

## INSTALLATION OF MILL E-Z™, MAGNUM SERIES™, OR RAPID MILL™ COMPOSITE PLUG

Prior to running a **Mill E-Z™**, **MAGNUM Series™**, or **RAPID MILL™** Composite Plug on wireline, it is recommended that a junk basket and gauge ring larger than the OD of the plug, and less than the drift of the casing, should be ran. A depth of greater than the setting depth of the bridge plug is desired. If any obstruction is encountered in the casing, additional runs should be made to recover obstruction or an alternate casing cleanup process considered.

Ensure the wireline setting tool has the appropriate amount of oil according to the temperature at the Plug's setting depth. It is preferable to use a Slow Set Power Charge in the setting tool. Make sure all connections on the setting tool are tight.

Hand tighten the **Mill E-Z™**, **MAGNUM Series™**, or **RAPID MILL Composite Plug** setting sleeve onto the setting tool.

For the **Mill E-Z™** or **MAGNUM Series™**, screw the adapter mandrel into the Mill E-Z™ Composite Plug and use a small pipe wrench when tightening the adapter mandrel into the aluminum mandrel of the plug. **\*NOTE: Do not tighten across shear groove.** Slightly more than hand tightened is sufficient.

For the **Mill E-Z™** or **MAGNUM Series™** 2-3/8", 2-7/8", or 3-1/2" apply thread tape to upper thread of adapter mandrel. This will prevent the adapter mandrel from falling into the well bore while coming out of the hole.

For the **Mill E-Z™** or **MAGNUM Series™** 4", 4-1/2", 5-1/2", 7", 7-5/8" or 9-5/8" apply torsion spring to upper thread of adapter mandrel. This will prevent the adapter mandrel from falling into the well bore while coming out of the hole.

For the **RAPID MILL™ Composite Plug**, apply included **LOCTITE®** to the bottom threads on the adapter mandrel. Then, thread adapter mandrel in to the brass shear sub in the bottom of the **RAPID MILL Composite Plug**. Visually inspect the bottom of the **RAPID MILL Composite Plug** to insure the adapter mandrel is bottomed out in the brass shear sub.

Guide the bridge plug and adapter mandrel into the setting sleeve and into the setting tool. Rotate clockwise until the mandrel threads are fully engaged. It is not necessary to use a pipe wrench when tightening the adapter mandrel and plug into the setting tool. Firmly hand tightened is sufficient.

Rotate the setting sleeve toward the plug until it has come into contact with the top of the bridge plug. Make sure there are no gaps between the top of the plug and the bottom of the setting sleeve. Also insure there is sufficient thread engagement between the setting sleeve and the setting tool. No more than 2 threads of the setting tool should be visible. Then rotate the jam nut down to the setting sleeve and tighten the jam nut to the setting sleeve with a pipe wrench. Tighten the set screw on the setting sleeve in to the setting tool. Now, the tool is ready to run in the hole. **NOTE: If the air gap cannot be eliminated, the setting tool should be disassembled and inspected.**

## RUNNING THE MILL E-Z™, MAGNUM SERIES™, OR RAPID MILL™ COMPOSITE PLUG IN A VERTICAL WELL

Once the length of the CCL to the top of the plug has been determined, pick up the setting tool and **Mill E-Z™, MAGNUM Series™, or RAPID MILL™** Plug assembly with wire line. **NOTE: For best results, DO NOT support the weight of the tool string by the bridge plug.** Support the weight by handling the setting tool itself. Precaution should be used once the assembly is suspended as to not let the plug swing into valves or pressure lines thus causing damage or injury to the plug and employees.

**NOTE: Hitting fluid level or a sand bridge at a rapid speed will prematurely set the bridge plug!** We recommend a line speed of slower than 100' per minute when hitting the fluid level. A line speed of approx. 200' per minute is recommended of a wellbore full of fluid. Certain conditions may warrant a less rapid descent or an increased rate of speed.

Once the setting depth is achieved, set the plug and note any weight loss of the assembly on the wire line trucks weight indicator. In some cases there may not be a positive indication that the plug is set. Pick up the setting assembly approx. 20' to 30'. Gently lower the assembly onto the plug noting any weight loss or CCL movement.

**\*Ample cement or sand may be used on the top of the plug to help absorb the percussion generated by the perforating guns.**

**\*Do not perforate within 75' of the plug after it is set.**

Disassemble the setting equipment from the setting tool.

**CAUTION: When testing the plug slowly fill hole with fluid so as not to hydraulically hammer the plug down the hole with the column of fluid. Recommended pump rate is ¼ to ½ bbl/min for the first 30 minutes, then slowly increase pump pressure to fill wellbore, to ensure a sufficient fluid cushion.**

## RUNNING THE MILL E-Z™, MAGNUM SERIES™, OR RAPID MILL™ COMPOSITE PLUG IN A HORIZONTAL WELL

Once the length of the tool string has been determined, pick up the perforating guns, CCL, setting tool, and **MILL E-Z™, MAGNUM Series™, or Rapid Mill™ Composite Plug** assembly with wireline. For best results, do not support the weight of the setting tool, CCL and plug by the plug. Support the weight by handling the setting tool itself. Precaution should be used once the assembly is suspended as to not let the plug swing into valves or pressure lines thus causing damage or injury to the plug and employees.

When running the plug in the well, a line speed of 200' per minute or less is desirable in the vertical section of the well. Certain conditions may warrant a slower or faster descent.

1. While paying close attention to line tension, slow down line speed to approx. 150 ft per minute when approaching the 30 degree kickoff point.
2. Start pumping fluid at a barrel a minute after tie in.
3. Increase pump pressure and rate to 2.0 BPM.
4. As deviation increases, you will slowly increase pump pressure and fluid rate to 4 BPM, to 6 BPM, then 8 BPM, etc. Make sure to space out pressure and fluid rate increases as not to hit BHA with sudden force. Do not exceed 15 BPM or 5,000 psi of pump pressure at any time during the pump down process. Never allow line speed to exceed 175 ft./min.
5. Approximately 200 ft from desired set depth, slow line speed to under 100ft / min to allow line to become fully taut.
6. Once desired depth has been reached, shut down pumps.
7. Fire setting tool and allow sufficient time to pass before picking up wireline.

To disassemble the setting equipment from the setting tool, hold back-ups on the setting tool, rotate the setting sleeve loose, and remove the adapter mandrel from the inside of the setting sleeve.

## RECOMMENDED COILED TUBING DRILLING/MILLING PROCEDURES FOR THE MILL E-Z™, MAGNUM SERIES™ AND RAPID MILL™ COMPOSITE PLUGS

The following Bottom Hole Assembly is recommended to remove the **MILL E-Z™, MAGNUM Series™, or the RAPID MILL™ Composite plug.**

- 6 Bladed Magnum Mill (95-98% of Drift Diameter)
- Hi Torque Mud Motor
- Hydraulic Disconnect
- Dual Back Pressure Valve
- Coiled Tubing Connector
- Enough Coil Tubing to reach bottom of well

The following is a recommended drilling/milling procedure for removing and eliminating one or multiple **MILL E-Z™, MAGNUM Series™, or RAPID MILL™** Composite Plugs from the well bore. Check to ensure all equipment is compatible and all running procedures are well within manufactures recommended guidelines.

1. Move in Coiled Tubing Equipment (It is recommended to have a Double Pump Truck spot the equipment.
2. Have a safety briefing to cover the rig up procedures
3. Rig up Coiled Tubing Equipment and enough lubricator to cover the bottom hole assembly, motor and the Magnum Mill.
4. Function test the BOP's with the coiled tubing crew.
5. Run Coil Tubing through the coiled tubing stack until pipe comes out of the lubricator.
6. Mic the coiled tubing to ensure the correct O.D. and no egg-shaping of the coiled tubing.
7. Straighten the coil and cut the bottom of the coil off. File the flared end of the coil to bevel the end of it. (This helps from cutting o-rings and damaging slips when making up the coil).
8. Make up the coil connector with a pull tester plate. Pull test the coil connector to manufactures recommended pull weight. NOTE: When pull testing the coil connector measure off the hydraulics, then compare it to the weight indicator to adjust the weight indicator if it is off.
9. Run the coil out of the lubricator and check the make on the coil. Retighten the coil connector and make up the set screws.
10. Load and circulate the coiled tubing with fluid until the fluid comes out clean. NOTE: Recommended to run in line filter with a screen.
11. Make up the dual back pressure valve, hydraulic release, and hi-torque motor with the Magnum Mill. Test the motor at surface by drilling a test hole.
12. Rig up on the well and test.
13. Run in the hole, pumping through the motor at the minimum rate checking pick up and run in weights.
14. Approximately 1,000' before the perfs bring the pump rate up on the motor to the manufacturer's recommended rate (approx. 400 to 600 rpm).
15. Pump a dyed gel sweep.
16. Approximately 100' before the perfs depth establish the flow rate in the return tank. The optimum rate is 1 bbl in / 1 bbl out. NOTE: The bbl for bbl rate will also depend on the pressures below the plug from the pressures from the open perfs. This will determine on how much back pressure to hold. If there is a possibility of drilling through higher a differential (after running the coil through the perfs, while staying off the plug) it would be necessary to clean out the well bore before drilling out the plug, this will eliminate the possibilities of sticking the coil.
17. After the rates and wellbore differentials are stable, run in the hole no more than 5.0 ft/min. watching the weight indicator. When you see about 200lbs to 500lbs of weight loss, let the coiled unit creep in the hole about 0.1 to 0.3 ft/min. watching for any pump pressure increases or continuation of weight loss.

## RECOMMENDED COILED TUBING DRILLING/MILLING PROCEDURES FOR THE MILL E-Z™, MAGNUM SERIES™ AND RAPID MILL™ COMPOSITE PLUGS (CONT'D)

(No more than 1,000 lbs.). Once you see the pump pressure increase 100 lbs. to 300 lbs. differential, set the brake to gain weight back to normal pump pressure. Release brake continuing the milling operations until string weight and pump pressure is regained (if you are taking a gas kick, it is recommended to pick up above the perfs and circulate the well until the pump rate and wellhead pressure is maintained and the weight on the coil is ok).

18. After the plug has been milled through, pump 10 bbl gel sweep with dye pumping 5 bbl gel and 5 bbl KCL water, then 5 bbl gel and continue to the desired depth.
19. For multiple plugs, continue drill-out procedures from step 14. *NOTE: Each stage will have different bottom hole pressures which will determine on what needs to be held on the backside.* Pumping gel sweeps before and after drilling the plug and circulating well clean before each stage will help from sticking the coiled tubing.

*NOTE: It is preferred to take a less aggressive approach and mill or grind the plug into small pieces to minimize debris size for particle management.*

## RECOMMENDED TUBING DRILLING PROCEDURES FOR THE MILL E-Z™ COMPOSITE PLUGS

The following Bottom Hole Assembly is recommended to remove the **Mill E-Z™, MAGNUM Series™, or RAPID MILL™ Composite Plug.**

- 6 Bladed Magnum Mill (95-98% of Drift Diameter)
- Bit Sub or Pump-Off Bit Sub
- Power Swivel
- Enough Tubing to reach bottom of well

The following is a recommended drilling procedure for removing and eliminating Mill E-Z™ Composite Bridge Plugs from the well bore. Check to ensure all equipment is compatible and all running procedures are well within manufactures recommended guidelines.

1. Rig up bit sub and bit/mill to end of tubing.
2. Run assembly to bottom and tag cement or plug lightly.
3. Pick up 4-6 feet off **Mill E-Z™, MAGNUM Series™, RAPID MILL™ Composite Plug** or cement.
4. Keep the pressure and pump rate approximately 120-150 ft/min annular flow, Approx 2 bbls/min.
5. Start turning power swivel and bring tubing 100-125 rpm.
6. Slowly lower bit assembly into hole until pump pressure increases or set down weight decreases.
7. Begin feathering the plug for the first few minutes to mill up the upper portion of the mandrel.
8. While drilling note any increase in pressure from the well due to the plug equalizing.
9. Pick up drill assembly to circulate the debris off the top of the plug.
10. Proceed to feathering the plug for the next few minutes while setting approx. 2,000 lbs of tubing weight on the plug.
11. After drilling out the upper portion of the plug, pick up the tubing string 5' to allow lower zone to equalize and circulate debris.
12. Continue drilling operation until string weight and pump pressure is regained.
13. Chase the bottom of the plug to the bottom of the well or the top of the next plug.
14. Shut down the pumps.
15. For multiple plugs return to step 7 before shutting down the pumps.
16. The bottom section of the first plug will increase your drill time ever so slightly.

*NOTE: It is preferred to drill or grind the plug into small pieces to minimize debris size for particle management.*