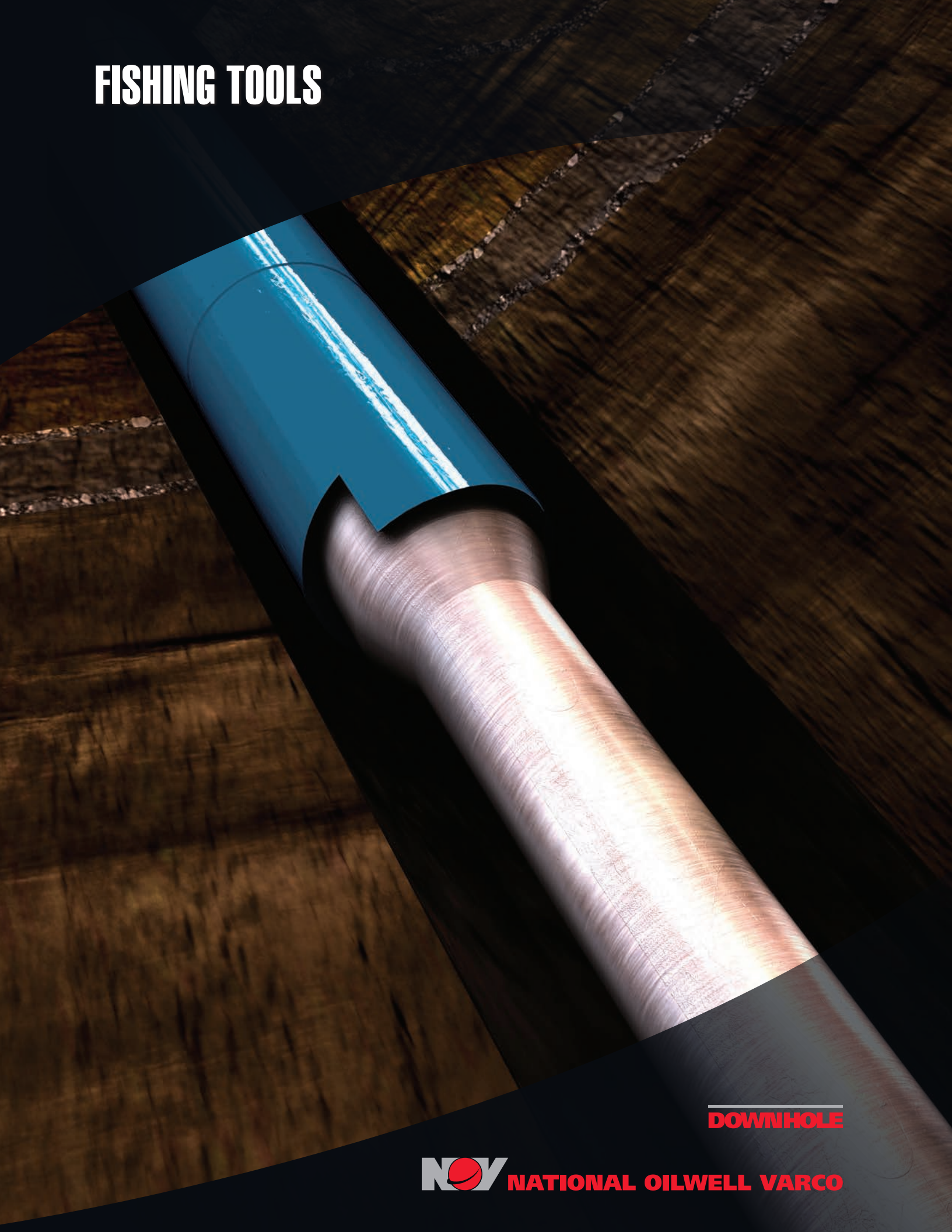


FISHING TOOLS



DOWNHOLE

NOV NATIONAL OILWELL VARCO

NOV® Downhole is the largest independent downhole tool and equipment provider in the world. We have the expertise to optimize BHA selection and performance, supporting over 150 locations in more than 80 countries.

Our complete range of solutions for the bottom hole assembly and related equipment includes:

- **Drill Bits**
- **Drilling Motors**
- **Borehole Enlargement**
- **Drilling Tools and Products**
- **Coring Services**
- **Fishing Tools**
- **Intervention and Completion Tools**
- **Service Equipment**
- **Advanced Drilling Solutions**

We take pride in delivering superior performance and reliability. Our objective is to exceed our customers' expectations, improve their economics and be an integral part of their strategies.

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Intervention, Retrieval, and Recovery

NOV Downhole is the manufacturer of Bowen® Fishing Tools, the world's most respected and reliable fishing tool products in the oil and gas industry for over 85 years. Fishing Tools are utilized in two types of operations.

1. **Well Intervention** – the operation of servicing an under-performing well in order to increase its production
2. **Fishing** – the operation of recovering an object that is stuck, damaged, or lost in the wellbore

NOV Downhole provides a vast range of fishing tools that have become industry standards. The comprehensive list of products includes catch tools, fishing stroking tools such as jars, intensifiers, and bumper subs, junk retrieval tools, milling and cutting tools, as well as repair and remedial tools. We lead the industry in terms of the size and diversity of our fleet and our ability to provide and service tools at a global level.

Each fishing tool is engineered to perform a specific operation. Since several fishing tools are utilized to make a fishing bottom hole assembly, each tool enhances the performance of the others to provide the most effective solution for all types of well intervention and fishing operations.

NOV Downhole's Bowen Line of Fishing Tools:

- External catch fishing tools
- Internal catch fishing tools
- Junk retrieval fishing tools
- Milling and cutting tools
- Accessory tools
- Repair and remedial tools

NOV Downhole offers a computer-based Fishing Jar Placement Program that determines the optimum jar placement in the fishing string to maximize the energy of the jarring impact and impulse. This successful, field-proven placement program compensates for the effects of hole angle, hole curvature, and frictional drag making it applicable for straight, directional, and horizontal hole analysis.

Fishing Tools

External Catch

Fishing tools that engage the fish on its outer diameter. These tools help you recover equipment downhole by using a grapple or by threading directly to its outside surface.

Internal Catch

Fishing tools that engage the fish in its inner diameter. Similar to External Catch Tools, this is achieved by a grapple or by threading directly to the fish's inside surface.

Junk Catch

Fishing tools used to remove debris, also known as "junk", from the wellbore. Magnets and junk baskets are ideal when retrieving a fish that is broken into pieces or has an irregular shape.

Milling and Cutting

Fishing tools used to mill or cut objects downhole for a specific reason. Whether you are milling up a fish that could not be retrieved to surface, cutting casing or tubing in an intervention operation, or performing a washing over procedure, NOV Downhole has the tools for the job.

Accessory Tools

NOV Downhole offers a variety of tools that enhance the fishing operation. Bumper subs provide you that extra movement in the drillstring when finding the top of the fish, fishing jars create the impact and impulse force to free the stuck fish, and our intensifiers are run in conjunction with the fishing jar to increase the jarring impact.

Remedial and Repair

Scrapers are used to clean the casing's inside wall, rollers restore the the inner diameter of casing and tubing to their normal inside diameter and roundness, and patches form a permanent sealed connection between two strings of tubing or casing.

Engineering Services

NOV Downhole provides customized solutions to your specific application. When a special tool is required, our experienced engineering staff is available to evaluate your application and provide a specific and reliable solution.

Series 150 Overshots

Bowen Series 150 Releasing and Circulating Overshots

The **NOV Downhole Bowen Series 150 Releasing and Circulating 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 have made it the standard of all external catch fishing tools.

Construction

The Bowen Series 150 Releasing and Circulating Overshot is composed of three outside parts: the Top Sub, Bowl, and Guide. The Basic Overshot may be dressed with either of two sets of internal parts, depending on whether the fish to be caught is near maximum size for the particular overshot.

If the fish diameter is near the maximum catch of the Overshot, a Spiral Grapple, Spiral Grapple Control, and Type "A" Packer are used. If the fish diameter is considerably below maximum catch size (usually $\frac{1}{2}$ ") a Basket Grapple and a Mill Control Packer are used.



Basket Grapple



Basket Grapple with Long Catch Stop



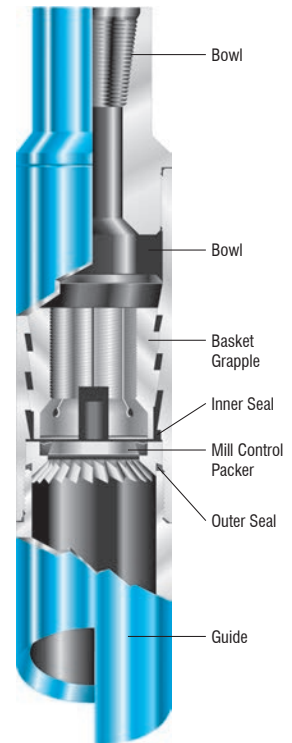
Inner Seal



Basket Grapple Mill Control Packer



Outer Seal



Bowen Series 150 Releasing and Circulating Overshot with Basket Grapple

Gripping and Releasing Mechanism

The Bowl of the Overshot is designed with helically tapered spiral section on its inside diameter. The gripping member (Spiral Grapple or Basket Grapple), is fitted into this section. When an upward pull is exerted against a fish, an expansion strain is spread evenly over a long section of the bowl and the compression strain is spread evenly over a long section of the fish. No damage or distortion occurs to either the fish or the Overshot. This design permits a far stronger tool with a smaller outside diameter than is possible with an overshot that employs a single tapered section which supports slips.

A Spiral Grapple is formed as a left-hand helix with a tapered exterior to conform with the helically tapered section in the Bowl. Its interior is wickered for engagement with the fish.

A Basket Grapple is an expandable cylinder with a tapered exterior to conform to the helically tapered section in the Bowl. Its interior is wickered for engagement with the fish. Two types of Basket Grapple are available to meet the need for catching various types of fish.

The Basket Grapple with Long Catch Stop has an internal shoulder located at the upper end, to stop the fish in the best catch position. It is designed to stop and catch collars and tool joints, with sufficient length left below the Grapple to allow the joint to be packed-off with a Basket Control Packer. The Basket Grapple with Short Catch Stop (not shown) has a double set of wickers of two different internal diameters. It is used to stop and catch a coupling with a ruptured piece of pipe engaged in its upper end. The upper set of wickers will catch the ruptured pipe and act as a stop against the coupling, while the lower set of wickers will catch the coupling.

Grapple Controls are of two types: Spiral Grapple Controls are used with Spiral Grapples; Basket Controls are used with Basket Grapples. Grapple Controls are used as a special key to allow the Grapple to move up and down during operation while simultaneously transmitting full torque from the Grapple to the Bowl.

Spiral Grapple Controls are always plain; Basket Grapple Controls may be either plain or include a Packoff. In addition to the Packoff, mill teeth are included. See Packoff Mechanism in this catalog for a complete explanation.

Series 150 Overshots

In operation, the Overshot functions in the same manner, whether dressed with Spiral Grapple parts or Basket Grapple parts.

During the engaging operation, as the Overshot is rotated to the right and lowered, the Grapple will expand when the fish is engaged, allowing the fish to enter the Grapple. Thereafter, with rotation stopped and upward pull exerted, the Grapple is contacted by the tapers in the Bowl and its deep wickers grip the fish firmly.

During the releasing operation, a sharp downward bump places the larger portion of the Bowl tapers opposite the Grapple, breaking the hold. Thereafter, when the Overshot is rotated to the right and slowly elevated, the wickers will unscrew the Grapple off the fish.

The fact that Bowen Releasing and Circulating Overshots require right-hand rotation only, both during engaging and releasing operation, is extremely important. This feature eliminates the dangers that are present when it is necessary to rotate the string in a left-hand direction.

Pack-Off Mechanism

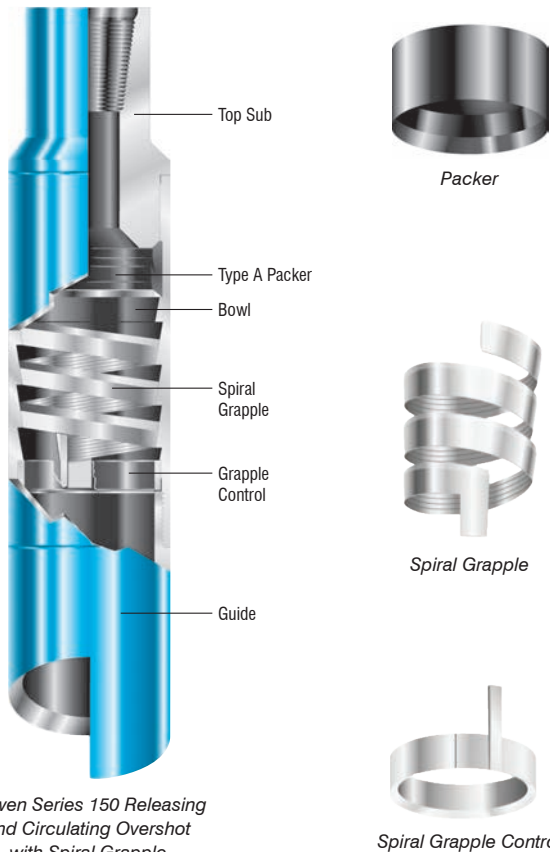
The type of Pack-off used depends on how the Overshot is dressed and the operators' choice. When the Overshot is dressed with a Spiral Grapple, a Type "A" Packer is used. It seals at its O.D. against the inside of the Bowl. It has an internal lip that seals around the fish. Each Type "A" Packer is designed to packoff a specific size. A Type "A" Packer should be ordered for each size Spiral Grapple.

Control Packers are used when the Overshot is dressed with a Basket Grapple. Control Packers are standard with a Type "R" (Replaceable) Packer. The patented Double Lip Packer provides greater sealing ability and reduces the chance of seal damage during fish engagement. The outer seal is also replaceable; this allows for field replacement of either seal. The Mill Control Packer is used when light dressing is required prior to fish engagement.

NOTE: Only one control can be installed in the overshot assembly at a time. Control Packers are manufactured for a specific size. One should be ordered to match each basket grapple size that has been ordered.

Plain Controls are used when no packoff is required. They are installed in the same location as the Control Packer.

NOTE: The tables on the following pages list all available controls. Refer to those tables for the proper part number.



Bowen Series 150 Releasing and Circulating Overshot with Spiral Grapple

Operation: Engaging and Pulling the Fish

Connect the Overshot to the fishing string and run it in the hole. As the top of the fish is reached, slowly rotate the fishing string to the right and gradually lower the Overshot over the fish. Allow the right-hand torque to slack out of the fishing string, and pull on the fish by elevating the fishing string. If the fish does not come, start the circulating pumps and maintain a heavy upward strain while fluid is forced through the fish.

Releasing From the Fish

Drop the weight of the fishing string heavily against the Overshot, then simultaneously rotate to the right and slowly elevate the fishing string until the Overshot is clear of the fish. To release from a recovered fish, follow the same procedure while holding fish below the Overshot.

Overshot Accessories

The more commonly used accessories for Bowen Series 150 Overshots are Extension Subs, Oversize Guides, Wall Hook Guides, Milling Shoes, and Lock Rings. These accessories are illustrated and listed beginning on page 10. Calculated strength data on all Bowen Series 150 Overshots are available on request.

Send for Bowen Technical Manual No. 1150 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Series 150 Releasing and Circulating Overshots.

FISHING TOOLS

Tools are listed in order of maximum catch size.

The following table shows only a partial listing of available NOV Dowhole Bowen overshots.

NOTE: Nitralloy Grapples are available upon request.

Bowen Series 150 Releasing and Circulation Overshots

Maximum Catch Size 2 $\frac{1}{8}$ " to 3 $\frac{3}{4}$ " Inclusive

Maximum Catch Size (Spiral)		2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{7}{8}$	3 $\frac{1}{16}$	3 $\frac{1}{8}$
Maximum Catch Size (Basket)		1 $\frac{3}{4}$	2	2	2	2 $\frac{1}{2}$	2 $\frac{9}{16}$	2 $\frac{5}{8}$
Overshot O.D.		2 $\frac{5}{8}$	3 $\frac{1}{8}$	3 $\frac{3}{8}$	3 $\frac{3}{8}$	3 $\frac{3}{8}$	3 $\frac{5}{8}$	4 $\frac{1}{8}$
Type		S.H.	X.S.H.	S.H.	F.S.	X.S.H.	S.H.	F.S.
Complete Assembly	Part No.	C-10199	9305	C-4623	C-5080	9270	C-5101	9105
(Dressed Spiral Parts)	Weight	28	42	46	55	51	60	70

Replacement Parts

Top Sub	Part No.	A-10200	9311	A-5083	A-5081	9276	A-5102	9106
Bowl	Part No.	B-10201	9306	B-5088	B-5082	9271	B-5103	9107
Packer	Part No.	B-10202	9309	B-5089	B-3395	8550	B-3594	809
Spiral Grapple	Part No.	B-10204	9307	B-5091	B-5085	9272	B-3596	1741
Spiral Grapple Control	Part No.	A-10205	9308	A-5092	A-5086	9273	B-3597	1747
Standard Guide	Part No.	A-10206	9312	A-5093	A-5087	9275	A-3598	1746

Basket Parts

Basket Grapple	Part No.	B-10204	9307	B-5091	B-5085	9272	B-3596	1741
Basket Grapple Control	Part No.	A-10205	9308	A-5092	A-5086	9273	B-3597	1747
Mill Control Packer	Part No.	B-10202-R	9309-R	B-5089-R	B-3395-R	8550-R	B-3594-R	809-R

Bowen Series 150 Releasing and Circulation Overshots

Maximum Catch Size 3 $\frac{1}{2}$ " to 4" Inclusive

Maximum Catch Size (Spiral)		3 $\frac{1}{2}$	3 $\frac{21}{32}$	3 $\frac{21}{32}$	3 $\frac{3}{4}$	4
Maximum Catch Size (Basket)		2 $\frac{7}{8}$	3 $\frac{1}{8}$	3.220	3 $\frac{7}{32}$	3 $\frac{1}{2}$
Overshot O.D.		4 $\frac{3}{8}$	4 $\frac{9}{16}$	4 $\frac{11}{16}$	4 $\frac{5}{8}$	4 $\frac{7}{8}$
Type		S.H.	S.H.	S.F.S.	S.H.	S.H.
Complete Assembly	Part No.	C-4619	C-5151	9109	C-5129	C-5154
(Dressed Spiral Parts)	Weight	72	77	83	82	95

Replacement Parts

Top Sub	Part No.	A-4620	A-5152	9110	A-5130	A-5155
Bowl	Part No.	B-4621	B-5153	9111	B-5131	B-5156
Packer	Part No.	L-7065	L-6665	6665	B-5538	B-5157
Spiral Grapple	Part No.	B-3607	B-4339	6662	B-5133	B-5159
Spiral Grapple Control	Part No.	B-3608	B-4340	6674	A-5134	B-5160
Standard Guide	Part No.	A-4622	A-4341	6667	A-5135	A-5161

Basket Parts

Basket Grapple	Part No.	B-3607	B-4339	6662	B-5133	B-5159
Basket Grapple Control	Part No.	B-3608	B-4340	6674	A-5134	B-5160
Mill Control Packer	Part No.	B-7065-R	L-6665-R	6665-R	B-5538-R	B-5157-R

FS (Full Strength) Engineered to withstand all pulling, torsional and jarring strain.

XFS (Extra Full Strength) . . . Engineered for extreme abuse.

SFS (Semi Full Strength) . . . Engineered for special hole conditions and maximum strength.

SH (Slim Hole) Engineered to withstand heavy pulling strains only.

XSH (Extra Slim Hole) Engineered for pick up jobs only.

Series 150 Overshots

Tools are listed in order of maximum catch size.

The following table shows only a partial listing of available NOV Dowhole Bowen® overshots.

NOTE: Nitralloy Grapples are available upon request.

Bowen Series 150 Releasing and Circulation Overshots

Maximum Catch Size 4¼" to 5½" Inclusive

Maximum Catch Size (Spiral)	4¼	4½	4¾	4¾	5	5	5½	
Maximum Catch Size (Basket)	3⅞	4½	4¾	4¾	4¾	4¾	4¾	
Overshot O.D.	5⅞	5¾	5¾	5¾	5¾	6¾	6¾	
Type	F.S.	S.H.	S.H.	S.F.S.	S.H.	F.S.	S.H.	
Complete Assembly	Part No.	5896	5698	C-5168	8975	C-5171	C-4825	8625
(Dressed Spiral Parts)	Weight	130	130	133	138	140	192	185

Replacement Parts

Top Sub	Part No.	5897	5699	A-5169	8976	A-5172	B-4826	8626
Bowl	Part No.	5898	5700	B-5170	8977	B-5173	B-4827	8617
Packer	Part No.	169	1140	B-2199	6114	L-5950	L-4505	8618
Spiral Grapple	Part No.	165	1135	B-2201	6112	B-4369	M-1071	8619
Spiral Grapple Control	Part No.	186	1137	B-2202	6113	B-4370	M-1072	8620
Standard Guide	Part No.	187	1143	B-2203	6121	B-4371	L-1074	8621

Basket Parts

Basket Grapple	Part No.	165	1135	B-2201	6112	B-4369	M-1071	8619
Basket Grapple Control	Part No.	186	1137	B-2202	6113	B-4370	M-1072	8620
Mill Control Packer	Part No.	169-R	1140-R	B-2199-R	6114-R	L-5950-R	M-4505	L-8618-R

Bowen Series 150 Releasing and Circulation Overshots

Maximum Catch Size 6¼" to 6¾" Inclusive

Maximum Catch Size (Spiral)	6¼	6¼	6¼	6½	6½	6¾	
Maximum Catch Size (Basket)	5¾	5¾	5½	5¾	5¾	6	
Overshot O.D.	7¾	7¾	7¾	7¾	8¾	7¾	
Type	S.H.	S.F.S.	F.S.	S.H.	F.S.	S.H.	
Complete Assembly	Part No.	9692	8741	C-2108	9860	C-5342	4785
(Dressed Spiral Parts)	Weight	216	241	261	220	274	235

Replacement Parts

Top Sub	Part No.	9693	8742	B-2106	9861	A-5343	9133
Bowl	Part No.	9694	1641	B-2109	9862	B-3711	9134
Packer	Part No.	9689	1642	L-1680	9865	2372	9136
Spiral Grapple	Part No.	9687	1644	B-2073	9863	B-2374	9137
Spiral Grapple Control	Part No.	9688	1645	A-2074	9864	B-2375	9138
Standard Guide	Part No.	9691	5525	A-2075	9867	A-2376	9139

Basket Parts

Basket Grapple	Part No.	9687	1644	B-2073	9863	B-2374	9137
Basket Grapple Control	Part No.	9688	1645	A-2074	9864	B-2375	9138
Mill Control Packer	Part No.	9689-R	1642-R	L-1680-R	9865-R	L-6635-R	9136-R

Tools are listed in order of maximum catch size.

The following table shows only a partial listing of available NOV Dowhole Bowen overshots.

NOTE: Nitralloy Grapples are available upon request.

Bowen Series 150 Releasing and Circulation Overshots

Maximum Catch Size 6 $\frac{5}{8}$ " to 7 $\frac{1}{4}$ " Inclusive

Maximum Catch Size (Spiral)		6 $\frac{5}{8}$	6 $\frac{3}{4}$	7	7 $\frac{1}{4}$
Maximum Catch Size (Basket)		5 $\frac{7}{8}$	6 $\frac{1}{8}$	6 $\frac{3}{8}$	6 $\frac{5}{8}$
Overshot O.D.		8 $\frac{1}{4}$	7 $\frac{7}{8}$	8 $\frac{1}{8}$	8 $\frac{3}{8}$
Type		F.S.	S.H.	S.H.	S.H.
Complete Assembly	Part No.	C-3032	C-5222	9217	C-5354
(Dressed Spiral Parts)	Weight	280	243	251	260

Replacement Parts

Top Sub	Part No.	A-3033	A-5223	9218	A-5355
Bowl	Part No.	B-3034	B-5224	9219	B-5356
Packer	Part No.	A-1814	B-5225	9224	B-5357
Spiral Grapple	Part No.	N-84	B-5227	9222	B-5359
Spiral Grapple Control	Part No.	M-89	A-5228	9223	B-5360
Standard Guide	Part No.	A-1818	A-5229	9226	A-5361

Basket Parts

Basket Grapple	Part No.	N-84	B-5227	9222	B-5359
Basket Grapple Control	Part No.	M-89	A-5228	9223	B-5360
Mill Control Packer	Part No.	A-1814-R	B-5225-R	9224-R	B-5357-R

Bowen Series 150 Releasing and Circulation Overshots

Maximum Catch Size 8" to 14 $\frac{3}{4}$ " Inclusive

Maximum Catch Size (Spiral)		8	8 $\frac{3}{8}$	8 $\frac{1}{2}$	9	9 $\frac{5}{8}$	10 $\frac{1}{8}$	11 $\frac{1}{4}$	12	14	14 $\frac{3}{4}$
Maximum Catch Size (Basket)		7 $\frac{1}{4}$	7 $\frac{3}{4}$	7 $\frac{3}{4}$	8 $\frac{1}{4}$	8 $\frac{7}{8}$	9 $\frac{1}{8}$	10 $\frac{1}{2}$	11 $\frac{1}{4}$	13 $\frac{1}{4}$	14
Overshot O.D. (inches)		9 $\frac{5}{8}$	9 $\frac{1}{2}$	10 $\frac{1}{8}$	10 $\frac{5}{8}$	11 $\frac{1}{4}$	11 $\frac{3}{4}$	12 $\frac{3}{4}$	13 $\frac{3}{4}$	16	16 $\frac{3}{4}$
Type		F.S.	S.H.	F.S.	F.S.	F.S.	F.S.	F.S.	-	-	-
Complete Assembly	Part No.	264	4834	8960	C-5321	C-1282	5329	15800	33006	68028	64553
(Dressed Spiral Parts)	Weight	337	314	358	401	480	42	948	975	1100	1200

Replacement Parts

Top Sub	Part No.	265	9063	8961	A-5322	A-12823	5330	15801	33007	68029	64554
Bowl	Part No.	266	9062	8962	B-5323	B-12824	5331	15802	33008	68030	64555
Packer	Part No.	235	9055	8956	B-5324	B-12825	5332	15805	33011	68031	64556
Spiral Grapple	Part No.	238	9057	8957	B-5326	B-12827	5334	15803	33009	68033	64558
Spiral Grapple Control	Part No.	239	9058	8958	B-5327	B-12828	5335	15804	33010	68034	64559
Standard Guide	Part No.	240	9059	8959	A-5328	A-12829	5336	15806	33012	68035	64560

Basket Parts

Basket Grapple	Part No.	238	9057	8957	B-5326	B-12827	5334	15803	33009	68033	64558
Basket Grapple Control	Part No.	239	9058	8958	B-5327	B-12828	5335	15804	33010	68035	64559
Mill Control Packer	Part No.	235-R	9055-R	8956-R	B-5324-R	B-12825-R	5332-R	15805-R	33011	68031	64556

RECOMMENDED SPARE PARTS:

- (1) Spiral — 3 packers, 2 grapples, for each size and 1 control
- (2) Basket — 2 grapples, 2 controls or mill control packers for each size
- (3) Mill Control Packer — 3 inner and 3 outer seals

Series 150 Overshots



Inner Seal

Bowen Inner Seals

Fish Size	Part No.	1 ⁷ / ₈	2	2 ¹ / ₈	2 ¹ / ₄	2 ³ / ₈	2 ¹ / ₂	2 ⁵ / ₈	2 ³ / ₄
Inner Seal	Weight	A-10803	A-10804	A-10805	A-10806	A-10807	A-10808	A-10809	A-10810
		1/50	1/32	1/32	1/32	1/32	1/32	1/32	1/32
Fish Size		2 ⁷ / ₈	3	3 ³ / ₈	3 ³ / ₄	3 ³ / ₈	3 ³ / ₂	3 ³ / ₈	3 ³ / ₄
Inner Seal	Part No.	A-10811	A-10812	A-10813	A-10814	A-10815	A-10816	A-10817	A-10819
	Weight	1/32	1/24	1/24	1/24	1/24	1/24	1/24	1/16
Fish Size		3 ³ / ₈	4	4 ¹ / ₈	4 ¹ / ₄	4 ¹ / ₈	4 ¹ / ₂	4 ¹ / ₈	4 ³ / ₈
Inner Seal	Part No.	A-10820	A-10821	A-10822	A-10823	A-10824	A-10825	A-10826	A-10827
	Weight	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
Fish Size		4 ⁷ / ₈	5	5 ¹ / ₈	5 ¹ / ₄	5 ¹ / ₈	5 ¹ / ₂	5 ¹ / ₈	5 ³ / ₄
Inner Seal	Part No.	A-10828	A-10829	A-10830	A-10831	A-10832	A-10833	A-10834	A-10835
	Weight	1/2	1/2	1/2	1/2	1/12	1/12	1/12	1/12
Fish Size		5 ⁷ / ₈	6	6 ¹ / ₈	6 ¹ / ₄	6 ¹ / ₈	6 ¹ / ₂	6 ¹ / ₈	6 ³ / ₄
Inner Seal	Part No.	A-10836	A-10837	A-10838	A-10839	A-10840	A-10841	A-10842	A-10843
	Weight	1/2	1/2	1/2	1/2	1/8	1/8	1/8	1/8
Fish Size		6 ⁷ / ₈	7	7 ¹ / ₈	7 ¹ / ₄	7 ¹ / ₈	7 ¹ / ₂	7 ¹ / ₈	7 ³ / ₄
Inner Seal	Part No.	A-10844	A-10845	A-10846	A-10847	A-10848	A-10849	A-10850	A-10851
	Weight	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
Fish Size		7 ⁷ / ₈	8	8 ¹ / ₈	8 ¹ / ₄	8 ¹ / ₈	8 ¹ / ₂	8 ¹ / ₈	8 ³ / ₄
Inner Seal	Part No.	A-10852	A-10853	A-10854	A-10855	A-10856	A-10857	A-10858	A-10859
	Weight	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Fish Size		8 ⁷ / ₈	9	9 ¹ / ₈	9 ¹ / ₄	9 ¹ / ₈	9 ¹ / ₂	9 ¹ / ₈	9 ³ / ₄
Inner Seal	Part No.	A-10860	A-10861	A-10862	A-10863	A-10864	A-12099	A-12100	A-12101
	Weight	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4

Bowen Inner Seals to Pass Upset and Pack-Off Pipe

Pack-Off Pipe Size	1 ¹ / ₄	1 ¹ / ₂	2 ¹ / ₈	2 ¹ / ₄	2 ³ / ₈	2 ¹ / ₂	2 ⁵ / ₈	3 ¹ / ₂	
Pass Upset Size	1 ³ / ₁₆	1.900	2.330	2 ¹⁹ / ₃₂	2 ¹⁹ / ₃₂	3 ³ / ₃₂	3 ³ / ₃₂	3 ³ / ₃₂	
Inner Seal	Part No.	A-13366	A-13317	A-13285	A-11690	A-11690	A-11691	A-11692	A-11693
Pack-Off Pipe Size		3 ¹ / ₂	3 ¹ / ₂	4 ¹ / ₂	4 ¹ / ₂				
Pass Upset Size		3 ³ / ₁₆	3 ¹⁵ / ₁₆	5	5 ¹ / ₈				
Inner Seal	Part No.	A-11693	A-11694	A-11695	A-11696				

RECOMMENDED SPARE PARTS: (1) 3 Inner Seals



Outer Seal

Bowen Type R Replaceable Outer Seals for Control Packers

Packer No.	Part No.	98R	98RS		113R		169R	
Outer Seal		30-43	30-42		30-33		30-22	
Packer No.				235R	A756R	809R	811R	A811R
Outer Seal	Part No.			27-72	30-32	30-11	30-11	30-18
Packer No.		856R	B972R	1025R	1140R	1189R	1253R	1453R
Outer Seal	Part No.	30-19	30-19	30-41	30-25	30-28	30-17	30-6
Packer No.		L1453R		1517R	L1517R	1634R	1680R	A1707R
Outer Seal	Part No.	30-6		30-14	30-14	30-38	27-65	30-19
Packer No.		A1814R	A1831R	A1867R	1966R	A1966R	1969R	A1969R
Outer Seal	Part No.	30-38	30-11	30-21	27-74	27-74	27-74	30-19
Packer No.		B2199R			2372R	B2436R		L3064R
Outer Seal	Part No.	30-27			30-38	30-24		30-24
Packer No.			B3395R	B3479R	B3594R		4185R	4398R
Outer Seal	Part No.		30-8	30-34	30-12		30-19	30-11
Packer No.		4505RS	B4520R			B4672R	B5075R	B5089R
Outer Seal	Part No.	30-28	30-30			30-22	30-6	30-7
Packer No.		B5107R	B5118R	5157R	B5157R	B5180R	B5188R	B5199R
Outer Seal	Part No.	30-12	30-14	30-20	30-20	30-32	30-33	30-36
Packer No.		B5217R	B5225R	B5236R	B5244R	B5252R	5260R	
Outer Seal	Part No.	30-39	30-39	30-42	30-42	30-43	30-43	
Packer No.				B5308R	B5316R	5324R	B5324R	5332R
Outer Seal	Part No.			30-48	27-64	30-48	30-47	30-52
Packer No.		B5357R		B5538R	5950R	L5950R	6114R	L6163R
Outer Seal	Part No.	30-41		30-18	30-28	30-28	30-25	30-18
Packer No.		B6346R			B6635R	6665R	L6665R	L7065R
Outer Seal	Part No.	30-46			27-66	30-17	30-17	30-16
Packer No.		L7090R		8550R	8618R	8947R	8956R	8985R
Outer Seal	Part No.	30-13		30-11	30-31	30-30	30-46	30-39
Packer No.		9020R	9033R		9103R	9122R	9136R	9203R
Outer Seal	Part No.	30-27	30-33		30-46	30-17	30-38	30-32
Packer No.		9215R	9224R	L9224R	9231R		B9240R	9250R
Outer Seal	Part No.	30-32	30-39	30-39	30-40		30-12	30-43
Packer No.		9298R		9309R	9407	9689R		9865R
Outer Seal	Part No.	30-42		30-6	MS9021-32	30-36		30-37
Packer No.		10368R	B11826R	12695R	B12825R	15255R	15805R	16398R
Outer Seal	Part No.	30-1	30-29	30-42	30-49	30-50	27-78	30-4
Packer No.		21303	26260	31656	33011	64556	68031	-
Outer Seal	Part No.	30-15	30-51	568-463	27-80	NA	NA	-

O-ring seals are normally furnished in sealed plastic bags of 10, 25, or 100 pieces each to prevent deterioration. Other quantities will be furnished in unsealed packages. Packing sets will always be furnished in sealed plastic bags.

Overshot Accessories

Bowen Itcoloy Mill Extensions

Overshot Mill Extension interiors are faced with Itcoloy to a size that will mill away a flared or jagged fish to enable it to pass up into and be engaged by the Grapple in the Bowl. Mill Extensions are installed between the Bowl and the standard, oversize or wallhook guides.

Bowen Itcoloy Mill Guides

Overshot **Itcoloy Mill Guide** interiors are faced with Itcoloy to a size that will mill away a flared or jagged fish to enable it to pass up into and be engaged by the Grapple in the Bowl. The Itcoloy Mill Guide is used in place of a standard or oversized Guide. They may be ordered using the Standard Guide number. Specify O.D. to be milled over and state, "Itcoloy Mill Guide."

Bowen Oversize Guides and Wall Hook Guides

If the hole size is so much greater than the fish size that it is possible for the Overshot to pass alongside the fish, an **Oversize Guide** or a **Wall Hook Guide** must be installed to insure alignment of the fish with the Overshot.



Itcoloy Mill Extensions



Itcoloy Mill Guides



Bowen Oversize Guides



Bowen® Wall Hook Guides

Bowen Wall Hook Guides

Guide O.D.	Length of Guide		
	36"	42"	48"
5" to 5½" O.D. Wt. Lbs.	94	110	-
Over 5½" to 6" O.D. Wt. Lbs.	102	117	-
Over 6" to 6½" O.D. Wt. Lbs.	110	126	-
Over 6½" to 7" O.D. Wt. Lbs.	117	134	-
Over 7" to 7½" O.D. Wt. Lbs.	126	144	-
Over 7½" to 8" O.D. Wt. Lbs.	135	155	-
Over 8" to 8½" O.D. Wt. Lbs.	145	166	188
Over 8½" to 9" O.D. Wt. Lbs.	155	177	198
Over 9" to 9½" O.D. Wt. Lbs.	166	191	213
Over 9½" to 10" O.D. Wt. Lbs.	177	204	228
Over 10" to 10½" O.D. Wt. Lbs.	189	244	273
Over 10½" to 11" O.D. Wt. Lbs.	201	285	318
Over 11" to 11½" O.D. Wt. Lbs.	214	299	333
Over 11½" to 12" O.D. Wt. Lbs.	227	312	348
Over 12" to 12½" O.D. Wt. Lbs.	-	327	366
Over 12½" to 13" O.D. Wt. Lbs.	-	343	383
Over 13" to 13½" O.D. Wt. Lbs.	-	360	402
Over 13½" to 14" O.D. Wt. Lbs.	-	377	421
Over 14" to 14½" O.D. Wt. Lbs.	-	391	436
Over 14½" to 15" O.D. Wt. Lbs.	-	404	451
Over 15" to 15½" O.D. Wt. Lbs.	-	419	467
Over 15½" to 16" O.D. Wt. Lbs.	-	433	483
Over 16" to 16½" O.D. Wt. Lbs.	-	448	500
Over 16½" to 17" O.D. Wt. Lbs.	-	462	516
Over 17" to 17½" O.D. Wt. Lbs.	-	479	535
Over 17½" to 18" O.D. Wt. Lbs.	-	496	554

Impression Blocks and Extension Subs

Bowen Impression Blocks

NOV Downhole Bowen Impression Blocks, which consist of a soft lead insert in the lower end of a steel housing, are used in fishing operations. They are designed to enable the operator to determine the configuration of the top of the fish and to locate its position in the well bore. Its use enables the operator to more precisely assess the fishing conditions and select the proper tool or tools needed to successfully complete the fishing operation.

Operation

To use an NOV Downhole Bowen Impression Block: Lower the tool into the well on the lower end of a fishing string of pipe. After the Block contacts the upper end of the fish, the weight of the string is further lowered straight down (never rotate) against the fish which indents into the soft lead lower end of the Block. When the fishing string is withdrawn from the well, the impression in the lead will reveal the condition of the fish.

Available in two styles:

Solid Impression Block:

- Simple design
- Solid steel body with pin thread on top and cavity on the bottom to retain the lead
- Mild steel except for tools with Sucker Rod threads that will be heat treated
- Short fishing neck (still provides wrench space and fishing length)

Watercourse Impression Block:

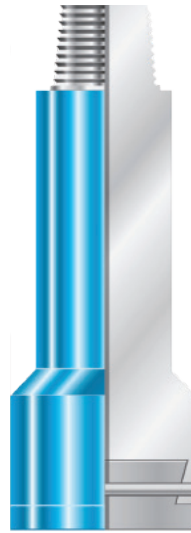
- Watercourse through tool and to face of lead impression (available to wash off top of fish to get good impression)
- Longer fishing necks provide length for rework of threads
- Heat-treated material used on most sizes regardless of thread

Bowen Impression Blocks are available with or without watercourse.

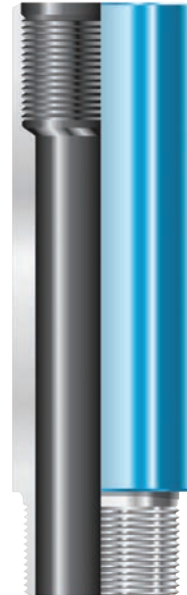
Bowen Extension Subs

If a twist-off has left a fish whose upper end is un-engageable, an Extension Sub is installed between Top Sub and the Bowl of the Overshot. This will permit lowering of the Overshot over the fish far enough to insure a secure engagement and a perfect pack-off. Extension Subs with stops will be furnished on request.

Extensions can usually be furnished with a bore very near the maximum catch diameter of the overshot bowl. Some cannot be made as large as maximum, because it will cause a substantial loss of strength. When an Extension requires boring to near maximum catch size, the operator should consult Bowen on maximum allowable sizes and effects on strength. When ordering, specify overshot and O.D. if other than standard. Unless otherwise specified, Extension Subs will be furnished in a standard 36-inch length.



Bowen Impression Block



Bowen Extension Sub

Bowen Impression Blocks

Size O.D. Larger Than	0	1 $\frac{1}{8}$ "	1 $\frac{1}{4}$ "	2 $\frac{1}{8}$ "	2 $\frac{1}{4}$ "	2 $\frac{3}{8}$ "	3 $\frac{1}{8}$ "	3 $\frac{3}{8}$ "	4 $\frac{1}{8}$ "	4 $\frac{1}{2}$ "	4 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	5 $\frac{3}{4}$ "	8	8 $\frac{1}{2}$ "
Up To and Including	1 $\frac{1}{8}$ "	1 $\frac{3}{8}$ "	2 $\frac{1}{8}$ "	2 $\frac{3}{8}$ "	3 $\frac{1}{8}$ "	3 $\frac{3}{8}$ "	4 $\frac{1}{8}$ "	4 $\frac{1}{2}$ "	4 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	5 $\frac{3}{4}$ "	8	8 $\frac{1}{2}$ "	9 $\frac{1}{4}$ "	
Pin Top Connection	$\frac{5}{8}$ S.R.	$\frac{3}{4}$ S.R.	$\frac{3}{4}$ S.R.	$\frac{3}{4}$ S.R.	$\frac{3}{4}$ S.R.	$\frac{3}{4}$ S.R.	$\frac{3}{4}$ S.R.	2 $\frac{7}{8}$ Reg.	2 $\frac{7}{8}$ Reg.	3 $\frac{1}{2}$ Reg.	3 $\frac{1}{2}$ Reg.	3 $\frac{1}{2}$ Reg.	4 $\frac{1}{2}$ Reg.	4 $\frac{1}{2}$ Reg.	4 $\frac{1}{2}$ Reg.
Assembly Part No.	37664	18133	18162	37667	69921	61573	49620	68610	78404	61576	33001	19580	32998	19581	81165
Weight	5	6	7	7	15	23	36	26	28	57	81	83	144	144	160
Watercourse Size	N/A	N/A	N/A	N/A	N/A	N/A	N/A	$\frac{1}{2}$ "	N/A	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "
Solid Impression Block															
Assembly Part No.	152867	152868	152869	152870	152871	152872	152873	152874	152875	152876	152877	152878	152879	152880	152881
Size O.D. Larger Than	9 $\frac{1}{4}$ "	10	11	11 $\frac{1}{2}$ "	11 $\frac{3}{4}$ "	12	13 $\frac{1}{4}$ "	14 $\frac{1}{2}$ "	15 $\frac{1}{4}$ "	17					
Up To and Including	10"	11	11 $\frac{1}{2}$ "	11 $\frac{3}{4}$ "	12	13 $\frac{1}{4}$ "	14 $\frac{1}{2}$ "	15 $\frac{1}{4}$ "	17	17 $\frac{1}{2}$ "					
Pin Top Connection	6 $\frac{5}{8}$ Reg.	6 $\frac{5}{8}$ Reg.	6 $\frac{5}{8}$ Reg.	6 $\frac{5}{8}$ Reg.	6 $\frac{5}{8}$ Reg.	6 $\frac{5}{8}$ Reg.	6 $\frac{5}{8}$ Reg.	6 $\frac{5}{8}$ Reg.	7 $\frac{1}{8}$ Reg.	7 $\frac{1}{8}$ Reg.					
Assembly Part No.	-	145715	68613	32995	80922	149208	-	-	146686	146696					
Weight	-	250	332	312	285	342	-	-	476	637					
Watercourse Size	-	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	-	2"	2"	-					
Solid Impression Block															
Assembly Part No.	152882	152883	152884	152885	152886	152887	152888	152889	152890	152891					

Series 10 Sucker Rod Overshots

Bowen Series 10 Sucker Rod Overshots

NOV Downhole Bowen Series 10 Releasing Sucker Rod Overshots are the best available tools for engaging and retrieving sucker rods, couplings, and similar items from inside tubing strings. Series 10 Overshots are available in sizes to engage up to 2⁵/₁₆" O.D. inside of 2⁷/₈" tubing and up to 1⁵/₈" O.D. inside 2³/₈" tubing.

Construction

The Bowen Series 10 Overshot consists of a Top Sub, a Bowl, a Spiral Grapple and a Control Guide. When a Basket Grapple is used in the Series 10 assembly, a Basket Grapple Control and a Plain Guide are required.

Operation

To engage & pull the fish: Connect the Overshot to the fishing string and run it in the hole and lower it slowly over the fish while rotating slowly to the right. Allow any twist to slack out of the fishing string and then pull on the fish by elevating the fishing string.

To release from the fish: Drop the weight of the fishing string heavily against the Overshot, then simultaneously rotate to the right and slowly elevate the fishing string until the Overshot is clear of the fish. To release from a recovered fish, follow the same procedure while holding the fish below the Overshot.

RECOMMENDED SPARE PARTS:

Spiral: 2 grapples, 1 control
Basket: 2 grapples, 1 grapple control

SPECIAL NOTES:

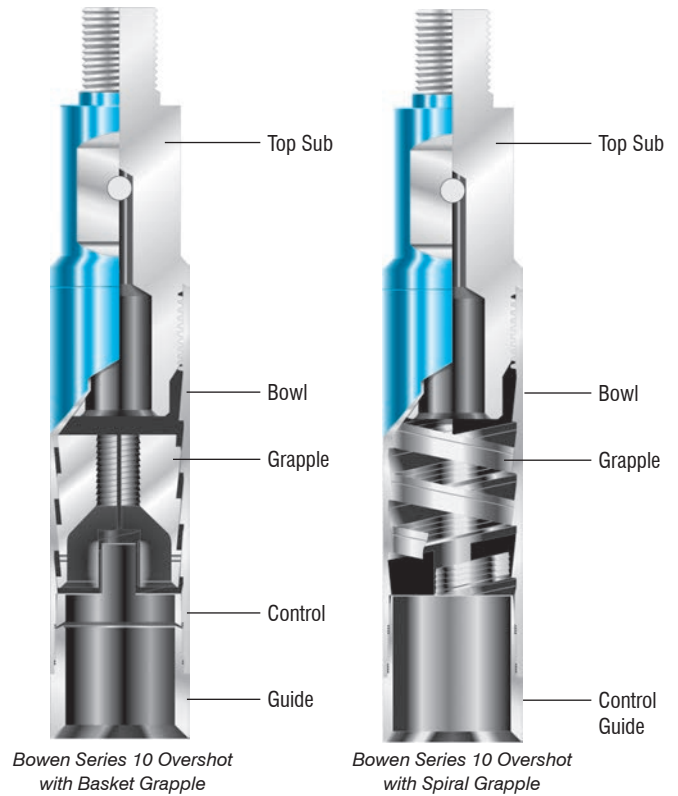
(1) Grapples available in 1/16" intervals.

FS (Full Strength) Engineered to withstand all pulling, torsional and jarring strain.

SFS (Semi Full Strength) Engineered for special hole conditions and maximum strength.

SH (Slim Hole) Engineered to withstand heavy pulling strains only.

Send for Bowen Technical Manual No. 1010 which includes complete descriptions of construction, operation, maintenance and listing for Bowen Series 10 Bowen Overshots.



Bowen Series 10 Sucker Rod Overshots

	1 ¹ / ₈	1 ¹ / ₄	1 ¹ / ₂	1 ¹ / ₂	1 ⁵ / ₈	1 ⁵ / ₈	1 ¹³ / ₁₆	1 ¹⁵ / ₁₆	2	2	2 ³ / ₈
Maximum Catch Spiral	7/8	1 1/4	1 5/8	1 5/8	1 7/8	1 7/8	1 5/8	1 3/4	1 13/16	1 13/16	2 3/8
Maximum Catch Basket	7/8	1 1/4	1 5/8	1 5/8	1 7/8	1 7/8	1 5/8	1 3/4	1 13/16	1 13/16	2 3/8
Overshot O.D.	1 1/8	1.43	1 25/32	1 29/32	1 29/32	1 29/32	2 5/16	2 1/4	2 5/16	2 7/8	2 27/32
Top Connection Standard	3/4 Rod	3/4 Rod	3/4 Rod	3/4 Rod	3/4 Rod	3/4 Rod	7/8 Rod	7/8 Rod	7/8 Rod	7/8 Rod	7/8 Rod
Type	F.S.	S.H.	S.H.	S.H.	S.H.	F.S.	S.F.S.	S.H.	S.H.	F.S.	S.H.
Complete Assembly	Part No. 9790	17985	13940	9990	9340	9880	11480	16070	9400	9530	15860
Weight	4	4	4	4 7/8	5	5	4 7/8	4 3/4	6	6 5/8	6 5/8

Replacement Parts

Top Sub	Part No.	9791	17986	13941	9341	9341	9341	11481	16071	9401	9531	15863
Bowl	Part No.	9792	17987	13942	9991	9342	9881	11482	16072	9402	9532	15861
Grapple (Spiral)	Part No.	9793	17988	13943	9992	9343	9343	11483	16073	9403	9403	9872
Control Guide	Part No.	9796	17989	13945	9993	9349	9883	11484	16076	9406	9535	-

Basket Parts

Grapple (Basket)	Part No.	9793	17988	13943	9992	9343	9343	11483	16073	9403	9403	9872
Grapple Control	Part No.	9794	18003	13947	9993	9344	9344	11485	16074	9405	9405	9873
Plain Guide	Part No.	9795	18004	13944	9994	9345	9345	11486	16075	9404	9533	15862

Series 20 Overshots

Bowen Series 20 Short Catch Sucker Rod Overshots

NOV Downhole Bowen Series 20 Short Catch Sucker Rod Overshots are designed to catch sucker rods, couplings and the exposed portions of other items which are too short to be engaged by the Series 10 or other conventional overshots.

Construction

The Series 20 Overshot consists of a Top Sub, a Bowl, a Grapple Control, and a Basket Grapple. It differs from the Series 10 in that there is no Guide, and the Grapple Control is above the Basket Grapple, permitting the Basket Grapple to be placed at the lowest position in the Bowl.

Operation

Operation of the Series 20 Short Catch Overshot is identical to that of the Series 10 Overshot.

RECOMMENDED SPARE PARTS:

- (1) 2 Grapples for each size
- (2) 1 Control

SPECIAL NOTES:

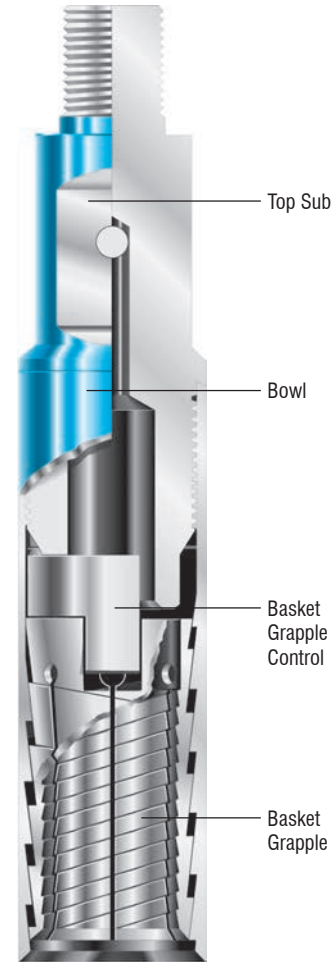
- (1) Grapples available in 1/16" intervals.

FS (Full Strength) Engineered to withstand all pulling, torsional and jarring strain.

SFS (Semi Full Strength) Engineered for special hole conditions commensurate with maximum strength.

SH (Slim Hole) Engineered to withstand heavy pulling strains only.

Send for Bowen Technical Manual No. 1010 which includes complete descriptions of construction, operation, maintenance and parts listing for Bowen Series 20 Short Catch Sucker Rod Overshots.



Bowen Series 20 Short Catch Sucker Rod Overshot

Bowen Series 20 Short Catch Sucker Rod Overshots

Maximum Catch Basket Only	7/8	1	1 1/4	1 3/8	1 1/2	1 5/8	2	2 1/8	2 3/8	2 1/2
Overshot O.D.	1 1/4	1 3/8	1 3/4	1 7/8	1 29/32	2 1/16	2 29/32	2 7/8	3 1/8	3 1/4
Standard Top Connection	5/8 Ros	5/8 Ros	5/8 Ros	3/4 Ros	3/4 Ros	7/8 Ros	7/8 Ros	2 3/8 Tub.	2 3/8 Tub.	2 3/8 Tub.
Type	S.H.	S.H.	S.H.	S.H.	S.H.	S.H.	S.H.	F.S.	S.H.	F.S.
Complete Assembly	Part No. 17315	25780	28760	18355	11555	17438	18305	20170	20645	22270
Weight	4 7/8	4 7/8	5	5 1/2	4 7/8	7 7/8	7 1/4	10 1/2	10 1/2	10 1/2

Replacement Parts

Top Sub	Part No.	17316	25781	28761	18356	9341	9401	18306	20172	20646	22271
Bowl	Part No.	17317	25782	28762	18357	11556	17439	18307	20171	20647	22272
Basket Grapple	Part No.	17318	25783	28763	18358	11557	17440	18308	18308	20648	22273
Grapple Control	Part No.	17319	25784	28764	18359	11558	17441	18309	18309	20649	22274

Series 70 Overshots

Bowen Series 70 Short Catch Releasing Overshots

Series 70 Short Catch Releasing Overshots are specifically designed to engage the exposed portion of a fish too short to be engaged with conventional catch overshots and where conditions prevent lowering the overshot past the fish. This tool will firmly engage a very short fish.

Construction

This tool is simple and rugged. The four pieces comprising the assembly cannot be incorrectly assembled.

Operation

The operation of the Series 70 Short Catch Releasing Overshot is identical to that of the well known Series 150 Bowen Overshot: engagement is effected by slowly lowering the assembly over the fish while maintaining slow right hand rotation; release is accomplished by bumping down heavily and then slowly elevating the fishing string while simultaneously rotating slowly to the right.

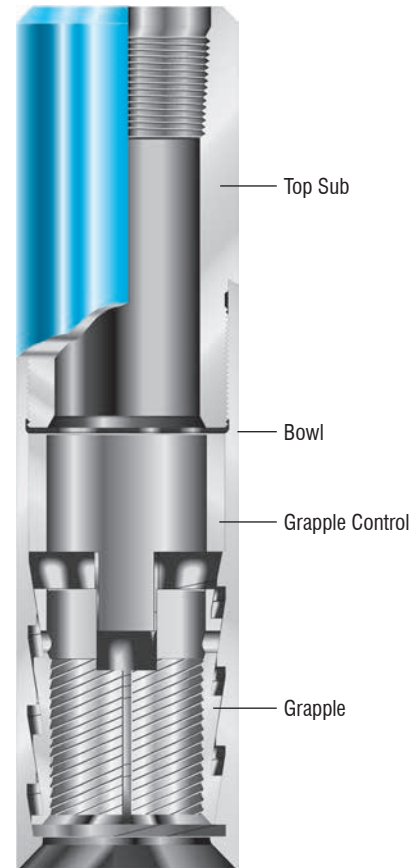
RECOMMENDED SPARE PARTS:

- (1) 2 Basket Grapples, each catch size
- (2) 1 Basket Grapple Control

SPECIAL NOTES:

- FS (Full Strength)** Engineered to withstand all pulling, torsional and jarring strain.
- SH (Slim Hole)** Engineered to withstand heavy pulling strains only.

Send for Bowen Technical Manual No. 1070 which includes complete descriptions of construction, operation, maintenance and parts listing for Bowen Series 70 Short Catch Releasing Overshots.



Bowen Series 70 Short Catch Releasing Overshot

Bowen Series 70 Short Catch Releasing Overshots

Maximum Catch		1 5/8	2 1/2	2 5/8	3 1/8	3 1/2	3 21/32	3 21/32	3 3/4	3 3/4	4 1/4	4 3/4	4 3/4	6	6 1/2
Standard O.D.		2 5/16	3 5/8	3 3/4	4 5/8	4 1/2	4 11/16	5 5/8	4 3/4	5 1/2	5 3/4	5 7/8	6 5/8	7 5/8	8 1/4
Type		S.H.	S.H.	S.H.	F.S.	S.H.	S.H.	F.S.	S.H.	F.S.	F.S.	S.H.	F.S.	F.S.	F.S.
Complete Assembly	Part No.	38506	17615	13535	11290	10434	10543	11297	12645	12785	13065	10560	11303	11630	38939
	Weight	8	30	36	57	59	100	87	59	123	116	129	153	165	245

Replacement Parts

Top Sub	Part No.	38507	17616	13536	11295	10435	10544	11298	10544	12786	13066	10561	11304	11631	38940
Bowl	Part No.	38508	17617	13537	11291	10436	10545	11299	12646	12787	13067	10562	11305	11632	38941
Basket Grapple	Part No.	38509	17618	13538	11929	10437	10546	11300	12647	12788	13068	10563	11306	11633	38942
Grapple Control	Part No.	38510	17619	13539	11294	10438	10547	11301	12648	12789	13069	10564	11307	11634	38943

Rotary Die Collars

Bowen Rotary Die Collars

Die Collars are simple, rugged, dependable external catch fishing tools.

Operation

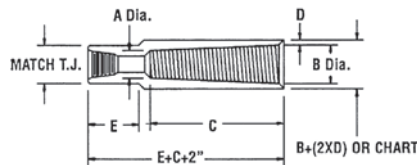
Run the Die Collar in the hole to the top of the stuck fish. Apply less than one point of weight and rotate the die collar until the tapered threads have engaged the fish. Stop rotation and pull the fish from the hole.

Die Collars are furnished in two types: Type "A" and Type "B." Type "A" Die Collars have a smooth end on the large diameter end, the guide is integral with the die collar.

NOTE: Type "A" Die Collars also available with cut lip design.

Type "B" Die Collars have a threaded end on the large wicker diameter end so that an optional guide can be used to better adapt the die collar to changing hole conditions. Optional guides are furnished with plain or cut lip designs. All Die Collars are furnished with hardened wickers, designed to engage even the most difficult fish. The standard wickers offered are a plain, watertight, non-fluted design, if circulation is required below the stuck point. An optional fluted type wicker is also available, designed to flush out the cuttings while engaging the fish.

NOTE: No additional charge for fluted wickers. Left-hand wickers and tool joint furnished on request.



Type B Die Collar with Lipped Guide



Type A Die Collar



Oversize Guide

Diameters A & B & Length C known:

$$\frac{12 \times (B - A)}{C} = \text{Taper per Foot (TPF)}$$

Diameters A & B known:

$$\frac{12 \times (B - A)}{\text{TPF}} = \text{Length C}$$

Diameter A & Length C known:

$$\frac{\text{TPF} \times C}{12} + A = \text{Diameter B}$$

Diameter B & Length C known:

$$B - \frac{\text{TPF} \times C}{12} = \text{Diameter A}$$

Large Wicker I.D. = "B" Diameter — The large wicker I.D. should be at least 1/2" larger than your known fish outside diameter.

Small Wicker I.D. = "A" Diameter — The small wicker I.D. should be at least 1/2" smaller than your known fish outside diameter. The small wicker diameter should never be less than 1 1/2" due to the boring and wickering operation during the manufacturing process.

Length of Wickers = "C" Length — The length of the wickers can be any length up to 24" long.

NOTE: Lengths longer than 24 inches require two-piece construction. Additional charges will be required for this type of construction.

Wall Thickness = "D" — Thickness at guide end of taper tap should never be less than 1/4".

Taper per Foot (TPF) = The standard taper per foot on all Die Collars, if not specified, will be 3/4" TPF. Never exceed 1" taper per foot. Tapers exceeding 1" TPF reduce the number of wickers which can engage the fish during a fishing operation.

NOTE: Tapers less than 3/4" TPF are used when the diameters selected cause the die collar to be too short.

Watercourse = All Rotary Die Collars are furnished with a circulation hole drilled through the center, providing the ordered connection was designed with a watercourse.

Tong Space = "E" Length — Tong space should be at least 9" on die collars. Add 1 1/2" of extra length per required recut of tool joint to the tong space area.

Bowen Die Collars

Nominal Size	3/4"	1"	1"	1 1/4"	2"	2 3/8"	2 3/8"	2 3/8"	2 7/8"	2 7/8"	2 7/8"	2 7/8"	3 1/2"	3 1/2"	3 1/2"	3 1/2"	3 1/2"
	Pipe	Pipe	Upset	Pipe	Pipe	Upset	API Reg	API I.F.	Pipe	Upset	API Reg	API I.F.	Pipe	Upset	API Reg	API F.H.	API I.F.
O.D.	1.660	1 13/16	1 29/32	2 5/16	3 7/16	3 11/16	4 3/16	4 7/16	4	4 3/8	4 7/8	5 1/4	4 3/4	5 1/8	5 1/2	5 7/8	6
Nominal Size	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	5 9/16"	5 9/16"	5 9/16"	5 9/16"	5 9/16"	6 5/8"	6 5/8"	6 5/8"	6 5/8"	6 5/8"	6 5/8"	6 5/8"
	Pipe	Upset	API Reg	API F.H.	API I.F.	Pipe	Upset	API Reg	API F.H.	API I.F.	Pipe	Upset	API Reg	API F.H.	API I.F.	API Reg	API Reg
O.D.	5 7/8"	6 3/8"	6 7/8"	7 1/8"	7 1/2"	7 1/4"	7 9/16"	8 1/4"	8 1/2"	8 7/8"	8 1/2"	8 5/8"	9 1/4"	9 1/2"	10	10 3/4"	13 5/8"

Rotary Taper Taps

Bowen Rotary Taper Taps

NOV Downhole Bowen Rotary Taper Taps are simple, rugged, dependable internal catch fishing tools.

Operation

Run the taper tap in the hole to the top of the stuck fish, Apply less than one point of weight, rotate the tap until the tapered threads have engaged the fish. Stop rotation and pull the fish from the hole.

Rotary Taper Taps are furnished in two types: Plain or Skirt type. Plain Taper Taps do not have a skirt thread provided on the shoulder. Skirt Type Taper Taps are threaded for a skirt. A skirt is used when the hole size is drastically different from the fish size. The taper tap can be dressed with a skirt or a skirt and oversize guide. This will allow for the taper tap to be guided into the fish more easily during the fishing operation.

NOTE: All skirt type taper taps are furnished with a thread protector. This will insure that the threads are not damaged if the taper tap is run in a fishing operation that does not require a skirt.

All NOV Dowhole Bowen Rotary Taper Taps are furnished with hardened wickers, designed to engage even the most difficult fish. The wickers are offered in a plain, water-tight, non-fluted design, if circulation is required below the stuck point, or a fluted type, designed to flush out the cuttings while engaging the fish.

NOTE: Non-fluted watertight wickers are furnished standard. Fluted-type wickers must be specified when ordered if required. Left hand wickers and tool joint furnished on request.

Large Wicker O.D. = "B" Diameter — The large wicker O.D. should be at least ½" larger than your known fish inside diameter.

Small Wicker O.D. = "A" Diameter — The small wicker O.D. should be at least ⅛" smaller than your known fish inside diameter. The small wicker diameter should never be less than a" due to depth of wickers required on the taper tap.

Length of Wickers = "C" Length — The length of the wickers can be any length up to 48" long.

NOTE: Lengths longer than 48 inches require two piece construction. Additional charges will be required for this type of construction.

Taper per Foot = The standard taper per foot on all Bowen Taper Taps, if not specified, will be ¾" taper per foot (TPF). Never exceed 1" TPF. Tapers exceeding 1" TPF reduce the number of wickers which can engage the fish during a fishing operation. This could cause the taper tap to fail during an attempted fishing operation.

NOTE: Tapers less than ¾" TPF are used when the diameters selected cause the taper tap to be too short.

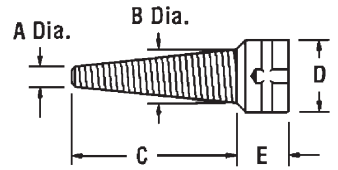
Watercourse = All Rotary Taper Taps are furnished with a circulation hole drilled through the center, providing the small diameter is large enough to accommodate it. Taper taps that have a small diameter less than 1" cannot have a standard circulation hole. These taper taps must be furnished with a cross-drilled circulation port above the skirt thread or above the largest wicker diameter if not threaded for skirt.

Tong Space = "E" Length — Tong space should be at least 9" on taps that are not threaded for a skirt and 11" for a tap that will be threaded. Add 1½" of extra length per required recut of tool joint to the tong space area.

Send for Bowen Technical Manual No. 2800 which includes complete descriptions of construction, operation, and parts listing for Bowen Rotary Taper Taps.

For Taper Tap skirt information send for Bowen Technical Manual No. 2100 on Bowen Full Circle Releasing Spears. (Skirts are interchangeable.)

Bowen Rotary Taper Taps



Diameters A & B known:

$$\frac{12 \times (B - A)}{TPF} = \text{Length C}$$

Diameter A & Length C known:

$$\frac{TPF \times C}{12} + A = \text{Diameter B}$$

Diameter B & Length C known:

$$B - \frac{TPF \times C}{12} = \text{Diameter A}$$

Diameters A & B & Length C known:

$$\frac{12 \times (B - A)}{C} = \text{Taper per Foot (TPF)}$$

Bowen Rotary Taper Taps

Nominal Size	5/8	3/4	1 1/16	1	7/8	1 1/4	2 3/8	2 1/2	2 3/4	2 7/8	2 7/8	3 1/2	
	S.R.	S.R.	F.J.	EUE	S.R.	EUE	EUE	Reg	I.F.	Reg	I.F.	Reg	
O.D.	1 1/2	1 3/4	1 13/16	1.9	2 5/16	2 3/8	3 1/8	3 1/2	3 3/8	3 3/4	4 1/8	4 1/4	
Part No.	25939	14458	15247	25880	14448	25881	25882	15233	15234	19487	19488	19489	
Nominal Size	3 1/2	3 1/2	3 1/2	4	4 1/2	4 1/2	4 1/2	4 1/2	5 1/2	5 1/2	5 1/2	6 3/8	6 3/8
	F.H.	I.F.	I.F.	F.H.	Reg	F.H.	X.H.	I.F.	Reg	F.H.	I.F.	Reg	F.H.
O.D.	4 3/8	4 3/4	5	5 1/4	5 1/2	5 3/4	6	6 1/8	6 3/4	7	7 3/8	7 3/4	8
Part No.	19490	19491	25883	25884	19492	19493	25885	19494	15240	15241	15242	15243	15244

Itco-Type Releasing Spears

Bowen Itco-Type Releasing Spears

NOV Downhole Bowen Itco-Type Releasing Spears provide a dependable, inexpensive, and simple means of engaging a fish internally. These Spears assure positive engagement, easy release from the fish when desired, and easy re-engagement after the Spear has been released.

Construction

The Itco-Type Releasing Spear consists of a Mandrel, Grapple, Release Ring, and Nut. The Mandrel may be obtained in either a Flush Type or a Shoulder Type. Mandrel top connections are furnished to order. The Nut can be obtained as a plain bullnose guide or with a pin connection for the attachment of other tools below the Spear.

Assembly and Operation

To Assemble: Screw the Grapple onto the Mandrel from the lower end with a left-hand action. Slide the Release Ring on below the helical section of the Mandrel and make up the Nut to the Mandrel. Before running in, screw the Grapple down against the Release Ring as far as it will go by hand. In this position, the Grapple will compress inward and will not engage the pipe sufficiently to interfere with the tool being run in.

To Engage the Fish: When the Spear has reached the point of desired engagement with the fish, rotate sufficiently to move the Mandrel one full turn to the left. This turns the Mandrel down through the Grapple, placing the Grapple into the engaging position. A straight pull will then wedge the Grapple into positive engagement with the fish.

To Release: Bump down to break the freeze, then rotate two or three turns to the right. This moves the Mandrel up through the Grapple, forcing the Grapple against the Release Ring and putting the Spear in released position. A straight upward pull will then generally free the Spear; however, it is recommended that the Spear be rotated slowly to the right when coming out. The matching cams of the Release Ring and Nut constitute a safety device which resists freezing or jamming.

Send for Bowen Technical Manual No. 2300 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Itco-Type Releasing Spears.

Bowen Itco-Type Releasing Spears

Nominal Catch Size O.D.	1.050	1.313	1.660	1.900	2 ³ / ₈	2 ⁷ / ₈	3 ¹ / ₂	4	4 ¹ / ₂	5	6	7	8 ⁵ / ₈	8 ⁵ / ₈	9 ⁵ / ₈	9 ⁵ / ₈	
	Pipe	Pipe	Pipe	Pipe	Tub.	Tub.	Tub.	Tub.	Tub.	Csg.	Csg.	Csg.	Csg.	Csg.	Csg.	Csg.	
Spear O.D. ("H")	1 ¹ / ₁₆	7 ⁷ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ⁷ / ₈	2 ³ / ₁₆	2 ¹³ / ₁₆	3 ¹ / ₄	3 ³ / ₈	4 ¹ / ₃₂	5	5 ³ / ₄	7 ¹ / ₄	7 ¹ / ₄	8 ¹ / ₄	8 ¹ / ₄	
Spear I.D.					3 ³ / ₈	3 ³ / ₈	1 ¹ / ₂	3 ³ / ₄	3 ³ / ₄	7 ⁷ / ₈	1	2	2 ³ / ₄	2 ³ / ₄	2 ³ / ₄	2	
Complete Assembly	Part No.	16455	19350	11195	9915	1344	1227	9410	9485	17475	9680	17234	9266	9380	17243	9281	17246*
	Weight	6	8	9	10	14	24	50	68	95	115	186	241	415	490	558	729

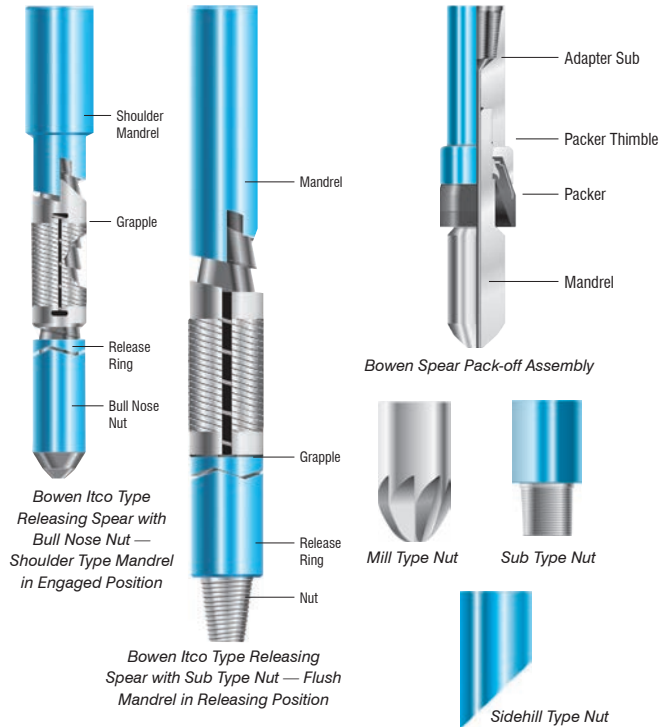
Replacement Parts

Mandrel (Flush Type)	Part No.	16456	19351	11196	9916	1345	1231	9411	9486	17476	9681	17235	9267	9381	17244	9282	17247
Mandrel (Shoulder Type)("A")	Part No.	16456	19351	11196	9916	1345	1231	9411	9486	17476	9681	17235	9267	9381	17244	9282	17247
Grapple	Part No.	16457	19352	11197	9917	1348	1230	9412	9487	17477	9682	17236	9268	9382	17245	9283	17248
Release Ring	Part No.	16458	19353	11198	9918	1347	1229	1584	534	13183	1336	9718	9279	9383	9383	9286	9286
Nut (Bull Nose)	Part No.	16459	19354	11199	9919	1346	1228	9413	9488	13184	1335	9719	9269	9384	9384	9284	9284

Bowen Spear Pack-Off Assembly

Packoff Assemblies are available for most Bowen Itco Type Releasing Spears to pack-off all sizes of tubing, drill pipe and casing. The Packoff Assembly is attached to the Sub Type Nut below the Spear, where it packs-off the fish in order to circulate through the fish.

Optional Nuts



Optional Nuts available are: Mill Type to mill away burrs, Sub Type to connect and run other tools below the Spear, and Sidehill Type to center the spear in greatly oversize holes to assure entry of the Spear into the fish.

NOTE: To order optional nuts, use standard nut number with suffix; -A for Mill Type, -B for Sub Type and -C for Sidehill Type Nuts. Include O.D. of spear used with and connection if Sub Type.

Segment-Type Spear Grapples

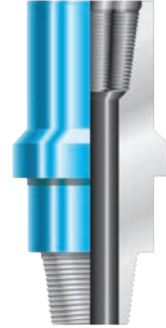
Type F Stop Subs

The **Type F Stop Sub** is designed to be used with the Flush Mandrel Type Releasing Spear when use of a stop is required. It is installed in the box connection at the top of the Mandrel.

RECOMMENDED SPARE PARTS:
(1) 2 Grapples for each catch size

Type S Oversize Stop Rings

The Type S Oversize Stop Ring is used with the Type F Stop Sub when use of a larger stop is required. It is installed on the Stop Sub shoulder with set screws.



Type F Stop Sub



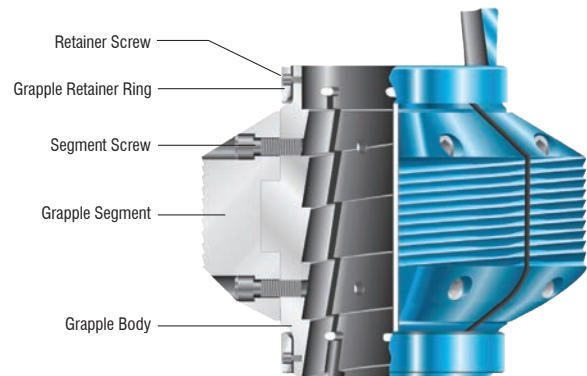
Type S Oversize Stop Ring

Optional Releasing Spear Accessories: Stop Subs and Stop Rings

Stop Sub Body O.D.	1 $\frac{1}{8}$	2 $\frac{3}{16}$	2 $\frac{13}{16}$	3 $\frac{1}{4}$	3 $\frac{3}{4}$	4 $\frac{1}{2}$	5	5 $\frac{11}{16}$	7 $\frac{1}{4}$	8 $\frac{1}{4}$
Stop Sub Stop O.D.	3 $\frac{1}{8}$	3 $\frac{3}{4}$	3 $\frac{3}{4}$	4 $\frac{1}{8}$	4 $\frac{1}{2}$	5	6	7	8 $\frac{5}{8}$	9 $\frac{5}{8}$
Stop Ring O.D.	3 $\frac{5}{8}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{3}{4}$	5	5 $\frac{1}{2}$	6 $\frac{5}{8}$	7 $\frac{9}{16}$	9 $\frac{1}{16}$	10 $\frac{3}{4}$
Stop Sub Type F	Part No.	19051	19052	19053	19054	19055	19056	19057	19058	19059
Stop Ring Type S	Part No.	18809	18800	18801	18802	18803	18804	18805	18806	18807

Bowen Segment-Type Spear Grapples

The **NOV Downhole Bowen Segment-Type Spear Grapple** is used to extend the catching ability beyond the range of a one piece grapple. This grapple consists of a Grapple Body, eight Grapple Segments, two Retainer Rings, six Ring Screws, six Ring Spacers, and Grapple Segment Screws. The helix of the Grapple Body matches that of the Spear Mandrel thereby making the action of the Spear the same as with a Standard Grapple.



Bowen Segment-Type Spear Grapple

Bowen Segment-Type Spear Grapples

Fits Spear Number	9380				17243				9281				17246			
To Catch Pipe Size	10 $\frac{3}{4}$	11 $\frac{3}{4}$	12 $\frac{3}{4}$	13 $\frac{3}{4}$	10 $\frac{3}{4}$	11 $\frac{3}{4}$	12 $\frac{3}{4}$	13 $\frac{3}{4}$	13 $\frac{3}{8}$	14	13 $\frac{3}{8}$	14	16	20		
Pipe Weight	32.75	38.00	45.45	48.00	32.75	38.00	45.45	48.60	48.00	42.00	48.00	42.00	55.00	90.00		
	48.00	54.00	66.72	68.00	48.00	54.00	66.72	68.00	68.00	57.00	68.00	57.00	65.00	94.00		
	40.00	47.00	-	61.00	40.00	47.00	-	61.00	61.00	-	61.00	-	-	-		
	55.50	60.00	-	85.00	55.50	60.00	-	85.00	85.00	-	85.00	-	-	-		
Complete Assembly:																
Part No.	9382				17245				9283				17248			

Full-Circle Releasing Spears

Bowen Full-Circle Releasing Spears

NOV Downhole Bowen Full-Circle Releasing Spears offer many outstanding advantages for all fishing jobs where it is necessary to engage a fish internally. Secure engagement is assured by the Full Circle Slips. Positive Release is assured by the primary release mechanism, backed by the left-handed wickers on the Slips which allow the tool to be unscrewed from the fish using right-hand rotation.

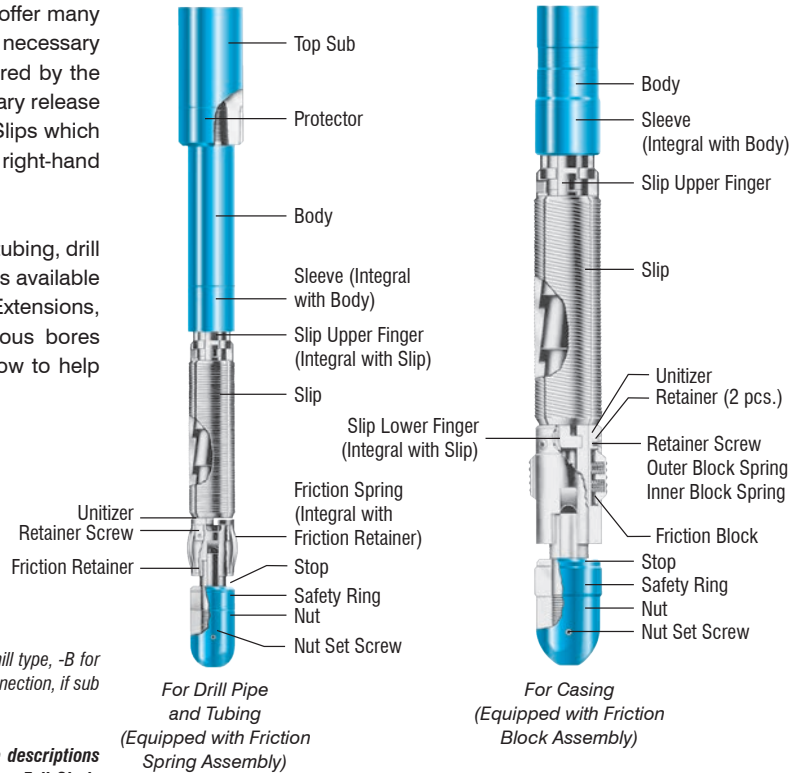
These tools are versatile, a size being available for each tubing, drill pipe and casing size. The full complement of accessories available include Mill Type, Sub Type and Sidehill Type Nuts, Extensions, Safety Ring Pack-offs, and Skirts and Guides. Generous bores are provided through the tools to assure ample fluid flow to help remove cuttings and furnish lifting force to the fish.

RECOMMENDED SPARE PARTS:

- (1) 2 Sets of Slips for each size to be caught
- (2) 1 Unitizer and 2 Friction Retainers (or 2 Friction Block Assemblies)
- (3) 1 Stop
- (4) 1 Safety Ring for each size of Slips

NOTE: To order optional nuts, use standard nut number with suffix -A for mill type, -B for sub type and -C for sidehill type nuts. Include O.D. spear used with and connection, if sub type. Refer to page 21 for illustrations of optional nuts.

Send for Bowen Technical Manual No. 2100 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Full-Circle Releasing Spears.



Full-Circle Releasing Spear for Drill Pipe and Tubing

Nominal Size	2 5/8 D.P.	2 5/8 Tbg.	2 7/8 D.P.	2 7/8 Tbg.	3 1/2 D.P.	3 1/2 Tbg.	4 D.P.	4 Tbg.	4 1/2 D.P.	5 1/2 & 5 1/8 D.P.	
Recommended Catching Range	2 5/8 D.P.	2 5/8 Tbg.	2 7/8 D.P.	2 7/8 Tbg.	3 1/2 D.P.	3 1/2 Tbg.	4 D.P.	4 Tbg.	4 1/2 D.P. or Tbg.	5 1/2 & 5 1/8 D.P.	
O.D. Smallest Slips Retracted	1 11/16	1 29/32	2	2 5/16	2 7/16	2 13/16	3 3/32	3 5/16	3 15/32	4 1/2	
Expansion Slips Over Safety Ring	1 1/32	1 1/32	3/8	3/8	13/32	13/32	15/32	15/32	1/2	9/16	
Slip Engagement Area (sq in)	55	59	74	87	95	115	126	135	178	265	
Complete Assembly	Part No.	6175	6693	6246	6684	7640	6701	7648	6710	6715	6723
	Weight	32	40	55	60	71	92	107	127	180	270

Optional Accessories

Safety Ring Packoff	Part No.	6181	6174	6252	5779	6268	6709	6683	5730	6722	6484
	Weight	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2 1/2	2 3/4	3 1/2	6
Extension (3 ft. Long)	Part No.	6176-6177	5858-6694	6247-6248	5771-6685	6263-7641	6702-6703	6676-7649	5839-6711	6270-6716	6277-6724
	Weight	22	26	29	40	46	60	70	75	85	130

Full-Circle Releasing Spear for Casing

Nominal Size	4 1/2	5	5 1/2	6	6 5/8	7	7 5/8	8 5/8	9 5/8	10 3/4	11 3/4	13 3/8	
Recommended Catching Range	4 1/2 4 3/4 & 5	5	5 1/2	6	6 5/8	7	7 5/8	8 5/8 & 9	9 5/8 & 10	10 3/4	11 3/4 & 12	13 & 13 3/8	
Expansion Slips Over Safety Ring	1/2	1/2	9/16	9/16	5/8	5/8	5/8	1 1/16	3/4	13/16	13/16	13/16	
O.D. Smallest Slips Retracted	3 29/32	4	4 1/2	5 1/2	5 1/2	5 3/4	6 7/16	7 1/4	8 3/16	9 1/2	10 9/16	12	
Slip Engagement Area (sq in)	210	217	265	315	350	365	430	485	580	690	785	890	
Complete Assembly	Part No.	10536	9337	9342	9347	9796	9352	10608	6318	10473	6067	6073	6081
	Weight	132	169	226	283	358	398	502	652	833	1240	1552	2017

Optional Accessories

Safety Ring Packoff	Part No.	6734	7583	6484	6041	6487	6047	6055	6529	6063	6072	6080	6088
	Weight	4	5	6	7	9	10	12	17	23	35	44	59

Simplex Packer Retrievers

Bowen Simplex Packer Retrievers

NOV Downhole Bowen Simplex Packer Retrievers are internal engaging fishing tools designed to retrieve all types of "drillable" production packers in a single run. They are used in an assembly which consists of a retriever, stinger, mill shoe and bushing. A Bowen Simplex Packer Retriever has a top sub, mandrel, cage and bottom nut. The retriever is attached to the stinger which is long enough to extend through the packer, when the milling operation is started. The mill shoe must be of a length which will shroud the packer. A short mill shoe may be used with a piece of washpipe in place of the long mill shoe. Mill shoes are faced on the bottom and I.D. with Bowen Itcoloy (sintered tungsten carbide). They will not damage the well casing. On the bottom of the bushing there is a box connection for attaching the stinger and a pin connection for attaching the washpipe or long mill shoe. On top is a box string connection.

To operate, lower the assembly until the Bowen Simplex Packer Retriever passes through the bore of the packer. Continue lowering until the mill shoe contacts the packer's slips. Begin circulation and rotation, and mill away the slips and sealing element until the packer is free. Then cease rotation, elevate the string and the retriever will engage and retrieve the packer. At any time after the retriever enters the packer, it can be released by lowering a few inches, rotating 90° to the right and slowly elevating the string.

Bowen Simplex Packer Retrievers

Catch Size (Packer I.D.)	1.968	2.380	2.688	3.250	4.125
Outside Diameter	1 ¹³ / ₁₆	2 ¹ / ₄	2 ⁵ / ₁₆	3 ³ / ₈	3 ³ / ₄
Inside Diameter	1/4	3/8	1/2	5/8	3/4
May be Dressed to Catch Thru	2	2.55	3.2	4	5
Connection	1 ¹³ / ₁₆ W.F.J.	1 ¹³ / ₁₆ W.F.J.	2 ³ / ₈ W.F.J.	2 ³ / ₈ API Reg.	2 ⁷ / ₈ API Reg.
Complete Assembly	Part No. 69035	69040	69045	69050	69055
Weight	14	20	23	28	35

Replacement Parts

Top Sub	Part No.	69036	69041	69046	69051	69056
Mandrel	Part No.	69037	69042	69047	69052	69057
Cage	Part No.	69038	69043	69048	69053	69058
Bottom Nut	Part No.	69039	69044	69049	69054	69059
Lock Pin	Part No.	13432	25499	13430	28501	25243
Weight		4	6	6 ¹ / ₂	8	10
	Weight	7	10	12	14	15
	Weight	1	1 ¹ / ₂	2	3	5 ¹ / ₂
	Weight	1 ¹ / ₂	2	2 ¹ / ₂	3	4
	Weight	1/8	1/8	1/8	1/8	1/8

Stingers

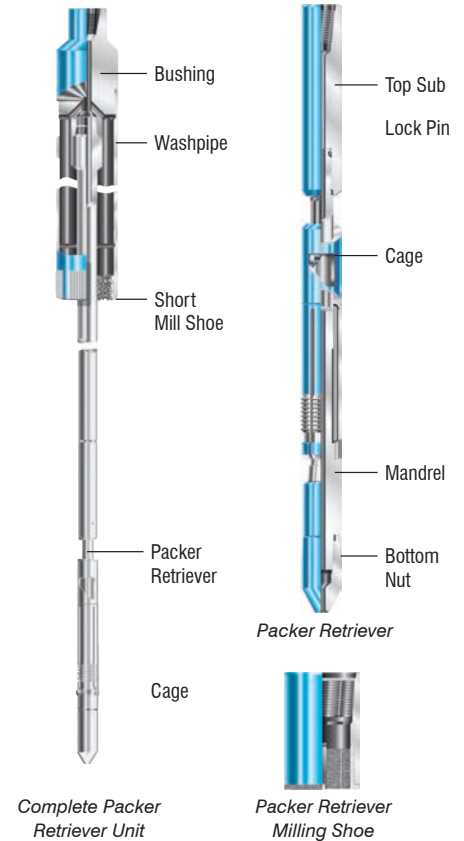
To Fit Packer Retriever No.	69035	69040	69045	69050	69055
Top Connection	2 ³ / ₈ API Reg Pin	2 ³ / ₈ API Reg Pin	2 ³ / ₈ API Reg Pin	2 ³ / ₈ API Reg Pin	2 ⁷ / ₈ API Reg Pin
Bottom Connection	1 ¹³ / ₁₆ Wilson F.J. Pin	1 ¹³ / ₁₆ Wilson F.J. Pin	2 ³ / ₈ Wilson F.J. Pin	2 ³ / ₈ API Reg Pin	2 ⁷ / ₈ API Reg Pin
Stinger 120"	Part No. 18053	18058	18063	18088	18073
Weight	75	105	115	150	180

Long Mill Shoes and Bushings

	4 ¹ / ₂	5	5 ¹ / ₂	5 ¹ / ₂	6	6 ⁵ / ₈	7	8 ⁵ / ₈
Casing Range	12.611.6tb	21.013.0tb	20.017.0tb	13.014.0tb	14.015.0tb	20.017.0tb	17tb	40.036.0tb
	4 ³ / ₄	5 ¹ / ₂	5 ³ / ₄	5 ³ / ₄	6 ⁵ / ₈	7	7 ⁵ / ₈	9
	16.0tb	25.0tb	25.2tb	19.517.0tb	32.029.0tb	32.024.0tb	2439tb	40.055.0tb
				6	7	7 ⁵ / ₈		
				23.020.0tb	40.0tb	45.0tb		
Shoe (Long-Single Piece)	Part No. 18052	18057	18062	18064	18069	18067	18024	18072
Weight	45	55	70	87	97	107	117	137
Bushing	Part No. 18051	28199	18061	18061	28200	28201	28202	28203
Weight	29	35	45	45	64	69	80	95

Short Mill Shoes and Bushings

	3 ¹ / ₂	4 ¹ / ₂	5	5 ¹ / ₂	6	6 ⁵ / ₈	7	8 ⁵ / ₈
Casing Range	7.710.2tb	9.516.6tb	11.518tb	13.23tb	14.15tb	17.24tb	17tb	24.49tb
		4 ³ / ₄	5 ¹ / ₂	5 ³ / ₄	6 ⁵ / ₈	7	7 ⁵ / ₈	9
		1618tb	25tb	1425tb	2634tb	2038tb	2439tb	4055tb
		5		6	7	7 ⁵ / ₈		
		24tb		1623tb	40tb	45tb		
Mill Shoe	Part No. 44422	25746	25748	25750	25752	25754	25756	25758
Weight	7	10	15	18	20	30	35	40
Washpipe (57" Long)	Part No. 44423	25745	25747	25749	25751	25753	25755	25757
Weight	25	35	50	75	70	85	120	130
Bushing	Part No. 44424	18051	28199	18061	28200	28201	28202	28203
Weight	20	29	35	45	64	69	80	95



Send for Bowen Technical Manual No. 2710 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Simplex Packer Retrievers.

Smooth Bore Packer Retrievers

Bowen Smooth Bore Packer Retrievers

Designed for Engagement of Smooth I.D. Bores

National Oilwell Varco's **Bowen Smooth Bore Packer Retrievers** are designed to be directly connected to a packer mill and to engage a packer with a smooth ID. It allows for constant rotation while milling and remains in the engaged position to prevent the packer from falling if it breaks loose. It can transfer torque to the packer if required and can also be engaged and released multiple times if needed.

Operation

The operation of the retriever is simple. The grapple is locked to the grapple carrier in a manner that prevents rotation while still allowing up and down movement between the grapple and grapple carrier. The grapple carrier is free to rotate on the mandrel unless the teeth are engaged between the grapple carrier and nut. Only right hand rotation and movement up and down are required for complete operation of this tool.

Placing the Retriever

The retriever is placed far enough under the packer mill to locate the grapple inside of the bore to be caught before milling begins. The length of the stinger/extension between the packer mill and the retriever is varied to adjust the location of the tool.

Engaging the Packer

The milling assembly is run into the hole and the top of the packer located. Rotation should be ceased or slowed to a minimum while entering the packer bore. As the retriever enters the bore, the grapple and grapple carrier will slide up to the shoulder on the mandrel. Additional downward force will compress the grapple to enter the bore. The entire assembly may now be lowered until the mill contacts the top of the packer. Once the grapple is positioned in the bore to be engaged, rotation may be resumed.

Milling the Packer

The packer may be milled at any speed and weight. The retriever will travel downward with the mill while staying in the engaged position should the packer break loose and fall.

Retrieving the Packer and Tubing

Engagement of the grapple may be tested at any time during the milling operation by stopping rotation and lifting the entire assembly. After the packer has broken free, it is recommended that rotation be ceased. Upward movement will engage the grapple. It is best if the entire assembly can be pulled out of the hole without any right hand rotation to prevent the risk of the retriever releasing from the packer.

Releasing the Packer

At any point during the milling operation, the grapple may be released by first setting down load and then lifting upward slightly while rotating to the right. The grapple will unscrew by an amount equal to the lead of the wickers for each rotation.



Packer Retriever
Smooth Bore

Bowen Smooth Bore Packer Retrievers

Size	inch	2¼"	3½"	3¾"	4¼"
Complete Assembly (less Grapple)	Part No.	501329	500977	503845	501650
Mandrel OD	inch	2¼	3½	3¾	4¼
	mm	57.2	77	95.3	107.9
ID	inch	¾	¾	⅝	1
	mm	9.5	9.5	15.9	25.4
Packer Size Range	inch	2.500 - 3.250	3.250 - 4.500	4.000 - 6.000	4.500 - 6.000
	mm	63.5 - 82.6	82.6 - 114.3	101.6 - 152.4	114.3 - 152.4
Nominal Catch Range	inch	± ½	± ⅙	± ⅙	± ⅙
	mm	± 0.79	± 1.59	± 1.59	± 1.59
Maximum Tensile	lbf.	113,300	262,000	402,000	512,000
Yield Strength	kN	504	1,165	1,788	2,277
Maximum Torsional	ft. lbs.	2,790	5,100	9,500	11,000
Yield Strength	Nm	3,782	6,914	12,880	14,914
Free Stroke	inch	12	12 Standard (36 Optional)	12 Standard (36 Optional)	12
	mm	304.8	304.8 (914.4)	304.8 (914.4)	304.8
Overall Length	inch	39¾	40 ⅞	47½	48½
	mm	1,012.8	1,036.6	1,206.5	1,222.4
Splined Ring		Yes	No	Yes	Yes

Safety Joints

Bowen Coarse Thread Safety Joints

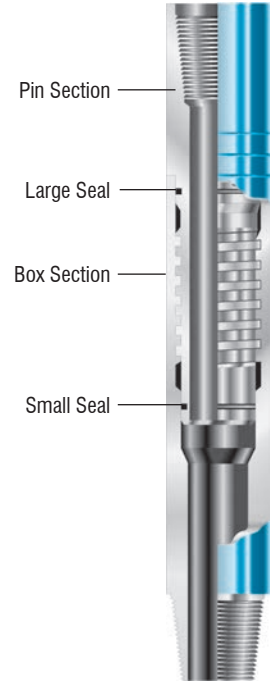
The **NOV Downhole Bowen Coarse Thread Safety Joint** allows quick release from drilling, fishing, testing, washover, or tubing strings should they become stuck, leaving a minimum of pipe in the hole, thereby reducing the problems of fishing or sidetracking. The new design is simple, eliminating the need of a release ring mechanism and lengthy disengagement procedures.

The Safety Joint has a rugged coarse thread design which will not loosen or wedge during operation. Once in the string the Safety Joint is resistant to vibration, heavy loads, and left or right-hand torque. The tool will disengage by simple left-hand rotation at approximately 40% of the tool's right-hand make-up torque.

O-ring packers above and below threads seal against internal and external fluid pressures. Both packers are rated for all normal pump pressures in continuous service.

The Safety Joint is available in a full range of sizes, types, lengths, etc. Bowen will manufacture the tool to fit customer's exact requirements. Three specific types are available as follows:

- Drill Pipe Safety Joints with tool joint connections, O.D. and I.D. correspond to those of tool joints.
- Tubing Safety Joints (not shown) with tubing connections: O.D. same as O.D. of coupling; I.D. same as I.D. of tubing string.
- Washover Safety Joints (not shown) run between drill pipe and washover string, have tool joint box in Safety Joint Pin Section, and washover string pin on Safety Joint Box Section. Diameters conform to those in use on washover pipe.



Bowen Coarse Thread Drill Pipe Safety Joint

Send for Bowen Technical Manual No. 4605 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Coarse Thread Safety Joints.

Bowen Drill Pipe Safety Joints

Size*	2 3/8	2 3/8	2 7/8	2 7/8	2 7/8	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	4	4	
Type	API Reg. Acme Reg.	API I.F. API F.H.	API Reg. Acme Reg.	Hyd. I.F.	Int. Flush	API Reg.	Hyd. I.F.	API F.H.	API Reg.	API I.F.	API F.H.	Int. Flush	
O.D. of Joint	3 3/8	3 3/8	3 3/4	3 3/8	4 1/8	4 1/4	4 1/2	4 5/8	4 3/4	4 3/4	5 1/4	5 3/4	
Bore of Joint	1	1 3/4	1 1/4	2 1/8	2 1/8	1 1/2	2 1/16	2 7/16	1 1/2	2 1/16	2 3/16	3 1/4	
Complete Assembly	Part No.	149342	149346	149350	149354	149358	149362	149366	149370	149374	149370	149382	149386
	Weight	40	40	40	48	58	70	63	72	69	68	105	120

Bowen Drill Pipe Safety Joints (Continued)

Size*	4	4 1/2	4 1/2	4 1/2	4 1/2	5 9/16	5 9/16	5 9/16	6 3/8	6 3/8	6 3/8	7 5/8	8 5/8	
Type	Int. Flush	API Reg.	API F.H.	X-Hole	API I.F.	API Reg.	API F.H.	API I.F.	API Reg.	API F.H.	API I.F.	API Reg.	API Reg.	
O.D. of Joint	6 1/4	5 1/2	5 3/4	6	6 1/8	6 3/4	7	7 3/8	7 3/4	8	8 1/2	9	10	
Bore of Joint	3 3/4	2 1/4	3	3 3/4	3 3/4	2 3/4	4	4 13/16	3 1/2	5	5 29/32	4	4 3/4	
Complete Assembly	Part No.	149390	149394	149398	149402	150238	149410	149414	149418	149422	149426	149430	149434	149438
	Weight	160	130	120	135	115	225	205	195	315	270	260	440	520

Bowen Tubing Safety Joints

Size	3/4	1	1	1 1/2	2	2 1/2	2 3/8	3	3	
Type	EUE	DSS Hardy Griffin	EUE	CS Hydril	EUE	EUE	Hydril C-100	EUE	EUE	
O.D. of Joint	1.660	1.590	1 29/32	2 1/8	3 1/8	3 3/16	3 3/16	4 1/2	5	
Bore of Joint	.812	.812	1	1 1/2	2	2 7/16	2 3/8	3	3	
Complete Assembly	Part No.	149442	149446	149450	149454	149458	149462	149466	149470	149474
	Weight	3 3/4	4	6 1/4	3 3/8	18	28	23	47	50

Bowen Washover Pipe Safety Joints

Size*	4	4 1/2	5	5 1/2	5 3/4	7	7 3/8	7 3/8	8 1/8	8 5/8	9	9 5/8	10 3/4	11 3/4	
Type	F.J.	F.J.	F.J.	F.J.	F.J.	Hydril F.J.	F.J.	F.J.	F.J.	F.J.	F.J.	F.J.	F.J.	F.J.	
O.D. of Joint	4	4 1/2	5 3/8	5 5/8	5 3/4	7 1/8	7 3/8	8	8 5/32	8 5/8	9 3/8	10 1/8	11 1/8	11 3/4	
Bore of Joint	1 1/4	1 1/4	2 1/8	2 1/8	2 1/8	3 3/4	3	3 3/4	3 3/32	4	4	-	4	-	
Complete Assembly	Part No.	149478	149482	149486	149490	149494	149498	149502	149506	149510	152172	149514	149518	150047	151992
	Weight	42	50	54	58	141	103	339	135	439	-	210	240	791	-

* Selected sizes available in H₂S (not available in all sizes). Left hand connections available upon request.

Fishing Bumper Subs

Bowen Fishing Bumper Subs

A fishing string made up properly always includes a dependable Bumper Sub. These Bumper Subs may also be used as a feed-off tool when using the “predetermined weight” method to cut tubing or casing. This method is described in Bowen Instruction Manual No. 5600.

Construction

The **NOV Downhole Bowen Fishing Bumper Sub** is simple yet rugged. It is composed of only five primary parts and a double seal assembly. The hexagon shaped mandrel slides in a similar shaped mandrel body to provide continuous torque capability. The standard 20-inch stroke of these tools is optimum for most purposes, but longer strokes will be furnished as required, on special order. Full circulation may be maintained through the bores of the tools at all times. When preferred by the operator, knockers with Chevron packing can be furnished at extra cost.

Operation

Bowen Fishing Bumper Subs are suited for all fishing operations. They will bump down, jar up, or help disengage a fish after retrieval.

They are easy to operate and maintain, and are available in sizes to match all sizes of fishing strings, drill pipe, or tubing.

NOTE: Standard stroke for bumper subs is 20 inches. Strokes up to 60 inches furnished. Specifications and prices on request.

RECOMMENDED SPARE PARTS:

- (1) 8 Non-Extrusion Rings
- (2) 8 Seal Protector Rings
- (3) 16 Knocker Seals
- (4) 4 Set Screws

Send for Bowen Technical Manual No. 4460 which includes complete descriptions of construction, operation, maintenance, and parts listings for Bowen Fishing Bumper Subs.

Bowen Fishing Bumper Subs

Connection	1¼	1½	2¾	2¾	2¾	2¾	2¾
	Ext. F.L.	API Reg.	API Reg.	API I.F.	EUE	API Reg.	API I.F.
Outside Diameter (inches)	1 13/16	2¼	3 5/32	3¾	3¾	3¾	4¼
Inside Diameter (inches)	¾	½	1	1½	1¾	1¼	1 15/16
Stroke (inches)	20	20	20	20	20	20	20
Complete Assembly 20" Stroke*							
Part No.	10120	18785	10105	39887	39893	10090	41824
Weight	25	35	80	119	127	110	140

* Standard stroke for bumper subs is 20 inches. Strokes up to 60 inches furnished. Specifications on request.

Optional Extra Accessories

Chevron Packing	-	-	-	-	-	30910	59191
Knocker Assembly	-	-	-	-	-	-	-

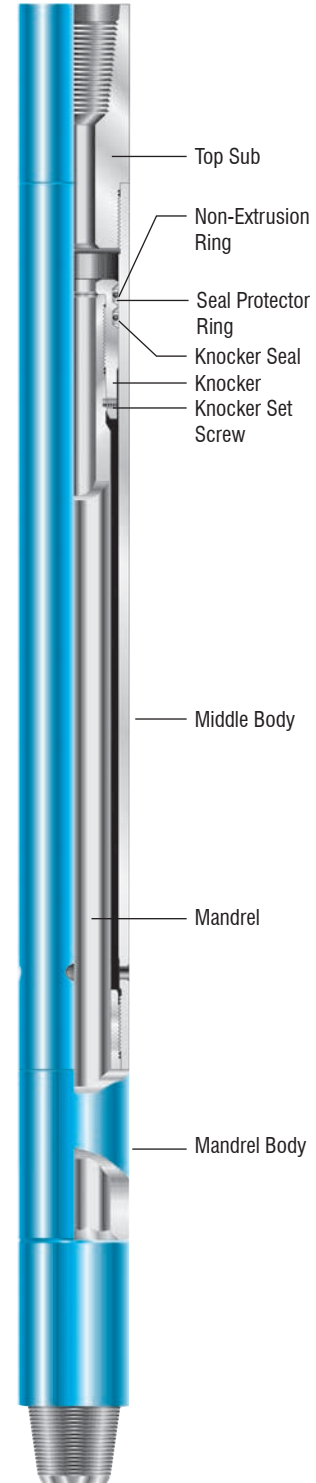
Bowen Fishing Bumper Subs

Connection	2¾	3½	4½	4½	5½	6¾	7¾
	EUE	API I.F.	API F.H.	API I.F.	API Reg.	API Reg.	API Reg.
Outside Diameter (inches)	4½	4¾	6	6¼	6¾	7¾	9
Inside Diameter (inches)	2¾	2	2	2¼	2¾	3½	4
Stroke (inches)	20	20	20	20	20	20	20
Complete Assembly 20" Stroke*							
Part No.	36794	39905	10135	10257	10690	26595	61596
Weight	152	189	334	370	455	620	850

* Standard stroke for bumper subs is 20 inches. Strokes up to 60 inches furnished. Specifications on request.

Optional Extra Accessories

Chevron Packing	-	-	-	-	-	30910	59191
Knocker Assembly	-	-	-	-	-	-	-



Bowen Fishing Bumper Sub

Lubricated Fishing Bumper Subs

Bowen Lubricated Fishing Bumper Subs

NOV Downhole Bowen Lubricated Fishing Bumper Subs are engineered to withstand sustained bumping action in severe fishing and deep workover operations.

The tools permit a 10-inch to 18-inch vertical stroke, either upward or downward, that is always available whether rotating or not. Tools with strokes greater than 18 inches up to 60 inches are available on request at extra cost.

A fishing string made up properly always includes a dependable Bumper Sub. This is absolutely mandatory when the fishing job is severe, or includes tools which require sharp bumping action to actuate or release them. No tool, other than Bowen's Lubricated Fishing Bumper Sub, can better meet these demands.

NOTE: Mandrel body wipers available on request.

RECOMMENDED SPARE PARTS:

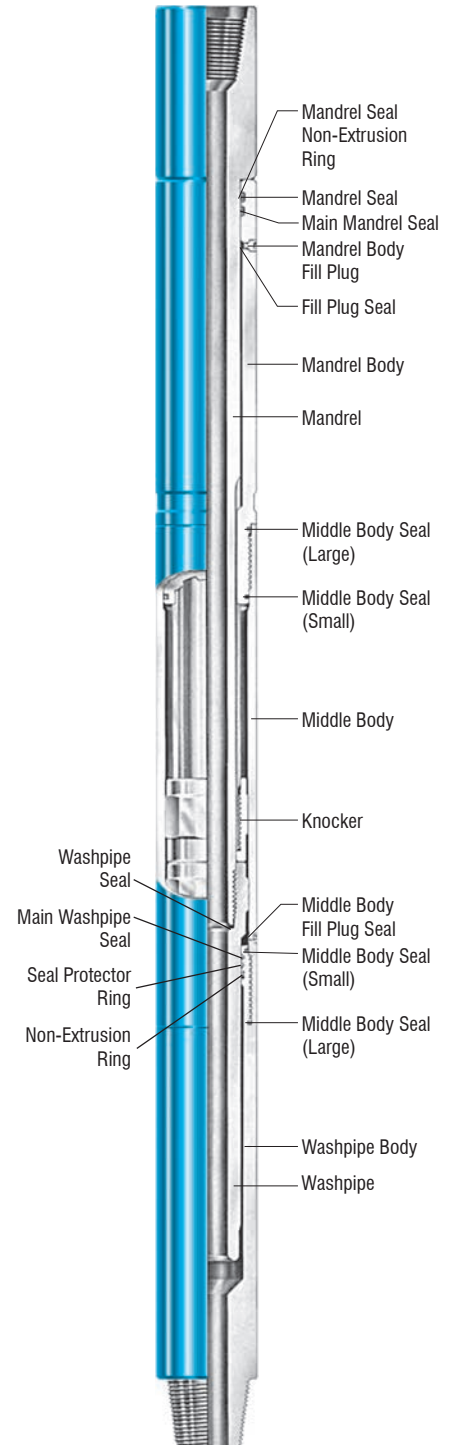
- (1) Service Kit
- (2) 6 Seal Packing Sets
- (3) 4 Middle Body Fill Plugs
- (4) 4 Mandrel Body Fill Plugs
- (5) 16 Main Mandrel Non-Extrusion Rings
- (6) 16 Main Mandrel Seal Protector Rings
- (7) 1 Seal Ring Setting Tool

Send for Bowen Technical Manual No. 4445 which completely describes the construction, operation, and maintenance of Bowen Lubricated Fishing Bumper Subs.

Bowen Lubricated Fishing Bumper Subs

Size and Connections	1¼	2¾	2¾	2¾	2¾	2¾	2¾	2¾	
	API Reg.	API Reg.	API I.F.	I.F.	EUE	API Reg.	API I.F.	PAC	
O.D. (inches)	2¼	3¾	3¾	3¾	3¾	3¾	4¼	3¾	
I.D. (inches)	¾	1	7/8	1½	1¾	1¾	1½	1½	
Stroke (inches)	10	15½	15½	15½	15½	15½	15½	11¾	
Complete Assembly	Part No.	41490	43501	39712	43470	43521	43509	43531	500661
	Weight	82	208.5	250	269	294	254	294	300
Service Kit	Part No.	55403	55403	55403	55403	55403	55403	55403	55403
	Weight	70	71	70	78	78	76	76	76
Setting Tool	Part No.	22709-24	22709-31	22709-34	22709-36	22709-38	22709-34	22709-40	22709-34
	Weight	2	6	11	18	18	11	18	11

Size and Connections	2¾	3½	3½	4½	4½	5½	5½	6¾	
	EUE	I.F.	API I.F.	API F.H.	API I.F.	API Reg.	API F.H.	API Reg.	
O.D. (inches)	4½	4¾	4¾	5¾	6¼	6¾	7	7¾	
I.D. (inches)	2¾	2¼	2	2½	3¼	2¾	3¼	3½	
Stroke (inches)	15½	11	15½	18	18	18	18	18	
Complete Assembly	Part No.	42700	152719	39727	39732	39737	39778	39747	39752
	Weight	304	300	333	505	558	588	728	816
Service Kit	Part No.	55403	55403	55403	55403	55403	55403	55403	55403
	Weight	76	76	76	90	90	93	100	100
Setting Tool	Part No.	22709-43	22709-43	22709-42	10572	22709-53	22709-54	10645	22709-61
	Weight	23	23	21	38	41	46	57	72



Lubricated Fishing Bumper Sub

Balanced Bumper Subs

Bowen Balanced Bumper Subs

The **NOV Downhole Bowen Balanced Bumper Sub** is engineered to withstand sustained bumping action in fishing, light milling, and workover operations. The tool is designed to permit a 10" to 18" vertical stroke, either upward or downward.

This stroke is always available to the operator, whether rotating or not. Strokes greater than 18" can be furnished on special request. The Bowen Balanced Bumper Sub will transmit full torque at all times during rotation and bumping operations. Adequate striking surfaces are provided at the limits of the free movement to produce the great impact so necessary to get high quality, positive bumping action in either direction. Specially designed rugged splines provide a source of continuous torque transmission. These splines are always in engagement, whether bumping or not.

The bores permit full circulation at all times. The balance feature which is composed of the Floater in a suitable Floater Body surrounding the Washpipe, serves a double purpose. It balances the external pressure with the circulating fluid pressure; and it serves to allow for volumetric expansion of the tool working fluid, due to temperature. This results in freer operation under extreme conditions of pressure differential or of temperature, or both. It also results in longer tool life.

Under such adverse conditions the Bowen Balanced Bumper Sub will perform where other tools fail.

The Bowen Balanced Bumper Sub is especially well-suited for use in deep, severe fishing operations, or for light milling or coring operations. It permits an immediate bumping action to prevent cuttings and cavings from settling and wedging the drilling or fishing string.

The Bowen Balanced Bumper Sub will free drill pipe and reamers, drill collars, bits and other tools which have become stuck, lodged or keyseated. The tool can readily be used to bump repeatedly in either direction or to bump alternately up and down.

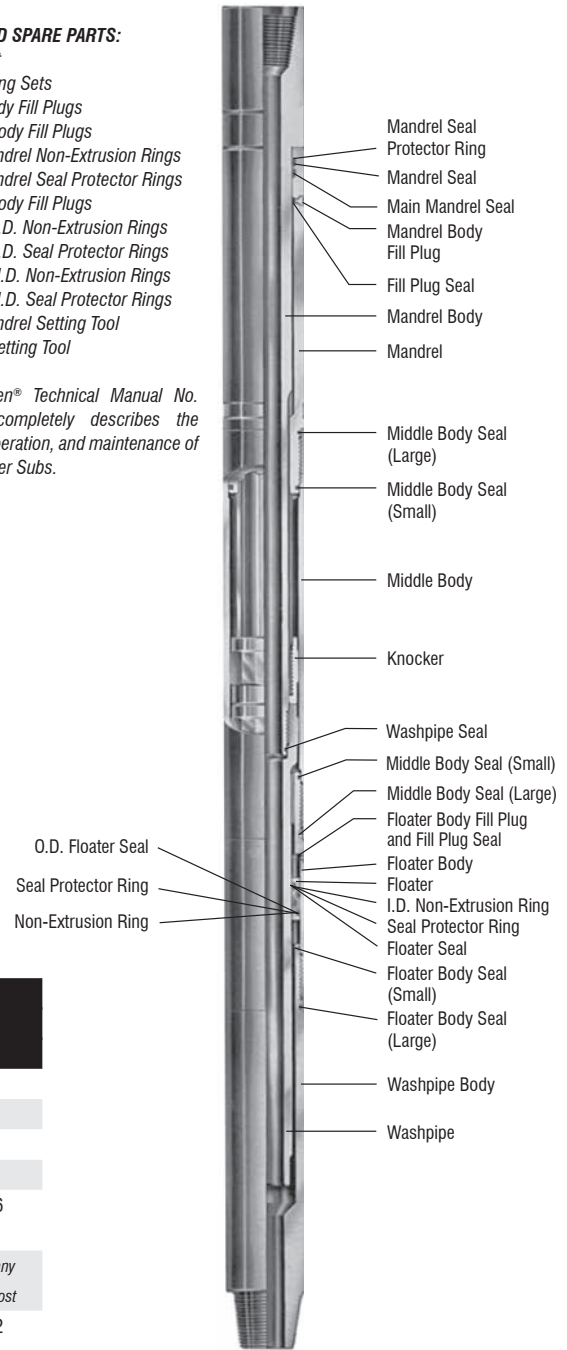
The Bowen Balanced Bumper Sub is an ideal tool to be used in coring operations. The bumping action is an effective way to break cores sharply and cleanly to permit easy removal when desired.

NOTE: Miscellaneous O-Ring Seals are normally furnished in sealed plastic bags of 10, 25, or 100 pieces each to prevent deterioration. Other quantities will be furnished in unsealed packages. Packing Sets, will always be furnished in sealed plastic bags.

RECOMMENDED SPARE PARTS:

- (1) 1 Service Kit
- (2) 6 Seal Packing Sets
- (3) 8 Middle Body Fill Plugs
- (4) 4 Mandrel Body Fill Plugs
- (5) 16 Main Mandrel Non-Extrusion Rings
- (6) 16 Main Mandrel Seal Protector Rings
- (7) 4 Mandrel Body Fill Plugs
- (8) 16 Floater O.D. Non-Extrusion Rings
- (9) 16 Floater O.D. Seal Protector Rings
- (10) 16 Floater I.D. Non-Extrusion Rings
- (11) 16 Floater I.D. Seal Protector Rings
- (12) 1 Main Mandrel Setting Tool
- (13) 1 Floater Setting Tool

Send for Bowen® Technical Manual No. 4455 which completely describes the construction, operation, and maintenance of Balanced Bumper Subs.



Bowen Balanced Bumper Sub

Bowen Balanced Bumper Subs

Size and Connections	2 ⁷ / ₈	3 ¹ / ₂	4 ¹ / ₂	5 ¹ / ₂	6 ⁵ / ₈	
	API	API	API	API	API	
	I.F.	F.H.	I.F.	REG.	REG.	
O.D. (inches)	4 ¹ / ₄	4 ³ / ₄	6 ¹ / ₄	6 ³ / ₄	7 ³ / ₄	
I.D. (inches)	1 ¹⁵ / ₁₆	2	3 ¹ / ₈	2 ³ / ₄	3 ¹ / ₂	
Stroke - Inches	15 ¹ / ₂	15 ¹ / ₂	18	18	18	
Full Bore*	*					
Complete Assembly	Part No.	44252	41228	42042	39975	42126
	Weight	297	410	684	786	1179
Service Kit	Part No.	Only one Service Kit required to service all sizes of tools. Service Kit does not include any				
	Weight	seal setting tool, which must be ordered separately as required for each tool, at extra cost				
Floater Setting Tool	Part No.	44261	41237	42051	39987	42132
	Weight	8	9	13	20	35

Type Z™ Oil Jars

Bowen Type Z Oil Jars

Sold Export Only

The **NOV Downhole Bowen Type Z Oil Jar** is the result of years of continuous improvement based on actual field use. It is a straight-pull operated Jar. This Jar is simple to assemble and easy to use. The Bowen Type Z Oil Jar is used for fishing, testing, coring, reaming, light drilling, side tracking, and washover operations.

Each blow can be controlled positively by the operator to deliver a very light blow or a blow of very heavy impact. Full circulation may be maintained throughout the tool for effective flushing. Full torque may be utilized in either direction and is at all times by means of heavy duty spines which are continuously in engagement.

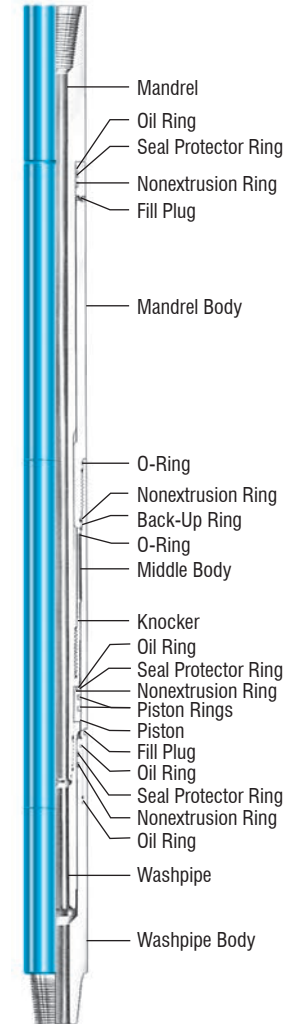
Only straight pull is required to operate the Bowen Type Z Oil Jar, and successive blows can be struck as often as the operator can slack off and raise the running string.

The Bowen Oil Jar should be tested in the Bowen Jar Tester prior to operation.

RECOMMENDED SPARE PARTS:

- (1) 1 Service Kit
- (2) 1 Washpipe
- (3) 2 Piston Assemblies
- (4) 16 Non-Extrusion Rings
- (5) 16 Seal Protector Rings
- (6) 4 Mandrel Body Fill Plugs
- (7) 4 Middle Body Fill Plugs
- (8) 8 Packing Sets
- (9) 1 Mandrel Body Setting Tool
- (10) 1 Piston Setting Tool
- (11) 4 Mandrel Body Seal Sets

Send for Bowen Technical Manual No. 4065 which includes complete descriptions construction, operation, maintenance, and parts listing for Bowen Type Z Oil Jars.



Bowen Type Z Oil Jar

Bowen Type Z Oil Jars

Size Connections (inches)	1 13/16 Wilson F.J.	1 1/4 API Reg.	2 3/8 PH-G Hyd. Bx.	2 3/8 EUE	2 3/8 API Reg.	2 3/8 API I.F.	2 3/8 EUE	2 3/8 API Reg.	2 3/8 API I.F.
Outside Diameter (inches)	1 13/16	2 1/4	2 29/32	3 1/16	3 1/8	3 3/4	3 3/4	3 3/4	4 1/4
Inside Diameter (inches)	5/8	3/8	1	1 1/2	1	1 1/2	1 7/8	1 1/4	1 15/16
Free Stroke (inches)	2 3/16	3	6 3/8	6.639	5 3/4	3 15/16	3 1/16	4 1/8	4 3/16
Type Jar	Special Sub	Int. Mand.	Sub	Sub	Int. Mand.	Sub	Int. Sub	Int. Mand.	Mand
Complete Assembly	Part No. 74723	54020	68010	55670	52504	52528	52497	52506	52502
	Weight 60	50	-	-	125	119	158	188	220
Mandrel Body Setting Tool	Part No. 22709-17	22709-24	22709-32	22709-31	22709-35	22709-36	22709-35	22709-40	22709-42
Piston Setting Tool	Part No. -	22709-19	22709-29	22709-32	22709-32	54922	54922	22709-37	22709-39

Size Connections (inches)	2 3/8 EUE	3 1/2 API F.H.	3 1/2 API I.F.	4 1/2 API F.H.	4 1/2 API I.F.	5 1/2 API Reg.	6 3/8 API Reg.	7 3/8 API Reg.
Outside Diameter (inches)	4 1/2	4 3/4	4 3/4	6	6 1/4	6 3/4	7 3/4	9
Inside Diameter (inches)	2 3/8	1 1/2	2	2	2 1/4	2 3/8	3 1/16	3 3/4
Free Stroke (inches)	5 3/16	4 7/16	5 1/16	4 9/16	6 1/2	6 1/2	6 1/2	6 1/2
Type Jar	Int. Mand.	Int. Mand.	Int. Mand.	Int. Mand.	Int. Mand.	Int. Mand.	Int. Mand.	Int. Mand.
Complete Assembly	Part No. 52653	52530	52500	52498	52544	52680	52711	66346
	Weight 202	325	285	590	640	757	900	1725
Mandrel Body Setting Tool	Part No. -	22709-40	22709-41	448	22709-48	22709-51	22709-59	22709-65
Piston Setting Tool	Part No. -	22709-36.5	22709-38	22709-41.75	54309	22709-45	22709-53	22709-57
Service Kit	Part No. 55403	Only one Service Kit is required for all sizes of tools. Kit does not include any Seal Setting Tools.						
	Weight 75 lbs	Seal Setting Tools must be ordered separately as required for each tool.						

Super Fishing Jars

Bowen Super Fishing Jars

Sold Export Only

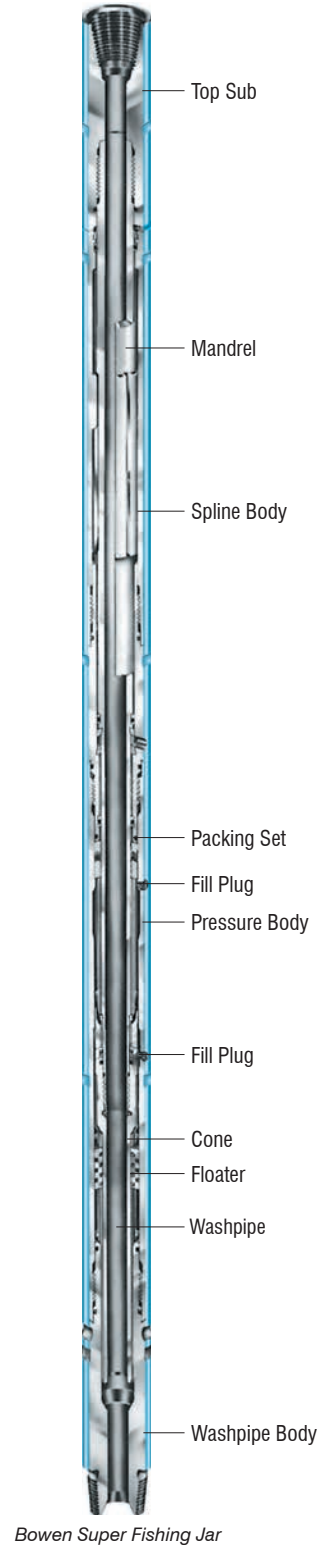
The patented **NOV Downhole Bowen Super Fishing Jar** is a straight-pull operated jar which employs a patented combination of proven principles of hydraulics and mechanics. This jar is simple to assemble and its unique design allows for easy operation.

Operation

No setting or adjustment is required before going in the hole or after the fish has been engaged. The Bowen Super Fishing Jar is designed to permit the operator to easily and simply control the intensity of the jarring blow within a wide range, from a very light impact to a blow of very high impact. The unique impact control of the Bowen Super Fishing Jar is made possible by the metering action of the patented cone assembly. As pull is applied to the jar, oil is forced from one side of the cone to the other through a metering slot. By being forced through a restricted passage, the fluid flow is retarded in such a manner that the stroke is delayed until the operator has ample time to take the necessary stretch in the running string (and Super Intensifier when it is used) to strike a blow of given impact.

Another important feature of the Super Fishing Jar is the ease of closing or resetting. Only sufficient weight to overcome friction is required. Closing is free of any danger of causing damage to the tool, since the metering action does not take place during resetting. During resetting, large ports are opened in the cone assembly allowing unimpeded flow of fluid from one cavity to the other.

Send for Bowen Technical Manual No. 4100 which includes complete descriptions of construction, operation, maintenance, and parts listing for the Bowen Super Fishing Jar.



Bowen Super Fishing Jars

Size and Connections (inches)	2 ³ / ₈	2 ³ / ₈	2 ⁷ / ₈	2 ⁷ / ₈	3 ¹ / ₂	4 ¹ / ₂	4 ¹ / ₂	5 ¹ / ₂	6 ³ / ₈	
	API Reg.	API I.F.	API Reg.	API I.F.	API I.F.	F.H.	API I.F.	API Reg.	API Reg.	
Outside Diameter (inches)	3 ³ / ₈	3 ³ / ₈	3 ³ / ₈	4 ¹ / ₄	4 ³ / ₄	6	6 ¹ / ₄	6 ³ / ₄	7 ³ / ₄	
Inside Diameter (included)	1	1 ¹ / ₂	1 ¹ / ₄	2	2	2	2 ¹ / ₄	2 ³ / ₈	3 ¹ / ₈	
Complete Assembly	Part No. 72888	146544	145737	80468	79789	145484	79691	145440	72978	
	Weight	160	-	320	465	-	890	-	1464	
Packing Assembly Sleeve for Mandrel	Part No. 74957	145567	145762	80494	79813	145512	79755	145478	70635	
	No. Req'd	1	1	1	1	1	1	1	1	
Floater Positioning Tool	Part No. 145215	146568	146568	145215	145217	145513	145218	145850	145219	
	Weight	5	1	-	9	6	-	11	-	
	No. Req'd	1	1	1	1	1	1	1	1	
Connector Body Wiper Installation Tool	Part No. 81897	146768	146996	-	-	146748	79755	145478	70635	
	No. Req'd	1	1	1	-	-	-	-	-	
Thread Protector for Tool Joint Box	Part No. 63090	63095	63092	63093	63096	63102	63101	63103	63106	
	No. Req'd	1	1	1	-	-	-	-	1	
Thread Protector for Tool Joint Pin	Part No. 63074	63091	63076	63077	63079	63083	63082	63084	63087	
	No. Req'd	1	1	1	-	-	-	-	1	
Service Kit	Part No. 145213	(ONLY ONE SERVICE KIT IS REQUIRED FOR ALL SIZES OF JARS.)								
	No. Req'd	1								
O-Ring Packing Set	Part No. 72914	146569	145760	80492	79811	145510	79696	145466	73064	
	No. Req'd	1	1	-	1	1	-	1	1	
Complete Packing Set (includes O-Ring Packing Set)	Part No. 72914	146570	145761	80493	79812	145511	79698	145467	73065	
	No. Req'd	1	1	-	1	1	-	1	1	

Super II Fishing Jars

Bowen Super II Fishing Jars

Sold Export Only

The **NOV Downhole Bowen Super II Fishing Jar** is a straight pull operated jar which employs a patented combination of proven principles of hydraulics and mechanics. This jar is simple to assemble and its unique design allows for easy operation. No setting or adjusting is required before going into the hole, or after the fish has been engaged.

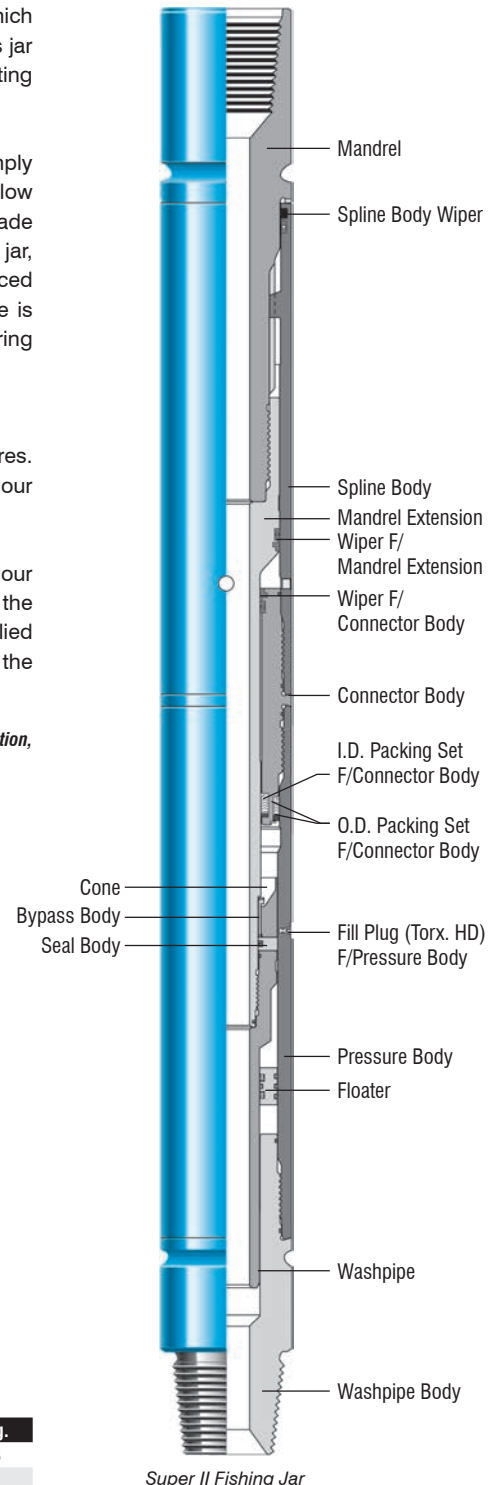
The Bowen Super II Fishing Jar is designed to permit the operator to easily and simply control the intensity of the jarring blow within a wide range, from a very light impact to a blow of very high impact. The unique impact control of the Bowen Super II Fishing Jar is made possible by the metering action of the patented cone assembly. As pull is applied to the jar, oil is forced from one side of the cone to the other through a metering slot. By being forced through a restricted passage, the fluid flow is retarded in such manner that the stroke is delayed until the operator has ample time to take the necessary stretch in the running string (and Super II Intensifier, when it is used) to strike a blow of given impact.

Features

The Super II Fishing Jar is a new design which incorporates many new design features. This is the next generation of fishing jar. Bowen is committed to continually upgrading our equipment, allowing our customers the versatility that is required in today's market.

The Super II Fishing Jar has been designed to be more rugged and dependable than our existing line of fishing jars. It incorporates a new one-piece mandrel design which gives the tool more torque and bending strength. All this adds up to greater impact loads being applied to the fish with less risk of tool failure or damage. The Super II Fishing Jar incorporates the same easy closing or resetting features found in the other Bowen Fishing Jars.

Send for Bowen Technical Manual No. 4102 which includes complete descriptions of construction, operation, maintenance, and parts listing for the Bowen Super II Fishing Jar.



Bowen Super II Fishing Jars

Size and Connections	2 ⁷ / ₁₆ PAC DSI	2 ³ / ₈ Reg.	3 ¹ / ₂ I.F.	4 ¹ / ₂ I.F.	6 ⁵ / ₁₆ Reg.
Outside Diameter (inches)	3 ⁷ / ₁₆	3 ¹ / ₈	4 ³ / ₄	6 ¹ / ₄ - 6 ¹ / ₂	7 ³ / ₄ - 8
Inside Diameter (inches)	1 ¹ / ₂	1	2 ¹ / ₄	2 ¹ / ₂	3 ³ / ₁₆
Total Stroke (inches)	11.75	11.75	12	12	12
Complete Assembly	Part No. 500635	153283	152790	152564	152408

Jar Intensifiers

Bowen Jar Intensifier® Tools

Sold Export Only

The **NOV Downhole Bowen Jar Intensifier** is run in conjunction with the Bowen Jar; either the Bowen Type Z Oil Jar, older Hydraulic Rotary Jar, or Super and Super II Fishing Jars. Its function is to supply acceleration to the upper end of the Jar and lower portion of the work string during the jarring stroke.

Each Bowen Jar Intensifier is designed to match a corresponding Bowen Rotary Jar. The Intensifier is essentially a fluid spring that stores energy when a strain is pulled on the running string. When the strain is removed by the free stroke of the Jar, the stored energy is released, accelerating the drill collars and jar end upward until a blow of high impact is struck.

The Bowen Jar Intensifier is completely safe to assemble, use and maintain, since no high pressure pre-loading is required.

The Intensifier is particularly valuable in deep, crooked holes where much of the stretch of the string is lost in friction. The tool is equally valuable at very shallow depths where very little stretch is available due to the short working string. Excessive numbers of drill collars should not be used when the Intensifier is in use.

A secondary advantage of the tool is its ability to absorb much of the shock of the rebounding string after the jarring stroke, protecting tools and string from damage. Full torque may be transmitted through Intensifier at all times, and full circulation may be maintained through the tool. Operation of the tool is very simple, requiring only straight pull, as rapidly or as slowly as required by the operation.

NOTE: Use only Bowen Intensifier Fluid in this tool. Other fluids will not work and will cause damage to the tool.

RECOMMENDED SPARE PARTS:

- (1) 10 Piston Packing Sets
- (2) 1 Washpipe
- (3) 4 Mandrel Body Fill Plugs
- (4) 2 Middle Body Fill Plugs
- (5) 6 Packing Sets
- (6) 16 Non-Extrusion Rings
- (7) 16 Seal Protector Rings
- (8) 4 Mandrel Body Seal Sets
- (9) 6 Refills of Intensifier Fluids

Required Accessories

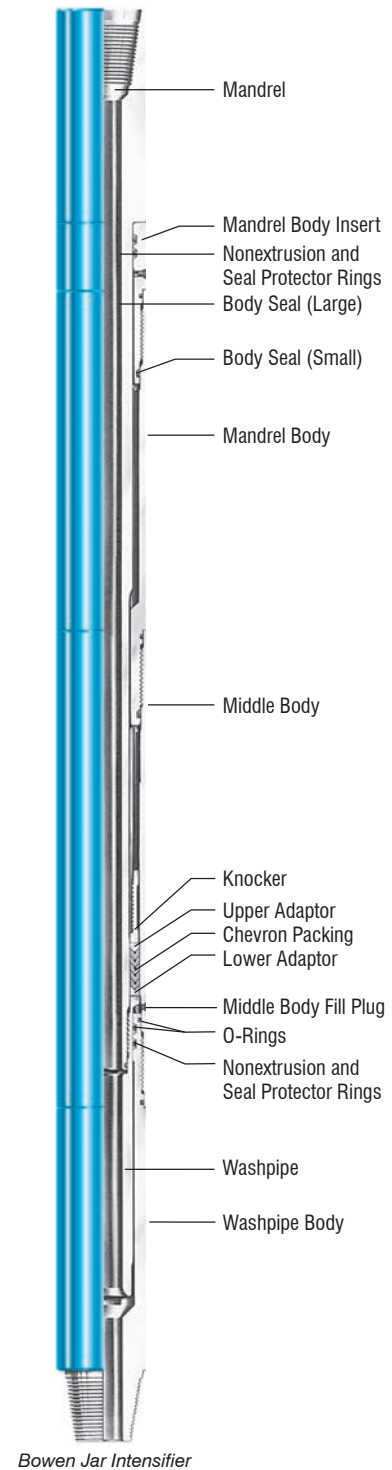
Jar Intensifier Fluid	Part No.	50529-A	1 Gallon
	Part No.	50529-B	2 Gallon
	Part No.	50529-C	5 Gallon
	Part No.	50529-D	30 Gallon
	Part No.	50529-E	50 Gallons
Transfer & Filter Unit	Part No.	52752	

Bowen Jar Intensifiers

Size & Connections	1 1/16	1 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 7/8	2 7/8
	Wilson F.J.	API Reg.	PH-6	API Reg.	API I.F.	EUE	API Reg.	API I.F.
Outside Diameter	1 1/16	2 1/4	2 9/32	3 1/8	3 3/4	3 3/4	3 3/4	4 1/4
Inside Diameter	5/16	3/8	1	1	1 1/2	1 1/2	1 1/4	1 1/16
Jars Used With	74723	54020	68010	52504	52528	52497	52506	52502
	-	18775	-	42736	37406	20150	38040	44483
Total Stroke to Solid	6	6	12 3/4	8 3/4	7 7/8	7 7/8	8 1/4	8 5/8
Complete Assembly	Part No. 64460	50640	68262	55867	55747	50660	55895	55664
	Weight 48	80	-	117	154	241	199	222
Mandrel Body Setting Tool	Part No. 22709-17	27709-24	27709-30.5	22709-32	22709-36	22709-36	22709-35	22709-40

Size & Connections	2 3/8	3 1/2	3 1/2	4 1/2	4 1/2	5 1/2	6 3/8	7 3/8
	EUE Reg.	API I.F.	API I.F.	API E.H.	API I.F.	API Reg.	API Reg.	API Reg.
Outside Diameter	4 1/2	4 3/4	4 3/4	6	6 1/4	6 3/4	7 3/4	9
Inside Diameter	2 3/8	1 1/2	2	2	2 1/4	2 3/8	3 1/16	3 3/4
Jars Used With	52653	52530	52500	52498	52544	52680	52711	66346
	35849	25960	38110	14710	12370	11130	15160	66346
Total Stroke to Solid (inches)	10 3/8	8 7/8	10 1/8	8 5/8	13	13	13	13
Complete Assembly	Part No. 50708	50700	55812	55860	55905	50720	55910	66372
	Weight 356	446	460	653	820	928	1248	1600
Mandrel Body Setting Tool	Part No. 22709-42	27709-40	27709-41	448	22709-48	22709-51	22709-59	22709-65
Service Kit	Part No. 55403	Only one Service Kit is required for all sizes of intensifiers.						
	Weight 75							

Does not include any Seal Setting Tool, which must be ordered separately as required for each tool.



Bowen Jar Intensifier

Send for Bowen Technical Manual No. 4019 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Jar Intensifier.

Super II Intensifier® Tools

Bowen Super II Intensifiers

The **NOV Downhole Bowen Super II Intensifier** is run in conjunction with the Bowen Super or Super II Fishing Jar. Its function is to supply intensified impacts during jarring operations. Each size of Bowen Super II Intensifier is designed to match a corresponding size of Super and Super II Fishing Jar. The Intensifier is essentially a fluid spring which stores energy when a strain is pulled on the fishing string. When the strain is removed by the free stroke of the jar, this stored energy is released, accelerating the drill collars upward until a blow of high impact is struck.

NOTE: The Bowen Super II Intensifier is completely safe to assemble, use and maintain, since no high-pressure pre-load is required. Full torque may be transmitted by the Intensifier at all times in either direction, and full circulation may be maintained through the tool.

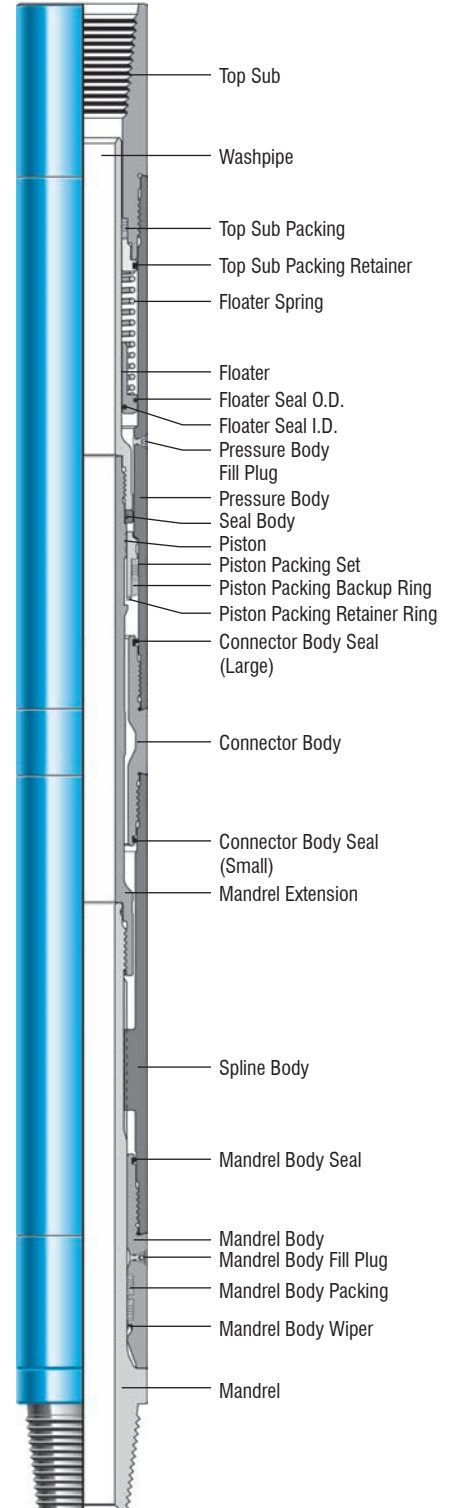
Operation

The operation of the tool is very simple, requiring only straight pull, to the desired pull load of the jar below.

Features

The Super II Intensifier incorporates two new features that greatly improve its performance and dependability. Its design allows for a constant working oil volume during operation. The second feature is the design for thermal compensation. The patented design allows oil to move into an area in the tool when elevated temperatures cause the oil to expand. When the temperature is lowered the oil automatically returns to the oil chamber in the tool. This unique system assures full stroke length at rated load, and eliminates the danger of over-pressure due to thermal expansion of the fluid, while also compensating for any minor leakage which may occur.

Send for Bowen Technical Manual No. 4025 which includes complete descriptions of construction, operation, maintenance, and parts listing for the Bowen Super II Fishing Jar Intensifier®.



Bowen Super II Intensifier

Bowen Super II Intensifiers

Size and Connections	2 $\frac{7}{16}$ PAC DSI	3 $\frac{1}{2}$ I.F.
Outside Diameter (inches)	3 $\frac{1}{16}$	4 $\frac{3}{4}$
Inside Diameter (inches)	1 $\frac{1}{2}$	2 $\frac{1}{4}$
Length	12 ft 9 in	13 ft 9 in
Total Stroke (inches)	6	11
Pull to Fully Open (lbs)	40,000	100,000
Tensile at Yield (lbs)	202,000	281,000
Torque at Yield (ft-lbs)	4,300	15,200
Complete Assembly Part No.	500651	153445

Jar Placement Program

The Need for Precise Jar Placement

The effectiveness of fishing jars depends not only on the design of the jar, but also on:

- Placement of the jar in the fishing string
- Fishing string design
- Hole conditions
- Description of fish

The difference in jar performance between proper and improper placement can be a factor of as much as 4. Simple rules of thumb for jar placement do not always work. Because the analysis of the mechanics of jarring is complex, a computer program is needed to precisely determine optimum jar placement.

The Importance of the Stress Wave Theory

The energy for jarring comes from the spring effect of the drill string when it is either stretched or compressed. When the jar trips, the sudden release of energy does not instantaneously go to the stuck point. Rather, the energy is transmitted by stress waves which travel at the speed of sound in metal. This energy transmission is further complicated by the following:

- Stress waves are partially transmitted and partially reflected at any change in drill string cross-section.
- Friction between the drill string and hole acts to dissipate the stress wave's energy.

Sometimes moving the jar only a few feet up or down in the fishing string can drastically change how the stress waves add together to create jarring force on the stuck point.

The Impact Impulse Factor

To move a fish, the jarring force (impact load) must exceed the sticking force. How far the fish moves depends on the duration of the impact load. The combined effect of impact load and duration is called impulse.

Optimum jar placement occurs with the largest impulse for an impact load greater than the sticking force.

The NOV Downhole Solution

NOV Downhole has spent many years perfecting jar placement computer programs to offer our customers optimum results in jarring operation.

Our Fishing Jar Placement Program functions exclusively with Bowen fishing tool products to assure you of precision in determining your jar placement alternatives.

Features and Advantages of the NOV Downhole Fishing Jar Placement Program

- Stress wave analysis techniques which track all stress waves.
- Unlimited number of section changes are allowed, enabling the modeling of virtually any drill string and bottom hole assembly.
- Effects of hole angle, hole curvature, and frictional drag are included.
- Suitable for analysis of straight, directional, and horizontal holes.
- Uniquely designed to model all Bowen Jars and Intensifiers
- Separate programs for drilling and fishing to allow appropriate data input and output results in field usable terms.
- Rapid solutions on personal computers for office or in the field use.
- Offered as a service for customers.
- Years of proven success in all types of field applications.



Fishing Jar Placement Program Mini CD

Surface Bumper Jars

Bowen Surface Bumper Jars

Sold Export Only

The **NOV Downhole Bowen Surface Bumper Jar** is designed to be installed in the drill string at the surface during fishing operations which require downward jarring impacts against a fish at the point where it is stuck. By a simple adjustment it may be set to vary the jarring force. The stroke of the tool is 48 inches, allowing the fish to be hammered down much farther than could be done with a conventional rotary jar. This tool provides many other outstanding advantages.

It is unique in that it is used only on the surface to release a stuck fish. Due to this intermittent usage, the service life of this tool is greatly extended when compared with conventional bumper subs.

The Bowen Surface Bumper Jar may be used to great advantage where the downhole drilling, fishing or washover running string becomes stuck, and a heavy downward force is required to release it. It is often used to free keyseated drill pipe and drill collars, and to initiate abrupt jarring impacts down the string to actuate Drilling Bumper Subs, Bumper Safety Joints and other similar downhole bumping tools. It is also useful for transmitting very heavy downward forces to release grappling tools such as Overshots or Spears when the grapples or slips have become imbedded in the fish or have become fouled due to repeated and prolonged downhole jarring. In many instances it has been successfully used where all previous methods have failed.

Full torque may be utilized in either direction, and full circulation may be maintained through the tool during its operation.

Basically, the Bowen Surface Bumper Jar consists of a hexagonal Mandrel Assembly working in a Bowl Assembly. The length of the stroke is important since, when using the tool, it is not necessary that the two striking surfaces meet as with conventional downhole jarring tools.

RECOMMENDED SPARE PARTS:

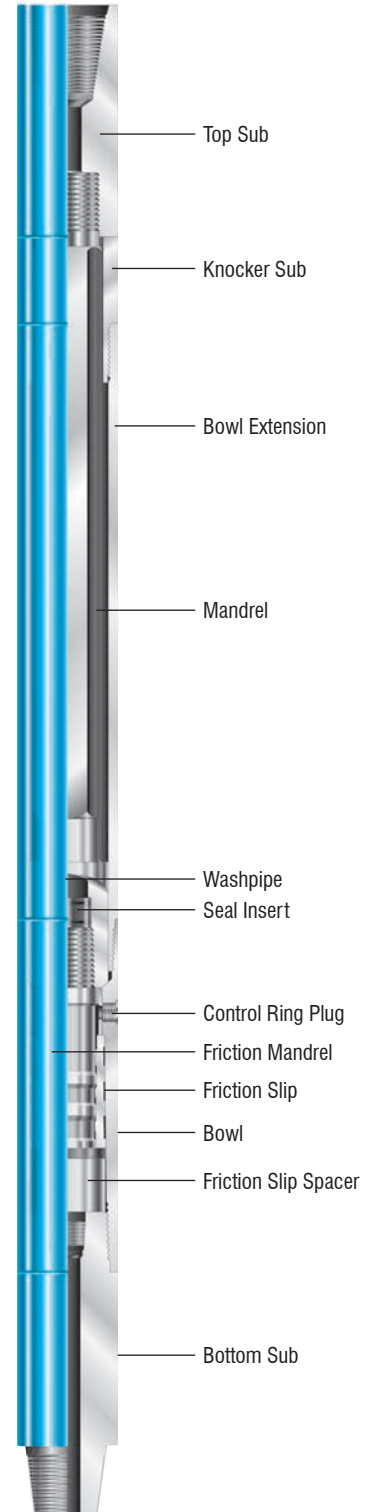
- (1) 2 Washpipes
- (2) 1 Seal Insert
- (3) 1 Friction Mandrel
- (4) 1 Control Ring
- (5) 1 Friction Slip
- (6) 1 Control Ring Plug
- (7) 4 Non-Extrusion Rings
- (8) 4 Seal Protector Rings
- (9) 6 Packing Sets

Send for *Bowen Technical Manual No. 4300* which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Surface Bumper Jars.

Bowen Surface Bumper Jars

Size and Connections		*
Outside Diameter (inches)		7
Inside Diameter (inches)		1 $\frac{7}{8}$
Total Stroke (inches)		48
Overall Length		11' 11"
Complete Assembly	Part No.	74520
	Weight	1160

*Connection to be specified by customer.



Bowen Surface Bumper Jar

Junk Baskets

Bowen-Itco Junk Baskets

The **NOV Downhole Bowen-Itco Junk Basket** is a rugged junk fishing device, using either a Mill Shoe or Flat Bottom Type Shoe in conjunction with two sets of free revolving finger type Catchers.

Construction

The catchers are of rivetless construction. They may be easily redressed on the job, eliminating the necessity of returning them to the shop for replacement. The upper catcher is designed to effectively break the core that is cut by the shoe. The fingers extend only halfway to the center. The lower catcher has alternately short and long fingers which extend almost to the center of the tool to effectively collect and retain odd pieces of junk or cores.

This Junk Basket may be easily converted to a fishing magnet by replacing the catchers with a Bowen magnet insert.

Alternate Mill Shoes available are Type B and Type C. The Type B is similar to Type A in design but with Itcoloy dressing. The Type C is flat bottomed and dressed with Itcoloy.

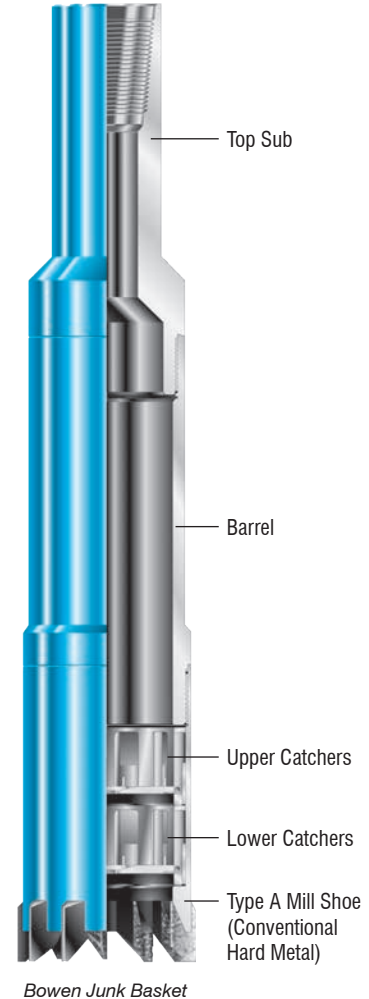
Operation

Operation of the Itco Junk Basket is simple, requiring only slow rotation and circulating fluid, to retrieve junk, cores or both simultaneously.

RECOMMENDED SPARE PARTS:

- (1) 2 Upper Catchers
- (2) 2 Lower Catchers
- (3) 2 Mill Shoes

Send for Bowen Technical Manual No. 3050 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen-Itco Junk Baskets.



Type B Mill Shoe (Itcoloy)



Type C Mill Shoe (Itcoloy)

Bowen-Itco Junk Baskets

Hole Size	3¼	4¼	4⅝	5	5⅝	6⅝	6⅞	7¼	8¼	9¼	10¼	11¼	12⅝	15	
	to 4⅝	to 4½	to 5	to 5½	to 6	to 6½	to 7	to 8	to 9	to 10⅝	to 11⅝	to 12½	to 15	to 20	
O.D. Barrel (Top End)	3⅝	3¾	3⅞	4¼	4¾	5¼	5¾	6½	7½	8½	9⅝	10⅝	11⅝	13¾	
O.D. Shoe (Top End)	3⅝	4⅛	4½	4⅞	5⅝	5⅞	6¼	7⅝	8⅝	9⅝	10⅝	11¼	12¼	14½	
Maximum No. of Fish	2 ²³ / ₃₂	2 ³¹ / ₃₂	3⅜	3 ²³ / ₃₂	4⅛	4½	4 ¹³ / ₁₆	5⅞	6⅜	7⅜	8⅞	9⅞	10⅞	12⅞	
Complete Assembly	Part No.	14590	14586	19375	14600	14605	19379	14615	14620	14625	14630	14635	14640	14645	14650
	Weight	55	60	65	80	100	110	125	160	205	255	290	360	450	655
Upper Catcher	Part No.	-	-	-	-	14607-W	19382-W	14617-W	14622-W	14627-W	14632-W	14637-W	14642-W	14647-W	14652-W
	Weight	-	-	-	-	3	3	4	5	7	8	12	14	20	30
Lower Catcher	Part No.	1495 3-W	14589-W	19377-W	14603-W	14608-W	19383-W	14618-W	14623-W	14628-W	14633-W	14638-W	14643-W	14648-W	14653-W
	Weight	1½	1½	2	2½	3	3	4	5	7	8	12	14	20	30
Conventional Shoe (Hard Faced)	Part No.	1459 4-A	14574-A	19378-A	14604-A	14609-A	19384-A	14619-A	14624-A	14629-A	14634-A	14639-A	14644-A	14649-A	14654-A
	Weight	8	8	10	14	16	18 1/2	20	28	38	49	55	70	100	175
Magnet Insert	Part No.	61842	61838	61858	61854	61862	61868	61874	61949	61955	61959	61969	61977	61979	61987
	Weight	9	11	21	23	32	42	57	65	76	115	167	251	334	553

Junk Baskets

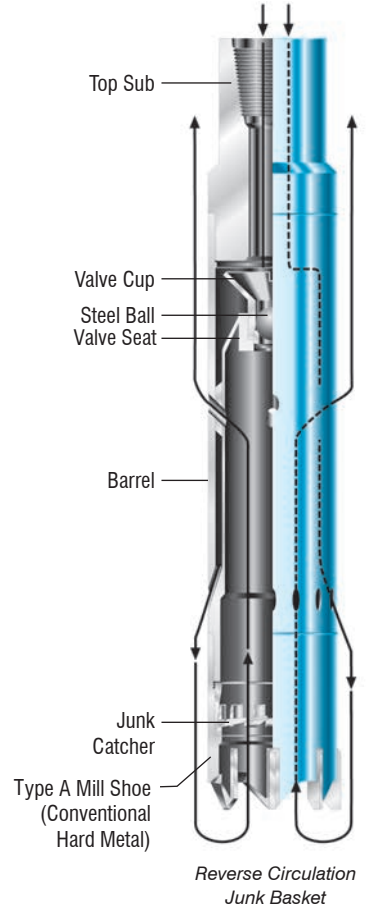
Bowen Reverse Circulation Junk Baskets

The **NOV Downhole Bowen® Reverse Circulation Junk Basket** is used to retrieve all types of small junk objects in well bores. This tool's unique principle of reverse circulation insures complete recovery of all junk and eliminates mis-runs. A drain through the tool also eliminates the possibility of pulling a wet string even though the inner barrel is plugged by the core. In addition, it may be converted into an effective fishing magnet and still retain the reverse circulation feature.

A single junk catcher is used in each assembly. A lifting sub is provided for ease of handling which includes a storage space for the steel ball used in the operation of the tool. It is converted into a fishing magnet by replacing the catcher with the Bowen magnet insert.

Alternate Shoes available are the Type B and Type C. The Type B shoe is similar in design to Type A but dressed with Itcoloy. The Type C is flat bottomed and dressed with Itcoloy.

During operation, with the steel ball dropped into the valve seat, fluid flows through the inner passage of the barrel and out the vents in its lower end. The fluid is directed outward and downward and deflected toward the center. Fluid flows in a continuous stream to the center of the tool and up through return ports in the upper end of the barrel. All junk is thus carried into the barrel above the junk catcher.

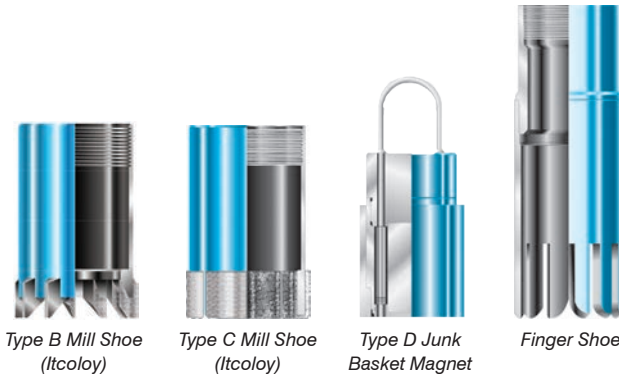


RECOMMENDED SPARE PARTS:

- (1) 2 Junk Catchers
- (2) 2 Mill Shoes
- (3) 1 Valve Cup
- (4) 1 Valve Seat
- (5) 1 Steel Ball

AVAILABLE ACCESSORIES:

- (1) Finger Shoes
- (2) Magnet Inserts



Send for Bowen Technical Manual No. 3100 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen® Reverse Circulation Junk Baskets.

Bowen Reverse Circulation Junk Baskets

Hole Size	3¼	4⅛	4½	5⅛	5½	6⅛	6⅝	7½	8⅝	9⅝	10¼	11¼	12⅝	13¼	16
	to 4	to 4½	to 5	to 5½	to 6	to 6½	to 7⅝	to 8¼	to 9½	to 10⅝	to 11⅝	to 12½	to 13⅝	to 16	to 17½
O.D. of Barrel	3⅝	4	4½	4⅞	5⅜	5¾	6¼	7	7⅞	9⅞	10⅞	11	11⅞	13	15
Max. Diameter of Fish	2⅞	2⅞	3⅞	3⅞	3¾	4⅞	4¾	5⅞	6⅞	7⅞	7⅞	8⅞	8⅞	9⅞	11⅞
Complete Assembly	Part No. 6635	7295	4448	4572	2618	2670	2677	2554	2567	2659	2684	2690	2696	2702	2708
Weight	85	98	108	128	142	185	238	293	374	441	576	665	797	932	1563

Replacement Parts

Valve Cup	Part No.	6638	6638	4451	4451	2621	2621	2621	2570	2570	2662	2662	2662	2662	2662	2662
Weight		3	3	4	4	5	5	5	7	7	9	9	9	9	9	9
Steel Ball	Part No.	6640	6640	4453	4453	2623	2623	2623	2572	2572	2665	2665	2665	2665	2665	2665
	Diameter	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	2¼	2¼	2¼	2¼	2¼	2¼
	Weight	⅜	⅜	¼	¼	½	½	½	¾	¾	2	2	2	2	2	2
Valve Seat	Part No.	6639	6639	4452	4452	2622	2622	2622	2571	2571	2663	2663	2663	2663	2663	2663
	Weight	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞
Junk Catcher	Part No.	21795	21855	21780	21790	21735	28349	21750	21725	18725	21745	21755	21760	21765	21770	21775
	Weight	1½	1½	2	3	3	4½	4½	7	7½	9	16	20	25	40	90
Mill Shoe	Part No.	6642	7299	4455	4576	2625	2676	2683	2556	2574	2668	2689	2695	2701	2707	2713
	Weight	8	10	12	13	14	16	18	28	36	43	61	78	94	124	218

Optional Accessories

Magnet Insert	Part No.	61836	61848	61840	61850	61852	61866	61872	61947	61953	61965	61967	61973	61975	61983	61985
Weight		9	10	13	22	23	31	46	57	67	98	117	153	154	295	421

Junk Baskets

Bowen Full-Flow Reverse Circulation Junk Baskets

The **NOV Downhole Bowen® Full-Flow Reverse Circulation Junk Basket** is similar to the standard Reverse Circulation Junk Basket and is also used to retrieve small junk objects in well bores. The difference is that the Full-Flow type has a unique valve assembly which allows circulation through the center to keep out shale or debris while running in the hole. A drain through the tool eliminates the possibility of pulling a wet string even though the inner barrel is plugged by the core.

Two Junk Catchers are used in each assembly. A Lifting Sub is provided for ease of handling which includes a storage space for the steel ball used in the operation of the tool. It is also converted into a Fishing Magnet by replacing the catchers with a Bowen® Magnet Insert.

Alternate Shoes available are the Type B and Type C. The Type B shoe is similar in design to Type A but dressed with Itcoloy. The Type C is flat bottomed and dressed with Itcoloy.

Operation

During operation, the ball is dropped to the valve seat. Pump pressure then causes pins to shear which opens the reverse circulation cavity to circulation. Fluid flows through the inner passage of the barrel, out the vents in its lower end, outward and downward deflected toward the center in a continuous stream, and up through return ports in the upper end of the barrel. All junk is thus carried into the barrel above the junk catchers.

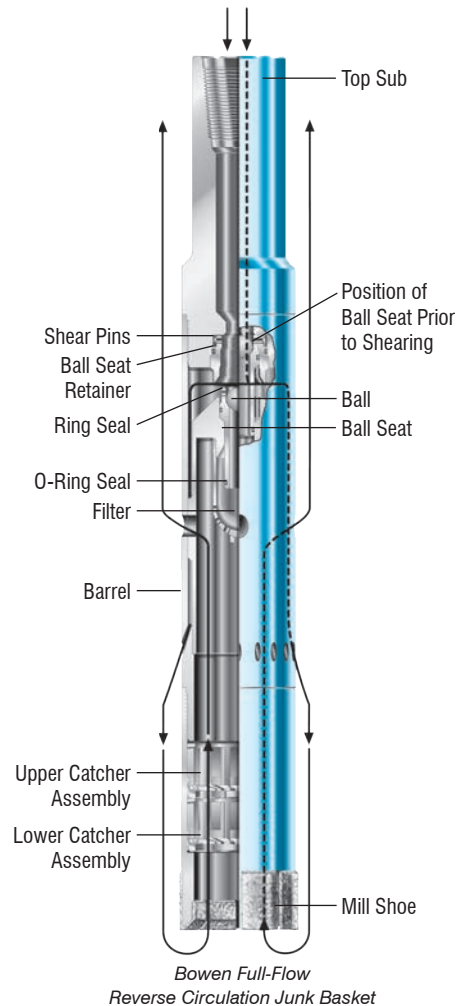
ACCESSORIES:

- (1) 2 Finger Shoes
- (2) 4 Finger Shoe Replacements
- (3) 1 Magnet Insert

RECOMMENDED SPARE PARTS:

- (1) 2 Junk Catchers
- (2) 2 Mill Shoes
- (3) 1 Ball Seat
- (4) 1 Ball Seat Retainer
- (5) 1 Steel Ball
- (6) 4 Valve Repair Kits
- (7) 2 Catcher Repair Kits (for each assembly)

Send for Bowen Technical Manual No. 3105 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Full-Flow Reverse Circulation Junk Baskets.



Bowen Full-Flow Reverse Circulation Junk Baskets

Hole Size	4 1/8 to 4 1/2	4 3/8 to 5	6 1/8 to 6 1/2	7 1/2 to 8 1/4	8 3/8 to 9 1/2	9 5/8 to 10 5/8	10 3/4 to 11 5/8	11 3/4 to 12 1/2
O.D. of Barrel	4	4 1/2	5 3/4	7	7 7/8	9 1/8	10 3/8	11
Max. Diameter of Fish	2 1/2	3 1/16	4 3/8	5 1/8	6 1/16	7 1/16	7 1/16	8 9/16
Complete Assembly Part No.	71226	70702	71127	70908	70923	71198	71218	70910
Weight	103	112	195	305	390	460	600	695

Replacement Parts

Ball Seat	Part No.	73452	70851	70851	67354	67354	67168	67168	67168
	Weight	1 3/8	1 1/4	1 1/4	1 5/8	1 5/8	2	2	2
Shear Pin (4 Req'd)	Part No.	70852	70852	70852	67175	67175	67175	67175	67175
	Weight	1/16	1/16	1/16	1/8	1/8	1/8	1/8	1/8
Upper Junk Catcher Assembly	Part No.	22070-W	22075-W	15130-W	22050-W	21640-W	14632-W	25235-W	31046-W
	Weight	1 1/2	2	4 1/2	5	7	9	11	15
Lower Junk Catcher Assembly	Part No.	21855-W	21780-W	28349-W	21725-W	18725-W	14633-W	18945-W	21760-W
	Weight	1 1/2	2	4 1/2	7	7 1/2	9	16	20
Mill Shoe A	Part No.	71228	70909	71124	72070	72081	71199-A	72080-A	72071-A
	Weight	15	20	31	28	36	50	61	78
Steel Ball	Part No.	6640	4453	4453	2572	2572	2665	2665	2665
	Diameter	1 5/16	1 1/8	1 1/8	1 1/16	1 1/16	2 1/4	2 1/4	2 1/4
	Weight	1/8	1/4	1/4	3/4	3/4	2	2	2

Optional Extra Accessories

Magnet Insert Assembly	Part No.	-	61840	61866	61876	61953	61961	61963	61973
	Weight	-	20	48	77	97	174	186	186

Junk Subs

Bowen Junk Subs

NOV Downhole Bowen Junk Subs, which are normally run just above the drill bit, have a cup for catching objects too heavy to be completely circulated out of the hole. This is particularly advantageous in junk milling operations. By running a Bowen Junk Sub above a scraper, operators can get quicker, cleaner scraping jobs.

Construction

Bowen Junk Subs are constructed from high quality steel, completely stress-relieved after cup and rib guides have been welded to the main body.

Rib guides prevent the cup from becoming crushed and help guide the tool through tight places upon withdrawal from the hole. Junk Subs are available in standard, long and extra long types.



Standard Type
Junk Sub

Bowen Junk Subs

Model Size		4¼ to 5⅝	4⅝ to 4⅞	5⅝ to 5⅞	6 to 6⅝	6½ to 7⅞	7½ to 8½	8⅝ to 9⅝	9⅝ to 11⅝	11½ to 13	14¾ to 17½
Standard Top Connection											
API Reg. Tool Joint Pin		2⅜	2⅞	3½	3½	3½	4½	4½	6⅝	6⅝	7⅝
O.D. of Body (Top Connection)		3⅝	3¾	4¼	4¼	4¼	5½	5½	7¾	7¾	8⅞
O.D. of Body (Under Cup)		2	2⅝	3⅝	3¼	3¼	4½	4½	5¼	5¼	7⅝
O.D. of Cup		3⅞	4	4½	5	5½	6⅝	7	8⅝	9⅝	12⅝
I.D. of Cup		3⅞	3⅝	4¼	4⅞	4⅞	5⅞	6⅞	7⅞	8⅞	11⅝
Diameter of Bore		¾	1¼	1½	1½	1½	2¼	2¼	3½	3½	4
Complete Assembly	Part No.	20340	15450	15455	15460	15465	15470	15475	15480	15485	55306
Standard Type	Weight	55	63	80	83	97	160	168	255	285	628
Length of Cup		10	10	10	10	10	10	10	10	10	10
Total Length		32½	29½	31	33½	33½	36¼	36¼	37½	37	39¼
Complete Assembly	Part No.	20345	17060	17065	17070	17075	17080	17085	17090	17095	62533
Long Type	Weight	65	87	105	120	136	235	246	342	420	827
Length of Cup		20	20	20	20	20	20	20	20	20	20
Total Length		47	49½	48	48	48	50¼	50¼	51	51½	50¼
Complete Assembly	Part No.	20295	20300	20305	20310	20315	20320	20325	20330	20335	62536
Extra Long Type	Weight	80	108	128	156	183	285	302	430	530	988
Length of Cup		30	30	30	30	30	30	30	30	30	30
Total Length		57	57½	59¼	57¼	55	56	60¼	57½	58	60

Fishing Magnets

Bowen Fishing Magnets

NOV Downhole Bowen Fishing Magnets are used to retrieve all types of small objects having magnetic attraction from bore hole bottoms. Such un-drillable objects as bit cones, bearings, slips, tong pins, and milling cuttings can often be retrieved only by magnetic attraction.

These Fishing Magnets are particularly valuable for use prior to diamond coring. In a single trip, the Bowen Fishing Magnet will completely clean the hole of these damaging junk items, insuring good performance and safeguarding the valuable bit.

Bowen Fishing Magnets may be run on wire lines or on pipe. Wireline operations have the advantages of speed and economy. Pipe operations have the great advantage of utilizing the generous circulation holes in the magnet to eliminate settlements above the fish, and to loosen the fish (see chart below). The first six assemblies (with sucker rod connections) do not have circulation bores.

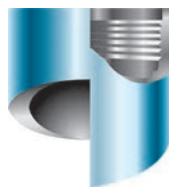
Bowen has **Wireline Adapters** available to run between the magnet and cable head or rope socket. When ordering, specify the required top connection and the magnet to be used with. The **Flush O.D. Type Guide** is sold as part of the assembly.

Cut-Lipped and Mill Type Guides are available as optional accessories. Order by standard guide number, specifying type required and magnet to be used on.

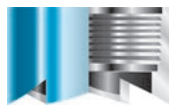
RECOMMENDED SPARE PARTS:

- (1) 1 Lipped Guide
- (2) 1 Mill Guide

Send for Bowen Technical Manual No. 3400 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Fishing Magnets.



Cut-Lipped Guide



Mill-Type Guide



Wireline Adapter



Bowen Fishing Magnet

Bowen Fishing Magnets

Hole Size	1¼ to 2	1½ to 2½	2 to 2¾	2¾ to 3¼	2¾ to 3½	3 to 3¾	-	3¼ to 4½	4 to 4¼
O.D. Size	1	1¼	1½	1¾	2¼	2½	-	3	3¼
Top Connection (Pin)	5/8 11-N.C.	5/8 S.R.	5/8 S.R.	3/4 S.R.	3/4 S.R.	3/4 S.R.	-	2½ Tbg.	2½ Tbg.
Approximate Pull (lbs*)	5 to 7	8 to 10	11 to 14	15 to 20	25 to 50	50 to 85	-	85 to 90	85 to 190
Complete Assembly	Part No. 32060	32080	32100	32120	32150	32170	-	32180	32190
Weight	1	1½	3¼	5	16	18	-	20	25
Hole Size	4¼ to 4½	4½ to 5	5½ to 5½	5½ to 6	6½ to 6½	6½ to 6½	-	6½ to 7½	7½ to 8½
O.D. Size	3½	4	4½	5	5½	5¾	-	6	7
Top Connection (Pin)	2¾ Reg.	2¾ API Reg.	2¾ API Reg.	2¾ API Reg.	3½ API Reg.	3½ API Reg.	-	3½ API Reg.	4½ API Reg.
Approximate Pull (lbs*)	150 to 250	175 to 250	250 to 320	320 to 385	385 to 425	385 to 425	-	425 to 500	550 to 700
Complete Assembly	Part No. 32210	32230	32240	32260	32270	32280	-	32290	32300
Weight	27½	43	67	80	95	106	-	120	162
Hole Size	8½ to 9¾	9½ to 11½	10½ to 11½	11¼ to 13	12¼ to 14	15	17	17	20
O.D. Size	8	9	10	10½	1½	14	16	16	19
Top Connection (Pin)	4½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	13¾ Reed V-4 Thd.
Approximate Pull (lbs*)	700 to 850	850 to 1000	1000 to 1125	1125 to 1260	1260 to 1550	1700 to 2100	-	3200 to 4000	4200 to 5000
Complete Assembly	Part No. 32310	32330	32340	32350	32370	32380	145729	79183	79189
Weight	205	335	390	431	512	770	-	1200	1700

* Calculated for full face contact.

Itcoloy Milling Tools

Bowen Itcoloy Milling Tools

NOV Downhole Bowen Milling Tools, hard faced with Itcoloy, sintered tungsten carbide particles, are designed to mill away stuck fish that cannot be retrieved by conventional fishing methods. Their super penetration rates results in fewer round trips. They are highly resistant to impact loads and their self sharpening feature results in maximum useful life.

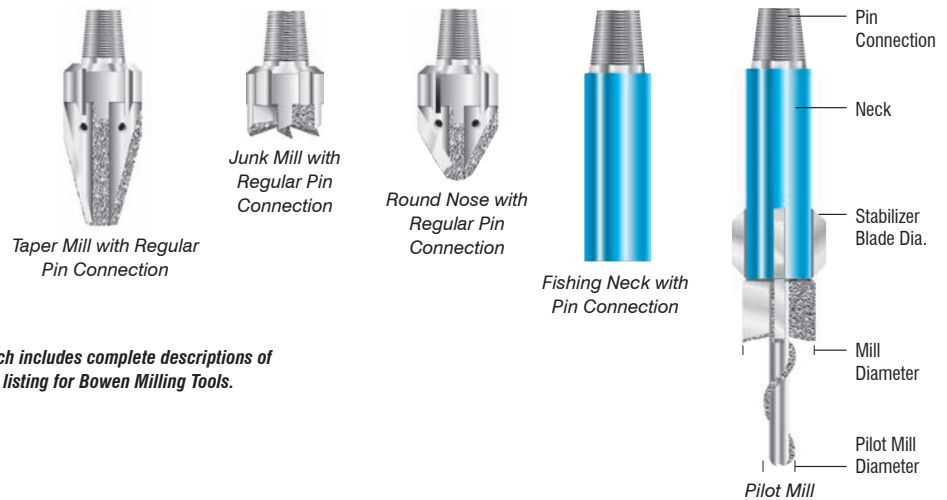
The Milling Tool selected should provide a maximum of milling edges to the material to be milled, maximum replacement of the milling edges as wear occurs, and maximum circulation to remove the cuttings.

Bowen Pilot Mills

Bowen Pilot Mills have been proven in the field to be well suited for milling liner hangers, eliminating inside cuts. They are also well suited for milling washpipe, safety joints, crossover swages, and washover shoes. All sizes available according to customer specifications.

RECOMMENDED FOR REDRESSING MILLS

- (1) Bowen Itcoloy 50 lbs.
- (2) Bowen Tinning Rod 10 lbs.
- (3) Bowen Brazing Flux 1 lb.



Send for Bowen Technical Manual No. 5100 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Milling Tools.

Bowen Milling Tools

Mill Size (O.D.)	2¼ - 2½	2½ - 2¾	2¾ - 3	3 - 3½	3½ - 4¼	4 - 4½	4½ - 4¾	4¾ - 5	5 - 5¼	5¼ - 5½
Top Connection (Pin)	1 13/16	1¼	1¼	1¼	2 3/8	2 3/8	2 7/8	2 7/8	3 1/8	3 1/8
Junk Mill	Wilson F.J.	API Reg.	API Reg.	API Reg.	API Reg.	API Reg.	API Reg.	API Reg.	API Reg.	API Reg.
Round Nose Mill (60° Incl. Angle)	Part No. 41618	41621	41623	41625	41630	41635	41635	41635	41641	41641
Taper Mill (30° Incl. Angle)	Part No. 41918	41921	41923	41626	41930	41935	41935	41935	41941	41941
Above mills can be furnished with 10" long fishing neck at additional charge.										
Part No.	-	-	-	-	42027	42028	42028	42028	42029	42029
F.N.O.D.	-	-	-	-	3 3/8	3¾	3¾	3¾	4¼	4¼
Mill Size (O.D.)	5½ - 5¾	5¾ - 6	6 - 6¼	6¼ - 6½	6½ - 6¾	6¾ - 7	7 - 7¼	7¼ - 7½	7½ - 7¾	7¾ - 8
Top Connection (Pin)	3½ API Reg.	3½ API Reg.	3½ API Reg.	3½ API Reg.	3½ API Reg.	3½ API Reg.	3½ API Reg.	4½ API Reg.	4½ API Reg.	4½ API Reg.
Junk Mill	Part No. 41641	41647	41647	41647	41653	41653	41653	41659	41659	41659
Round Nose Mill (60° Incl. Angle)	Part No. 41941	41947	41947	41947	41953	41953	41953	41959	41959	41959
Taper Mill (30° Incl. Angle)	Part No. 42001	42002	42002	42002	42003	42003	42003	42004	42004	42004
Above mills can be furnished with 10" long fishing neck at additional charge.										
Part No.	42029	42029	42029	42029	42029	42029	42029	42030	42030	42030
F.N.O.D.	4¾	4¾	4¾	4¾	4¾	4¾	4¾	5¾	5¾	5¾
Mill Size (O.D.)	8½ - 8¾	8¾ - 8½	8¾ - 8¾	8¾ - 9	9 - 9¼	9 - 9½	9 - 9¾	9 - 10	10 - 10¼	10 - 10½
Top Connection (Pin)	4½ API Reg.	4½ API Reg.	4½ API Reg.	4½ API Reg.	4½ API Reg.	4½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.
Junk Mill	Part No. 41665	41665	41665	41671	41671	41671	41677	41677	41677	41683
Round Nose Mill (60° Incl. Angle)	Part No. 41965	41965	41965	41971	41971	41971	41977	41977	41977	41983
Taper Mill (30° Incl. Angle)	Part No. 42005	42005	42005	42006	42006	42006	42007	42007	42007	42008
Above mills can be furnished with 10" long fishing neck at additional charge.										
Part No.	42030	42030	42030	42030	42030	42030	42031	42031	42031	42031
F.N.O.D.	5¾	5¾	5¾	5¾	5¾	5¾	7¾	7¾	7¾	7¾
Mill Size (O.D.)	10½ - 10¾	10¾ - 11	11 - 11¼	11 - 11½	11½ - 11¾	11½ - 12	12 - 12¼	12¼ - 12½	-	-
Top Connection (Pin)	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	6½ API Reg.	-	-
Junk Mill	Part No. 41683	41683	41689	41689	41689	41689	41695	41695	-	-
Round Nose Mill (60° Incl. Angle)	Part No. 41983	41983	41989	41989	41989	41989	41995	41995	-	-
Taper Mill (30° Incl. Angle)	Part No. 42008	42008	42009	42009	42009	42009	42010	42010	-	-
Above mills can be furnished with 10" long fishing neck at additional charge.										
Part No.	42031	42031	42031	42031	42031	42031	42031	42031	-	-
F.N.O.D.	7¾	7¾	7¾	7¾	7¾	7¾	7¾	7¾	-	-

Rotary Shoes

Bowen Rotary Shoes Hard-Faced with Itcoloy

NOV Downhole Bowen Milling Shoes and Bowen Rotary Shoes dressed with Itcoloy are designed in various sizes and styles to meet the many conditions encountered in oil well fishing and washover operations. Illustrated are the various styles with an explanation of their intended service.

Shoe Types

Type A

Type A Rotary Shoe is used to cut metal on the fish without cutting the casing. Cuts on the inside diameter (I.D.) and the bottom. Does not cut on the outside diameter (O.D.).

Type B

Type B Rotary Shoe is used for washing over a fish and cutting metal or formation in the open hole. Cuts on the outside diameter (O.D.) and the bottom. Does not cut on the inside diameter.

Type C

Type C Rotary Shoe is used for washing over and cutting metal, formation, or cement. Cuts freely on the inside diameter (I.D.), the outside diameter (O.D.), and the bottom.

Type D

Type D Rotary Shoe is used to cut metal on the fish without cutting the casing where clearances are limited. Cuts on the inside diameter (I.D.) and the bottom. Does not cut on the outside diameter (O.D.).

Type E

Type E Rotary Shoe is used for washing over a fish and cutting metal, formation or cement in the open hole where clearances are limited. Cuts on the outside diameter (O.D.) and the bottom. Does not cut on the inside diameter (I.D.).

Type F

Type F Rotary Shoe is used to size and dress the top of a fish inside of the casing. Makes a tapered cut on the inside diameter (I.D.), and cuts on the bottom. Does not cut on the outside diameter (O.D.).

Type G

Type G Rotary Shoe is used for washing over and cutting metal, formation or cement in the open hole with limited inside clearances. Cuts on the inside diameter (I.D.), the outside diameter (O.D.), and the bottom.

Type H

Type H Rotary Shoe is used for washing over and cutting metal in the open hole with limited clearance on the outside diameter (O.D.). Cuts on the inside diameter (I.D.), the outside diameter (O.D.) only.

Type I

Type I Rotary Shoe is used for washing over and cutting formation only. Mill tooth design permits maximum circulation. Cuts on the bottom only. Does not cut on the outside diameter (O.D.) or inside diameter (I.D.).

Type J

Type J Rotary Shoe is used for washing over and cutting formation only. Mill tooth design with side wings permits maximum circulation. Cuts on the bottom and on the outside diameter (O.D.). Does not cut on the inside diameter (I.D.).

Type K

Type K Rotary Shoe is used for washing over and cutting on the bottom face only. Does not cut on the outside diameter (O.D.), or the inside diameter (I.D.).

Bowen also supplies all necessary components for washover operations:

- **Washpipe** — all grades, sizes, and connections.
- **Lift Plugs** — for all connections. furnished with or without bail.
- **Drive Subs** — for crossover from drill string to washpipe. Available in all connections as plain or long type with elevator recess.

Send for *Bowen Technical Manual No. 5100* which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Milling Tools.



Type A



Type G



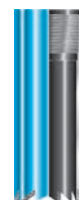
Type B



Type H



Type E



Type I



Type D



Type J



Type E



Type K



Type F

Itcoloy

Bowen Itcoloy

NOV Downhole Bowen Itcoloy is used to form the cutting or milling surfaces on milling shoes, rotary shoes, junk mills, section mills, milling stabilizers, piloted liner mills, etc.

Bowen Itcoloy contains the maximum desired concentration of selected, crushed sintered tungsten carbide particles imbedded in a resilient nickel-silver alloy matrix. The carbides used are all steel cutting grades with a hardness of 91 to 93 Rockwell "A." The matrix is specially compounded and has a tensile strength of 100,000 psi. Bowen Itcoloy is packed in cartons of approximately 10 pounds each and is available in several graded sizes.



Itcoloy Rods

Bowen Itcoloy

Part No.	Nominal Size	Graded Particle Size	Rod Size	Approximate Weight Per Rod
145723	3/8	3/8 - 1/4	3/8 X 3/8 X 18	14 7/8 oz.
145722	5/16	5/16 - 1/4	5/16 X 3/16 X 18	12 oz.
145720	3/16	3/16 - 1/8	1/4 X 3/16 X 18	10 5/8 oz.
145721	1/8	1/8 - 1/16	1/4 X 3/16 X 18	9 1/2 oz.
145728	10 - 18	10 - 18 Screen Mesh	1/4 X 3/16 X 18	7 1/4 oz.
145726	18 - 30	18 - 30 Screen Mesh	3/16 X 3/16 X 18	5 1/2 oz.
145727	30 - 45	30 - 45 Screen Mesh	3/16 X 3/16 X 18	5 1/2 oz.

Tinning Rod and Brazing Flux

Bowen Tinning Rod is a specially compounded flux-coated, nickel-silver brazing Alloy particularly suited as a base for Bowen Itcoloy. Bowen Tinning Rod produces a corrosion-resistant weld deposit with a tensile strength of 100,000 psi and a hardness of 160 170 Brinell. Tinning Rod is packed in cartons of approximately ten pounds each. Bowen Tinning Rod should be ordered in quantities approximating 20 percent of the Bowen Itcoloy order

Bowen Brazing Flux is a specially compounded braze-welding flux to prepare the surface of the base metal for the application of Bowen Tinning Rod and Bowen Itcoloy. Bowen Brazing Flux is packed in cans of approximately one pound each. Bowen Brazing Flux should be ordered in quantities approximating two percent of the Bowen Itcoloy order.

Send for Bowen Technical Manual No. 5100 that completely describes Itcoloy and its application.

Brazing Flux — Part No. 145725



Tinning Rods — Part No. 145719

Ditch Magnets / Magnet Chargers

Bowen Ditch Magnets

The **NOV Downhole Bowen Ditch Magnet** is the best available and most effective means of trapping and removing metal particles from the drilling mud that the shale shaker will not get. This unit will capture all metals having magnetic attraction and hold them until they can be removed from the mud stream. The Magnet is particularly valuable during milling operations. Removal of mill cuttings and debris reduces wear of mud pumps and other equipment, as well as eliminating problems caused by the return downhole of harmful debris. They are equally effective during washover and fishing jobs.

Construction

The Bowen Ditch Magnet features simplicity, ruggedness and high power-to-weight ratio. The 36-inch long Magnet weighs only 90 pounds and will hold in suspension as much as half this weight of mill cuttings. The design is clean; eliminating trays, gates and other auxiliary equipment. The magnet is encased in stainless steel and has integral handles at each end for lifting.

Operation

No special instructions are required to operate the Bowen Ditch Magnet. It is most effective when suspended by soft line in the mud ditch. It may also be suspended by soft line in the shaker discharge. The unit should be cleaned several times per day, depending on milling rate. Just remove the Magnet and clean with fresh or salt water hose. Wipe all cuttings from the unit and return it to duty. The unit may be cleaned less often during other operations when return cuttings come slower.

Bowen Magnet Chargers

The Bowen Magnet Charger is designed to induce a strong magnetic charge into bar type fishing magnets. It is able to do big charging jobs with small electrical service. The Bowen Magnet Charger is a pulsed type unit and requires much less electrical power than ordinary continuous type chargers.

The Bowen Magnet Charger includes a Power Supply Unit and Magnetizing Coil Unit. The solid state Power Supply Unit converts alternating current input into short pulse, high-peak direct current output to the Magnetizing Coil.

Operation

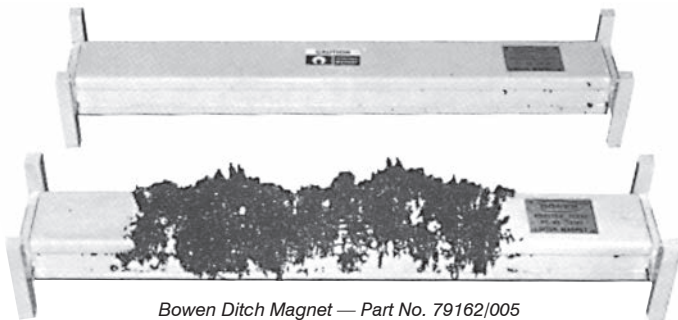
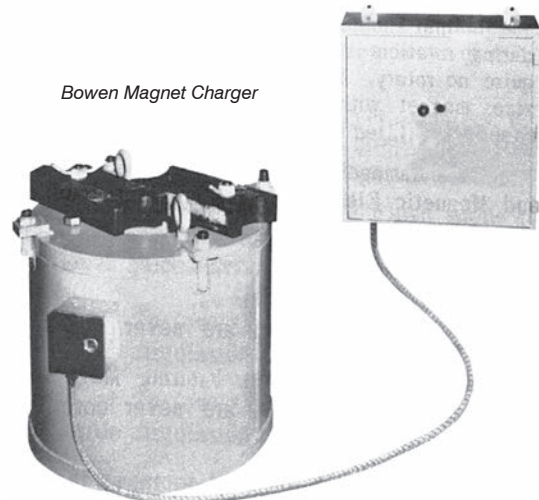
The magnet is placed in the Magnetizing Coil and locked into place by means of adjustable arms which are a part of the magnetic circuit. A push of the button on the Power Supply Unit starts the magnetizing cycle, which automatically shuts off after the short interval of time required to reach peak magnetizing force. The Bowen Magnet Charger can be used to magnetize fishing magnets up to 14- and 20- inch outside diameters.

Bowen Magnet Chargers and Replacement Parts

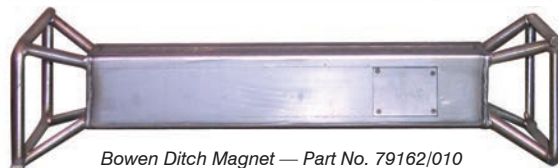
Size	14"	20"
Bowen® Magnet Charger		
Complete Assembly	71999	71662
Weight	5,100	7,100
Power Supply Unit		
Part No.	70973	70973
Weight	100	100
Magnetizing Coil Unit		
Part No.	70974	76663
Weight	5,000	7,000

Input Requirements: 100 amperes, 208/230 volts, 50/60 Hz, AC, single phase.

Bowen Magnet Charger



Bowen Ditch Magnet — Part No. 79162/005



Bowen Ditch Magnet — Part No. 79162/010
Standard length is 36 inches. Optional lengths available upon request

Hydraulic External Cutters

Bowen Hydraulic External Cutters

NOV Downhole Bowen Hydraulic External Cutters are hydraulically actuated mechanical tubing and drill pipe cutters. The cutters provide fast, efficient, smooth cutting and are capable of cutting and recovering strings of tubing or drill pipe. The cutter knives are fed entirely by pump pressure, thus giving the operator sensitive control.

Construction

Simple, yet rugged, Bowen Hydraulic External Cutters are composed of a top sub, body, guide, a set of knives, and a segmented piston assembly. Two shear pins hold the piston in a “running in” position until they are sheared to begin the cut. The piston assembly is composed of a rubber ring and a set of interlocking, conical piston segments. The segments are held in a contracted position by a tough rubber ring stretched around the end of the segments in a suitable groove. Each piston segment has a fluid passage which is engineered to simultaneously pass fluid for flushing, cooling, and restricting the fluid flow for ample pumpdown force on the knives to effect the cut.

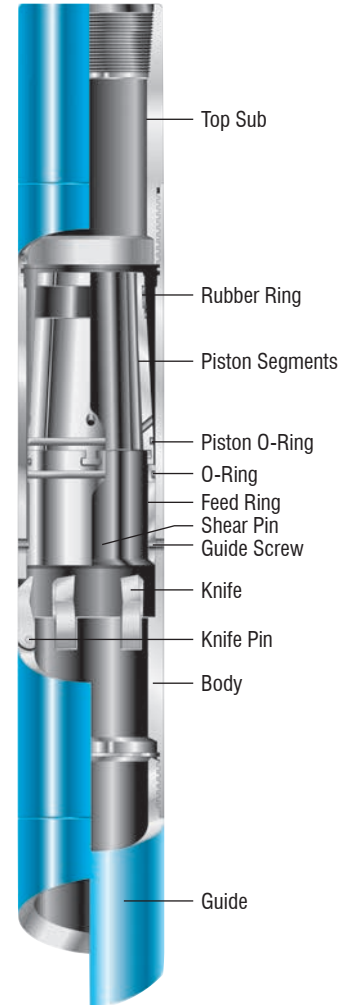
Operation

To operate, assemble the cutter using the proper size and type of piston assembly. Run the cutter into the hole to cutting depth. When cutting depth is reached, open the fill-up and standpipe valves just enough to shear the shear pins. Begin slow rotation — 15 to 25 rpm. Slowly close the bypass valve again to pump fluid down the working string. This will begin feeding the knives to start the cut. The amount of pressure and gallons per minute required depends on the cutter size and piston assembly being used. Use extreme caution to avoid surging of pump pressure when starting a cut. Pressure surging causes the string length to contract and expand, moving the cutter up and down. This motion prevents the knives from remaining in one position when starting a cut. A rough chattering action followed by the smoothing of the rotary will signal the completion of the cut. Bring the cut section out and strip it from the washpipe. Do not spud coming out of hole.

RECOMMENDED SPARE PARTS:

- (1) 1 Set Piston Segments
- (2) 1 Feed Ring
- (3) 24 Shear Pins
- (4) 6 Sets Knives
- (5) 2 Sets of Knife Pins
- (6) 1 Set Knife Pin Screws
- (7) 6 Rubber Rings
- (8) 6 Piston O-Rings

Send for Bowen Technical Manual No. 5550 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Hydraulic External Cutters.



Bowen Hydraulic External Cutters

Bowen Hydraulic External Cutters

Size Pipe to Cut — Outside Diameter	1.050	2 ¹ / ₁₆	1.900	1.900	1.315	1.900	2 ¹ / ₁₆	2 ³ / ₈	3 ¹ / ₂
	-	1.900	2 ¹ / ₁₆	2 ¹ / ₁₆	1.660	2 ¹ / ₁₆	2 ³ / ₈	2 ³ / ₈	4
	-	1.660	2 ³ / ₈	2 ³ / ₈	1.900	2 ³ / ₈	2 ³ / ₈	3 ¹ / ₂	4 ¹ / ₂
	1.315	-	2 ⁷ / ₈	2 ¹ / ₁₆	2 ⁷ / ₈	3 ¹ / ₂	4	5	-
	-	-	-	-	2 ³ / ₁₆	-	4 F.J.	-	-
I.D. of Cutter	1 ²⁵ / ₃₂	2 ⁷ / ₈	3 ⁵ / ₈	3 ¹³ / ₁₆	3 ³ / ₁₆	3 ⁷ / ₈	4 ⁵ / ₁₆	4 ⁷ / ₈	6 ¹ / ₂
O.D. of Cutter	2 ⁹ / ₁₆	3 ³ / ₄	4 ⁷ / ₁₆	4 ⁹ / ₁₆	4 ¹ / ₁₆	4 ¹ / ₁₆	5 ⁵ / ₁₆	6 ¹ / ₁₆	8
Fluid Pressure Req'd to Operate (psi)	-	20 to 40	10 to 25	10 to 30	20 to 45	10 to 25	15 to 55	15 to 40	10 to 20
Fluid Flow Req'd to Operate (gpm)	-	120 to 200	125 to 145	125 to 200	119 to 208	125 to 128	210 to 232	135 to 200	142 to 182
Complete Assembly Part No.	57922	70086	70209	79215	34415	41727	34551	51148	35957
Complete Assembly Weight	-	-	-	-	55	80	180	160	280

Internal Cutters

Bowen Internal Cutters

NOV Downhole Bowen Internal Cutters are simple, efficient tools for cutting tubing, casing or drill pipe. They are available in sizes for cutting 1½" tubing up to 20¾" casing. Manufactured to exacting standards, Internal Cutters permit the redressing of a basic assembly in order to cut alternate sizes of pipe. Internal Cutters are used to cut tubing, casing or drill pipe. They may be run on sucker rods, macaroni strings, tubing, or drill pipe, depending upon the diameter of the pipe to be cut.

The Internal Cutter consists of a Wiper Block (or a Drag Spring) Assembly to accomplish setting in the pipe; Slips and Cone Assembly to anchor the tool; a Main Spring to assist in maintaining uniform feed to the Knives; wedge-like Knife Blocks to drive the Knives upward and outward to engage the pipe; and hardened and ground Knives for easy, efficient cutting.

An important feature of the Internal Cutter is the "Automatic Bottom." This device permits the operator to set the cutter at any desired depth, to release the tool and to reset at another depth, all without coming out of the hole.

Bowen Collar Finders

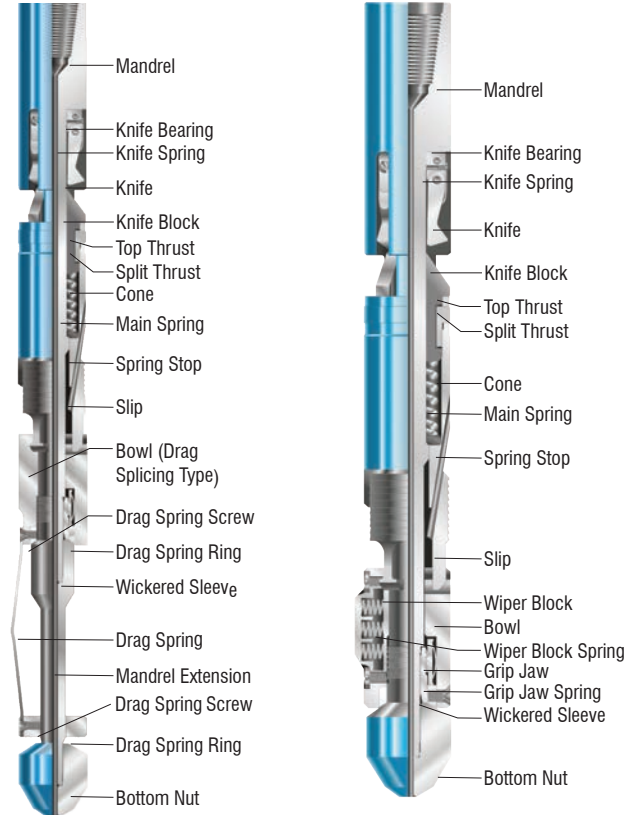
Bowen Collar Finders (not shown), assembled at the bottom of a Cutter, enable the operator to locate the nearest collar to the cutting depth. Construction permits free lowering into pipe. When the assembly is raised, the upper ends of the Collar Locators engage the space between two joints of pipe. Additional upward pull snaps the Shear Pin; the reaction in the string is very apparent at the surface and the operator then knows the exact location of the collar.

RECOMMENDED SPARE PARTS:

- (1) 6 Sets of Knives
- (2) 2 Sets of Knife Pins
- (3) 6 Sets of Knife Springs
- (4) 2 Sets of Knife Spring Screws
- (5) 1 Set of Slips
- (6) 1 Set of Wiper Blocks
- (7) 1 Set of Wiper Block Springs
- (8) 1 Set of Wiper Block Screws
- (9) 1 Set of Grip Jaws
- (10) 1 Set of Grip Jaw Springs
- (11) 1 Wickered Sleeve
- (12) 1 Set of Drag Springs
- (13) 1 Set of Drag Spring Screws

Bowen Internal Cutters

Size Pipe to Cut	1.9 Tub.	2¾	2¾	2¾	2¾	3½	4½	4½	5	5 O.D.	6 O.D.	7 O.D.	8½ & 9	9¾	11¾	13 & 13¾	16	20
		2¾ Tub.	2¾ Tub.	2¾ Tub.	3½ Tub.	4½ Tub.	4½ O.D. Tub.	4½ O.D. Csg.	5 F.H.D.P.	5½ O.D. I.F.D.P.	6 O.D. I.U.D.P.	7 O.D. Csg.	8½ O.D. Csg.	9¾ O.D. Csg.	10¾ O.D. Csg.	12 L.P.	18½ O.D. Csg.	20¾ Csg.
Can Be Dressed to Cut		2¾ Tub.			I.F.D.P.	I.F.D.P.	4½ Tub.	4½ Csg.	5 Csg.	F.H.D.P.	4¾ Csg.		8½ Csg.	7 Csg.	8 Csg.		11¾ Csg.	
O.D. of Cutter & Min. O.D.	1½	1¾	1¾	2¼	2¼	2¾	2½	3¾	3¾	4	5	5½	7¼	8¼	—	11¾	14½	18¾
Standard Assembly With Drag Spring or Wiper Block	D.S.	D.S.	D.S.	D.S.	D.S.	W.B.	D.S.	W.B.	D.S.	W.B.	W.B.	W.B.	W.B.	W.B.	W.B.	W.B.	W.B.	W.B.
Complete Assembly																		
Part No.	25940	8430	2174	8505	9176	8570	9465	8844	9081	8200	14785	8745	15532	15080	41876	19525	21240	19760
Weight	15	17	16½	22	28½	39	39	54	71	130	180	251	410	680	900	1120	1150	1200



Bowen Internal Cutters with Drag Springs

Bowen Internal Cutters with Wiper Blocks

Send for Bowen Technical Manual No. 5600 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Internal Cutters and Bowen Collar Finders.

Internal Pressure Pipe Cutters

Bowen Internal Pressure Pipe Cutters

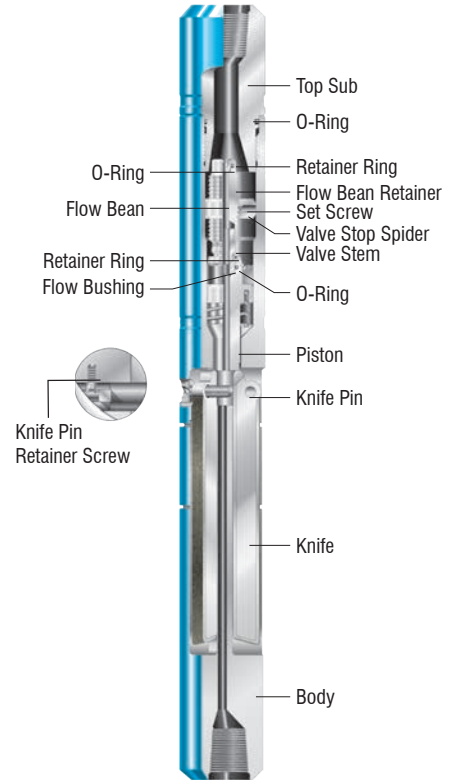
The **NOV Downhole Bowen Internal Pressure Pipe Cutter** is a simple hydraulic actuated pipe cutter, consisting of a Body, with multiple Knives and Knife Pins: actuated by a Piston with a Pressure Relief Valve System consisting of a Flow Bushing, Valve Stem, Flow Bean Retainer, Valve Stop Spider, Flow Bean, and Set Screws.

Operation

The Cutter is attached to the drill pipe or tubing. The knives are wired to retain them in the groove and lowered to the desired depth. Rotation is started (usually 30 to 50 rpm). The pump is turned on, usually to 900 psi. The cutter is held in one position while cutting, and the piston forces the knives through the pipe. When the knives reach the preset diameter, the piston will separate from the valve stem and provide more mud flow through the tool, causing a marked decrease in pump pressure, indicating the knives have severed the pipe.

The pump pressure indication is preset by a simple adjustment, allowing the knives to extend at exactly the desired diameter.

Send for *Bowen Technical Manual No. 5680* which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Internal Pressure Pipe Cutters.



Internal Pressure Pipe Cutters

Bowen Internal Pressure Pipe Cutters

Size Pipe to Cut* (inches)	4½ to 6½	4¾ to 7½	6¾ to 7¾	8½ to 11¼	9½ to 36	10¾ to 36	13¾ to 36
O.D. of Cutter (inches)	3¾	4¼	5¾	7¾	8¼	9½	11¾
Size Connection Box Up (inches)	2¾ I.F.	2¾ I.F.	3½ I.F.	*	*	9½	*
Size Connection Box Down (inches)	2¾ Reg.	2¾ Reg.	3½ Reg.	*	*	*	*
Complete Assembly	147483	154154	147489	150959	147495	147343	147369

* Blank connection NOTE: Connections to be specified. Knives furnished undressed, unless specified

Optional Accessories

Centralizing Top Sub Sizes Listed Below:

For 5" O.D.	80566	-	-	-	-	-	-
For 5½" O.D.	80567	-	-	-	-	-	-
For 7" O.D.	-	-	80720	-	-	-	-
For 7¾" O.D.	-	154162	80721	-	-	-	-

Knife Size to Cut Listed Below:

7¾" to 9¾" O.D. Pipe	-	-	81896	-	-	-	-
8½" to 9½" O.D. Pipe	-	-	-	151023	-	-	-
10¾" O.D. Pipe	-	-	-	-	147021	-	-
10¾" to 13¾" O.D. Pipe	-	-	-	151029	-	-	-
11¼" to 13¾" O.D. Pipe	-	-	-	-	-	147358	-
13¾" to 16" O.D. Pipe	-	-	-	-	147022	147359	147358
16" to 18¾" O.D. Pipe	-	-	-	-	-	-	147359
18" to 20" O.D. Pipe	-	-	-	-	147023	147360	-
18¾" to 20" O.D. Pipe	-	-	-	-	-	-	147360
24" to 30" O.D. Pipe	-	-	-	-	147024	147361	-
26" to 30" O.D. Pipe	-	-	-	-	-	-	147361
30" to 34" O.D. Pipe	-	-	-	-	147025	-	-
34" to 36" O.D. Pipe	-	-	-	-	147026	147362	147362

External Cutters

Bowen External Tubing and Drill Pipe Cutters

NOV Downhole Bowen External Cutters are automatic springfed cutters that provide fast, efficient, external cutting and recovery of long sections of tubing, drill pipe or casing. The springfed feature prevents excessive strain from being applied from the rig floor, which could cause the knives to burn or break before the cut is made.

The Body of the Bowen External Cutter is designed so that when an upward strain is taken on the cutting string (and the Spring Dog Assembly has engaged a tool joint or collar), the downward travel of the Spring Dog Assembly and the Thrust Washer is limited to compressing the Main Spring and to shearing the Feed Ring Shear Pin. Thereafter the Knives are fed for the cutting operation only by the Main Spring. A Thrust Bearing Assembly assures smooth, low friction rotation of the cutter.

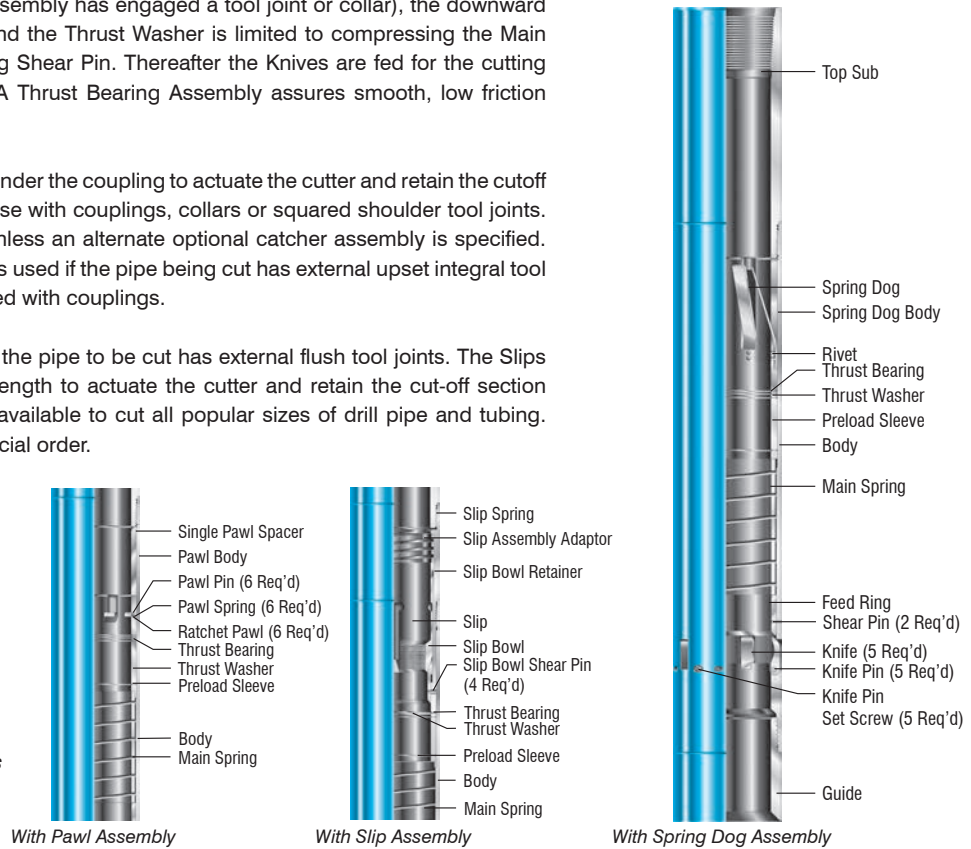
The Spring Dog is designed to catch under the coupling to actuate the cutter and retain the cutoff section of the pipe. It is effective for use with couplings, collars or squared shoulder tool joints. It is standard and will be furnished unless an alternate optional catcher assembly is specified. The optional Ratchet Pawl Assembly is used if the pipe being cut has external upset integral tool joints. This assembly may also be used with couplings.

The optional Slip Assembly is used if the pipe to be cut has external flush tool joints. The Slips will grip the pipe at any point in its length to actuate the cutter and retain the cut-off section of pipe. Bowen External Cutters are available to cut all popular sizes of drill pipe and tubing. Special sizes will be furnished on special order.

RECOMMENDED SPARE PARTS:

- (1) 1 Feed Ring
- (2) 24 Shear Pins
- (3) 6 Sets Knives
- (4) 2 Sets Knife Pins
- (5) Set Screws
- (6) Spring Dog Assemblies

Send for **Bowen Technical Manual No. 5500** which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen External Cutters.



Bowen External Tubing and Drill Pipe Cutters

Size Pipe to Cut	1.050 Thru 1.315 Tub.	1.315 Thru 2 3/8 Tub.	1.660 Thru 2 3/8 Tub.	1.900 Thru 2 7/8 Tub.	2 1/8 Thru 3 1/2 Tub.	2 3/8 Thru 3 1/2 Tub.	2 3/8 Thru 4 Tub.	3 1/2, 4 4 1/2, 5 D.P. 5 1/2 Csg.	4 Thru 5 3/4 Csg.
Maximum Size Will Pass Over	1.552	3 1/8	3 3/8	3 3/4	4 1/4	4 1/2	4 3/4	6 1/4	6 1/2
I.D. of Cutter	1 5/8	3 1/8	3 3/4	3 3/8	4 3/8	4 5/8	4 7/8	6 3/8	6 5/8
O.D. of Cutter	2 5/16	3 3/8	4 1/2	4 1 1/16	5 5/8	5 7/8	6 1/16	7 3/8	8 1/8
Minimum Size Hole to Run In	2 7/16	4 1/8	4 3/4	4 1 5/16	5 7/8	6 1/8	6 1/4	8 1/4	8 5/8
Complete Assembly With Spring Dog Assembly									
Part No.	32848	47127	47167	47210	47309	47264	47360	47422	47541
Weight	30	51	108	78	181	144	154	293	390

Optional Extra Accessories

Ratchet Pawl Assembly									
Part No.	13666	47138*	47181	47218	47315	47275	47367	47426	47547
Weight	3	3	2 1/4	9 1/4	13	13	15	15	17
Slip Assembly									
Part No.	-	47133	47185	47221	47319	47279	47371	47430	47551
Weight	-	9 1/2	11 1/2	12	19	21 1/4	31 3/4	46 3/4	55
Load Required to Shear Each Shear Pin (lbs)	280	285	637	285	637	637	637	637	990
Double Shear Strength (lbs)	570	570	1275	570	1275	1275	1275	1275	1950
Load Required to Shear Each Slip Bowl Pin (lbs)	-	4125	4125	4125	8285	8285	8285	8285	9950
Quadruple Shear Strength (lbs)	-	16,500	16,500	16,500	33,150	33,150	33,150	33,150	39,750

*2 1/2" max. I.D. thru Ratchet Pawl Assembly

Tubing and Casing Patches

Bowen Packer-Type Tubing and Casing Patches

NOV Downhole Bowen Packer-Type Patches are external catch tools, designed to engage a previously prepared Fish, pack it off, and become a permanent part of the repaired tubing, pipe, or casing string.

The same dependable method of engagement and release which is used for Bowen Overshots is employed in Bowen Packer-Type Casing Patches. These Patches feature positive engagement and positive seal-off in either direction, providing a permanent, rigid connection which will remain leak proof for years, yet it may be easily released if ever the need arises.

Bowen Packer-Type Casing Patches will not restrict the bore of the casing or tubing in any manner, and are as strong as the string being repaired. They are available in all popular sizes from 3/4" standard pipe through 24" casing. Non-standard Patches will be furnished on special order for any size pipe or casing at extra cost.

High Pressure Packer-Type Casing Patches are available upon request.

Send for Bowen Technical Manual No. 6300 which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Packer-Type Casing Patches.

Bowen Lead Seal Tubing and Casing Patches

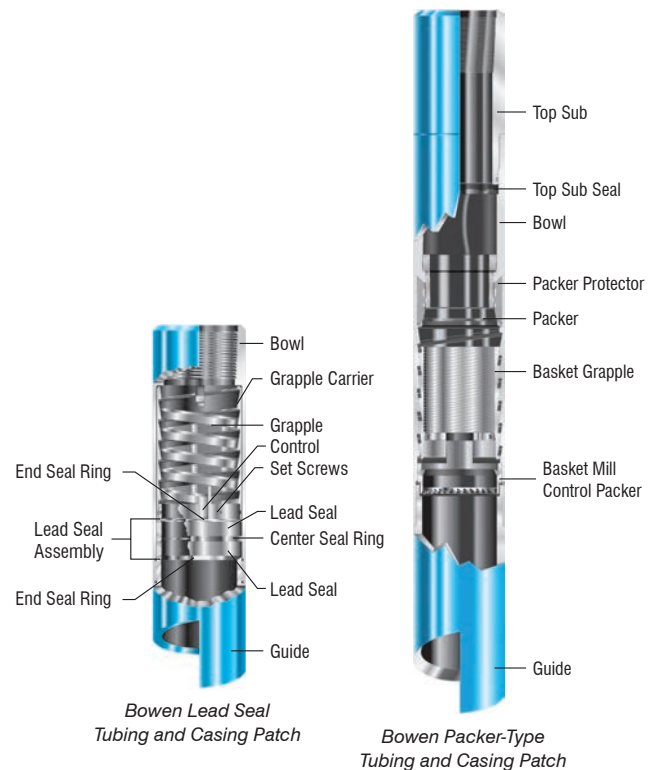
NOV Downhole Bowen Lead Seal Casing Patches are particularly well suited for service in wells which contain fluids and gases which are harmful to synthetic rubber packers. The seals used are compression type, multiple lead rings. These seals are cast from commercially pure (unalloyed) lead, which is fully annealed for uniformity of flow and to minimize the setting load required to set them.

The same method of engagement (and release) is utilized as in the Packer-Type Casing Patch. When engaged, an upward strain causes the outer assembly to move upward while the engaged

grapple, carrier and control remain stationary. Compression between the carrier and guide causes the lead seals to flow around the tubing or casing, forming a highly effective seal.

Special sizes, left-hand tools, left-hand connections, or oversize O.D.s will be furnished on special order at extra cost. Send for Bowen Technical Manual No. 6400 which includes complete descriptions of Bowen Lead Seal Casing Patches.

Send for Bowen Technical Manual No. 6400 which includes complete descriptions of Bowen Lead Seal Casing Patches.



Bowen Packer-Type Casing Patches

Casing O.D.	3/4 Pipe	1 Pipe	2 3/8	2 7/8	4	4 1/2	5	5 1/2	5 3/4	6	6 1/2	7	7 1/2	8	8 1/2	9	10 1/4	11 3/4	13 3/8
Patch O.D.	1 29/32	1 29/32	3 7/16	4 1/4	5 1/4	5 3/4	6 1/4	6 9/16	7 1/16	7 5/16	7 15/16	8 3/8	9	10 1/16	11 1/8	12 5/16	13 3/8	15 1/2	
Complete Assembly																			
Part No.	1703	17025	48368	37324	22420	11215	11220	11220	22430	11230	11235	11240	11245	11250	11255	11260	39136	41042	
Weight	22	22	—	—	100	116	134	145	150	158	171	187	203	242	296	369	450	600	

Bowen Lead Seal Casing Patches

Casing O.D.	2 3/8	2 7/8	4	4 1/2	5	5 1/2	5 3/4	6	6 1/2	7	7 1/2	8	8 1/2	9	10 1/4	11 3/4	13 3/8
Patch O.D.	3 7/16	4	5 1/4	5 3/4	6 1/4	6 3/16	7 1/16	7 5/16	7 15/16	8 3/8	9	10 1/16	11 1/8	12 5/16	13 3/8	15 1/2	
Complete Assembly																	
Part No.	17258	16140	22400	13270	13280	12315	22410	13290	13300	12500	13070	13310	12475	13320	20855	18445	
Weight	30	31	44	51	76	82	84	90	98	109	141	149	175	203	226	250	

Bowen Lead Seal Casing Patches — H2S

Casing O.D.	2 3/8	2 7/8	3 1/2	4	4 1/2	4 3/4	5	5 1/2	5 3/4	6	6 1/2	7	7 1/2	8	8 1/2	9	10 1/4	11 3/4	13 3/8	13 3/8
Patch O.D.	3 7/16	4	4 3/4	5 1/4	5 3/4	6 1/16	6 1/4	6 9/16	7 1/16	7 5/16	7 15/16	8 3/8	9	10 1/16	11 1/8	12 5/16	13 3/8	14 1/2	14 7/8	15 1/2
Complete Assembly																				
Part No.	42757	42760	42763	42766	42769	42772	42775	42754	42778	42781	42784	42787	42790	42793	42796	42799	42802	42805	42808	
Weight	30	31	37	44	51	63	76	82	84	90	98	109	141	149	175	203	226	239	250	

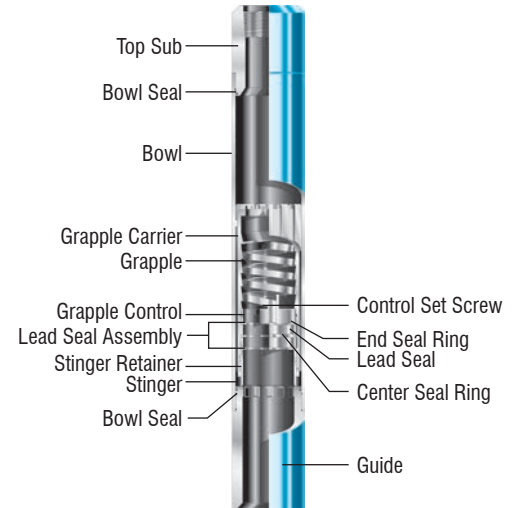
Casing Patches

Bowen Lead Seal Cementing Casing Patches

NOV Downhole Bowen Lead Seal Cementing Casing Patches are designed to form a permanent sealed connection between two strings of tubing or casing and cement them together in a single run. These Patches incorporate the proven Bowen compression-type multiple lead seal assembly and a valving method which allows it to be cemented in place immediately after it is set. The primary seals are cast from commercially pure lead, which is impervious to most well fluids and gases. These seals are effective in temperatures up to 550°F. These Casing Patches are very simple to operate. The Patch is assembled, attached to the running string and lowered over the washed over string. The running string is lifted, allowing the outer body parts to move up-hole while the Grapple and Carrier remain in position. This compresses the Lead Seals, forming an initial seal.

The running string is then lowered, telescoping the carrier and stinger upward in the outer body parts and opening the valve formed between the integral lower seal and the stinger. Cement is immediately pumped through this valve, cementing the Patch and running string in place. After cementing, a moderate pull is again applied to the running string and maintained during the cement curing interval.

Send for *Technical Manual No. 6460* which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Lead Seal Cementing Casing Patches.



Lead Seal Cementing Casing Patch

Lead Seal Cementing Casing Patches

Casing O.D.	2 $\frac{3}{8}$	2 $\frac{7}{8}$	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$ *	5 $\frac{3}{4}$	6	6 $\frac{3}{8}$	7	7 $\frac{3}{8}$	8 $\frac{3}{8}$	9 $\frac{3}{8}$	10 $\frac{3}{8}$	11 $\frac{3}{8}$	13 $\frac{3}{8}$
Patch O.D.	4 $\frac{1}{8}$	4 $\frac{5}{8}$	5 $\frac{1}{4}$	5 $\frac{3}{4}$	6 $\frac{1}{2}$	6 $\frac{3}{4}$	7 $\frac{1}{16}$	7 $\frac{3}{4}$	8	8 $\frac{5}{8}$	9 $\frac{1}{8}$	9 $\frac{3}{8}$	11 $\frac{1}{8}$	11 $\frac{15}{16}$	13 $\frac{5}{8}$	14 $\frac{3}{4}$	16 $\frac{5}{8}$
Complete Assembly Part No.	40514	41209	41210	40596	40619	40649	38179	41088	40679	40858	40859	40869	41004	41085	41086	41089	41087
Weight	102	131	143	156	217	224	261	258	273	285	337	379	507	717	816	956	1363

*This size available for H₂S service. Complete assembly No. 146503.

Bowen Underwater Wellhead Casing Patches

NOV Downhole Bowen Underwater Wellhead Casing Patches are engineered to allow casing to be salvaged during landing operations that would otherwise necessitate expensive underwater washover and pulling operations. Bowen Underwater Wellhead Casing Patches are essentially the same as the standard Bowen Packer Type Casing Patch, with the added feature of a long Top Extension. Casing Patches are available in a complete range of sizes from 5 $\frac{1}{2}$ " through 13 $\frac{3}{8}$ " casing. Additional sizes to meet specific requirements will be made on special order. The Top Extension is manufactured from casing where practical to reduce cost to a minimum. Where hole sizes will not permit the inexpensive extension, alloy tubing is used. In most cases, extensions are available in any required length.

Sometimes during landing operations the casing being landed gets stuck off bottom. If this happens while the casing is being floated down in cement, an expensive and time consuming fishing job could result. In place of conventional fishing, the operation may be salvaged by using a Bowen Casing Patch in the following manner. The first collar below the wellhead may be located and the casing cut. The upper portion of the casing is removed from the well. The remaining portion of the casing is engaged and packed off, and is then engaged with a Bowen Releasing Spear and pulled up into the path a sufficient distance to insure proper tension in the casing string.

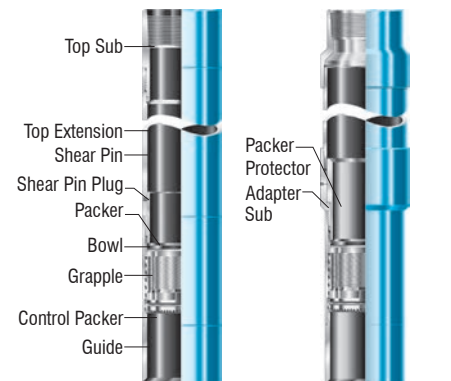
Send for *Bowen Technical Manual No. 6480* which includes complete descriptions of construction, operation, maintenance, and parts listing for Bowen Underwater Wellhead Casing Patches.

Underwater Wellhead Casing Patches

Casing Size	5 $\frac{1}{2}$	5 $\frac{7}{8}$	7	7	9 $\frac{5}{8}$	9 $\frac{5}{8}$	10 $\frac{3}{4}$	10 $\frac{3}{4}$	13 $\frac{3}{8}$	13 $\frac{3}{8}$
Casing Patch O.D.	7 $\frac{1}{32}$	6 $\frac{13}{16}$	8 $\frac{5}{16}$	8 $\frac{5}{16}$	11 $\frac{1}{8}$	11 $\frac{1}{8}$	14 $\frac{3}{8}$	12 $\frac{5}{16}$	17	15 $\frac{1}{8}$
Type of Extension	Casing	Alloy	Casing	Alloy	Casing	Alloy	Casing	Alloy	Casing	Alloy
Length of Extension (ft)	10	10	10	10	10	10	10	10	10	10
Type of Casing Patch	Packer	Packer	Packer	Packer	Packer	Packer	Packer	Packer	Packer	Packer
Complete Assembly Part No.	47778	47772	44960	47767	45000	47758	47736	47730	43379	40398
Weight	500	455	400	730	645	1145	1625	1325	1300	1980

Optional Extra Accessories

Dressing Mill (Accessory)										
Part No.	44822	-	49249	54341	54343	49251	51699	-	54338	54516
Weight	55	-	101	120	130	127	125	-	140	250



Underwater Wellhead Casing Patches: Alloy Extension (left) and Casing Extension (right)

Casing Patches

Bowen High Pressure Casing Patches

The Bowen High Pressure Casing Patch is an external catch tool, designed to engage a previously prepared fish, pack it off, and become a permanent part of the repaired casing, pipe or tubing.

The same dependable method of engagement and release which is utilized for Bowen Overshots is employed in the Bowen High Pressure Casing Patch. This method assures positive engagement and a positive seal from either direction. The Patch provides a permanent connection, which remains rigid and leak-proof for many years yet it can be released if ever the need arises.

Bowen High Pressure Casing Patches will not restrict the bore of the casing or tubing in any manner.

The Bowen High Pressure Casing Patch is composed of three outside parts and five internal parts. This simplicity of design is matched by the simple operation.

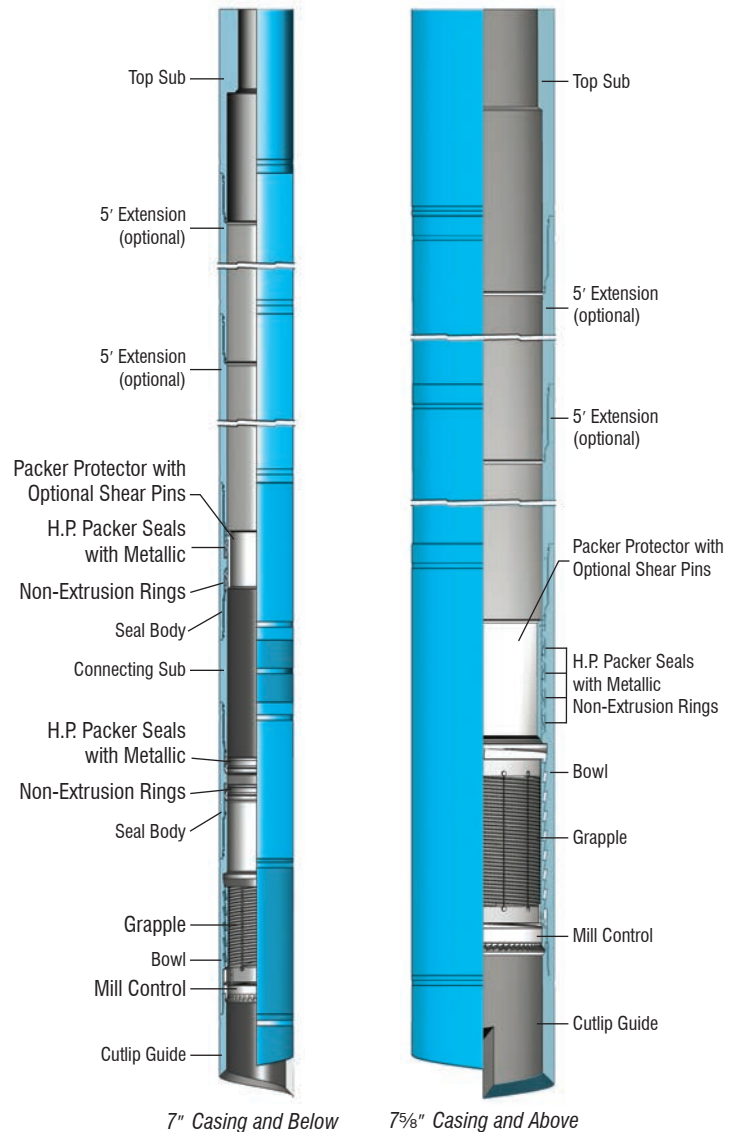
Operation

The Bowen High Pressure Casing Patch as indicated is used to repair a damaged casing string by replacement of the damaged section, without having to remove the entire string of casing from the hole.

Where the upper portion of a casing string becomes ruptured or disoriented from the lower portion such as by faulting or caving of the formation, crushing, rupture, or backing off, the upper portion must be removed. New casing is then replaced, the Bowen High Pressure Casing Patch forming the patching means between the old and new strings.

Construction

The Bowen High Pressure Casing Patch is constructed in the most basic manner to perform the functions of engaging the fish, sealing off the fish, or releasing, either during or after setting operations, should this become necessary.



Bowen High Pressure Casing Patches

Casing Size (inches)	2 ³ / ₈	2 ⁷ / ₈	3 ¹ / ₂	4 ¹ / ₂	5 ¹ / ₂	6 ⁵ / ₈	7	7 ⁵ / ₈	7 ⁷ / ₈	8 ⁵ / ₈
Maximum O.D. (inches)	3 ¹⁵ / ₃₂	4 ¹ / ₃₂	4 ¹³ / ₁₆	6	7 ¹ / ₈	8 ⁵ / ₁₆	9 ¹ / ₁₆	9 ⁹ / ₁₆	9 ¹¹ / ₁₆	10 ⁵ / ₁₆
Maximum Pressure Rating @ O.D. (psi)	20000	20000	20000	17000	17000	15000	15000	15000	15000	15000
Assembly Part Number	504803	504751	504738	504294	504305	504727	504159	504635	504636	504679
Maximum Recommended Pull Load @ 0 Pressure (lbf)	189000	246000	333000	488000	642000	770000	938000	1032000	1028000	1108000
Maximum Recommended Pull Load @ Max. Pressure (lbf)	100000	116000	140000	218000	238000	253000	360000	347000	321000	232000

Casing Size (inches)	9 ⁵ / ₈	9 ⁷ / ₈	10 ³ / ₄	11 ³ / ₄	11 ⁷ / ₈	13 ³ / ₈	13 ⁷ / ₈	16	18 ⁵ / ₈	20
Maximum O.D. (inches)	12 ¹ / ₈	12 ³ / ₈	13 ³ / ₈	14 ¹ / ₂	14 ⁵ / ₈	16 ¹ / ₂	16 ³ / ₄	18 ¹ / ₁₆	22 ¹ / ₈	24
Maximum Pressure Rating @ O.D. (psi)	15000	15000	15000	15000	15000	15000	15000	8000	8000	8000
Assembly Part Number	504567	504402	504648	504194	504668	504617	504074	504701	504716	504518
Maximum Recommended Pull Load @ 0 Pressure (lbf)	1521000	1561000	1802000	2014000	2031000	2593000	2633000	1881000	2569000	2881000
Maximum Recommended Pull Load @ Max. Pressure (lbf)	430000	412000	440000	388000	370000	485000	446000	272000	389000	368000

Note: The pressure ratings and pull loads listed above are for the maximum O.D. Tools with smaller O.D.'s and corresponding lower pressure ratings and pull loads are available upon request. New High Pressure Casing Patch sizes are being designed and may not be on this list. Call sales for updated information.

Casing Scrapers

Bowen Casing Scrapers

The **NOV Downhole Bowen Casing Scraper** is ideal for the removal of mud, cement, bullets, rust, scale, paraffin, perforation burrs and other obstructions from the inside walls of casing.

Maintaining a clean casing I.D. is important when operating drilling, fishing, or wireline tools. Likewise, packers, patches, spears, and similar tools require clean surfaces to grip. Obstructions on casing walls will frequently cause these tools to fail or become difficult to operate.

Construction

Utilizing a simple one-piece mandrel design, the Bowen Casing Scraper is constructed to be rugged, yet simple to operate and maintain. The Scraper conditions 50 percent more surface area than any other tool on the market. The full circle blades are so spaced to contact 600° (almost two complete circles) of casing surface at once.

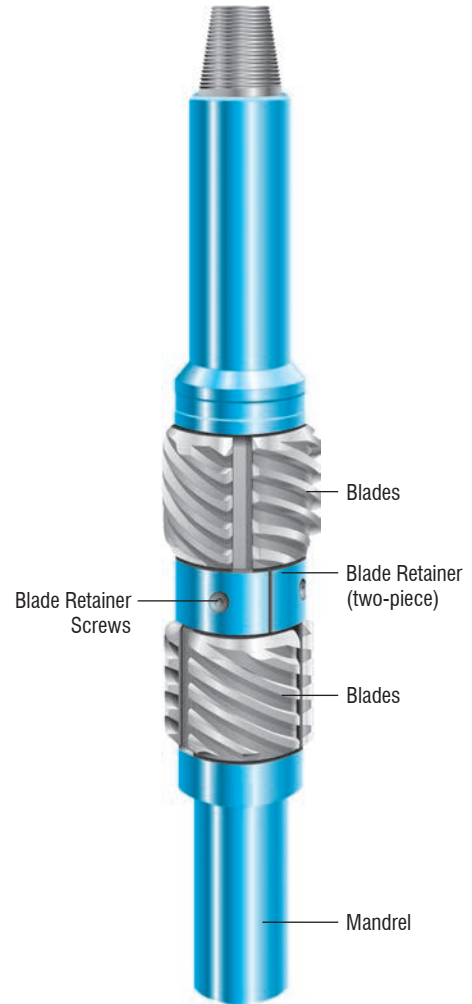
Short and compact, the Scraper also incorporates a long taper on the blades for passing through joints without hanging. The Scraper works in vertical or rotary operations and may be run on drill pipe or wireline.

Bowen Casing Scrapers are available to condition pipe ranging from 2 $\frac{3}{8}$ -inch tubing to 13 $\frac{3}{8}$ -inch casing. For more information on the use, operation and specifications of the Scraper contact your National Oilwell Varco representative.

Advantages

- More scraping surface approximately 50 percent more than any other scraper on the market extends blade life.
- Full circle blades contact 600° surface at once.
- Short, compact, easy to assemble and disassemble.
- Longer guide taper on blades for passing through joints without hanging.
- Vertical and rotary operation may be run on wireline or drill pipe.
- Investment cast tool steel blades allows maximum scraping ability.

Send for *Bowen Technical Manual No. 6255* which includes complete descriptions of construction, operation, maintenance, and parts listing for the Bowen Casing Scraper.



Bowen Casing Scraper

Bowen Casing Scrapers

Designed to Scrape (inches)	4 $\frac{1}{2}$ to 7 O.D. Csg.	5 $\frac{1}{2}$ to 7 $\frac{5}{8}$ O.D. Csg.	6 $\frac{5}{8}$ to 8 $\frac{5}{8}$ O.D. Csg.	9 $\frac{5}{8}$ to 10 $\frac{3}{4}$ O.D. Csg.	10 $\frac{3}{4}$ to 11 $\frac{3}{4}$ O.D. Csg.	13 $\frac{3}{8}$ to 14 O.D. Csg.
Connection (inches)	2 $\frac{3}{8}$ API Reg.	2 $\frac{7}{8}$ API Reg.	3 $\frac{1}{2}$ API Reg.	4 $\frac{1}{2}$ API Reg.	6 $\frac{5}{8}$ Reg.	6 $\frac{5}{8}$ Reg.
Complete Assembly Part No.	150032	149088	149335	150025	150418	150034

Required Accessories

Bandit Tool Part No.	149267	149267	149267	149267	149267	149267
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Blade Chart

Complete Assembly Part No.	150032	149088	149335	150025	150418	150034
Blade Part No.	150361	149090 150564	149338 150017	150028	152007	150037
Max Casing ID	4.622	5.250 6.188	6.688 7.188	9.188	10.412	13.238
Min Casing ID	3.886	4.662 5.600	5.850 6.308	8.224	9.220	11.911

NOV Downhole Offerings

Drilling Motors

- HEMIDRIL® Drilling Motors
- PowerPLUS™ Drilling Motors
- Vector™ Drilling Motors

ReedHycalog® Drill Bits

- Fixed Cutter Bits
- Roller Cone Bits
- Bi-Center Bits
- TuffCutter™ Bits

Bowen® Fishing Tools

- External Catch Tools
- Internal Catch Tools
- Junk Retrieval Tools
- Milling and Cutting Tools
- Accessory Tools
- Repair and Remedial Tools

Borehole Enlargement

- ReedHycalog® CSD® Bi-Center Bits
- Anderreamer™ Concentric Hole Openers
- Concentric String (CS) Tools
- Eccentric String (ES) Tools

Advanced Drilling Solutions

- Complete Drilling Optimization Services
- SystemMatched™ Drill Bits
- BHA Optimization and Vibration Mitigation
- TerraSCOPE®, VibraSCOPE™, BlackBox® Analysis
- Hydraulics and MSE Analysis

Drilling Tools

- Agitator™ Tools
- Drilling Jars
- Anderdrift™ Tools
- Drilling Jar Intensifier™ Tools
- Drilling Bumper Subs
- Collars, Stabilizers and Drillstring Components
- Reamers and Wipers
- V-Stab® Vibration Dampening Tools

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- OrientExpress™ Oriented Wireline Coring
- Conventional Coring

Intervention and Completion Tools

- Coiled Tubing Tools
- Ultra CT Jars
- CT Agitator™ Tools
- PCE/Progressive CT Tools
- CT Motors
- CT HEMIDRIL® Motors
- CT PowerPLUS™ Motors

Service Equipment

- Connection Tools
- TorqueMaster™ Make-Up/Break-Out Machines
- Product Testing
- Jar and Motor Test Stands
- Workshop Accessories
- Vises, Skids, Service Tool Packages

Downhole Solutions

Drilling Solutions

Engineering and Project Management Solutions

Industrial Solutions

Lifting and Handling Solutions

Production Solutions

Supply Chain Solutions

Tubular and Corrosion Control Solutions

Well Service and Completion Solutions

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For a complete list of NOV Downhole locations, visit us online:

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D391000198-MKT-001 Rev.07