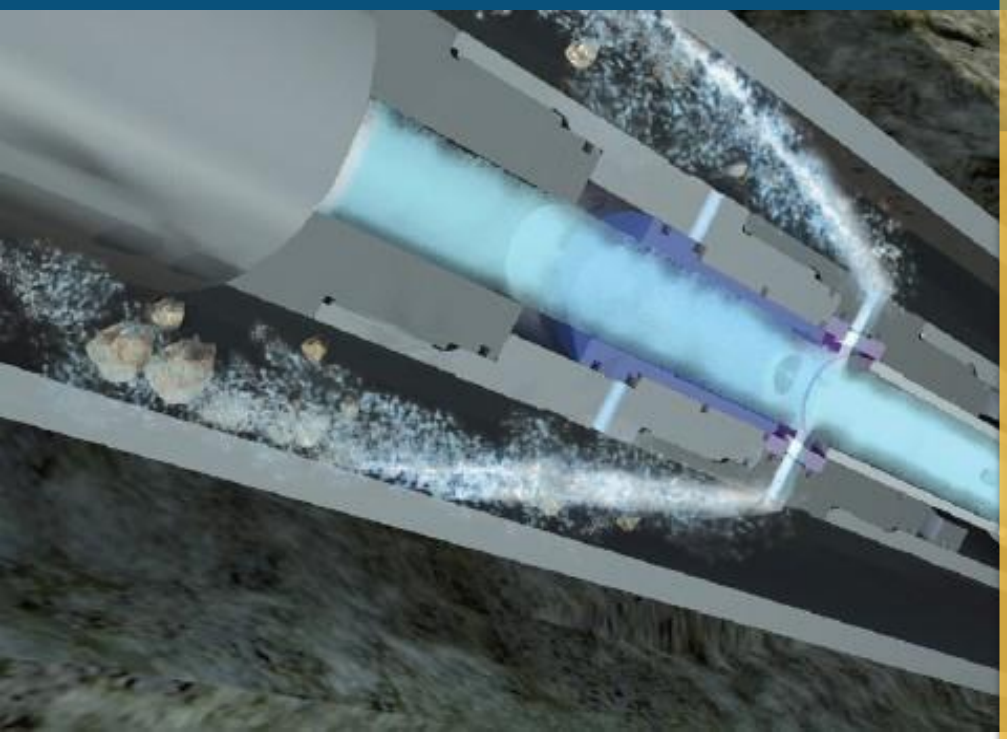
RESERVOIR GROUP

WELL INTERVENTION PRODUCTS OVERVIEW



Design

We have the engineering knowledge and resources to offer unique equipment solutions; designing tools to suit our customer's individual needs. Well Intervention utilizes the latest SolidWorks CAD, PDM, and Simulation software to design, manage, and analyze class-leading bespoke products.

Manufacture

Our ever expanding, in-house production facility has a wide range of CNC lathes, milling machines and inspection equipment to manufacture our products under one roof from start-to-finish. We also offer sub-contract machining services to oil and gas related companies.

Products

Well Intervention offers a very comprehensive range of products to suit most downhole coiled tubing needs. Our products are designed with a focus on a simple operation, reliability, and ease of maintenance.

Services

Customers can expect to deal with friendly, cooperative staff, who are flexible in their approach to achieve high levels of service and support to help our customers meet their operational oilfield objectives.

Reservoir Group has developed and established a solid reputation in design and delivery of proprietary and specialised thru-tubing tools for our local and international markets.

Our strength lies in our experience in the coil-tubing industry and the ability to supply innovative solutions to our customers' individual tool requirements.

We have the knowledge and manufacturing capability to offer unique equipment solutions ; designing and manufacturing tools to suit our customer's needs in a reduced time

When you place an order with Well Intervention, we work hard to exceed our customer expectations ; customers can expect to deal with friendly, co-operative staff, who are flexible in their approach to achieve high levels of service and support to help our customers meet their operational oil field objectives.

RESERVOIR GROUP

WELL INTERVENTION SERVICES OVERVIEW

Well Intervention Services Mission

Well intervention is committed to developing and providing reliable, innovative and cost effective services and solutions. We will be a market leader by providing a consistently superior level of customer service. We strive for continuous improvement and to deliver success to both our customers and to our company

Well Intervention is a specialist in thru tubing services: a complete solution provider to the global oil & gas industry. A new name that encompasses industry-leading knowledge and experience, we represent a synthesis of well intervention expertise – from solution design, through tool manufacture and rental, to expert field service delivery.

Well intervention has been formed by combining the resources and capabilities of successful inter- national businesses. It means we are equipped to form bespoke, single-point solutions that reflect the unique challenges and complexities of individual projects. We deliver comprehensive well intervention packages shaped by the unique technical and commercial priorities of each customer – and generate new value in the process.

Well intervention possesses the experience, the tool portfolio and the combined knowledge that encompasses these needs for successful well intervention. Our team with combined field experience of over 200 years supports all field operations, bringing you and your organization highly skilled workers and vast technical support for various Thru-Tubing applications. Reservoir Group tool portfolio is comprised of over 70 proven quality milling tools and custom BHA assemblies tailored to both Coiled tubing and threaded pipe applications

- **We deliver efficiency, derived from our 'one stop shop' proposition. We offer reliability, from our experience and international track record. We bring assurance, from our commitment to a 'right**
- **Services include ; custom mill design, fishing tools for any specific application, single and two phase flow modeling, re-stimulation packages, analytical surface/R+D testing, and extensive contingency planning. Tool Manufacturing and all-inclusive**

Product List

NOTES:
The information published in this catalogue is also available upon request in electronic format as a PDF file. If you are reading this document from a printed paper copy, please remember that the electronic version has the most up-to-date information and that in case of discrepancy between one and the other, that the electronic version shall prevail. The information herein applies to current models only. To re-order parts for previously purchased items, consult the documentation that came with the Tool .

Description and specifications are subject to change without notice.

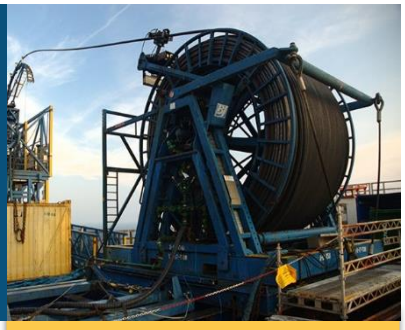
RESERVOIR GROUP

STANDARD COILED TUBING BHA

Return Link Product List

RESERVOIR GROUP

Coiled Tubing External Slip-Type Connector



Well Intervention Products & Services' External Slip-Type Coiled Tubing Connector is specially designed for heavy duty Coiled Tubing applications. It provides a reliable method of attaching the Bottom Hole Assembly (BHA) to the Coiled Tubing.

The connector is attached to the Coiled Tubing by means of a slip mechanism which provides resistance to tensional and torsional loads. Pressure integrity is provided by two O-Rings which form a seal on the OD of the Coiled Tubing.

Available for all sizes of Coiled Tubing between 1-1/4" to 2-7/8" OD. Our connectors can be supplied with industry-standard connections or as per customer requirements.

Tool Specifications

Coil OD	Tool OD	Tensile Yield	Torsional Yield	Standard Connections
Ø1-¼"	Ø1-11/16"	37,500 lbs	590 ft-lbs	1.000" AMMT
Ø1-¼"	Ø2-1/8"	76,000 lbs	1,400 ft-lbs	1-½" AMMT
Ø1-¼"	Ø2-¼"	115,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø1-½"	Ø2-1/8"	76,000 lbs	1,400 ft-lbs	1-½" AMMT
Ø1-½"	Ø2-¼"	115,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø1-½"	Ø2-7/8"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø1-¾"	Ø2-¼"	61,000 lbs	1,150 ft-lbs	1-½" AMMT
Ø1-¾"	Ø2-7/8"	200,000 lbs	4,500 ft-lbs	2-3/8" PAC DSI
Ø1-¾"	Ø3-1/8"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø2.000"	Ø2-7/8"	155,000 lbs	3,400 ft-lbs	2-3/8" PAC DSI
Ø2.000"	Ø3-1/8"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø2-3/8"	Ø3-1/8"	135,900 lbs	3,400 ft-lbs	2-3/8" PAC DSI
Ø2-3/8"	Ø3-3/8"	188,000 lbs	4,600 ft-lbs	2-3/8" PAC DSI
Ø2-7/8"	Ø3-½"	114,000 lbs	3,200 ft-lbs	2-7/8" PAC DSI
Ø2-7/8"	Ø3-¾"	225,000 lbs	6,000 ft-lbs	2-7/8" PAC DSI
Ø2-7/8"	Ø4-¾"	500,000 lbs	17,000 ft-lbs	3-½" IF Pin

Design Features

- ✓ Simple to Install
- ✓ High Tensile & Torsional Strength
- ✓ Simple Maintenance and Replacement of Parts
- ✓ Standard & H2S Service Versions Available
- ✓ Anti-Rotation Screws Prevent the Top & Bottom Subs from Backing-Off
- ✓ Wide Range of Connector ODs for a Given Coiled Tubing Size for Maximum Flexibility

Notes

- ✓Other sizes & connections available upon request
- ✓Values shown are for standard service tools

RESERVOIR GROUP

Coiled Tubing High-Load External Slip-Type Connector

The High-Load External Slip-Type Connector is specially designed for heavy duty Coiled Tubing applications

The connector is attached to the Coiled Tubing by means of a slip-mechanism which provides resistance to tensile & torsional loads. Pressure integrity is provided by two O-Rings which form a seal around the Coiled Tubing OD.

The High-Load version of this tool had an extended grapple section which effectively distributes the axial load over a larger surface area. This helps to prevent collapse and swelling of the Coiled Tubing under extreme conditions.

Tool Specifications

Coil OD	Tool OD	Tensile Yield	Torsional Yield	Standard Connections
Ø1-¼"	Ø2-1/8"	100,500 lbs	1,600 ft-lbs	1-½" AMMT
Ø1-¼"	Ø2-¼"	115,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø1-½"	Ø2-1/8"	75,000 lbs	1,400 ft-lbs	1-½" AMMT
Ø1-½"	Ø2-¼"	100,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø1-½"	Ø2-7/8"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø1-¾"	Ø2-1/8"	28,000 lbs	525 ft-lbs	1-½" AMMT
Ø1-¾"	Ø2-¼"	48,000 lbs	900 ft-lbs	1-½" AMMT/td>
Ø1-¾"	Ø2-7/8"	200,000 lbs	4,500 ft-lbs	2-3/8" PAC DSI
Ø1-¾"	Ø3-1/8"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø2.000"	Ø2-7/8"	155,000 lbs	3,400 ft-lbs	2-3/8" PAC DSI
Ø2.000"	Ø3-1/8"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø2-3/8"	Ø3-1/8"	119,900 lbs	2,900 ft-lbs	2-3/8" PAC DSI
Ø2-3/8"	Ø3-3/8"	188,000 lbs	3,900 ft-lbs	2-3/8" PAC DSI
Ø2-7/8"	Ø3-½"	115,000 lbs	3,100 ft-lbs	2-7/8" PAC DSI
Ø2-7/8"	Ø3-¾"	225,000 lbs	6,200 ft-lbs	2-7/8" PAC DSI
Ø2-7/8"	Ø4-¾"	500,000 lbs	17,000 ft-lbs	3-½" IF Pin
Ø3-½"	Ø4-½"	225,000 lbs	6,200 ft-lbs	2-7/8" IF Pin
Ø3-½"	Ø4-¾"	400,000 lbs	12,000 ft-lbs	3-½" IF Pin

Design Features

- ✓High Tensile & Torsional Strength
- ✓Standard H2S Service Versions Available
- ✓Simple Maintenance & Replacement of Parts
- ✓Extended Grapple to Reduce Coiled Tubing Collapse & Swelling
- ✓Anti-Rotation Screws to Prevent the Top & Bottom Subs from Backing Off
- ✓Simple to Install, With NO Removal of Internal Weld Bead (Flashing) Required
- ✓Wide Range of Connector ODs for a Given Coiled Tubing Size for Maximum Flexibility
- ✓Also High-Pressure/ Extreme
- ✓Temperature (15,000 PSI/ 232°C/ 449.6° F) Available for 1.75" & 2.00" OD Coiled Tubing

Notes

- ✓ Other sizes & connections available upon request
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

Coiled Tubing Internal Dimpling Connector

Well Intervention Products & Services' Internal Dimple Connector provides a reliable means of connecting the Bottom Hole Assembly (BHA) with the Coiled Tubing.

The Internal Dimple Connector can be designed to have the same OD as the Coiled Tubing for running "slick" (Slim-Hole) tool strings or with over-sized bottom sections to confirm BHA has reached surface. Prior to installation, the internal weld bead (flashing) can be removed using Well Intervention Products' Internal Coiled Tubing Reamer. The connector can then be dimpled on using Reservoir Groups' Manual Dimpling Tool or any standard hydraulic jig. The dimples allow the connector to effectively transmit both torque and tensile loads.

The dimple connection has comparable strength to that of the Coiled Tubing. The design features dual O-Rings to provide a reliable seal on the Coiled Tubing's ID. The Internal Dimple Connector can be designed and manufactured to suit any size and weight of Coiled Tubing, with any combination of Tool OD and threaded connection.

Tool Specifications

Tool OD	Coil OD	Tensile Yield	Torsional Yield	Standard Connections
Ø1-11/16"	Ø1-¼" x 0.095" w/t	49,000 lbs	690 ft-lbs	1.000" AMMT
Ø1-11/16"	Ø1-¼" x 0.145" w/t	45,000 lbs	540 ft-lbs	1.000" AMMT
Ø1-½"	Ø1-½" x 0.095" w/t	61,000 lbs	1,000 ft-lbs	1.000" AMMT
Ø1-½"	Ø1-½" x 0.075" w/t	41,500 lbs	650 ft-lbs	1.000" AMMT
Ø1-¾"	Ø1-¾" x 0.109" w/t	61,000 lbs	650 ft-lbs	1.000" AMMT
Ø1-¾"	Ø1-¾" x 0.175" w/t	61,000 lbs	650 ft-lbs	1.000" AMMT
Ø2.000"	Ø2.000" x 0.109" w/t	109,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø2.000"	Ø2.000" x 0.175" w/t	92,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø2-7/8"	Ø2-3/8" x 0.125" w/t	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø2-7/8"	Ø2-3/8" x 0.175" w/t	207,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI

Design Features

- ✓Simple Design & Use
- ✓Easily Operated by One Person
- ✓Minimal Maintenance
- ✓Accommodates a Range of Coiled Tubing Sizes
- ✓Sturdy Construction to Ensure a Long Service Life
- ✓Lightweight Alternative to Hydraulic Dimpling Jigs

Notes

- ✓ Other sizes & connections available upon request
- ✓ Values shown are for standard service tools

RESERVOIR GROUP

➢ Coiled Tubing External Dimpling Connector

Well Intervention External Dimple Coiled Tubing Connector is used when the internal surface of the Coiled Tubing is unable to provide a sealing surface, due to pitting from acid or corrosion.

The larger bore of this connector enables higher flow rates and larger drop- ball sizes to be used. The assembly is also useful when an external end connector with a minimal OD is required.

The outer surface of the Coiled Tubing is prepared using emery cloth to provide a sealing surface. Using the Well Intervention External Dimpling Tool, the surface of the Coiled Tubing can be dimpled. The connector is then installed over the end of the Coiled Tubing, and the dimpling screws are tightened into the impressions made from the dimpling tool.

Design Features

- ✓Simple Design
- ✓Internal Reaming NOT Required
- ✓Standard & H2S Service Versions Available
- ✓Simple Maintenance in the Field
- ✓Suitable for All Wall Thicknesses of a Given Coiled Tubing OD
- ✓Allows Full-Bore Flow Through the Connector
- ✓Perfect Solution for Light Applications Such as Nitrogen (N2) Lifting or Fluid Pumping
- ✓Useful Alternative When Internal Connectors Are Unable to Provide a Seal

Tool Specifications

Tool OD	Coil OD	Tensile Yield	Torsional Yield	Standard Connections
Ø2-1/8”	Ø1-½”	63,000 lbs	1,375 ft-lbs	1-½” AMMT
Ø2-¼”	Ø1-¾”	63,000 lbs	1,375 ft-lbs	1-½” AMMT
Ø2-1/8”	Ø2.000”	63,000 lbs	1,375 ft-lbs	2-3/8” PAC DSI
Ø2-7/8”	Ø2-3/8”	63,000 lbs	1,750 ft-lbs	2-3/8” PAC DSI

Notes

- ✓ Other sizes & connections available upon request
- ✓ Yield Values shown are for standard service tools

RESERVOIR GROUP

Coiled Tubing Roll-On Connector

The Coiled Roll-On Connector provides a reliable means of connecting the Bottom Hole Assembly (BHA) to the Coiled Tubing.

Prior to installation of the Roll-On Connector, the internal weld bead (flashing) can be removed from the coiled tubing using the Internal Coiled Tubing Reamer or with a die-grinder where permitted. The in-line connector is then attached by crimping the Coiled Tubing into the pre-formed channels on the connector body, using a Roll-On Connector Crimping Tool. Pressure containment is provided by O-Rings located between the channels on the connector.

The Roll-On Connector is available for all Coiled Tubing sizes between 1" and 3-1/2" OD. These connectors can be supplied with an OD the same size as the Coiled Tubing to accommodate "slick" (Slim-Hole) tool strings, as well as supplied with industry-standard connections or as per customer requirements. Specialist versions are available upon request.

Tool Specifications

Coil OD	Coil OD & W/t	Tensile Yield	Standard Connections
Ø1-11/16"	Ø1-¼" x 0.095"w/t	34,000 lbs	1.000" AMMT
Ø1-11/16"	Ø1-¼" x 0.145"w/t	30,000 lbs	1.000" AMMT
Ø1-½"	Ø1-½" x 0.095" w/t	55,000 lbs	1.000" AMMT
Ø1-½"	Ø1-½" x 0.145" w/t	36,500 lbs	1.000" AMMT
Ø1-¾"	Ø1-¾" x 0.095" w/t	64,000 lbs	1.000" AMMT
Ø1-¾"	Ø1-¾" x 0.045" w/t	42,000 lbs	1.000" AMMT
Ø2.000"	Ø2.000" x 0.095" w/t	115,000 lbs	1-½" AMMT
Ø2.000"	Ø2.000" x 0.145" w/t	102,000 lbs	1-½" AMMT
Ø2-3/8"	Ø2-3/8" x 0.125" w/t	115,000 lbs	1-½" AMMT
Ø2-3/8"	Ø2-3/8" x 0.204" w/t	115,000 lbs	1-½" AMMT

Design Features

- ✓ Simple, Robust One-Piece Design
- ✓ Standard & H2S Service Versions Available
- ✓ Can be Supplied with "Slick" (Slim-Hole) or Over-Sized Bottom Section
- ✓ Available for a Wide Range of Coiled Tubing ODs & Wall Thicknesses
- ✓ Supplied with Industry-Standard Connections or Client-Specific Connections
- ✓ Crimping Rollers Can Be Manufactured to Suit Coiled Tubing OD for Specific applications

Notes

- ✓ Other sizes & connections available upon request
- ✓ Yield Values shown are for standard service tools

RESERVOIR GROUP

➢ Double Flapper Check Valves

The Double Flapper Check Valves provide the primary internal well control barrier within the Coiled Tubing Bottom Hole Assembly (BHA) during "live" well intervention operations.

The Check Valves prevent the wellbore fluid and pressure from entering the Coiled Tubing string while allowing for unrestricted flow through the tool string.

The flapper valves are spring-loaded in the normally closed position but will open fully during circulation to provide a large internal Through-Bore passage of drop-balls.

The two flapper cartridges are easily removable for quick and easy inspection and redress. A high-performance elastomeric seal is used within each flapper cartridge for improved sealing performance and reliability. The dual flapper design provides full redundancy for increased safety.

DesignFeatures

- ✓ Simple, Robust Construction
- ✓ Large, Uninterrupted Through-Bore
- ✓ Dual Barrier Design for Increased Safety
- ✓ Removable Cartridges for Easy Redress
- ✓ Standard & H2S Service Versions Available
- ✓ High Pressure & High Temperature Options Available

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Standard Connections
Ø1-¼"	25,500 lbs	315 ft-lbs	1.062"-16 UN
Ø1-½"	31,500 lbs	430 ft-lbs	1.000" AMMT
Ø1-11/16"	55,000 lbs	820 ft-lbs	1.000" AMMT
Ø1-¾"	61,800 lbs	690 ft-lbs	1.000" AMMT
Ø2-1/8"	103,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø2-7/8"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø3-1/8"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC DSI
Ø3-¾"	255,500 lbs	7,250 ft-lbs	2-7/8" PAC DSI
Ø4-¾"	490,000 lbs	17,500 ft-lbs	3-½" IF

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S service versions available

RESERVOIR GROUP

C-Load Hydraulic Disconnect

The C-Load Hydraulic Disconnect is an extremely robust, heavy duty, drop- ball emergency release tool.

It allows a stuck Bottom Hole Assembly (BHA) to be detached at a pre-determined point. The inherent strength of the C-Load Hydraulic Disconnect is provided by its` unique grapple design, which also resists bending and vibrational loads.

The C-Load Hydraulic Disconnect offers excellent resistance to impact and torque loading and is suitable for heavy duty applications including below jars in a tool string, milling, under-reaming, cutting & perforating assemblies. The tool is also fitted with a rupture disc facility in order to re-establish circulation in the event of a plugged tool string.

The tool is activated by a drop-ball via the work string and applying a

pre-determined amount of pressure to activate the release mechanism. The upper portion of the tool can then be recovered from the well, leaving an internal “GS” profile for subsequent fishing operations.

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Standard Drop Ball Sizes	Pressure Rating	Standard Connections
Ø1-¼”	25,000 lbs	310 ft-lbs	Ø3/8”	5,000 psi	1.062”-16UN
Ø1-½”	31,000 lbs	430 ft-lbs	Ø7/16”	5,000 psi	1.125”-10 SA
Ø1-11/16”	51,600 lbs	750 ft-lbs	Ø9/16”	5,000 psi	1.000” AMMT
Ø2-1/8”	86,000 lbs	1,500 ft-lbs	Ø¾”	5,000 psi	1-½” AMMT
Ø2-7/8”	170,750 lbs	3,900 ft-lbs	Ø7/8”	7,500 psi	2-3/8” PAC DSI
Ø3-3/8”	200,000 lbs	5,200 ft-lbs	Ø1-¼”	5,000 psi	2-3/8” PAC DSI
Ø4-¾”	391,000 lbs	14,250 ft-lbs	Ø1-¾”	5,000 psi	3-½” IF

DesignFeatures

- ✓ Simple & Effective Emergency Release Joint
- ✓ Torque-Through Feature
- ✓ Standard Internal “GS” Profile
- ✓ Variable Shear Ratings
- ✓ Easy Field Redress & Set-up

Notes

- ✓ Other sizes & connections available upon request
- ✓ Values shown are for standard service tools

RESERVOIR GROUP

Mechanical Shear-Type Disconnect

The Mechanical Shear-Typed Disconnect is a simple and effective emergency release tool. The Shear Disconnect can be ran in place of a ball-activated tool, in situations where a drop-ball cannot be used, such as below a motor. It allows a stuck Bottom Hole Assembly (BHA) to be detached at a pre-determined tensile load.

The tool is typically used in fishing applications where a motor is used to "bait" a fish. Once the fish has been engaged with the appropriate fishing tool, an over-pull is applied to shear the Disconnect, again at a pre-determined tensile load, leaving a standard internal "GS"- type profile for subsequent fishing/ jarring operations.

Design Features

- ✓ Simple & Effective Emergency Release Joint
- ✓ Torque-Through Feature
- ✓ Standard Internal Fishing Neck Profile
- ✓ Standard & H2S Service Versions Available
- ✓ Variable Shear Ratings
- ✓ Easy Field Redress & Set-up

Tool Specifications

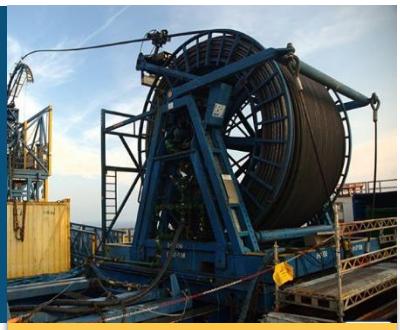
Tool OD	Max Disconnect Shear value (Brass Screws)	Max Disconnect Shear value (Steel Screws)	Fishing Yield	Pressure Rating	Standard Connections
Ø2-1/8"	13,000 lbs	19,000 lbs	115,000 lbs	5,000 psi	1-½" AMMT
Ø2-7/8"	30,000 lbs	50,000 lbs	179,000 lbs	7,500 psi	2-3/8" PAC DSI
Ø3-1/16"	30,000 lbs	50,000 lbs	210,000 lbs	5,000 psi	2-3/8" PAC DSI

Notes

- ✓ Other sizes & connections available upon request
- ✓ Yield values are shown for standard service tools

RESERVOIR GROUP

Pump-Off Disconnect



The Well Intervention Products & Services' Pump-Off Disconnect has been specifically designed for use in highly deviated and horizontal well sections.

The tool allows a stuck Bottom Hole Assembly to be disconnected and leaves a standard internal GS profile for subsequent fishing operations. However, this tool differs from standard disconnects as no over-pull is required for activation. This is especially important in long horizontal sections where there is insufficient pull at the BHA to operate the Disconnect. The tool is also equipped with a rupture disc port which allows circulation to be regained if the lower BHA is plugged off.

If a stuck BHA is encountered, a drop-ball is launched into the Coiled Tubing and circulated to the Pump-Off Disconnect. When the ball is seated, an increase in circulating pressure will be observed as the tool is activated. Once the tool has disconnected, normal circulation will be regained, and a pressure drop will be visible. The Coiled Tubing can then be pulled to surface as normal.

Design Features

- ✓ Flow-Through Capability
- ✓ Easy Make-Up/ Break-Out
- ✓ Tapered Nose For Self-Aligning
- ✓ Rotationally Locked When Made Up
- ✓ Upper Lock Nuts Locked in Place by Grub Screws

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Activation Drop Ball	Standard Connections
Ø2-1/8"	75,000 lbs	1,350 ft-lbs	Ø9/16"	1-½" AMMT

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S Service versions are available
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

S-Type Motor Head Assembly

The new standard Well Intervention S-Type Motor Head Assembly (MHA) combines three essential coil tubing BHA components into one compact unit: Dual Flapper Check Valves, Heavy Duty Hydraulic Disconnect and Dual Circulating Sub.

This MHA is now one of the shortest and lightest on the market.

The primary advantage against our standard design, with the length decreased by approximately 30%, is the benefit with rig-up height when restricted. The weight has also been reduced for ease of use. The Dual Flapper Check Valves provide the primary well control barrier within the coil tubing bottom-hole assembly during well intervention operations. The double-barrier, normally closed configuration prevents the inflow of wellbore fluids to the coil tubing whilst allowing high circulating rates to be achieved. The new Threaded CV assembly is now threaded to the Top Sub which allows assembly and disassembly without any need for a removal tool.

The MHA Hydraulic Disconnect section is an extremely robust, heavy duty, drop-ball release mechanism. It allows a stuck bottom-hole assembly to be disconnected and provides a standard internal GS profile for subsequent fishing operations. The inherent strength of the MHA Disconnect is provided by its unique grapple design which also resists bending and vibrational loads. The new improved design incorporates Release Piston Basket which firmly secures the Release Piston preventing it from falling out.

The Dual Circulation Sub section is a drop-ball activated device, which includes a standard rupture disc port. Improved Circ. Piston design allows the drop ball to seat firmly in tapered pocket making sure the tool will not lose any pressure. The burst disc can be activated to regain circulation if the lower section of the bottom-hole assembly has been plugged off

Design Features

- ✓ One of the shortest tools available
- ✓ Lighter tool to handle
- ✓ Easy assembly
- ✓ Tool rated to 10,000 psi working pressure
- ✓ Fewer external sections
- ✓ Drop Balls up to 1-1/16”
- ✓ Optimal disconnecting system
- ✓ Torque-through capability
- ✓ Extremely resistant to impact loads
- ✓ Standard & H2S Service versions available
- ✓ Variable shear ratings and ball seat sizes
- ✓ Integral Rupture Disc assists regaining circulation
- ✓ Captive placement of Disconnect Shear Screws ensures security Under vibrational Loads

Notes

- ✓ Other sizes & connections available upon request
- ✓ Yield values shown are for standard service tools
- ✓ Big Bore MHA’s with larger drop ball size also available

RESERVOIR GROUP

S-Type Motor Head Assembly

Tool Specifications

Tool OD	Tensile Yield (lbs)	Torsional Yield (ft-lbs)	Standard Drop Ball Sizes	Pressure Rating	Standard Connections	OAL	EFF. Length
2-1/8”	82,000	1,400	3/4” Disconnect 5/8” Circ. Sub Drop Ball	10,000	1-1/2” AMMT Box & Pin	27.075”	24.097”
2-7/8”	170,300	3,900	1-1/16” Disconnect 15/16” Circ. Sub Drop Ball	10,000	2-3/8” Std. Pac Box & Pin	33.547”	31.297”

RESERVOIR GROUP

C-Load Motor-Head Assembly

The C-Load Motor-Head Assembly (MHA) combines three essential Coiled Tubing BHA components into one compact unit: Double-Flapper Check Valves, heavy duty Hydraulic Disconnect and Dual-Acting Circulating Sub. High-Pressure/ Extreme Temperature (15,000 PSI/ 232° C/ 449.6° F) option also available.

The Double-Flapper Check Valves provide the primary well control barrier, within the Coiled Tubing Bottom Hole Assembly (BHA), during well intervention operations. The double barrier, normally closed configuration prevents the inflow of wellbore fluids to the Coiled Tubing, while still allowing high circulating rates to be achieved.

The C-Load Hydraulic Disconnect section is an extremely robust, heavy duty, drop-ball release mechanism. It allows a stuck Bottom Hole Assembly (BHA) to be disconnected and provides a standard internal "GS" profile for subsequent fishing operations. The inherent strength of the C-Load Disconnect is provided by its' unique grapple design, which also resists bending and vibrational loads.

The Dual-Acting Circulating Sub is a drop-ball-activated device, which includes a standard rupture disc port. The shear rating of the circulating piston can be adjusted to suit specific well conditions.

The rupture disc can be activated to regain circulation if the lower section of the Bottom Hole Assembly (BHA) has been plugged off

The shear rating of the Disconnect and circulating sections can be adjusted to suit specific well conditions.

Design Features

- ✓ Torque-Through Capability
- ✓ Standard & H2S Service Versions Available
- ✓ Variable Shear Ratings & Ball Seat Sizes
- ✓ Integral Rupture Disc Assists in Regaining Circulation
- ✓ Well-Proven, Reliable, Robust & Compact Design
- ✓ Maintenance & Redress Readily Performed in the Field
- ✓ High Pressure/ High Temperature Versions Available
- ✓ Extremely Resistant to Vibrational & Impact Loads
- ✓ Torque Transmission Clutches Positioned to Minimize Risk of Damage During Operation
- ✓ Captive Placement of Disconnect Shear Screws Ensures Security Under Vibrational Loads

Notes

- ✓ Other sizes & connections available upon request
- ✓ Yield values shown are for standard service tools
- ✓ Medium Pressure MHAs Also Available
- ✓ High Pressure MHAs Also Available
- ✓ Big Bore MHAs with Larger Drop-Ball Sizes Also Available

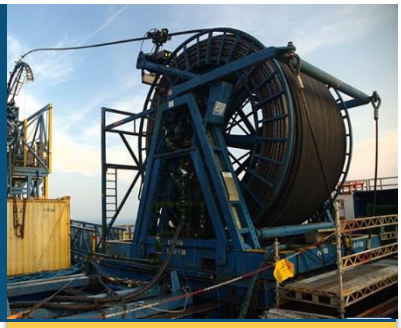
RESERVOIR GROUP

➢ C-Load Motor-Head Assembly

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Standard Drop Ball Sizes	Pressure Temp Rating	Standard Connections
Ø1-¼"	25,500 lbs	315 ft-lbs	Ø3/8" (Disconnect) Ø5/16" (Circ. Sub)	5,000 psi / 190 °C	1.062"-16UN
Ø1-½"	31,000 lbs	430 ft-lbs	Ø7/16" (Disconnect) Ø3/8" (Circ. Sub)	5,000 psi / 190 °C	1.125"-10 SA
Ø1-11/16"	34,250 lbs	500 ft-lbs	Ø9/16" (Disconnect) Ø½" (Circ. Sub)	7,500 psi / 190 °C	1.000" AMMT
Ø1-11/16"	34,250 lbs	500 ft-lbs	MPHT Ø9/16" (Disconnect) Ø½" (Circ. Sub)	10,000 psi / 190 °C	1.000" AMMT
Ø1-11/16"	34,250 lbs	500 ft-lbs	HPHT Ø9/16" (Disconnect) Ø½" (Circ. Sub)	15,000 psi / 190 °C	1.000" AMMT
Ø1-¾"	51, 600 lbs	750 ft-lbs	Ø9/16" (Disconnect) Ø½" (Circ. Sub)	5,000 psi / 190 °C	1-½" AMMT
Ø2-1/8"	86,000 lbs	1,500 ft-lbs	Ø¾" (Disconnect) Ø5/8" (Circ. Sub)	5,000 psi / 190 °C	1-½" AMMT
Ø2-1/8"	86,000 lbs	1,500 ft-lbs	MPHT Ø¾" (Disconnect) Ø5/8" (Circ. Sub)	1,000 psi / 190 °C	1-½" AMMT
Ø2-1/8"	86,000 lbs	1,500 ft-lbs	HPHT Ø¾" (Disconnect) Ø5/8" (Circ. Sub)	15,000 psi / 190 °C	1-½" AMMT
Ø2-7/8"	170,750 lbs	3,900 ft-lbs	Ø7/8" (Disconnect) Ø¾" (Circ. Sub)	7,500 psi / 190 °C	2-3/8" PAC DSI
Ø2-7/8"	194,750 lbs	4,300 ft-lbs	MPHT Ø7/8" (Disconnect) Ø3/4" (Circ. Sub)	10,000 psi / (190°C)	2-3/8" PAC DSI
Ø2-7/8"	170,000 lbs	3,700 ft-lbs	HPHT Ø7/8" (Disconnect) Ø3/4" (Circ. Sub)	15,000 psi / (190°C)	2-3/8" PAC DSI
Ø2-7/8"	194,750 lbs	4,300 ft-lbs	**HPET** Ø3/4" (Disconnect) Ø5/8" (Circ. Sub)	**15,000 psi / (232°C)**	2-3/8" PAC DSI
Ø3-1/8"	180,000 lbs	4,600 ft-lbs	Ø7/8" (Disconnect) Ø¾" (Circ. Sub)	5,000 psi / 190 °C	2-3/8" PAC DSI
Ø4-¾"	391,000 lbs	14,250 ft-lbs	Ø1-¾" (Disconnect) Ø1- 5/8" (Circ. Sub)	5,000 psi / 190 °C	3-½" IF

Quick Connect



The Reservoir Group Quick Connect is a self-aligning, tool-string connection assembly, capable of withstanding high degrees of torque in both directions

The Quick Connect is designed to assist in situations where it is difficult to rotate the tools to engage threads, which can be an issue with longer tool strings. It may also be used to assist in pressure deploying & de-deploying operations. It can also be used when the tool-string cannot be turned during deployment, contains a fine thread or when working at heights is an issue. The tool has full pressure integrity once the two parts are locked together.

Use of the Quick Connect allows the BHA to be divided into more manageable sections.

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Standard Connections
Ø2-1⁄8”	68,000 lbs	1,200 ft-lbs	1-1⁄2” AMMT
Ø2-7⁄8”	109,500 lbs	1,750 ft-lbs	2-3⁄8” PAC DSI
Ø3-3⁄4”	255,500 lbs	7,250 ft-lbs	2-7⁄8” PAC DSI
Ø4-3⁄4”	490,000 lbs	15,750 ft-lbs	3-1⁄2” IF

Design Features

- ✓ Flow through capability
- ✓ Easy make up / break out
- ✓ Tapered nose for self-aligning
- ✓ Rotationally locked when made up
- ✓ Standard & H2S Service versions available
- ✓ Upper lock nuts locked in place by grub screws

Notes

- ✓ Other sizes & connections available upon request
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

➢ Dual-Acting Circulating Sub

The combined Dual-Acting Circulating Sub has been designed to save wear on Bottom Hole Assembly components and to provide an increased flow rate through tools after activation.

A drop-ball Circulating Sub is typically used on drilling or milling BHAs. At the required depth a drop-ball is launched into the Coiled Tubing or Jointed Pipe and pumped down to the Circulating Sub. When the ball seats and pressure is increased, a piston within the tool is shifted, which allows flow to be directed to the annulus. This isolates further flow through the motor and allows the flow rate to be increased. The resulting higher annular flow assists in cleaning debris from the wellbore.

The Circulating Sub can also be fitted with a rupture disc port which allows circulation to be regained in an emergency situation.

Design Features

- ✓ Easily Field Re-Dressable
- ✓ Optional Rupture Disc Available
- ✓ Easy to Assemble & Operate
- ✓ Surface Indication of Successful Activation
- ✓ Various Circulation Port Sizes Available to Suit Expected Well Conditions
- ✓ Interchangeable Circulation Piston Allows Different Sizes of Drop-Balls to be Used

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Standard Drop Ball Sizes	Pressure Rating	Standard Connections
Ø1-11/16”	55,000 lbs	690 ft-lbs	Ø7/16”	5,000 psi	1.000” AMMT
Ø2-1/8”	115,000 lbs	1,600ft-lbs	Ø5/8”	5,000 psi	1-1/2” AMMT
Ø5/8”	115,000 lbs	1,600 ft-lbs	Ø7/8”	5,000 psi	1-1/2” AMMT
Ø2-7/8”	210,000 lbs	3,900 ft-lbs	Ø7/8”	5,000 psi	2-3/8” PAC DSI
Ø2-7/8”	210,000 lbs	4,800 ft-lbs	Ø1-3/16”	5,000 psi	2-3/8” PAC DSI
Ø3-1/8”	210,000 lbs	4,800 ft-lbs	Ø1-1/4	5,000 psi	2-3/8” PAC DSI
Ø3-1/8”	312,000 lbs	5,800 ft-lbs	Ø1-1/4”	5,000 psi	2-3/8”REG
Ø4-3/4”	570,000 lbs	18,000 ft-lbs	Ø2-1/8”	5,000 psi	3- 1/2 IF

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S Service Versions Available
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

Dual Pump-Out Sub

The Dual Pump-Out Sub is a pressure-activated tool which prevents wellbore fluid from entering the work string as it is ran in hole.

Two pressure-retaining shear plugs are fitted to this sub, to provide the required double-barrier isolation. The tool is commonly used to confirm the pressure integrity of a velocity string. Following installation of the string, once string integrity has been confirmed, pressure inside the velocity string is increased to the required value to shear the screws retaining the plugs in position.

This then allows the plugs to exit the lower section of the sub. Fluids can now be produced through the velocity string.

Design Features

- ✓ Adjustable Shear Rating
- ✓ Simple Design & Operation
- ✓ Shear Screws Positioned Internally
- ✓ Internal & External Pressure Integrity
- ✓ Full-Bore Access Following Tool Activation

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Pressure Rating	Standard Connections
Ø2-1/16”	65,000 lbs	1,100 ft-lbs	5,000 psi	1-½”(#2.9) CS Hydril
Ø2-1/8”	64,000 lbs	1,100 ft-lbs	5,000 psi	1-½”(#2.9) CS Hydril
Ø2-¼”	79,000 lbs	1,400 ft-lbs	5,000 psi	1-½”(#2.9) CS Hydril
Ø2-9/16”	64,000 lbs	1,600 ft-lbs	5,000 psi	2-3/8” (#4.6) VAM FJL
Ø2-5/8”	64,000 lbs	1,600 ft-lbs	5,000 psi	2-3/8” (#4.6) VAM FJL
Ø2-7/8””	64,000 lbs	1,600 ft-lbs	5,000 psi	2-3/8” (#4.6) VAM FJL
Ø3-1/8”	170,000 lbs	4,000 ft-lbs	5,000 psi	2-3/8” EUE
Ø3-3/8”	199,000 lbs	5,000 ft-lbs	5,000 psi	2-7/8” (#6.4) VAM TOP

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S Service Versions Available
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

DEBRIS REMOVAL- JETTING & CIRCULATING

Return Link Product List

RESERVOIR GROUP

Annular Flow Sub

The Annular Flow Sub has been designed to allow switching of flow between the RIH mode of split flow between annular and through the tool, to purely through the tool by means of pumping a drop ball.

The tools ball seating piston can be changed to accommodate various sizes of drop ball and alternatively, a blank plug can be fitted which will direct all flow to the annulus. This can be especially useful when running inflatable packers as it helps to ensure the packer will not inflate prematurely.

When the required depth is reached, a drop-ball is pumped to the Annular Flow Sub. An increase in pressure will be observed as the ball seats in the tool. When the pins in the tool are sheared the tool is activated and a pressure drop indication is noticeable at the surface. The annulus ports are sealed and flow is directed through the bore of the BHA.

Design Features

- ✓ Single Use Per Run
- ✓ Surface Indication of Successful Activation
- ✓ Controlled Setting of Inflatable Down-Hole Components
- ✓ Can be Fitted With Various Nozzles, or Blanks to Suit Requirements

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Standard Drop Ball Sizes	Pressure Rating	Standard Connections
Ø2-1/8”	102,000 lbs	1,600 ft-lbs	Ø½”	5,000 psi	1-½” AMMT
Ø2-7/8”	170,000 lbs	3,900 ft-lbs	Ø½”	5,000 psi	2-3/8” PAC DSI

Notes

- ✓ Other sizes & connections available upon request

RESERVOIR GROUP

In-line Down-Hole Filter

The In-line Filter prevents the passage of debris into the Bottom Hole Assembly components. This is especially important in locations where the fluid supply may be contaminated or contain sediments.

The filter screen is contained within the main body of the assembly and can easily be removed for inspection, cleansing and replacement. The tools are supplied with 80 micron or 300 micron filters and others are available upon request.

The In-line filter is typically ran above tools with fine tolerances, such as jetting nozzles, rotating jetting tools and cavitation tools.

Design Features

- ✓ Efficient Design/ Minimal Number of Components
- ✓ Provides Debris Restriction of Critical BHA Components
- ✓ Easy Replacement of Filters
- ✓ Variety of Micron-Rated Filters Available

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Pressure Rating	Standard Connections
Ø1-11/16”	38,400 lbs	575 ft-lbs	5,000 psi	1.000” AMMT
Ø2-1/8”	115,000 lbs	1,600 ft-lbs	5,000 psi	1-½” AMMT
Ø2-5/8”	115,000 lbs	1,600 ft-lbs	5,000 psi	1-½” AMMT

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S Service Versions Available
- ✓ Yield values shown are for standard service tools

Jetting & Cementing Nozzles

Well Intervention Products & Services' Jetting Nozzles are available in multiple orientations and configurations i.e. up, down, lateral or rotational. Standard Jetting Nozzles are provided with machined ports and threaded nozzle inserts. Variety of inserts are also available.

All Nozzle types and sizes can be manufactured to customer requirements.

Tool Specifications

Tool OD	Hole Sizes	Tensile Yield	Torsional Yield	Standard Connections
Ø1-¼"	5 x Ø5 mm	52,000 lbs	690 ft-lbs	0.970" Stub Acme
Ø1-3/4"	5 x Ø6 mm	61,870 lbs	690 ft-lbs	1.000" AMMT
Ø2-1/8"	5 x Ø6 mm	115,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø2-½"	5 x Ø3/16"	115,000 lbs	1,600 ft-lbs	1-½" AMMT
Ø2-7/8"	5 x Ø¼"	210,000 lbs	4,800 ft-lbs	2-3/8" PAC Dsi
Ø3-1/8"	5 x Ø5/16"	362,000 lbs	5,800 ft-lbs	2-3/8" REG
Ø3-½"	5 x Ø7/16"	362,000 lbs	5,800 ft-lbs	2-3/8" REG
Ø3-¾"	5 x Ø½"	362,000 lbs	5,800 ft-lbs	2-3/8" REG

RESERVOIR GROUP

➢ SpinCat™ Rotary Wash Tool

The SpinCat™ family of tools provide a durable, controlled rotation solution for well intervention operations. A viscous fluid governor controls rotation speed to maximize jet power delivered to the tubing or casing walls. By using only a few rotating jets, each jet is bigger to convey hard-hitting power. Replaceable jets are efficient and clean recesses and irregular surfaces without damaging the well tubulars. Over thirty years of waterjet engineering back the SpinCat™ design, setting the standard for rotary nozzle performance and durability.

The SpinCat ™ is an extremely durable, self-rotating nozzle for well service applications. The powerful rotating jet design is engineered to maximize the limited hydraulic horsepower available to the BHA at the end of a long-Coiled Tubing or Jointed Pipe work string. Jet reaction force powers rotation of the head and in internal centrifugal speed control mechanism maintains rotation speeds.

SpinCat™ tools have a straight flow-through design with a leak free high-pressure seal, so pump power is not wasted.

Sizes available in 1-11/16”, 2-1/8”, 2-1/2” & 2-7/8” OD

Design Features

- ✓ Rotating Assembly for Complete 360° Coverage
- ✓ Simple Maintenance- Field Serviceable
- ✓ Durable Fluoro-Elastomer Seals
- ✓ Replaceable 1/8” Attack-Tip™ Nozzle(s)
- ✓ Computerized Diagnostic Analysis
- ✓ Controlled Rotation-Increases Dwell Time

Notes

- ✓ Other sizes & connections available upon request

RESERVOIR GROUP

SpinCat™ Rotary Wash Tool

Tool Specifications

Model	SC-168™	SC-212™	Ø 2.50”	Ø 2.875”
Max. Pressure	5,000 psi 345 bar	5,000 psi 345 bar	5,000 psi 345 bar	5,000 psi 345 bar
Flow Range	0.7 - 1.3 bpm 111 - 207 lpm	0.8 - 2.0 bpm 127 - 318 lpm	1.0 - 3.0 bpm 160 - 480 lpm	1.0 - 3.0 bpm 160 - 480 lpm
Flow Rating	2.3 Cv	4.6 Cv	7.5 Cv	7.5 Cv
Outside Diam.	1.68 in 43 mm	2.12 in 54 mm	2.50 in 64 mm	2.87 in 73 mm
Overall Length	9.8 in 250 mm	12.3 in 312 mm	16 in 406 mm	15.6 in 396 mm
Inlet	1” AMMT	1-1/2” AMMT	1-1/2” AMMT	2-3/8” PAC
Rotation Speed	150-200 rpm	150-200 rpm	80-150 rpm	80-150 rpm
Weight	4.6 lbs 2 kg	8.9 lbs 4 kg	15.9 lbs 7.2kg	20 lbs 9.1 kg
PSI Loss @ 1 bpm	330 psi 23 bar	83 psi 6 bar	31 psi 2 bar	31 psi 2 bar
Max. Pressure	390°F 200°C	390°F 200°C	390°F 200°C	390°F 200°C

RESERVOIR GROUP

Venturi Junk Basket

The Venturi Junk Basket is used to remove debris from the wellbore. Based upon the "Venturi Principle", this tool functions similarly to a vacuum cleaner and allows solids to be stored in an integral debris chamber and transported to surface for safe disposal.

The Venturi Junk Basket operates by pumping fluid through external nozzles in the tool to an internal debris chamber. The increase in fluid velocity at the nozzles results in a reduction of pressure in the Venturi chamber. This pressure differential creates a circulation path through the tool carrying loose debris into the debris chamber.

A filter screen in the tool prevents debris from blocking the flow path in the Venturi chamber. When circulation through the tool is stopped, "finger

catcher" at the bottom of the tool close preventing solids from falling back into the wellbore. The capacity of the debris chamber can be increased by adding wash pipe extensions.

The Venturi Junk Basket can also be run with a Wash Over Shoe fitted to the bottom of the Venturi. When used in conjunction with a down-hole motor, this provides the facility for debris removal in operations such as milling or washing over a fish.

Design Features

- ✓ Interchangeable Nozzles Allows for Various Flow Rates & Pressures
- ✓ Debris Chamber can be Enlarged with Wash Pipe Extensions
- ✓ Can be Operated by Pumping Fluid, Gas or a Combination of Both
- ✓ Can be Used with a Mud Motor
- ✓ Catcher Sub Available as a Stand-Alone Item

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Pressure Rating	Standard Connections
Ø1-11/16"	37,250 lbs	400 ft-lbs	5,000 psi	1.000"AMMT x 1-11/16" CWP
Ø1-13/16"	40,500 lbs	430 ft-lbs	5,000 psi	1.000"AMMT x 1-13/16" CWP
Ø2-1/16"	48,650 lbs	730 ft-lbs	5,000 psi	1-½" AMMT x 2-1/16" CWP
Ø2-¼"	56,900 lbs	800 ft-lbs	5,000 psi	1-½" AMMT x 2-¼" CWP
Ø2-5/8"	76,500 lbs	1,180 ft-lbs	5,000 psi	1-½" AMMT x 2-¼" CWP
Ø3-1/8"	82,000 lbs	3,200 ft-lbs	5,000 psi	2-3/8" PAC Dsi x 3-1/8" CWP

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S Service Versions Available
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

FISHING-CATCH & PULL

Return Link Product List

RESERVOIR GROUP

Lead Impression Block

The Lead Impression Block (LIB) is is used to make an accurate impression of an obstruction or a fish down hole. With this impression it is possible to determine the dimensions and configuration of the upper end of a fish as well as its' condition and position in the well. This information well help determine the selection of the fishing tool required to retrieve the fish.

The Lead Impression Block is a steel cylinder housing with soft lead molded at the bottom. The LIB is ran on the bottom of a tool string and will be ran in-hole just above the fish or obstruction. As weight is set slowly onto the fish top/ obstruction, in impression is cast into the lead mold. Impressions should only be made once prior to pulling out of hole. Repeated impressions can overlap each other, rendering it impossible to interpret once back on surface.

The Lead Impression Block can be redressed to use again by remolding the lead insert.

Benefits

- ✓ Provides an impression of the top of a fish or obstruction
- ✓ Low-cost alternative to down-hole cameras
- ✓ Flow-Through design allows circulation through the tool
- ✓ Side-Mounted circulation ports allow-full-face impression
- ✓ Easy to dress & use again

RESERVOIR GROUP

Flow-Release GS Spear

The Flow-Release GS Spear provides a reliable method of attaching to and retrieving tools with an internal "GS"- type fish neck.

To latch into a fish neck, run the tool in hole above the fish, kick in pumps then stab into the GS profile. When the pump is stopped, the tool will return to the latched position and the downhole assembly can be retrieved to surface.

To release the tool from the fish neck, weight is set down on the BHA and the flow rate is increased. Flow through the tool creates back pressure which acts on an internal piston, causing the grapple to retract into the release position.

The orifice is easily accessible and can be changed so that the release pressure is attained at the desired flow rate.

Design Features

- ✓ Simple, Robust Design With Minimal Number of Components
- ✓ Flow-Through Capability
- ✓ Interchangeable Orifices
- ✓ Easily Field Redressable

Tool Specifications

Tool OD	Tensile Yield	Nominal F/N Size	Standard Connection
Ø1-½"	26,500 lbs	1-½" GS Profile	1.000" AMMT
Ø1-11/16"	40,500 lbs	2.000" GS Profile	1.000" AMMT
Ø2.000"	56,000 lbs	2.000" GS Profile	1-½" AMMT
Ø2-1/8"	88,000 lbs	2-½" GS Profile	1-½" AMMT
Ø2-7/8"	155,000 lbs	3.000" GS Profile	2-3/8" PAC
Ø3-5/8"	244,000 lbs	4.000" GS Profile	2-3/8" PAC
Ø4-7/16"	244,000 lbs	5.000" GS Profile	2-3/8" PAC
Ø5-½"	244,000 lbs	6.000" GS Profile	2-3/8" PAC
Ø5-¾"	244,000 lbs	7.000" GS Profile	2-3/8" PAC

RESERVOIR GROUP

➢ Flow-Release Slick-Catch Spear

The Flow-Release Slick-Catch Spear provides a method of engaging and recovering tubulars or other types of equipment with a slick internal profile. The Slick-Catch Spear can also be used where standard internal fish neck profiles have become damaged preventing the use of standard pulling tools.

To latch into a fish neck, run the tool in hole above the fish, kick in pumps then stab into the ID. To release the tool from the fish, simply set down weight on the BHA while circulating at a pre-determined flow rate through the tool. Flow through the tools' adjustable orifice creates the backpressure required to move the latch grapple into the release position. The internal spring returns the grapple to the engaged position when flow through the tool is stopped. The tool can be functioned as many times as required.

The Flow-Release Slick-Catch Spear's adjustable orifice is easily changed to adjust the activation flow rate and pressure to suit each application. Flow through the tool can also be used to wash debris from above as well as inside the fish top prior to making engagement.

Design Features

- ✓ Hydraulic Operation, no shear screws required
- ✓ Flow-Through capability
- ✓ Can be functioned multiple times
- ✓ High Tensile strength for jarring operations
- ✓ Torque-Through version also available
- ✓ Range of "Catch" sizes available for each tool

Tool Specifications

Tool OD	Tensile Yield	Min Catch	Release Pressure	Standard Connection
Ø1-3/4"	43,000 lbs	Ø1.297"	660psi	1.000" AMMT
Ø2-1/8"	54,000 lbs	Ø1.563"	700psi	1-1/2" AMMT
Ø2-7/8"	140,000 lbs	Ø2.500"	500psi	2-3/8" PAC DSI
Ø3.000"	140,000 lbs	Ø2.500"	500psi	2-3/8" PAC DSI
Ø3-1/8"	161,000 lbs	Ø3.125"	350psi	2-3/8" PAC DSI

RESERVOIR GROUP

➢ Flow-Release JDC Pulling Tool

The Flow-Release JDC Pulling Tool is used for the running and retrieval of equipment fitted with an external JDC-style fish neck.

For retrieval operations, run the tool in hole above the fish, kick in pumps then go over the external fishing profile. When the pump is stopped, the tool will return to the latched position and the downhole assembly can be retrieved to surface.

The Coiled Tubing is then slowly pulled out of the hole which causes the grapple within the pulling tool to engage the fish neck. Once latched onto the fish neck, pulling and jarring operations may commence.

To release the Pulling Tool from the fish, the weight is set to neutral and flow through the tool is established. This creates a pressure differential which releases the grapple from the fish neck, allowing the tool to be pulled free.

The "release" flow rate is altered by changing the nozzle fitted to the tool, and this is easily performed on location.

Tool Specifications

Tool OD	Tensile Yield	Largest F/N Size	Release Pressure	Standard Connection
Ø2-1/8"	76,000 lbs	Ø1-3/8"	350psi	1-½" AMMT
Ø2-5/8"	115,000 lbs	Ø1-¾"	200psi	1-½" AMMT
Ø2-7/8"	65,000 lbs	Ø2-5/16"	200psi	2-3/8" PAC DSI
Ø3-3/8"	165,000 lbs	Ø2-5/16"	200psi	2-3/8" PAC DSI

Design Features

- ✓ Simple, Robust Design With Minimal Number of Components
- ✓ Interchangeable Grapples With a Wide Range of Catch Sizes
- ✓ Easily Calibrated on Location
- ✓ Available With Threaded Main Body to Allow Over-Size Guides to be Fitted

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard H2S service versions available

RESERVOIR GROUP

➢ Flow-Release Slick-Catch Overshot

The Flow-Release Slick-Catch Overshot is designed to engage and retrieve tubing or tools with a "slick" outside diameter. The hydraulically operated Overshot may be repeatedly released from the fish as required.

For retrieval operations, run the tool in hole above the fish, kick in pumps then go over the slick outside diameter of the fish. When the pump is stopped, the tool will return to the latched position and the downhole assembly can be retrieved to surface. The Coiled Tubing is then slowly pulled out of the hole which causes the grapple within the overshot to fully engage the fish neck. Once latched onto the fish neck, pulling and jarring operations may commence.

To release the Slick-Catch Overshot from the fish, the weight of the string is set to neutral and flow through the tool can be established. This creates a pressure differential which releases the grapple, allowing the tool to be pulled free.

The "Release" flow rate is easily altered by changing the nozzle fitted to the tool. Flow through the tool can also be used to wash debris from the top of the fish prior to latching.

Tool Specifications

Tool OD	Tensile Yield	Largest F/N Size	Release Pressure	Standard Connection
Ø2-1/8"	80,000 lbs	Ø1-½"	150psi	1-½" AMMT
Ø2-5/16"	85,000 lbs	Ø1-11/16"	200psi	1-½" AMMT
Ø2-5/8"	96,000 lbs	Ø2.000"	200psi	1-½" AMMT
Ø2-7/8"	105,000 lbs	Ø2-¼"	200psi	2-3/8" PAC DSI
Ø3-1/8"	115,000 lbs	Ø2-½"	200psi	2-3/8" PAC DSI
Ø3-3/8"	84,000 lbs	Ø2-7/8"	200psi	2-3/8" PAC DSI
Ø3-5/8"	194,000 lbs	Ø2-7/8"	200psi	2-3/8" PAC DSI
Ø4-½"	210,000 lbs	Ø3-½"	200psi	2-3/8" PAC DSI

Design Features

- ✓ Simple, Robust Design With Minimal Amount of Components
- ✓ Interchangeable Grapples With a Wide Range of Catch Sizes
- ✓ Easily Field Redressable
- ✓ Available With Threaded Main Body to Allow Over-Size Guides to be Fitted

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard H2S service versions available

Bowen Series 10 & 20 Overshots

The Series 10 Overshot is a small diameter tool used to engage and retrieve sucker rods, couplings or other small diameter tools. The field- proven and reliable design provides the strongest tool available to externally engage and pull a fish in slim-hole applications.

The Overshot can be used for Coiled Tubing or Jointed Pipe operations. When the Overshot is ran on Jointed Pipe or in certain Coiled Tubing operations it can be released with right-hand rotation.

Various sizes and styles of guides can be fitted to the Overshot to help align with the fish.

The Series 20 Short-Catch Overshot is a small diameter tool specifically designed to externally engage a short profile fish top, where the Series 10 Overshot cannot.

The grapple control is positioned above the basket grapple rather than below it to allow the basket grapple to be placed in the lowest part of the bowl/ closest to the fish top

Benefits

- ✓ Released With Right-Hand Rotation
- ✓ High Tensile Strength for Jarring Operations
- ✓ Proven, Reliable Design
- ✓ Various Catch Size for Each Tool

Notes

- ✓ Various sizes & catch ranges available upon request

Bowen Series 70 Short-Catch Overshot

The Series 70 Short-Catch Overshot is specifically designed to engage a portion of a fish too short to engage with a conventional Overshot.

The grapple control is positioned above the basket grapple rather than below it to allow the basket grapple to be placed in the lowest part of the bowl/ as close as possible to the fish top.

The Overshot can be used in Coiled Tubing and Jointed Pipe operations. When the Overshot is used in conjunction with Jointed Pipe or in certain Coiled Tubing operations, the Overshot can be released by rotating to the right.

Benefits

- ✓ Released With Right-Hand Rotation
- ✓ Large Flow-Thru Capability
- ✓ High Tensile Strength for Jarring Operations
- ✓ Proven, Reliable Design
- ✓ Various Catch Sizes Available for Each Tool

Notes

- ✓ Specs Available Upon Request
- ✓ The Grapple Overshot is directly available in a range from 2-5/8" OD to 4-3/8" OD with a Catch range of 2-1/2" – 3-3/8" OD.

RESERVOIR GROUP

Bowen Series 150 Overshot

The Bowen Series 150 Overshot is the strongest tool available to externally engage, pack-off and pull a fish. The basic simplicity and rugged construction with which it is designed has made it the standard for all external fishing tools.

The Bowen Grapple Overshot is composed of three external components: The Drive Sub, Bowl & Guide. The basic Overshot may be dressed with either two sets of internal parts, depending on whether the fish to be caught is near maximum size for the particular Overshot.

If the fish diameter is near the maximum catch of the Overshot, a Spiral

Grapple will be used.

If the fish diameter is considerably below the maximum catch size (usually ½"), a Basket Grapple will be used.

Releasing the tool requires right hand rotation, which cannot be achieved by Coiled Tubing. If a release feature is required, a releasing tool should be ran above it.

The Grapple Overshot is used when there are parts of the BHA or Coiled Tubing separates down-hole. It can also be used to reconnect a stuck section of parted Coiled Tubing in order to allow a Chemical Cutter to be ran on wireline.

The Bowen Overshot ranges from 2-1/8" OD – 4-11/16" OD with a catch range of 1" OD – 3-3/4" OD. Other sizes available upon request.

➢ Pick-Up/ Bulldog Overshot

The Pick-Up/ Bulldog Overshot has been designed for the retrieval of fish with a large outside diameter. It is often the only available method of retrieving such fish, and the design is simple and robust. The Overshot is fitted with a 'C' Grapple which is located in a tapered bowl to provide the required clamping force.

The tool is operated by running the Overshot over the fish neck. As the tool is picked up, the Grapple compresses around the fish neck and the assembly is pulled out of hole to surface. Once engaged, the tool cannot be released.

Design Features

- ✓ Simple & Robust Design
- ✓ Small Ratio of Fish OD to Overshot OD

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S service versions available
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

Flow- Release Bull Dog Spear

The Flow-Activated Releasable Fishing/ Bull Dog Spear

is a variable catch, internal spear used to retrieve a lost-in-hole cylindrical fish from the well bore.

A complete range of slips are available for each tool size. To operate, simply run into the fish and set down weight, pick up and retrieve the fish. To release from the fish, set down the weight and circulate in conjunction with a Hydraulic Sequencing Tool above the spear. The spear will then release due to the flow-created differential pressure.

When ordering flow-activated releasable fishing/bulldog spears, please specifiy:

- ✓ **Size**
- ✓ **Thread connection**
- ✓ **Additional slips required**

Design Features

- ✓ Flow or Drop-Ball Activated
- ✓ Hardened & Double-Tempered Slips
- ✓ Robust Construction
- ✓ Variable Slip Sizes for Each Tool

Tool Specifications

Nominal Size	2”	2½”	3”	3½”	4”
Maximum O.D.	1.850”	2.250”	2.626”	3.110”	3.625”
Minimum I.D. (without choke)	0.250”	0.390”	0.390”	0.390”	0.390”
Tensile Strength (Standard service)	37,000 lbs	59,000 lbs	80,000 lbs	80,000 lbs	84,000 lbs
Make-Up Length	18.38”	21.62”	24.30”	24.30”	24.30”
Standard Slips Supplied	1-3/8” - 1½”	2” - 2-1/8”	2¼” - 2-3/8”	2-5/8” - 2¾”	3-1/8” - 3¼”

RESERVOIR GROUP

KELO Socket Overshot

The KELO Socket Overshot is specially designed for Coiled Tubing and HWO operations to catch Out-of-Round fish tops. It is designed to catch fish with a flat moulded top i.e. collapsed tubing or capillary coil, as well as corroded pipe or fish made of hardened material (difficult to make engagement).

This special pulling tool is designed to catch fish externally. The KELO Socket Overshot has an angled path inside the tool with a big tapered entry on the bottom for a smooth entrance for the fish. Various sized guides are available for the KELO Socket Overshot to decrease the clearance between the fish and tool in bigger tubulars or casings and achieve better catch chances.

The KELO Socket Overshot has no release possibility of its own. If a release feature is required, a releasing tool should be run above it.

Various sized grapples are available for the KELO Socket Overshot to fit 0.125" – 1.25" OD fish. Other sizes available upon request

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Benefits

- ✓ Specially Designed to Catch Out-of-Round Fish Tops Where a Standard Overshot Will Not Catch
- ✓ Also Ideal to Catch Corroded Fish or Hardened Material Fish
- ✓ Various Sized Grapples Available Upon Request

Tool Specifications

Outside Diameter	2-5/8"	67mm
Inside Diameter	N/A	—
Catch Range	0.125" - 1.250"	3.175mm - 31.75mm
Length	29.625"	752mm
Weight	32.3 lbs	14.7 Kgs
Top Connection	1½" AMT	—
Maximum Tensile Load	93,000 lbs	42,000 Kgs

RESERVOIR GROUP

➢ Snipper/ Cutting Overshot

The Snipper/ Cutting Overshot is a simple Fishing Tool which is used to cut and retrieve Coiled Tubing that has been parted, stuck and/ or abandoned in the well bore.

The cutting action is achieved by a combination of over-pull and the inward travel of a hardened Grapple. The Grapple cuts into the OD of the Coiled Tubing which is weakened to the point where the applied over-pull will sever the Coiled Tubing.

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Design Features

✓ Ability to Cut & Retrieve Coiled Tubing
✓ Simple & Robust Design
✓ Easy Set-up For Successful Cuts

Tool Specifications

Tool OD	Coil Size	Tensile Yield	Torsional Yield	Standard Connection
Ø2-5/16”	Ø1-½”	73,000 lbs	1,200 ft-lbs	2-1/16” (#3.25) CS Hydril
Ø2.700”	Ø1-½”	144,000 lbs	2,900 ft-lbs	2-3/8” (#4.70) CS Hydril
Ø2.700”	Ø1-¾”	139,000 lbs	2,900 ft-lbs	2-3/8” (#4.70) CS Hydril
Ø3-3/8”	Ø1-½”	150,000 lbs	3,000 ft-lbs	2-7/8” (#6.4) CS Hydril
Ø3-3/8”	Ø1-¾”	150,000 lbs	3,000 ft-lbs	2-7/8” (#6.4) CS Hydril
Ø3-3/8”	Ø2.000”	165,000 lbs	4,400 ft-lbs	2-7/8” (#6.4) CS Hydril

Notes

✓ Other sizes & connections available upon request
✓ Standard & H2S service versions available

ITCO Spear

The ITCO Spear is a compact design used to engage the fish internally. The Field-Proven and reliable design provides the strongest tool available to internally engage and pull a fish.

Various grapple sizes are available for each tool to catch a range of tubing sizes or fish IDs. Pack-off assemblies are also available for most ITCO spears to allow circulation through the fish, if required.

The ITCO spear can be used for Coiled Tubing or Jointed Pipe operations. When the tool is run on Jointed Pipe or in certain Coiled Tubing operations, the spear can be released from the fish with right-hand rotation.

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Design Features

- ✓ Robust, three- blade design for centralisation and stability
- ✓ Unique blade design with a wide operating range
- ✓ High expansion ratio
- ✓ Large, unrestricted through-bore

Tool Specifications

Tool OD (in)	Ø 2.13”	Ø 2.81”
Standard Connection (in)	1.25” Reg Box	1.25” Reg Box
Max Catch Range (in)	3.485”	3.698”1.25” Reg Box
Tensile Strength (lbs)	270,000	357,000

Notes

- ✓ Maximum catch size listed. Grapple can be changed to accommodate smaller ODs
- ✓ The information provided above is for typical common tool sizes only,

RESERVOIR GROUP

Tri-Jaw Barbed Grab

The Intervention Products' Tri-Jaw Barbed Grab is designed to retrieve damaged and broken objects from a wellbore.

It is often used when traditional grapple-style fishing tools have been unsuccessful in retrieving the fish.

The Bottom Hole Assembly (BHA) is ran to the required depth and circulation is established through the Coiled Tubing. When the flow rate is increased, a pressure differential is created across a spring-loaded piston within the Grab, which causes the jaws to expand. When circulation is stopped, the jaw is quickly returned to the closed position. The BHA may then be pulled to surface.

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Design Features

- ✓ Robust Jaw Design
- ✓ High Expansion Ratio
- ✓ Triple-Jawed to Maximize Catching Potential
- ✓ Blades Retracted into Body When Pressure is Reduced
- ✓ Internal Spring Placement Provides Slick Outside Diameter

Tool Specifications

Tool OD	Tensile Yield	Maximum Jaw Expansion Diameter	Activating Pressure	Standard Connections
Ø2-½"	61,000 lbs	Ø5.000"	430 psi	1-½" AMMT
Ø2.700"	61,000 lbs	Ø5.000"	430 psi	1-½" AMMT

Notes

- ✓ Other sizes and connections available upon request
- ✓ Standard and H2S service versions available
- ✓ Yield values shown are for standard service tools

Magnets

Well Intervention Services' Magnet Tools are specially designed to remove metal debris and (milling) cuttings from the well bore. Small pieces can also be fished from a well, i.e. broken fingers from Running/ Pulling Tools. The magnet tools are available in 2 designs, the Magnet Bar & the Magnet Sub.

The Magnet Bar is ran in the tool string during milling jobs to help remove milling cuttings in situations with either low annular velocity, well fluid with poor carrying properties or the density of the cuttings are too great that they simply cannot be circulated out of the well bore. Typically, the Magnet Bar will be run directly above the motor or milling assembly.

The Magnet Sub is often used to retrieve lost fingers, grapples or other light metal parts that are broken from Running, Pulling, Fishing or any other type(s) of tools. The Magnet Sub will be run at the bottom of a tool string with a Circulating Sub above

Design Features

- ✓ Catch Metal Debris, Cutting and Small Metal Pieces
- ✓ Helps to Keep Metal Debris out of the Mud System
- ✓ Magnets are Replaceable
- ✓ The Magnet Bar can be Ran Anywhere in the Tool String

Notes

- ✓ These magnets can be custom-built with requested ODs & connections
- ✓ Please contact Reservoir Group's Well Intervention Products & Services to
- ✓ discuss your magnet requirement

RESERVOIR GROUP

Milling & Cutting Tools

RESERVOIR GROUP

Junk Mill

The Reservoir Group has a wide range of mills & bits

specially designed to be ran on our motors during Jointed Pipe & Coiled Tubing milling operations. We are specialists in designing and manufacturing mills so solve down-hole problems.

The junk mills are dressed with Crushed Tungsten Carbide to stand up to the abuses they are subjected to during milling operations. With the machinery and trained staff on-site, we can offer custom-built mills in any size and shape. Available in Flat Bottom, Concave, Convex Configurations to suit any down-hole application.

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Design Features

- ✓ Small Cuttings- Low Set-Down-Weight Needed with the Tungsten Carbide
- ✓ Most Common Mill for Plugs, FRAC Seats, Cement, Alloy-Steel Packers, Perforating Guns, Drill Pipe, Tools Joints, Reamers & Under-Reamers
- ✓ Large Circulation Ports & Large Flow Channels for Optimal Cooling & Removal of Cuttings
- ✓ High Number of Flow Ports for Optimal Debris Flushing
- ✓ Maximum Useful Life Enhanced by Self-Sharpening Feature
- ✓ Mill Redressed with Fresh Layer of Crushed Tungsten Carbide After Every Use, Ensuring Customers Start Every Job With Newly Dressed Mills
- ✓ Optional Quick Tip™ Hard-Facing is Available on Stabilisation Pads
- ✓ Available in Flat Bottom, Concave & Convex Configurations
- ✓ Can be Ran on Jointed Pipe & Coiled Tubing

Notes

- ✓ These Mills can be custom built as per customer needs-connections & ODs
- ✓ Please contact Reservoir Group for further information

RESERVOIR GROUP

Offset Mills

Well Intervention Services' Offset Mill is an innovative mill designed to pass through restrictions (including casing damage & deformation, over-torqued collars, etc) while still retaining the ability to mill to FULL ID below.

When ran in conjunction with a Reservoir Group Down-Hole Motor, the performance is unmatched

Reservoir Group has tremendous experience successfully deploying this proprietary technology on composite bridge plugs and FRAC plugs as well as cement with a proven track record in difficult down-hole conditions, saving our customers incalculable time and money!

Design Features

- ✓ Ability to Pass Through Restrictions While Still Retaining Ability to Mill to Full ID Below
- ✓ Fully Customizable to Meet Client's Specific Requirements
- ✓ Unrivalled Experience With Casing Deformation & Plug Mill Outs
- ✓ Available in Flat-Bottom, Concave or Convex Configuration

Notes

- ✓ These Mills can be custom built with requested connections & ODs
- ✓ Please contact Reservoir Group's Well Intervention Products & Services to discuss your mill requirements

Step Mills

The Reservoir Group has a wide range of mills & bits specially designed to be ran on our down-hole motors for Coiled Tubing and Jointed Pipe milling operations. We are specialists in designing and manufacturing mills to solve various down-hole problems. The Step Mill is such an example of our ability to do so.

The Step Mill is primarily utilised to mill through nipple profiles/ or obstruction in a client completion. This may become a requirement to allow access of tooling with an OD which will not fit through the nipple/ obstruction.

It may also be required to mill a nipple to a larger ID to facilitate fishing tools

Design Features

- ✓ Stepped to Minimise Surface Contact of Each Step
- ✓ Tungsten Carbide Inserts
- ✓ Crushed Carbide-Dressed Ported Nose
- ✓ Designed & Built to Client's Specific Requirements

Notes

- ✓ These Mills can be custom built with requested connections & ODs
- ✓ Please contact Reservoir Group's Well Intervention Products & Services to discuss your mill requirements

Taper Mills

The Taper Mill is designed to open up restrictions or mill out cement and other debris contained in the well bore. The mill's sturdy construction and robust cutting structure ensure high material rates minimising milling times. The Tapered Mill can be manufactured in various sizes and configurations.

Design Features

- ✓ Low Torque Cutting Structure
- ✓ Designed to Open Up Restrictions in the Well Bore
- ✓ High Number of Flow Ports for Optimal Debris Flushing
- ✓ Can be Ran on Jointed Pipe & Coiled Tubing

Notes

- ✓ These Mills can be custom built with requested connections & ODs
- ✓ Please contact Reservoir Group's Well Intervention Products & Services to discuss your mill requirements

FB Mills

Well Intervention has a wide variety of mills & bits

specially designed to be ran on our down-hole motors for Coiled Tubing and Jointed Pipe milling operations. We are specialists in designing and manufacturing mills to solve various down-hole problems. The FB Mill is such an example of our ability to do so.

The FB Mill is primarily utilised to mill through Completion Ball Valves or Flapper Valves. It is dressed with Crushed Tungsten Carbide on the nose to assist with the mill bedding into the target. The Tungsten Carbide Inserts are backed up on the nose with Crushed Carbide. The taper and the back of the mill head are also dressed with Crushed Carbide and this gives the ability ream/ back-ream through the target if required

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Design Features

- ✓ Tungsten Carbide Inserts on Nose
- ✓ Crushed Carbide Dressing
- ✓ Back-Reaming Capability
- ✓ Ability to Mill Through Chrome
- ✓ Various Sizes Available
- ✓ Ability to Custom Build to Client's Specific Requirements

Notes

- ✓ These Mills can be custom built with requested connections & ODs
- ✓ Please contact Reservoir Group's Well Intervention Products & Services to discuss your mill requirements

Hurricane & Aardvark

Full Body Aardvark Mills are ideal for drilling high pressure/ multiple plugs and cemented pipe.

- ✓ Carbide Buttons range in size from 5 / 16” to 1 / 2”.
- ✓ Bit Size Range: 1-3/4” to 8-3/4” OD in 1/8” increments.
- ✓ Circulation Ports available in 5/16” for down-hole motors, and 1-1/4” for reverse-circulating applications.
- ✓ Custom Sizes also available with minimal lead time.

Full Body Chomps Mills are ideal in applications that involve milling cast iron and other metal, or combination of cement and cast iron.

- ✓ Carbide Buttons range in size from 5 / 16” to 1 / 2”.
- ✓ Bit Size Range: 1-3/4” to 8-3/4” OD in 1/8” increments.
- ✓ Circulation Ports available in 5/16” for down-hole motors, and 1-1/4” for reverse-circulating applications.
- ✓ Custom Sizes also available with minimal lead time.

FBCS Hurricane mills are recommended for milling cement and metal/ composite plugs.

- ✓ Compact Dome Carbide Inserts.
- ✓ Mill sizes from 1-3/4” to 6-7/8” OD in 1/8” increments.
- ✓ 1 / 2” Circulation ports for down-hole motor applications or standard circulating. Bodies Manufactured from 4140 HT Steel.
- ✓ Custom Sizes also available with minimal lead time

Hurricane & Aardvark

B1CS Hurricane Mills are recommended for milling cement and composite plugs.

- ✓ Compact Dome and Chisel Carbide Inserts.
- ✓ Mill sizes from 1-3/4” to 6-7/8” OD in 1/8” increments.
- ✓ 1 / 2” Circulation ports for down-hole motor applications or standard circulating. Bodies Manufactured from 4140 HT Steel.
- ✓ Custom Sizes also available with minimal lead time.

Full Body Bear Claw Mills are ideal for milling cement. Not recommended for milling metal.

- ✓ Carbide Buttons range in size from 5 / 16” to 1 / 2”.
- ✓ Bit Size Range: 1-3/4” to 8-3/4” OD in 1/8” increments.
- ✓ Circulation Ports available in 5/16” for down-hole motors, and 1-1/4” for reverse-circulating applications.
- ✓ Custom Sizes also available with minimal lead time

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Full Body PDC (Polycrystalline Diamond Compact) Mills are ideal for milling extremely hard and abrasive materials.

- ✓ Uses range from hard cement, sand, and Barium scale. Bit Size Range: 1-3/4” to 8-3/4” OD in 1/8” increments.
- ✓ Circulation Ports available in 5/16” for down-hole motors, and 1-1/4” for reverse-circulating applications.
- ✓ Bodies Manufactured from 4140 HT Steel.
- ✓ Custom Sizes also available with minimal lead time

.

RESERVOIR GROUP

➢ Dimond-Impregnated Mills

30-40 Mesh Diamond -Impreg

Convex MX Mill with center point

Concave MX Mill

MX Taper Mill

MXT Step Mill

MX Diamond-Impregnated Mills are made using LPI (Low Pressure Impreg) where grit-sized synthetic diamonds are blended with Tungsten/ Tungsten Carbide Matrix that is molded to form blades in the mill face. Those blades can then be formed to almost any custom shape. MX Diamond-Impregnated Mills can be manufactured with a convex or concave profile to self-centre. The MX Mills Are Custom-Made to suit each specific application.

The diamonds on the MX Mill act as much like a diamond grinding rock and they continue to work until fractured or worn, with fresh diamonds exposed as the upper layers slough off, enabling the mill to continue working. This process can be repeated until the mill is completely worn down.

MX Mills have been used to cut extremely hard targets including:

- ✓ **Case-Hardened Steel**
- ✓ **Incolloy**
- ✓ **Carbide**
- ✓ **Chert**
- ✓ **Pyrite**
- ✓ **Chrome**

Design Features

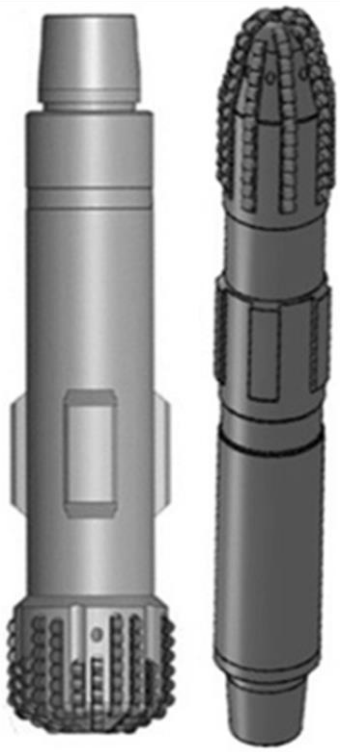
- ✓ ½" Circulation Ports for Motor Applications or Standard Circulation
- ✓ Specially Designed for Milling Cement & Composite Plugs

Notes

- ✓ ½" Circulation Ports for Motor Applications or Standard Circulation
- ✓ Specially Designed for Milling Cement & Composite Plugs

RESERVOIR GROUP

Raptor Mill



The Raptor Mill is designed to remove scale including Barium Sulphate scale, cement and other debris contained in the well bore.

The tools' sturdy construction and aggressive cutting inserts ensure high material removal rates therefore minimising milling times. The design allows for a small contact area which results in low torque consumption to reduce stalling of the motor.

The Raptor Mill can be manufactured in various sizes. Tapered noses also available

Design Features

- ✓ Wear-Protection from Stabilisation Pads
- ✓ Optional QuickTIP™ Hard-Facing is Available on Stabilisation Pads
- ✓ High Number of Flow Holes for Optimal Debris Flushing
- ✓ Can be Ran on Coiled Tubing & Jointed Pipe
- ✓ Field-Proven on Barium Sulphate Scale Milling

Tool Specifications

Tool OD (in)	Connections	Torsional Yield
Ø 2.000"	1" AMMT Pin	1,250 ft/lbs
Ø 2.313" /Ø 2.700" /Ø 2.830"	1½" AMMT Pin	1,250 ft/lbs
Ø 3.100" /Ø 3.375" /Ø 3.400" /Ø 3.500" /Ø 3.610"/ Ø 3.750" /Ø 3.880" /Ø 3.950" /Ø 4.000" /Ø 4.095" / Ø 4.250" /Ø 4.310" /Ø 4.400"/Ø 4.500" /Ø 4.650"	2-3/8" PAC DSI Pin	4,300 ft/lbs

Notes

- ✓ These mills can be custom-built with requested ODs & connections
- ✓ Please contact Reservoir Group's Well Intervention Products & Services to discuss your mill requirements

RESERVOIR GROUP

Abrasive Cutting Equipment

Well Intervention Products & Services has developed tools for cutting or punching tubing without the need for explosives or chemicals. Instead, an abrasive liquid- a mixture of "cutting sand" and a viscous gel- is used. The liquid is pumped through the work string at high rates through the cutting nozzle, punching tubing or drill pipe within minutes.

For cutting tubing or drill pipe, a rotating device is included in the work string, combined with a cutting nozzle with tangential holes. When the abrasive liquid is pumped, the nozzle begins rotating in a controlled manner at approximately 40 RPMs. The tools can be designed to punch in any direction, to create circulation, or remove an obstruction in the well.

The Cutting Tool is ran in conjunction with the Hydraulic Anchor Tool. This is a flow-operated anchoring tool that centralises the string, holding it in place during the cutting or punching operation. The tangential holes in the cutting nozzle create a rotating force and the nozzle rotates in a controlled manner

Design Features

- ✓ Smooth Cut- Easy to Access After Operation is Complete
- ✓ Operation is Easily Adjusted by Extending the Pump Time or Increasing Pump Rate
- ✓ No Explosives or Chemicals Required
- ✓ Tools Can Be Ran Through Restrictions
- ✓ Also Effective in Corroded or Oval Tubing
- ✓ Operation Can Be Tested & Simulated on Surface
- ✓ Tools Rated for H2S & C02 Service

Tool Specifications

Outside Dia.	Top connection	Nozzles	Nozzles holes	Pressure rating
Any size required	1-3/8" UN	Tungsten	2.7 mm	350 bar

RESERVOIR GROUP

➢ Wash-Over Shoes Underreamer

Well Intervention Products & Services can provide a full range of rotary Wash-Over Shoes designed and manufactured specifically for Jointed Pipe & Coiled Tubing applications. Wash-Over Shoes can be used for simple clean out operations such as being ran below Venturi Junk Basket for the removal of debris or can be designed for more specialised applications such as dressing the top of a fish or milling over a stuck packer/ plug.

A range of Wash-Over Shoes are available from stock, however most Wash-Over Shoes are designed and manufactured to suit each specific application.

Wash-Over Shoes can be supplied in a variety of sizes and configurations with Connections to suit all standard Wash Pipe Sizes.

Shoes can be dressed with a variety of cutting structures including Crushed Carbide, Carbide Inserts, PDC (Poly Crystalline Diamond Compact) and diamond inserts or diamond impregnated. Various styles of Wash-Over Shoes are available including, but not limited to, Flat-Bottom, Scalloped and Castellated Profiles depending on the operation being performed

Design Features

- ✓ Designed Specially to Suit Each Application
- ✓ Manufactured Locally for Quick Delivery
- ✓ Robust, Field-Proven Designs & Cutting Structures
- ✓ Variety of Styles & Cutting Structures Available

Notes

- ✓ These wash-over shoes can be custom-built with required connections & OD
- ✓ Please contact Reservoir Group's Well Intervention Products & Services to
- ✓ discuss your wash-over shoe requirements

RESERVOIR GROUP

Hydraulic Under-Reamer

The Hydraulic Under-Reamer is designed to clean or remove cement, scale and other material from the inside diameter of down-hole tubulars.

The tool is Ran In Hole (RIH) until the desired depth is reached, increasing the pump rate through the tool will expand the blades to the correct diameter.

Maintaining this flow rate through the tool maintains the blades at the expanded diameter.

Once the clean out job has successfully been completed, reducing the pump rate will allow the blades to collapse back into the body.

Can also be converted to Hydraulic Tubing Anchor

Design Features

- ✓ Positive Blade Retraction & Expansion; This Allows Pumping at a Reduced Rate While Running in Hole
- ✓ Tool Design Allows Reaming in Either Direction
- ✓ Fluid Can Be Directed onto Each Blade Through Inter-Changeable Nozzles to Ensure Positive Flushing Action
- ✓ Blades Are Linked Together Preventing Independent Movement Which Detracts from the Clean Out Performance of the Tool
- ✓ Pressure-Retaining Fluid Path Through the Tool to Additional Stages & Through the Bit
- ✓ Pressure Drop Function Provides Surface In-dication that the blades are fully expanded

Tool Specifications

Tool O.D.	1-11/16”	2-1/8”	3-3/8”	5”
Connections	1” AMT	1½” AMT	2-3/8” REG	2-7/8” REG
Type Pressure Drop	300 psi	400 psi	200 psi	750 psi
Max Blade Diameter	3½”	4¼”	6¼”	11”
Tensile Yield	63,000 lbs	105,000 lbs	201,000 lbs	494,000 lbs
Torsional Yield	930 ft-lbs	1625 ft-lbs	3500 ft-lbs	13,000 ft-lbs

RESERVOIR GROUP

Max Drill Motor ™

Reservoir Group Max Drill Motor is an extremely durable and adabtable slimhole positive displacement downhole motor. It incorporates proven industry – leading components for highest performance and reliability. The Max Drill Motors adaptable, Modular design provides maximum flexibility. A wide choice of power sections is available to suit any given application or well environment, including high temperature and two-phase fluid applications.

The Max Drill Motors are inspected and assembled in house to a stringed procedure, state of the art inspection and measurment equipment is used to guarantee consistent performance and reliability

In the unlikely event of a connection failure or back-off, a Rotor Catch device is incorporated in all motors to prevent the loss of components downhole.

Max Drill Motors can be used for a variety of thru –Tubing or slimhole applications including scale and cement milling. Debris removal, under-reaming cutting, window milling, plug and packer milling. They have also proven succeful in certain fishing applications where downhole rotation is required. The hign strength sections and drive subs are designed to withstand the most severe bending and cyclical forces encountered during milling and cutting operations

Design Features

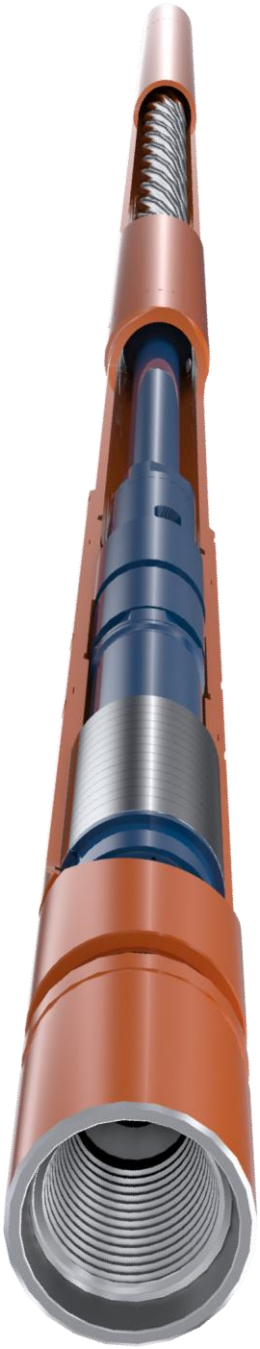
- ✓ Field Proven reliable components
- ✓ Adaptable modular design
- ✓ Large selection of power sections available
- ✓ Even Wall Stator Technology for maximum power output
- ✓ Heigh strength bearing section and drive sub
- ✓ Rotor catch safety device incorporated as standard

Tool Specifications

Motor Size (in)	Standard Connection	Flow Rate (gpm)	Speed Range (rpm)	Operating Torque (ft/lbs)	Max Operating Torque	No.of Stages	Lobe Ratio	Overall Length (ft)
1.69	1” AMMT	20-50	210-530	150	230	2.3	5/6	8.51
2.13	1-1/2” AMMT	30-60	200-400	223	314	2.5	5/6	8.35
2.88	2-3/8” PAC DSI	50-125	185-464	820	1415	4.7	5/6	13.01

RESERVOIR GROUP

Max Drill (All Metal) Motors ™



Reservoir Group introduces its latest well intervention solution, Max-Drill All Metal Motor.

The Max-Drill All Metal Motor provides a metal to metal power section capable of operating in extreme environments, giving the operator the confidence the motor will perform as it should and not prematurely fail during operation.

Engineered for superior performance.

The all metal rotor and stator construction is designed to operate in high wellbore temperatures in excess of 200°C (400°F) and capable of handling harsh fluid types such acid, oil-based mud, H2S and Nitrogen.

The Max-Drill All Metal Motor does not use any elastomers and therefore is not susceptible to rubber chunking, blistering or de-bonding like traditional elastomer power sections.

Max-Drill All Metal Motor performs in Demanding conditions

Performance Data	Imperial	Metric
Configuration	9/10 (3.8 STAGE)	
Flow Rate	50 - 150 GPM	189 - 568 LPM
Speed	183 - 550 RPM	
Full Load Torque	650 ft-lbs	850 Nm
Power	93 HP	70 kW
Max Differential Pressure	1,950 psi	13,500 KPa
Temperature-Max	>400°F	>200°C

Design Features

- ✓ No Elastomer (rubber)
- ✓ High Temperature Rating
- ✓ Increased Fluid Compatibility
- ✓ Delivering Performance
- ✓ Ideal for Descaling Applications

Benefits

Increased motor performance than standard elastomer PDM motors that fail in harsh environments

The All Metal Motor is not susceptible to stator swelling in high temperature conditions

Capable of operating with all fluid types such as acid, oil-based mud, water-based mud, H2S and nitrogen

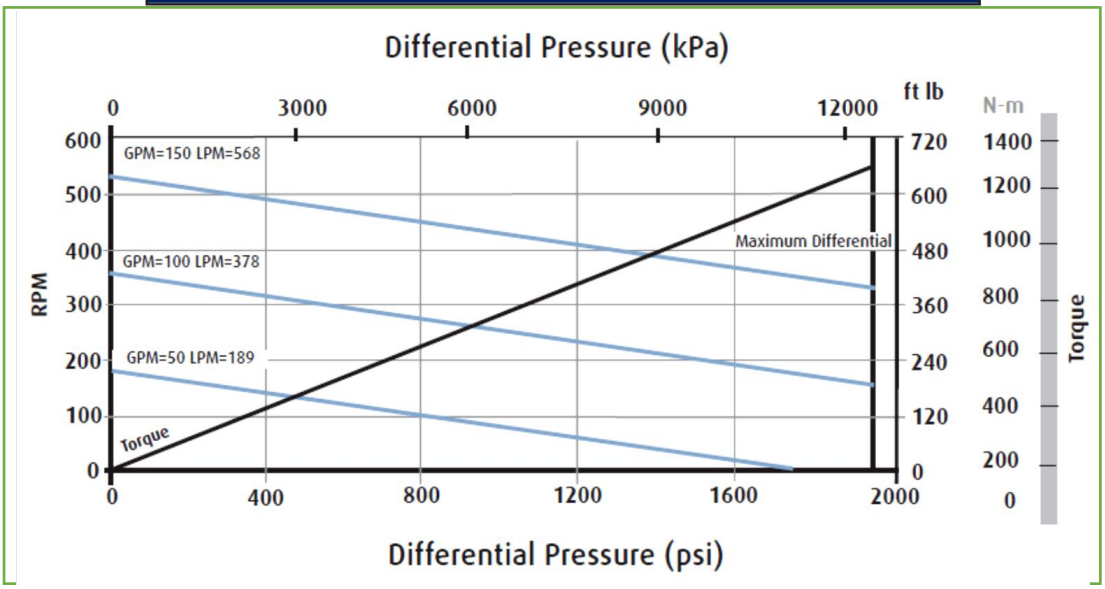
All Metal Motor provides confidence when high temperatures and harsh fluids are present

Delivering high torque in combination with aggressive fluids for challenging descaling operations

Max Drill (All Metal) Motors ™

Specifications	Imperial	Metric
OD	2.875"	73 mm
Length	11.10 ft	3.40 m
Top Connection	2-3/8" PAC DSI Box	
Bottom Connection	2-3/8" PAC DSI Box	
Bearing Type	Fluid Lubricated	
WOB-Max Operating	5,200 lbf	2,300 daN
WOB-Max	10,400 lbf	4,600 daN
Overpull-Max Operating	42,700 lbf	19,000 daN
Overpull - MaX	56,000 lbf	25,000 daN

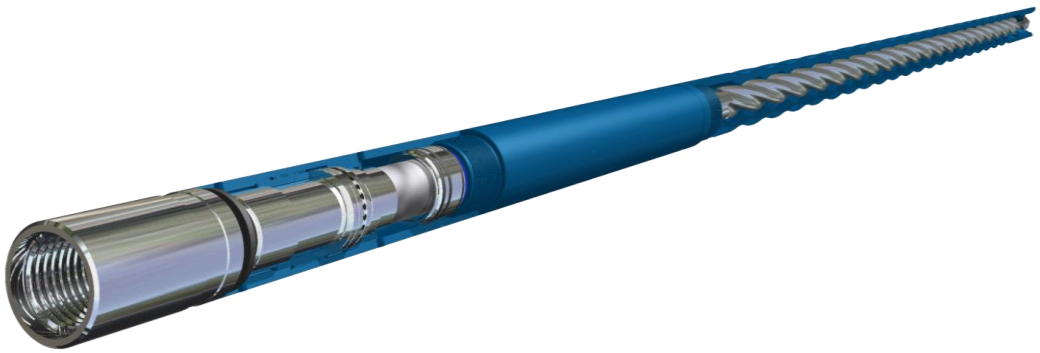
Power Section performance Curve



RESERVOIR GROUP

Max Drill (Even Wall) Motors ™

Reservoir Group Max Drill Even Wall Positive Displacement Motor provides more strength, better durability and increased power output compared with the most conventional thru tubing motors. Even Wall PDM's available in sizes ranging from 1 through 2 -OD's. Other sizes are available on request



Tool Specifications

Motor Size (in)	Standard Connection	Flow Rate (gpm)	Speed Range (rpm)	Operating Torque (ft/lbs)	Max Operating Torque	No.of Stages	Lobe Ratio	Overall Length (ft)
1.69	1" AMMT	20-40	216-433	131	168	2.3	5/6	8.51
2.13	1-1/2" AMMT	20-50	270-680	256	280	6	5/6	11.39
2.88	2-3/8" PAC DSI	60-120	200-400	764	1487	3.5	5/6	13.11

Design Features

- ✓ More power underlying steel lobes permit the rubber to achieve a stronger seal resulting in 2x more power than most conventional motors
- ✓ Longer Life – Uniform thikness
- ✓ of injected elastomer in each tool reduces the probability of chunking due to hysteritec failure since the elastomer is structurally supported by the steel tube
- ✓ Higher temperature rating – thin, uniform thikeness of the rubber causes it to expand very little with temperature changes. Head generated in standard drilling operations is more readily dissipated through the thin layer of rubber, directly to the steel tube; The unique spiral outer tube is designed to help transfer heat from the rubber directely to the outer tube allowing runs in heigher temperatures. These motors have been run in well temperatures >204°c
- ✓ Chemical resistance –Fluids that tend to swell or soften other various rubber compounds on the market do not effect the Even Wall PDM,
- ✓ Oil based mud and synthetic muds are no problem for the Even Wall PDM

RESERVOIR GROUP

SURFACE GEAR & HANDLING EQUIPMENT

Return Link Product List

RESERVOIR GROUP

Hydraulic C-plate

The Reservoir Group Hydraulic C-plate has been designed for the safe and efficient make-up of toolstring connections. The Hydraulic C-plate is typically used when working within lifting frames on semi-submersible rigs or when working at heights where it can be difficult to correctly align the toolstring connection

The Hydraulic C-plate provides sufficient stroke to allow for the safe make-up of smallest diameter connections and eliminates the need for radio communication or for manipulation of the CT string, lifting frame winch or crown block. The C-plate is operated by the use of a hydraulic hand pump giving the operator full control of raising and lowering the toolstring.

The Hydraulic C-plate would typically be used in conjunction with Reservoir Group Quick Connect Sub which also eliminates the need for a hydraulic tong for toolstring make-up

Design Features

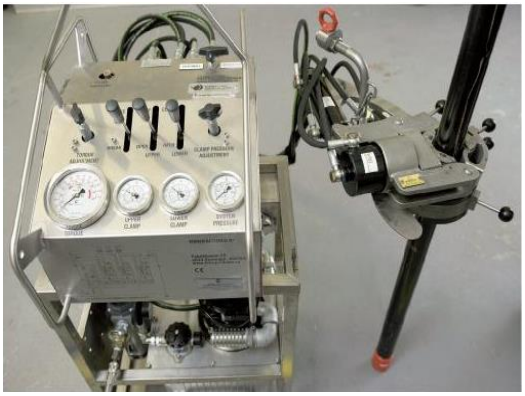
- ✓ Safe & efficient toolstring make-up
- ✓ Eliminates radio communication
- ✓ Compatible with Wellvention Quick Connect Assemblies
- ✓ Eliminates movement of CT or blocks
- ✓ Reduces risk of personal injury
- ✓ Reduces risk of equipment damage
- ✓ Compact lightweight design

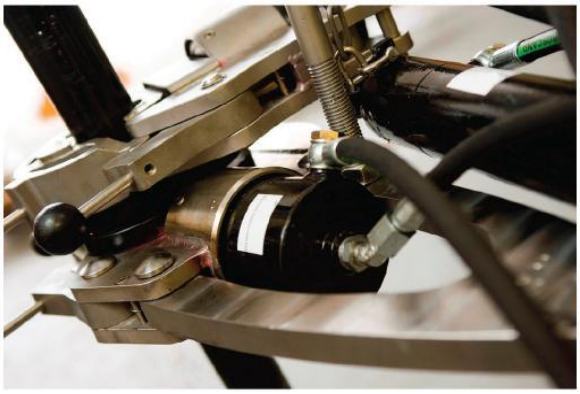
Tool Specifications

Stroke	5.00”
Load Rating	4,500 KG
Unit Weight	20 Kg

RESERVOIR GROUP

➢ Hydraulic Make / Break Tong Unit





Design Features

- ✓ Safe & efficient toolstring make-up
- ✓ Compact lightweight, versatile design
- ✓ For use on rotary connections up to 3-1/2" OD
- ✓ Can also be used with small-diameter tubing and drill strings
- ✓ Can be used on connections with different diameters
- ✓ Quick and easy to operate
- ✓ Extension hoses can be fitted for working at height

Reservoir Group Hydraulic Tong Unit is designed to provide a safe and reliable method of making and breaking small-diameter toolstring connections. The hydraulic tong ensures the correct make-up torque is applied to the rotary connections and also eliminates any unsafe practices when attempting to make and break connections manually.

The unit comprises three separate components: an air-driven hydraulic power pack, control panel, and torque head. A compact and lightweight design makes the tong unit easy to handle, allowing it to be used safely when working at height, such as on an elevated work platform, or in limited work spaces.

Certified lifting points are available on all components for safe and easy handling at the rig site. The unit's torque head is fitted with a lifting point which allows for working with a toolstring in either a vertical or horizontal position

Tool Specifications

Tool joint diameter range	1.69" - 3.50"
Maximum make-up torque	4,000 ft-lbs
Maximum breakout torque	5,600 ft-lbs

RESERVOIR GROUP

Lift Subs

Reservoir Group designs & manufactures a variety of lifting subs to allow the safe transfer of Bottom Hole Assembly sections. They are available in box or pin configurations and all standard connections are available. They are designed to accept shackles which are certified for the expected loads.

Lift Subs are commonly used in pressure deployment operations where long BHAs are used. The Lift Subs can be attached to the BHA sections to allow safe transfer between locations. They can also be fitted with the box and pin connections provided on Reservoir Groups' Quick Connect Assemblies to ensure ease-of-use with our Pressure Deployment Systems.

Design Features

- ✓ Simple, One-Piece Design
- ✓ Designed to Accept Specified Shackles
- ✓ Compatible With Reservoir Groups' Quick Connect Assemblies
- ✓ Can be Provided With NPT Ports to Assist in Pressure Testing of Tool

Tool Specifications

Tool OD	Tensile Yield	Shackle Size	Standard Connection
Ø1-11/16"	49,000 lbs	3.25 Ton x 19mm Pin Diameter	1.000" AMMT
Ø2-1/8"	70,750 lbs	4.75 Ton x 22mm Pin Diameter	1-½" AMMT
Ø2-7/8"	90,000 lbs	4.75 Ton x 22mm Pin Diameter	2-3/8" PAC Dsi

Notes

- ✓ Other sizes & connections available upon request
- ✓ Other shackle sizes available upon request
- ✓ Can be supplied with load certification upon request

RESERVOIR GROUP

➢ Coiled Tubing Inetrnal Reamer

Internal Coiled Tubing Reamer is designed to remove the weld bead (flashing) and improve the surface finish on the internal wall of the Coiled Tubing. This provides a smooth surface which allows the O-Rings on an Internal Coiled Tubing Connector to seal.

The tool can be fitted with a range of different cutter reamers and bushes to accommodate various Coiled Tubing ODs and wall thicknesses. The bevel cutter provides a lead-in for the connector and helps prevent damage to the O-Ring seals. It is a simple, hand-operated tool which requires minimal training.

Design Features

- ✓ Self-Aligning
- ✓ Sturdy Construction
- ✓ Machines a High-Quality Finish on the Coiled Tubing ID
- ✓ Hardened Reaming and Bevel Inserts to Ensure Long Service Life
- ✓ Simple to Adjust to Suit Multiple Coiled Tubing ODs & Wall Thicknesses
- ✓ Bevel Cutter Available to Add Lead-In on Coiled Tubing ID to Prevent Damage to O-Rings

Tool Specifications

Coil OD Range	Tool OD	Coil Wall Thickness	Weight
Ø1-1/2- Ø2-3/8”	Ø3-1/4	Any	19.9-lbs
Ø1-3/4- Ø2-7/8”	Ø3-7/8	Any	20.3 lbs

Notes

- ✓ Other sizes & connections available upon request
- ✓ 1-1/4” Coiled Tubing Conversion Kit Available for 3-1/4” OD Version

RESERVOIR GROUP

Coiled Tubing Internal Dimpling Tool

The Coiled Tubing Internal Dimpling Tool

provides a quick and simple method of installing an Internal Dimple Connector.

A hex bit and wrench are used to apply torque to the dimpling bolts and form the Coiled Tubing into the dimple profiles on the connector. This creates a high-tensile & torsional strength connection between the Coiled Tubing and the Bottom Hole Assembly (BHA).

The dimpling jig is assembled from two halve-sections to allow the make-up of both "slick" (Slim-Hole) and over-sized Internal Dimple Connectors. The use of inserts allows the tool to accommodate various sizes of Coiled Tubing. A hydraulically operated dimple jig is also available upon request.

Design Features

- ✓ Simple Design & Use
- ✓ Easily Operated by One Person
- ✓ Minimal Maintenance
- ✓ Accommodates a Range of Coiled Tubing Sizes
- ✓ Sturdy Construction to Ensure a Long Service Life
- ✓ Lightweight Alternative to Hydraulic Dimpling Jigs

Tool Specifictions

Tool OD	Coil OD Range	Coil Wall Thickness	Weight	Length
Ø3-1/2"	Ø1.000- Ø1-1/4	Any	15.2 lbs	6.000"
Ø4-3/4"	Ø1-1/2- Ø2-3/8	An	20.5 lbs	6.250"

Notes

- ✓ Other sizes & connections available upon request

RESERVOIR GROUP

Coiled Tubing External Dimpling Tool

The External Coiled Tubing Dimpling Tool External Coiled Tubing Dimpling Tool provides an effective method of attaching an External Dimple Connector to the Coiled Tubing.

The External Dimpling Tool is slid over the end of the Coiled Tubing and the integral hammer is used to ensure that the tool "Bottoms Out". The dimpling screws are then hand-torqued to form dimples on the outside diameter of the Coiled Tubing. The assembly is then removed, and the threaded end of the External Connector is made up to the reverse end of the External Dimpling Tool.

The External Dimple Connector is then inserted over the end of the Coiled Tubing and lined up with the dimple's impressions. The set screws on the External Dimple Connector are then secured into the dimples on the Coiled Tubing and the connector is ready for pull & pressure testing.

The sliding hammer may be used to assist both the installation and the removal of the External Dimple Connector

Design Features

- ✓ Easily Re-Dressed in the Field
- ✓ Available in Various Coiled Tubing Sizes
- ✓ Sturdy Design With Minimal Maintenance
- ✓ Integral Sliding Hammer to Assist Installation & Removal

Tool Specifications

Coil OD	Tool OD	Coil Wall Thickness	Tensile Yield	Standard Connections
Ø1-1/2"	Ø3-7/8"	Any	125,000	1.000" AMMT
Ø1-1/2"	Ø3-7/8"	Any	125,000	1-1/2" AMMT
Ø1-3/4"	Ø3-7/8"	Any	125,000	1-1/2" AMMT
Ø2.000"	Ø4.000"	Any	125,000	2-3/8" PAC DSI

RESERVOIR GROUP

➢ Pull/ Pressure Test Subs

The Well Intervention Products & Services' Pull/ Pressure Test Subs are designed to enable the safe and efficient testing of Coiled Tubing Connectors.

The Coiled Tubing Connector is made up to the box end of the plate and a pull test is performed. The Pull/ Pressure Test Sub is also used for pressure testing the Coiled Tubing Connector and Bottom Hole Assembly Components.

Pull/ Pressure Test Subs can be equipped with either side-mounted or concentric pressure ports.

This well-proven design can be used for all types of Coiled Tubing Connectors

Design Features

- ✓ Simple, One-Piece Design
- ✓ Side-Mounted NPT Ports Can be Provided to Prevent Accidental Valve Damage
- ✓ Can be Used for Testing Several Coiled Tubing Sizes
- ✓ Large OD Suitable For a Wide Range of Pull Testing Configurations

Tool Specifications

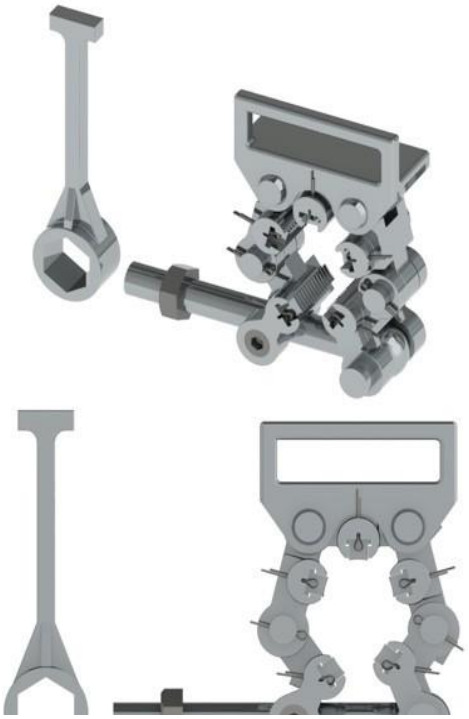
Tool OD	Tensile Yield	Torsional Yield	Pressure Rating	Standard Connections
Ø6-½"	61,850 lbs	90 ft-lbs	5,000 psi	1.000" AMMT x ½" NPT
Ø6-½"	115,000 lbs	1,600 ft-lbs	5,000 psi	1-½" AMMT x ½" NPT
Ø6-½"	210,000 lbs	4,800 ft-lbs	5,000 psi	2-3/8" PAC Dsi x ½" NPT

Notes

- ✓ Other sizes, pressure ratings and connections available upon request

RESERVOIR GROUP

➢ ‘T’-Type Safety Clamp



The ‘T’-Type Safety Clamp help guard against dropping flush-joint pipe, tool strings, stream-lined drill collars, etc. into the hole while making/ breaking the tool string. These clamps are ideal as an emergency elevator shoulder for lifting items which have no shoulders for attaching conventional elevators.

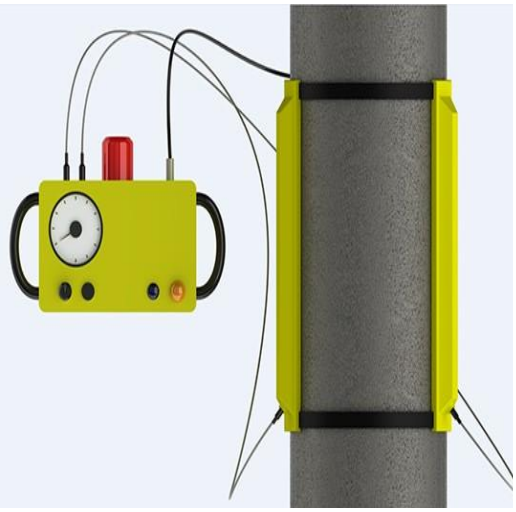
The Safety Clamp consists of individual links, flexibly hinged together. Each link has a separate tapered slip which acts as a gripping member, much like a tapered rotary slip, and each slip is held in a retracted position on the taper by spring tension. When the clamp is tightened, each small slip takes a firm initial grip on the surface of the pipe. Should the pipe start to slip/ fall, or should any load increase occur against the slips, the taper mounting causes each slip to wedge tighter against the surface of the pipe to increase the grip or lock the pipe against further movement.

Gripping pressure is always uniform around the pipe so there is little chance of crushing thin-walled pipe or damaging the surface of the pipe. And since each link, complete with tapered slip, is interchangeable as a unit, the Safety Clamp is readily adaptable to virtually any diameter. Each link changes the effective gripping diameter of the clamp. All parts are made of alloy steel, heat-treated for strength and gripping ability.

The ‘T’-Type Safety Clamp is designed for small diameter pipe, 1-1/8” –4-1/2” OD. Each link changes the effective working range approximately 1” in diameter. For sizes larger than 4-1/2” OD, the ‘C’-Type Safety Clamp must be used.

RESERVOIR GROUP

End of Coil Detector-Thru Riser (Magnetic) Detector



The End of Coil Detector is used to assist oil service providers involved in running slim-hole tools. This non-invasive wellhead sensor takes guesswork out of detecting the end of the Coiled Tubing inside the riser, preventing injuries and saving lives.

How it Works:

The sensor detects the passing end of the Coiled Tubing, and relays this information to the Control Box giving both a visual and audible warning alarm to the operators

Two data-output ports provide a low/ high alarm signal and an analogue logging signal. The Sensor Assembly is intrinsically safe and certified for use in Zone 0 hazardous areas. The Control Box and Battery Pack are certified for Zone 1.

The main system consists of two sensor heads, a Control Panel that includes an alarm, and a 12V battery pack. The sensors are typically positioned up to 50 meters (150+ feet) away from the Control Panel using the supplied connecting cables. The sensors are strapped to the outside of the riser (lubricator) section using a simple strap and buckle arrangement.

When the sensors are diametrically opposed to each other, tightening of the straps will keep everything in place. The position of the sensors is important to give full coverage of the riser bore. The system must be powered by a 12V DC supply, either fed by an infallible transformer or by a battery pack supplied with the kit.

PIG / Dart Catcher

The Reservoir Group Coil Tubing Pig /Dart Catcher has been designed for safe and environmentally clean CT string pigging operation

Design Features

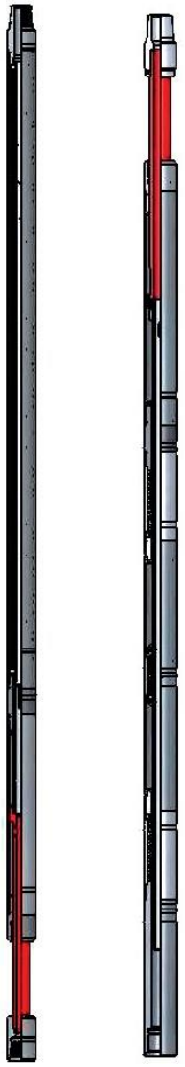
- ✓ Safe & efficient toolstring make -up
- ✓ Eliminates spills
- ✓ Built in rupture disc feature to prevent over pressure
- ✓ Positive Indication when ball/dart has landed
- ✓ Bleed off facility to safely remove any trapped pressure
- ✓ Connectors available for 1-1/2''_2-3/8" Coil Tubing
- ✓ All fluids can be pumped to a tank or drain

RESERVOIR GROUP

SPECIALTY TOOLS

RESERVOIR GROUP

Dual Acting Hydraulic Jar & Accelerator



Jar Accelerator

The Dual Acting Hydraulic Jar & Accelerator's primary function is to free stuck equipment in the wellbore and can be run on coiled tubing or jointed pipe. The instrument's torque capabilities mean it can be run in conjunction with downhole motors.

The Accelerator is designed to achieve maximum stroke length, so maximum impact force is delivered, even if the weight applied is limited. The bi-directional hydraulic Jar has benefited from comprehensive testing, resulting in a number of new features as standard. The hydraulic time delay system is compensated for load, temperature and pressure to ensure full jar action in highly deviated wells with high pressure/temperatures.

Hydraulic Jar Technical Data			
Tool Size (OD)	1.69"	2.13"	2.88"
Tool ID (in.)	0.56"	0.75"	1.00"
Upper Connection	1" AMMT Box	1 ½" AMMT Box	2 3/8" PAC Box
Lower Connection	1" AMMT Pin	1 ½" AMMT Pin	2 3/8" PAC Pin
Length Closed (in.)	68"	63"	73"
Total Stroke (in.)	11"	12.5"	12"
Maximum Jar Load (lbs)	10,000	18,000	32,000
Maximum Tensile Load (lbs)	50,000	95,000	195,000
Torsional Yield (ft-lbs)	320	700	2,700
Pump Open Area (in^2)	0.70	1.20	2.30

Benefits

- ✓ Load and pressure-compensated time delay system
- ✓ Rigid heavy-duty debris-tolerant mechanical design, with good bending support in horizontal wells
- ✓ Designed to be run in gas well without trapping internal pressure
- ✓ Increased impact force versus load applied in both directions
- ✓ Temperature-compensated time delay system up to 200°C
- ✓ Short overall length, available with H2S service
- ✓ Simple, reliable operation
- ✓ No setting or adjustment required before running
- ✓ The operator controls the intensity of jar hits
- ✓ Wide range of impacts by varying applied load

RESERVOIR GROUP

Bi-directional Impact Hammer

The Reservoir Group Bi-directional Impact Hammer is a reliable high impact bi-directional hammer with a large through bore which allows for ball activated tools to be run below it. Available in H2S, CO2 and Acid resistant materials. It can also be run in a single up or down mode.

One advantage of the Bi-directional adaptor on the I-Stroke system is that the impact hammer will not activate unless a push or pull force is applied. The force required to activate the hammer is low, approximately 600 lbf or 2300 lbf depending on direction, no pipe movement is required, reducing coiled tubing fatigue.

Technical Specifications		
Outside Diameter	2⅛"	54 mm
Inside Diameter	0.55"	13.9 mm
Length	33"	838 mm
Weight	20 lbs	9.3 kg
Top Connection	1½"	AMT
Max. Operating Temp.	300 °F	150 °C
Max. Pressure	3,000 psi	210 Bar
Max. Flow rate	80 gal/min	300 L/min
Tensile yield	48.000 lbf	214 kN
Torque	swivel	

Benefits

- ✓ Full bore through tool, allows ½" ball to pass
- ✓ Bi-directional adapter prevents the hammer from being activated unless minimum push / pull force is exceeded ; approximately 600 lbf (2.7 kN) / 2300 lbf (10.2 kN)

Single Acting (down) Impact Hammer

Reservoir Groups Single Acting Down Impact Hammer is a tool that transmits multiple downward impact forces at high frequency, thus eliminating the need to cycle the coiled tubing at surface and reducing fatigue on the coil. The tool is operated by a combination of flow rate and setdown weight which is converted into mechanical energy. The hammer is constructed with a single-piece, non flexible impact shaft for maximum impact force and power efficiency. The Hammer is available in 1.69" & 2.13" sizes

Transmission The Impact Hammer has a single-piece non-flexible shaft; it is the simplest and the most reliable means of transmission for all applications in an impact drill.

Power Section Hammer has a non-typical power section which does not rely on rubber components for efficient operation. The tool is constructed from aviation quality stainless steel for use in hostile environments such H2s, Co2, Hcl and can be operated with a variety of fluids including diesel, foam, light oils, nitrogen gas and in high temperature applications

Bearing Assembly, The Impact Hammer Impact Drill Jar's bearing assembly is well-suited for weight on bit, side loading, and overpulls. Non-typical bearings are used, eliminating common problems of lubrication failure and overheating.

Applications

- ✓ Shifting sliding sleeves and isolation valves
- ✓ Breaking ceramic discs
- ✓ Swaging & Broaching operations
- ✓ Driving debris and stuck tools downhole
- ✓ Cleaning sand and scale

➢ Single Acting (down) Impact Hammer

Technical Data		
Tool Size (OD)	**1.69”**	**2.13”**
Upper Connection	1” AMMT Box	1 ½” AMMT Box
Lower Connection	1” AMMT Pin	1 ½” AMMT Pin
Length (Inches)	31.6”	36.7”
Yield Strength (Lbs.)	37,100	37,500
Service	H2s	H2s

Operating Data		
Tool Size (OD)	**1.69”**	**2.13”**
Operating Pressure (psi)	500 - 2,500	500 - 2,500
Pump Rate (Gal./Min.)	10 - 42	10 - 70
Hits Per Minute	25 - 800	25 - 800
Set Down Weight (Lbs.)	500 - 1,800	500 - 2,850
Maximum Pull (Lbs.)	20,000	30,000
RPM (flow rotation)	3-17	3-17

RESERVOIR GROUP

Hydraulic Bow Spring Centraliser

The Hydraulic Bow spring centraliser is used to provide stability and centralisation to a Bottom Hole Assembly (BHA).

The design allows the BHA to be centralised even if it has to pass through restrictions that are too small for Fixed-Blade Stabilisers. By pumping fluid through the tool, the piston is activated which expands the bow springs and centralises the BHA.

Well Intervention Products & Services also produces a Mechanical Bow Spring Centraliser. This model does not require fluid to circulate through the tool for operation. Two of these centralisers are normally placed along the length of the BHA to obtain best results.

Design Features

- ✓ Mechanical or Hydraulic Versions Available
- ✓ Standard & H2S Service Versions Available
- ✓ Simple Design & Operation
- ✓ High Bow Spring Epansion

Tool Specifications

Tool OD	ID Range	Tensile Yield	Torsional Yield	Standard Connections
Ø1-11/16”	Up To Ø6.000”	53,000 lbs	650 ft-lbs	1.000” AMMT
Ø1-13/16”	Up To Ø6.000”	58,000 lbs	690 ft-lbs	1.000” AMMT
Ø2-1/8”	Up To Ø7.000”	76,000 lbs	1,100 ft-lbs	1-½” AMMT
Ø2-7/8”	Up To Ø10.000”	124,000 lbs	2,000 ft-lbs	2-3/8” PAC DSI

Notes

- ✓ Other sizes & connections available upon request
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

Hydraulic Tubing End Locator

The Hydraulic Tubing End Locator (TEL) give the operator the ability to correlate tool string depth by locating on either the tubing entry guide or a nipple profile within the well bore. As the tool is hydraulically operated, it can be functioned multiple times to ensure accurate depth correlation.

Flow through the tool creates the required hydraulic pressure to activate the locating arms. An over-pull will be observed when the tool is pulled through a restriction such as a nipple profile or when re-entering the production tubing. The locating arms will collapse when a predetermined force is applied. The pull force required is variable depending on pump rate and pressure.

The locating arms will retract to the tool OD when flow through tool has stopped. A safety shear release feature is incorporated in the unlikely event that the spring does not fully retract the locating arms or can also be used to de-activate the tool when it is no longer required.

Design Features

- ✓ Short & Compact Design
- ✓ Wide "Tag" Range for Each Tool
- ✓ Simple Adjustment for Tubing or Nipple Profile Size
- ✓ Reliable, Repeatable Operation
- ✓ Emergency Shear-Out Feature
- ✓ Variable Nozzle Sizes and Shear Ratings
- ✓ Simple Field-Redress Capability

Tool Specifications

Tool OD (in)	2.130"	2.880"
Connections	1½" AMMT	2-3/8" PAC DSI
Tag Range	Up to 5" tubing	Up to 7" tubing
Torsional Strength (ft-lbs)	750 ft/lbs	1,900 ft/lbs
Tensile Strength (lbs)	63,000 lbs	113,800 lbs
Overall Length (ft)	2.50'	2.28'

Notes

Other sizes available upon request

RESERVOIR GROUP

➢ Torque-Through Knuckle Joint

The Well Intervention Products & Services' Torque-Through Knuckle Joint has been designed to provide a Coiled Tubing Bottom Hole Assembly with additional movement and flexibility.

This additional flexibility is often required when the BHA is ran through a restriction or the wellbore has a high degree of deviation.

The Torque-Through design enables the transmission of rotational forces through the Knuckle Joint to other BHA components below. The Torque- Through Knuckle Joint can also be used in centralising Fishing BHAs over fish necks.

The Knuckle Joint provides a 10° angle of deflection and pressure integrity is maintained across this range by internal pressure sealing. The large Through- Bore allows the passage of drop-balls to tools below the Knuckle Joint.

Design Features

- ✓ Pressure Integrity
- ✓ 10° Angle of Deflection
- ✓ Torque-Through Capability
- ✓ Large Through-Bore to Enable Passage of Drop-Balls

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Pressure Rating	Deflection Angle	Standard Connections
Ø1-5/8"	35,000 lbs	400 ft-lbs	5,000 psi	12°	1.000" AMMT
Ø1-1/16"	36,000 lbs	440 ft-lbs	5,000 psi	12°	1.000" AMMT
Ø2-1/8"	75,000 lbs	1,050 ft-lbs	5,000 psi	10°	1-½" AMMT
Ø2-7/8"	140,900 lbs	3,100 ft-lbs	5,000 psi	10°	2-3/8" PAC DSI
Ø3-1/8"	165,500 lbs	3,1000 ft-lbs	5,000 psi	10°	2-3/8" PAC DSI

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S service versions available
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

Hydraulic Kick-Over Knuckle Joint

Hydraulic Kick-Over Knuckle Joint has been designed to provide a method of deflecting Coiled Tubing Bottom Hole Assembly from the straight line of the tool string.

The tool is activated by increasing the pump rate through the Coiled Tubing. This activates a piston within the tool and a kick-over of 12° is achieved.

The Hydraulic Kick-Over Knuckle Joint has many useful applications. It provides a standard BHA with flexibility which can assist in passing through wellbore restrictions. Additionally, in conjunction with Indexing Tools, lateral sections of a wellbore may be found and entered. This combination of tools is also useful in locating fish in larger diameter wellbores. Pressure integrity and a large Through-Bore are features of this tool which also allow off-centre jetting operations to be performed. They also ensure the safe passage of drop-balls and treatment fluid

Design Features

- ✓ Pressure Integrity
- ✓ 12° Angle of Deflection
- ✓ Hydraulically Operated
- ✓ Torque-Through Capability
- ✓ Large Bore-Through to Enable Passage of Drop-Balls
- ✓ May be Repeatedly Operated as Required During Deployment

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Pressure Rating	Deflection Angle	Standard Connections
Ø1-5/8”	35,000 lbs	400 ft-lbs	5,000 psi	12°	1.000” AMMT
Ø1-1/16”	39,250 lbs	490 ft-lbs	5,000 psi	12°	1.000” AMMT
Ø2-1/8”	68,575 lbs	1,200 ft-lbs	5,000 psi	12°	1-½” AMMT
Ø2-½”	90,000 lbs	1,500 ft-lbs	5,000 psi	12°	1-½” AMMT
Ø2-7/8”	109,750 lbs	2,100 ft-lbs	5,000 psi	12°	2-3/8” PAC DSI
Ø3-1/8”	128,600 lbs	2,400 ft-lbs	5,000 psi	12°	2-3/8” PAC DSI

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S service versions available

RESERVOIR GROUP

Knuckle Joint

The Well Intervention Knuckle Joint has been designed to provide a Coiled Tubing Bottom Hole Assembly with additional movement and flexibility.

This additional flexibility is typically required when the BHA is ran through a restriction or the wellbore has a high angle of deviation.

The Knuckle Joint provides a 10° angle of deflection and pressure integrity is maintained across this range by internal pressure sealing. The large Through- Bore allows the safe passage of drop-balls to tool below the Knuckle Joint.

Design Features

- ✓ Pressure Integrity
- ✓ 10° Angle of Deflection
- ✓ Torque-Through Capability
- ✓ Large Through-Bore to Enable Passage of Drop-Balls

Tool Specifications

Tool OD	Connections	Max Catch Size	Pressure Rating	Deflection Angle	Standard Connections
Ø1-11/16”	55,000 lbs	N/A	5,000 psi	10°	1.000” AMMT
Ø2-1/8”	80,500 lbs	N/A	5,000 psi	10°	1-½” AMMT
Ø2-3/8”	88,650 lbs	N/A	5,000 psi	10°	1-½” AMMT
Ø2-7/8”	109,500 lbs	N/A	5,000 psi	10°	2-3/8” PAC DSI
Ø3-1/8”	169,750 lbs	N/A	5,000 psi	10°	2-3/8” PAC DSI

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S service versions available
- ✓ Yield values shown are for standard service tools

➢ Hydraulic Indexing Tool

The Hydraulic Indexing Tool is designed to provide slow, controlled rotation of Coiled Tubing BHA.

At the end of each cycle, the torque induced is mechanically locked into the tool allowing the piston to return to its initial position. This cycling process can be repeated as often as required, simply by increasing and decreasing the fluid through the tool.

By simply increasing the flow rate through the nozzle within the tool, the back pressure created moves a hydraulic piston linearly downwards within the tool. This movement is transferred into a rotary motion, turning the lower end of the tool in small rotational increments an unlimited number of times.

Design Features

- ✓ Slow, Controlled Rotation of Coiled Tubing BHA
- ✓ Torque Mechanically Locked into the Tool After Each Stroke
- ✓ Simple to Redress
- ✓ Pressure Drop on Surface Following Each Cycle

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Pressure Rating	Standard Connections
Ø2-1/8”	53,000 lbs	830 ft-lbs	5,000 psi	1-½” AMMT
Ø2-7/8”	73,300 lbs	960 ft-lbs	5,000 psi	2-7/8” PAC DSI

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S service versions available
- ✓ Yield values shown are for standard service tools

Mechanical Indexing Tool

The Mechanical Indexing Tool from Reservoir Group Well Intervention Products & Services is designed to provide controlled, incremental rotation of a Coiled Tubing BHA without the need to pump through the coiled tubing.

This is particularly useful when used above Fishing and Debris Removal Tools. The tool is functioned by setting weight down on the BHA & then picking up. This leads to the lower collar of the tool indexing at a pre-determined angle. At the end of each stroke, the torque induced is mechanically locked in position by a spring-loaded piston. Indexing can be repeated as often as desired.

Design Features

- ✓ Slow, Controlled Rotation of Coiled Tubing BHA
- ✓ Adjustable Angle Index
- ✓ Torque Mechanically Locked After Tool Indexes
- ✓ Lateral-Entry Operations When Used in Conjunction with Hydraulic Kick-Over Knuckle Joint
- ✓ Rotational Movement Can Assist Location of External Fish Necks

Tool Specifications

Tool OD	Tensile Yield	Torsional Yield	Set-Down Load to Index	Rotational Increment	Standard Connections
Ø2-1/8”	80,000 lbs	1,100 ft-lbs	220 lbs	20°	1-½” AMMT
Ø2-7/8”	122,000 lbs	2,700 ft-lbs	220 lbs	20°	2-3/8” PAC DSI
Ø3-1/8”	185,000 lbs	4,350 ft-lbs	220 lbs	20°	2-3/8” PAC DSI
Ø5.000”	300,000 lbs	11,000 ft-lbs	300 lbs	12°	3-½” IF Box x Pin

Notes

- ✓ Other sizes & connections available upon request
- ✓ Standard & H2S service versions available
- ✓ Yield values shown are for standard service tools

RESERVOIR GROUP

Hydraulic Tubing Cutter 3-blade

The Hydraulic Tubing Cutter is a 3-bladed, hydraulically-activated cutting device used to cut down-hole production tubing, casing and drill pipe. The device provides a safe alternative to chemical and explosive cutters. The tool is ran in conjunction with a down-hole motor on Jointed Pipe or Coiled Tubing. A high expansion hydraulic anchor is typically included in the cutting assembly to prevent any movement if the cutter during activation- a common cause of failure. The tool incorporates a dual-activation piston which increases the axial load on the cutter blades, ensuring a clean and efficient cut.

Circulation through the jet sub creates the internal pressure required to shift the dual-piston and blade cams, forcing the cutter blades to expand. The jet sub incorporates interchangeable nozzles to adjust the flow rate required to achieve the desired activation pressure. Upward-facing jets help clean the cut area while also cooling the cutter blades. On completion of the cut, the spring-loaded blade-return mechanism ensures the cutter blades are returned to the "run-in" position and retained within the body of the tool.

The cutter blades can be dressed with a variety of cutting structures, with each set of blades purpose-built and designed to suit the particular size and grade of tubing/ casing to be cut.

Design Features

- ✓ Dual-Activation Piston for Clean & Efficient Cut
- ✓ Three-Blade Design for Maximum Stability
- ✓ Blades Fully Retracted & Retained Within the Tool
- ✓ Variety of Cutting Structures to Suit All Material Grades
- ✓ Interchangeable Nozzles
- ✓ Fully Field Re-Dressable

Tool Specifications

Tool OD (in)	1-11/16"	2-1/8"	2-7/8"
Connection	76,000 lbs	1½" AMMT	2-3/8" PAC DSI
Tubing / Casing Size (in)	Up to 3½"	Up to 5 "	Up to 7"
Activation Pressure (psi)	550 psi	350 psi	400 psi
Tensile Strength (lbs)	56,000 lbs	80,000 lbs	155,000 lbs
Overall Length (ft)	2.57'	2.68'	2.80'

Memory Gauge Carrier

The Coiled Tubing Gauge Carrier is designed to be run as part of any coiled tubing string where pressure and temperature data is required.

A 3/4" Trip Ball can be pumped through the carrier to activate a Hydraulic Disconnect and release the tool string from an inflatable packer or as an emergency disconnect.

The carrier holds two Omega Micro Automatic gauges or two Omega HT Micro Gauges for high temperature wells which can each record up to 1,000,000 data sets at any sample rate chosen by the operator.

Our complete data gathering pack comes ready to run as the gauges are fully automatic so require no field input to switch on or off.

MEMORY GAUGE SPECIFICATIONS	Technical Specifications	Gauges
	TRANSDUCER TYPE	Silicon
PRESSURE	Resolution	0.2 psi
	Accuracy	+/- 0.06% FSO
	Range	8,800 psi or 15,000 psi
TEMPERATURE	Resolution	0.05 ºC
	Accuracy	+/- 1.0 ºC
	Range	0 - 150 ºC
	Memory Size	1,000,000 data sets
	Battery Lifetime	up to 1 year
	Sample rate	1 second to 600 seconds
	Connections	Amerada Pin/box
	Housing Material	17/4 PH stainless steel
	Service	Standard and H2S

Design Features

- ✓ The tool is "Run-It-Yourself" so no additional personnel are required
- ✓ Short in design OAL 47.5" and a diameter of 2.25"
- ✓ The 1,000,000 data set gauge memories give a complete history of all your jobs
- ✓ Fast 1 second sampling means all events can be analyzed

RESERVOIR GROUP

➢ Multi - Cycle Tool
Tidal Force Tool (TFT)

Reservoir Group's Tidal Force Tool (TFT) enhances wellbore cleanout efficiency with increased annular velocities

The Tidal Force Tool (TFT) is a proprietary flow-activation technology that diverts flow to the annulus isolating the motor below. The TFT can be configured for a wide range of flow rates. All fluid is passed thru the TFT to the BHA (bottom hole assembly) below. Once the flow rate is increased above the predetermined set rate all fluid is diverted to the annulus isolating the BHA below. Positive indication of tool cycling is noticeable at surface.

It's full flow-through technology diverts flow through the side ports of the tool—significantly improving hole cleaning and management of debris. The TFT is ideal for milling, cleanouts, and jetting applications.

Its design enables superior performance with unlimited number of cycles and functioning the TFT is achieved by simply increasing or reducing the flow to the predetermined cycle rate. No drop balls or shut down of pumps are required.

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Tool Specifications

Tools OD (inch)	Length (inch)	Torsional Yield (ft lbs)	Differential Pressure Rating	Max. Closed Flow Rate	Max. Open Flow Rate	Temperature Rating	Standard Connection
2 7/8"	30	3,100	5,000 psi	750 L/min 4.7 bpm	1200L/min 7.6 bpm	190°C	2 3/8" STD PAC Box & Pin

Design Features

- ✓ High flow capability and lower circulating pressures
- ✓ Eliminates the need for drop-balls or pressure equalization to cycle
- ✓ Unlimited number of cycles
- ✓ Ability to isolate flow to the motor
- ✓ Effectively manages debris

Benefits

- ✓ Increased annular velocity for improved hole cleaning
- ✓ Increased efficiency and saves time between operations
- ✓ Allows for continuous operation and eliminates the need to trip out of hole due to limited cycles
- ✓ Reduces motor wear and extends the motor life
- ✓ Reduces the risk of becoming stuck in hole
- ✓ Limited impact To BHA length

Tidal Force Tool for Demanding Applications

- ✓ Milling-Jetting-Cleanouts
- ✓ No drop balls or shut down of Pumps
- ✓ Increase annular velocities
- ✓ Unlimted Cycles
- ✓ Ideal for SSD and Frac Sleeve washing

RESERVOIR GROUP

Double Ended Selective Shifting Tool (DESST)

The Reservoir Group Coiled Tubing Double Ended Selective Shifting Tool (DESST) is a work tool for opening and closing sliding side sleeves. It has been designed specifically to selectively shift PCE, Otis, Camco, Baker sliding sleeves (SSD's) in well bores.

The DESST shifting keys are normally retracted during the running operation and are hydraulically flow activated to the open shift position by increasing surface pump volume and therefore pressure at the downhole location of the DESST and SSD. The DESST can selectively open or close multiple SSD's in a single CT trip.

Technical Specifications				
Tool	2.312"	2.75"	3.313"	3.813"
Max OD Tool	2.15"	2.72"	3.25"	3.660"
Available keys	2.312"	2.75" & 2.813"	3.313"	3.813"
Max OD keys	2.60"	3.02"	3.61"	4.09"
Min ID (orifice)	0.25"	0.39"	0.72"	0.72"
Operational Pressure	450psi	450psi	500psi	800psi
Optional shear release	yes	yes	yes	yes
M/U Length	101.7cm	95.6cm	114.3cm	104.5cm
Connection	1 ½" AMT	1 ½" AMT	2 3⁄8" PAC	2 3⁄8" PAC

Benefis

- ✓ Flow activated no drop balls required
- ✓ Dual action for opening and closing sliding side sleeves
- ✓ Positive or selective key options
- ✓ Optional shear release
- ✓ Optional external fish neck

RESERVOIR GROUP

WELL INTERVENTION LOCATIONS

Aberdeen, UK	Well Intervention Services (Specializing in Off-Shore Operations)
Assen, Netherlands	Well Intervention Services (Specializing in Off-Shore Operations)
Hat Yai, Thailand	Well Intervention Services
Vung Tau City, Vietnam	Well Intervention Services
Manama, Bahrain	Well Intervention Services
Safat, Kuwait	Well Intervention Services
Saudi Arabia	Well Intervention Services