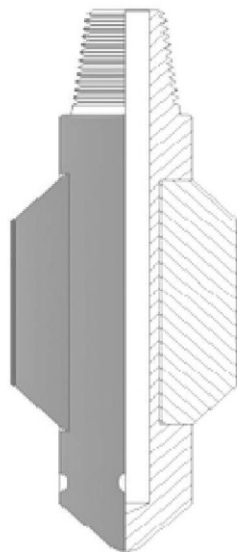


#### CLEAN OUT BLADE MILL: CBM

##### DESCRIPTION & APPLICATION:

Clean Out Blade Mill Tool is used to clean and remove any deposits in the ID of the tie back receptacle before running the tie back extension. This is required so as to make sure that there is a clean ID and prevent damage to the seals of the tie-back extension.

"TDM" & "CBM" mills are run in with a casing scraper to ensure a properly prepared area for the tie back packer to set and seal in



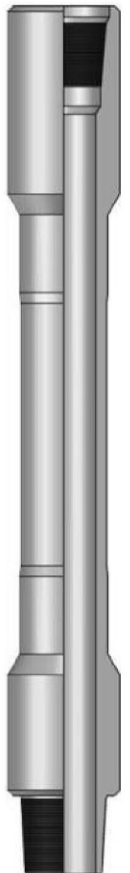
## HANDLING NIPPLE HN

### HANDLING NIPPLE: HN

Handling Nipple provides an interface between the Liner Hanger assembly and the Drill Pipe. The Handling Nipple is provided in the same grade of material as that of the Drill Pipe.

DIM	SIZE	
	4-1/2"	3-1/2"
O.D.	5.000	3.500
LENGTH	180	180

CONNECTION	SIZES (In)	
	4-1/2	3-1/2
BOX THD.	4-1/2 API I.F. BOX	3-1/2 API I.F. BOX
PIN THD.	4-1/2 API I.F. PIN	3-1/2 API I.F. PIN



### JUNK SCREEN MODEL: JNS

#### DESCRIPTION & APPLICATION:-

Junk Screen prevents debris from setting on top of the setting tool and helps in ease of retrieval. It also prevents debris from damaging the polished bore Tieback Receptacle and it is run as part of the setting tool assembly.



## SEAL JOINT WITH RETRIVABLE PACK OF BUSHING : SLJ

### SEAL JOINT WITH RETRIVABLE PACK OF BUSHING : SLJ

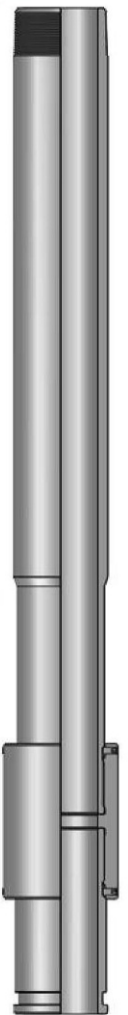
#### DESCRIPTION & APPLICATION:-

Slick Joint is used in combination with the Retrievable Pack off bushing and provides a seal between the liner and setting tool during cementing operations. The slick joint stinger is stabbed into the bushing inner V-Ring Seal Pack off assembly and the bushing OD is sealed and located in the pack off bushing profile within the setting collar or the liner top packer to provide high integrity seal. This method significantly reduces the upward hydraulic force on the drill pipe during cementing operations. After the cement job the slick joint and the retrievable pack off bushing are pulled out of the liner top with no drill out required.

#### TOP SET COUPLING: TSC

#### DESCRIPTION & APPLICATION:-

Top Set Coupling is used above the Compression Liner Packer and proves heavy duty Box-Up threads to enable the Liner Hanger Setting Tool to be connected, through the Packer and Liner Hanger, in turn to the Liner.



## LINER WIPER PLUG MODEL: LWP

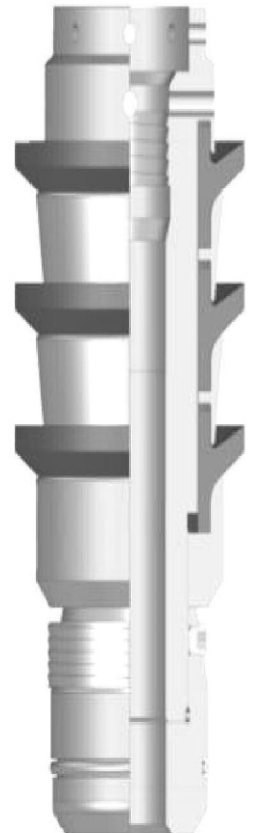
### DESCRIPTION & APPLICATION:-

WS Latch down liner wiper plug is used along with Drill pipe wiper plug to displace cement through the ID of a liner during cementing operations. The Latch Down Liner wiper plug is compatible with the Landing Collar and latches into the Landing collar latch profile. It has an extremely good record of displacing cement and bumping in the landing collar and is an ideal choice for any application in which a ball seat in the wiper plug is not required or a dual plug system is not wanted.

The Latch down liner wiper plug is shear-pin to the bottom of running tools. The Drill Pipe Wiper Plug is released behind the cement. The Latch down liner wiper plug is displaced through the liner, acting as a mechanical barrier behind the cement. It lands in the landing collar, and pressure can be applied as required.

### Features & Benefits:-

- Latch down liner wiper plug can wipe liners of the same size. This is also provide design operational flexibility.
- Interlocking lugs between the Latch down liner wiper plug nose and the landing collar prevent rotation of the plug during drilling out operation.
- The design of the Latch down liner wiper plug is robust. The sturdy body can withstand high bump pressures when it latches in either the or landing collar.
- Nitrile fins and O-rings are standard; other elastomers are available on request.



## DRILL PIPE WIPER PLUG MODEL : DWP

### DESCRIPTION & APPLICATION:-

Drill pipe wiper plug is released from the Plug dropping cementing head to follow the cement down the drill pipe. WS Drill Pipe Wiper Plug effectively cleans the cement from the ID of the drill pipe and liner hanger running tools down till the landing collar. It separates the cement from the displacing fluid. The Drill pipe wiper Plug is installed in a Plug Dropping Head at the top of the liner run-in string. Prior to pumping displacement fluid. It consist of anti-rotation threads which provide locking mechanism to the plug. At the bottom of the liner run-in string, the Drill pipe wiper Plug lands and latches into the Liner Wiper Plug at which time hydraulic pressure is applied to release the Liner Wiper Plug. The two [2] plugs are displaced together through the liner to the Landing Collar.

### FEATURES:

- It is made of PDC Drillable material to save drill out time.
- It consist of latch ring which locks the drill pipe wiper plug to the liner wiper plug.
- Positive bi-directional seal is provided by the seal ring.
- When the wiper plug latches in, it allows for a positive shear indication.
- Standard elastomer for Fins and O-rings is Nitrile which is suitable for most well conditions.

DRILL PIPE	3 1/2 ~ 5	5	5 1/2
MAJOR FIN	4.375	4.330	4.850
MINOR FIN	2.210	3.125	3.125
NO. OF FINS	3	3	3
OD (in)	1.600	2.313	2.313
NOSE OD	1.425	2.120	2.120
LENGTH	9.500	12	12



## SETTING COLLAR MODEL SNC

### SETTING COLLAR MODEL SNC

#### DESCRIPTION & APPLICATION:-

The Setting collar is used to carry the liner into the well. It is used when using a rotating liner hanger. The setting collar has right hand releasing threads which are made up with the threads of the setting tool.

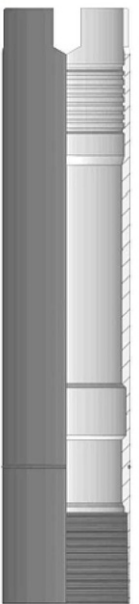
The Setting Collar is made up on top of the Liner Hanger and generally used when a liner extension is not planned.

The fluted top guide assures centering of the liner in the hole and its shape provides an internal guide for smooth running of the tools into the liner.

### SWAB ASSEMBLY MODEL SWA

#### DESCRIPTION & APPLICATION:-

Swab Cup Assembly is used with hydraulic set Liner Hanger in deviated wells. It is used for low cost applications This assembly has two swab cups which provide sealing during liner hanger setting and cementing jobs. It is also used to run slotted liners.



## HYDRAULIC RELEASE LINER HANGER RUNNING TOOL MODEL HRT

### DESCRIPTION & APPLICATION:-

Hydraulic Running Tool is used to run and set the liner hanger with or without Liner Top Packer. The Running Tool is made with Setting Sleeve & assembly is run on drill string to the bottom. The Hydraulic Release Drilldown Liner Setting Tool connects to the Liner Setting Sleeve profile provides a means to carry a liner down hole, set a liner hanger and release from the liner prior to or, if desired, after cementing. The primary releasing mechanism is hydraulic with an emergency mechanical back-up release system. This tool carries the weight of the liner on a fully supported Collets assembly with no threads that could back off and drop the liner while running in the hole. High torque ratings of the Hydraulic release Running Tool system allow aggressive rotation if required to work a liner to bottom.

### Features & Benefits:

Constructed of high strength material to provide high load capacity. Push, pull and rotate while running the liner down hole. The design of this tool allows right- hand rotation of the work string and liner with the tool in tension, compression or neutral

Rotation after release when running a rotating liner hanger. Multiple torque fingers permit rotation of the liner during cementing after the hanger is set and the running tool released from the liner.

No rotation to release after actuating the hydraulic cylinder. The tool is retrieved by straight pickup. The collet is retained in the released position by an internal body lock ring to prevent re-engagement into the setting sleeve profile.

Release pressure and torque are adjustable to allow use in a wide variety of running conditions and/or applications.

The HRD-E liner setting sleeve provides a smooth ID for passage of seals and other tools run through the liner top.

Secondary mechanical release in the event the primary hydraulic releasing mechanism fails to operate; the setting tool may be released mechanically by 1/4 turn to left. Special secondary set- down weight shear required for full mechanical release.



## MECHANICAL RELEASE NON-ROTATING LINER HANGER RUNNING TOOL MODEL MNT

### DESCRIPTION & APPLICATION:-

MNT is a non-rotating running tool which conveys the liner assembly into the well and it is then released by compression and with right hand rotation after setting the hanger. "MNT" is constructed with standard API drill box cementing seal joint box for direct connection to a retrievable seal joint or drillable seal joint.

## MECHANICAL ROTATING LH RUNNING TOOL MODEL MRT

### DESCRIPTION & APPLICATION:

MRT Setting Tool is used to set rotating liner hanger. The Setting Tool is provided with Spring loaded top sub with tool joint connection, rotating Dog Sub that engages with the setting collar. This dog sub transfers torque from drill string, to the liner, while in tension or compression for the purpose of setting Mechanical Liner Hanger, Rotating Liner Hanger during Cementing operation , or insuring setting tool engagement during run-in .





## MECHANICAL LINER HANGER RUNNING WITH PACKER SETTING TOOL MCT

### DESCRIPTION & APPLICATION:-

MCT is a liner hanger running setting cum packer setting tool that conveys the liner, wiper plugs, seal assembly and hanger assembly into the well. It is a non-rotating tool that can be released in compression with right hand rotation after setting the liner hanger and completion of cementing. It also serves as pack-off tool when the liner runs with the liner top pack-offs. The "MCT" is provided with slots on the body for circulation purposes. The face of Setting Dog of the Running Tool is knurled for sufficient grip. With the Liner hung and the setting tool released the string is picked up to release the setting dogs. Setting Weight back down on the string will activate and lock the pack off in the set position.

### TOP SET PACKER SETTING TOOL MODEL TST

#### DESCRIPTION & APPLICATION:

Top Set Packer Setting Tool used along with the liner setting tool. TST is Provided with slots on the body for circulation purposes. It is used when running liner equipment with liner top pack-offs. After setting the Liner hanger and releasing the running tool, the string is picked up to release the setting dogs. Setting weight back down on the string will activate and lock the pack-off in the set position.



## CEMENTING HEADS

### Drill Pipe Cementing Head

Cementing head is used when the rigs are not equipped with a top drive. It is commonly used with drilling and service rigs which are conventional land based, and also with offshore rigs that using a conventional manifold.

The Cementing Manifold connects the cementing lines to the running string during liner operations. It consists of an integral heavy duty swivel which allows easy drill pipe string manipulation with the cementing lines connected to the manifold.

For unobstructed operation, the swivel mechanism and drill pipe plug retainer are built in below the elevators Cementing Manifold is available with single or multi plug drop capabilities.

#### Features and Benefits:

Used for cementing liner and inner string.

It consist of built-in rotary swivel for rotating applications

Designed for high pressure applications up to 10,000 PSI

It's Small bore makes it is suitable for drill pipe cementing and liner wiper plugs.

It consist of Pick-up sub for handling and installing cement head and Replaceable bottom sub

#### Configuration:

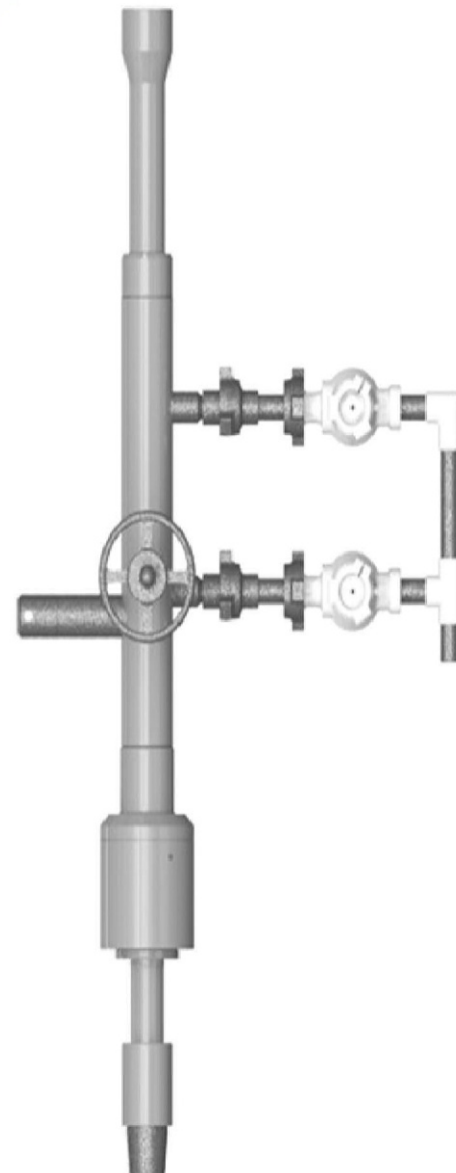
Ball dropping Sub.

Plug release Plunger Assembly.

Manifold,Downward union.

Plug valves threaded connection.

The cement heads are available in sizes 2 7/8" through 5 1/2"



## TOP DRIVE CEMENTING HEAD

### TOP DRIVE CEMENTING HEAD

Power swivel or a top-drive drilling system as the drill string power source is required if, Top Drive Cementing head is to be used. It is most beneficial to use Top drive cementing head with rotational and reciprocating liner assemblies for best results during cementing operations. It consist of integral swivel which allows rotation.

**Top Drive Cementing Head commonly have 4-1/2" I.F. Box up and Pin down connections for 10,000 PSI Cementing Line and Tensile Strength of 400 Ton. It is also available in 3-1/2" IF B X P connections.**

#### Features and Benefits:

- Used for liner and inner string cementing where top drive is available.
- It is reliable when high circulation and rotation at high RPMs for longer periods of time is required.
- Designed for high pressure applications up to 10,000 PSI
- Indication of successful landing of ball or plug is got at the Flag sub indicator .
- It consist of Ball Dropping Sub from which various sizes of setting balls can be released
- It consist of small bore which makes it suitable for drill pipe cementing and liner wiper plugs.

#### Configuration:

Ball dropping Sub.

Plug release Plunger Assembly.

Flag sub indicator.

Plug valves threaded connection.

The cement heads are available in sizes 2 7/8" through 5 1/2"



## PLUG DROPPING CEMENTING HEAD

### PLUG DROPPING CEMENTING HEAD

These type of cementing heads are used during Stage Cementing operations or when Stage Collar cementing plugs or conventional top and bottom cementing plugs are to be used.

**They are available in Single or Double Plug container configurations.**

#### Features & Benefits:

It is suitable for high pressures due to its compact structure and reasonable design. It is made of high strength alloy steel.

It consists of Union type of quick-latch Joint at the bottom of the double plug cement head for easy and casing to connect.

Internal Pressure balance is achieved as cement head Body I.D. is greater than cementing plug diameter

Cementing Heads are available in a wide range of working Pressures from 3,000 psi to 10,000 psi.

#### Configuration:

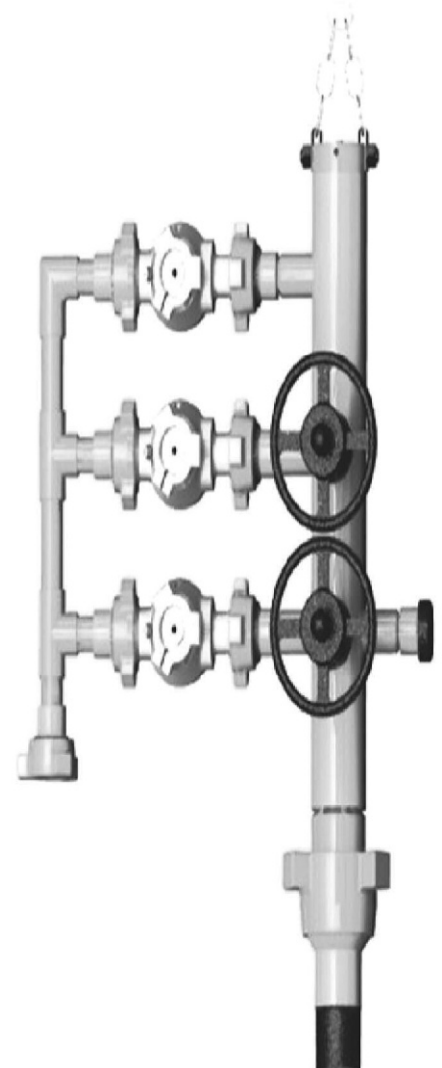
Plug release Plunger Assembly.

Quick-Latch Joint.

Manifold, Downward union.

Integral Plug Valve.

The cement heads are available in sizes 4" through 20" .



# CROSSOVERS

## CROSSOVERS

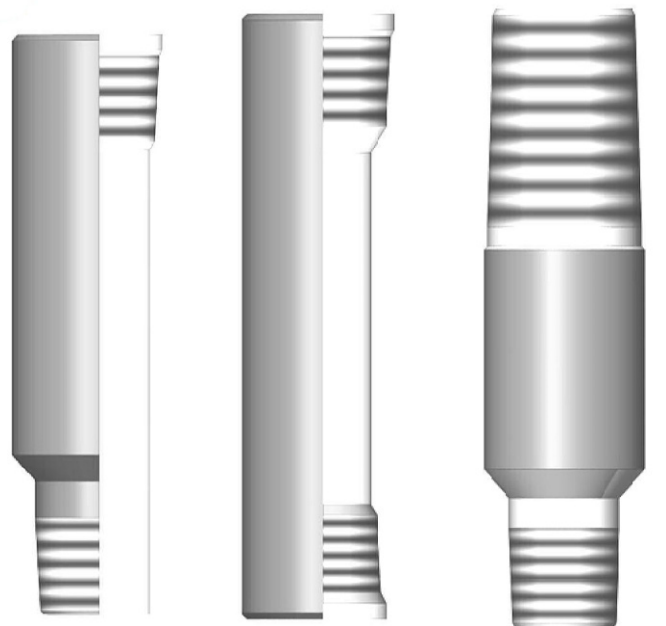
A crossover sub is used to crossover from one connection size to another or as the disposable Component used to extend the connection life of a more expensive drill stem member. Cross-over sub is mainly a short sub assembly which is used to enable the connection of two components with differing thread types or sizes.

Crossover Subs are manufactured with material, length and thread connections as specified by the customer. The connections are protected by a phosphate surface coating that minimizes galling on initial make-up.

Crossover subs are available with following connection:

- Box x Pin
- Box x Box
- Pin x Pin

Crossover Subs are manufactured with material, length and thread connections as specified by the customer. The connections are protected by a phosphate surface coating that minimizes galling on initial make-up.



Box x Pin

Box x Box

Pin x Pin

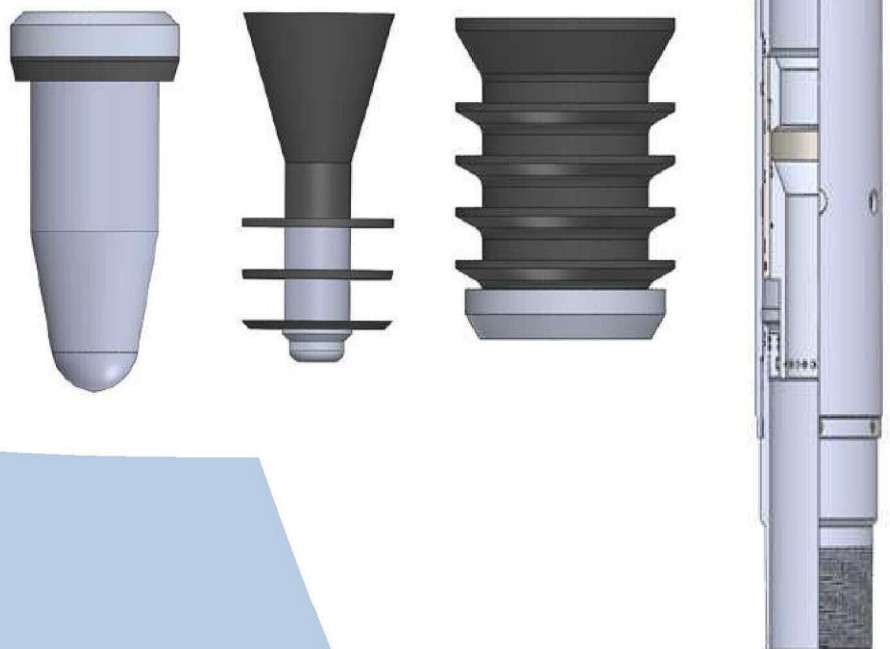
## HYDRAULIC STAGE CEMENTING TOOL

The Slim Hole Stage Cementing Collar has been designed for stage cementing applications where the annular spaces dictate the use of a reduced OD stage collar.

The design features two internal sleeves that shift during the stage cementing operations. The bottom sleeve is shifted open hydraulically by increasing the pressure within the casing; opening pressure is field adjustable.

Closing of the stage cementing collar is achieved through the pumping of a closing plug behind second stage cement and applying pressure upon completing displacement. This Type can also be used in liner applications when the closing plug has been adapted to fit the closing seat in the stage collar.

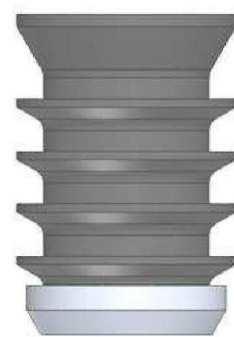
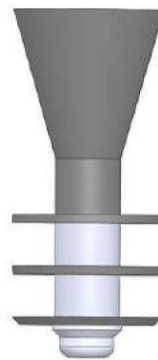
Stage tool drill-out materials are all PDC drillable aluminium, rubber and phenolic.



# HYDRAULIC STAGE CEMENTING TOOL

## Product Specification

Casing Size	Max Diameter	Weight ppf	Drill out I.D	Overall Length	Opening Pressure P.S.I	Closing Pressure P.S.I	Opening pressure/ FREE-FALL DEVICE P.S.I
5"	6.125	15-18	4.400	29" (approx)	3000	1500	1100
7"	8.275	26-29	6.200	31" (approx)	2600	1500	1000
9 5/8"	11.125	43.5-53.5	8.600	32" (approx)	2400	1500	1000
13 3/8"	15.000	61-72	12.375	33" (approx)	2100	1500	900



## MECHANICAL STAGE CEMENTING TOOL

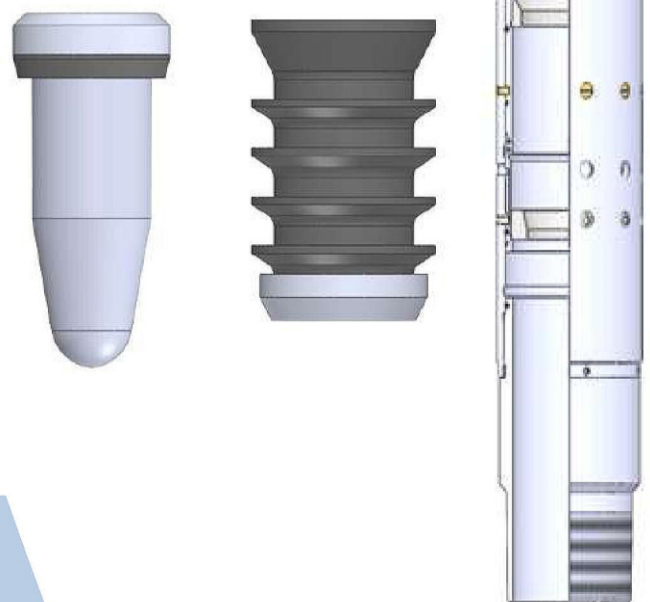
Mechanical Stage collar ( Mechanical stage cementing tool) allows cementing of casing string in two stages.

These collar set the standard for reliability, cost effectiveness, and ease of use with outstanding built-in features and quality. They are the collars of choice when drilling requirements call for proven technology and low risk.

The compact, simple design minimizes the number of moving parts and makes the tools easier to handle.

The collar's clear opening and closing indications at the surface accommodate the hydraulic conditions of the well for safer, more efficient operations. The internal sleeves increase reliability and prevent premature opening from formation restrictions on applied pressures.

It reduces total pumping pressure in long casing strings.

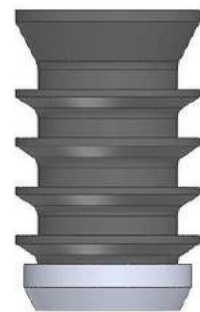




# MECHANICAL STAGE CEMENTING TOOL

## Product Specification

Casing Size	Max Diameter	Weight	Drill out I.D	Overall Length	Closing Pressure PSI	Closing Force LBS	Opening pressure/ Free Fall Device (P.S.I)
5"	6.125	15-18	4.400	29" (approx)	1500	25,000	1100
7"	8.275	26-29	6.200	31" (approx)	1500	57,000	1000
9 5/8"	11.125	43.5-53.5	8.600	32" (approx)	1500	111,000	1000
13 3/8"	15.000	61-72	12.375	33" (approx)	1500	19500	900



# CASING ACCESSORIES

## FLOAT SHOE & FLOAT COLLAR

offers Cement Poppet-type Float equipment offers dependable performance for all classes oil and gas wells. The valves prevent cement backflow, provide casing buoyancy during run in, and act as internal BOP's during the process of running and cementing the casing.

Float equipment is manufactured to match customer casing specification. All Poppet type cement Float Shoe & Collars are PDC drillable.

### NOSE TYPES

- Cement Nose
- Bullet Nose
- Spade Nose
- Eccentric Nose
- Phenolic Nose

### FLOAT TYPES

- Conventional Single Valve
- Conventional Double Valve
- Non-Rotating Single Valve
- Non-Rotating Double Valve

### Thread

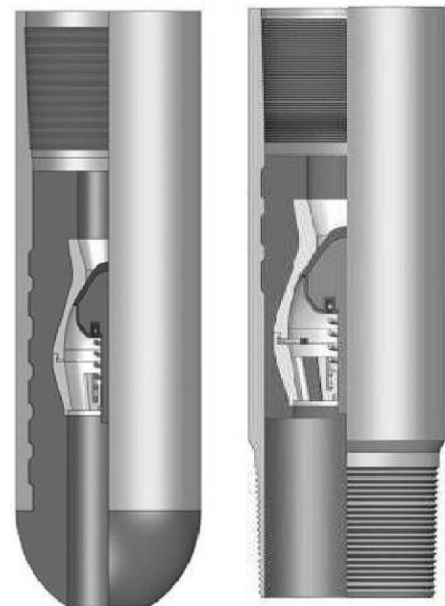
- BTC
- LTC
- STC
- Premium

### Grade

- J/K-55
- L/N-80
- C/T-95
- P-110
- Q-125

### Size

- 4-1/2" to 30"



Bullet Nose



Spade Nose



Eccentric Nose



Phenolic Nose

## CASING ACCESSORIES

SIZE	WEIGHT (PPF)	O.D (inch)	I.D. (inch)	BURST			COLLAPSE		
				J/K- 55	L-80	P-110	J/K-55	L-80	P-110
4-1/2	9.5-11.6	5.000	4.052	4790	6970	9580	4010	4940	5560
4-1/2	13.5-15.1	5.000	3.826	7210	10480	14420	7170	11080	14340
5	11.5-21.4	5.563	4.408	5700	8290	11400	5560	7250	8850
5-1/2	14-17	6.050	4.950	4810	7000	9620	4040	4990	5620
5-1/2	20-26.8	6.050	4.670	7270	10560	14530	7670	11160	14540
7	17-23	7.656	6.456	3740	6340	8720	2270	3830	4430
7	26-32	7.656	6.276	4980	7240	9960	4330	5410	6230
7	35-38	7.656	6.004	6850	9960	13700	7270	10180	13030
9-5/8	32.3-40	10.625	8.921	3520	5120	7040	2020	2370	2470
9-5/8	43.5-53.5	10.625	8.755	4720	6870	9440	3880	4750	5310
13-3/8	48-61	14.375	12.615	2730	3980	5470	1130	1130	1130
13-3/8	68-72	14.375	12.415	3450	5020	6910	1950	2260	2330
16	65-84	17.000	15.124	2630	3830	5270	1020	1020	1020
16	109	17.000	14.688	3950	5740	7890	2560	3080	3470
18-5/8	87.5-94.5	20.000	17.755	2250	3270	4490	630	915	1260
18-5/8	97.7-117.5	20.000	17.653	2510	3650	5020	880	1280	1760
20	94-106.5	21.000	19.000	2410	3500	4810	770	1120	1540
20	133-169	21.000	18.438	3760	5470	7520	2470	2770	3030



**Bullet Nose**



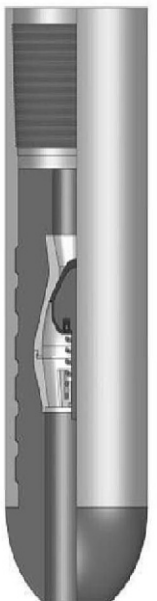
**Spade Nose**



**Eccentric Nose**



**Phenolic Nose**



## DOUBLE VALVE FLOAT SHOE WITH DOWN-JET PORTS & SPADE NOSE

### DOUBLE VALVE FLOAT SHOE WITH DOWN-JET PORTS & SPADE NOSE

This design ensures positive sealing in vertical, deviated & horizontal well. They have a back-pressure valve that prevents fluids from entering the casing while the pipe is lowered into hole and prevents cement from flowing back into the casing after displacement, while enabling circulation down through casing. Double Valve helps maximum protection against back flow of cement. There are three down-jet ports located below float valve in side of the float shoe shell to help to increase cement bonding strength due to swirl effect by cementing.

Sometimes, it provides landing point for cementing plugs when Collar is not used.

It is available with Down-jet, Up-jet & Side-jet ports as well.

#### Features & Benefits:

- Down-jet ports increase bonding strength of cement.
- Provide passage of fluid with added assurance that flow will not be interrupted when casing rests at bottom.
- Easy PDC drillable.
- Cost effective.
- Maximum protection against back flow of cement.



**Bullet Nose**



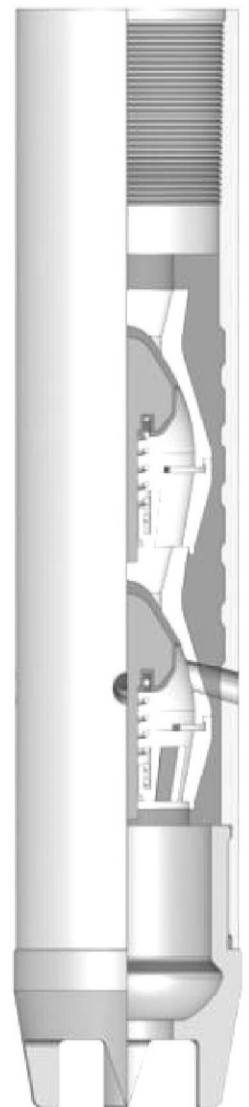
**Spade Nose**



**Eccentric Nose**



**Phenolic Nose**



## STAB-IN FLOAT SHOE/COLLAR

### STAB-IN FLOAT SHOE

Stab-in Float Shoes are provided with features where the drill pipe is stabbed directly into the float shoe. Stab in float shoe resists high temperature, good sealing and drill ability, convenient connection. This kind of shoe is used for inner string cementing operations. Stab-in cementing is an improved method for cementing large diameter casing. It improves displacement accuracy, and cement volume and net rig time. WS provide Single as well as with Double Valve Stab-in Float Shoe.

#### Feature & Benefits:

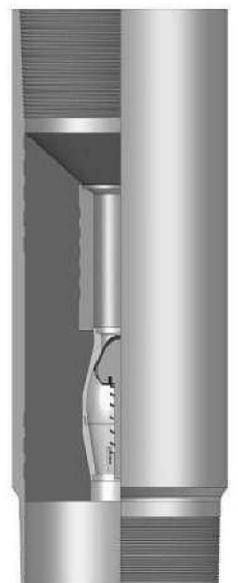
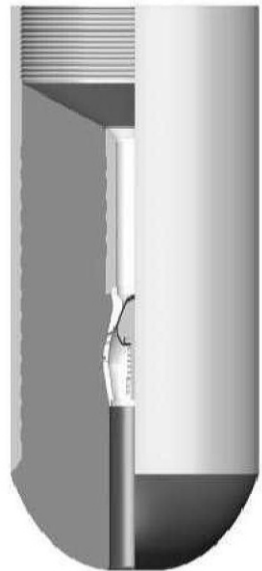
Reduced cement volume, rig time for cementing operations.  
Use of Drill Pipe Dart instead of large dia. cementing plugs.  
Cementing pressure confined to Drill pipe as in squeeze cementing jobs

### STAB-IN FLOAT COLLAR

WS Stab-in Float Collars are provided with features where the drill pipe is attached to Stab-in stinger or directly stab into the float collar. It resists high temperature, good sealing and drill-out ability & convenient connection. This kind of collars is used for inner string cementing operations. Stab-in cementing is an improved method for cementing large diameter casing. It can also improve displacement accuracy, and cement volume and net rig time. wellsecure provide Single as well as with double valve Stab-in Float Collar.

#### Feature & Benefits:

Reduced cement volume, rig time for cementing operations.  
Use of Drill Pipe Dart instead of large dia. cementing plugs.  
Cementing pressure confined to Drill pipe as in squeeze cementing jobs.



## STAB-IN STINGER

The Stab-in Stinger is used for cementing large diameter casings lowered on drill pipe. The string presents special cementing consideration due to high displacement volume of large diameter casing.

Problem with high displacement are overcome by using Stab in Cementing Equipment to allow cementing through drill pipe.

### Features & Benefits:

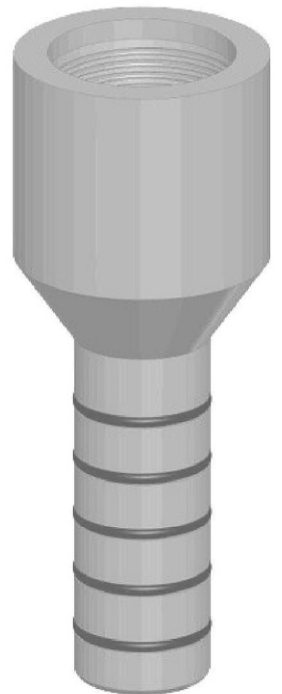
Small diameter inner string off drill pipe is used to displace cement which minimizes displacement volume behind cement and there by reduces contamination and save time.

Drill out of cement inside large casing is minimized by controlling cement top with displacement fluid in drill pipe and Poppet valve in Stab in Shoe.

Reduce cement volume conventional displacement requires calculation of excess cement factor, whereas with stab-in methods excess cement need be no greater than the volume of the drill pipe. No large plugs are needed.

Protect casing cementing pressures are confined to the drill pipe as in a squeeze job.

Available in size 3-1/2" - 6-5/8".



## STAB-IN LATCH STINGER

Stab-in Latch Stinger is used for cementing large diameter casings lowered on drill pipe. The string presents special cementing consideration due to high displacement volume of large diameter casing.

Problem with high displacement are overcome by using Stab in Cementing Equipment to allow cementing through drill pipe.

### Features & Benefits:

Small diameter inner string off drill pipe is used to displace cement which minimizes displacement volume behind cement and there by reduces contamination and save time.

Drill out of cement inside large casing is minimized by controlling cement top with displacement fluid in drill pipe and Poppet valve in Stab in Shoe.

Reduce cement volume conventional displacement requires calculation of excess cement factor, whereas with stab-in methods excess cement need be no greater than the volume of the drill pipe. No large plugs are needed.

Protect casing cementing pressures are confined to the drill pipe as in a squeeze job.

Available in size 3-1/2" - 6-5/8".



## AUTO-FILL FLOAT SHOE & COLLAR

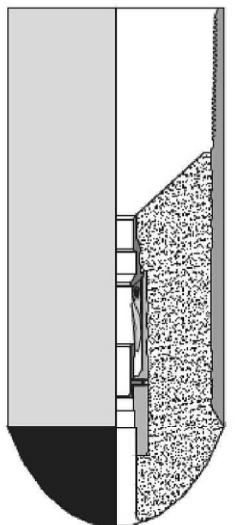
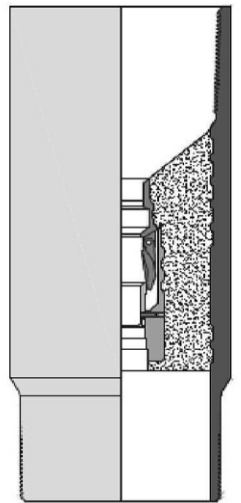
Auto Fill Cement Float Shoe or Collar permits the casing to fill automatically while being run into the hole. The valve is in the open position while running in allowing maximum filling of the casing as it is lowered into the well bore.

This is especially effective on liner jobs and sensitive hole conditions.

The Circulation may be established at any time during or after casing is run. The flapper type back pressure valve does not become operative until the drop ball is dropped or pumped down. From this point on like Differential Fill-up Shoe or Collar, this model Auto Fill Cement Float Shoe or Collar acts as conventional Floating Equipment. All Auto fill Cement Float Shoes and Collar are PDC drillable. When run in tandem, a single ball may be used to activate both the Float Collar & Shoe.

### Features & Benefits:

- 90% casing fill-up during run in.
- Reduce surge pressure.
- Casing can be automatically filled up during running-in
- Casing can be circulated at any time at low rates, without having to convert the valve from the fill-up to the back-pressure mode.
- It can be provided in conventional as well as with non rotating profile.
- PDC Drillable.





## REAMER SHOE

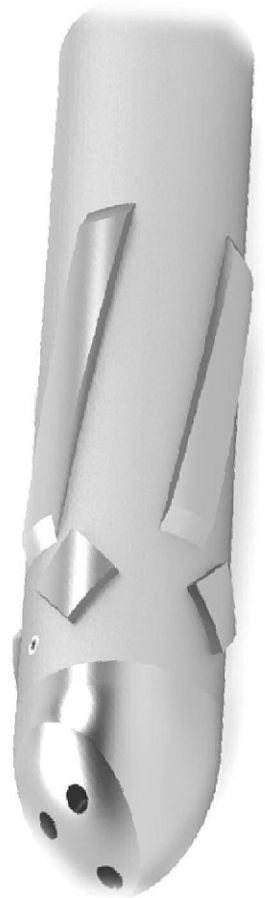
Reamer Shoe With Different guide nose's which helps to overcome obstructions such as mud cake, swelling shale or sand bridges and washed out areas in the wellbore and guides the casing or liners to total depth.

It is designed with blade cutting structure and diamond shaped faces which ensure safe passage of casing and liners thus facilitating rotating and reciprocating applications.

Compatible with all casing and liner hanger assemblies, WS Reamer Shoe provides highly effective protection- against unexpected or anticipated casing and liner running problems.

### Feature & Benefits:

- Carbide spiral vanes and diamond shapes structure provides full-bore coverage in rotating and reciprocating applications, which provides easy passage to total depth.
- The eccentric nose can climb ledges and negotiate other well bore obstructions while the cutting structure reams out tight spots.
- Reamer shoe enables both rotating and reciprocating reaming action while running casing and liners.
- Flow ports provide full-bore coverage while rotating and reaming, and they prevent channeling while cement is pumped.
- All internal parts and standard aluminum alloy nose are PDC drillable.
- Reamer Shoe is available in all API grade material
- Reamer shoe can be furnished in API threads as well as in Premium threads.
- Reamer Shoe is available in Single and Double valve Configuration.
- Maximum Back Pressure rating: 5000 psi @400°F.
- Reamer shoe is available in welded design as well as single piece design.



**Bullet Nose**



**Spade Nose**



**Eccentric Nose**



**Phenolic Nose**

## CEMENT GUIDE SHOE

Guide shoe runs on the first joint of casing into the hole to help in smooth run in. Guide Shoe has no back-pressure valve.

It has an open end to enable fluid circulation for mud conditioning, cement placement and hole cleaning. It also provide landing point to Cementing Plugs.

**Note:-** Cement Down-Jet Swirl Guide shoe is also available on request.

### Feature & Benefits:

Rounded nose assists running casing in hole.

PDC drillable.

Cost effective

Guide Shoe is available in all API grade material.

Guide shoe can be furnished in API threads as well as in Premium threads.

Jet port configuration is available upon request.

WellSecure offers Side Jet Ports, Down Jet Ports and Up Jet Ports.

Available in sizes 4-1/2" to 30"

Available with Different Type of Noses as below.



**Bullet Nose**



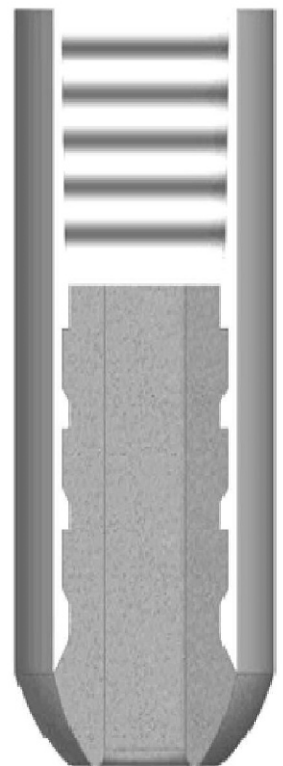
**Spade Nose**



**Eccentric Nose**



**Phenolic Nose**



## CEMENTING PLUGS

Cementing Plugs are used during cementing operations for wiping the casing ID clean of drilling fluids and provides separation between cement, mud and spacers.

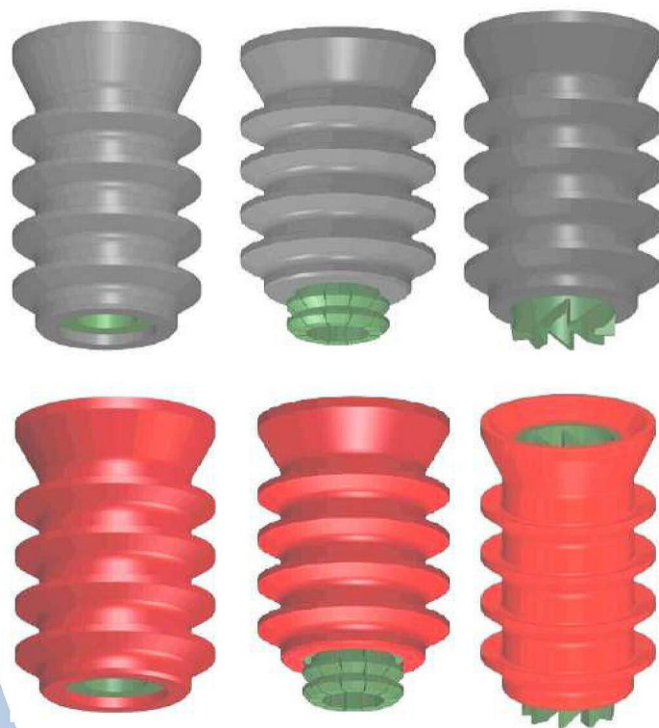
The plugs are constructed of material selected to reduce drill out time, thereby resulting in cost saving. They also prevent over displacement of cement slurry and provide indication when the cement job is complete.

The Bottom plug separated the cement from the drill mud and features a rubber diaphragm which is opened once the plug has landed on the cement float collar.

The top plug is used when dual plug system is required and displaces cement and lands on the upper end of the bottom plug. No metal parts are used and therefore, plugs are PDC Drillable.

### **FEATURES**

- Conventional Type Rotating Plugs
- Non-Rotating Clutch Type Plugs
- Non-Rotating Thread Type Plugs
- Anti-Locking Mechanism for Fast Drill Out
- MOS 2 Core for Easy Drill
- Nitrile, HNBR, HT-Nitrile Materials
- High Bump Pressures
- Adjustable Rupture Pressures
- Available from 4-1/2" to 20" Sizes.



## TOP & BOTTOM PLUGS WITH ALUMINUM CORE

### ALUMINIUM CORE CEMENTING PLUGS

Aluminum core plugs are ideal for use in high temperature well conditions. They are made of Cast Aluminum core and wiping fins are molded from Natural Rubber or Hydrogenated Nitrile (HNBR).

These plugs are PDC Drillable. The top plug is manufactured in black natural rubber and the bottom plug in orange with rupture diaphragm at 300 psi differential. Operating range is up to 2750 F. Plugs can be ordered in Viton.

### **FEATURES**

- Conventional Type Rotating Plugs
- Non-Rotating Clutch Type Plugs
- Non-Rotating Thread Type Plugs
- Anti-Locking Mechanism for Fast Drill Out
- AL Core for Easy Drill
- Nitrile, HNBR, HT-Nitrile Materials
- High Bump Pressures
- Adjustable Rupture Pressures
- Available from 13-3/8" to 20" Sizes.



# COMBINATION TOP & BOTTOM CEMENTING PLUG

## COMBINATION TOP & BOTTOM CEMENTING PLUG

Combination Cementing Plugs involves wiping inner diameter of two or more casing strings in one wiping action.

These plugs allows tapered casing strings to be cemented while ensuring efficient wiping of the cement from different casing IDs in the string.

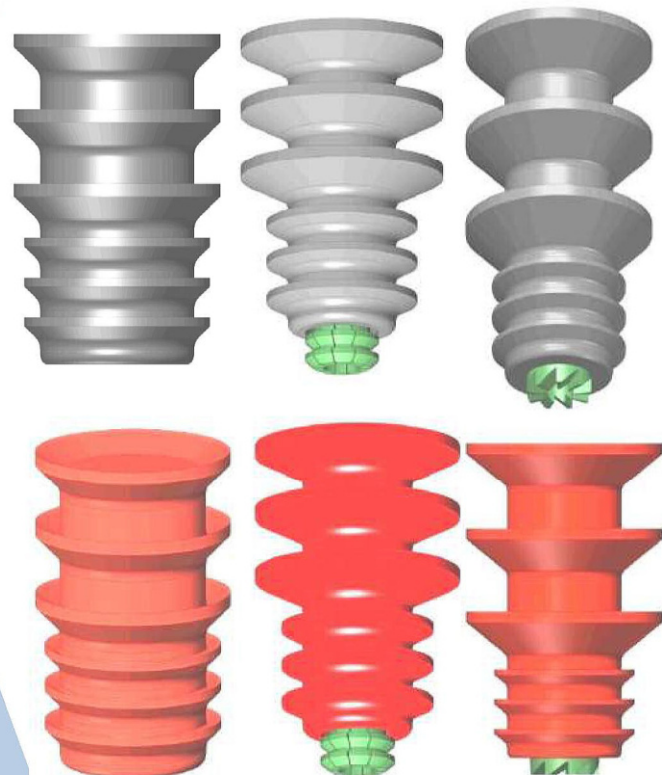
They are Designed and tested to withstand 5,000 psi differential pressure. The different sizes of Rubber Fins which help in wiping on the casing walls as well as assist in displacing the cement in one step.

It is made of graded rubber.

These Plugs are completely PDC drillable.

### **FEATURES**

- Conventional Type Rotating Plugs
- Non-Rotating Clutch Type Plugs
- Non-Rotating Thread Type Plugs
- Anti-Locking Mechanism for Fast Drill Out
- AL/MOS2 Core for Easy Drill
- Nitrile, HNBR, HT-Nitrile Materials
- High Bump Pressures
- Adjustable Rupture Pressures
- Available from 4-1/2" to 20" Sizes.



## TOP LATCH IN PROFILE ANTI ROTATING CEMENTING PLUG

### TOP LATCH DOWN WIPER PLUG

It is designed with one end having anti rotation Latch In Profile to lock in latch in the profile provided in float collar. The Top Latch down plug consists of screw in latch-down baffle plate and top-plug. The plug features an O-ring seal on the nose. It also prevents flow back. These are PDC drillable.

Note: The plugs are available in 4-1/2", 5-1/2", and 7" size.

### BOTTOM LATCH DOWN WIPER PLUG

These plugs features an O-ring seal and a lock ring on the nose. The ring locks the plug firmly in place and the O-ring holds pressure from either direction.

They provides a double latch-down plug system when combined with top latch down plug. The bottom plug features a rupture disc with a burst pressure range of 300-500 psi. These plugs are PDC drillable and suitable for standard and high temperature well conditions.

Note: The plugs are available in 4-1/2", 5-1/2", and 7" size.



## SOLID RIGID CENTRALIZER

### STRAIGHT VANE SOLID RIGID CENTRALIZER

Straight Vane solid primary cementing job with rigid centralizer provide the right feature for getting a good aximum wellbore standoff with suitable functionality. Straight vane solid rigid centralizers provide ultimate drag and torque reduction with pass.



### SPIRAL VANE SOLID RIGID CENTRALIZER

Spiral Vane solid rigid centralizer provide the right feature for getting a good primary cementing job with maximum wellbore standoff with suitable functionality. Straight vane solid rigid centralizers provide ultimate drag and torque reduction with maximum fluid by pass.



## SOLID RIGID CENTRALIZER

### STRAIGHTVANE SET-SCREW SOLID RIGID CENTRALIZER

Straight Vane set screw solid rigid centralizer provide the right feature for getting a good primary cementing job with maximum wellbore standoff with suitable functionality. Straight vane Set screw solid with maximum fluid by pass.



### SPIRAL VANE SET-SCREW SOLID RIGID CENTRALIZER

Spiral Vane set screw solid rigid centralizer provide the right feature for getting a good primary cementing job with maximum wellbore standoff with suitable functionality. Spiral vane Set screw solid rigid centralizers provide ultimate drag and torque reduction with maximum fluid by pass. The vortex motion generated by the spiral vanes helps to increase the fluid velocity with reduced flow area.





## SOLID RIGID CENTRALIZER

Size (in Inch)	Hole size (In inch)	Max. OD (in inch)	ID (in inch)	Height (in inch)	No of Vane
<b>4-1/2</b>	6	5.750	4.625	8	4
	6-1/4	6	4.625	8	4
	6-1/2	6.250	4.625	8	4
	7-7/8	7.625	4.625	8	4
<b>5</b>	6-1/2	6.250	5.125	8	4
	6-3/4	6.750	5.125	8	4
	7-7/8	7.625	5.125	8	4
	8-1/2	8.250	5.125	8	4
<b>5-1/2</b>	7-7/8	7.625	5.625	8	4
	8-1/2	8.250	5.625	8	4
	8-3/4	8.750	5.625	8	4
	9-7/8	9.625	5.625	8	4
<b>7</b>	8-1/2	8.250	7.125	8	6
	8-3/4	8.750	7.125	8	6
	9-7/8	9.625	7.125	8	6
<b>9-5/8</b>	11-5/8	11.375	9.750	8	8
	12-1/4	12	9.750	8	8
	13-3/4	13.750	9.750	8	8
<b>11-3/4</b>	13-3/4	13.750	11.875	8	8
	14-3/4	14.750	11.875	8	8
	15-1/2	12.250	11.875	8	8
<b>13-3/8</b>	16	15.75	13.500	8	8
	17-1/2	17.250	13.500	8	8
<b>14</b>	16	15.75	14.125	8	10
	17-1/2	17.250	14.125	8	10
<b>16</b>	20	19.75	16.125	8	10
	22	21.75	16.125	8	10
<b>18-5/8</b>	22	21.75	18.750	8	12
	24	23.75	18.750	8	12
<b>20</b>	24	23.75	20.125	8	12



## POSITIVE RIGID CENTRALIZER

### HINGED NON-WELDED POSITIVE BOW CENTRALIZER

Positive bow centralizer is designed with positive steel channel bow which provides positive casing standoff. This uniquely designed with flat bottom U profile of different depths. The Centralizers significantly reduce frictional drag while being used in deviated holes. They provide almost 100% Stand Off when run inside a cased hole. They are commonly used when a casing is lowered inside another casing.

### HINGED WELDED POSITIVE BOW CENTRALIZER

Hinged welded positive bow centralizers have strongly welded to the end collar under required temperature and condition with extra low hydrogen coated electrodes. Operational and general design features are the same as non welded positive bow centralizer.

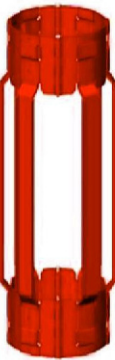
### SLIP-ON WELDED POSITIVE BOW CENTRALIZER

Operational and Design features is the same welded positive bow centralizer. Slip-On Positive Bow Centralizer are manufactured with solid end rings that can be easily slipped on the casing OD during Installation. Centralizers bow have strongly welded to the end Collar under required temperature and Condition with extra low hydrogen coated electrodes.



## POSITIVE RIGID CENTRALIZER

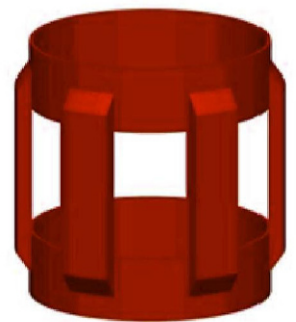
Size (in Inch)	Hole size (In inch)	Max. OD (in inch)	ID (in inch)	Height (in inch)	No of Bow
<b>4-1/2</b>	6	5.750	4.625	20	4
	6-1/4	6	4.625	20	4
	6-1/2	6.250	4.625	20	4
	7-7/8	7.625	4.625	20	4
<b>5</b>	6-1/2	6.250	5.125	20	4
	6-3/4	6.750	5.125	20	4
	7-7/8	7.625	5.125	20	4
	8-1/2	8.250	5.125	20	4
<b>5-1/2</b>	7-7/8	7.625	5.625	20	4
	8-1/2	8.250	5.625	20	4
	8-3/4	8.750	5.625	20	4
	9-7/8	9.625	5.625	20	4
<b>7</b>	8-1/2	8.250	7.125	20	6
	8-3/4	8.750	7.125	20	6
	9-7/8	9.625	7.125	20	6
<b>9-5/8</b>	11-5/8	11.375	9.750	20	8
	12-1/4	12	9.750	20	8
	13-3/4	13.750	9.750	20	8
<b>10-3/4</b>	12-1/4	12	10.875	20	8
	13-3/4	13.750	10.875	20	8
	14-3/4	14.750	10.875	20	8
<b>11-3/4</b>	13-3/4	13.750	11.875	20	8
	14-3/4	14.750	11.875	20	8
	15-1/2	12.250	11.875	20	8
<b>13-3/8</b>	16	15.75	13.500	20	8
	17-1/2	17.250	13.500	20	8
<b>16</b>	20	19.75	16.125	20	10
	22	21.75	16.125	20	10
<b>18-5/8</b>	22	21.75	18.750	20	12
	24	23.75	18.750	20	12



## **SLIP ON WELDED SOLID POSITIVE RIGID CENTRALIZER**

### **SLIP ON WELDED SOLID STRAIGHT VANE POSITIVE RIGID CENTRALIZER**

Positive Rigid Centralizer with straight solid vanes is easy to install on casing string. It minimizes sticking and contact with casing string. They reduce frictional drag and provide up to 90% stand off in deviated wells. These are directly slipped onto the casing and do not have any end collars.



### **SLIP ON WELDED SOLID SPIRAL VANES POSITIVE RIGID CENTRALIZER**

These Positive Rigid Centralizer with Spiral Vanes maximizes swirl and enhances localized turbulence. In this special type of iron phosphate coating process to protect from rust then coated with polyester powder.



## HEAVY DUTY SPIRALIZERS

### HEAVY DUTY WELDED SPIRALIZER-L & SPIRALIZER-R

Heavy Duty Welded Spiralizer is designed for high deviated horizontal well where casing centralization is the main consideration. The spiralizer system is made of steel, giving it a toughness advantage over other materials and alloys in different style, but normally straight or curved vane is used. It ensures positive stand off, maximum flow, maximum well bore stabilization, maximum holding strength, decreased drag.

Both spiral and straight fin designs minimize drag forces while running pipe. The fins glide smoothly on the low side of horizontal boreholes. It can be made to float between casing stop collars or be secured to the casing OD, if it is required to rotate the casing while cementing. Due to inclined or spiral fins they help to create turbulence in the fluid which removes any wellbores debris or mud cake deposited and helps in smooth running in of the casing string.

#### Features:

It help for proper distribution of cement around the casing during the cementing.

It also help to reduce the friction for inserting the casing in wellbore.

It helps to improve strength of cement bond by evenly distributing the cement



## SLIP-ON WELDED SPIRALIZERS

Slip on Welded Spiralizer provide low coefficient of friction to reduce drag forces while running in pipe thus optimizing mud displacement and minimizing pressure drop across the Centralizer.

In this the bow springs hardly welded to the end collars on suitable temperature with proper correct grade electrode. While giving maximum standoff these blades create vortex flow to optimize mud displacement.

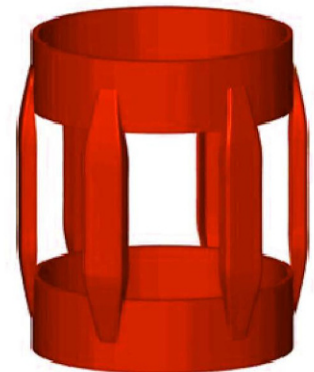
They are available with straight vane or spiral vane type options which resist high side loads. They are capable of providing maximum stand off.



**SLIIP-ON WELDED  
SPIRALIZER-L**



**SLIIP-ON WELDED  
SPIRALIZER-R**



**SLIIP-ON WELDED  
SPIRALIZER**

## SLIP ON STAND OFF BAND

These centralizers are made in a variety of style, but they generally have straight or curved vanes. They can be secured to the casing OD, or they can float between casing stop collars if the well casing rotates during cementing.

### CONDUCTOR PIPE CENTRALIZER

It has high impact with shock resistance, along with optimum mechanical strength.

This is providing the right feature for getting a good primary cementing for maximum wellbore. It also provides ultimate drag and torque reduction with maximum fluid bypass with low friction.

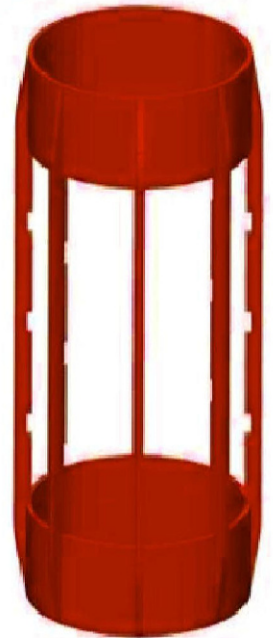
### SINGLE PIECE BOW SPRING CENTRALIZER

WS Single Piece Bow Spring Centralizer is made of one single sheet which is locked through a locking mechanism.

It has high restoring force and since it is made from one single piece it has smooth surface unlike other welded centralizers, this further provides uniform hardness to the centralizer and low friction to the fluid while running in.

It cannot be shipped into half and is shipped as a single piece. It is prevented from rusting since it undergoes special iron phosphate coating process.

It is available in 4-1/2" to 20" sizes.



## SPRING BOW CENTRALIZER

Centralizer designed to withstand the most extreme down hole conditions. Manufactured from mechanical stock tubing, the centralizer designed to perform in wells containing tight clearances and under-reamed hole sections.

### HINGED NON-WELD BOW SPRING CENTRALIZER

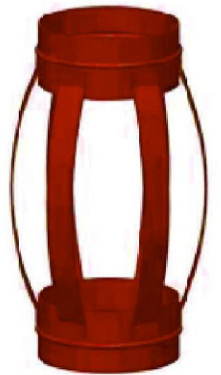
It is used to hold the casing to fix in the center position in the wellbore. It is suitable for horizontal as well as vertical. Our product design is very easy for installation and disassembled. Low Starting force as well as high resorting force achieved by the bow with the suitable steel alloy with the uniform hardness by the special type of treatment.

All specification meets with API 10D for most demanding conditions.



### HINGED WELDED BOW SPRING CENTRALIZER

It has more Restoring Force as compare to Non Welded Centralizer. In this welding of bows to collars is carried out under controlled conditions to ensure crack free weld with minimum distortion and maximum rigidity. The Centralizers have Bow Spring strongly welded to the End Collar under required temperature and condition with extra low Hydrogen coated Electrodes. These Centralizers meet all the specifications as laid down by API 10D.



### SLIP ON WELDED BOW SPRING CENTRALIZER

It is manufactured with solid end rings, requiring the centralizer to be slipped on the casing. Slip On Centralizers are provided for direct installation on pipe by slipping on. Rust prevented by special Iron Phosphate coating, then coated with Polyester Powder.





## SPRING BOW CENTRALIZER

Size (in Inch)	Hole size (In inch)	Max. OD (in inch)	Max. compressed (OD)	ID (in inch)	Height (in inch)	No of Bow
4-1/2	6	7.155	5.415	4.625	20.5	4
	6-1/4	7.155	5.415	4.625	20.5	4
	6-1/2	7.628	5.415	4.625	20.5	4
	7-7/8	9.045	5.415	4.625	20.5	4
5	6-1/2	7.667	5.935	5.125	20.5	4
	6-3/4	7.667	5.935	5.125	20.5	4
	7-7/8	9.084	5.935	5.125	20.5	4
	8-1/2	10.108	5.935	5.125	20.5	4
5-1/2	7-7/8	9.124	6.440	5.625	20.5	4
	8-1/2	10.069	6.440	5.625	20.5	4
	8-3/4	10.069	6.440	5.625	20.5	4
	9-7/8	11.092	6.440	5.625	20.5	4
6-5/8	8-1/2	9.321	7.590	6.750	20.5	6
7	8-1/2	9.714	7.785	7.125	20.5	6
	8-3/4	10.187	7.785	7.125	20.5	6
	9-7/8	11.604	7.785	7.125	20.5	6
7-5/8	9-7/8	10.836	8.613	7.750	20.5	6
8-5/8	10-5/8	11.821	9.590	8.750	20.5	6
	11-5/8	13.989	9.590	8.750	20.5	6
	12-1/4	14.262	9.590	8.750	20.5	6
9-5/8	11-5/8	13.809	10.640	9.750	20.5	8
	12-1/4	14.281	10.640	9.750	20.5	8
	13-3/4	15.305	10.640	9.750	20.5	8
9-7/8	11-5/8	13.592	10.897	10.0	20.5	8
	12-1/4	14.065	10.897	10.0	20.5	8
	13-3/4	15.088	10.897	10.0	20.5	8
10-3/4	12-1/4	13.573	11.821	10.875	20.5	8
	13-3/4	15.462	11.821	10.875	20.5	8
	14-3/4	16.014	11.821	10.875	20.5	8
11-3/4	13-3/4	15.482	12.787	11.875	20.5	8
	14-3/4	16.427	12.787	11.875	20.5	8
	15-1/2	17.451	12.787	11.875	20.5	8
13-3/8	16	18.632	14.440	13.500	20.5	8
	17-1/2	19.104	14.440	13.500	20.5	8
13-5/8	16	18.356	14.696	13.750	20.5	8
	17-1/2	18.907	14.696	13.750	20.5	10
14	16	18.730	15.070	14.125	20.5	10
	17-1/2	19.281	15.070	14.125	20.5	10
16	20	21.781	17.098	16.125	20.5	10
	22	24.065	17.098	16.125	20.5	10
18-5/8	22	23.415	19.755	18.750	20.5	12
	24	26.722	19.755	18.750	20.5	12
20	24	25.817	21.133	20.125	20.5	12
	26	28.100	21.133	20.125	20.5	12



## SEMI-RIGID BOW SPRING CENTRALIZER

### HINGED NON-WELDED SEMI-RIGID BOW SPRING CENTRALIZER

Bow spring is made of special Steel Alloy under rigid heat treatment process. Rust is prevented by special phosphate and coating. It has high Restoring force and high Stand Off with low Running Force which is ideally suitable for Deviated and Horizontal wells where load on springs are maximum. During the cementing mud is removed with the help of bow.

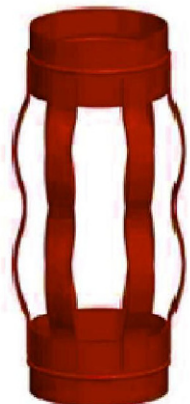
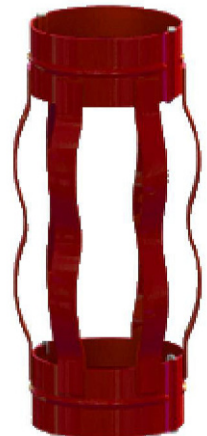
Compare to other spring Bow centralizers this device obtain high stand off because of high restoring force. It increase contact area for less Bow penetration, which helps in complete mud removal while cementing.

### HINGED WELDED SEMI-RIGID BOW SPRING CENTRALIZER

It has more Restoring Force as compare to Non Welded Centralizer. Rust is prevented by special phosphate and coating. The spring characteristics of its double crested profile permit compression to facilitate movement through tight spot. Internal hinge folded on the inside stay intact even under extreme stress.

### SLIP ON WELDED SEMI-RIGID BOW SPRING CENTRALIZER

Slip on welded semi-rigid bow spring centralizer have same design and operational feature as hinged welded centralizers. It is directly placed on pipe by slipping on. These centralizers undergo a special Iron Phosphate coating process to prevent from Rust then coated with special Polyester Powder.



## SEMI-RIGID BOW SPRING CENTRALIZER

Size (in Inch)	Hole size (In inch)	Max. OD (in inch)	Max. compressed (OD)	ID (in inch)	Height (in inch)	No of Bow
4-1/2	6	6.125	5.560	4.625	20	4
	6-1/4	6.375	5.560	4.625	20	4
	6-1/2	6.625	5.560	4.625	20	4
	7-7/8	8	5.560	4.625	20	4
5	6-1/2	6.625	5.107	5.125	20	4
	6-3/4	6.875	5.107	5.125	20	4
	7-7/8	8	5.107	5.125	20	4
	8-1/2	8.625	5.107	5.125	20	4
5-1/2	7-7/8	8	6.730	5.625	20	4
	8-1/2	8.625	6.730	5.625	20	4
	8-3/4	8.875	6.730	5.625	20	4
	9-7/8	10	6.730	5.625	20	4
6-5/8	8-1/2	8.625	7.710	6.750	20	6
7	8-1/2	8.625	7.710	7.125	20	6
	8-3/4	8.875	7.710	7.125	20	6
	9-7/8	10	7.710	7.125	20	6
7-5/8	9-7/8	10	8.750	7.750	20	6
8-5/8	10-5/8	10.750	9.730	8.750	20	6
	11-5/8	11.350	9.730	8.750	20	6
	12-1/4	12.375	9.730	8.750	20	6
9-5/8	11-5/8	11.750	10.780	9.750	20	8
	12-1/4	12.375	10.780	9.750	20	8
	13-3/4	14	10.780	9.750	20	8
9-7/8	11-5/8	12	10.103	10.0	20	8
	12-1/4	12.750	10.103	10.0	20	8
	13-3/4	14.250	10.103	10.0	20	8
10-3/4	12-1/4	12.750	11.960	10.875	20	8
	13-3/4	14.250	11.960	10.875	20	8
	14-3/4	15.250	11.960	10.875	20	8
11-3/4	13-3/4	14.250	12.920	11.875	20	8
	14-3/4	15.250	12.920	11.875	20	8
	15-1/2	16	12.920	11.875	20	8
13-3/8	16	16.500	14.580	13.500	20	8
	17-1/2	18	14.580	13.500	20	8
13-5/8	16	16.500	14.730	13.750	20	8
	17-1/2	18	14.730	13.750	20	10
14	16	16.500	15.210	14.125	20	10
	17-1/2	18	15.210	14.125	20	10
16	20	20.500	17.240	16.125	20	10
	22	22.500	17.240	16.125	20	10
18-5/8	22	22.500	19.890	18.750	20	12
	24	24.500	19.890	18.750	20	12
20	24	24.500	21.270	20.125	20	12



## BOW SPRING TURBULATOR

### HINGED NON-WELDED BOW SPRING TURBULATOR

Hinged Non-Welded bow spring Turbulator have all the characteristic of regular Centralizer as far as Starting Force is concerned. The main difference is that Turbulator Centralizer has deflector blades fitted on Standard Bow Springs. In this blades or Fins are specially made of Heat Treated spring steel. The turbo fins divert the fluid flow to more evenly distributing the cement around the casing by generating turbulence in cement slurry during cementing operations. The end collars have hinges and are non-welded and can therefore be shipped in half making transportation economical.



### HINGED WELDED BOW SPRING TURBULATOR

Hinged Welded bow spring Turbulator have all the characteristic of regular Centralizer as far as Starting Force is concerned. It has deflector blades fitted on Standard Bow Springs. In this blades or Fins are specially made of Heat Treated spring steel. The turbo fins divert the fluid flow to more evenly distributing the cement around the casing. Our Hinged Welded Bow Spring Turbulator is designed and manufactured as per API 10D Standard.



### SLIP ON WELDED BOW SPRING TURBULATOR

Slip on Welded bow spring Turbulator have all the characteristic of regular Tabulator as far as Starting Force is concerned. It is directly installed on pipe by slipping on as the end collars do not have any hinges. This can be pre-installed onto the casing at the yard itself and thus save time on site



## CEMENT BASKET

The Cement Basket is available in Hinged Type and Slip on type. It is run above liners or casing above weak formations that require protection from Hydrostatic pressure generated by cement column.

Steel staves mounted on a steel ring. These can be used in cased hole as well as open hole formations.

It should be allowed to travel on the joint of casing. Although sizes are available for all standard casing sizes

### FEATURES:

Special zinc Phosphate and powder coating process to prevent from Rust and ensure stocking in the open for a long time.

Its design allows cement to flow in an upward direction, yet helps to prevent it from falling downward.

Developed to exceeds API 10D standards

**Note :** Available in 4 1/2" to 20 " sizes.

Any special sizes or combination can be made available on request.



## STOP RING

Stop Ring is used to keep Centralizer in its place on the casing string. The Centralizer are installed over or between the stop ring. It is tested according to API RP 10D-2/ISO 10427-2 to get good mechanical properties.

### SLIP ON SET SCREW STOP RING

Set Screw on stop rings are provide for griping the casing string. Stop rings with set screws are able to provide up to 15000 lb. holding force. It is specifically designed to be used in upset tubing Available in size range 4<sup>1/2</sup> to 20".

Note:-Also available with **Double Bow**.

### HINGE SPIRAL NAIL STOP RING

Hinged spiral nail stop ring, when driven in firmly, lock the collar into position around the casing.

Available in size range 4<sup>1/2</sup> to 20".



### HINGE BOLTED STOP RING

In this the Bolt lock mechanism allows for quick and easy installation over casing.

Available in size range 4<sup>1/2</sup> to 20".

