Type A Packer Type Tubing & Casing Patches
OVERVIEW
The Logan Type A Packer Type Tubing Patch is used to repair a section of damaged tubing without having to remove the entire string from the hole to replace it. This external catch tool is designed to engage a previously prepared fish, pack it off, and become a permanent part of the tubing string. Positive engagement and seal-off in either direction provides a permanent, rigid connection that will remain leak-proof for years, yet is easily removable if the need arises.

USE
When an upper section of tubing must be replaced because it has become crushed or ruptured, the Logan Type A Packer Type Tubing Patch provides a permanent, dependable means to join old and new sections of the string.

The Logan Type A Packer Type Tubing Patches will not restrict the bore of the tubing and are available in popular tubing sizes from 2-3/8 through 3-1/2 inches O.D.

CONSTRUCTION
The simple design of the Logan Type A Packer Type Tubing Patch is composed of a top sub, bowl, seven type A packers, an upper pack-off adapter, a packer protector, spiral grapple, spiral grapple control, a lower pack-off adapter, and a cut-lipped guide. The simple design of the Logan Type A Packer Type Tubing Patch matches its simple operation.

The upper and lower connections of the top sub match the connections of the running string and the bowl.

The upper end of the bowl connects to the upper pack-off adapter. The upper pack-off adapter houses a space for the packer protector to slide into during operation. The bowl has a spiraled section that contains the spiral grapple, and space for the spiral grapple control. The lower connection of the bowl accepts the lower pack-off adapter.

The guide connects to the bottom end of the lower pack-off adapter. The guide assists smooth entry of the fish into the catch area of the spiral grapple. It also maintains the position of the inner working parts (spiral grapple, spiral grapple control, and packer protector). The outside diameter of the guide is usually flush with the tubing patch.

The spiral grapple engages the fish with wickers on its inside diameter. Spirals on its outside diameter mate with the spirals in the bowl. Wickers and spirals are made with left-hand threads to permit release with right-hand rotation.

The upper and lower pack-off adapters are used to pack-off well pressure in both directions. The upper pack-off adapter, using three type A packers facing downhole, allows the casing patch to pack-off well pressure from below and uses a packer protector. The packer protector is located in the upper pack-off adapter because it cannot pass through the bowl and grapple assembly and maintain the pack-off.

The lower pack-off adapter, using three type A packers facing uphole, is designed to pack-off well pressure from above and does not require a packer protector.

The type A packers are a one-piece, double-lipped sleeves molded from synthetic rubber. This compound offers the best properties for general oil well service — it withstands most fluids, resists gas invasion, and resists abrasion.

The spiral grapple control finger serves as a special key to the spiral grapple and the bowl to prevent the spiral grapple from rotating. The grapple may freely move up and down to sufficiently engage or release the fish. Torque required to release the assembly may be transmitted from the running string through the top sub, bowl, spiral grapple control, and on to the spiral grapple.

Logan Type A Packer Type Tubing Patches are constructed of the highest quality alloy steels to provide many years of service in harsh well environments. The spiral grapple is manufactured of high quality hardened alloy steel that is able to bite into the tubing to provide a secure attachment to the existing tubing in the well.

OPERATION
Prepare the upper end of the fish prior to running the Tubing Patch. This includes washing over and removing burrs and splits from the upper end of the fish, as well as sizing the fish.

Attach the properly assembled tool to the running string.

CAUTION: Tongs should be used on the top sub only. Pressure exerted on the bowl, lower pack-off adapter, and upper pack-off adapter, may result in damage or distortion.

Lower the tool into the hole until the depth of the fish is reached. Rotate the running string slowly to the right as it is slowly lowered. Combined slow rotation and lowering is important to the proper operation of the tool and should be continued until the fish has entered the tool.

(Continued on page 4)
The outside of the packer seals against the inside of the bowl. The packer protector protects the upper lip from damage until the fish enters and pushes the packer protector up and out of the way. Watch the rig weight indicator to determine when the packer protector has reached the lower end of the top sub. Complete engagement can be assured by allowing the Tubing Patch to support 10,000 to 15,000 lbs. of weight.

**CAUTION:** After the fish has entered the tubing patch and the packer protector has been unseated, the tubing patch may be released as previously instructed. However, no attempt to re-engage the fish should be made once it has disengaged.

A second engagement would most likely rupture the upper lip of the seal and render it useless. If a second engagement is necessary, bring the tool to the surface and reset the packer protector as described in Assembly, steps 8–10 on page 5. A second run may then be safely attempted.

Pick up the running string to remove the weight from the Tubing Patch while letting the torque slacken from the running string.

**CAUTION:** Exercise care to avoid backlash.

Mud pressure applied at this point will check the effectiveness of the packers.

**CAUTION:** Carefully increase pressure gradually to allow the packers to seat smoothly. Do not use the mud pumps to unnecessarily shock load the tubing patch.

If it becomes necessary to remove the tubing patch, bump down to release the grapple and slowly raise the string while rotating to the right. Continue rotation until the patch has cleared the tubing and lift from hole.

Ordinary corrosion does not affect the Tubing Patch and it may be released years after its initial setting. However, if the Tubing Patch has been cemented in place and cement has invaded the internal working parts, the patch may not release. In such cases, the patch can be milled away or removed by cutting the string below the patch.

**ASSEMBLY**

The Logan Type A Packer Type Tubing Patch can easily be assembled at the rig site where it will be used.

Check all parts to ensure that they are in good working condition before beginning assembly. Make sure the packers, spiral grapple, and spiral grapple control are the proper size for the operation. Thoroughly clean and lubricate parts. If the tool will be stored for a long period, do not lubricate the packers or the section of the body that houses the packers. Petroleum products will shorten the life-span of the synthetic rubber seals.

Proceed with assembly as follows:

1. Clamp the bowl horizontally into a suitable vise.

   **CAUTION:** Excessive force can distort or crack the bowl and pack-off adapters. Use only enough gripping action in the vise to break the connections. Avoid making heavy tool marks on the bowl or pack-off adapters.

2. Install three type A packers (facing uphole) into the lower pack-off adapter. Using the packer installation tool (Logan Part No. J1789), collapse the packer and insert it into the lower pack-off adapter. Make sure the packer is properly seated. Repeat until all three type A packers are properly installed.

3. Apply thread dope to the guide threads and screw the guide onto the bottom of the lower pack-off adapter.

4. Install one type A packer (facing uphole) in the bowl slot. Collapse the packer to help it pass through the top end of the bowl by pressing one side toward the center. Insert it into the space immediately above the spiral section. Make sure the packer is properly seated in the bowl.

5. Assemble the spiral grapple in the bowl by grasping the lower end of the grapple and screwing it with left-hand (counter-clockwise) rotation into the lower end of the bowl. Continue to screw the spiral grapple into the bowl until it is at least 1/4 inch past the counter bore provided for the spiral grapple control. Align the tang slot in the bowl and spiral grapple.

6. Insert the spiral grapple control into the bowl. The protruding control finger should rest in the slots in the lower end of the bowl spiral and the spiral grapple.

If it becomes necessary to remove the tubing patch, bump down to release the grapple and slowly raise the string while rotating to the right. Continue rotation until the patch has cleared the tubing and lift from hole.

Ordinary corrosion does not affect the Tubing Patch and it may be released years after its initial setting. However, if the Tubing Patch has been cemented in place and cement has invaded the internal working parts, the patch may not release. In such cases, the patch can be milled away or removed by cutting the string below the patch.
7. Install three type A packers (facing downhole) into the upper pack-off adapter.

Using the packer installation tool (Logan Part No. 1789), collapse the packer and insert it into the upper pack-off adapter. Make sure the packer is properly seated. Repeat until all three type A packers are properly installed.

**NOTE:** The 2-3/8 and 3-1/2 Tubing Patches have a pack-off adapter extension. The 2-7/8 Tubing Patch does not. Skip to step 11 for the 2-7/8 Tubing Patch.

8. Screw the upper pack-off adapter onto the bowl.

9. Screw the upper pack-off adapter extension onto the upper pack-off adapter.

10. Install the packer protector by sliding it into the pack-off adapter extension small end first. Be sure to slide the packer protector into the upper pack-off adapter until it is just below the lip on the bottom (lowest) type A packer.

**NOTE:** The 2-3/8 and 3-1/2 Tubing Patches have a pack-off adapter extension. The 2-7/8 Tubing Patch does not. Skip to step 11 for the 2-7/8 Tubing Patch.

11. For the 2-7/8 Tubing Patch, install the packer protector by sliding it into the top end of the upper pack-off adapter. The lower end of the packer protector will rest immediately below the lower lip of the lowest downhole facing packer.

The packer protector is designed to deflect the upper seal lip of the packer and prevent it from being damaged during the seating operation. The fish will push the packer protector out of the packer as it enters. With the fish in proper catch position, the packer will seal the fish into place.

**NOTE:** The 2-3/8 and 3-1/2 Tubing Patches have a pack-off adapter extension. The 2-7/8 Tubing Patch does not. Skip to step 13 for the 2-7/8 Tubing Patch.

12. Apply thread dope to the top sub threads and pack-off adapter extension. Screw the top sub onto the top of the pack-off adapter extension with right-hand (clockwise) rotation and tighten.

13. For the 2-7/8 Tubing Patch, apply thread dope to the top sub threads and upper pack-off adapter. Screw the top sub onto the top of the upper pack-off adapter with right-hand (clockwise) rotation and tighten.

14. Tighten all connections to the recommended torque before running the Type A Packer Type Tubing Patch in the hole.

Assembly is now complete and the tool is ready for service.

**MAINTENANCE**

Maintenance is simple, but important. After each use, the tool should be disassembled, inspected, and repaired as required.

Before reassembling, inspect all parts, especially the grapple. Check the wickers for damage and wear to ensure safe operation. Lubricate parts as they are assembled. Grease or paint the exterior to prevent corrosion.

**Disassembly**

Proceed with disassembly as follows:

1. Clamp the tool horizontally into a suitable vise — clamping immediately below the top sub connection just below the threaded joint.

**CAUTION:** Excessive force can distort or crack the bowl and pack-off adapters. Use only enough gripping action in the vise to break the connections. Avoid making heavy tool marks on the bowl or pack-off adapters.

2. Loosen and remove the top sub.

**NOTE:** The 2-3/8 and 3-1/2 Tubing Patches have a pack-off adapter extension. The 2-7/8 Tubing Patch does not. Skip to step 5 below for the 2-7/8 Tubing Patch.

3. Remove the pack-off adapter extension.

4. Remove the packer protector from the pack-off adapter extension.

5. Remove the upper pack-off adapter from the bowl.

6. Remove the packer protector by sliding it out of the upper end of the upper pack-off adapter.

7. Remove the three type A packers.

8. Loosen and remove the guide from the lower pack-off adapter.

9. Remove lower pack-off adapter from the bowl.

10. Remove the three type A packers from the lower pack-off adapter.

11. Lift out the spiral grapple control from the bowl.

12. Remove the spiral grapple from the bowl by unscrewing it with right-hand (clockwise) rotation.

13. Remove the type A packer from the bowl. Slip a bent screwdriver (Logan Part No. J1073) under one end of the packer until an edge can be grasped. Collapse the packer to help it pass through the top end of the bowl by pressing one side toward the center.

Disassembly is now complete.
## LOGAN TYPE A PACKER TYPE TUBING PATCHES

<table>
<thead>
<tr>
<th>O.D. TUBING</th>
<th>2-3/8</th>
<th>2-7/8</th>
<th>3-1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>O.D. PATCH</td>
<td>3-1/8</td>
<td>3-5/8</td>
<td>4-11/16</td>
</tr>
<tr>
<td>COMPLETE ASSEMBLY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>503-002</td>
<td>503-003</td>
<td>503-004</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>TOP SUB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>Z1002</td>
<td>Z1003</td>
<td>Z10035</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>...</td>
<td>36295</td>
<td>...</td>
</tr>
<tr>
<td>TOP SUB SEAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>568-143</td>
<td>568-233</td>
<td>568241</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>568143</td>
<td>568233</td>
<td>568241</td>
</tr>
<tr>
<td>BOWL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>Z2002</td>
<td>Z2003</td>
<td>Z20035</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>...</td>
<td>36827</td>
<td>...</td>
</tr>
<tr>
<td>BOWL SEAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>568-146</td>
<td>568-235</td>
<td>568-241</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>568146</td>
<td>568235</td>
<td>568241</td>
</tr>
<tr>
<td>No. Req’d</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PACKER PROTECTOR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>Z3002</td>
<td>Z3003</td>
<td>Z30035</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>...</td>
<td>36296</td>
<td>...</td>
</tr>
<tr>
<td>PACKER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>A4001</td>
<td>A4005</td>
<td>A4019</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>9309</td>
<td>8550</td>
<td>...</td>
</tr>
<tr>
<td>No. Req’d</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>GRAPPLE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>A5001</td>
<td>A5005</td>
<td>A5019</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>9307</td>
<td>9272</td>
<td>6662</td>
</tr>
<tr>
<td>GRAPPLE CONTROL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>A6001</td>
<td>A6005</td>
<td>A6019</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>9308</td>
<td>9273</td>
<td>6674</td>
</tr>
<tr>
<td>GUIDE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>A3001</td>
<td>A3005</td>
<td>A3019</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>9312</td>
<td>9275</td>
<td>6667</td>
</tr>
<tr>
<td>UPPER PACKOFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADAPTER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>Z9002</td>
<td>Z9003</td>
<td>Z90035</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>...</td>
<td>36297</td>
<td>...</td>
</tr>
<tr>
<td>LOWER PACKOFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADAPTER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>Z10002</td>
<td>Z10003</td>
<td>Z100035</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>...</td>
<td>36298</td>
<td>...</td>
</tr>
<tr>
<td>PACKOFF ADAPTER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXTENSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logan Part No.</td>
<td>Z11002</td>
<td>...</td>
<td>Z110035</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

## ACCESSORIES

<table>
<thead>
<tr>
<th>PACKER INSTALLATION TOOL</th>
<th>Logan Part No.</th>
<th>J 1789</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCREWDRIVER INSTALLATION TOOL</td>
<td>Logan Part No.</td>
<td>J 1073</td>
</tr>
</tbody>
</table>

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Note: H₂S casing patches available upon request.

When ordering, please specify:
1. Complete assembly or part number
2. Size and type of connection

### LEGAL NOTICE

All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products.

“Bowen” is a registered trademark of National Oilwell Varco.
LOGAN ASSEMBLY NO. 503-002-001, 3-1/8" OD TUBING PATCH FOR 2-3/8" TUBING

Collapse Pressure:
17,105 psi @ 0 lbs
12,836 psi @ 40,000 lbs

Tensile @ Yield:
Due to Bowl = 178,342 lbs
Due to Extension = 80,499 lbs

LOGAN ASSEMBLY NO. 503-003-001, 3-5/8" OD TUBING PATCH FOR 2-7/8" TUBING

Collapse Pressure:
14,889 psi @ 0 lbs
11,862 psi @ 48,000 lbs

Tensile @ Yield:
Due to Bowl = 177,052 lbs
Due to Extension = 102,688 lbs
LOGAN ASSEMBLY NO. 503-004-001, 4-11/16" OD TUBING PATCH FOR 3-1/2" TUBING

Collapse Pressure:
14,336 psi @ 0 lbs
9,276 psi @ 100,000 lbs

Tensile @ Yield:
Due to Bowl = 310,700 lbs
Due to Extension = 310,700 lbs
OVERVIEW
This Logan Type A Packer Type Casing Patch is used to repair a section of damaged casing without having to remove the entire string from the hole to replace it. This external catch tool is designed to engage a previously prepared fish, pack it off, and become a permanent part of the casing string. Positive engagement and seal-off in either direction provides a permanent, rigid connection that will remain leak-proof for years, yet is easily removable if the need arises.

USE
When an upper section of casing must be replaced because it has become crushed or ruptured, the Logan Type A Packer Type Casing Patch provides a permanent, dependable means to join old and new sections of the string.

The Logan Type A Packer Type Casing Patches will not restrict the bore of the casing and are available in popular casing sizes from 4-1/2 to 13-5/8 inches O.D.

CONSTRUCTION
The simple design of the Logan Type A Packer Type Casing Patch matches its simple operation. It is composed of a top sub, bowl, type A packer, packer protector, basket grapple, a mill control packer, and a cut-lipped guide.

The upper connection of the top sub match the connections of the running string and the bowl. An o-ring seal is located below the lowest thread of the top sub.

The upper end of the bowl connects to the top sub. The bowl houses a space for the packer protector to slide into during operation, a spiraled section that contains the basket grapple, and space for the mill control packer. The lower connection accepts the guide.

The guide assists smooth entry of the fish into the catch area of the grapple. It also maintains the position of the inner working parts (basket grapple, mill control packer, and packer protector). The outside diameter of the guide is usually flush with the casing patch.

The grapple engages the fish with wickers on its inside diameter. Spirals on its outside diameter mate with the spirals in the bowl. Wickers and spirals are made with left-hand threads to permit release with right-hand rotation. The grapple is also constructed with a series of longitudinal slots to allow diametric flex during operation.

The type A packer is a one-piece, double-lipped sleeve molded from synthetic rubber. This compound offers the best properties for general oil well service — it withstands most fluids, resists gas invasion, and resists abrasion.

The outside of the packer seals against the inside of the bowl. The packer protector protects the upper lip from damage until the fish enters and pushes the packer protector up and out of the way.

The mill control packer mills off burrs from the outside of the fish as it enters the tool. The control finger serves as a special key to the grapple and the bowl to prevent the grapple from rotating. The grapple may move up and down to sufficiently engage or release the fish. Torque required to release the assembly may be transmitted from the running string through the top sub, bowl, mill control packer, and on to the grapple.

Logan Type A Packer Type Casing Patches are constructed of the highest quality alloy steels to provide many years of service in harsh well environments. The grapple is manufactured of high quality hardened alloy steel that is able to bite into the casing to provide a secure attachment to the existing casing in the well.

OPERATION
Prepare the upper end of the fish prior to running the Casing Patch. This includes washing over, and removing burrs and splits from the upper end of the fish, as well as sizing the fish.

Attach the properly assembled tool to the running string.

CAUTION: Tongs should be used on the top sub only. Pressure exerted on the bowl may result in damage or distortion.

Lower the tool into the hole until the depth of the fish is reached. Rotate the running string slowly to the right as it is slowly lowered. Combined slow rotation and lowering is important to the proper operation of the tool and should be continued until the fish has entered the tool. Watch the rig weight indicator to determine when the packer protector has reached the lower end of the top sub. Complete engagement can be assured by allowing the Casing Patch to support 15,000 to 20,000 pounds of weight.

CAUTION: After the fish has entered the casing patch and the packer protector has been unseated, the casing patch may be released as previously instructed. However, no attempt to re-engage the fish should be made once it has disengaged.

A second engagement would most likely rupture the upper lip of the seal and render it useless. If a second engagement is necessary, bring the tool to the surface and reset the packer protector as described in Assembly, step 3 on page 11. A second run may then be safely attempted.

Pick up the running string to remove the weight from the Casing Patch while letting the torque slacken from the running string.

CAUTION: Exercise care to avoid backlash.
TYPE A PACKER TYPE CASING PATCHES

Mud pressure applied at this point will check the effectiveness of the packer.

**CAUTION:** Carefully increase pressure gradually to allow the packer to seat smoothly. Do not use the mud pumps to unnecessarily shock load the casing patch.

Pick up the running string. Apply sufficient pull to remove slack from the string and set the slips. Load is not required to maintain engagement or seal. Avoid excessive pull as it reduces the allowable hydrostatic pressure capacity of the assembly. *(Refer to Strength Data graphs on pages 14 – 20.)*

No attempt should be made to re-engage the tool after the fish has entered the casing patch, the packer protector has dislodged, and the tool has disengaged from the fish. The upper lip of the packer may rupture if the packer protector is not positioned properly. Bring the tool to the surface to reset the packer protector before attempting to re-engage the tool.

**Releasing the Casing Patch**

If it becomes necessary to remove the casing patch, bump down firmly to release the grapple’s hold on the fish. Slowly raise the string while rotating to the right. Continue rotation until the patch has cleared the fish and lift from hole. Combined rotation and elevation is important.

Ordinary corrosion does not affect the Casing Patch and it may be released years after its initial setting. However, if the Casing Patch has been cemented in place and cement has invaded the internal working parts, the patch may not release. In such cases, the patch can be milled away or removed from the string by cutting below the patch.
ASSEMBLY

The Logan Type A Packer Type Casing Patch can easily be assembled at the rig site where it will be used.

Check all parts to ensure that they are in good working condition before beginning assembly. Make sure the packer, basket grapple, and mill control packer are the proper size for the operation.

Thoroughly clean and lubricate parts. If the tool will be stored for a long period, do not lubricate the packer or the section of the body that houses the packer. Petroleum products will shorten the life-span of the synthetic rubber seals.

Proceed with assembly as follows:

1. Clamp the bowl horizontally into a suitable vise.

   **CAUTION:** Tongs should be used on the top sub only. Use only enough gripping action in the vise to break the connection. Avoid making heavy tool marks on the bowl. *Excessive force can distort or crack the bowl.*

2. Install the type A packer in the bowl slot. Collapse the packer to help it pass through the top end of the bowl by pressing one side toward the center. Insert it into the space immediately above the spiral section. Make sure the packer is properly seated in the slot.

3. Slide the packer protector into the top end of the bowl and into the upper portion of the packer. The lower end of the packer protector will rest immediately above the lower lip of the packer.

   The packer protector is designed to deflect the upper seal lip of the packer and prevent it from being damaged during the seating operation. The fish will push the packer protector out of the packer as it enters. With the fish in proper catch position, the packer will seal the fish into place.

4. Screw the grapple into the bowl by grasping the lower end of the grapple and turning it with left-hand (counter-clockwise) rotation onto the lower end of the bowl.

   A large single slot in the lower end of the grapple distinguishes it from the upper end. Insert the upper end of the grapple deeply into the bowl so the large slot lines up with the similar slot in the bottom spiral portion of the bowl. When properly positioned, the grapple bottom will be just above the lowest part of the spiral in the bowl.

5. Insert the mill control packer into the bowl. The protruding control finger should align and rest in the slots in the lower end of the bowl spiral and the basket grapple.

6. Apply thread dope to the guide threads. Screw the guide into the bottom of the assembly. Tighten the guide to the bowl.

7. Place the o-ring seal in the groove in the lower end of the top sub.

8. Apply thread dope to the top sub threads and the o-ring seal. Screw the top sub onto the top of the bowl to complete the assembly. Tighten the top sub to the bowl.

9. Tighten all connections to the recommended torque before running the Type A Packer Type Casing Patch in the hole.

Assembly is now complete and the tool is ready for service.

MAINTENANCE

Maintenance is simple, but important.

After each use, the tool should be disassembled, inspected, and repaired as required.

Before reassembling, inspect all parts, especially the grapple. Lubricate parts as they are assembled. Check the wick-ers for damage and wear to ensure safe operation. Grease or paint the exterior to prevent corrosion.

Disassembly

Proceed with disassembly as follows:

1. Clamp the tool horizontally into a suitable vise — clamping immediately below the top connection and just below the threaded joint.

   **CAUTION:** Excessive force can distort or crack the bowl. Use only enough gripping action in the vise to break the connection. Avoid making heavy tool marks on the bowl.

2. Loosen and remove the top sub.

3. Remove the o-ring seal.

4. Loosen and remove the guide.

5. Lift out the mill control packer.

6. Remove the basket grapple by unscrewing it with right-hand (clockwise) rotation.

7. Remove the packer protector by sliding it out of the upper end of the bowl.

8. Slip a bent screwdriver (Logan Part No. J1073) under one end of the packer until an edge can be grasped. Collapse the packer by pressing one side toward the center. Remove the packer.

Disassembly is now complete.
LOGAN TYPE A PACKER TYPE CASING PATCHES

<table>
<thead>
<tr>
<th>O.D. CASING</th>
<th>4-1/2 Csg</th>
<th>5</th>
<th>5-1/4</th>
<th>5-3/4</th>
<th>6</th>
<th>6-5/8</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>O.D. PATCH</td>
<td>5-1/2</td>
<td>6</td>
<td>6-1/4</td>
<td>6-13/16</td>
<td>7</td>
<td>7-1/16</td>
<td>7-5/16</td>
</tr>
<tr>
<td>COMPLETE ASSEMBLY</td>
<td>Logan Part No.</td>
<td>503-005</td>
<td>503-006</td>
<td>503-007</td>
<td>503-008</td>
<td>503-009</td>
<td>503-010</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11215</td>
<td>11220</td>
<td>11225</td>
<td>...</td>
<td>11230</td>
<td>11235</td>
<td>11240</td>
</tr>
<tr>
<td>TOP SUB</td>
<td>Logan Part No.</td>
<td>Z1005</td>
<td>Z1006</td>
<td>Z1007</td>
<td>Z1008</td>
<td>Z1009</td>
<td>Z1010</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>5186</td>
<td>4868</td>
<td>4888</td>
<td>...</td>
<td>4966</td>
<td>4986</td>
<td>5026</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>568247</td>
<td>568251</td>
<td>568255</td>
<td>568257</td>
<td>568259</td>
<td>568261</td>
<td>568262</td>
</tr>
<tr>
<td>No. Req’d</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11217</td>
<td>11220</td>
<td>11227</td>
<td>...</td>
<td>11232</td>
<td>11237</td>
<td>11242</td>
</tr>
<tr>
<td>PACKER PROTECTOR</td>
<td>Logan Part No.</td>
<td>Z3005</td>
<td>Z3006</td>
<td>Z3007</td>
<td>Z3008</td>
<td>Z3009</td>
<td>Z3010</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>5188</td>
<td>4868</td>
<td>4888</td>
<td>...</td>
<td>4966</td>
<td>4986</td>
<td>5028</td>
</tr>
<tr>
<td>BASKET GRAPPLE</td>
<td>Logan Part No.</td>
<td>Z5005</td>
<td>Z5006</td>
<td>Z5007</td>
<td>Z5008</td>
<td>Z5009</td>
<td>Z5010</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11218</td>
<td>11223</td>
<td>11228</td>
<td>...</td>
<td>11233</td>
<td>11238</td>
<td>11243</td>
</tr>
<tr>
<td>GRAPPLE CONTROL</td>
<td>Logan Part No.</td>
<td>Z6005</td>
<td>Z6006</td>
<td>Z6007</td>
<td>Z6008</td>
<td>Z6009</td>
<td>Z6010</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11219</td>
<td>11222</td>
<td>11227</td>
<td>...</td>
<td>11234</td>
<td>11239</td>
<td>11244</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>O.D. PATCH</td>
<td>9</td>
<td>8-1/2</td>
<td>7-3/4</td>
<td>8-1/4</td>
<td>8-5/8</td>
<td>9-1/4</td>
<td>10-1/8</td>
<td>10-3/4</td>
</tr>
<tr>
<td>COMPLETE ASSEMBLY</td>
<td>Logan Part No.</td>
<td>503-012</td>
<td>503-013</td>
<td>503-014</td>
<td>503-015</td>
<td>503-016</td>
<td>503-017</td>
<td>503-018</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11245</td>
<td>11250</td>
<td>11255</td>
<td>11260</td>
<td>...</td>
<td>...</td>
<td>5043</td>
<td>...</td>
</tr>
<tr>
<td>TOP SUB</td>
<td>Logan Part No.</td>
<td>Z1012</td>
<td>Z1013</td>
<td>Z1014</td>
<td>Z1015</td>
<td>Z1016</td>
<td>Z1017</td>
<td>Z1018</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>5046</td>
<td>5151</td>
<td>5206</td>
<td>5162</td>
<td>...</td>
<td>...</td>
<td>40399</td>
<td>...</td>
</tr>
<tr>
<td>TOP SUB SEAL</td>
<td>Logan Part No.</td>
<td>568-265</td>
<td>568-269</td>
<td>568-273</td>
<td>568-274</td>
<td>...</td>
<td>568-456</td>
<td>...</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>568265</td>
<td>568269</td>
<td>568273</td>
<td>568274</td>
<td>...</td>
<td>...</td>
<td>568456</td>
<td>...</td>
</tr>
<tr>
<td>No. Req’d</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>...</td>
<td>...</td>
<td>1</td>
<td>...</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11247</td>
<td>11251</td>
<td>11256</td>
<td>11261</td>
<td>...</td>
<td>...</td>
<td>41045</td>
<td>...</td>
</tr>
<tr>
<td>PACKER PROTECTOR</td>
<td>Logan Part No.</td>
<td>Z3012</td>
<td>Z3013</td>
<td>Z3014</td>
<td>Z3015</td>
<td>Z3016</td>
<td>Z3017</td>
<td>Z3018</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>5048</td>
<td>5153</td>
<td>5200</td>
<td>5160</td>
<td>...</td>
<td>...</td>
<td>41045</td>
<td>...</td>
</tr>
<tr>
<td>PACKER</td>
<td>Logan Part No.</td>
<td>Z4012</td>
<td>Z4013</td>
<td>Z4014</td>
<td>Z4015</td>
<td>Z4016</td>
<td>Z4017</td>
<td>Z4018</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11246</td>
<td>11251</td>
<td>11256</td>
<td>11261</td>
<td>...</td>
<td>...</td>
<td>41045</td>
<td>...</td>
</tr>
<tr>
<td>BASKET GRAPPLE</td>
<td>Logan Part No.</td>
<td>Z5012</td>
<td>Z5013</td>
<td>Z5014</td>
<td>Z5015</td>
<td>Z5016</td>
<td>Z5017</td>
<td>Z5018</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11248</td>
<td>11253</td>
<td>11258</td>
<td>11263</td>
<td>39142</td>
<td>41037</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>GRAPPLE CONTROL</td>
<td>Logan Part No.</td>
<td>Z6012</td>
<td>Z6013</td>
<td>Z6014</td>
<td>Z6015</td>
<td>Z6016</td>
<td>Z6017</td>
<td>Z6018</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11471</td>
<td>11473</td>
<td>11475</td>
<td>11477</td>
<td>39141</td>
<td>41039</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>GUIDE</td>
<td>Logan Part No.</td>
<td>Z7012</td>
<td>Z7013</td>
<td>Z7014</td>
<td>Z7015</td>
<td>Z7016</td>
<td>Z7017</td>
<td>Z7018</td>
</tr>
<tr>
<td>Bowen No.</td>
<td>11249</td>
<td>...</td>
<td>11259</td>
<td>11264</td>
<td>39144</td>
<td>41040</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

ACCESSORIES

PACKER INSTALLATION TOOL
Logan Part No. J1789

SCREWDRIVER INSTALLATION TOOL
Logan Part No. J1073

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Note:
(1) H₂S casing patches available upon request.
(2) Type C Tungsten Carbide Mill Guides available upon request.

LEGAL NOTICE

All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products. "Bowen" is a registered trademark of National Oilwell Varco.
**CALCULATED TENSILE AND BURST STRENGTHS**

<table>
<thead>
<tr>
<th>CASING O.D.</th>
<th>4-1/2</th>
<th>5</th>
<th>5-1/2</th>
<th>5-3/4</th>
<th>6</th>
<th>6-5/8</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATCH O.D.</td>
<td>5-3/4</td>
<td>6-1/4</td>
<td>6-13/16</td>
<td>7-1/16</td>
<td>7-7/16</td>
<td>7-15/16</td>
<td>8-3/8</td>
</tr>
<tr>
<td>COMPLETE ASSEMBLY</td>
<td>Logan Part No.</td>
<td>Bowen No.</td>
<td>503-005</td>
<td>11215</td>
<td>503-006</td>
<td>11220</td>
<td>503-007</td>
</tr>
<tr>
<td>MAX. INTERNAL BURST (FLUID) PRESSURE (PSI) *</td>
<td>10,600</td>
<td>9,800</td>
<td>10,300</td>
<td>8,496</td>
<td>9,067</td>
<td>7,558</td>
<td>8,052</td>
</tr>
<tr>
<td>MAX. PRESSURE ACROSS PACKERS (PSI) *</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>TENSILE STRENGTH @ YIELD W/ ZERO PSI (LBS) *</td>
<td>398,600</td>
<td>436,700</td>
<td>481,900</td>
<td>378,700</td>
<td>451,300</td>
<td>378,600</td>
<td>415,300</td>
</tr>
<tr>
<td>MAX. PULL LOAD W/ ZERO PSI (LBS) *</td>
<td>299,000</td>
<td>327,500</td>
<td>361,400</td>
<td>284,000</td>
<td>338,500</td>
<td>284,000</td>
<td>311,500</td>
</tr>
</tbody>
</table>

**LEGAL NOTICE**

All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products.

“Bowen” is a registered trademark of National Oilwell Varco.
LOGAN ASSEMBLY NO. 503-005 (BOWEN 11215)
5-3/4" OD STANDARD CASING PATCH FOR 4-1/2" CASING — 5,000 PSI MAX WP 140K YIELD MAT'L

LOGAN ASSEMBLY NO. 503-006 (BOWEN 11220)
6-1/4" OD STANDARD CASING PATCH FOR 5" CASING — 5,000 PSI MAX WP 140K YIELD MAT'L

Collapse Pressure:
10,303 psi @ 0 tensile
7,049 psi @ 247k tensile

Tensile Strength @ Yield:
Tensile Strength w/ 0 Internal Pressure = 408,975 lbs
Tensile Strength w/ 5k Internal Pressure = 329,453 lbs

LOGAN ASSEMBLY NO. 503-006 (BOWEN 11220)
6-1/4" OD STANDARD CASING PATCH FOR 5" CASING — 5,000 PSI MAX WP 140K YIELD MAT'L

Collapse Pressure:
8,799 psi @ 0 tensile
6,592 psi @ 229k tensile

Tensile Strength @ Yield:
Tensile Strength w/ 0 Internal Pressure = 408,975 lbs
Tensile Strength w/ 5k Internal Pressure = 310,800 lbs

LEGAL NOTICE
All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products. “Bowen” is a registered trademark of National Oilwell Varco.
LOGAN ASSEMBLY NO. 503-007 (BOWEN 11225)
6-13/16" OD STANDARD CASING PATCH FOR 5-1/2" CASING — 5,000 PSI MAX WP 140K YIELD MAT'L

WORKING PRESSURE (PSI)

TENSILE LOAD (LBS)

Collapse Pressure: Tensile Strength @ Yield:
10,303 psi @ 0 tensile Tensile Strength w/ 0 Internal Pressure = 408,975 lbs
7,049 psi @ 242k tensile Tensile Strength w/ 5k Internal Pressure = 329,453 lbs

LOGAN ASSEMBLY NO. 503-008 (BOWEN 22430)
7-1/16" OD STANDARD CASING PATCH FOR 5-3/4" CASING — 5,000 PSI MAX WP 140K YIELD MAT'L

WORKING PRESSURE (PSI)

TENSILE LOAD (LBS)

Collapse Pressure: Tensile Strength @ Yield:
N/A psi @ 0 tensile Tensile Strength w/ 0 Internal Pressure = N/A lbs
N/A psi @ 154k tensile Tensile Strength w/ 5k Internal Pressure = N/A lbs

LEGAL NOTICE
All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products.

“Bowen” is a registered trademark of National Oilwell Varco.
LOGAN ASSEMBLY NO. 503-009 (BOWEN 11230)
7-5/16" OD STANDARD CASING PATCH FOR 6-5/8" CASING — 5,000 PSI MAX WP 140K YIELD MAT’L

Collapse Pressure:
N/A psi @ 0 tensile
N/A psi @ 208k tensile

Tensile Strength @ Yield:
Tensile Strength w/ 0 Internal Pressure = N/A lbs
Tensile Strength w/ 5k Internal Pressure = N/A lbs

LOGAN ASSEMBLY NO. 503-010 (BOWEN 11235)
7-15/16" OD STANDARD CASING PATCH FOR 6" CASING — 5,000 PSI MAX WP 140K YIELD MAT’L

Collapse Pressure:
N/A psi @ 0 tensile
N/A psi @ 111k tensile

Tensile Strength @ Yield:
Tensile Strength w/ 0 Internal Pressure = N/A lbs
Tensile Strength w/ 5k Internal Pressure = N/A lbs

LEGAL NOTICE
All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products.

“Bowen” is a registered trademark of National Oilwell Varco.
LOGAN ASSEMBLY NO. 503-011 (BOWEN 11240)
8-3/8" OD STANDARD CASING PATCH FOR 7" CASING — 5,000 PSI MAX WP 110K YIELD MAT'L

Collapse Pressure:
- 7,111 psi @ 0 tensile
- 6,320 psi @ 119k tensile

Tensile Strength @ Yield:
- Tensile Strength w/ 0 Internal Pressure = 408,073 lbs
- Tensile Strength w/ 5k Internal Pressure = 254,135 lbs

LOGAN ASSEMBLY NO. 503-012 (BOWEN 11245)
9" OD STANDARD CASING PATCH FOR 7-5/8" CASING — 5,000 PSI MAX WP 110K YIELD MAT'L

Collapse Pressure:
- 7,271 psi @ 0 tensile
- 6,795 psi @ 82,900 tensile

Tensile Strength @ Yield:
- Tensile Strength w/ 0 Internal Pressure = 424,350 lbs
- Tensile Strength w/ 5k Internal Pressure = 196,032 lbs

LEGAL NOTICE
All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products.

"Bowen" is a registered trademark of National Oilwell Varco.
LOGAN ASSEMBLY NO. 503-013 (BOWEN 11250)
10-1/16" OD STANDARD CASING PATCH FOR 8-5/8" CASING — 5,000 PSI MAX WP 110K YIELD MAT’L

Collapse Pressure: 7,221 psi @ 0 tensile
Tensile Strength @ Yield: Tensile Strength w/ 0 Internal Pressure = 538,125 lbs
6,845 psi @ 102,300 tensile Tensile Strength w/ 5k Internal Pressure = 245,993 lbs

LOGAN ASSEMBLY NO. 503-014 (BOWEN 11255)
11-1/8" OD STANDARD CASING PATCH FOR 9-5/8" CASING — 5,000 PSI MAX WP 110K YIELD MAT’L

Collapse Pressure: 6,555 psi @ 0 tensile
Tensile Strength @ Yield: Tensile Strength w/ 0 Internal Pressure = 558,620 lbs
6,408 psi @ 62,500 tensile Tensile Strength w/ 5k Internal Pressure = 194,821 lbs

LEGAL NOTICE
All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products.

“Bowen” is a registered trademark of National Oilwell Varco.
LOGAN ASSEMBLY NO. 503-015 (BOWEN 11260)
12-5/16" OD STANDARD CASING PATCH FOR 10-3/4" CASING — 5,000 PSI MAX WP 110K YIELD MAT'L

Collapse Pressure:
6,996 psi @ 0 tensile
6,466 psi @ 14,355 tensile

Tensile Load (LBS)
Tensile Strength @ Yield:
Tensile Strength w/ 0 Internal Pressure = 624,255 lbs
Tensile Strength w/ 5k Internal Pressure = 170,412 lbs

LOGAN ASSEMBLY NO. 503-016 (BOWEN 39136)
13-3/8" OD STANDARD CASING PATCH FOR 11-3/4" CASING — 3,500 PSI MAX WP 110K YIELD MAT'L

Collapse Pressure:
N/A psi @ 0 tensile
N/A psi @ 121,000 tensile

Tensile Load (LBS)
Tensile Strength @ Yield:
Tensile Strength w/ 0 Internal Pressure = N/A lbs
Tensile Strength w/ 5k Internal Pressure = N/A lbs

LEGAL NOTICE
All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products.

“Bowen” is a registered trademark of National Oilwell Varco.
LOGAN ASSEMBLY NO. 503-017 (BOWEN 41042)
15-1/8" OD STANDARD CASING PATCH FOR 13-3/8" CASING — 3,500 PSI MAX WP 110K YIELD MAT'L

Collapse Pressure:
N/A psi @ 0 tensile
N/A psi @ 23,300 tensile

Tensile Strength @ Yield:
Tensile Strength w/ 0 Internal Pressure = N/A lbs
Tensile Strength w/ 5k Internal Pressure = N/A lbs

LOGAN ASSEMBLY NO. 503-018 (BOWEN 80669)
16" OD STANDARD CASING PATCH FOR 13-5/8" CASING — 3,000 PSI MAX WP 110K YIELD MAT'L

Collapse Pressure:
N/A psi @ 0 tensile
N/A psi @ 839,500 tensile

Tensile Strength @ Yield:
Tensile Strength w/ 0 Internal Pressure = N/A lbs
Tensile Strength w/ 5k Internal Pressure = N/A lbs

LEGAL NOTICE
All references to Bowen® part numbers in this literature are used to identify interchangeable tools and parts. Reference to such tools and parts does not imply that Logan Oil Tools is a licensee or is in any way affiliated with National Oilwell Varco. Logan Oil Tools does not sell, or offer to sell, National Oilwell Varco (Bowen) products.

“Bowen” is a registered trademark of National Oilwell Varco.
U.S. SALES OFFICES

▲ **California**
3155 Pegasus Drive
Bakersfield, CA 93308-6800
661.387.1449 | Fax 661.387.1624

▲ **Louisiana**
103 Bluffwood Drive
Broussard, LA 70518-3310
337.839.2331 | Fax 337.839.2334
118 Common Court
Houma, LA 70360-7982
985.868.7333 | Fax 985.868.7007

▲ **North Dakota**
4925 Highway 85 South
Williston, ND 58801
701.572.0565 | Fax 701.572.0644

▲ **Oklahoma**
424 South Eagle Lane
Oklahoma City, OK 73128-4225
405.782.0625 | Fax 405.782.0760

▲ **Pennsylvania**
244 Grey Fox Drive, Suite 1
Montoursville, PA 17754-9572
570.546.1066 | Fax 570.546.0388

▲ **Texas**
1519 South Flournoy
Alice, TX 78332
361.396.0139 | Fax 361.396.0112
11610 Cudden Road
Houston, TX 77066-3008
832.602.2134 | Fax 832.286.4117
11006 Lucerne Street
Houston, Texas 77016-1920
281.219.6613 | Fax 281.219.6638
1305 Energy Drive
Kilgore, TX 75662-5539
903.984.6700 | Fax 903.984.6755
601 McDonald
Odessa, TX 79761-6106
432.580.7414 | Fax 432.580.7656

▲ **Utah**
1369 South 1100 East
Vernal, UT 84087-8600
435.781.2856 | Fax 435.781.2858

INTERNATIONAL STOCKING DISTRIBUTORS

▲ **Canada**
Logan Oil Tools
9755 45th Avenue NW
Edmonton, Alberta T6E 5V8
780.433.9957 | Fax 780.468.1979

▲ **Colombia**
Logan Oil Tools Sucursal Colombia
Calle 113 No. 7-21
Edificio Teleport Business Park
Torre A, Oficina 915
Bogota, Colombia
(57.1).629.1995 | Fax (57.1).612.8357

▲ **Singapore**
Logan Oil Tools Pte Ltd
54 Loyang Way
Singapore 508747
65.654.2842 | Fax 65.654.2047

▲ **United Arab Emirates**
Logan Oil Tools
Jebel Ali Free Zone (South)
P.O. Box 23724
Dubai, UAE
971.4.813.8000 | Fax 971.4.813.8001

▲ **Woodhouse International**
P.O. Box 23724
Dubai, UAE
971.4.347.2300 | Fax 971.4.347.4642

▲ **United Kingdom**
Logan Oil Tools, U.K. Ltd.
Unit C1 Kintore Business Park
Kintore, Inverurie
Aberdeenshire AB51 OYQ
Scotland
+44.1467.631190