Baker Hughes

Conventional Fishing

Product Catalog

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SECTION 1 :
EXTERNAL AND INTERNAL CUTTING TOOLS

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EXTERNAL AND INTERNAL CUTTING TOOLS

BG Outside Cutter

Product Family No. H17017

Applications

- To retrieve fish of any length having no internal access
- Retrieve fish in the same run as cutting operation is conducted
- Controlled cutting at predetermined depth
- Generate clean top of fish

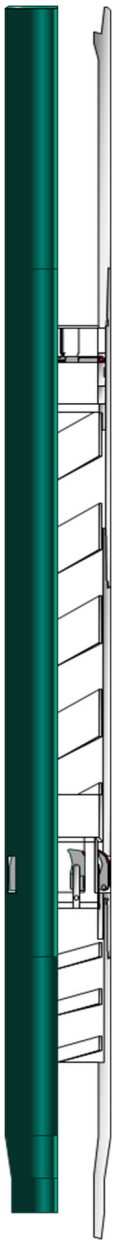
Advantages

- Fewer moving parts eliminates failure points
- Cuts pipe in fewer than five minutes saving time and expense
- Large ID allows cutter to easily pass over gas lift mandrels, ball valves, and other obstacles
- Predetermined and controlled pressure eliminates knife breakage when swallowing fish
- Can rotate while washing over fish increasing flexibility

The BG Outside Cutter is an automatic, spring-fed cutter that provides fast and reliable external cutting and recovery of tubing and drill pipe in a wide variety of pipe hardness and tool joint configurations. It applies a predetermined and controlled amount of pressure on the knives, eliminating the problem of broken knives and missed cuts.

The BG cutter ensures a cut even if the strain pulled on the pipe is above or below the desired amount. It cuts tubing with coiled tubing inside and recovers both strings.

The predetermined pressure compensates for any miscalculations or faulty readings regarding the amount of strain pulled on the fish, eliminating knife breakage. This feature makes it ideal for high-angle and horizontal wells.



Specifications

Cutter OD	Cutter ID	Cut Pipe Siz-	Max. Passover OD
4063 in. (103.1 mm)	3.125 in. (79.3 mm)	1.312—2.375 in. (33.4-60.3 mm)	3.063 in. (77.7 mm)
5.500 in. (139.7 mm)	4.00 in. (101.6 mm)	1.312—2.875 in. (33.4-73.0 mm)	3.938 in. (100.0 mm)
5.750 in. (146.0 mm)	4.313 in. (109.5 mm)	2.062—2.875 in. (52.3-73.0 mm)	4.250 in. (107.9 mm)
5.938 in. (150.8 mm)	4.875 in. (123.8 mm)	2.375—3.500 in. (60.3-88.9 mm)	4.820 in. (122.4 mm)
6.375 in. (161.9 mm)	4.938 in. (125.4 mm)	2.875—3.500 in. (73.0-88.9 mm)	4.875 in. (123.8 mm)
8.125 in. (206.3 mm)	6.625 in. (168.2 mm)	3.500—5.000 in. (88.9-127.0 mm)	6.563 in. (166.7 mm)

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EXTERNAL AND INTERNAL CUTTING TOOLS

Standard & Washover Outside Cutter

Product Family No. H17013 & H17014

Applications

- To retrieve fish of any length having no internal access
- Retrieve fish in the same run as cutting operation is conducted
- Controlled cutting at predetermined depth
- Generate clean top of fish

Advantages

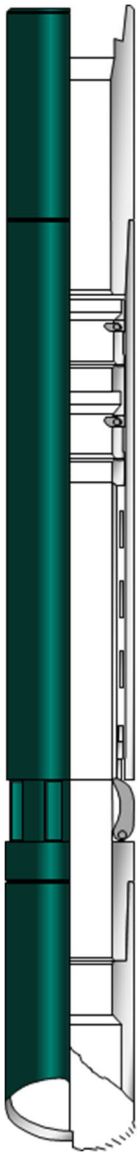
- Knives constructed of heat-treated, contour-ground tool steel can cut tubulars with plugged ID and maximizes cutting performance
- Cuts clean with no requirement for dressing saves time and expense
- Cuts mechanically reducing risk
- Simple design and operation increase reliability

The Standard and Washover Outside Cutter are mechanically operated cutting tools used to cut and recover tubulars from the outside in one trip. The washover outside cutter has a sleeve around the knife cage that allows circulation to go out the bottom of the washpipe to optimize washover operations.

The standard cutter does not have this sleeve and circulation goes out at the knives. Both cutters require the outside of the pipe to be free.

The tool is operated by pulling the dog assembly up under a collar or tool joint while rotating. The dog assembly forces the wedge block down, which forces the knives in until the cut is complete.

When the cut is complete, the cutter and fish can be pulled out of hole and the fish stripped out of the washpipe. The cut left by the outside cutter will be smooth on the outside diameter and slightly flared on the inside diameter (ID). Engaging externally and running wireline requires no dressing off.



Specifications

Cutter OD	Cutter ID	Connection
3.813 in. (96.8 mm)	3.125 in. (79.3 mm)	3.812 in. TSWP
4.063 in. (103.2 mm)	3.156 in. (80.2 mm)	4.000 in. TSWP
4.531 in. (115.1 mm)	3.625 in. (92.1 mm)	4.500 in. TSWP
4.698 in. (119.1 mm)	3.781 in. (96.6 mm)	4.500 in. TSWP
5.625 in. (142.9 mm)	4.625 in. (117.5 mm)	5.375 in. TSWP
6.00 in. (152.4 mm)	4.875 in. (123.8 mm)	5.750 in. TSWP
6.125 in. (155.6 mm)	5.125 in. (130.2 mm)	6.000 in. TSWP
7.688 in. (195.3 mm)	6.250 in. (158.8 mm)	7.625 in. TSWP
8.313 in. (211.1 mm)	6.813 in. (173.0 mm)	8.125 in. TSWP
9.375 in. (238.1 mm)	7.875 in. (200.0 mm)	9.000 in. TSWP
11.375 in. (238.1 mm)	9.875 in. (250.8 mm)	10.750 in. TSWP
12.000 in. (304.8 mm)	10.750 in. (273.1 mm)	11.750 in. TSWP
14.250 in. (362.0 mm)	11.875 in. (301.6 mm)	12.750 in. TSWP
16750 in. (425.5 mm)	15.000 in. (381.0 mm)	16.000 in. TSWP

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EXTERNAL AND INTERNAL CUTTING TOOLS

Outside Shear Pin Cutter

Product Family No. H17113

Applications

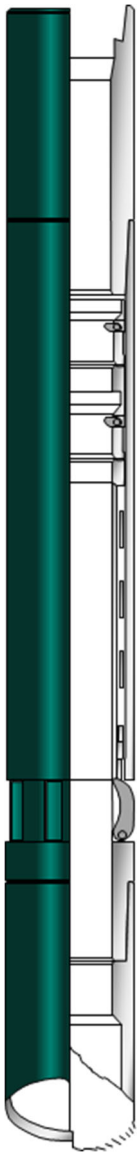
- To retrieve fish of any length having no internal access
- Retrieve fish in the same run as cutting operation is conducted
- Controlled cutting at predetermined depth
- Generate clean top of fish

Advantages

- Largest ratio of fish-OD to cutter-OD of any outside cutter applies when other cutters cannot operate
- Cut is clean and requires no dressing which saves time and expense
- Cut is made mechanically reducing risk
- Body constructed from AISI 4140 heat-treated alloy steel improves reliability
- Knives constructed of heat-treated and contour-ground tool steel maximizes cutting performance

The Outside Shear Pin Cutter is used to cut and remove tubing or drill pipe from the wellbore. The outside shear pin cutter offers the maximum ratio of fish-outside-diameter (OD) to cutter-OD of any outside cutter. The outside shear pin cutter is meant to be used only when a custom-sized cutter is needed due to fish-OD.

The Baker Hughes BG outside cutter, washover outside cutter, or the standard outside cutter are available for more rugged applications.



Specifications

Cutter OD	Cutter ID	Connection
3.375 in. (85.7 mm)	2.000 in. (50.8 mm)	3.312 in. TSWP
4.375 in. (111.1 mm)	3.375 in. (85.7 mm)	4.000 in. TSWP
	3.625 in. (89.6 mm)	4.500 in. TSWP
4.562 in. (115.9 mm)	3.750 in. (95.3 mm)	4.500 in. TSWP
5.313 in. (134.9 mm)	4.375 in. (111.1 mm)	5.000 in. TSWP
5.625 in. (142.9 mm)	4.625 in. (117.5 mm)	5.375 in. TSWP
5.750 in. (146.0 mm)	5.875 in. (149.2 mm)	5.500 in. TSWP
6.250 in. (158.8 mm)	5.250 in. (133.4 mm)	6.000 in. TSWP
7.625 in. (193.7 mm)	6.375 in. (161.9 mm)	7.625 in. TSWP
8.125 in. (206.4 mm)	6.813 in. (161.9 mm)	8.125 in. TSWP
8.750 in. (222.3 mm)	7.750 in. (196.9 mm)	8.625 in. TSWP
10.750 in. (273.0 mm)	9.250 in. (235.0 mm)	10.750in. TSWP
13.750 in. (348.7 mm)	11.875 in. (301.6 mm)	13.375 in. TSWP

EXTERNAL AND INTERNAL CUTTING TOOLS

Inside Hydraulic Cutter

Product Family No. H17003

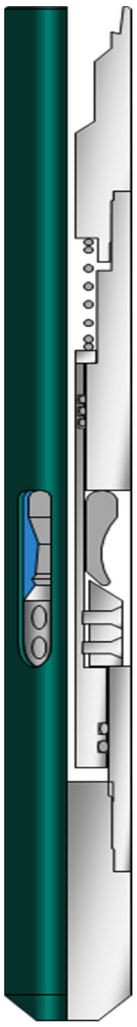
Advantages

- Largest ratio of fish-OD to cutter-OD of any outside cutter applies when other cutters cannot operate
- Positive indication of cut eliminates risk of casing damage
- Knife design prevents damage to outer casing when cut is complete
- Positive anchor assembly improves stability and smooths cut
- Easy conversion to different sizes saves time and expense

The Inside Hydraulic Cutter cuts single strings of casing smoothly and efficiently with hydraulic actuation. It incorporates an indicator that signals through pump pressure when the cut is complete, and has a positive anchor slip assembly to keep the cutter anchored in the casing. Pistons force the slips to firmly anchor the tool before the knives contact the casing, eliminating the chance of damage to the casing.

The cutter is manufactured of tool steel, and can be dressed with carbide inserts for enhanced cutting performance. If is also available in different sizes to accommodate different casing sizes. When the cutter has been run to the desired cutting depth, rotation is initiated, and circulation is started.

An increase in torque indicates that casing is being cut. When the cut is complete, the control dog moves into a recess in the bottom nut, causing a decrease in pump pressure that indicates the cut is complete. Straight pickup retracts the slips and knives.



Specifications

Cutter OD	Max. Cut Size	Connection
4.125 in. (104.8 mm)	7.000 in (177.8 mm)	NC-31
5.500 in. (139.7 mm)	7.000 in. (177.8 mm)	NC-38
5.750 in. (146.1 mm)	7.625 in. (193.7 mm)	NC-38
8.125 in. (206.4 mm)	10.720 in. (273.1 mm)	NC-50
11.750 in. (298.5 mm)	13.375 in. (339.7 mm)	NC-50

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EXTERNAL AND INTERNAL CUTTING TOOLS

Inside Mechanical Cutter

Product Family No. H17012

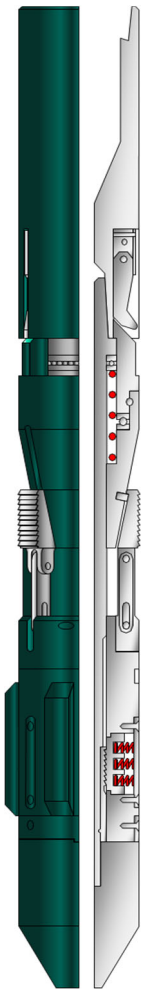
Advantages

- Easy conversion can cut alternate casing weights
- Automatic nut design allows tool to disengage and reset repeatedly
- Mechanical operated requires no hydraulics
- Slip assembly anchors cutter centrally and ensures precise smooth cut

Inside Mechanical Cutter cuts tubing and casing internally. Each cutter consists of a friction assembly used to set the tool in the pipe, a slip assembly for anchoring, and a cutting assembly with tool steel or insert knives. The tools cut quickly and easily convert to alternate casing weights.

The inside mechanical casing cutter is lowered into the hole to the point where the cut is to be made. The tool is rotated to the right and gradually lowered. This action allows the friction block assembly to unscrew from the mandrel, which anchors the tool in the pipe. After the slips are set, the wedge block forces the knives outward until the pipe is cut.

When the cut is complete, picking up the workstring then automatically returns the friction assembly to the run- in position. An automatic nut design allows the tool to disengage and reset repeatedly without coming out of the hole.



Specifications

Cutter OD	Max. Cut Of Kinfe	Connection
3.00 in. (76.2 mm)	4.625 in (117.5 mm)	2.375 in. FJ
4.00 in. (101.6 mm)	6.375 in. (161.9 mm)	2.875 in. Reg
5.250 in. (133.4 mm)	8.313 in. (227.0 mm)	NC-38
6.875 in. (174.6 mm)	9.875 in. (250.8 mm)	NC-50
7.125 in. (181.0 mm)	10.000 in. (254.0 mm)	5.500 in. Reg
8.00 in. (203.2 mm)	11.500 in. (292.1 mm)	5.500 in. Reg
11.750 in. (298.5 mm)	16.125 in. (409.6 mm)	6.625 in. Reg

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EXTERNAL AND INTERNAL CUTTING TOOLS

Perseus Pump Thru Cutter

Product Family No. H17020

Applications

- Deploys with other tools, enabling single trip combination and operations such as set bridge plug, pump cement, dress cement and cut casing
- Can be used as
  - Underreamer
  - Descaler
  - Milling short windows

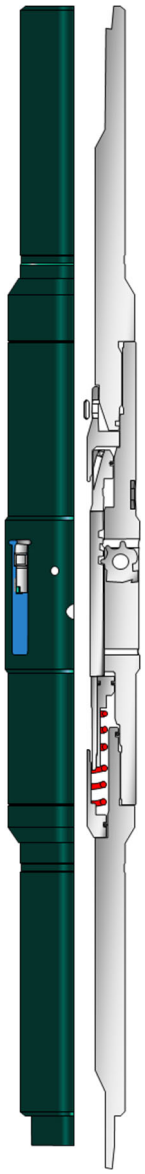
Advantages

- Integral knife retraction feature
  - Allowing for easy downhole manipulation.
- Knives can be easily changed at the rig floor
  - Reducing turnaround time.
- Knives are dressed with METAL MUCHER™ AMT carbide inserts
  - Provides effective cutting and swarf control.
- Pressure indicator designed for signal of successful cut-out by a pressure drop
  - Provides clear confirmation of a completed cut to surface.
- 100% of fluid directed through tool with pressure integrity for hydraulic tool activation below
  - Allowing multiple operations during a single downhole trip

The Perseus™ Pump-Thru Cutter is a hydraulically operated tool designed to cut a single string of casing. The unique internal design allows flow and pressure integrity below the tool without knife activation for operations such as milling cement or setting bridge plug or retainer or inflatable. The Perseus pump through cutter has three knives. The knives can cut through casing quickly, with little effort and are available in various lengths dependent on the required casing or cuts to be made. The knives are dressed with AMT™-Advanced Milling Technology inserts.

The Perseus pump-through cutter is used during plug and abandonments or slot recoveries to reduce the operational time needed by allowing other operations to occur during the same trip. The cutter will remain dormant and maintain pressure integrity which allows a plug to be set either mechanically or hydraulically, a ball can then be dropped to active the knives for cutting of the casing.

Alternatively, the cutter can be run above a mill/bit to dress a cement plug then activated to cut the casing after the isolation of the well has been confirmed. The cutter can make multiple cuts during the same run making it ideal to be run.



Specifications

Cutter OD	Casing Size Cut	Connection
5.500 in. (139.7 mm)	7.00— 8.625 in. (177.8— 219.0 mm)	NC –38
8.25 in. (209.55 mm)	9.625-14.00 in. (244.47-355.6 mm)	NC-50
11.750 in. (298.45 mm)	13.375-16.0 in. (339.7-406.4 mm)	6.625 in. Reg

EXTERNAL AND INTERNAL CUTTING TOOLS

Hercules Multi-string Cutter

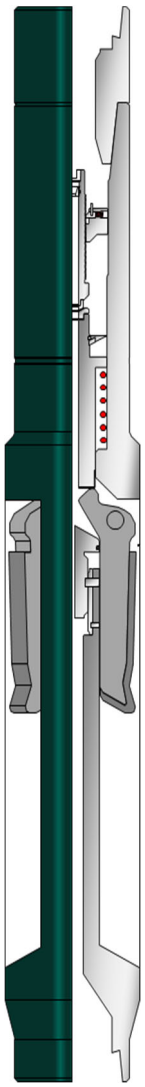
Product Family No. H17009

Advantages

- Integral knife retraction feature
- Solid body design and can withstand extreme shock loads during cutting
- Pressure indicator can be adjusted without taking the tool apart, saves time and expense
- Positive adjustment screw
  - Can be set for mechanical lock on knives
  - Allows for single-string cuts with minimal contact to the outer string
- Large piston area
  - Reduces amount of surface pressure required to operate cutter
- Knives can easily be changed on rig floor
  - Saves time and expense

HERCULES™ Multi-string Cutter is a hydraulically operated, solid-body tool used to cut through multiple strings of casing or large-diameter strings quickly and safely. The three knives of the HERCULES multistring cutter are normally dressed with either SUPERLOY™ high-strength material or Advanced milling technology (AMT™) inserts and are 30% stronger than standard multistring cutters. The HERCULES cutter can be used in any cutting application where rotation and pressure can be applied to the tool. The HERCULES multistring cutter is hydraulically operated by drilling fluid pressure acting against a piston. The necessary pressure differential is established by the flow rate of the drilling or workover fluid through the indicator nozzle. The nozzle size can be adjusted as necessary to produce a sufficient pressure differential depending on the fluid pump flow rate available.

The continued movement of the piston forces the knives to pivot about the knife pins. When the knives are near full extension, the indicator contacts the indicator stop. At this point, drilling fluid begins to flow freely through the indicator, which results in a sudden pressure drop, signalling the operator the knives are fully extended. In subsea applications, a marine swivel or universal wellhead recovery system is required. When casing repair operations are performed for a slot recovery, safeguards must be taken to ensure the outer casing is not damaged. For this type of operation, the HERCULES multistring cutter can also be mechanically controlled by the positive adjustment screw, which is installed below the knives to limit the maximum knife extension.



Specifications

Cutter OD	Casing Size Cut	Connection
8.250 in. (209.6 mm)	9.625— 30 in. (244.5-762.0 mm)	6.625 in. Reg
11.750 in. (298.6 mm)	13.375-48.0 in. (399.7-1219.2 mm)	6.625 in. Reg
16.000 in. (406.8 mm)	18.0-60.0 in. (457.2-1066.8 mm)	7.625 in. Reg

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EXTERNAL AND INTERNAL CUTTING TOOLS

Multi-String Cutter

Product Family No. H17008

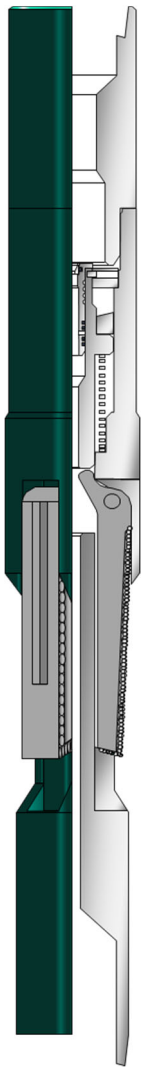
Advantages

- Rugged, dependable design withstands extreme shock loads during cutting
- Cuts multiple strings even when not concentric handles nonstandard wells
- Knives changeable on rig floor reduces risk and non-productive time
- Tempered steel dressable with AMT -Advanced Milling Technology with SUPERLOY inserts maximizes cutting power and performance
- Large piston area reduces amount of surface pump pressure required to operate cutter and expand knives

The Multi-String Cutter is used to cut through multiple strings of casing or large- diameter strings quickly and safely. Its tempered steel knives are normally dressed with either SUPERLOY™ high-strength material or METAL MUNCHER™ advanced milling technology (AMT™) inserts for superior performance. It is used on both fixed and floating platforms as well as on land rigs.

The multistring cutter is hydraulically operated by drilling fluid flowing through an indicator nozzle and activating a piston, which contacts the cutter knives and pivots them into cutting position. The cutter is dressed with knives and run in the well with a stabilizer immediately above and/or below it. When cutting depth is reached, rotation begins. Pump pressure is applied to force the knives against the casing inside diameter. Rotary speed and pump pressure are then increased until the knives have cut through the casing and expanded to their maximum position. A sudden pressure drop and torque decrease indicates the cut has been made.

After the cut is finished, the pumps are shut off and the tool is pulled out of the hole. For floating platform operations, a slack joint or motion compensator, marine swivel, and space-out assembly are required in addition to the stabilizers.



Specifications

Cutter OD	Casing Size Cut	Connection
3.125 in. (79.4 mm)	4.00-5.50 in. (101.6-139.7 mm)	2.375 in. Reg
3.750 in. (95.3 mm)	4.50-6.625 in. (114.3-168.3 mm)	2.875 in. Reg
4.500 in. (114.3 mm)	5.50-9.625 in. (139.7-244.5 mm)	NC-31
5.500 in. (139.7 mm)	7.00-13.375 in. (177.8-339.7 mm)	3.500 in. Reg
5.750 in. (146.0 mm)	7.00-13.375 in. (177.8-339.7 mm)	NC-38
7.250 in. (184.2 mm)	8.625-20.0 in. (219.1-508.0 mm)	4.500 in. X-hole
8.250 in. (209.6 mm)	9.625-30.0 in. (244.5-762.0 mm)	6.625 in. Reg
11.750 in. (298.5 mm)	13.375-48.0 in. (339.7-1219.2 mm)	6.625 in. Reg
16.00 in. (406.8 mm)	18.0-60.0 in. (457.2-1066.8 mm)	7.625 in. Reg

SECTION 2 :
EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Circulating and Releasing Overshot

Series 150, 70 , 20 & 10

Product Family No. H11507, H11230, H11220 & H11210

Advantages

- Robust design for engaging different sizes of fish
- Ability to change the catch range on the rig floor to dress as per the requirement
- Right hand to set and right hand to release from the fish
- For the shorter fish neck, S70 can be utilized to engage the fish
- Designed to be used with the impact tools
- Variety of configurations to optimize the intervention operations
- Available in all sizes

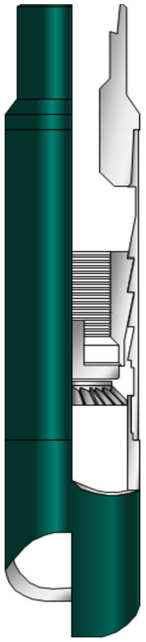
Circulating and releasing overshot is a powerful tool that externally engages, packs off, and pulls a fish. Its basic simplicity and rugged construction have made it the standard of all external catch fishing tools.

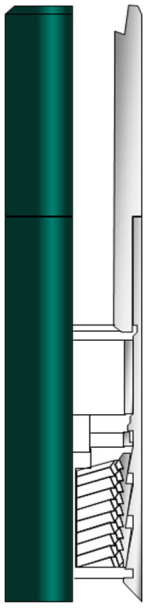
It is composed of three outside parts, namely top sub, bowl, and guide. It can be dressed with either of two sets of internal parts, depending on whether the fish to be caught is near maximum size for the particular overshot. If it is, a spiral grapple, spiral grapple control, and Baker Hughes Type A™ packer are used. If the fish diameter is considerably below maximum size, a basket grapple and a basket grapple mill control packer are used.

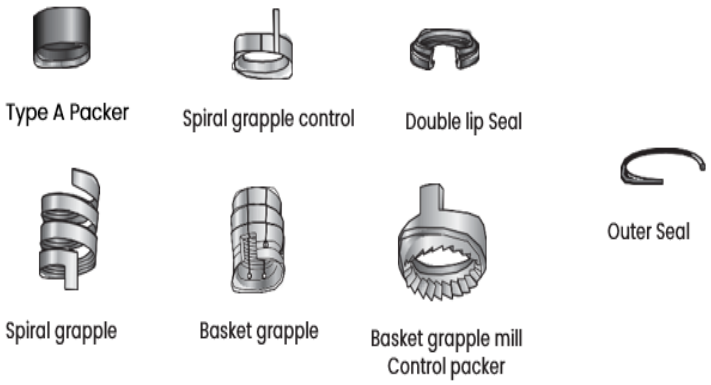
Overshot types can be identified by one of the following strengths for which they are engineered:

- Full Strength (FS): withstands all pulling, jarring, and torsional strain
- Extra Full Strength (XFS): engineered for extreme abuse
- Semi-Full Strength (SFS): withstands all pulling strain
- Slim Hole (SH): withstands heavy pulling strain only
- Extra Slim Hole (ESS): engineered for pick-up job only

Different series of the overshot are available depending on the application.







EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Bulldog Overshot

Product Family No. H111107

Advantages

- Smallest ratio of fish OD to overshot OD addresses cases where other options cannot work
- Simple design eases operation and maintenance
- Can be manufactured in one or two pieces adding flexibility to fit unique situations

The Bulldog Overshot is used for straight pickup of fish with outside diameters (ODs) too large to be caught by any other method. It is useful when releasable tools cannot be used.

The bulldog overshot's simple design incorporates a C-grapple, and can be manufactured in one or two pieces for added flexibility.

The bulldog overshot is not releasable and has limited tensile and torsion strengths.

Specifications	
OD	**Tensile Strength**
1.875 in. (47.6 mm)	36,650 lbs.
1.906 in. (48.4 mm)	35,240 lbs.
2.000 in. (50.8 mm)	26,600 lbs.
2.125 in. (53.9 mm)	31,700 lbs.
2.797 in. (71.04 mm)	30,800 lbs.
3.375 in. (85.7 mm)	48,000 lbs.
3.640 in. (92.4 mm)	26,500 lbs.

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EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Kelo Socket Overshot

Product Family No. H111106

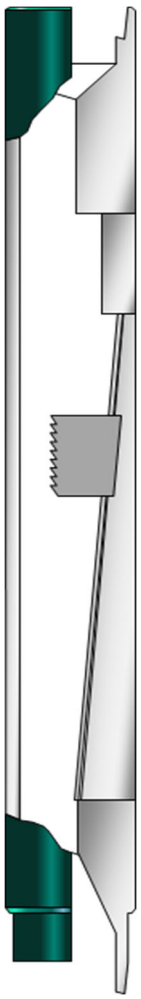
Advantages

- Slip is the only moving part simplifies operation
- Slip rides in a T-slot in the tool and opens and sets without rotation can be run on non-rotational string
- Optional oversized guides prevents overshot from missing fish when washing over
- SUPERLOY™/GLYPHALOY dressing available through mills offs flared ends or tops of tubing

Kelo Socket Overshots are simple bulldog overshots used to catch small-diameter work strings and sucker rods inside casing. They are also used to recover coiled tubing that has parted and remains in the hole.

Before running, the non-releasable Kelo Socket is dressed with the correct slip.

The tools are tripped in the hole and the socket is lowered over the top of the fish without rotation. If the fish has a flared top, it is dressed off with the PERLOY™ dressed guide using right-hand rotation. The rotary is then stopped and the Kelo Socket is lowered over the fish.



Specifications

Size	Catch Range
2.125 in. (54.0 mm)	0-0.625 in. (0-15.8 mm)
2.250 in. (57.1 mm)	0.468-1.062 in. (11.9-27.0 mm)
3.125 in. (79.4 mm)	0.750-1.500 in. (19.0-38.1 mm)
3.500 in. (88.9 mm)	0.625-1.688 in. (15.9-42.9 mm)
3.750 in. (95.2 mm)	0.625-1.688 in. (15.9-42.9 mm)
3.813 in. (96.8 mm)	0.625-1.688 in. (15.9-42.9 mm)
4.125 in. (104.8 mm)	0-2.000 in. (0-19.0 mm)
4.500 in. (114.3 mm)	0-2.179 in. (0-55.3 mm)
5.750 in (146.0 mm)	0-2.750 in. (0-89.8 mm)

Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

TMF Overshot

T-Dog, Mouse-Trap & Flipper Dog
Product Family No. H11407

Advantages

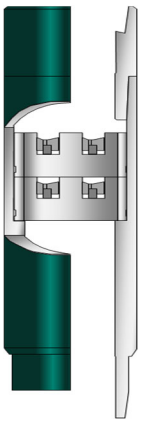
- Can be dressed three different ways increases flexibility
- Solid body with no windows allows overshot to be used in washover string, and allows one-trip recovery
- Unique cage design allows unrestricted passage of coupling through the tool and allows operator wash over several joints of pipe
- Dogs and slips are energized by springs placing them in the catch position as they pass over and under coupling
- Box X pin washpipe connections allows overshot to be positioned anywhere in the washover string
- T-dog cage dressing allows tool to be released at any time
- Available in all sizes

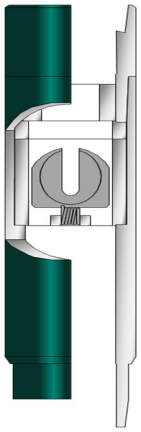
The T-Dog, Mouse-Trap, and Flipper-Dog (TMF) overshot can be dressed three different ways for different washover and fishing applications. It is threaded on both ends so it can be run anywhere in a washover string. Because there are no windows in the body of the tool, it can be used in full washover applications.

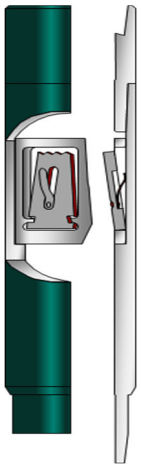
The T-Dog slips are used to catch square-shouldered collared pipe. The releasable T-Dog overshot is used to wash over and recover mud-stuck or sanded-up collared pipe in one trip, when the entire fish can be washed over. This type is releasable.

The Mouse-Trap assembly is used to catch sucker rod or integral joint tubing. The Mouse-Trap overshot is effective at fishing cable, coiled tubing, and sucker rods. Depending on the application, the flapper can be dressed with cutting or gripping capabilities, in which case the overshot is not releasable.

The Flipper-Dog assembly is used to catch integral joint tubing or a fish with different outer diameters. The Flipper-Dog overshot can be used to wash over mud-stuck, sanded-up collared, or integral joint pipe, in which case the overshot is not releasable.







EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

High-Pressure Packoff Assembly

Product Family No. H11059

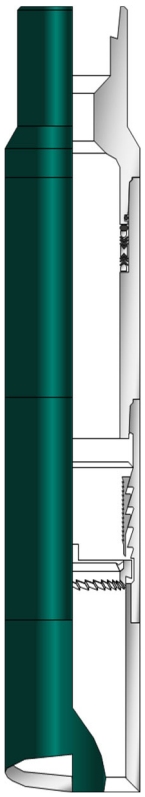
Advantages

- Establish high-pressure circulation down the well
- Tubing and casing patch applications
- Converts standard overshot to a temporary or permanent tubing patch adds flexibility
- Allows high-pressure circulation to the fish which removes inside diameter blockage and spots releasing fluid
- Superior packing resists corrosion from down-hole fluids
- High-Pressure Packoff rating Withstands two to three times the pressure of standard overshot packing
- Packoff assembly threads are compatible with popular overshot bowl and top sub threads
- Available in all overshot sizes

The High-Pressure Packoff Assembly is an overshot accessory that is used to establish high-pressure circulation down the well to remove blockage and spot releasing fluid. It is also used for tubing patch applications. It is a simple design consisting of the packoff sub with packing and packing retainer rings.

The High-Pressure Packoff is run between the top sub and the bowl. After a clean fish top has been established, the High-Pressure Packoff can be run in with the overshot. The fish is engaged after the instructions for the overshot are followed.

After the fish is positively engaged, it is possible to apply two to three times the pressure that can normally be applied to a standard overshot packing. The packing is normally stacked to hold pressure internally and externally.



Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Hydraulic Casing Spear

Product Family No. H12309

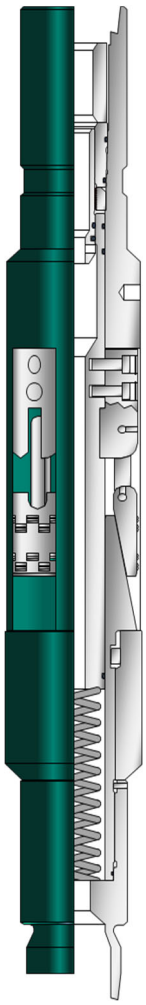
Advantages

- Simple construction eases operation and maintenance
- Slips are retracted inside body prevents damage to tool or casing when casing is cut
- Bore-through inside diameter permits circulation to casing cutter
- Dressings for alternate casing sizes improves flexibility
- Set and released hydraulically requires no mechanical intervention
- Rugged design withstands severe downhole environments

The Hydraulic Casing Spear is used to retrieve casing sizes from 9.625—13.375 in. (244.5 mm to 339.7 mm) and is run above a mechanical or hydraulic inside-casing cutter. It allows cutting and pulling the casing string in one trip. The spear can be rotated inside the casing string without engaging. After the cut is completed, the spear can then be positioned at the desired location inside the casing string. The tool can withstand the most severe downhole environments for casing retrieval.

The spear is dressed to the correct size casing to be engaged. We recommend running the hydraulic spear one joint above the cutter you are using. This prevents needing to strip out of the casing at surface to lay down cutter and accessories.

After the cut is made, the spear is picked up to be positioned at the top of casing string and the restriction plug is dropped into the drill pipe. One minute per 1,000 ft (305 m) is allowed for the restriction plug to seat in the spear. Pressure is brought up slowly to the necessary pressure drop (minimum of 500 psi [34.47 bar]) to set the spear. When the spear is set, the casing is picked up and pulled out of the hole slowly. The joint of pipe is set on top of the spear in rotary and the shear release ball is dropped into the pipe. The kelly or top drive is picked up and screwed into the pipe. The casing is picked up and set in slips and secured. Pressure is increased on the spear to the necessary shear load. After the shear screws are sheared, the spear is released and can be laid down.



Specifications

Cutter OD	Catch Range	Connection
5.750 in. (146.05 mm)	8.250—9.105 in. (209.5– 231.2 mm)	NC-38
8.000 in. (203.2 mm)	8.250-12.899 in. (209.5– 327.6mm)	NC-50

Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

ITCO-type Bowen Releasing Spear

Product Family No. H12210

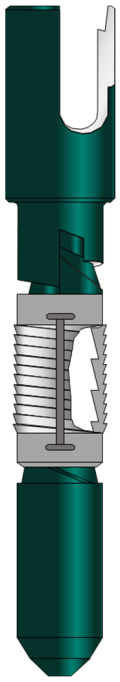
Advantages

- Engage a fish internally
- Easy release mechanism reduces risk
- Wide range of catch sizes available
- Rugged manufacture enhances durability
- Available in Heavy Duty version as well
- Available to catch all sizes of the casing/tubing

The ITCO-type Bowen Releasing Spear provides a dependable, inexpensive, and simple means of engaging a fish internally. The spear ensures positive engagement, easy release from the fish when desired, and easy re-engagement after the spear has been released.

It consists of a mandrel, grapple, release ring, and nut.

The mandrel is available in a flush or shoulder type, and mandrel-top connections are furnished to order. The flush type goes into an inside diameter, and the shoulder type bottoms out. The nut can be obtained as a plain bullnose guide or with a pin connection for the attachment of other tools such as a packoff or alignment tool below the spear.



Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Spear Packoff

Product Family No. H12210

Advantages

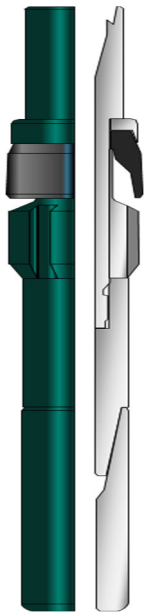
- Fishing operations
- Special guide allows tool to enter casing without damage to packing element
- Hydraulic pressure improves lifting power
- Available for all casing/tubing sizes

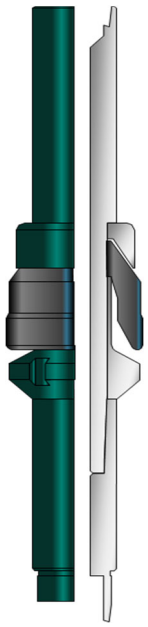
The Spear Packoff is run just below a casing spear to pack off and allow hydraulic pressure to be applied to the fish. Applying this pressure dramatically improves the lifting power of the fishing string and helps break down sediment or formation by forcing circulation through and around the fish. A continuous seal is enhanced when this pressure is applied. This tool can mean the difference between retrieving a fish the first time, in a single trip, or needing to make another attempt.

The Spear Packoff is made up to the lower pin connection of a casing spear when fishing for casing. It is guided into the casing by a special guide positioned just below the packing element. When the pack off is inside the casing, spear operation continues. The pump is turned on if the casing needs to be pressurized or circulation needs to be established.

Special care should be taken not to damage the packing element when entering the casing stub, particularly when the casing top has been damaged and has burrs or jagged edges that can cut the element.

The Spear Packoff is available in all casing sizes and comes with bullnose or connection configuration.





Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Selectable Packoff

Product Family No. H12315

Applications

- Providing isolation during the slot recovery operation to boost annulus behind casing
- Combination with MASTODON™ downhole pulling tool to increase operational efficiency

Advantages

- Providing isolation during the slot recovery operation to boost annulus behind casing
- Isolation during cut and pull operations
  - Mechanical activated tool
  - Ability to combined with multiple hydraulic activated tools
- Able to withstand highest pulling tools
  - Able to be used with downhole pulling tool MASTODON
  - Combination with Perseus, XP rotational spear and other slot recovery tools
  - Stroke limiting feature
  - Premium; field proven elements to seals wide range of casing sizes

The Selectable Packoff is a mechanically operated tool designed to isolate a wellbore. The unique design allows for the setting of the tool with a predetermined stroke, while allowing for an increased overpull without damaging the packing element. The Selectable Pack utilizes the proven packing elements and can seal wide range of casing. The tool has a stroke limiting feature that allows the element to ser under moderate load and not be damaged with High tensile loads. The tool is mechanical activated for allowing different hydraulic operated tools to be operated. Perfect for the combined cut and pull operations.

Specifications

	8.25 in. (209.5 mm)	9.38 in. (238.2)
Casing Sizes	9.625 in. (244.4 mm)	10.75 in. (273.05)
Differential Rating	5000 psi (344.7 bar)	
Temperature	32-300 F (0—148.8 C)	
Tensile Rating	1,600,000 lbs. (800 ton)	
Torsional Rating	20,000 ft-lbs. (27,116.3 N-m)	
Spring Pre-load	90,000 lbs. (45 ton)	

Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Spear Stop Sub

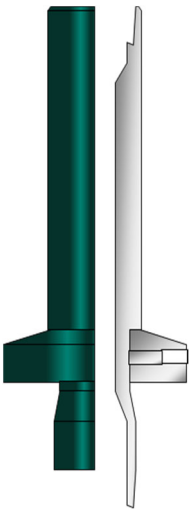
Product Family No. H12036

Advantages

- Release Bowen ITCO-type spears
- Prevent the spear from continuing down the hole when oil jars are re-set
- Positively locate and position the spear into the fish
- Simple design simplifies operation and maintenance
- Available in different connections adds flexibility
- Large selection of stop rings for each sub can be run on any type of internal catch spear
- Available for all casing/tubing sizes

The Spear Stop Sub can be run on top of any type internal catch spear. Its main purposes are to aid in the release of Bowen ITCO-type spears and to prevent the spear from continuing down the hole when you reset the oil jars. It can also be used to positively locate and position spear into the fish tool.

The spear stop sub is made up on the bottom of bumper jars, and the correct size of stop ring is installed. The Spear Stop Sub is then made up on top of the spear and run in hole until the stop ring lands on top of the fish. Fishing operations can then proceed.



Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Type B Spear

Product Family No. H12609

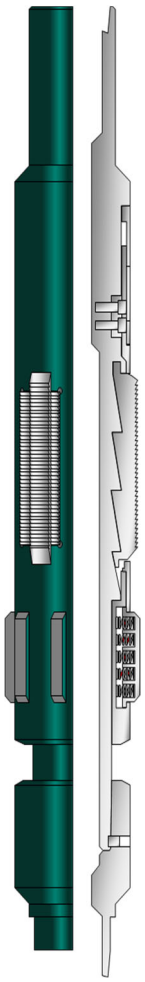
Advantages

- Retrieve casing
- Set underwater casing patches
- Dressings for alternate casing sizes adds flexibility
- Carburized teeth and large surface area on slips provide solid positive engagement in fish
- Simple construction eases operation and maintenance
- Left-hand or right-hand release allows spear to work in multiple situations
- Optional slips provide vertical teeth or carbide buttons for backing off
- Easily released improves reliability and reduces risk

Type B Spear is used to retrieve casing sizes from 4-1/2 in. to 13-3/8 in. (114.3 mm to 339.7 mm). The design of the spear makes it the easiest spear on the market to release. It can be set for left-hand or right-hand release and is easily field-dressed to change the release setting.

To engage the spear, it is lowered onto the fish until the slips are past the top of the casing. One-quarter rotation places it in the catch position. Because of the slotted mandrel design, the spear can be released with only enough downward travel to break the freeze between the slip segments and the mandrel. After the freeze is broken, the spear is rotated one-quarter round in the release direction to release it.

The spear design protects the slips when it runs down inside the fish, and it can be run to any depth. This feature makes Type B Spear perfect for setting underwater casing patches.



Specifications

Tool OD	Casing Sizes	Connections
3.625 in. (92.0 mm)	4.500—5.000 in. (114.3—127.0 mm)	2..375 in. Reg
3.938 in. (100.0 mm)	4.500—5.500 in. (114.3—139.7 mm)	2.875 in. Reg
4.500 in. (114.3 mm)	5.500—7.000 in. (139.7—177.8 mm)	2.875 in. Reg
5.750 in. (146.1 mm)	7.000—7.750 in. (177.8—196.8 mm)	3.500 in. Reg / 4.500 in. FH / 3.500 in. IF
6.875 in. (174.6 mm)	8.625—9.625 in. (219.0—244.4 mm)	5.500 in. Reg
8.250 in. (209.6 mm)	9.625—11.750 in. 244.4—298.5 mm)	5.500 in. Reg
10.500 in. (266.7 mm)	11.750—13.625 in. (298.5—339.7 mm)	5.500 in. Reg / 6.625 in. Reg

Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Type D Spear

Product Family No. H12009

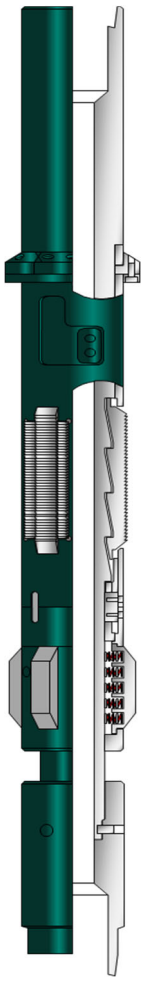
Advantages

- Slips with carburized teeth and large surface area provide solid positive engagement in fish
- Simple construction eases operation and maintenance
- J-slot holds spear in the catch or release position
- Left-hand or right-hand release allows spear to work in multiple situations
- Optional slips with vertical teeth or carbide buttons for backing off provide torsional load

The Type D Spear is used to retrieve casing sizes from 4.500 in. to 30.000 in. (114.3 mm to 762 mm). It is ideal for backing off casing or rotating out mudline hangers and packer bore receptacles. The spear can be set for left-hand or right-hand release and is easily field-dressed to change the release setting.

The J-slot, which holds the spear in the catch or release position, makes this spear the most reliable solution for recovering small, lightweight fish. To engage the spear, it is lowered into the fish until the stop ring is taking weight. One-quarter rotation places the spear in the catch position. The spear is released by bumping down and then applying one-quarter rotation in the opposite direction.

Because the mandrel must travel down the body length of the J-slot to release, the stop ring should not be removed from the body.



Specifications

Tool OD	Casing Sizes	Connections
3.625 in. (92.0 mm)	4.500—5.000 in.	2..375 in. Reg
4.500 in. (114.3 mm)	5.500—7.000 in.	2.875 in. Reg
5.750 in. (146.1 mm)	7.000—7.750 in.	3.500 in. Reg / 4.500 in.
6.875 in. (174.6 mm)	8.625—9.625 in.	5.500 in. Reg
8.250 in. (209.6 mm)	9.625—11.750 in.	5.500 in. Reg
10.500 in. (266.7 mm)	11.750—13.625 in.	5.500 in. Reg / 6.625 in.
14.000 in. (355.6 mm)	16.000-24.000 in.	6.625 in. Reg
20.750 in. (527.1 mm)	24.000-30.000 in.	6.625 in. Reg

Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Type E Spear

Product Family No. H12109

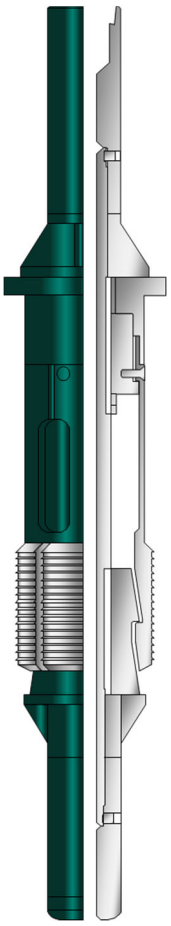
Advantages

- Slips with carburized teeth and large surface area provide solid positive engagement in fish
- Dressings for alternate casing sizes increases flexibility
- Heavy-duty, high-strength manufacture withstands the most severe downhole environments
- Simple construction permits easy operation and maintenance
- Full-bore inner diameter through-tool accommodates both smaller and larger sizes
- Can be set and released repeatedly without coming out of hole saves time

Type E Spear is used to retrieve casing sizes from 9.625 in. to 30 in. (244.4 mm to 762 mm). It has a heavy-duty, high-strength design for use in the most severe downhole environments. It is normally run-in hole in the catch position and can be run with drill collars and jars when a stuck fish is anticipated.

Type E Spear can be operated in two modes: with or without a stop ring. If the top of the casing is uniform and the outside diameter of the tool is unrestricted, the stop ring is used. In cases of split casing or to set the spear deep within the casing, no stop ring is used.

The spear can be released at any time by sharply dropping the string to break contact between the slips and the mandrel and rotating to the right. It can be reset to the catch position by rotating to the left. The spear can be set and released repeatedly without coming out of the hole.



Specifications

Tool OD	Casing Sizes	Connections
8.000 in. (203.2 mm)	9.625—11.750 in. (244.4—298.4 mm)	NC-50
10.500 in. (266.7 mm)	13.375—30.000 in. (339.7—762.0 mm)	6.625 in. Reg

Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

XP Rotational Spear

Product Family No. H12609

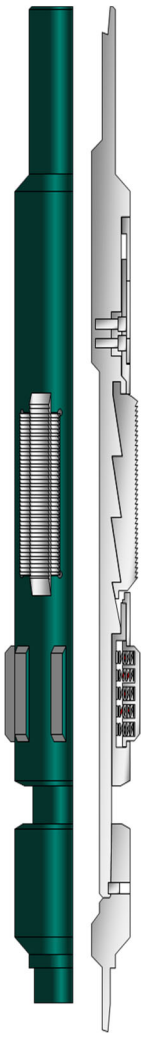
Advantages

- High tensile capability
- Unique patterned slip design
- Double slip area as compared to conventional high expansion spear
- Rotational capability
- Ability to allow rotation for cutting or another operation
- Design to allow ease of release after high tensile loads
- 14% less stress in casing

XP Rotational Spear allows the rotational capability thru the high expansion spear that increase the operational efficiency in a single trip cut and pull solutions.

This spear is designed to sustain highest tensile loads (1.7 M lbs.) generated by MASTODON™ (Downhole pulling tool) while allowing the rotational capability. The unique slip design combined with the load distribution enables ease of release of the spear. Tool increases the operational efficiency during slot recovery operations as it enables combination with multiple tools.

With this tool having highest ratings, enables combined cut and pull solution which saves trips and increase operational efficiency. This tool can be combined with cutter, selectable pack off and jacking tool to allows multiple operations in single trip.



Specifications

Tool OD	Catch Range	Connections
5.625 in. (142.8 mm)	5.822-6.406 in. (147.8—162.7 mm)	NC-38
8.250 in. (209.5 mm)	8.393—10.040 in. (213.1—255.0 mm)	6.625 in. Reg
11.000 in. (279.4 mm)	12.250—13.210 in. (311.1—335.5 mm)	6.625 in. Reg

Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Box Tap

Product Family No. H11099

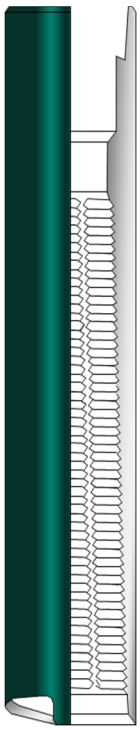
Advantages

- Addresses cases where other options do not work
- Engages the outside of the fish
- Taps many types of downhole equipment providing greater flexibility
- 3/4 in. Taper works most effectively in fishing applications
- Can be used for post-job analysis BHA optimization
- Available in all sizes
- Available in left-hand and right-hand configuration

The Box Tap engages the outside of a fish when conventional releasing overshot is unfeasible. Like the Baker Hughes Taper Tap, the Box Tap cuts threads where no threads are present. Box Taps fish out various types of downhole equipment, including tubulars, bridge plugs, and packers. The normal taper of the Box Tap is ¾ in. per foot, which is the most effective for fishing applications.

The Box Tap is run into a hole and the top of the fish is lightly tagged. The Box Tap is then picked up and rotated slowly with free torque in the workstring. While rotating, the box tap is slowly lowered onto the fish until the torque begins to build up rapidly. The setdown weight is increased as the torque increases. When the Box Tap is firmly seated on the fish, the fish can be retrieved with straight pull (dependent on the fishing scenario).

Taps are non-releasable and should be run with bumper jars and safety joints. Taps should be used only when releasable engagement-type tools are not an option.



Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Taper Tap

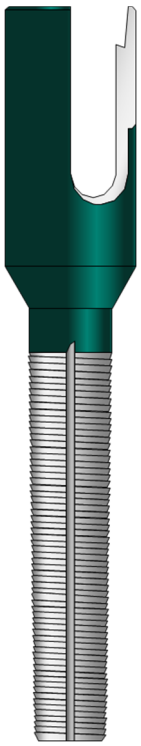
Product Family No. H12100

Advantages

- Addresses cases where other options do not work
- Engages the outside of the fish
- Taps many types of downhole equipment providing greater flexibility
- 3/4in. Taper works most effectively in fishing applications
- Can be used for post-job analysis BHA optimization
- Available in all sizes

Taper Tap engages the inside of a fish where conventional releasing spears would not be feasible. Like the Box Tap, the taper tap is designed to cut threads where no threads are present. Taper Taps can be used to fish tubulars, bridge plugs, packers, or other types of downhole equipment.

Run the Taper Tap into the hole and lightly tag the top of the fish. Pick up and begin to rotate slowly. Note the free torque of the workstring. While rotating, slowly lower the Taper Tap into the fish until the torque begins to build up rapidly. Increase the set-down weight as the torque increases. Once the Taper Tap is firmly seated in the fish, attempt to retrieve the fish with straight pull (dependent upon the fishing scenario).



Baker Hughes

EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Hollow Pin Tap

Product Family No. H12101

Advantages

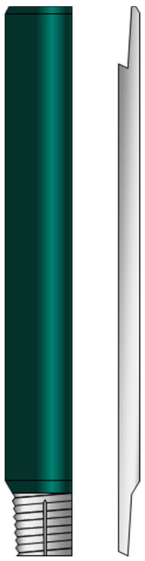
- Available in all washpipe connections adds flexibility
- Manufactured from high-quality AISI 4140 material enhances reliability
- Carburized wickers with high surface hardness improves performance and durability

Hollow Pin Tap is designed for a very specific operation. When a joint pf washpipe has twisted off with a fish sticking out of the top, a hollow pin is usually the only solution for engaging the tool. The Hollow Pin Tap, which can be manufactured with any connection, has the same inner diameter as the washpipe connections.

This allows washpipe that has twisted off over the maximum washover site to be engaged. The Hollow Pin Tap is non-releasable and should be used only when releasing tools are not an option.

The Hollow Pin Tap is run into the hole and it lightly tags the top of the fish. Caution must be used going over the fish sticking out of the top of the washpipe. The pin tap is then picked up and rotated slowly, with free torque in the workstring.

During rotation, the Hollow Pin Tap is slowly lowered into the fish until the torque begins to build up rapidly. The set down weight is increased as the torque increases. When the Hollow Pin Tap is firmly seated in the fish, the fish can be retrieved with straight pull (dependent on the fishing scenario).



EXTERNAL AND INTERNAL ENGAGEMENT TOOLS

Center Prong & Crankshaft Rope Spear

Product Family No. H12028/H12229

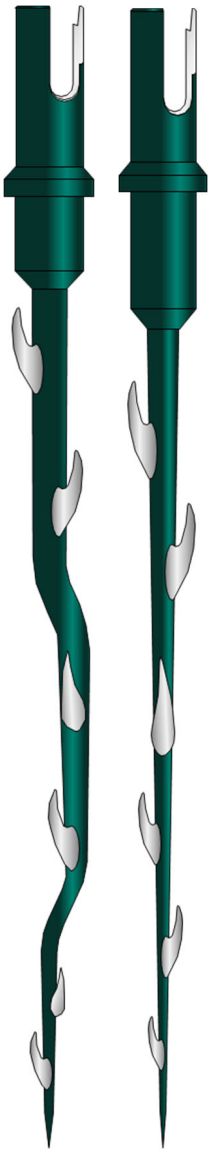
Advantages

- Retrieve wireline and wire-rope left downhole
- Retrieve wore or rope stuck to downhole tools
- Simple construction reduces maintenance costs
- Easily customizable adds flexibility

The Center Prong & Crankshaft Rope Spear are reliable and efficient wireline and wire-rope retrieval tools that retrieve all sizes of electric wireline, slick line, braided line, or other types of wire-rope that have been left downhole. The retrieval can be performed even if the wireline or rope is still attached to stuck downhole tools.

The spears can also be used to retrieve control line or electric submersible pump cable left downhole in cased hole or openhole wells. In cased-hole applications, we recommend that a stop always be run above the spear. In openhole wells, we recommend not running a stop.

The rope spear is a reliable and efficient wireline and wire rope retrieval tool. The rope spear retrieves all sizes of electric wireline, slick line, braided line or other types of wire rope that has been left downhole. It can also be used to retrieve control line or ESP cable that has been left downhole. This tool has been very successful in recovering these items in cased or open hole.



SECTION 3 :
CUTTING STRUCTURE

Baker Hughes

CUTTING STRUCTURE

AMT–Advanced Milling Technology

Shaped Cutting Inserts

Advantages

- Wide range of cutting shapes and metallurgical choices, such as pyramid-shaped or rectangular
- Enables optimization of each unique milling application (exotic material, high-volume cutting, high durability, high impact)
- In-depth analysis of each well's needs and ongoing review provides custom-fit solution, including a variety of cutting structures if needed
- Uses new design and carbide metallurgies increases milling penetration rate
- Reduces milling time associated with exotic materials saves operating cost
- Cutter durability eliminates redundant equipment, enables more time on bottom, reducing trips required and decreases operational expenses
- Tightly controlled welding processes and quality controls
- Offers consistent dependability

The Advanced Milling Technology (AMT™) offer enhanced wear rate, impact resistance, and cutting edge, resulting in shortened milling time. They address the more exotic and abrasive materials commonly encountered in today's milling and fishing operations, maximizing performance in a wider range of applications and in less time.

Because the blades using AMT material offer greater durability and maximized cutter life, fewer trips are needed to complete the operations and redundant equipment can be eliminated. The more durable metallurgy in cutting structures also results in longer trips and less nonproductive time, further decreasing operational expenses.

The AMT portfolio is ideal for cutting casing for plug and abandonments, pipe that's stuck with scale, reentry portions, dressing off hard-banding, and even titanium logging tools. The wide range of metallurgical treatments and cutting shapes available enhance our ability to provide solutions for all such applications. Debris size and shape is controlled and minimized through the improved penetration rates of this stronger material and through the application of a custom-fit solution based on the unique designs available in AMT.

Specifications

Insert Names	Shape
PM	
D	
G	
M	
J	
L	
S	
C	
Q	
N	

Baker Hughes

CUTTING STRUCTURE

SUPERLOY Milling Material

Crushed Carbide

Advantages

- Highest-quality tungsten carbide maximizes cutting effectiveness
- Rod form eases application
- Ideal for junk milling of all sizes expands use of tool to multiple applications

The SUPERLOY™ Milling Material is composed of crushed sintered-tungsten particles that are suspended in a special copper-base, brazing-type alloy with high nickel content, and is used to dress cutters and mills to maximize cutting effectiveness. Tungsten carbide is the finest milling material available for downhole steel cutting or milling tools. SUPERLOY material can be used on all types of downhole cutting and milling tools.

Predressed junk mills and rotary shoes are available in all types and sizes, as are tapered and string mills of various outside diameters (ODs). SUPERLOY material works well on milling loose junk such as bit cones, tong dies, and packers, and for washing over stuck or cemented pipe. It can be used to mill off the OD or inside diameter (ID) of casing to provide a clean top for casing patch operations. It is also effective as a dressing on upper and lower watermelon mills in the WindowMaster™ whipstock window-cutting system.

Specifications
Size
1.125 in. (3.17 mm)
0.187 in. (4.76 mm)
0.25 in. (6.35 mm)
0.313 in. (7.93 mm)
0.375 in. (9.52 mm)

Baker Hughes

CUTTING STRUCTURE

Glyphaloy Milling Material

Insert Rods

Advantages

- Uniform Height in All Orientations
- Good Performance When Randomly Dressed
- Wide Cutting Edge
- Consistent, High Performance Carbide
- No Waste or Hazard from "Burned" Chips

The Glyphaloy Milling Material is composed of inserts that are suspended in a special copper-base, brazing-type alloy with high nickel content, and is used to dress cutters and mills to maximize cutting effectiveness

Insert based rods allows the versatility to have the sharp insert type dressing on any of the milling tools. The durability of the inserts increase the life of the mills. The option to stack the rods in the direction of the milling optimize the swarf control. With different grades and sizes available provides versatility to be used in milling tubulars and well as the junk with increase rates of penetration.

Specifications
Size
0.25 in. (6.35 mm)
0.313 in. (7.93 mm)
0.375 in. (9.52 mm)

SECTION 3 :
MILLS AND SHOES

MILLS AND SHOES

Cone Buster Mill

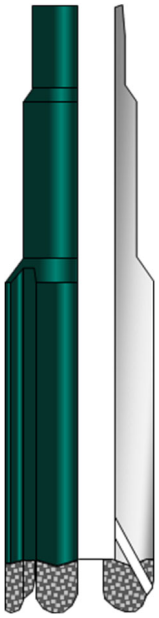
Product Family No. H15106

Advantages

- Can be spudded on
- Durability Improves operations and saves time by providing the option to operate aggressively if needed.
- OD dressed with SUPERLOY carbide
- Improves performance
- Concave bottom
- Keeps fish centered on the mill to mill cones and similar objects more effectively
- Available in all sizes upon request

The Cone Buster Mill is dressed with SUPERLOY™ carbide on the outside diameter (OD) and has a slightly concave bottom. It is used for milling bit cones or other objects where it is advantageous to keep the fish centered under the mill for greater effectiveness.

The mills comes with variety of design to accommodate the AMT™ Advanced Milling technology backed by SUPERLOY/GLYPHALOY.



MILLS AND SHOES

Hollow Mill Assembly

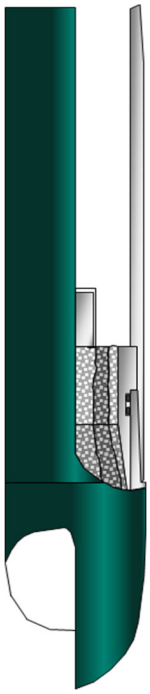
Product Family No. H15120

Advantages

- Taper design of insert permits full removal of flared or oversized fish top
- Mill insert placement allows fish to be dressed before grapple engages and gives positive indication that the overshot will swallow the fish
- SUPERLOY dressing on mill improves cutting performance
- Insert can be used in place of basket grapple control allows for short fishing neck applications
- Available in all overshot sizes

Hollow Mill Assembly, which consists of a container and insert, is used as an overshot accessory to mill away flared or oversized tops of pipe that have been jet-cut or broken off during drilling or workover operations. The Hollow Mill Assembly makes it possible to mill over and recover fish in a single trip.

The Hollow Mill Assembly is installed between the overshot bowl and guide. Because the total torque is applied to the tang of the hollow mill insert, milling requires low weight and torque. After the oversized fish top is milled away, the overshot can be lowered to engage the fish with the grapple.



MILLS AND SHOES

AMT Junk Mill

Product Family No. H15141

Advantages

- Increased penetration rates reduce rig time
- Smaller, more uniform cuttings enhance debris removal
- Ability to combine with various inserts available in Advanced Milling Technology
- Adaptable to concave, convex, flat and bladed mill
- Available in all sizes upon request

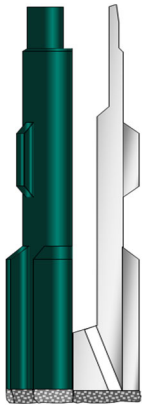
The AMT™ Junk Mill is used for milling stationary obstructions. It uses the patented AMT technology as the lead cutting structure, is backed up by SUPERLOY™/GLPYHALOY tungsten carbide. With the SUPERLOY.GLPHALOY backing, if the AMT inserts become damaged, the mill performs like a standard junk mill until a new row of inserts is exposed.

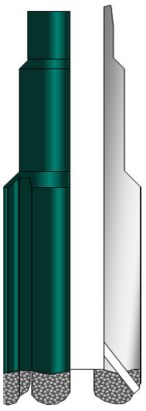
The mills have been used to mill cemented tubing, in some cases at rates exceeding 30 ft (9 m) per hour. With this technology, many times cemented drill collars and drill pipe can be milled faster than they can be washed over and recovered.

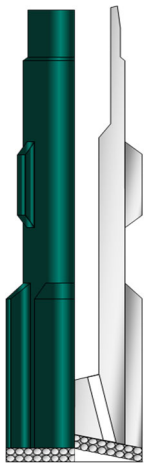
Either a choke sub or a nozzle below the tool can generate this pressure. The nozzle size can be predetermined to allow maximum kick over force at the tool. The hydraulic pressure can also be generated by a hydraulic release fishing overshot or spear whichalready uses a nozzle for activation.

The tool can also be used with a boostpiston to lift larger loads or where only low flow rates are available.

These mills are available in concave, convex, flat and bladed models







MILLS AND SHOES

Piranha Mill

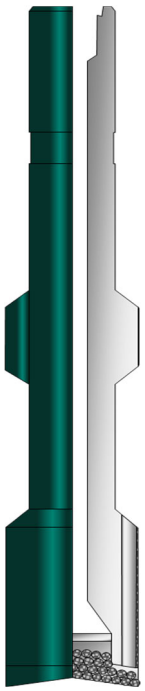
Product Family No. H15141

Advantages

- Offset center prevents coring
- Deep V design allows maximum fluid circulation and holds maximum amount of tungsten carbide dressing
- SUPERLOY /GLYPAHLOY/AMT™ Inserts mill dressing prolongs cutter life
- Available in all sizes upon request

The Piranha Mill is dressed with SUPERLOY™/GLPHALOY carbide and has an offset center to prevent coring. It is used for milling cemented pipe and in situations where there are large amounts of junk in the hole, which requires a mill with a longer life. It is ideal for milling tubing, and can be dressed for open hole or cased hole applications.

The Piranha Mill is specially designed with a deep V for maximum circulation of fluid and to hold a large amount of tungsten carbide dressing.



MILLS AND SHOES

Taper Mill

Product Family No. H15110

Advantages

- Mills restrictions from the casing inner diameter promotes more efficient operation
- Minimally aggressive design can be used to open a damaged window or parted casing
- Advanced Milling Technology (AMT™) and SUPERLOY /GLYPHALOY dressing improves performance and longevity
- Available in all sizes upon request

The Taper Mill enters restricted areas in casing, tubing, or open hole and removes wellbore restrictions or obstructions by milling. Taper Mill designs vary, based on the intended use.

Taper Mills designed for uses inside casing are dressed with SUPERLOY™ /GLYPHALOY carbide beginning at the reduced outside diameter (OD) at the bottom of the mill to the full drift of the casing. When full-drift OD is reached, the Taper Mill will have a length of smooth, turned-down SUPERLOY dressing for stabilization, minimizing any unnecessary casing damage. For open hole applications, the rough SUPERLOY/ GLYPHALOY cutting structure extends over the entire dressed area of the mill.

When run with a section or pilot mill or cutter, the Taper Mill acts as a stabilizer, reducing vibration and increasing section mill life. The Taper Mill also acts as a guide when bottomhole assemblies (BHAs) enter the casing.

MILLS AND SHOES

Rotary Shoe

Product Family No. H15013, H15014 & H15871

Advantages

- Mills restrictions from the casing outer diameter promotes more efficient operation
- Efficient removal of the biting elements of packers or fish to swallow and mill
- Advanced Milling Technology (AMT) and SUPERLOY /GLYPHALOY dressing improves performance and longevity
- Available in all sizes upon request

Rotary Shoes are used on the bottom of washpipe in washover or milling operations. They are made from heat-treated alloy steel and dressed with AMT™, SUPERLOY™ or Glyphaloy cutters. The specific application will determine the type of shoe best suited for the job.

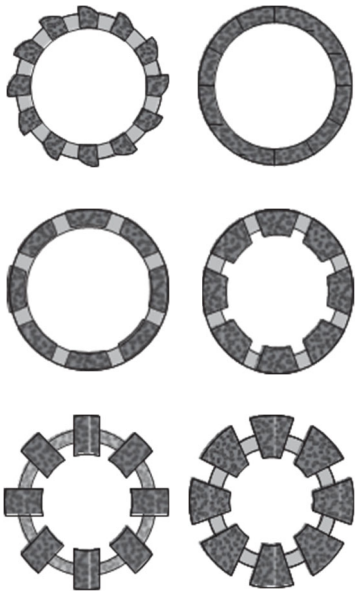
OH type Shoe is used for washing over and cutting formation. The mill tooth design with side wings allows maximum circulation. This shoe cuts on the outside and bottom only. There are multiple iterations available for the shoes utilizing multiple cutting structures

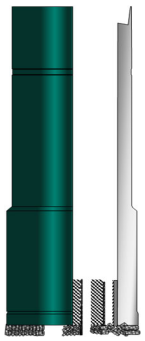
Cased hole is used for washing over. The mill tooth design of this shoe permits maximum circulation consistent with limited clearances. The Type B shoe cuts on the bottom only.

Flat bottom rotary shoe is used to cut metal on the fish where clearances are small.

This shoe cuts on the inside and bottom only.

Flat bottom with internal honing rotary shoe has an internal upset for use where clearance permits, allowing the cutting structure to be placed without restricting the ID of the shoe stock itself. This shoe cuts on the inside and bottom only.





MILLS AND SHOES

String and Watermelon Mills

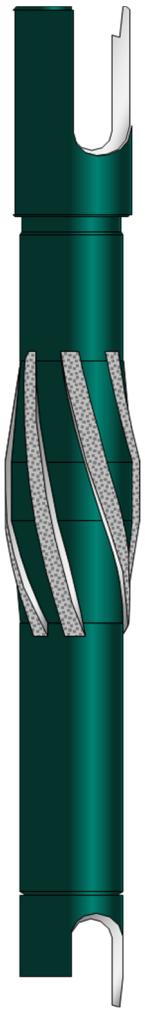
Product Family No. H15109

Advantages

- Can be inserted into workstring at any point is customizable to various scenarios
- Can be dressed rough or smooth OD as well as be customized to appropriate hole conditions and reduces risk
- Advanced Milling Technology (AMT™) and SUPERLOY™ /GLYPHALOY dressing improves performance and longevity
- Optimize gauged pads to clean burrs of perforations
- Available in all sizes upon request

String and Watermelon Mills can mill, dress, and stabilize the workstring and bottomhole assembly (BHA) in milling and drilling operations. Another feature is the ability to elongate casing windows during a whipstock operation. They can also be used to remove tight spots, restrictions, or dog legs in casing.

These types of mills are often run above section mills so any bird nesting of cuttings can be broken up and circulated to ensure that the section mill can be pulled out of the well. Most of these mills have a standard drill pipe or drill collar connection to eliminate crossovers.



MILLS AND SHOES

AMT Packer Mill

Product Family No. H14071

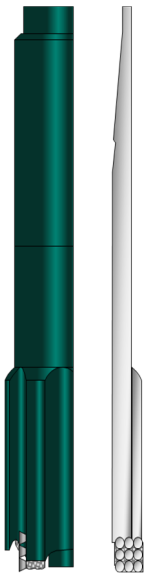
Advantages

- Can be inserted into workstring at any point is customizable to various scenarios
- AMT inserts mill to provide more robust milling
- Comes with Drill pipe connection to have stronger strengths
- Advanced Milling Technology (AMT) and SUPERLOY™ /GLYPHALOY dressing improves performance and longevity
- Available in all sizes upon request

The AMT™ Packer Mill can mill, dress, and stabilize the workstring and bottomhole assembly (BHA) in milling and drilling operations.

These types of mills are often run to mill the certain type of junk in the well. This mill is designed to have appropriate junk slots to allow the optimum removal of the cuttings.

The mill is used to remove the liner hanger or any tubulars that needs to be milled in one trip. It can be run with the centralization nose with connection in the middle as an option.



SECTION 4 :
PACKER MILLING AND RETRIEVING TOOLS

Baker Hughes

PACKER MILLING AND RETRIEVING TOOLS

Quick Pick Packer Milling System

Product Family No. H14028

Advantages

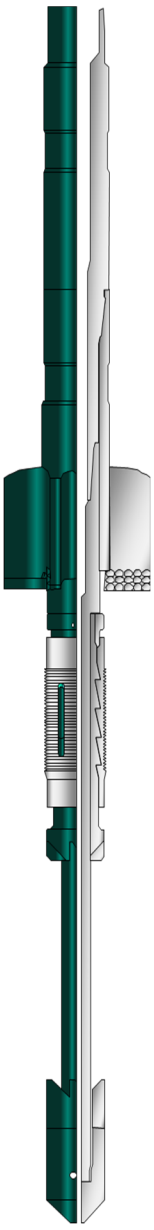
- Increase penetration rates
- Combination with AMT Packer mill to optimize the milling
- Swarf control with superior removal of steel
- Eliminates the large pieces of debris by milling the entire packer
- Integrated grapple to reduce the spinning parts and retrieve packer with a seal bore in one trip
- Available for all casing and seal bore sizes

The Quick Pick™ Packer Milling System is designed for milling packers in the shortest possible time and retrieving them in one trip. The system contains a mill that uses the patented AMT™ technology as the lead cutting structure backed by SUPERLOY™. With SUPERLOY backing, if the METAL MUNCHER™ inserts become damaged, the mill will perform like a standard packer mill until a new row of inserts is reached. The aggressive cutting structure of the inserts can be effective in milling high-chrome, harsh-environment packers. The system also contains a new, innovative packer retriever that is directly connected to the packer mill.

This system allows engagement of packers with a seal bore or a smooth ID. It allows for constant rotation while remaining in the engaged position to prevent the packer from falling when it breaks loose. It can be engaged and released multiple times.

Running procedures for this tool are to pick up tool, run in hole, locate the top of the packer, stop rotation, and enter the packer bore. As the retrieving tool enters the bore, the grapple and the grapple carrier will slide up to the shoulder on the mandrel. The upward movement occurs because the grapple OD is larger than the ID being engaged.

Additional downward force will compress the grapple to enter the bore. Lower the entire assembly until the mill contacts the top of the packer (slight overpull can be performed to ensure that grapple is in catch position). Again, lower string until mill sets on top of packer—pick up and begin milling. At any point in the milling process, the grapple can be released by stopping rotation, setting down load, and lifting as lightly as possible while rotating slowly to the right.



Baker Hughes

PACKER MILLING AND RETRIEVING TOOLS

CJ Packer Milling Tool

Product Family No. H74706

Advantages

- Increase penetration rates
- Combination with AMT Packer mill to optimize the milling
- Swarf control with superior removal of steel
- Eliminates the large pieces of debris by milling the entire packer
- Integrated collet to reduce the spinning parts and retrieve packer with a seal bore in one trip

The CJ Packer Milling Tool is designed for milling packers in the shortest possible time and retrieving them in one trip. The system contains a mill that uses the patented AMT™ technology as the lead cutting structure backed by SUPERLOY™. With SUPERLOY backing, if the METAL MUNCHER™ inserts become damaged, the mill will perform like a standard packer mill until a new row of inserts is reached. The aggressive cutting structure of the inserts can be effective in milling high-chrome, harsh-environment packers. The system also contains a new, innovative packer retriever that is directly connected to the packer mill. It allows for constant rotation while remaining in the engaged position to prevent the packer from falling when it breaks loose.

This tool is used to mill over and retrieve retainer production packers. It contains a catch sleeve which is used to retrieve the body of the packer after the outside portion of the packer has been milled up.

CJ-1, CB and CC are also available on request.

SECTION 5 : SECTION AND PILOT MILLING

Baker Hughes

SECTION AND PILOT MILLING

AMT Section Mill

Product Family No. H15872

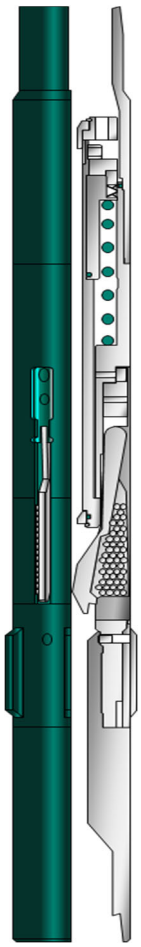
Advantages

- Hydraulic operation provides fast, efficient downhole milling
- Unique knife design reduces long stringers, removes casing in short chips for easy cleanout
- Six knives used for initial cut-out reduce cut-out time and minimize risk of bent or broken knives
- AMT dressing on knives improves cutting performance
- Available in extended body size up-on request

The AMT ™ Section mill is an inside cutter and a section mill for sidetracking operations, as well as for milling perforated casing in production zones, loose joints of surface pipe, and old casing for cementing new smaller casing to the formation.

The hydraulic activated tool has knives that extend out to the desired size and with positive stop function the weight and rotation is used to mill the tubular.

The knives are dressed with AMT cutters to have increased rate of penetration and smaller swarf control.



Specifications

Tool OD	Casing Sizes	Connections
3.625 in. (92.0 mm)	4.500 in. (114.3mm)	2..375 in. Reg
4.500 in. (114.3 mm)	5.500 in. (139.7 mm)	2.875 in. Reg
5.500 in. (139.7 mm)	7.000 in. (177.8 mm)	3.500 in. Reg
6.250 in. (158.8 mm)	7.625 in. (193.7 mm)	3.500 in. Reg
7.250 in. (184.2 mm)	8.625 in. (219.1 mm)	4.500 in. Reg
8.250 in. (209.3 mm)	9.625 in. (244.5 mm)	4.500 in. Reg
9.250 in. (235.0 mm)	10.75 in. (273.1 mm)	6.625 in. Reg
11.500 in. (292.1 mm)	13.375—16.000 in.	6.625 in. Reg

Baker Hughes

SECTION AND PILOT MILLING

Heavy Metal Swarf-Free Section Mill

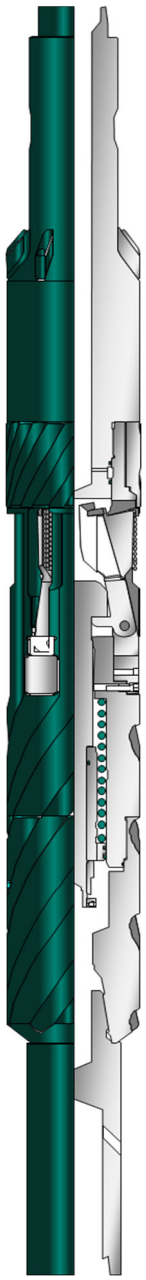
Product Family No. H15878

Advantages

- Able to incorporate upwards milling with robust design
- Eliminates the need for swarf cleaning, transport, and disposal • Reduces swarf-related costs and time by more than 50% through reduced swarf exposure
- Decreases HSE exposure to personnel
- Omits the need for special equipment and fluids to circulate swarf to surface
- AMT™ dressed knives for optimization of cutting with less flow rate and positive feeding
- Designed to work with either left handed motor or left handed pipe

The HEAVY METAL™ swarf-free section milling service to provide a reliable solution without the negative side effects of swarf. It eliminates swarf to surface through a unique upwards milling process, depositing swarf deep in the rathole, while still enabling a secure rock-to rock barrier. This unique service reduces time and costs in half—eliminating the need for swarf removal and the risks that swarf presents to people, equipment, and the environment. the desired size and with positive stop function the weight and rotation is used to mill the tubular.

The bottomhole assembly (BHA) consists of multiple tools providing different functions to enable upwards section milling using normal right hand drill pipe connections without any rotation at surface. A torque isolator allows uninterrupted axial movement and continuously isolates reactive torque of the left-hand mud motor, while milling upwards. The mud motor requires circulation from surface and provides downhole left-hand-rotation and torque to the section mill and auger. The system's section mill features upward-facing knives that utilize advanced milling technology (AMT) carbide cutting structures, and allow upward milling and reaming in one run—even in long laterals. The section mill cuts through the casing at the bottom of the window, mills upward to the desired distance, and then reliably retracts its knives at the top of the window. The auger continuously transports any swarf created from the window to the bottom of the rathole, leaving it all in the well, while providing a window free of swarf. Because the swarf does not have to be circulated to surface, there is no need to change over to a high viscosity milling fluid, saving additional cost and logistics.



Specifications

Tool OD	Casing Sizes	Connections
5.500 in. (139.7 mm)	7.000 in. (177.8 mm)	NC 38 Left hand
8.250 in. (209.3 mm)	9.625 in. (244.5 mm)	NC 50 Left hand

Baker Hughes

SECTION AND PILOT MILLING

AMT Pilot Mill

Product Family No. H15874

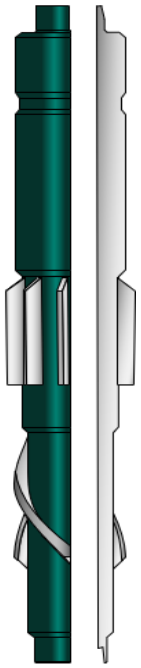
Advantages

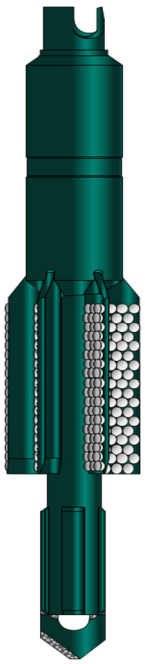
- Longer blades to have more cutters for milling longer tubulars
- AMT Dressed blades for longevity and durability
- Integral stabilizer to centralize the tubular and minimize
- Engineering junk slots to maximize the flow by and junk removal
- Available in diamond point design as well
- Available to mill 4.500 in—18.625 in. (114.3—473.0 mm) casing

The AMT™ Pilot Mill is a high-performance mill used for milling washover pipe, casing, and liners. The blade design continuously indexes a new cutting surface during milling. The insert design produces small, uniform and easy-to-handle cuttings. The AMT Pilot Mill is available with 18-in. (457-mm) blades for slot recovery and long sections of casing to be milled.

The AMT cutting structure provides a high rate of penetration. This will require a mud system capable of suspending the cuttings and carrying them to the surface. Special consideration should also be given to additional surface equipment to handle cuttings.

AMT Pilot Mills are available to cut all standard sizes of casing and can be manufactured for any size. The mills can be manufactured with a connection down for milling applications that are too close to surface to run sufficient drill collar weight above the mill.





SECTION 6 :
SPECIALITY TOOLS

SPECIALITY TOOLS

Hydraulic Casing Backoff Tool

Product Family No. H14110

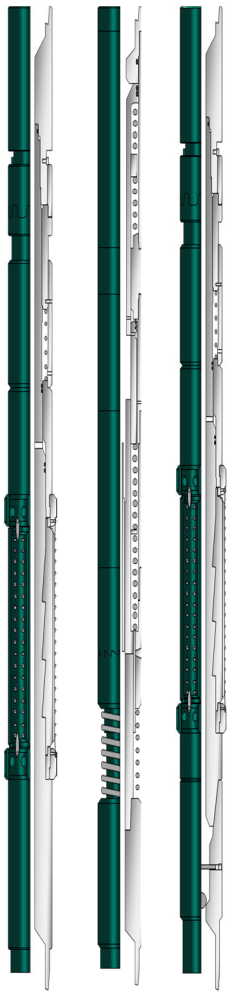
Advantages

- Eliminates blind backoffs of casing and allows operator to back off casing at known depth and location
- High torque breakout capacity
- Anchor sections contain special carbide insert slips, which make firm bites into casing ID to withstand torque output of tool
- Leaves threaded connection for reengaging with new casing string. Maintains full casing integrity when casing is screwed back together properly
- Eliminates restricted ID after repairing casing
- Simple design consists of the top anchor section, backoff tool and lower anchor section
- No left-hand workstring required for backoff
- Eliminates over torquing of tool joints in workstring, saving connections
- Can be used with tubing as a workstring

The Hydraulic Casing Backoff Tools are used to back off casing at a known or desired coupling location. They are often used as an alternative to running a casing patch during a casing repair program.

The typical Hydraulic Casing Backoff Tools assembly consists of one stand of drill collars, mechanical collar locator, lower anchor section, backoff section, upper anchor section, pump out sub, several stands of drill collars and workstring. Normally the casing is cut and pulled then the Hydraulic Casing Backoff Tool is used to remove the stub.

The tool is assembled and run in the well to the desired depth. The mechanical collar locator pinpoints the collar to be backed off and the backoff tool straddles the collar. The anchor sections are set hydraulically and the tool is then cycled until breakout is accomplished. The pump is turned off and the workstring picked up. This releases the anchors and allows the tool to be tripped out of the well. The backed off casing is then retrieved with an appropriate spear.



Specifications

Tool OD	Casing Sizes	Max. Torque @5,000 psi
4.500 in. (114.3 mm)	5.500 in. (139.7 mm)	15,000 ft-lb (20,337 N-m)
5.500 in. (139.7 mm)	7.000—7.625 in. (177.8—193.6 mm)	25,000 ft-lb (33,896 N-m)
8.000 in. (203.2 mm)	9.625—13.375 in. (244.4—339.7m)	50,000 ft-lb (67,791 N-m)

SPECIALITY TOOLS

Hydraulic Reversing Tool

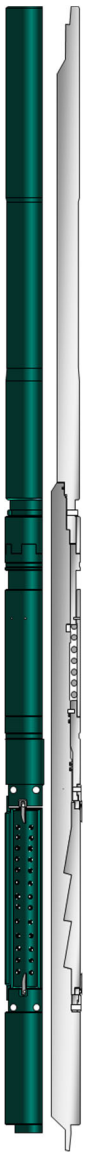
Product Family No. H14210

Advantages

- Deep wells design
- Eliminates restricted ID after repairing casing
- Simple design consists of the top anchor section and reversing tool assembly
- No left-hand workstring required for backoff
- Eliminates over torquing of tool joints in workstring, saving connections

The Hydraulic Reversing tool is used to apply break out torque and unscrew length of drill pipe, drill collars or tubing. The reversing tool is made up to the top of a typical fishing string (i.e., a left-hand box tap, taper tap, or overshot; a left-hand J-joint and one or more joints of left-hand Drill pipe)

All connections above the anchor section are right-hand. The tools are run in the well and the fish is engaged. Anchor slips are set with pump pressure, then bled off and the collar weight is lowered onto the anchor section. Next, the tool is pressured up to make backoff. When the fish connection breaks, a decrease in pump pressure will occur. The reversing tool is cycled until the connection is completely backed out. Then the pump is turned off and the workstring is picked up. This releases the slips in the anchor section and allows the fish to be tripped out of the hole.



Specifications

Tool OD	Casing Sizes	Torque Output
4.500 in. (114.3 mm)	5.500 in. (139.7 mm)	15,000 ft-lb (20,337 N-m)
5.500 in. (139.7 mm)	7.000—7.625 in. (177.8—193.6 mm)	25,000 ft-lb (33,896 N-m)
8.000 in. (203.2 mm)	9.625—13.375 in. (244.4—339.7m)	50,000 ft-lb (67,791 N-m)

SPECIALITY TOOLS

Marine Swivel

Product Family No. H17002

Advantages

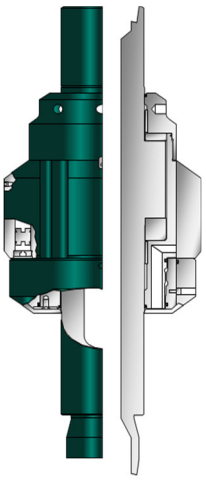
- Suspend a cutting string in a fixed vertical position
- Specially designed profile enables pinpoint accuracy for the repositioning of a cutter
- Heavy-duty bearings release and recover the casing hanger seal assembly
- Hanger seal extractor adapts easily to retrieve any straight pull-release seal assembly
- Adapter rings enable cutting larger casing strings
- Seal Extractors are available for all types of seals

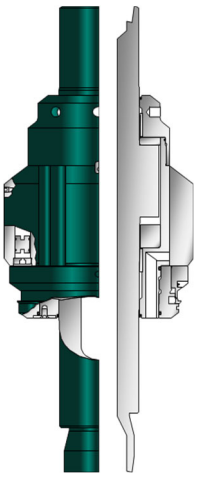
The Marine Swivel is used exclusively on floating rigs to suspend a cutting string in a fixed vertical position and position and stabilize it for an accurate cutting operation.

To accomplish this, the Marine Swivel seal extractor must land on a fixed point in the marine riser, blowout preventer, or subsea wellhead. For cutting larger casing strings, after the riser has been removed, adapter rings can be added to the Marine Swivel seal extractor. The addition of the hanger seal extractor, which replaces the adapter ring and blank bottom, enables this tool to extract the hanger seal assembly from a subsea wellhead.

The Marine Swivel lands onto an intermediate casing hanger in an 18.75 in. (476.3-mm) subsea wellhead. The integral seal extractor snaps into the casing hanger seal assembly when landed. To operate effectively in either application, a slack joint or long-stroke bumper jar should always be run above the Marine Swivel seal extractor. This eliminates premature movement of the swivel and also reduces the drill string flex to prevent an uneven cut.

After the intermediate casing string is cut, the casing hanger seal is released with a straight pull.





Specifications

Tool OD	Inside Diameter	Connection
18.75 in. (476.3 mm)	3.50 in. (88.9 mm)	6.625 in. Reg

SPECIALITY TOOLS

RatPack Impulse Tool

Product Family No. H14070

Advantages

- Fast impulses compared to cycling jars reduce load factors on the workstring and service rig
- Operation is independent of over-pull or set- down loads does not need to run drill collars and does not need high-tensile workstring; can be torqued and jarred through and operates with any engaging device
- Quicker operation time compared to jars saves rig time

The RatPACK™ impulse tool can recover a fish in just a few minutes. Unlike jars, which create high impacts on the fish, the RatPACK tool creates low- frequency upward-impact impulses on items that are friction-point or sand-stuck. The RatPACK tool fills the gap between jars, which can hit only every minute or two with high impacts and surface vibrators. Surface vibrators such as jars have limited effectiveness in retrieving point- stuck equipment and in deviated or horizontal wells.

The RatPACK runs on a bottomhole assembly directly above an engaging device to remove retrievable packers and point-stuck equipment that cannot be pulled free. Some instances where the packer cannot be freed include when junk or sand is on top of the packer; the wellbore is deviated; and when there are limitations of the workover rig, workstring, or production tubing. In most cases, jarring from the surface only causes the packer to become stuck tighter or jars the mandrel out, causing the packer to be recovered by washing over.

Tool operation is independent of overpull. High or low overpulls can be applied while the tool is operated, making the RatPACK tool ideal for high -angle or horizontal wellbores. The tool does not require drill collars or high-strength work strings, and uses clear fluid types such as water, brine, or calcium chloride out of the hole.

Because the impulses caused by the RatPACK tool rattle and shake the packer free, in contrast to the high-load impacts seen with jarring strings, using the RatPACK tool is the preferred method of recovering stuck retrievable packers and point-stuck equipment.

Specifications

Tool OD	Overall Length	Connection
3.500 in. (88.9 mm)	30.0 ft (9.14 m)	2.375 in. Reg
4.750 in. (120.6 mm)	22.0 ft (6.70 m)	NC-38

SPECIALITY TOOLS

Universal Wellhead Retrieving System

Product Family No. H12215

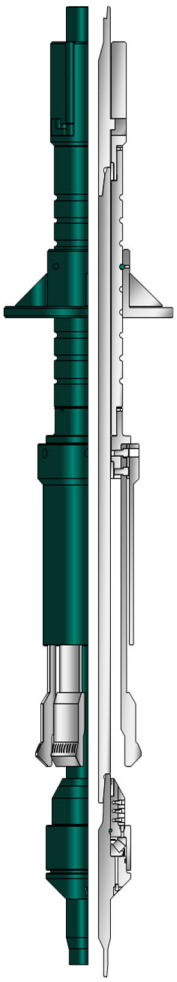
Advantages

- For removing a subsea wellhead from the sea floor
- Easily adjusted catches wellheads of all manufacturers
- Keeps workstring in tension while cutting
- Does not damage sealing areas
- Quick operation takes one trip to cut casing and recover wellhead
- Design to catch all types of wellhead

The Universal Wellhead Retrieving System runs in conjunction with a Hercules cutter capable of severing multiple strings of casing to remove any subsea wellhead from the sea floor. It can be adjusted easily, so that a wellhead made by any manufacturer can be engaged and lifted by this universal retrieving system.

The system consists of an adjustable lift lug assembly and landing collar positioned on an inner mandrel. The lifting mechanism is supported on the mandrel by a thrust bearing that permits the mandrel to rotate, which in turn rotates the multistring cutter mounted on the bottom of the mandrel.

The lift lug assembly engages an internal upset in the wellbore. This technique provides positive engagement and eliminates reliance on the penetration of wickers into the inside diameter of the wellhead. Lift-lug-engaged diameter is controlled with interchangeable sleeves. The depth of lift lug position in the wellhead is controlled by adjusting the placement of the landing collar.



Specifications

Wellhead Size	Max. Tensile Load (Static)	Max. Tensile Load (Dynamic)
18.75 in. (476.25 mm)	1,240,000 lbs. (562,454 kg)	362,000 lbs. (164,200 kg)

SPECIALITY TOOLS

Terminator

Vessel Deployed Wellhead Cutting System

Advantages

- For removing a subsea wellhead from the sea floor
- Requires minimal deck spread
- Minimizes environmental footprint
- Powered by ROV or other hydraulic power source
- No separate umbilical needed
- Operates with minimal crew and reduces HSE exposure
- Can be done in a single trip if deck handling of cut wellhead is convenient

Terminator™ vessel deployed subsea wellhead cutting system helps avoid the limitations and costs of traditional offerings with a simple, safe, efficient solution. This one-of-a-kind system includes a hydraulic motor, wellhead connector, and industry-proven Hercules™ cutter that allows you to execute your subsea wellhead cutting from a vessel in an unprecedented short period of time of less than an hour for single cuts and within a few hours for multi-casing cuts.

By using a mechanical cutter instead of abrasive water jet cutting methods, the Terminator system eliminates associated risks with high pressures and lowers overall environmental footprint as it requires only 100 horsepower to operate. Additionally, there are virtually no water depth limitations, making it a great solution for deep-water applications.

The system can be mobilized quickly and only requires two personnel on board to operate. Once the Terminator system is deployed overboard, there is no additional equipment on the deck.

Specifications

Well Connection	Water Depth	Cut Range
18.75 in. (476.25 mm) H-4, Adjustable , MLS system	10,000 ft (3,000 m)	9.625—60.00 in (244.47—1524.0 MM)

SPECIALITY TOOLS

Mastodon Hydraulic Pulling Tool

Product Family No. H14035 & H14036

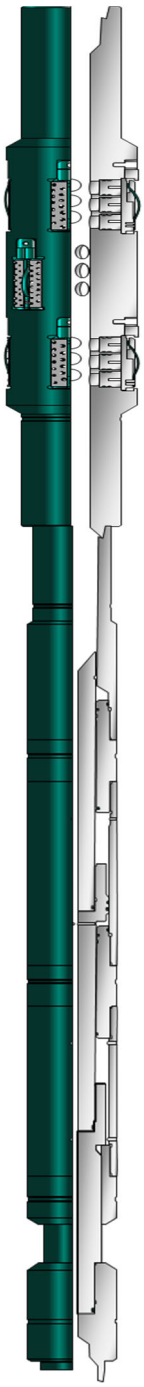
Advantages

- Rotate whole system that enables the combine cut and pull run to be done without motor and doing cleanup on the same run
- Ability to pull up to 1.8 M lbs. down hole.
- Saves rig time by pulling longer sections of casing out in a single run
- Simple design, easy operation
- Can be used in combination with different fishing tools like the, CICM, mechanical slot tool, Perseus cutter, XP spear, Selectable pack off and other clean up equipment to optimize the operations to be more efficient.
- Designed to have minimum impact in the casing during anchoring
- Ability to add multiple power sections to add stroke length on each pull.

The Mastodon™ Hydraulic Pulling Tool is specially designed to pull objects from cased holes and open hole using hydraulic pump pressure. The tool is designed to anchor in the casing, exert its pulling force on the fish below the fish below and transmit the force to the casing rather than the surface equipment. This design allows Mastodon Hydraulic Pulling Tool to be used with most conventional workover rigs.

Mastodon tool is composed of two sections: The anchor section provides a large slip engagement area, anchoring the tool to the casing wall to safely transmit the heavy pulling strains with minimum risk to the casing. The power section actuates with hydraulic force to apply a pulling force to the fish. The power section exerts its tremendous pulling force throughout a 46.4-in. (1178.56 mm) stroke.

The Rotational capability of Mastodon Hydraulic Pulling Tool is specially designed to pull objects from cased holes and open hole using hydraulic pump pressure. Rotation Mastodon Hydraulic Pulling Tool enables multiple



Specifications

Anchoring Casing Size	Pull Ratio (lbs to psi)	Pull at Maximum Pressure
9.625—10.750 in. (244.47-273.05 mm)	120:1	1,200,000 lbs. (544,310.8 kg)
13.375—20.000 in. (339.71—508.00 mm)	300:1	1,800,000 lbs. (816,466.2 kg)

SPECIALITY TOOLS

Mastodon C-Valve

Product Family No. H14039

Advantages

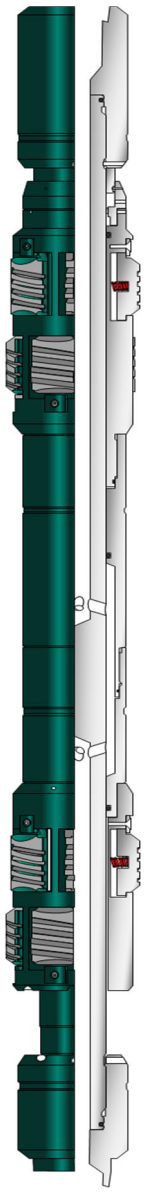
- C-Profile Slot allows for valve to be locked open or closed during operation.
- Large flow through area that allows for cutting and cleanup combined operation with the Mastodon system
- The valve does not provide any restriction to flow from surface during cutting operations
- Scraper body with scraper blade that allows for mechanical manipulation of the valve from surface via the work string.
- Scraper body with scraper blade that cleans the casing when running in to the well
- Designed to be run as part of the Mastodon Casing Retrieval System
- Saves rig time by enabling combined solutions in a single run

The MASTODON™ C-Valve is designed to be used below the spear and above the Hercules cutter near the bottom of the pulling tool.

The tool provides the ability for multiple opening and closing of the string to activate the Mastodon by the string manipulation. With the combination of other tools like XP spear, selectable pack off and Perseus cutter optimizes the slot recovery operation.

Specifications

Tool OD	Tool ID	Connections
9.250 in. (234.95 mm)	2.250 in. (57.15 mm)	NC-50
11.750 in. (298.45 mm)	3.000 in. (76.20 mm)	6.625 in. Reg



SPECIALITY TOOLS

Extrudable Ball Drop Sub

Product Family No. H14039

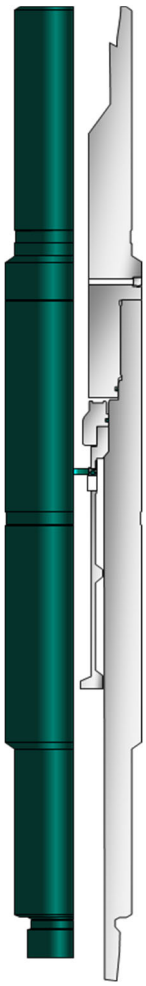
Advantages

- Extrudable balls that allows for repeated operations up to 20 times
- Ability to combine with multiple different tools like Perseus cutter, XP spear and Mastodon Hydraulic pulling tool
- Saves operation time by being able to combine operations
- Built in rupture disk for draining of string when combine operation is finish to not pull wet.
- Saves rig time by enabling combined solutions in a single run
- Non-extrudable version also available on request

The Extrudable Ball Drop Sub is designed to be used as part of the One-Trip Mastodon Cut and Pull System. This tool allows for a cut to be made, a pull attempt, and repeated for additional cuts as needed.

The extruded balls are kept in the ball catcher designed in the tool.

Each ball extrudes at the predetermined value of pressure calculated.



Specifications

Tool OD	Ball Size	Connections
7.750 in. (196.85 mm)	1.125 in. (28.57 mm)	NC-50 and 6.625 in. Reg

SPECIALITY TOOLS

Disconnect Junk Mill

Product Family No. H15203

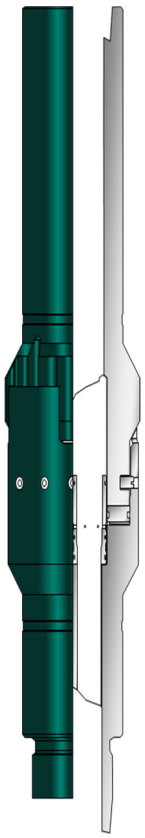
Advantages

- Carbide dressed Junk Mill facing down after disconnecting allows for dressing of cement.
- Large flow through area that allows for cementing through the tool before and after the disconnect
- Shear disconnect abilities that uses robust shear screws to permit disconnect when desired
- Designed to enable cement job without contamination or swabbing
- No risk for coring during tagging and dressing of cement.
- Enables the features of combining multiple applications in single runs

The Disconnect Junk Mill is designed for Slot recovery and P&A applications to be able to combine runs and optimize operations. Disconnect Junk Mill is an over pulled or ball drop activated tool that is designed to disconnect from accessories that is hanging below it like, Drill pipe and plugs. When disconnected a junk mill facing down is exposed. This mill can be used to weight test the cement plug once hardened.

Specifications

Tool OD	Tool ID	Connections
8.375 in. (212.72 mm)	1.500 in. (38.1 mm)	NC-50
12.125 in. (307.97 mm)	1.500 in. (38.1 mm)	NC-50



SPECIALITY TOOLS

Perseus Ball Dropping Sub

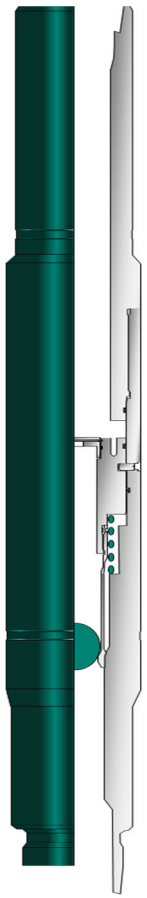
Product Family No. H17022

Advantages

- Stores a ball below a restriction to allow the usage of the ball drop activated tools
- Hydraulically operated tool , ball is released after pre-determined flow rate has been achieved
- Ball will not drop unless the pumps are shut off , preventing unwanted activation

The Perseus™ Ball Dropping sub is an accessory tool used in conjunction with the Perseus cutter in P&A and slot recovery operations. This tool enables the use of a ball activated tool below a restriction. The Perseus ball dropping sub is intended to be used to activate the Perseus cutter when located below a motor.

The Perseus Ball dropping sub is hydraulically operated and intended to hold a ball below a restriction. Flow is diverted around the ball prior to activation. Upon increasing flow rate, the tool is sheared, unlocking the piston. Once the pumps are turned off, the collet is released and the ball is dropped to activate a tool lower in the string.



Specifications

Tool OD	Ball Size	Connections
7.750 in. (212.72 mm)	1.250 in. (31.75 mm) / 2.250 in. (57.15 mm)	NC-50

SPECIALITY TOOLS

X-treme SJI Mechanical Slotting Tool

Eliminate explosive and improves efficiency

Advantages

- Reduce HSE exposure for personnel
- Remove the cost and complexity of operating explosive perforating guns
- Flexibility for combined operations in one-trip with fewer personnel
- Easier handling and transport due to smaller operational footprint
- Run on coiled tubing and eliminate the need for a rig creating substantial savings

Applications

- Annular remediation
- Formation integrity testing
- Environmental isolation
- Slot and test
- Slot and circulation
- Workover cut, wash, and retrieve solution
- Slot production liner

The SJI Xtreme™ Mechanical Slotting tool functions with a reusable, single-bladed wheel that mechanically slots casing simplifying operations, reducing tool string length, and taking away the requirement for sump. The shorter tool string also reduces the operational footprint saving deck space and making transport and handling easier.

Other P&A methods using explosives, mechanical cutters, or abrasive cutters all require multiple trips exposing personnel to HSE risks each time. The X-treme SJI tool enables explosive-free, single-trip operations reducing HSE exposure.

The X-treme SJI mechanical slotting tool is made of a robust and reliable single-blade wheel design that enables it to perform multiple applications in the same well. The tool can perform up to 4,000 slots per hour. It also brings flexibility and “plug and play” functionality allowing planning and execution of the exact operations your well needs in one trip.

Add real-time barrier log data from xSight™ Casing Integrityand Cement Mapping (CICM) and you can change the slotted length/ depth in-hole without waiting. Now, log, slot, jet, wash, and isolate operations can be combined and performed in the same trip for maximum efficiency. The tool can also be paired with other technologies like the Perseus™ pump through cutter and Mastodon™ hydraulic pulling tool for efficient cutting and removal of casing.

Specifications

Tool Sizes
4.500 in. (114.3 mm)
5.875 in. (149.22 mm)
8.250 in. (209.55 mm)
12.250 in. (311.15 mm)

SECTION 7 :
ACCESSORY TOOLS

ACCESSORY TOOLS

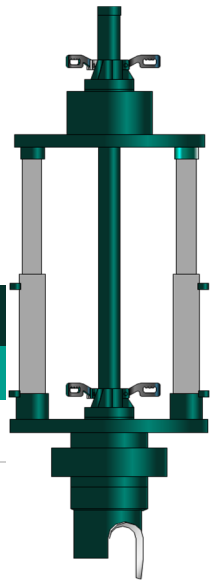
Casing Jack System

Product Family No. H15109

Advantages

- Combined lifting ratio of 100:1
- 6,000 psi (413.7 bar) lift capacity translates to 600,000 lb
- (272 160 kg) of total lift
- Accepts API casing handling equipment
- Pulls against top of wellhead flange instead of the rig derrick or substructure
- High-pressure power unit operates a closed hydraulic system so casing jack does not require an external pump

On abandonment jobs, Casing Jack System can help free stuck casing and pull enough pipe to lower the overpull, allowing the rig to finish pulling the casing out of the hole. On jobs where casing is rehung in the wellhead, casing jacks provide pull necessary to reset the casing hanger at the original tension at which the casing was run, regardless of the type of rig on the well.



Specifications

Casing Jack OD	Jacking Plate
9.750 in. (248.0 mm)	771,618 lbs (317,100 kg)

SPECIALITY TOOLS

Drilling Safety Joint

Product Family No. H15025

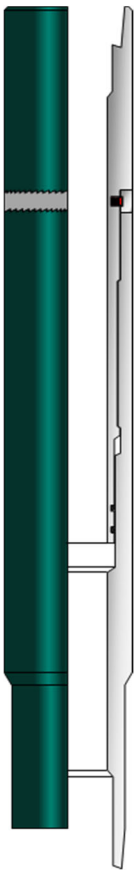
Advantages

- Simple design and construction
- No shear pins
- Backs out at approximately 25% of the makeup torque
- Can be manufactured with non-magnetic materials for use near measurement-while-drilling tools (MWD)

The Drilling Safety Joint is designed to provide a means of disconnecting from the bottomhole assembly (BHA) or a non-releasable engaging tool without the use of wireline or a manual backoff. The drilling safety joint can be easily made up, released and reengaged and it will still withstand all normal operations.

Specifications

Tool OD	Connection	Tensile Yield
3.125 in. (79.37 mm)	2.375 in. Reg	219,926 lbs (99,756.75 kg)
4.750 in. (120.65 mm)	2.875 in. Reg	332,240 lbs (150,701.52 kg)
6.500 in. (165.10 mm)	NC-50	546,387 lbs (247,836.97 kg)
8.000 in. (203.20 mm)	6.625 in. Reg	1,483,452 lbs (672,882.50 kg)



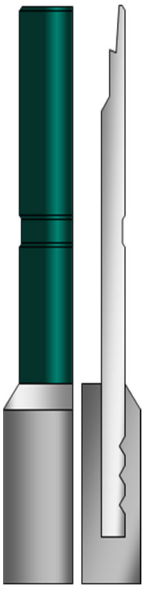
Lead Impression Block

Product Family No. H14106

Advantages

- Simple design and construction
- One-piece construction with a cast lead head
- Can be reworked for multiple runs
- Available in many sizes for a wide range of impression possibilities
- Body parts constructed from AISI 4140 heat-treated alloy steel
- Available in all sizes upon request

The lead impression block is designed to give an imprint of the top of a fish in the hole to help determine the condition and position of the top of the fish. The impression block can also be used to give clues on how to retrieve an unknown fish in the well.



SPECIALITY TOOLS

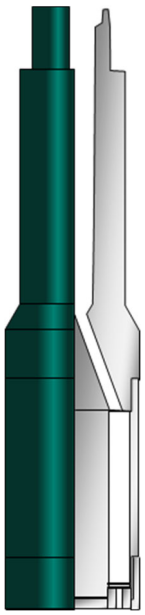
Fishing Magnet

Product Family No. H13101

Advantages

- Simple design and construction
- No shear pins
- Flow ports available
- Different variations of lip guide available

The Fishing Magnet is designed retrieving the junk from the hole utilizing the magnetic forces. The magnet is a part of tool which is able to attract all loose fish and larger surface area enables maximum contact. The magnet element can be from standard as well as rare earth magnets.



SPECIALITY TOOLS

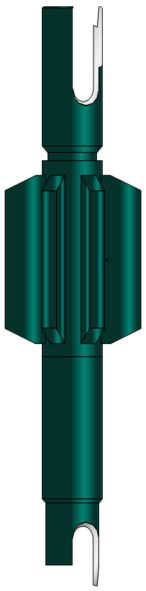
Non– Rotating Stabilizer

Product Family No. H17130

Advantages

- Provides maximum control for cutting and milling operations
- Reduces shock load on cutter knives for longer cutting life
- Sleeves can be easily changed to other sizes
- Sleeves available for 4-1/2-in. (114.3-mm) –20-in. (508.0-mm) casing

The Non-Rotating Stabilizer provides maximum centralization and ensures smooth and efficient rotation in cutting, milling and fishing operations. It is composed of a mandrel, sleeve and bottom sub. The tool may be run with other fishing tools to centralize a small-OD fishing tool in a



SPECIALITY TOOLS

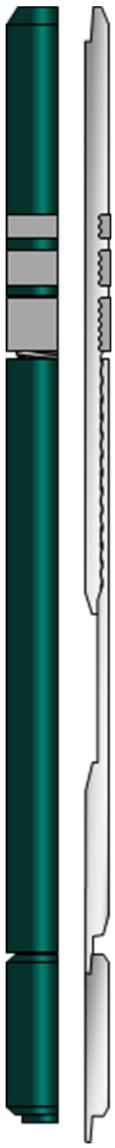
Ring Type Space Out Assembly

Product Family No. H12215

Advantages

- Simple design and operation
- Allows pinpoint accuracy for positioning the cutter
- Deepwater application

The Ring-Type Space-Out Assembly is used primarily with the multi-string cutter and the marine swivel. The space-out assembly is used to accurately reposition the cutter after the required knife changes, mostly when cutting 3 or 4 strings of casing positioned eccentrically, while running the multi-string cutter on floating platforms.



SPECIALITY TOOLS

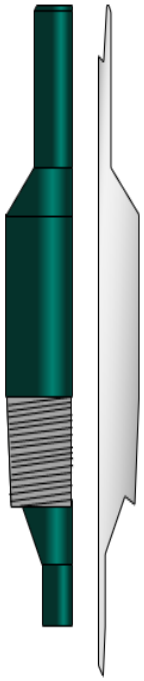
Triple Connection Bushing

Product Family No. H14025

Advantages

- One-piece construction
- Any size and combinations can be ordered
- Large-enough ID for backoff shots to pass through
- Available in all sizes upon request

The Triple Connection Bushing consists of three connections—a washpipe connection and two drillpipe connections. The bushing is generally run in conjunction with a backoff or packer retrieving assembly. The Triple Connection Bushing is ideal for any BHA requiring an inside and outside assembly. The tool OD is built per specifications of the washpipe connection and the ID is determined by API specifications of the smaller drill pipe connection.



SPECIALITY TOOLS

True Circle Tong Bushing

Product Family No. H18056

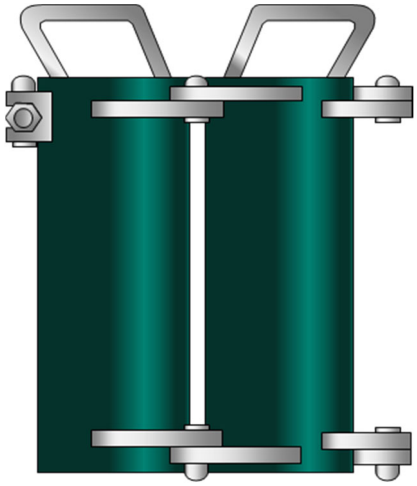
Advantages

- Simple and rugged
- Wraps around pipe's outside diameter in a true circle for even distribution of torque
- Keeps tubulars from being mashed
- Reduces or eliminates tong damage on thin wall tubulars and washpipe

The True-Circle Tong Bushing protects tubulars such as washpipe from being mashed when made up or broken out by rig tongs.

The True-Circle Tong Bushing is wrapped around the tubular and a latch bolt is placed into the slotted latch holder; then the latch nut is tightened. Place tongs on the true circle tong bushing only.

Tighten connection to recommended makeup torque and remove bushing.



SPECIALITY TOOLS

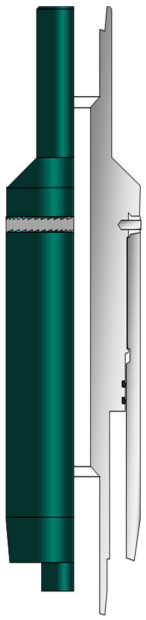
Washover Backoff Safety Joint

Product Family No. H12215

Advantages

- Available in most washpipe and tool joint connections
- Saves rig time by making it possible to wash over, back off, and recover in one trip
- May be used as standard washover safety joint
- Simple design, easy operation

The Washover Backoff Safety Joint is a multipurpose safety joint installed in the washover string in place of the washpipe drive sub. The Washover Backoff Safety Joint can be used like standard drilling safety joints. In the event of a washover string becoming stuck, the Washover Backoff Safety Joint can easily be backed off from the surface so the fishing string above the washpipe may be recovered.



SPECIALITY TOOLS

Shearable Triple Connection Bushing

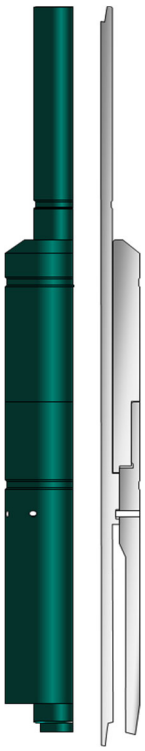
Product Family No. H14092

Advantages

- Simple design—consisting of lug, washpipe, drive bushing and shear screws
- Rotationally locked
- Controlled axial movement
- Customizable stroke length

The Shearable Triple Connect Bushing is a simple deign of mandrel, drive bushing, lugs and shear screws. The mandrel and busing are rotationally locked with the help of lugs , allowing the torque to be transmitted from drill pipe to washover shoe.

Brass screw prevents the mandrel and overshot from moving axially until a specific weight has been applied. This tool can be combined with VACS™ to facilitate the cleanup run of above packer.



Specifications

Casing Size	Tool ID	Connection
7.000—7.625 in. (177.8—193.6 mm)	2.125 in. (53.9 mm)	NC-31 & 5.750in. TSWP
9.625 in. (244.4 mm)	2.688 in. (68.2 mm)	NC-38 & 8.125 in. TSWP

SECTION 7 : WASHPIPE AND ACCESSORIES

Baker Hughes

WASHPIPE AND ACCESSORIES

WASHPIPE

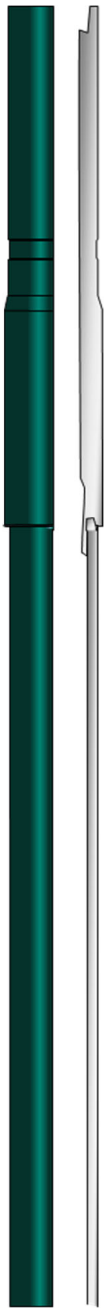
Product Family No. H15660

Tools

- Extensions
- Bushing from Washpipe to overshot and vice versa available
- Different connections available
- Handling equipment available

The Washpipe provide the biggest ID to allow milling or swallowing multiple types of fish. This can be used for various applications like milling, cutting , cleaning or fishing .

Grade of Washpipe provide strength required to perform the job with maximum available tensile and torque strength . Multiple tools are available to go with Washpipe.



Specifications
Details
WPIPE, 16"WPHYD B X 16"WPHYD P 16"OD
WPIPE, 13.3"WPHYD B X 13.3"WPHYD P 13.3"
WPIPE, 11.7"WPHYD B X 11.7"WPHYD P 11.7"
WPIPE, 10.7"WPHYD B X 10.7"WPHYD P 10.7"
WPIPE, 9.6"WPHYD B X 9.6"WPHYD P 9.6"OD
WPIPE, 9"WPHYD B X 9"WPHYD P 9"OD
WPIPE, 8.3"WPHYD B X 8.3"WPHYD B 8.3"OD
WPIPE, 8.1"WPHYD B X 8.1"WPHYD P 8.1"OD
WPIPE, 7.6"WPHYD B 7.6"OD
WPIPE, 7.3"WPHYD B 7.3"OD
WPIPE, 6.3"WPHYD B 6.3"OD
WPIPE, 6"WPHYD B X 6"WPHYD P 6"OD
WPIPE, 5.7"WPHYD B X 5.7"WPHYD P 5.7"OD
WPIPE, 5.6"WPHYD B X 5.6"WPHYD P 5.6"OD
WPIPE, 5.5"WPHYD B X 5.5"WPHYD P 5.5"OD
WPIPE, 4.5"WPHYD B 4.5"OD
WPIPE, 4.3"WPHYD B 4.3"OD
WPIPE, 4"WPHYD BWPHYD P 4"OD
WPIPE, 3.7"WPHYD B 3.7"OD
WPIPE, 3.5"WPHYD B 3.5"OD
WPIPE, 2.2"WPHYD B X 2.2"WPHYD P 2.2"OD
WPIPE, 3.6" TSWP B X 3.6" TSWP P 3.6"OD
WPIPE, 9.6"XLINE WP B X 9.6"XLINE WP P 10"
WPIPE, 7.6"XLINE WP B X 7.6"XLINE WP P 8"O
WPIPE, 5"XLINE WP B X 5"XLINE WP P 5.3"OD