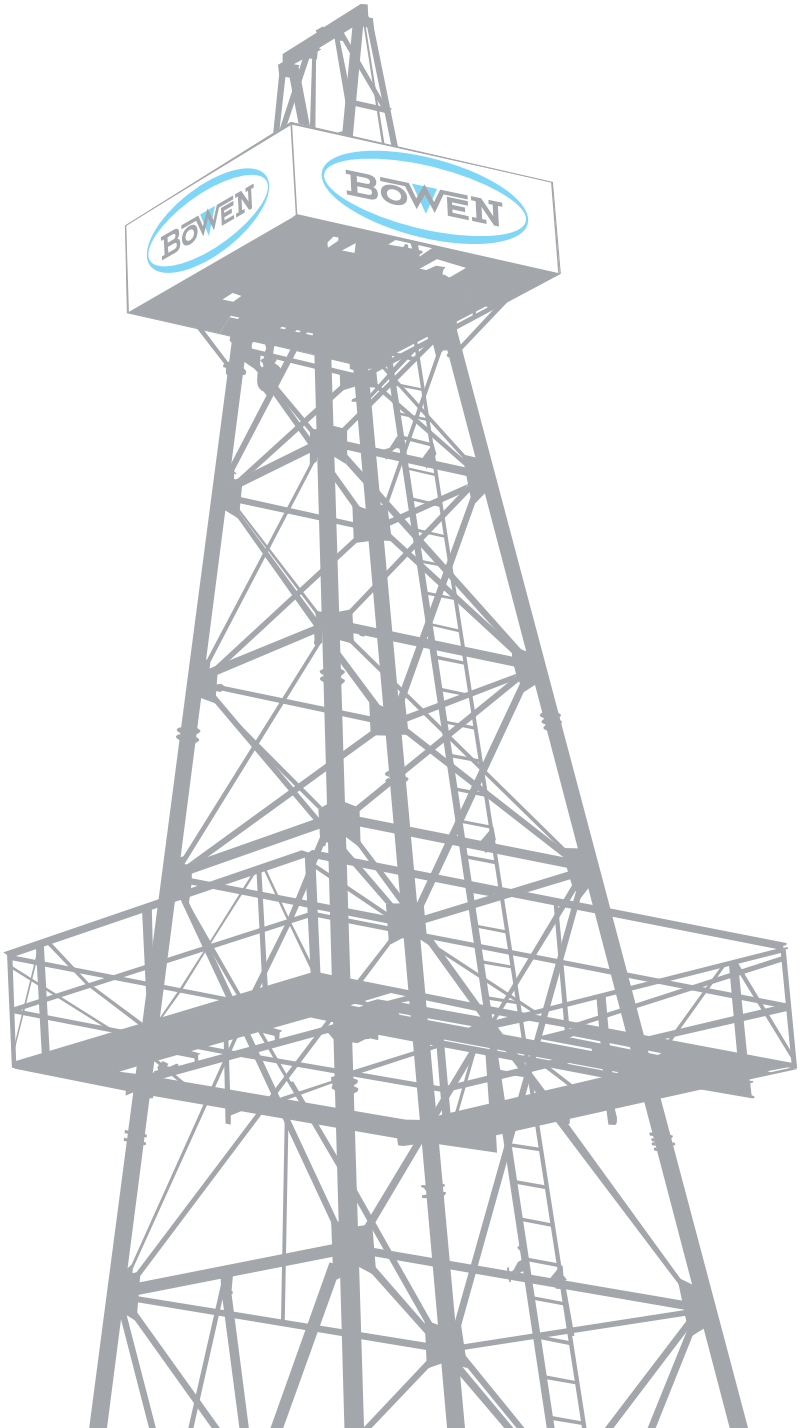
Bowen Premier Casing Patch

Instruction Manual 6550



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Repair & Remedial Tools

Bowen Premier Casing Patch

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Bowen Premier Casing Patch

General Description

The Bowen™ Premier 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 Premier casing patch.

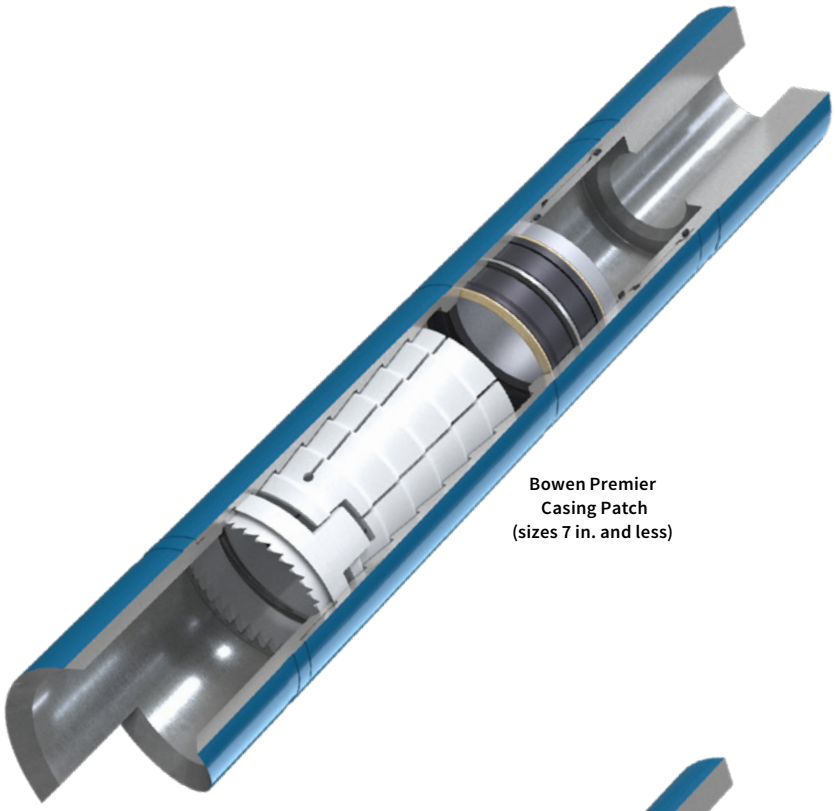
This method assures positive engagement and positive seal-off from either direction. The patch provides a permanent connection which remains rigid and leak-proof for many years, yet is positively releasable if ever the need arises.

Bowen Premier casing patches will not restrict the bore of the casing or tubing in any manner.

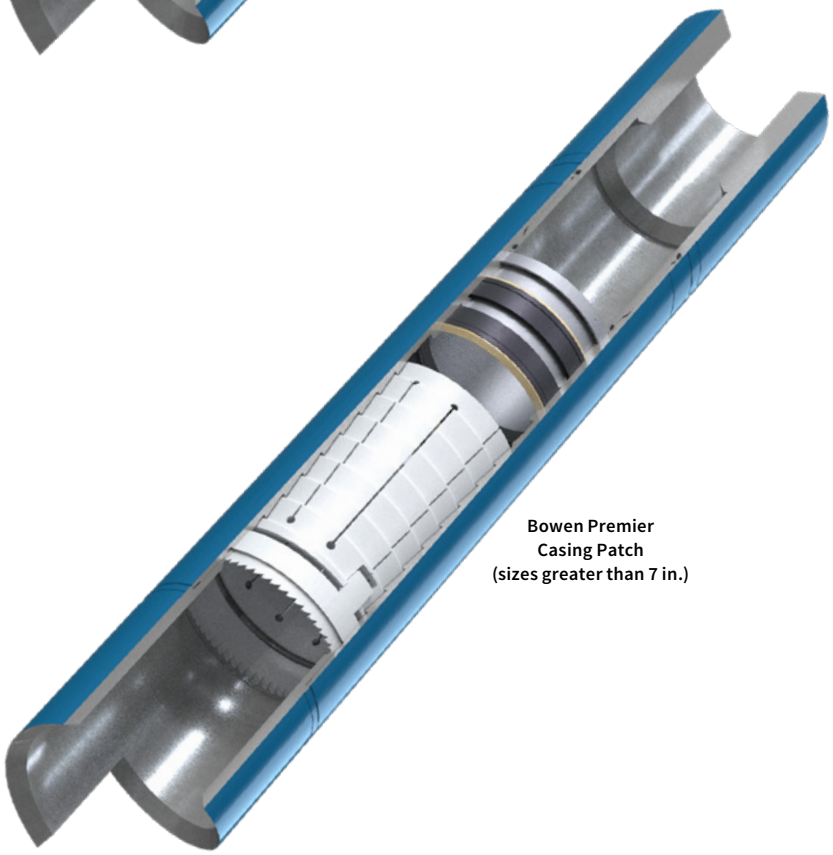
The Bowen Premier casing patch is composed of three outside parts and seven internal parts. This simplicity of design is matched by the simple positive operation.

Use

The Bowen Premier casing patch 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, and the Bowen Premier casing patch forms the patch between the old and new strings.



Bowen Premier Casing Patch (sizes 7 in. and less)



Bowen Premier Casing Patch (sizes greater than 7 in.)

Bowen Premier Casing Patch

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 advisable.

The top sub, extensions, bowl, and guide form the outer assembly.

The top sub has an upper connection to match the running string, and a lower connection to mate with the bowl or optional extensions as used for underwater operations. Top sub and extensions have seals, which are located immediately above and below the pin connection threads of the top sub and extensions.

The bowl has an upper connection for the top sub or optional extension, an area of length into which the packer protector slides during operation, a spiraled section which contains the engaging grapple, a space for the mill control, and a lower connection to accept the guide.

The guide is usually flush with the outside diameter of the casing patch, and cut lipped. The primary purpose of the guide is to assist smooth entry of the fish into the catch area of the patch. A secondary function is to maintain the inner working parts in position.

The inner working parts of the Bowen Premier casing patch are the grapple, packer, non-extrusion ring, mill control, shear ring, and packer protector.

The grapple is a cylinder with wickers in its inside diameter for engaging the fish and spirals on its outside diameter to mate with the spirals in the bowl. Both the wickers and the spirals are made with a left-hand lead, which allow release by right-hand rotation. The grapple has a series of longitudinal slots which allow the grapple to flex diametrically during operation.

The packer has a single oversized lip on the ID to seal on the casing and a small lip to seal on the inside of the bowl seal groves. It is molded in one piece from synthetic rubber compounds to include the best combination of properties for general oil well service. It withstands most well fluids and has good resistance to gas invasion and abrasion.

The non-extrusion rings serve as backup rings to the packers as to prevent the packers from extruding between the casing and the bowl. Made from various materials, the non-extrusion rings are very important to the performance of the packers. If they fail to perform, the packers alone will not be capable of containing a high working pressure.

In service, the outside of the packer seals against the inside of the bowl but the oversized lip on the ID is protected from damage by the packer protector, until the entering fish pushes the packer Protector up out of the way. This packer protector has a shear ring which includes holes for optional shear pins which are not required but can be used to ensure proper position of the packer protector until engagement of casing and prevent premature exposure of the packers and possible damage to packers.

The mill control serves the dual purpose of removing burrs from the outside of the fish as it enters the assembly and has a control finger that keys the grapple to the bowl. The grapple is free to move up and down sufficiently to engage or release the fish, but is prevented by the control finger from rotating. Thus, the torque required to release the assembly may be transmitted from the running string through the top sub, extensions, bowl, mill control, and on to the grapple.

Operation

NOTE: Prior to running the Casing Patch, the fish should be prepared. This usually includes washing over and cleaning the upper end of the fish of splits and burrs and sizing the fish.

NOTE: The tool should be assembled in accordance with the Complete Assembly instructions found on this page.

1. Assemble the tool to the running string and buck it up tight.

CAUTION: Use tongs on Top Sub only. If undue pressure is exerted on the Bowl, crushing or distortion may result.

2. Lower the tool into the hole until the fish depth is reached. As the fish is reached, the running string should be slowly rotated to the right while lowering it slowly. This combined slow rotation and lowering is important to the operation of the tool.

   This should be continued until the fish has entered the tool and “bottomed” the Packer Protector against the lower end of the Top Sub. This can be determined by watching the rig weight indicator. Allow 15,000 to 20,000 pounds of weight to be supported by the Casing Patch to assure good and complete engagement.

3. At this point, pick up the running string to remove the weight from the Casing Patch, while allowing the torque to slack from the running string.

4. The effectiveness of the Packer may be checked at this point, by applying mud pressure.

CAUTION: Take care to gradually increase pressure, allowing the Packer to seat smoothly. In no case should the Casing Patch be slugged, or shock loaded unnecessarily by the mud pumps.

5. Pick up the running string and apply sufficient pull to remove any slack from the string and set the slips. No load is required to maintain engagement nor is any load required to effect or maintain a seal; any excessive pull should therefore be avoided, as excessive pull reduces the allowable hydrostatic pressure capacity of the assembly. See strength charts in this manual.

NOTE: The Bowen Premier Casing Patch is relatively unaffected by ordinary corrosion, etc., so that it may be released years after initial setting. If the Casing Patch is cemented in place, however, so that the internal working parts are invaded by cement,

the patch may not release. In such cases, its removal may require milling it away or cutting the string below the patch and removing the patch with a portion of the milled over and retrieved string.

If for any reason it is desired to release and remove the Casing Patch from the tubing or casing string, proceed as follows:

To Release the Premier Type Casing Patch

1. Bump down firmly until the top of the fish bottoms against the Top Sub. This will break the freeze between the Grapple and the fish.

2. After bumping down, slowly elevate the running string while simultaneously rotating slowly to the right.

3. Continue this slow elevation and rotation until the Casing Patch is clear of the fish. This combined slow rotation and elevation is important to the proper function of the Casing Patch.

   CAUTION: Once the fish enters the Casing Patch and unseats the Packer Protector the Casing Patch may be released as previously described. No attempt should be made to re-engage the fish. Once it is disengaged, a second engagement would likely rupture the upper lip of the seal, rendering it useless. If a second engagement is necessary, the tool must be brought to the surface and the Seal Protector reseated as described in Complete Assembly. A second run may then be made with safety.

Complete Assembly

NOTE: Before actual assembly begins, the parts should be thoroughly checked to assure that they are in good condition and of the proper size for the operation. The Packer, Grapple, and Mill Control are all marked with the part number and catch size.

NOTE: Clean all parts thoroughly and lubricate them with grease or lubricating oil. If the tool is to be stored for any length of time, it is preferable to not grease the Packer or that portion of the Bowl that houses the Packer. Petroleum products are detrimental to rubber products, particularly when stored in the open atmosphere.

NOTE: All threads should be adequately greased with thread dope prior to assembly. All seals should be greased prior to assembly. Makeup torques can be found in the Makeup Torque Chart.

Actual assembly should proceed as follows:

1. Clamp the bowl in a suitable vise, horizontally.

NOTE: The assembly instructions assume assembly without extension sub. If using any number of extension subs are used, install all o-rings/back-up rings and properly grease all connections before making up in-between the top sub and bowl.

2. Packer Installation
   a.) For 7 in. tools and below
   - Install the first Non-extrusion Ring, Packer, and Seal Back-up Ring into the Bowl as shown in the assembly drawing.
   - Next, install Snap Ring to keep the first seal in place.
   - The second Seal Back up Ring, Packer, and Non extrusion Ring are then installed.

   b.) For 7-⅝ in. tools and above
   - Collapse the Packer by squeezing one side in toward the center. This will make the Packer small enough to be passed through the top end of the Bowl and be inserted into the space provided immediately above the spiraled section.
   - Each Packer requires a Non-extrusion Ring. Reference the assembly drawing for position and direction of Packer.

3. Packer Protector Installation
   - Install Shear Ring onto the Packer Protector by using Shear Pins to hold into place.
   - Assemble the Packer Protector Assembly into position by sliding it into the top end of the Bowl. The Packer Protector will slide in and keep the lip of the top Packer deflected. The bottom Packer will not be trapped under the Packer Protector. The Packer Protector is slid in until it comes to rest with its lower end immediately above the bottom Packer.
   - The Packer Protector is designed to keep the lip of the top Packer deflected until the fish pushes the Packer Protector out of the Packers. The Packer Protector prevents the lip of the Packers from being damaged during the setting operation. Once the fish is in proper catch position, the Packers will seal the fish in place.

4. Grapple Installation
   - Assemble the Grapple in the Bowl. This may be done by grasping the Grapple by its lower end and screwing it into the Bowl from the Bowl lower end. Left-hand rotation is required, as the spiraled outside diameter is a left-hand lead spiral. This design allows the tool to be released by right hand rotation, when required.
   - The lower end of the Grapple can be distinguished from the upper end by the single large slot in the lower end of the Grapple.
   - Insert the Grapple deep enough into the Bowl to allow the single large slot to line up with the similar slot in the bottom portion of the Bowl spiral.
   - The bottom of the Grapple should be just above the lowest part of the spiral in the Bowl, when in proper position.

5. Mill Control Installation.
   Insert the Mill Control into the Bowl so that the protruding control finger rests in the slot in the lower end of the Bowl spiral and simultaneously in the Grapple slot.

6. Guide Installation. Apply thread dope to the threads of the guide and assemble the Guide to the Bowl and tighten.

7. Top sub / Extension(s) Installation
   - Install the O-rings and Back-up Rings onto Top Sub grooves. Each Back-up Ring should be installed with their face of curvature lined up with the corresponding O-ring curvature. Refer to assembly drawing for details.
   - If any number of Extension subs are used (optional), install all O-rings and

Back-up Rings and properly grease all connections before making up in between the Top Sub and Bowl.
- Assemble the Top Sub to the Bowl or Extensions as applicable.

Complete Disassembly

To completely disassemble the casing patch, proceed as follows:

1. Clamp the Assembly horizontally in a suitable vise. Clamp the Bowl in the middle, taking care not to crush the Bowl.

2. Break loose and remove the Top Sub and Extension(s) when applicable.

CAUTION: If the Casing Patch was used and engaged and released from a fish, it is likely that the Packer Protector will be loose in the Top Sub and disengaged from the Shear Ring. Take care to secure this part so it does not fall and become damaged during disassembly.

3. Remove the O-rings and Back-up Rings from the Top Subs and Extension(s).

4. If Packer Protector is still installed, remove the Packer Protector along with the Shear Ring, sliding it out the upper end of the Bowl.

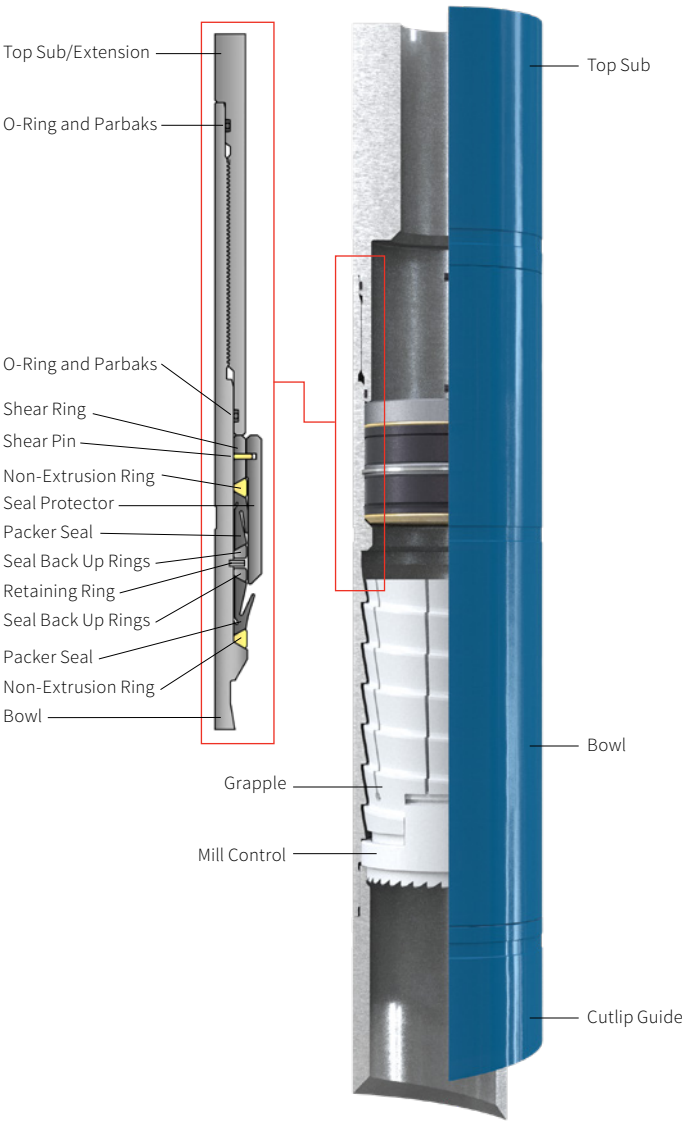
5. Remove the Packers and Non-extrusion Rings. For 7 in. tools and below also remove Seal Back-up Rings and Support Ring in reverse order from the assembly instructions. Items may be removed with a bent screwdriver or other assembly tool.

6. Break loose and remove the guide.

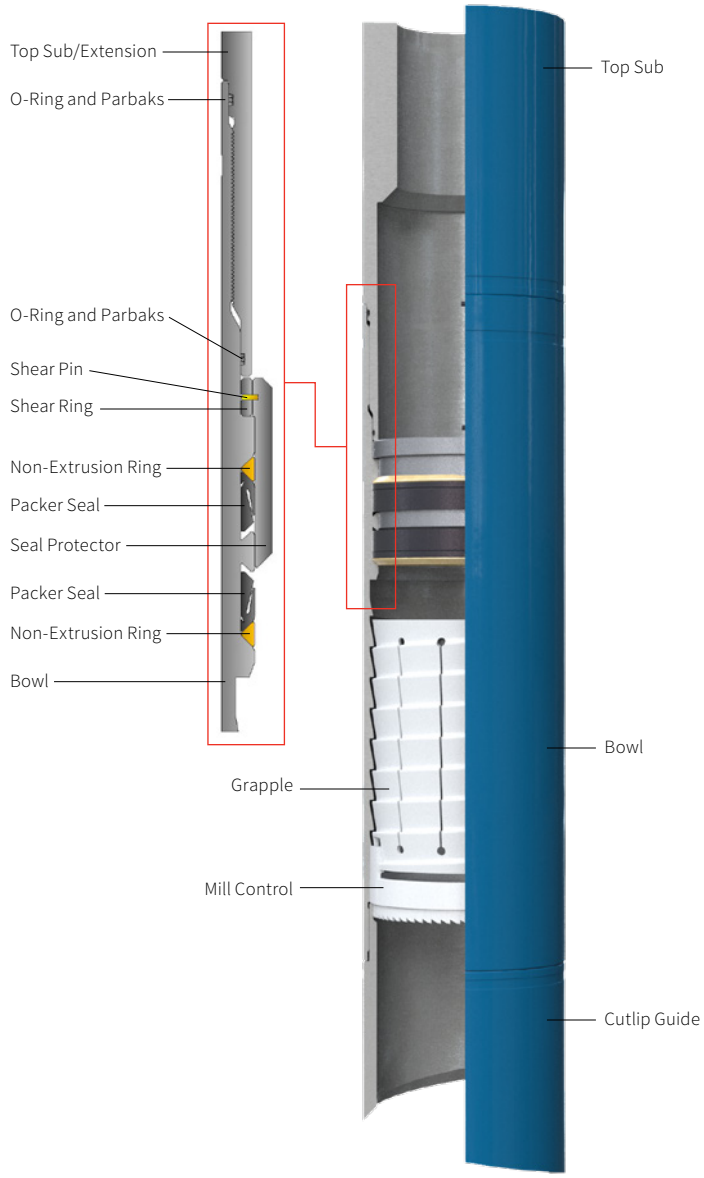
7. Lift out the mill control.

8. Remove the grapple. This may be done by unscrewing it, using right hand rotation. This completes the disassembly of the tool.

Bowen Premier Casing Patch



7 in. casing and below



7⅝ in. casing and above

Bowen Premier Casing Patch

Strength Chart

Casing Size	Standard O.D.	Assembly Part Number	Maximum Recommended Torque for Cutlip to Bowl Connection	Maximum Recommended Torque for all Other Connections
4½ in.	5 1/16 in.	508612	3,000 ft-lbs	5,400 ft-lbs
5½ in.	6 3/16 in.	508501	4,300 ft-lbs	9,700 ft-lbs
7 in.	8 7/16 in.	508603	6,400 ft-lbs	16,100 ft-lbs
9⅝ in.	11½ in.	508522	17,200 ft-lbs	50,900 ft-lbs
13⅜ in.	15¾ in.	508532	40,800 ft-lbs	111,800 ft-lbs

NOTE: These values are the maximum torque values recommended and are set at 50% of yield. These torques are not required for all jobs and lower torques will work with less wear and tear to the threads. New torque values are required if running a tool with turned down OD. It is assumed that the torque is applied to the OD evenly so as to not collapse or cause excessive damage to the OD of the tool. Torque is measured in ft-lbs.

Makeup Torque Chart

Casing Size	Standard O.D.	Pressure Rating @ Standard O.D.	Assembly Part Number	Maximum Recommended Pull Load @ 0 Pressure	Maximum Recommended Pull Load @ 10 KPSI
4½ in·	5 1/16 in.	10,000 psi	508612	274,390 lbs	115,350 lbs
5½ in.	6 3/16 in.	10,000 psi	508501	390,910 lbs	153,330 lbs
7 in.	8 7/16 in.	10,000 psi	508603	509,420 lbs	124,580 lbs
9⅝ in.	11½ in.	10,000 psi	508522	988,160 lbs	260,560 lbs
13⅜ in.	15¾ in.	10,000 psi	508532	1,640,100 lbs	235,100 lbs

NOTE: The pressure ratings and pull loads listed above are for the maximum O.D. Tools with smaller OD'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.

Specifications and Replacement Parts

Specifications for Bowen Premier Casing Patches — Basket Grapple

Nominal Size		4½ in.	5½ in.	7 in.	9⅝ in.	13⅜ in.
Standard Patch O.D.		5 1/16 in.	6 3/16 in.	8 1/16 in.	11½ in.	15¾ in.
Complete Assembly	Part No.	508612	508501	508603	508522	508532
	Weight*	138 lbs	180 lbs	270 lbs	561 lbs	1,020 lbs
	Weight**	458 lbs	598 lbs	794 lbs	1,344 lbs	2,413 lbs

Replacement Parts

Cutlip Guide	Part No.	504284/010	504295/010	504149/010	504571/500	504618/500
	Weight	19.3 lbs	23.7 lbs	48 lbs	82.8 lbs	162.9 lbs
Mill Control	Part No.	504285	504296	504161	504570	504619
	Weight	7.4 lbs	7.4 lbs	7.4 lbs	7.7 lbs	14 lbs
Bowl	Part No.	508607	508496	508596	508520	508530
	Weight	35.3 lbs	52.5 lbs	92.2 lbs	167.9 lbs	357 lbs
Basket Grapple	Part No.	504287	504298	504160	504569	504621
	Weight	7.8 lbs	10.7 lbs	16.2 lbs	34 lbs	77.6 lbs
Packer	Part No.	504288	504299	504167	504576	504622
	Weight	0.3 lbs	0.3 lbs	0.5 lbs	0.8 lbs	1.3 lbs
Non-Extrusion Ring	Part No.	504289	504300	504166	504577	504623
	Weight	0.3 lbs	0.4 lbs	0.6 lbs	1.3 lbs	2.5 lbs
Seal Backup Ring	Part No.	508609	508497	508600	—	—
	Weight	0.2 lbs	0.3 lbs	0.5 lbs	—	—
Retaining Ring	Part No.	508608	508499	508599	—	—
	Weight	0.2 lbs	0.2 lbs	0.3 lbs	—	—
Shear Ring	Part No.	504291	504302	504163	504575	504624
	Weight	1 lbs	1.2 lbs	2 lbs	2.5 lbs	4 lbs
Shear Pin	Part No.	504084/005	504084/005	504084/005	504084/005	504084/006
	Weight	N/A	N/A	N/A	N/A	N/A
Packer Protector	Part No.	508610	508498	508601	508521	508531
	Weight	2.8 lbs	3.5 lbs	6 lbs	18 lbs	43 lbs
Extension	Part No.	504292/200	504303/200	504164/300	504573/500	504626/500
	Weight	159.9 lbs	209 lbs	262 lbs	392 lbs	696 lbs
Top Sub	Part No.	508611	508495	508602	508519	508529
	Weight	62.9 lbs	78.7 lbs	112 lbs	243.8 lbs	355 lbs
O-Ring	Part No.	568251/020	568259/020	568265/020	568275/020	568280/020
	Weight	N/A	N/A	N/A	N/A	N/A
O-Ring	Part No.	568249/020	568257/020	568264/020	568274/020	—
	Weight	N/A	N/A	N/A	N/A	N/A
Parbak	Part No.	8/215	8/037	8/915	8/117	8/279
	Weight	N/A	N/A	N/A	N/A	N/A
Parbak	Part No.	8/036	8/257	8/107	8/273	8/701
	Weight	N/A	N/A	N/A	N/A	N/A

*Without Extensions
** With Two Extensions

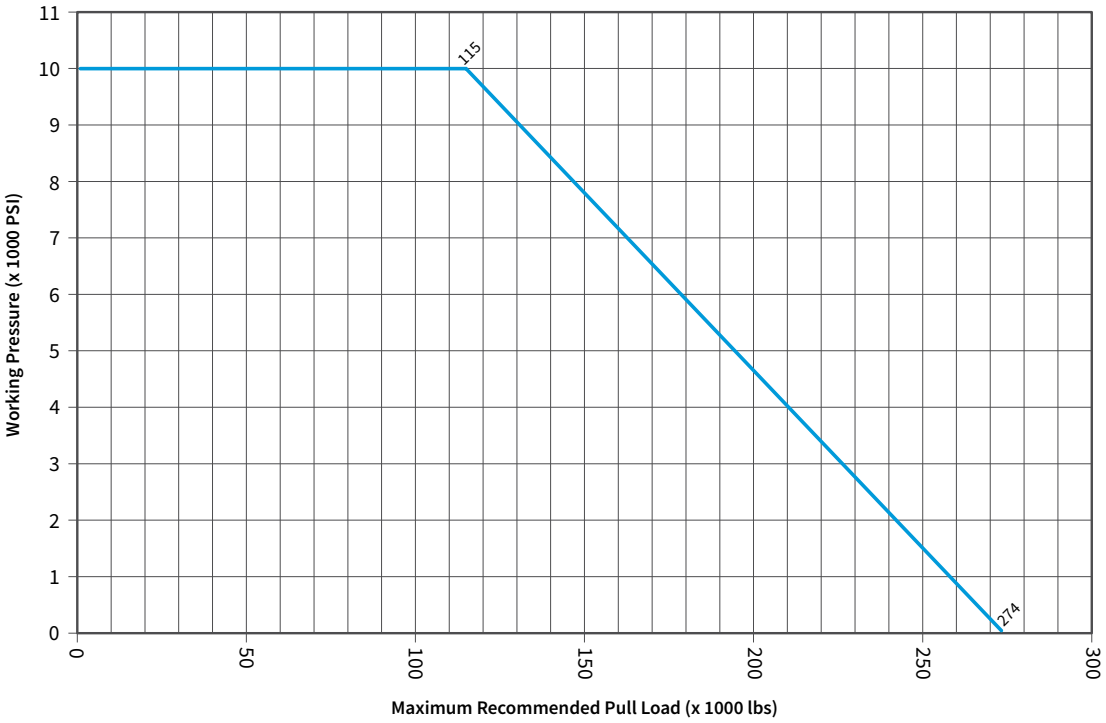
How to Order

Specify:
(1) Name and Number of Assembly or Part
(2) Casing O.D.
(3) Size and Type of Top Connection
(4) Hole Size

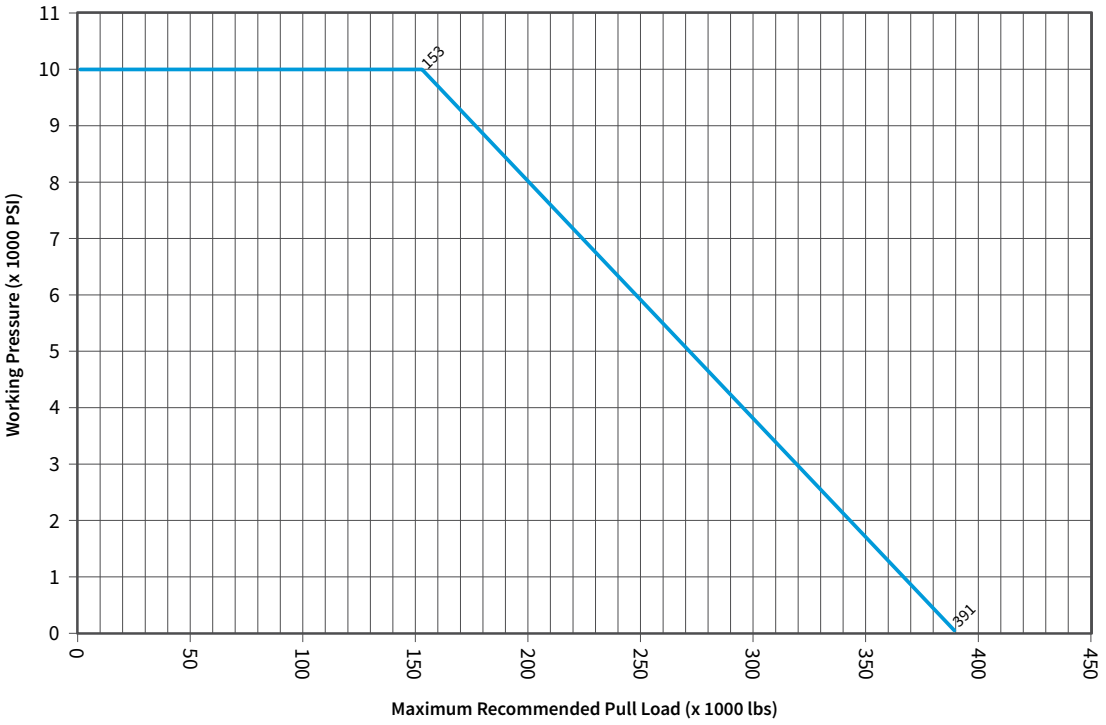
Bowen Premier Casing Patch

Strength Vs. Pressure

4½ in. Premier Casing Patch Standard Diameter 5 11/16 in. OD
Working Pressure Vs. Max. Recommended Pull Load

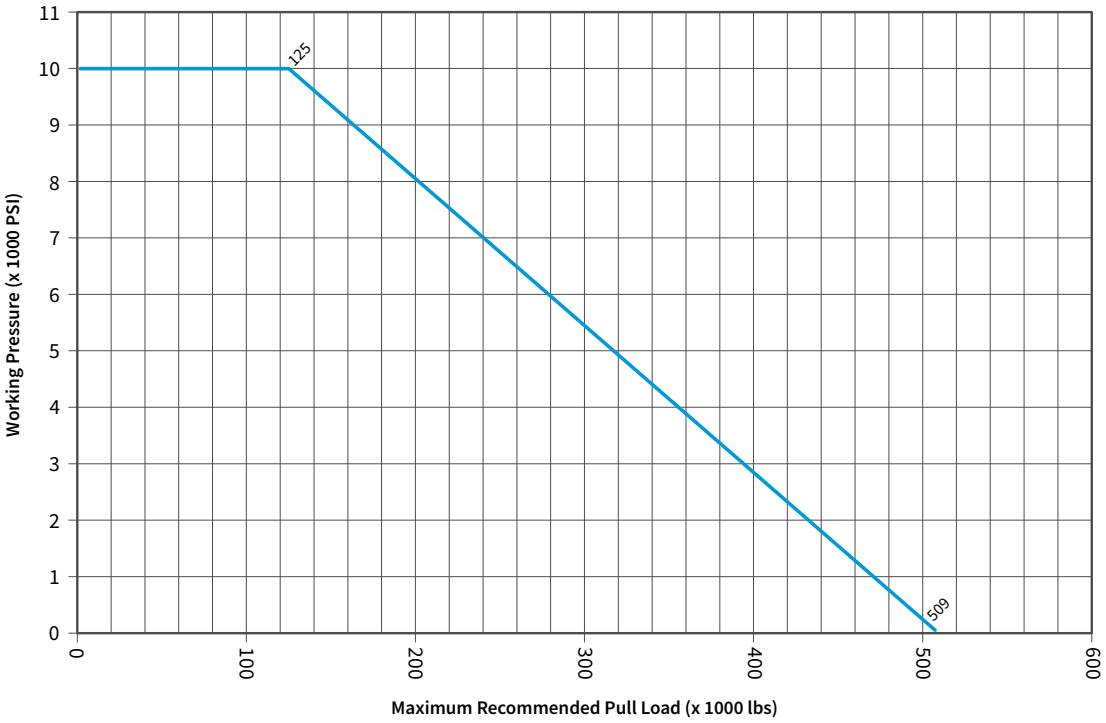


5½ in. Premier Casing Patch Standard Diameter 6 13/16 in. OD
Working Pressure Vs. Max. Recommended Pull Load

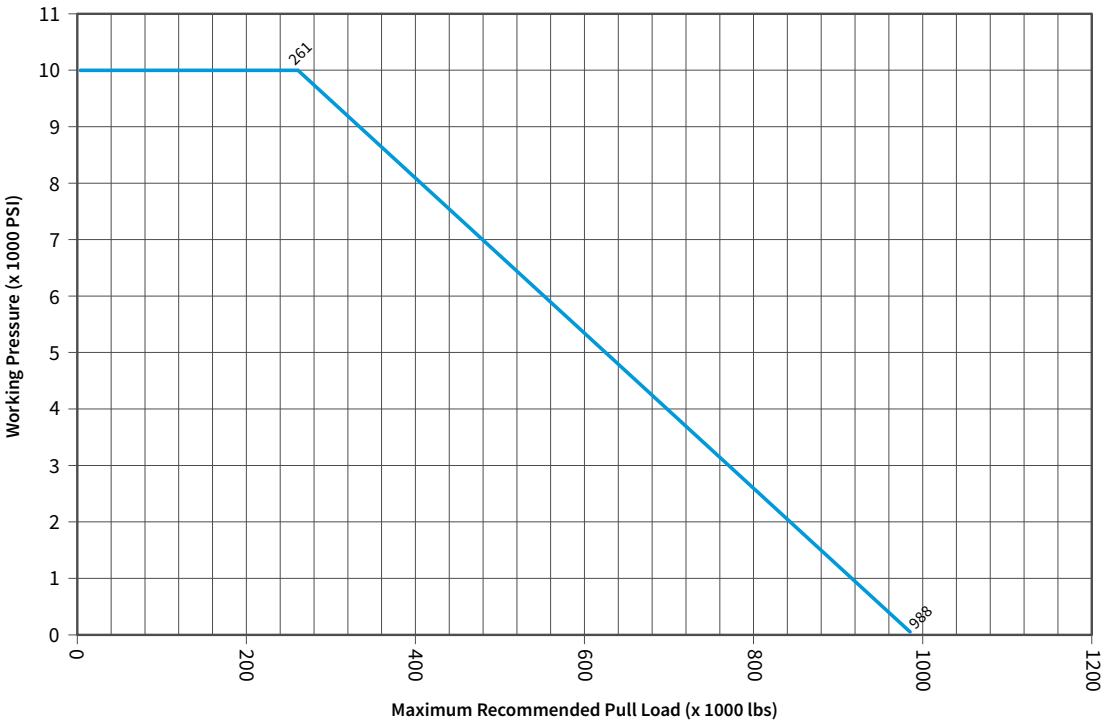


Strength Vs. Pressure

7 in. Premier Casing Patch Standard Diameter 8 7/16 in. OD
Working Pressure Vs. Max. Recommended Pull Load



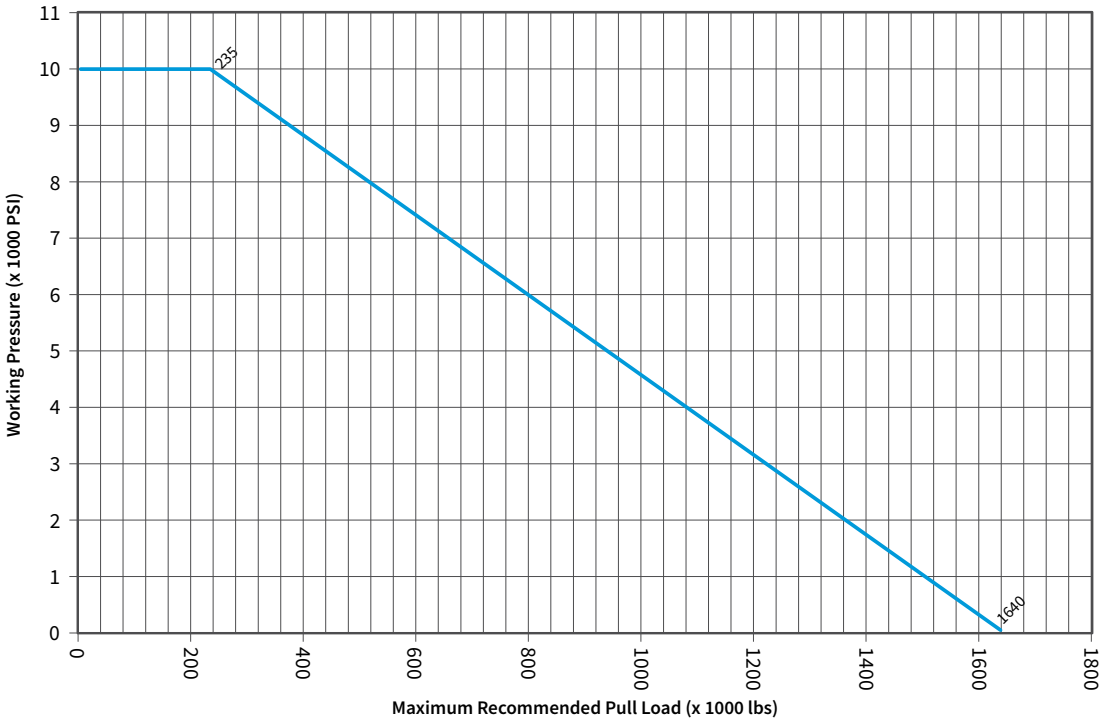
9 5/8 in. Premier Casing Patch Standard Diameter 11 1/2 in. OD
Working Pressure Vs. Max. Recommended Pull Load



Bowen Premier Casing Patch

Strength Vs. Pressure

13⅜ in. Premier Casing Patch Standard Diameter 15¾ in. OD
Working Pressure Vs. Max. Recommended Pull Load



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