

# Liner Hanger Systems



**PetroForge  
Technology**



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## Introduction

PetroForge offers Liner system comprises Liner string and Running tool string which are designed to work together as a Liner System. PetroForge Liner system provide rotating & non-rotating Liner system.

Liner String hook up includes Float Shoe, Float Collar, Landing Collar, Liner Hanger, Liner Top Packer & Polished Bore Receptacle sequentially from down to top.

Running Tool hookup includes Single-Wiper Plug (SWP), Stinger, cementing pack off, Running Tool, Packer Actuator, Debris Barrier, Cement Displacement (Drill Pipe Dart).

## Application

- Deep and/or highly deviated liners
- Extended-reach liners
- Cementing of deep/long/horizontal liners
- Drill-down liners
- Liners that must be reamed down
- Liners that must be floated in
- Large-diameter liners run at shallow depths

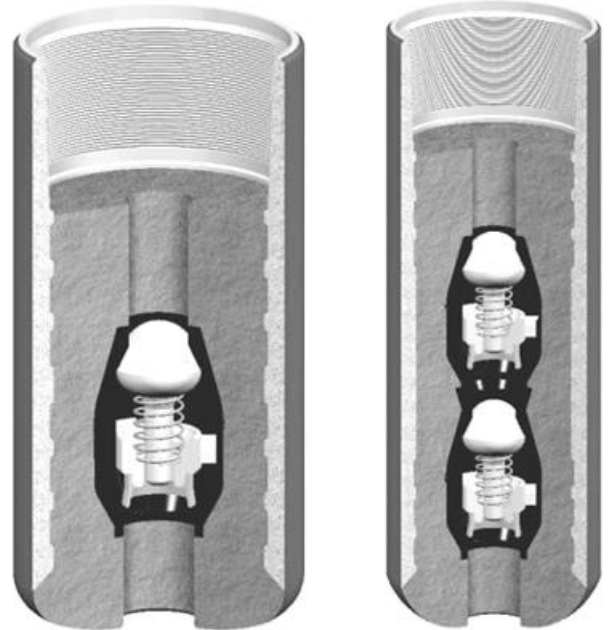


## Liner System

Liner String hook up includes Float Shoe, Float Collar, Landing Collar, Liner Hanger, Liner Top Packer & Polished Bore Receptacle sequentially from down to top.

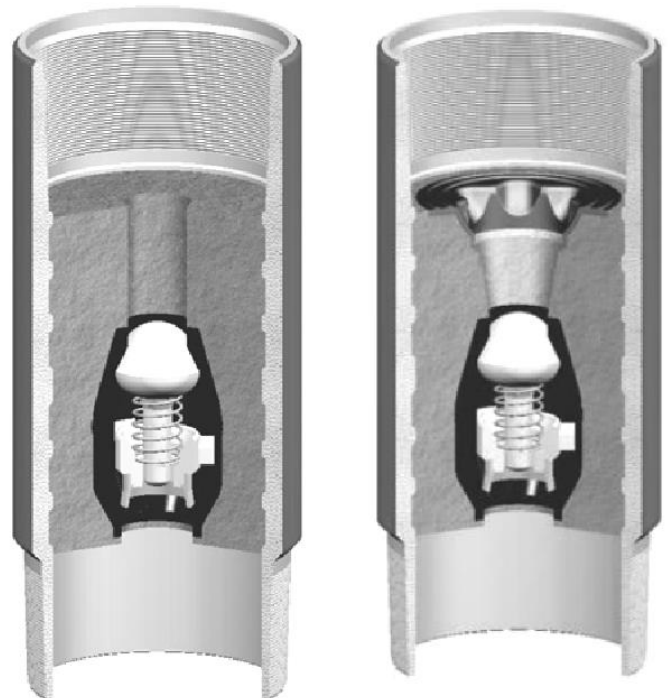
### PFT-FS Float Shoe

Float shoe provides function of guiding liner string to the depth. Guide shoes, auto-fill shoes, or conventional float shoes perform the primary function of guiding the casing to total depth. Guide shoes, conventional float shoes, or auto-fill shoes can be used.



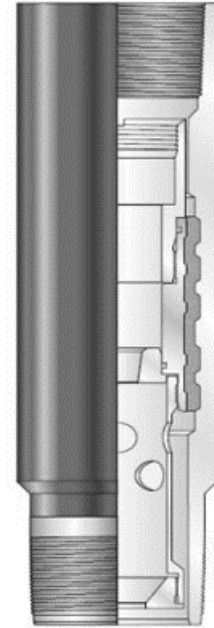
### PFT-FC Float Collar

Float collars are usually installed at least one or more joints above the shoe. Float collars contains a check valve assembly that allows fluid to displace out of the casing but prevents the flow of fluids back into the casing following cementing. The float collar may also provide a landing point for the cement wiper plugs. Conventional or auto-fill float collars can be use



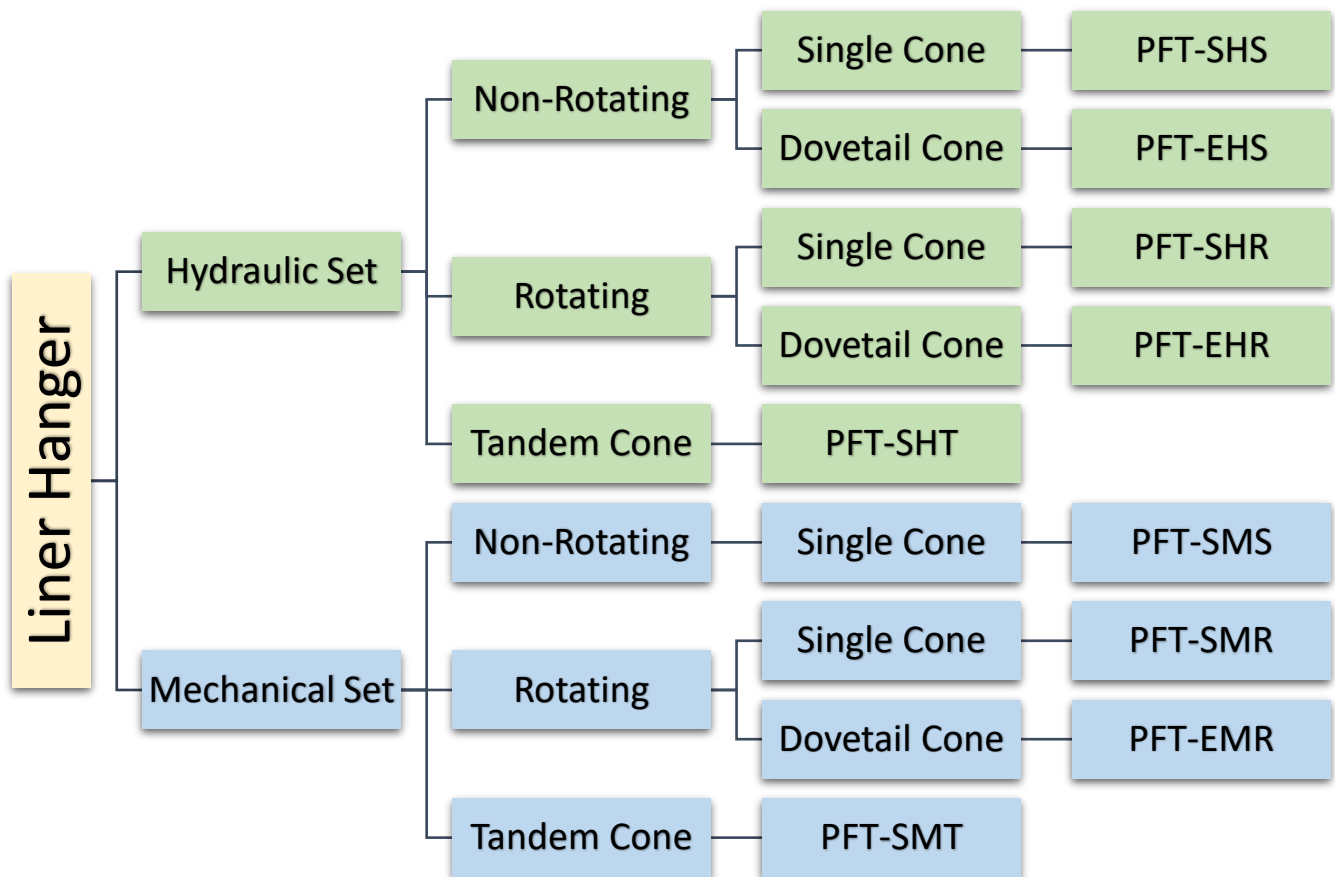
## PFT-LC Landing Collar

The landing collar is typically run one or two joints above the float collar. Landing Collars are special application collars that when used act as a landing point for a wiper plug. In addition, landing collars can be configured to contain a ball seat which allows hydraulic events to be performed.



## Liner Hanger

The liner hanger is run above the landing collar and used to suspend or “hang” the liner inside the previous liner / casing string and not have it set on bottom. The liner hanger is designed with rigid slips. To set the liner hanger, the slips are expanded against the previous liner / casing string ID. Once the slips are set, the liner hanger basically becomes a simple wedge suspending or “hanging” the liner off in the previous casing / liner string. Liner hanger slips can be set (expanded) mechanically or hydraulically and liner hangers can be rotatable.



## PFT-EMR Mechanical Set, Rotating, Dovetail Cone Liner Hanger

PFT-EMR is designed to hang any length of liner in a well which has small inclination and that require no rotation during RIH. The cones are non-welded and slips are protected to optimize bypass area. The liner hanger is actuated by picking up the drill string and rotating the PFT-EMR at least one-sixth of a turn to the right after reaching setting depth. Setting down weight on the PFT-EMR sets it, forcing the slips into the host casing. A bearing on the PFT-EMR hanger allows rotation after the hanger is set.

## Features, Advantages, and Benefits

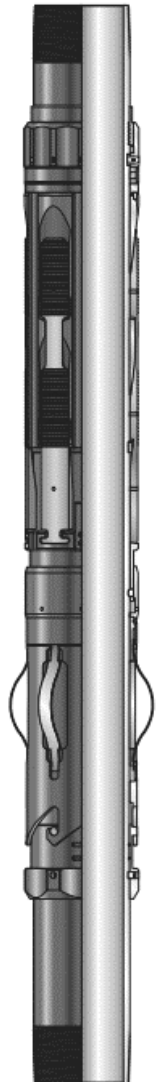
- PFT-EMR provides high hanging capacity due large slips area which minimizes the stress in the host casing.
- Resetting & Repositioning is possible.
- The heavy-duty bearing allows liner rotation after the hanger has been set, and during cementing operations, thus improving the quality of the cement bond.
- The wire-locked gauge ring protects slips from damage while running in the well.
- Case Hardened slips ensure that the liner hanger can be set in the hardest grades of host casing.
- Bypass area allow for high circulation rates past the hanger assembly to help removal of debris during well cleaning hence improving the quality of cement displacement.
- The free-rotating drag cage is designed to protect the drag springs from damage if the hanger is activated by more turns than required.
- The PFT-EMR can be set in a broad range of host casing weights.

## Application

- Well having small inclination
- Liner that does not have to be reamed or drilled down
- Production liners that may require high pressure stimulation jobs during life of the well

## Specifications

Contact PetroForge Sales & Marketing team.

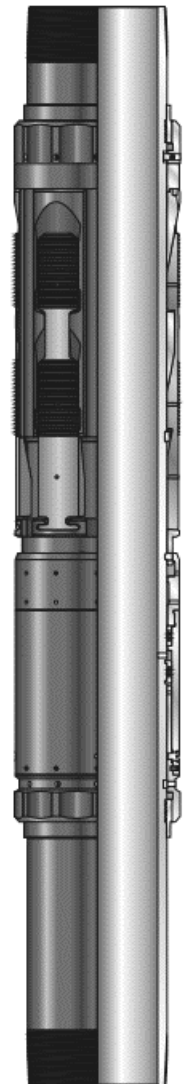


## **PFT-EHS Hydraulic Set, Non Rotating, Dovetail Cone Liner Hanger**

PFT-EHS is designed to be used in deep, highly deviated wells. Optimized bypass makes the PFT-EHS hanger an ideal choice for drill-down and reaming liner applications. Hydraulic pressure differential is created across the cylinder due to which slips are forced to bite into the host casing. The PFT-EHS features a spacer ring and cannot be rotated after the hanger is set

## **Features, Advantages, and Benefits**

- Suitable for deep and/or highly deviated wells.
- PFT-EHS provides high hanging capacity due large slips area which minimizes the stress in the host casing.
- PFT-EHS provides operational flexibility. One PFT-EHS can be set inside host casings of the same size but varying weights.
- There is no risk of prematurely setting the hanger due to mechanical locking.
- To prevent seal damage during rotation, set screws are provided to rotationally lock the hydraulic cylinder to the mandrel. This ensures that the hanger cylinder does not become a possible leak path in later well life.
- Case Hardened slips ensure that the liner hanger can be set in the hardest grades of host casing.
- Bypass area allow for high circulation rates past the hanger assembly to help removal of debris during well cleaning hence improving the quality of cement displacement.
- Hydraulic actuation can be planned using shear screws which ensures accurate predetermined setting pressure.



## **Application**

- Liners in deep and/or highly deviated wells
- Extended-reach liners
- Liners at any necessary depth Drill-down liners
- Liners that must be reamed down

## **Specifications**

Contact PetroForge Sales & Marketing team.

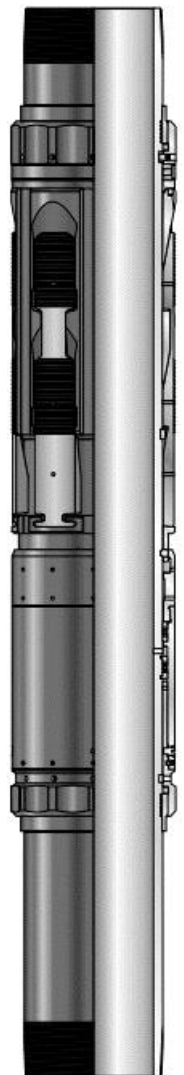


## PFT-EHR Hydraulic Set, Rotating, Dovetail Cone Liner Hanger

PFT-EHR is designed to use in deep, highly deviated wells. Optimize bypass make the PFT-EHR hanger an ideal choice for drilldown and reaming-liner applications. Hydraulic pressure differential is created across the cylinder due to which slips are forced to bite into the host casing. A bearing on the PFT-EHR hanger allows rotation after the hanger is set.

## Features, Advantages, and Benefits

- Suitable for deep and/or highly deviated wells.
- PFT-EHR provides high hanging capacity due large slips area which minimizes the stress in the host casing.
- PFT-EHR provides operational flexibility. One PFT-EHR can be set inside host casings of the same size but varying weights.
- The heavy-duty bearing allows liner rotation after the hanger has been set, and during cementing operations, thus improving the quality of the cement bond.
- There is no risk of prematurely setting the hanger due to mechanical locking.
- To prevent seal damage during rotation, set screws are provided to rotationally lock the hydraulic cylinder to the mandrel. This ensures that the hanger cylinder does not become a possible leak path in later well life.
- Case Hardened slips ensure that the liner hanger can be set in the hardest grades of host casing.
- Bypass area allow for high circulation rates past the hanger assembly to help removal of debris during well cleaning hence improving the quality of cement displacement.
- Hydraulic actuation can be planned using shear screws which ensures accurate predetermined setting pressure.



## Application

- Liners in deep and/or highly deviated wells
- Extended-reach liners
- Liners at any necessary depth
- Drilldown liners
- Liners that must be reamed down

## Specifications

Contact PetroForge Sales & Marketing team.

## **PFT-SMS Mechanical Set, Non-Rotating, Single Cone Liner Hanger**

PFT-SMS liner hanger is an economically designed liner hanger that features a cone with six slips, wire-locked to the body rather than welded. The PFT-SMS is suitable for liners that do not have to be reamed or drilled down. The liner hanger is actuated by picking up the drill string and rotating the PFT-SMS at least one-sixth of a turn to the right after reaching setting depth. Setting down weight on the PFT-SMS sets it, forcing the slips into the host casing.

### **Features, Advantages, and Benefits**

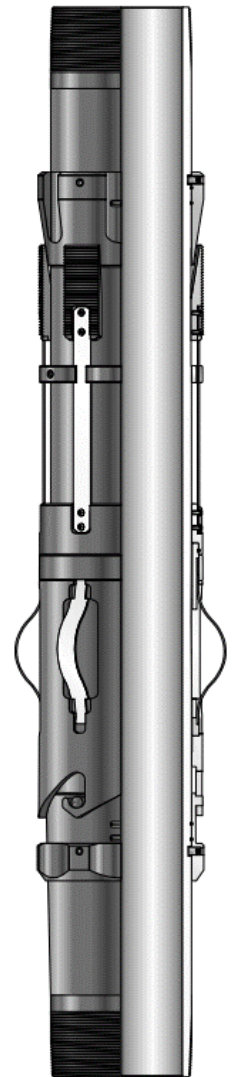
- Non welded construction. Components are wire locked on body.
- High hanging capacity due to single-cone design with six carburized slips comparable to competitors' tandem-cone hangers.
- Easy Resetting & Repositioning.
- The free-rotating drag cage is designed to protect the drag springs from damage if the hanger is activated by more turns than required.
- PFT-SSM provides operational flexibility. One PFT-SMS can be set inside host casings of the same size but varying weights.
- Bypass area allow for high circulation rates past the hanger assembly to help removal of debris during well cleaning hence improving the quality of cement displacement

### **Application**

- Well having small inclination
- Liner that does not have to be reamed or drilled down

### **Specifications**

Contact PetroForge Sales & Marketing team.



## PFT-SMT Mechanical Set, Tandem Cone Liner Hanger

PFT-SMT features tandem cones with six slips per cone, wire-locked to the body rather than welded. The PFT-SMT is suitable for liners that do not have to be reamed or drilled down. The liner hanger is actuated by picking up the drill string and rotating the PFT-SMT at least one-sixth of a turn to the right after reaching setting depth. Setting down weight on the PFT-SMT sets it, forcing the slips into the host casing.

### Features, Advantages, and Benefits

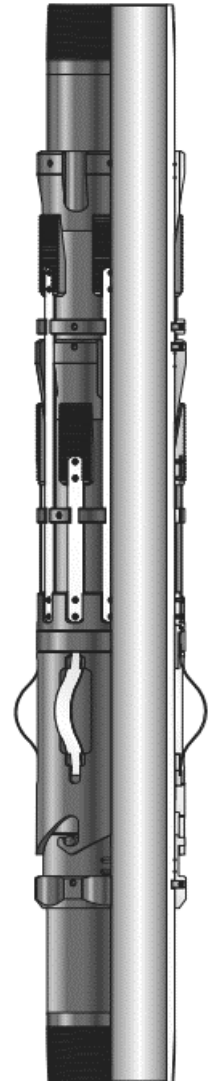
- Non-welded construction. Components are wire locked on body.
- High hanging capacity due to single-cone design with six carburized slips comparable to competitors' tandem-cone hangers.
- Easy Resetting & Repositioning.
- The free-rotating drag cage is designed to protect the drag springs from damage if the hanger is activated by more turns than required.
- PFT-SMT provides operational flexibility. One PFT-SMT can be set inside host casings of the same size but varying weights.
- Bypass area allow for high circulation rates past the hanger assembly to help removal of debris during well cleaning hence improving the quality of cement displacement

### Application

- Well having small inclination
- Liner that does not have to be reamed or drilled down

### Specifications

Contact PetroForge Sales & Marketing team.



## PFT-SMR Mechanical Set, Rotating, Single Cone Liner Hanger

PFT-SMR liner hanger is an economically designed liner hanger that features a cone with six slips, wire-locked to the body rather than welded. The PFT-SMR is suitable for liners that do not have to be reamed or drilled down. The liner hanger is actuated by picking up the drill string and rotating the PFT-SMR at least one-sixth of a turn to the right after reaching setting depth. Setting down weight on the PFT-SMR sets it, forcing the slips into the host casing.

## Features, Advantages, and Benefits

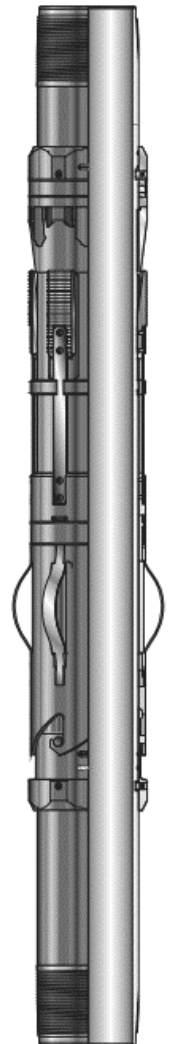
- Non-welded construction. Components are wire locked on body.
- High hanging capacity due to single-cone design with six carburized slips comparable to competitors' tandem-cone hangers.
- Easy Resetting & Repositioning.
- The free-rotating drag cage is designed to protect the drag springs from damage if the hanger is activated by more turns than required.
- PFT-SMR provides operational flexibility. One PFT-SMR can be set inside host casings of the same size but varying weights.
- Bypass area allow for high circulation rates past the hanger assembly to help removal of debris during well cleaning hence improving the quality of cement displacement

## Application

- Well having small inclination
- Liner that does not have to be reamed or drilled down

## Specifications

Contact PetroForge Sales & Marketing team.



## **PFT-SHS Hydraulic Set, Non-Rotating, Single Cone Liner Hanger**

PFT-SHS liner hanger is an economically designed liner hanger that features a cone with six slips, wire-locked to the body rather than welded. The PFT-SHS is suitable for liners that do not have to be reamed or drilled down. Hydraulic pressure differential is created across the cylinder due to which slips are forced to bite into the host casing. A bearing on the PFT-SHS hanger allows rotation after the hanger is set.

### **Features, Advantages, and Benefits**

- Suitable for deep and/or highly deviated wells.
- Non-welded construction. Components are wire locked on body.
- High hanging capacity due to single-cone design with six carburized slips comparable to competitors' tandem-cone hangers.
- PFT-SHS provides operational flexibility. One PFT-SHS can be set inside host casings of the same size but varying weights.
- Longitudinal fluid bypasses the channels in the cone and increases annular flow areas, enabling high circulation rates.

### **Application**

- Liner that does not have to be reamed or drilled down
- Liner that does not require rotation after the hanger is set.

### **Specifications**

Contact PetroForge Sales & Marketing team.



## PFT-SHT Hydraulic Set, Tandem Cone Liner Hanger

PFT-SHT features tandem cones with six slips per cone, wire-locked to the body rather than welded. The PFT-SHT is suitable for liners that do not have to be reamed or drilled down. Hydraulic pressure differential is created across the cylinder due to which slips are forced to bite into the host casing. A bearing on the PFT-SHT hanger allows rotation after the hanger is set.

### Features, Advantages, and Benefits

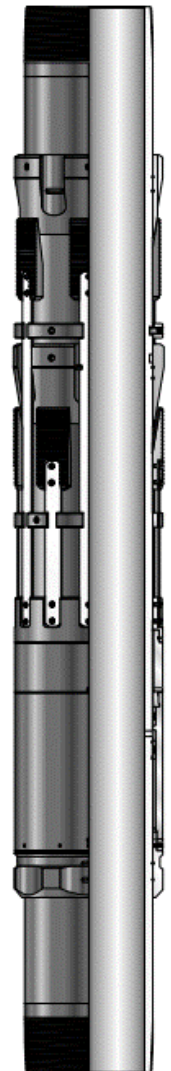
- Suitable for deep and/or highly deviated wells.
- Non welded construction. Components are wire locked on body.
- High hanging capacity due to single-cone design with six carburized slips comparable to competitors' tandem-cone hangers.
- PFT-SHT provides operational flexibility. One PFT-SHT can be set inside host casings of the same size but varying weights.
- Longitudinal fluid bypasses the channels in the cone and increases annular flow areas, enabling high circulation rates.

### Application

- Liner that does not have to be reamed or drilled down
- Liner that does not require rotation after the hanger is set.

### Specifications

Contact PetroForge Sales & Marketing team.



## **PFT-SHR Hydraulic Set, Rotating, Single Cone Liner Hanger**

PFT-SHR liner hanger is an economically designed liner hanger that features a cone with six slips, wire-locked to the body rather than welded. The PFT-SHR is suitable for liners that do not have to be reamed or drilled down. Hydraulic pressure differential is created across the cylinder due to which slips are forced to bite into the host casing. A bearing on the PFT-SHR hanger allows rotation after the hanger is set.

### **Features, Advantages, and Benefits**

- Suitable for deep and/or highly deviated wells.
- Non-welded construction. Components are wire locked on body.
- High hanging capacity due to single-cone design with six carburized slips comparable to competitors' tandem-cone hangers.
- The heavy-duty bearing allows liner rotation after the hanger has been set, and during cementing operations, thus improving the quality of the cement bond.
- PFT-SHR provides operational flexibility. One PFT-SHR can be set inside host casings of the same size but varying weights.
- Longitudinal fluid bypasses the channels in the cone and increases annular flow areas, enabling high circulation rates

### **Application**

- Liner that does not have to be reamed or drilled down

### **Specifications**

Contact PetroForge Sales & Marketing team.



## Liner Packer

Liner Packer is designed to fill the annular area created between Liner & the Host Casing ID & provide seal between the Liner OD and the host Casing ID.

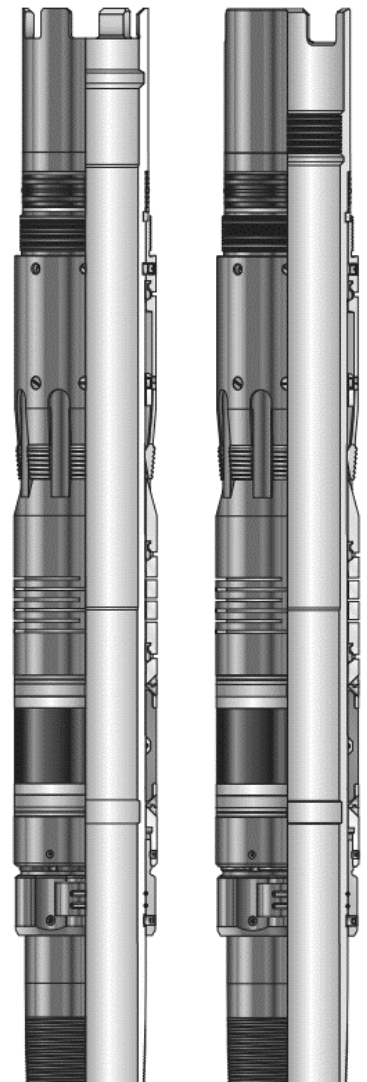
## PFT-ETP

PFT-ETP liner-top packer is designed to isolate the cement, preventing gas migration or flow while the cement sets. It is provided with profile on top for the running tool to connect running tool to the liner when a liner setting sleeve is not run.

The packer is normally set by applying set down weight on the tie-back polished bore receptacle using the packer actuator after the running tool is released. The weight sets the element and the hold down slips.

## Features, Advantages, and Benefits

- Peroxide-cured HNBR packing element creates a reliable seal that prevents gas migration in the cement in most well conditions, saving the cost of a liner-top squeeze.
- One-piece packing element is resistant to swabbing to enable high circulation rates past the liner-top packer assembly, aiding removal of debris during well cleaning and improving the quality of cement displacement.
- Integral beam spring stores an internal force that helps boost the setting load on the element under dynamic loading conditions, such as temperature or pressure changes, maintaining seal integrity.
- High-torque, one-piece mandrel is equipped with premium connections that meet or exceed the torque of the liner connections.
- XYLAN coated backup rings reduce the setting force required for energizing the packing element.
- Hold down slips and integral body lock-ring ratchet system positively lock in the applied setting forces to ensure that the packer does not become unset.
- The PFT-ETP liner-top packer incorporates the profile and seal bore for retrievable cement pack-off. This feature eliminates the need for—and cost of—a separate assembly. It also ensures easy retrieval of the pack-off because the pack-off does not have to be retrieved through a premium connection.
- PFT-ETP provides operational flexibility. One PFT-ETP can be set inside host casings of the same size but varying weights.





## Application

- Any cemented liners
- Uncemented liners for which a seal between the liner OD and the host casing ID is necessary or advantageous
- Tie-back packers

## Specifications

Contact PetroForge Sales & Marketing team.

## PFT-ETPH3

PFT-ETPH3 is a high-pressure liner-top packer, designed to isolate the cement, preventing gas migration or flow while the cement sets. It is provided with the profile and seal bore for retrievable cementing pack-off and, to connect running tool to the liner when a liner setting sleeve is not run.

The packer is normally set by applying set down weight on the tie-back polished bore receptacle using the packer actuator after the running tool is released. The weight sets the element and hold down slips.

Suitable for Pressure up to 10,000-psi (68.9-MPa) & temperature up to 350°F

## Features, Advantages, and Benefits

- Integral beam spring stores an internal force that helps maintain the setting load in the element under dynamic loading conditions, such as temperature or pressure changes. This process helps maintain seal integrity.
- Three-piece packing elements create a reliable seal that isolates gas migration in the cement below the packer from the annulus above, saving the cost of a liner-top squeeze.
- High-torque, one-piece mandrel is equipped with premium connections that meet or exceed the torque of the liner connections.
- XYLAN® coated filler rings reduce the setting force required for energizing the packing element. This advantage is useful in applications such as extended reach wells that present a challenge to getting enough weight down to set the liner-top packer.
- Hold-down slips and an integral body lock-ring ratchet system positively lock in the applied setting forces to ensure that the packer remains set.
- The high-pressure liner-top packer incorporates the profile and seal bore for Weatherford's WRSM and RSM retrievable cement pack-offs. This feature eliminates the need for—and cost of—a separate assembly. It also facilitates retrieval of the pack-off because it does not have to be retrieved through a premium connection.
- PFT-ETPH3 provides operational flexibility. One PFT-ETPH3 can be set inside host casings of the same size but varying weights.
- A mechanical locking mechanism is available in 7-in. (177.8-mm) models that use the R running tool. The lock ensures that the liner-top packer cannot be set until the liner running tool has been released. This feature dramatically reduces the potential for nonproductive time.



## Application

- Any cemented liners
- Uncemented liners for which a seal between the liner OD and the host-casing ID is necessary or advantageous
- Tieback packers
- High-pressure applications within the specified temperature rating

## Specifications

Contact PetroForge Sales & Marketing team.

## PFT-PBR

The Polished Bore Receptacle connects to the Liner Packer and protects the running tool assembly while RIH. In addition, the PBR has a honed seal bore that provides a means of tying back the liner to surface if necessary. Finally, when a liner top packer is included in the liner system, the PBR provides the extension that transfers the force necessary to set the packer. The PBR can be placed in different locations within the liner system upper or lower.



## Features, Advantages, and Benefits

- Honed seal bore ID provides effective seal surface.
- The PBR houses the running tool string during operations and protects the running tools from damage.

## Specifications

Contact PetroForge Sales & Marketing team.

## Running Tool System

Running Tool system includes Wiper Plug, Stinger, cementing pack off, Running Tool, Packer Actuator, Debris Barrier, Cement Displacement (Drill Pipe Dart).

## Wiper Plug

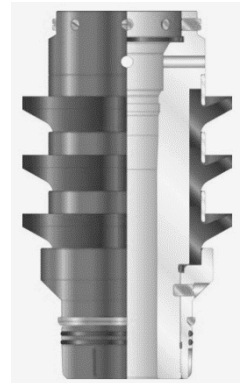
Wiper Plug is used to displace cement from the Liner into the annulus. The dart wipes the ID of the work string and then latches into the wiper plug which then releases from the work string and wipes the ID of the liner. The set makes a physical barrier between the cement and mud avoiding contamination of the cement with the displacing fluid.

## PFT-LWP Liner Wiper Plug

The PFT-LWP provide isolation between drilling fluids & cement during displacement. The PFT-LWP II is assembled to the bottom of liner-running tools using shear pins. PFT-LWP launches the plug, which enables the PFT-LWP to be displaced through the liner. The PFT-LWP then lands and latches in the landing collar and creates a positive seal from both above and below the landing collar

## Features, Advantages, and Benefits

- PFT-LWP provides operational flexibility. One PFT-LWP can wipe liners of the same size but varying weights.
- Non-rotating latch feature prevents the PFT-LWP and drill pipe dart from rotating during drill out of the landing collar, which saves rig time.
- Drillable using a polycrystalline diamond compact (PDC) bit, which simplifies drill out operations.
- Latching the PFT-LWP into the landing collar enables the plug to withstand high bump pressures and high backpressures.



## Application

- Any application for which a ball seat in the wiper plug is not required
- Any application for which a dual-plug system is not required

## Specifications

Contact PetroForge Sales & Marketing team.

## Single Wiper Plug with Integrated Ball Seat

The single-wiper plug (PFT-SWP) provides isolation between drilling fluids and the cement during displacement. The PFT-SWP is designed with a ball seat located on the wiper plug that reduces pressure surging when the seat is sheared.

The Single wiper plug is deployed in conjunction with the dart as a jointed system. Therefore, there is no effect on dart when picking up running tool to verify that the running tool has been released. This is because the plug does not move in relation to the running tool. The compatible drill pipe dart latches and seals into the inner body of the plug, and differential pressure across the plug launches the plug from the plug adapter. The plug is displaced through the liner and acts as a mechanical barrier behind the cement. Then the plug lands, latches in the landing collar, and creates a positive seal from both above and below the landing collar.

## Features, Advantages, and Benefits

- The integral ball seat design provides more reliability than conventional landing-collar ball sets and minimizes the potential for nonproductive time.
- Significantly reduces the possibility of formation damage resulting from hydraulic shock.
- Suitable for high bump pressures and high backpressures.
- Nonrotating latch system prevents the PFT-SWP and dart single wiper plug drill pipe dart from rotating during drill out of the landing collar saving rig time.
- Drillable using a polycrystalline diamond compact (PDC) bit, which simplifies drill out operations.
- A set of profiled dogs, rather than shear screws, lock the PFT-SWP to the running-tool string, which reduces the risk of premature release and associated Non-Productive Time.



## Application

- Any liner for which a single-wiper plug is required

## Specifications

Contact PetroForge Sales & Marketing team.

## Cementing Pack-off

The cementing pack off provides a seal between the liner ID and the running string OD and between the cementing pack-off ID and the Stinger OD. The dogs of the cementing pack-off fit into a profile in the packer below where the running tool is connected to the packer.

The seal on the OD creates a pressure containment to allow items such as a hydraulically activated hanger to be activated. The seal also allows pumped fluids to circulate through the bottom of the liner.

Cementing Pack-offs can be non-retrievable or retrievable. Non-retrievable cementing pack-offs are left in the hole with the sales equipment after the rental tools are retrieved and require drilling out. A Retrievable Pack-off is retrieved with the running tools which leaves a full bore in the liner.

## Features, Advantages, and Benefits

- Thermoplastic seals can withstand high differential pressures and are almost chemically inert.
- Reduces rig time by eliminating the need to drill out a non-retrievable pack-off.
- Reduces the hydraulic lifting forces affecting the running tool string during cementing operations, reducing the risk of pumping the tool string up the hole.
- Dogs do not contact the slick joint. This design prevents damage to the slick joint and ensures optimal performance after the running tool has been released.

## Application

- Cemented liners

## Specifications

Contact PetroForge Sales & Marketing team.

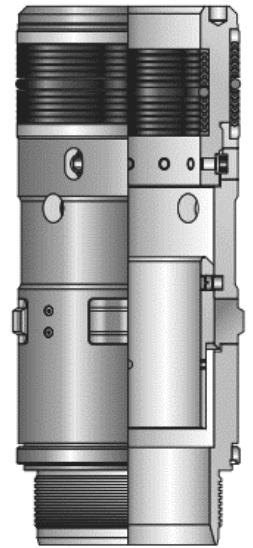


## Retrievable Cementing Pack-off

The retrievable cementing pack-off provides seal between the running string OD and the liner ID. It allows pressure to build against a ball seat farther down the hole so that items such as hydraulically activated liner hangers can be set, while ensuring that all mud and cement are circulated through the bottom of the liner.

It contains internal and external seals. It fits into a profile located in the liner-top packer or liner setting sleeve, which provides the seal bore for the external seals and the lock profile for the dogs. The inner seals form a seal against the outside of the polished stingers.

It is released by shifting the inner sleeve with a pickup sub or a pressure-port straddle.



## Features, Advantages, and Benefits

- Thermoplastic seals can withstand high differential pressure and are almost chemically inert.
- Reduces rig time by eliminating the need to drill out a non-retrievable pack off.
- The design of the RSM reduces the hydraulic lifting forces affecting the running-tool string during cementing operations, reducing the risk of pumping the tool string up the hole.
- The bottom connection makes it compatible with jointed pack-off system.
- Dogs do not contact the polished stinger. This design prevents damage to the polished stinger and ensures optimal seal performance after the running tool has been released

## Application

- Cemented liners
- Uncemented liners that use a hydraulically set liner hanger

## Specifications

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## Running Tool

The running tool create link between packer actuator tool (at the top) and a stinger (at the bottom). Running tools allow the work assembly to run the liner system to the desired setting depth and also transmit torque from the work string to the liner string before and after the liner hanger has been set. Once the liner hanger is set, the running tool is released from the liner assembly, and the work assembly can be retrieved from the hole. Liner deployment tools are activated either mechanically by rotation, or hydraulically by applying differential pressure across a cylinder.

## PFT-RM Running Tool with mechanical release

PFT-RM running tool, with mechanical release, features a left-hand float nut that supports the weight of the liner. It is high-torque running tool. The thrusting cap engages with the castellations on the liner-top packer or liner setting sleeve, which allows the tool to rotate the liner in tension. The tool is released by placing it in compression and rotating to the right. Torque is transmitted through the thrusting cap to rotate the liner once the float nut has been released.

## Features, Advantages, and Benefits

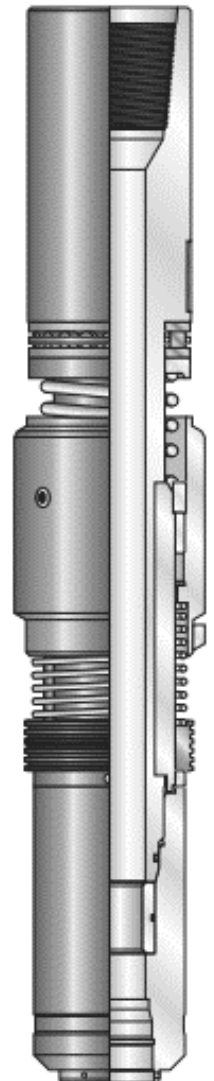
- Thrusting cap rotates the liner after the R running tool has been released which helps to improve the cement bond.
- Simple in operations.

## Application

- Liners that do not require rotation in compression

## Specifications

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## PFT-RH Running Tool with Hydraulic release

PFT-RH running tool with hydraulically released mechanical lock is high-torque running tool with drill down capability. The running tool features a left-hand float nut that supports the weight of the liner. The thrusting cap engages with the castellations on the liner-top packer or liner setting sleeve, which allows the tool to rotate the liner. The running tool can be mechanically locked to the liner assembly, eliminating the risk of premature release of the liner. The left-hand float nut of the tool is connected to the liner during deployment. Placing the tool in compression and rotating to the right then releases the tool. Torque is transmitted through the thrusting cap to rotate the liner once the float nut has been released.

## Features, Advantages, and Benefits

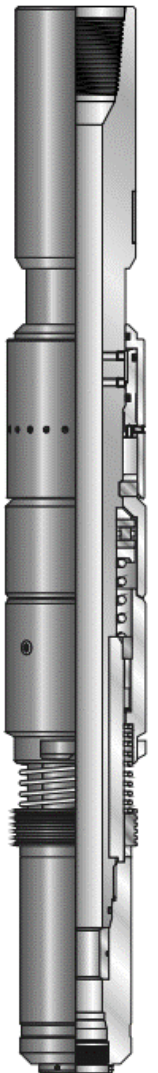
- Liner can be rotated to bottom in tension and compression without the risk of premature release.
- Thrusting cap rotates the liner after the running tool has been released which helps improve the cement bond.
- The running tool is equipped with a landing profile (standing valve) as a backup release mechanism for the hydraulically released mechanical lock, ensuring retrieval of the running string.

## Application

- Liners in deep and/or highly deviated wells Extended-reach liners
- Liners at any necessary depth Drill-down liners or liners that must be reamed down
- Hydraulic liner hangers Mechanical liner hangers

## Specifications

Contact PetroForge Sales & Marketing team.



## PFT-HRT Running Tool with Hydraulic release

PFT-HRT features hydraulic release and drill-down capability. Complete Weight of the liner is taken by its supported collet. Castellations feature on the torque sleeve allows the tool to rotate a liner through the mating castellations on the liner-top packer or liner setting sleeve. Release of the tool achieved through primary & secondary mechanism. Differential pressure across the hydraulic cylinder retracts the collet from the liner-top packer or liner setting sleeve activates the primary release mechanism. One-sixth left-hand turn at the tool activates a secondary mechanical release.

## Features, Advantages, and Benefits

- A high torque capability in both tension and compression,
- Suitable for running liners that must be reamed down.
- Torque sleeve enables rotation of the liner after the running tool has been released, which improves the cement bond.
- Supported collet connects to the liner, enabling the running tool to support long, heavy liners. Secondary left-hand, mechanical release ensures that the running string can be retrieved.

## Application

- Liners in deep and/or highly deviated wells Liners at any necessary depth
- Liners that must be reamed down or Liners that are not conventionally cemented

## Specifications

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## Packer Actuator

The top of the packer actuator connects to the debris barrier extension and the bottom connects to a running tool. The packer actuator transfers force through the PBR to activate a liner top packer. Packer setting tools can be mechanical or hydraulic and rotatable.

## PFT-RPA Packer Actuator

PFT-RPA rotating packer actuator enables transfer of weight through the polished bore receptacle (PBR) to set liner-top packer. A bearing helps in rotation of the running string to help transfer weight downward to set the liner-top packer. Spring-loaded dogs are collapsed inside the PBR until the tool is raised to set the packer. When exposed above the PBR, the dogs are forced outward and cannot re-enter the PBR. Weight set down on the running string at this point transfers to the PBR through the tool to set the liner-top packer

## Features, Advantages, and Benefits

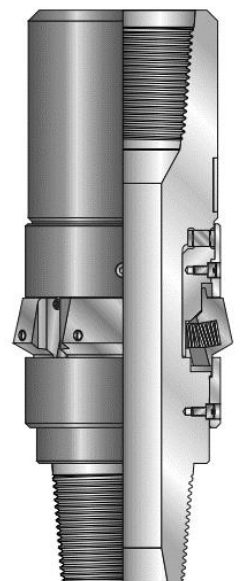
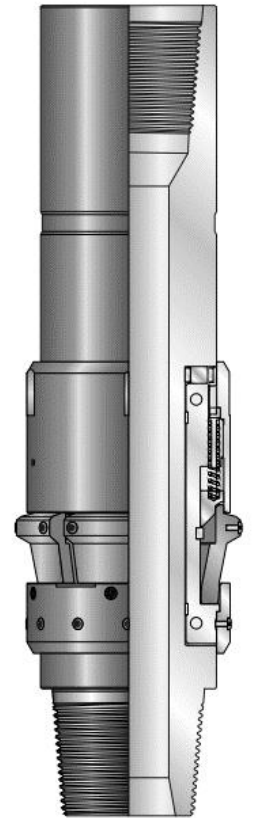
- Several features help ensure the setting of the liner-top packer, including: – Spring-loaded dogs, when actuated, act as positive shoulders that cannot re-enter the PBR, ensuring the required set-down weight is always applied to the top of the PBR.
- Axial-thrust bearing enables rotation of the running string as set-down weight is applied, aiding in the transfer of setting forces required to set the liner-top packer.
- Before setting the packer, the running string is picked up to ensure the hanger-setting tool has released. Brass screws in the dogs prevent damage to the ID of the PBR when moving the tool.

## Application

- Liners using a top-set liner-top packer
- All liner-top packers used as a second-run tieback packer

## Specifications

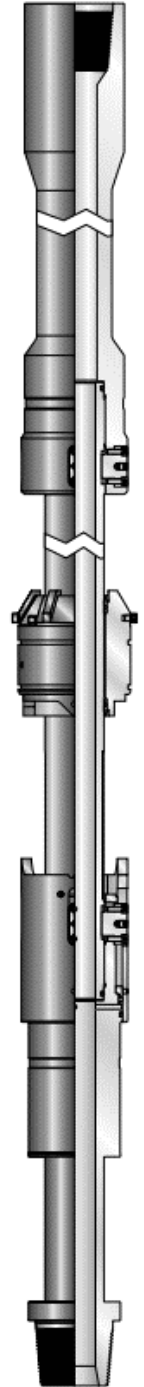
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## Debris Barrier

The main function of the debris prevention system is to prevent debris from entering the polished bore receptacle (PBR) during the liner run-in, circulating the well clean, and cementing. It is recommended to use a debris barrier at the top of the PBR. The debris barrier has an extension. A packer actuator (setting tool) is made up to the bottom of the debris barrier extension. There are a variety of debris barriers available

Debris barrier system consists of a lifting sub, the setting tool extension, the junk bonnet and the rotating packer actuator. No connection between the junk bonnet and the packer actuator, resulting in a shorter tool. Debris barrier system is deployed with a cushion of fresh water between system body and the cementing pack-off, enabling the junk bonnet to float in position at the liner top and prevent entry of debris. When cementing operations are completed, the running string is raised until the bypass channel on the setting tool extension straddles the junk bonnet, thereby equalizing the pressure so that the junk bonnet can be retrieved from the PBR. If pressure does not equalize because of the debris above the junk bonnet, the incorporated spring sleeve is actuated to reestablish communication through the circulation port. The top of the junk bonnet body is equipped with back reaming blades that enable the tool to be back reamed through debris when necessary to help ensure retrieval of the running tools. After the junk bonnet is pulled out of the PBR, the service engineer continues to pick up the running string until the rotating packer actuator clears the top of the PBR. Weight is then slacked off until the rotating packer actuator dogs engage the top of the PBR. Additional running-string weight is applied to the PBR through the PFT-RPA and transmitted to the packer below to set the element and slips.



## Features, Advantages, and Benefits

- Debris barrier system prevents debris from packing off around the running tools by keeping the junk bonnet at the top of the PBR until released, ensuring optimal running-tool performance and positive indication of running-tool release without the danger of becoming stuck.
- The bypass channel enables fluid-circulating pressure to equalize, minimizing the force needed to retrieve the junk bonnet.
- The spring sleeve is shear-pinned to a closed position, eliminating the risk of inadvertently opening.
- The spring sleeve enables circulation to be reestablished through a circulation port, ensuring the retrieval of the junk bonnet.
- Junk Bonnet is equipped with back reaming blades and, when being retrieved, is locked to the Setting Tool Extension by rotation lugs, enabling the junk bonnet to be back reamed through debris for a successful, running-tool retrieval.
- The incorporated circulating valve prolongs the tool life by using a single-piece captive seal, preventing any potential washout.
- Full testing and documentation, including redress criteria, are verified by testing, improving field reliability.
- The interchangeable handling sub can be customized to complement any drill string, providing operational flexibility.

- The debris barrier system is equipped with high-torque connections, providing strength in the wellbore.

## Application

- Cemented liners
- Liners in unconsolidated formations, especially at higher deviations
- Liners in sidetracked wells with accumulations of steel debris
- Liners in holes with problems caused by mud solids and lost-circulation material fluids
- Liners in wells from which retrieval of running tools can be difficult

## Specifications

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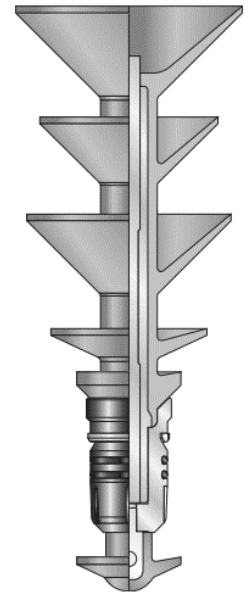
## Cement Displacement

### Drill Pipe Dart

Drill pipe dart is used to wipe the interiors of drill pipe and running tools, providing a mechanical barrier between the cement and the displacement fluid.

### Features, Advantages, and Benefits

- Composed entirely of PDC-drillable materials (aluminum, HNBR, polyurethane, and Duromer), allows trouble-free drill out, helping to conserve rig time.
- The unique locking-taper design locks to the wiper plug to prevent rotation, therefore facilitating drill out and reducing rig time.
- The lead fin provides stability downhole among the various drill pipe diameters.
- The sealing fin provides a positive bidirectional seal for Weatherford's compatible PFT-LWP when the drill pipe dart latches in, allowing for a positive shear indication when the plug is released and enabling the wiper plug to withstand a high differential pressure when bumped.
- The PFT-SWP is locked to the running string by a set of profiled dogs rather than shear screws, reducing the risk of premature release and associated nonproductive time.
- The aluminum nose is specially designed with peroxide-cured HNBR O-rings suitable for most well conditions to provide outstanding sealing capabilities.
- The universal fin design provides operational flexibility, enabling the Drill pipe dart to be employed with multiple drill pipe or work string sizes.



### Application

- • Liner cementing jobs that require wiping drill pipe in conjunction with PFT-SWP or PFT-LWP wiper plugs

### Specifications

Contact PetroForge Sales & Marketing team.