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Swivel Type Hydraulic Set Liner Hanger:
Model: WC-SHSLH
Product No. WC-10102

The Swivel Receptacle Slip Liner Hanger gives a matchless performance by joining the slip design of the Receptacle Slip Hanger with an inner mandrel supported by a high roller bearing.

The Swivel Receptacle Slip Liner Hanger Body and slip have an efficient cone angle two times greater than conventional hangers, reducing extra pressure applied on casing wall.

It allows longer, heavier liners to be run on multi-string or un-cemented casing.

The Swivel Receptacle Slip Liner Hanger is set hydraulically.

Setting tools & components required for liner rotation are also available on sale or rental basis.

Features:-
- Right hand rotation of liner after hanging and even during cementing process
- Receptacle slip design eliminates cone collapse while providing an effective cone angle twice than the conventional liner hangers
- Slips are manufactured to high hardness for high-grade casing anchoring
- High load roller bearing can be replaced with a spacer ring when swivel action is not desired or feasible
- 125,000 yield strength is standard achieved by high strength alloys
- Overall design reduces stress build-up in support casing

SPECIFICATION GUIDE

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<thead>
<tr>
<th>Liner Size OD In mm</th>
<th>Casing</th>
<th>Max. OD in</th>
<th>Weight (lbs/ft)</th>
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Non Rotational Hydraulic Liner Hanger:
Model : WC-NRHLH-1 (Single Cone)
Product No. : WC-10103

Model : WC-NRHLH-2 (Double Cone)
Product No. : WC-10109

Non Rotational Hydraulic Liner Hanger is used to hang a liner in well without rotating the work string to set the hanger. The hydraulic liner hanger is recommended 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.

This Hanger is meant for use with Compression Packer, is provided with internal casing threads for Top Packer.

The hydraulic cylinder is safety pinned to actuate at a predetermined setting force.

**Features and Benefits:**

- Hanger body is manufactured from L-80 and P-110 casing grades, other weight range & casing grades available on request.
- Hydraulic cylinder manufactured from material matching yield strength & metallurgy of the liner hanger.
- Hydraulic piston incorporates features to protect o-rings from wellbore debris.
- Slips manufactured to 60 Rockwell scale for high grade casing compatibility.
- Solid body hangers are machined from AISI 4140, 4145 Series alloy steel with controlled yield strengths and hardness for liner compatibility.
- Liner hanger are available with all API and premium threads connections.

**SPECIFICATION GUIDE**

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**Mechanical Liner Hanger:-**
**MODEL:** WC-MLH-1  
**PRODUCT No.** WC-10104

Mechanical-Set Liner Hanger is one of the most dependable and competent hanger, as it is comprised of the hanger mandrel, more than one set of cone pad, slips and a cage assembly to carry the slips.

The slip cage contains a “J” slot and high strength drag springs to manage the movement of the slips into contact with the cones.

Mechanical Set Liner Hanger are set through manipulation of the work string (pick-up & 1/4 right hand turn) line up the cones and the slips, and a further slack off sets the slips onto the casing wall.

**Features and benefits:-**

Casing body hanger is manufactured from L-80 and P-110 casing grades, other weight range & casing grades available on request.

Single or multiple cone designs available to match hanging capacity with liner strength, minimizing stress in supporting casing.

Slips are case hardened to 60 Rockwell for high grade casing compatibility.

Liner Hangers are available with all API threads connections.

**SPECIFICATION GUIDE**

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<thead>
<tr>
<th>Liner Size OD In mm</th>
<th>Casing</th>
<th>Max. OD in</th>
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<td>Size In mm</td>
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**Mechanical Liner Hangers**

Four main mechanical liner hangers are the WSM, WTM, WRM, and WPMR.

**WSM Liner Hanger**  
*Model: WC-WSM*  
*Product: WC-10105*

The W-series single-cone mechanical (WSM) liner hanger features a single cone and a right-hand setting mechanism. It is easy to operate and has adequate hanging capacity for medium to long liners.

**WTM Liner Hanger**  
*Model: WC-WTM*  
*Product: WC-10106*

The W-series tandem-cone mechanical (WTM) liner hanger features tandem cones and a right-hand setting mechanism. It functions identically to the WSM liner hanger but provides twice the hanging capacity, which is ideal for all but the longest liners.

**WRM Liner Hanger**  
*Model: WC-WRM*  
*Product: WC-10107*

The W-series rotating mechanical (WRM) liner hanger features a single cone, a right-hand setting mechanism, and a bearing. The bearing allows for rotation of the liner after the hanger is set. The WRM functions identically to the WSM and has the same hanging capacity, but it also allows rotation of the liner after the hanger is set.

**WPMR Liner Hanger**  
*Model: WC-WPMR*  
*Product: WC-10108*

The premium mechanical rotating (WPMR) liner hanger features tandem cones, protected slips, and a heavy-duty bearing. It is Wellcare’s top-of-the-line mechanical liner hanger. The WPMR functions identically to the other mechanical liner hangers but has greater hanging capacity, a heavy-duty bearing, and protected slips.

**SPECIFICATION GUIDE**

<table>
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<tr>
<th>Liner Size OD In mm</th>
<th>Casing Size In mm</th>
<th>Weight (lbs/ft)</th>
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Covered Slip Liner Hanger:—
MODEL : WC-CSLH
PRODUCT No. WC-10101

Covered Slip Hydraulic set Rotating Liner Hangers use to rotate the liner string while running in and during cementing operations insuring a more complete cement bond.

Specially designed slips deliver excellent hanging capacity and eliminate the risk of the premature setting. The design is primarily based on the hydraulic setting of slip segments (Four totals) which distribute the liner weight evenly on the ribs provided on to the slips, guided in the pocket of 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 and rotated during running in and cementing and set after cementing by applying pressure against the liner wiper plug after it is landed in Collar. To set the Hanger before cementing Landing Collar with setting ball must be run.

It comes in two versions with bearing and without. Bearings are of cylindrical imported quality with power to resist high thrust and torque.

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 scale hardness of 57-64 for use in the highest grade casing strings.
- Incorporated with high compressive thrust bearing.

**SPECIFICATION GUIDE**

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Compression Set Liner Top Packer

Compression Set Liner Top Packers 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 packers 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. This packer is equipped with hold down slips, which makes it suitable to use in horizontal wells. The packer have integral setting collar to rotate the Liner Hanger during running in and cementing.

Operation:-

The liner top packers are set from the top after cementing using the packer setting dogs on the liner running tool. Weight is applied by the work string to energize the element, which is then locked in place with the internal ratchet assembly.

Swab Cup Packer:

MODEL: WC-SWCP
PRODUCT NO. WC-11601

The Swab Cup Packer has two wire meshed Swab Cup Element. Which provides extra sealing during setting of liner hanger and cementing job. Groove is provided at the bottom end to attach the liner hanger.
Tieback Seal Nipple Packer:-
**MODEL: WC-TSNP**
**PRODUCT NO. WC-10301**

Tieback seal nipple packer is used as a remedial tool to control a leaking liner top due to annular gas migration or questionable cement competency in the liner-lap seal. The assembly provides the required annular flow control as well as a tieback seal receptacle for future production or remediation of the well.

Constructed of material matching the grade of the liner casing, when it landed, provides a continuous bore diameter to that of the liner.

To facilitate ease of entry, it is equipped with a standard mule guide nose with large circulation ports. Standard seal configuration is four units in fabric reinforced NBR with optional seals in HNBR. Seal elements are standard HNBR material and are bottom activated when it is fully engaged in the packer. Setting force is trapped by a dual ratchet ring assembly and a permanent, packer style, full circle, hold down slip.

Available in rotating or non-rotating configuration with retrievable or no cementing bushing profile running and setting, this assembly may be configured with conventional mechanical right hand release running tool, rotating mechanical running tool or hydraulic release running tool.

### SPECIFICATION GUIDE

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<th>Packer Size OD In Mm</th>
<th>Casing Size In mm</th>
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<td>13 3/8 339.7</td>
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Model : WC-TSNP
Prod. No. : WC-10301
Tieback Seal Nipple:-
MODEL: WC-TSN
PRODUCT NO. WC-11202

Tieback seal nipple allows for future extension of the liner casing string to surface for production, testing or remedial operations during the life of the well. 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. This provides mono bore access to the reservoir.

It may be used temporarily or permanently. To facilitate both ease of entry and cementing operations. It is equipped with a standard mule guide nose with circulations ports. Standard seal configurations is four units in fabric reinforced NBR with optional seals in HNBR.

It is available in lengths form three to 30 feet depending on the application. On an optional basis, the tieback seal nipple may be provided with a latch assembly for production applications where it is appropriate to land the tieback casing in tension. Other configurations allow for the top or bottom locate within the assembly. Configured with a box top design, the tieback seal nipple will directly connect to the tieback casing string or to other components.

### SPECIFICATION GUIDE

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<th>Packer Size OD In Mm</th>
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Liner Tieback Accessories:–

Liner tieback top dress and polishing mills are run prior to tying back into the tieback seal receptacle with a seal nipple or seal nipple packer assembly. The purpose of running the mills is to ensure the liner top has not been damaged since installation, and to remove any scale or other foreign material from the polished seal bore.

The top dress mill is designed to dress or return the top edge of the receptacle to an acceptable condition and configuration to allow entry of the seal nipple without damaging the seal units. The polishing mill is a soft-bodied mill that vibrates inside the receptacle, removing deposited material from its highly polished surface to allow optimal contact with the seal nipple.

For seal nipple packer applications, the mills are run in with a casing scraper to ensure a properly prepared area for the packer to set and seal in.

Both mills are provided with drill-pipe connections and are sized for specific lengths by the use of a spacer nipple. Detailed procedures for dressing and polishing are available.
**Top set Coupling:-**

It is being used in conventional liner hanger with the liner top packer and other end threaded connection as per the liner running tools.

**Tie Back Receptacle:-**

The Tie-Back Receptacle provides a high integrity honed seal bore above a liner Hanger which permits landing, sealing and extending additional liner to a point further up the hole, or the surface.

### SPECIFICATION GUIDE

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**Liner Swivel Sub:-**

The liner Swivel Sub is normally used when running mechanical set liners in highly deviated wells in which rotating to set the liner may be a problem. The swivel allows rotation of the hanger without rotating the total liner. A clutch system in the swivel (feature may be detected if required) allows easy release of running nut from the liner, if the liner has to be set on bottom.

### Features / Benefits

- ID of the Swivel is equal to or larger than API drift diameter.
- Premium Box and Pin connections.
- Can be run in any casing/hole larger than the Swivel OD.
- Incorporates axial (compression and tension) and radial slide bearings.
Mechanical release running tool is an industry-standard rotational release running tool. With no rotational drive capability, this tool simply conveys the liner assembly and then is released with right-hand rotation after the hanger has been set. Designed to release in compression, this tool may be run in vertical, high-angle or horizontal wells with a high degree of confidence.

As a service tool, the mechanical release running tool is a heavy duty design and construction ensures a long, usable service life. Standard configuration is with an API drift pipe box cementing seal joint box for direct connection to a retrievable seal joint, drillable seal joint, solid bushing or inverted cup tool.

It may be run in conjunction with various setting tools to run liner top packers or tieback seal nipple packers.
Mechanical Release Setting Tool:-
Model : WC–STRM
Product No.: WC-11102

Mechanical release setting tool is a full feature, mechanical release running tool and packer setting assembly. With no rotational drive capability, this simply conveys the liner assembly and then is released with right-hand rotation after the hanger has been set. Designed to release in compression, this tool may be run in vertical, high-angle or horizontal wells with a high degree of confidence. The bearing system facilitates both easy release of the liner, and also aids in the setting of weight set, liner top packer assemblies by allowing the weight to be applied under a rotational load, more evenly distributing weight and ensuring that maximum setting force reaches the packer assembly.

As a service tool, the mechanical release setting tool features heavy-duty design and construction for a long, usable service life. Standard configuration is with API drill pipe box for direct connection to a retrievable seal joint, drillable seal joint, solid bushing or inverted cup tool.

It may be run liner top packers or tieback seal nipple packers.
**Setting Tool:**
**Model:** WC-STLH
**Product No.** WC-11104

Setting tool is used to set the mechanical liner hanger. The setting tool is provided with top sub with tool joint connection, Rotating Dog Sub, Kelly and Setting Nut.

This toll is compatible to be used in high angle as well as in straight well with very easy and comfortably could be used.
Mechanical Release-Rotating:-
Model : WC-STRM-2
Product No. WC-11103

It is the most advanced mechanical release running tool available in the market today. Utilizing a unique new tension spring assembly, rotational setting dogs of integral manufacture, and a proven dual-stage rotational engagement system, the mechanical release-rotating is the tool of choice for use with hanger system.

Designed for difficult liner running conditions such as drill-in or extended-reach applications, it is heavy duty design and manufacture. Its ability to perform in vertical, high-angle and horizontal well bores with none of the inherent problems of hydraulic release tools makes it one of the most reliable running/setting tools available worldwide.

The packer setting mechanism features protective guides on the dog assemblies so as not to damage or score the micro-honed ID of the tie back seal receptacle. The integral bearing assembly allows full setting force to be applied rotationally to whichever model of liner top packer has been selected.

Standard configuration is with an API drill pipe box for direct connection to a retrievable seal joint, drillable seal joint, solid bushing or inverted cup tool.
Hydraulic Release Running Tool: -
Model : WC-RTLH
Product No. WC-11005

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 Collet 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.
Setting Collar With Optional TBR:-

Setting collar is a typically run above the liner hanger for the purpose of carrying the liner weight and engagement of the setting tool while running in the hole. It also serves as a tool entry guide after completion. The setting collar can be provided with honed tie back receptacle extension pup joint to accommodate Kelly stroke of the running tool.

Setting Collar:-

Setting collar is a basic releasing collar used to carry the liner into the well. The right-hand releasing thread ensures easy release of the setting tool.

The setting collar is made up on top of the liner hanger and is recommended for use when a liner extension is no planned.

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

Locking Type:-
Model : WC-CBRL
Prod. No. WC-12201

It provides a superior liner to work string seal that retrieves with removal of the liner running/setting tools, and eliminates any bushing drill-out.

It is pressure-balanced assembly that does not exert any damaging loads onto the polished cementing seal joint. All seals are provided in material. Locking-dog assemblies are spring-loaded to insure positive engagement, particularly in high-angle or horizontal applications.

It is easily installed in the field and requires no special handling or assembly tools.

It is of heavy-duty design and construction, ensuring a long, usable service life. Standard configurations allows for slip on installation over a retrievable cementing seal joint. It may be run in conjunction with any running tool sub, liner top packer, or tieback seal nipple packer equipped with its profile.

Features:-
- Positive locking dogs
- HNBR internal & external seals
- Pressure loading on support sleeve not cementing seal joint
- Easy field installation

Cementing Bushing Drillable

Type:-
Model: WC-CBDL
Prod. No. WC-12202

It provides a superior liner to work string seal that is run with the liner system as a separate component or, integrally in running tool sub, liner top packer or tieback seal nipple packer. 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.

Cementing seal joint is available in a variety of lengths to meet the most demanding well conditions it features a separate, replaceable plug adapter sub.
Debris Screen:-

Its locking style debris screen eliminates associated problems of debris entering the tieback seal receptacle during the running and releasing of the liner assembly. Traditional style, insert type debris screens are prone to moving during run-in, particularly during verification of release form the liner or when setting a liner top packer. When moved from the liner top, debris is allowed to enter into an extremely close tolerance annular space between the running/setting tools and the tieback seal receptacle which may result in the tools being permanently or temporarily stuck. In a permanent situation, free point, back-off and milling operations are required to remedy the situation. In a temporary situation, potential loss of the liner during retrieval and its unplanned return to the bottom of the well usually result in a costly fishing operation as well as damage to the liner casing.

It has a locking dog assembly that prevents movement of the debris screen until the running/setting tools physically release the assembly. A machined profile is provided in the tieback seal receptacle. A stainless steel well screen section provides a barrier to smaller debris during the running of the liner. As a secondary barrier.

Unlike fluid cushion junk system offered by other companies, it is easily installed in the field and requires no special handling or assembly tools.

It is of heavy duty design and construction, ensuring a long, usable service life. Standard configuration is for slip on installation over API IF tool joints provided on all drill pipe handling nipples run with the liner running/setting tools assembly. It may be run in conjunction with all tieback seal receptacles, liner top packers and tieback seal nipple packers.

Features:-

- Positive locking dogs
- Stainless steel screen
- Wiper ring
- Easy field installation

Junk Screen:-

The liner hanger junk screen should be run as part of the setting tool assembly to prevent debris from damaging the polished bore Tieback mandrel. It will also prevent debris from.
Drilling Safety Joint:-

Model : WC-DSJ

Prod. NO. WC-11802

The Wellcare Safety Joint is manufactured to provide safe and easy release and make-up whenever disengagement becomes necessary.

This dependable, field-tough tool is designed to transmit torque in either direction when placed in the drill, fishing, or washover string.

Components:-

The safety joint consists of a pin section, a box section, and a friction ring. The internal connection of the safety joint is a coarse acme thread used to facilitate easy pack-off and re-engagement.

A knurled release ring between the box and pin sections maintain torsion integrity until back-off procedure is initiated. An O-ring seal contains pressure while the safety joint is made up.

Assembly and Operation:-

To assemble, install the safety joint in the drill string as indicated below. Make up the service connection to a torque of approximately 60 to 75% of the drill string connections.

- In drill strings, the safety joint should be located above the drill collars to avoid compression.
- In fishing strings, the safety joint should be located directly above the fishing tool but below the jar or bumper sub.
- In washover strings, the safety joint should be located between the drill pipe and the washover pipe. Wellcare Washover Safety Joints are provided with a tool joint box thread and a washover pipe pin thread.

To disengage the safety joint while down-hole, place pipe in tension and apply left-hand torque. Hold torque while slowly lowering pipe until safety joint breaks. Continue to unscrew safety joint to the left. To re-engage the safety joint, lower pipe until pin section of safety joint lands on box section. Apply one point of weight. Rotate to the left one or two turns. Then rotate to the right until torque builds up, indicating safety joint is made up.

<table>
<thead>
<tr>
<th>Drilling Safety Joints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection</td>
</tr>
<tr>
<td>Tool OD</td>
</tr>
<tr>
<td>Tool ID</td>
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<table>
<thead>
<tr>
<th>Drilling Safety Joints</th>
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<tbody>
<tr>
<td>Connection</td>
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<td>Tool OD</td>
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<tr>
<td>Tool ID</td>
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<th>Drilling Safety Joints</th>
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<tbody>
<tr>
<td>Connection</td>
</tr>
<tr>
<td>Tool OD</td>
</tr>
<tr>
<td>Tool ID</td>
</tr>
</tbody>
</table>
Lift Plugs:

Wellcare Lift Plugs are designed to provide an economical method of handling washover strings. They are available in all thread types and sizes, have sufficient shoulder diameter to support handling the washover string, and can be ordered with or without lifting bail.

MODEL: WC-LP
PRODUCT NO. WC-11501

<table>
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<tr>
<th>Lift Plugs</th>
<th>4½</th>
<th>4¼</th>
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<th>5½</th>
<th>5⅛</th>
<th>6</th>
</tr>
</thead>
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<tr>
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<td>6</td>
</tr>
<tr>
<td>Plain Length</td>
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<td>12½</td>
<td>13</td>
<td>13½</td>
<td>13¾</td>
<td>14</td>
</tr>
<tr>
<td>With Bail Length</td>
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<td>5⅛</td>
<td>5⅜</td>
<td>6</td>
<td>6⅛</td>
<td>6⅞</td>
</tr>
<tr>
<td>Shoulder F.J.W.P</td>
<td>3⅛</td>
<td>4</td>
<td>4</td>
<td>4⅝</td>
<td>4⅞</td>
<td>5⅛</td>
</tr>
</tbody>
</table>

Elevator Lift Subs:

Wellcare Elevator Lift Subs are used to handle the washover string and have an upper shoulder as well as reduced neck for securing in the elevator.

MODEL : WC-ELS
PRODUCT NO. WC-11502

<table>
<thead>
<tr>
<th>Lift Plugs</th>
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<th>7</th>
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<td>6</td>
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<td>6</td>
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<td>7</td>
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<tr>
<td>Plain Length</td>
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<td>14⅜</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>19½</td>
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<tr>
<td>With Bail Length</td>
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<td>8⅜</td>
<td>9</td>
<td>9⅜</td>
<td>10</td>
</tr>
<tr>
<td>Shoulder F.J.W.P</td>
<td>5⅛</td>
<td>6</td>
<td>6⅛</td>
<td>7</td>
<td>7⅜</td>
<td>8</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Lift Plugs</th>
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<th>10⅝</th>
<th>11⅜</th>
<th>12⅛</th>
</tr>
</thead>
<tbody>
<tr>
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<td>7</td>
<td>7</td>
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<td></td>
</tr>
<tr>
<td>With Bail Length</td>
<td>10⅛</td>
<td>11¼</td>
<td>12¼</td>
<td></td>
</tr>
<tr>
<td>Shoulder F.J.W.P</td>
<td>8½</td>
<td>9⅛</td>
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</tbody>
</table>

MODEL : WC-ELS
PRODUCT NO. WC-11502
Wellcare Drive Subs provide the crossover connection between the drill pipe string and the washover string. Each is machined from high-grade alloy steel and heat treated to provide maximum strength and durability.

**Construction** – Drive subs are provided with a box connection up, cut to customer specifications, for make-up with the fishing string. A pin connection down is also cut to customer specification and will match the washover string connections. A fishing neck is provided for ease of handling. A long type drive sub with extra long fishing neck is also available.

### Drive Subs

<table>
<thead>
<tr>
<th>Washpipe Size</th>
<th>4 1/2</th>
<th>4 3/4</th>
<th>5</th>
<th>5 1/2</th>
<th>5 3/4</th>
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<tr>
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<td>16</td>
<td>16</td>
<td>16</td>
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<tr>
<td>Long Type Length, in.</td>
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<td>46</td>
<td>46</td>
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### Drive Subs

<table>
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<th>Washpipe Size</th>
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<th>7 7/8</th>
<th>8 1/8</th>
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<tr>
<td>Short Type Length, in.</td>
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<td>Long Type Length, in.</td>
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### Drive Subs

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<th>11 1/4</th>
<th>13 3/8</th>
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<tr>
<td>Long Type Length, in.</td>
<td>50</td>
<td>54</td>
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</table>
Cross-Over Sub (Rotary Sub):-

Wellcare manufactures a complete line of rotary subs. Each sub provides a connection between joints of different size or type of drilling, washover, or tubing strings. Wellcare subs may be used in applications when it is necessary to have frequent disconnection points. All Wellcare subs are manufactured from high-alloy, heat treated steel and threaded to the customer’s specifications. Subs can be ordered pin-to-pin, box-to-box, or box-to-pin and are available in lengths up to 96 inches. Right or left-hand threads can be provided.

<table>
<thead>
<tr>
<th>Cross-Over Subs (Rotary Subs)</th>
<th>Largest O.D., inches</th>
<th>1½</th>
<th>1¼</th>
<th>2</th>
<th>2¼</th>
<th>2½</th>
<th>3</th>
<th>3¼</th>
<th>3½</th>
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<tbody>
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<th>3¼</th>
<th>4</th>
<th>4¼</th>
<th>4½</th>
<th>5</th>
<th>5¼</th>
<th>5½</th>
<th>5¾</th>
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<tbody>
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<td>12</td>
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<table>
<thead>
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<th>Cross-Over Subs (Rotary Subs)</th>
<th>Largest O.D., inches</th>
<th>6</th>
<th>6¼</th>
<th>6½</th>
<th>6¾</th>
<th>7</th>
<th>7¼</th>
<th>7½</th>
<th>7¾</th>
<th>8</th>
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</thead>
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<td>14</td>
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<table>
<thead>
<tr>
<th>Cross-Over Subs (Rotary Subs)</th>
<th>Largest O.D., inches</th>
<th>8¼</th>
<th>8½</th>
<th>8¾</th>
<th>9</th>
<th>9¼</th>
<th>9½</th>
<th>9¾</th>
<th>10</th>
<th>10¼</th>
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<tbody>
<tr>
<td>Length, inches</td>
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<td>14</td>
<td>14</td>
<td>16</td>
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<table>
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<tr>
<th>Cross-Over Subs (Rotary Subs)</th>
<th>Largest O.D., inches</th>
<th>10¼</th>
<th>10¾</th>
<th>11</th>
<th>11¼</th>
<th>11½</th>
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<th>12</th>
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<table>
<thead>
<tr>
<th>Cross-Over Subs (Rotary Subs)</th>
<th>Largest O.D., inches</th>
<th>12¼</th>
<th>13</th>
<th>13¼</th>
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<td>Length, inches</td>
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<td>16</td>
<td>16</td>
<td>16</td>
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<td>16</td>
</tr>
</tbody>
</table>
**Drill Pipe Wiper Plug:**
*Model: WC-DWP  
Product No. WC-10901*

It is designed to wipe clean the work string after cementing operations, the drill pipe wiper plug is designed to latch and seal into the liner wiper plug. When latched together, the plugs provide isolation between the liner cement and displacement fluid. When landed and latched into the appropriate landing collar, they provide a redundant back pressure valve to the floats in the shoe, landing collar and float collar.

The cup style design of the wiper fins provides a positive seal for activation of any hydraulic components and does not rely on an interference type seal like other plug systems. The wipers and molded seals are standard HNBR material.  

A robust anti rotation nose latch and clutch profile prevents rotation of the plugs during drill out operations.

Available in a tandem plug configuration, the wiper system allows for wiping of the work string and liner casing in advance of the cementing operation.

**Features:**
- Positive anti-rotation clutch profile
- Robust anti-rotation latch assembly
- Standard HNBR moulded seals and wiper fins.
- Available with multi plug configuration to suit any tapered drill pipe/work string.
Liner Wiper Plug:-  
**Model No. WC-LWP**  
**Prod. No. WC-10801**

Liner wiper plug is designed to wipe clean the liner casing after cementing operations in conjunction with the drill pipe wiper plug is designed to latch and seal into the liner wiper plug. When latched together, the plugs provide isolation between the liner cement and displacement fluid. When landed and latched into the appropriate landing collar, they provide a redundant back pressure valve to the floats in the shoe, landing collar and float collar.

The cup style design of the wiper fins provides a positive seal for activation of any hydraulic components and does not rely on an interference type seal like other plug systems. The wipers and molded seals are standard HNBR material.

A robust anti rotation nose latch and clutch profile prevents rotation of the plugs during drill out operations.

Available in a tandem plug configuration, the wiper system allows for wiping of the work string and liner casing in advance of the cementing operation.

**Features:-**
- Positive anti-rotation clutch profile
- Robust anti-rotation latch assembly
- Standard HNBR moulded seals and wiper fins.
- Available with multi plug configuration to suit any tapered drill pipe/work string.

Seal Joint:-  
**Model: WC-SJT**  
**Prod. No. WC-11801**

Seal Joint provides the Mandrel with ground O.D. to provide a sealing surface for the Pack-off Bushing. Groove is provided at the bottom end to attach the Liner Wiper Plug.

Our seal joint manufactured from high grade alloy material and surface would be chrome plated so as to possess resistance for corrosive environments.
**Landing Collar With Ball Seat:**

**Model : WC-LBS**

**Prod. No. WC-10501**

Landing Collar is used when setting liner hanger prior to cementing. A setting ball seat in the shear seat allowing 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.

**Landing Collar Hydraulic Activated:**

**Model : WC-LHA**

**Prod. No. WC-10502**

Hydraulically activated landing collar is used when running hydraulic set liner hangers or other hydraulic components run in a liner string. Shear setting of the assembly is field adjustable by the addition or removal of batch tested and matched shear screws.

Internal components are constructed for wrought aluminum and are compatible for drill out. We retained ball seat design prevents the sheared out cage and ball assembly from interfering with float equipment run below the landing collar. Large, milled slots provide an unrestricted flow area while cementing. Shears/setting balls are available in bronze, aluminum or phenolic materials of varying specific gravity for use in vertical, high angle or horizontal wells or for specific cement weights. All seals are of standard HNBR material.

A robust anti-rotation profile and latch assembly is designed to receive the liner wiper plug. When latched. These plugs provide a redundant seal to those of the float equipment.

The body of the landing collar is manufactured of material matching the grade of the liner casing, which provides performance equal to or greater than that of the liner casing.

**Features:**

- Positive anti-rotation profile for liner wiper.
- Robust latch assembly for liner wiper.
- Standard HNBR molded seals.
- Available with anti-wear coating.
**Landing Collar Latch Type:-**
**Model : WC-LLH**
**Prod. No. WC-10503**

Latch type landing collar is used when running mechanical set liner hangers. It is designed to provide a latch-and-seal area for the liner wiper plug.

A robust anti-rotation profile and latch assembly is designed to receive the liner wiper plug. When latched. These plugs provide a redundant seal to those of the float equipment.

The body of the landing collar is manufactured of material matching the grade of the liner casing, which provides performance equal to or greater than that of the liner casing.

---

**Landing Collar With Catcher Sub:-**
**Model : WC-LCS**
**Prod. No. WC-10504**

Landing collar with catcher sub is used when setting liner hanger prior to cementing. A setting ball seats in the shear seat allowing 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.

The collar incorporates a latch with non-rotational mechanism to accept, lock and seal the liner wiper plug upon completion of cementing. The catcher is provided to collect the ball seat with ball after shear.
Double Valve Bottom Set Jet Swirl Shoe:–
Model : WC-DBJS
Prod. No. WC-10601

Double valve bottom set jet swirl shoe is designed for running and cementing liner assemblies with the contingent ability to be set on bottom in the event the liner does not hang. Specifically, there are features not present in more conventional primary cementing shoes. These features include:

- Spade nose with anti-rotation fins which allow the liner to remain stationary while the work string is rotated to release from the liner assembly.
- Since and down circulation ports. In many cases, the liner is set close to the bottom of the hole and may encounter cuttings and other well debris. The side and down ports aid in the flow of cement in these debris filled applications. This is of particular importance when the liner is set on bottom.

Internal components are constructed of cement, thermo-plastic, and rubber, and are compatible for drill out. The float assemblies are tested and rated to API recommended practice 10F. The unique design of the molded rubber seal prevents impingement and erosion of the seals by the circulating fluids, ensuring a positive seal at conclusion of the liner installation.

The body of the jet swirl is manufactured of material matching the grade of the liner casing, which provides performance equal to or greater than that of the liner casing.

Reamer Shoe with Double Valve:–
Model : WC-RSDV
Prod. No. WC-10602

Reamer Shoe with double valve has reaming capacity to drill through difficulties during lowering of liner. Tungsten Carbide composite facing is provided to negotiate drilling and reaming. Also Aluminum guide is provided.

Internal components are constructed of cement, thermo-plastic, and rubber, and are compatible for drill out. The float assemblies are tested and rated to API recommended practice 10F. The unique design of the molded rubber seal prevents impingement and erosion of the seals by the circulating fluids, ensuring a positive seal at conclusion of the liner installation.
Double Valve Jet Swirl Shoe:
Model : WC-DJSS
Prod. No. WC-10604

Double valve jet swirl is designed for running and cementing liner assemblies with the contingent ability to be set on bottom in the event the liner does not hang. Specifically, there are features not present in more conventional primary cementing shoes.

Internal components are constructed of cement, thermo-plastic, and rubber, and are compatible for drill out. The float assemblies are tested and rated to API recommended practice 10F. The unique design of the molded rubber seal prevents impingement and erosion of the seals by the circulating fluids, ensuring a positive seal at conclusion of the liner installation.

The body of the jet swirl is manufactured of material matching the grade of the liner casing, which provides performance equal to or greater than that of the liner casing.
Top Drive Cementing Head:-
Model : WC-TDCH
Prod. No. WC-11702

Top Drive Cementing Head having 4-1/2” I.F. Box up and Pin down connections for 15,000 PSI Cementing Line and Tensile Strength of 400 Ton. The integral body of Cementing Head removed all internal connection and easy to use. Top Drive Cementing Head comprises with Flag sub and Ball dropping Sub.

The Positive Ball Dropping Sub is used to release varied sizes of setting balls to a ball seat down hole. This can be accomplished without breaking a drill pipe connection at the surface or by removing a hammer union cap. The ball is enclosed in a recess unaffected by the flow of fluids and is released with a simple turn of the handle. The handle is locked during the circulation period thus preventing possible premature release of setting ball. The sub is designed to drop varied sizes of ball, ranging from 1.25” to 2.25” diameter.

- Provides “positive” means to release a setting ball down.
- Ball is protected from fluids while conditioning the liner.
- Simple operation.
- Drops various sizes of balls.

Flag sub is placed immediately below the plug dropping head and swivel. The position of the Flag indicates that the pump down plug has been released from the head and has moved down the drill pipe.

- Positive indication that plug has left the cementing head.
- High tensile strength.
- Drill pipe connection standard.

Features and Benefits:-

- Maximum strength and toughness from quenched and tempered alloy steel construction.
- Displacement fluid and cement are diverted below or above the plug through an external manifold.
- Manifold rated to 15,000 PSI working Pressure.
- Cementing flag sub for visual indication of drill pipe wiper plug release is integral with the Plug Dropping Manifold.
- Heavy duty swivel permits easy manipulation of the string without having to break down the cementing lines.
Cement Manifold:--
Model : WC-CEMF
Prod. No. WC-11701

It is designed for use with conventional land based drilling and service rigs, as well as with offshore rigs not equipped with a top drive or using a conventional manifold.

The heavy duty design and construction of this assembly easily handles the tensile loads seen in deep drilling liner applications with sufficient capacity to handle any problems like stuck pipe, that could occur while running a liner assembly.

Cementing Manifold is a robust cementation device which allows you to hang drill pipe weight by the rig elevators meanwhile retaining the plug to be released at will, once cementing is complete.

The Cementing Manifold also connects the cementing lines to the running string during liner operations, and includes a heavy duty swivel for easy drill pipe string manipulation with the cementing lines still connected to the manifold.

The swivel mechanism and drill pipe plug retainer are built in below the elevators for unobstructed operation.

Cementing Manifold is available with single or multi plug drop capabilities.

Features and Benefits

- High strength Q&T 4145 alloy steel construction
- Displacement fluid and cement can be diverted below or above the plug through an external manifold
- Manifold rated to 10,000 PSI working pressure Wiper plug release tell tale visual confirmation possible
- Cementers most respected cementing manifold design
HOOK UP:
LINER HANGER SYSTEM LINER RUNNING TOOL ASSEMBLY

Tie Back Seal Receptacle

Liner Top Packer, Integral Body, Rotational type c/w retrievable cementing bushing profile

Drill Pipe Wiper Plug

Handling Nipple

Debris Screen, Locking Type

Rotational Running Tool c/w integral type packer setting dogs

Retrievable Cementing Bushing, Locking Type

Cementing Seal Joint For Retrievable Type cementing bushing

Liner Wiper Plug

Liner Float Shoe

Liner Coupling

Hydraulic Landing Collar

Liner Coupling

Liner

Liner
TIEBACK SEAL NIPPLE PACKER

- Tieback Seal Receptacle
- Tieback Seal Nipple Packer c/w 6 FT. Seal Nipple

RUNNING TOOL ASSEMBLY

- Handling Pup Joint
- Debris Screen Non Locking Type
- Running Tool
- retrievable Cementing Bushing, Locking type
- Cementing Seal Joint f/ Retrievable Type Cementing Bushing