BS Composite Cement Retainer
BS Composite Bridge Plug

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DRILLING INSTRUCTIONS FOR BS COMPOSITE TOOLS

BS COMPOSITE TOOLS:

- BS Composite Cement Retainers
- BS Composite Bridge Plugs

DRILLING RECOMMENDATIONS:

As drilling rates are subject to many different variables, the following recommendations may not always provide the most efficient drilling rates; however, these recommendations are offered as a general guideline while conditions and equipment are unknown.

- Bit Type- short or medium toothed hard-formation and PDC.
- Rotary Speed-75 to 120 rpm
- Pump Rate- ½ to 4 bpm
- Weight- Begin with 5,000 to 7,000 lbs. for the first 4inches of the plug / retainer. Then increase the weight to 2,000 to 3,000 lbs. per inch of bit diameter for the retainer of the tool.
- Drill Collars- Add as necessary to provide weight and stability.
- Normal Circulation- Use a junk basket above the bit nozzles when circulating the fluid down the work-string.
- Reverse Circulation-Remove bit nozzles. Check that the inside diameter of the drill-string is sufficient to allow cutting through.

  Operators may choose to vary weight, speed, and pump rate to increase the drilling efficiency. Although BS composite materials naturally reduce the potential for bit tracking, these techniques may also be employed to reduce bit tracking should it occur.

PROCEDURES:

<u>Drilling with Normal Circulation</u>

While adhering to the drilling recommendations listed previously, the operator should continue with the following guidelines.

1. Tag the tool to be drilled up with the bit.
2. Begin circulating fluid at ½ to 6 bpm to wash away any debris. To maximize drilling efficiency, avoid flow rates greater than 6 bpm.
3. While rotating the bit, set back on the tool with 5,000 to 7,000 lbs. and then increase to 2,000 to 3,000 lbs. per inch of bit diameter.
4. Pick up 6 inches or more.
5. Begin rotating the bit 75 to 120 rpm.
6. Reduce weight as material is removed.

<u>Drilling the Reverse Circulation</u>

While adhering to the drilling recommendations listed previously, the operator should continue with the following guidelines.

1. Tag the tool to be drilled up with the bit.
2. Begin circulating fluid at ½ to 6 bpm to wash away any debris. To maximize drilling efficiency, avoid flow rates greater than 6 bpm.
3. While rotating the bit, set back on the tool and slack off 2,000 to 3,000 lb. per inch of bit diameter.
4. Pick up 6 inches or more.
5. Begin rotating the bit 75 to 120 rpm.
6. Reduce the weight as material is removed.
7. Observe the cuttings to see if the returns contain rubber from the packing element after drilling approximately 6 to 8 inches.
8. Watch the reverse pump pressure gauge to avoid plugging the bit with the rubber. In case the bit gets plugged, pick up the work-

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string approximately 2 ft. and circulate for about 2 minutes.

9. Reduce the rotation to 10 to 20 rpm and set weight back on the tool. Repeat as needed until drill passes the packing element.
10. Resume the previous drilling procedure.

Mechanical Setting Tool and Retainer Assembly, All Sizes

1. Slide Drag Pad Assembly up until stopped by control nut.
2. Rotate Drag Pad Assembly right against Stop.
3. Slide Upper Slips over the Stinger Sub Body. Loosen clamp enough to install Slip Segments over the ridge on the Control Latch.
4. Align the slip Segments over the ridge on the control latch, then tighten clamp fully.
5. Lubricate non-wickered portion of the slips with JT-6 high temp grease.
6. Check to see that the drag pad unit is still back against the stop.
7. Check to see that the drag pad unit is still up against the control nut. Rotate setting sleeve down over slip until sleeve bottoms out. Back off ½ turn.
8. Tighten set screws. Lubricate stinger seal and threads on control latch, then slide retainer over stinger.
9. Drive retainer over stinger seal until the retainer bottoms out on the control latch.
10. Rotate retainer to make up onto control latch. (Left hand thread).
11. Install rotational lock screws in the holes in control latch and secure.

Running In and Setting Mechanically

During running in, care must be exercised to prevent right hand rotation from being transmitted to the retainer.

NOTE: As a precaution, one left hand rotation should be made every five to ten stands.

1. After reaching setting depth, pick up two feet to provide slack which will allow the control nut to rotate freely.
2. Rotate ten turns to the right (at the tool) to thread the control nut upward and free the control sleeve.
3. Lower the tool back to setting depth. This action, combined with the restraining force of the drag pads, pulls the setting sleeve from over the upper slip assembly. The radial springs, attached inside the upper slip segment force the slips out against the casing. At the same time the retaining sleeve is pulled off the dog, un-locking the stinger sub body from the control latch.
4. To complete the setting of the retainer or bridge plug pull at least the minimum tension shown on the chart below. Slack off an equivalent amount of the tool and reapply tension holding for at least one minute. The tubing may be tested at this point by pulling a slight tension to close the sleeve valve. There may be time when junk in the hole may prevent the full release of the dog from the stinger sub body and thereby prevent actuation of the valve. Should this occur, as indicated by testing the tubing, alternately pick up and slack off the tubing. This action will cam the dog out of the groove in the stinger sub body and allows full control movement.

   The sleeve valve is operated with 2" of movement at the retainer, up to close and down to open.
5. To release the setting tool from the retainer, pick up to close the valve. Holding a slight tension, apply 300 to 400 ft.-lb. (Size 45-47 one shear screw) or 600 to 800 ft-lb (Size 49 up to 2 shear screws) of right-hand torque to the tubing or drill pipe. This will shear the rotational lock screws and allow the control latch, with ten additional right turns (at the tool), to be unscrewed from the retainer.
6. After releasing from the retainer rotationally, a set down weight of 3,000 to 5,000 lbs. will re-latch the setting tool and an 8,000 to 10,000 lbs. tension will unlatch. The stinger will remain sealed in cement retainer seal bore as long as the snap out force is not exceeded.

NOTE: The cement retainer body is made of a readily drillable material. Each time the setting tool is snapped out of the retainer, the snap in and snap out values will decrease slightly until they reach approximately 2,500 lbs. (snap in) and 5,000 to 6,000 lbs. (snap out). This pattern will occur with each retainer run. Control of the valve is maintained by setting down to open and by picking up to close. The control distance in the retainer is 2".

Tension Required With 90 Hard Elements

Tool Size	Minimum Tension (lbs.)	Maximum Tension (lbs.)
4 ½" - 5"	20,000	30,000
5 ½"	30,000	40,000
6 5/8" – 20"	40,000	50,000

Tension Required With 80 Hard Elements

Tool Size	Minimum Tension (lbs.)	Maximum Tension (lbs.)
4 ½" – 7"	20,000	30,000
8 5/8" – 20"	30,000	45,000

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Should it be advantageous to have a lower torque requirement to release the setting tool from the retainer, the brass screw in the following table may be substituted for the standard annealed steel type rotational lock screws. The brass screws require approximately 200 ft/lbs. of torque to shear per screw.

Tool Size	Brass Screw
4 ½"	5/16" – 18" x ½"
5 ½"	5/16" – 18" x 5/8"
7"	5/16" – 18" x ¾"
7 5/8"	5/16" – 18" x 1"
8 5/8"	5/16" – 18" x ¾"
9 5/8"	5/16" – 18" x 1" – 1/4"

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ASSEMBLY OF WIRELINE SET CEMENT RETAINER/BRIDGE PLUG AND WIRELINE ADAPTER KIT TO PRESSURE SETTING.

ASSEMBLY

1. Remove torque shear screw from top of retainer bridge plug body.
2. Thread shear stud into lower end of tension mandrel. (Tight)

NOTE: On size 43 thru 45 cement retainer the long end of the shear stud to be threaded into the tension mandrel.

3. Thread shear stud and tension mandrel sub assembly into the retainer or bridge plug by inserting this sub assembly downward through the top of the tool. The shear stud should make up 15/16" for size 43 thru 45 tools and 1 1/8" for all larger tools.
4. Install lock spring on the upper thread of tension mandrel. The lock spring must be used to prevent the cement retainer from backing off of the pressure setting assembly during running.
5. Install adjuster sub on pressure setting assembly for size 45 or larger (for 20 Baker pressure setting assembly only)
6. Install setting sleeve on pressure setting assembly.
7. Slide upper wireline slip onto upper cone of cement retainer.
8. Thread tension mandrel with lock spring into the adjuster sub until the gap between the cylinder head and cross link sleeve on the pressure setting assembly closes.

CAUTION: ***DO NOT WRENCH!*** This operation should be performed by hand.

NOTE: This step is easier if performed while the pressure setting assembly is hanging in the derrick. (Size 46 and larger)

9. Proceed by running to setting depth and setting as per wireline operating procedures.
10. When pressure setting tool is removed from the well, remove the wireline adapter kit setting sleeve, adjuster sub and tension mandrel for reuse.

PRECAUTIONS

1. The setting tool should be properly maintained according to manufacturer's instructions and the oil level checked to assure compliance with these instructions before the cement retainer/bridge plug is attached.
2. Confirm that the cement retainer/bridge plug is the proper size for the casing size and weight in which it will be set.
3. Occasionally the situation may arise where the cement retainer must pass thru a heavier weight casing than that for which it is designed or damage sections of casing with reduced internal diameters. In these situations, the cement retainer/bridge plug should always be sized to the casing size and weight at the setting point.
4. A wireline junk catcher with an appropriate gage ring size should always be run before running the cement retainer or bridge plug. The wireline junk catcher will remove debris from the wellbore and gage the internal diameter to assure that no obstructions or restrictions exist that could cause problems when the cement retainer/bridge plug is run.

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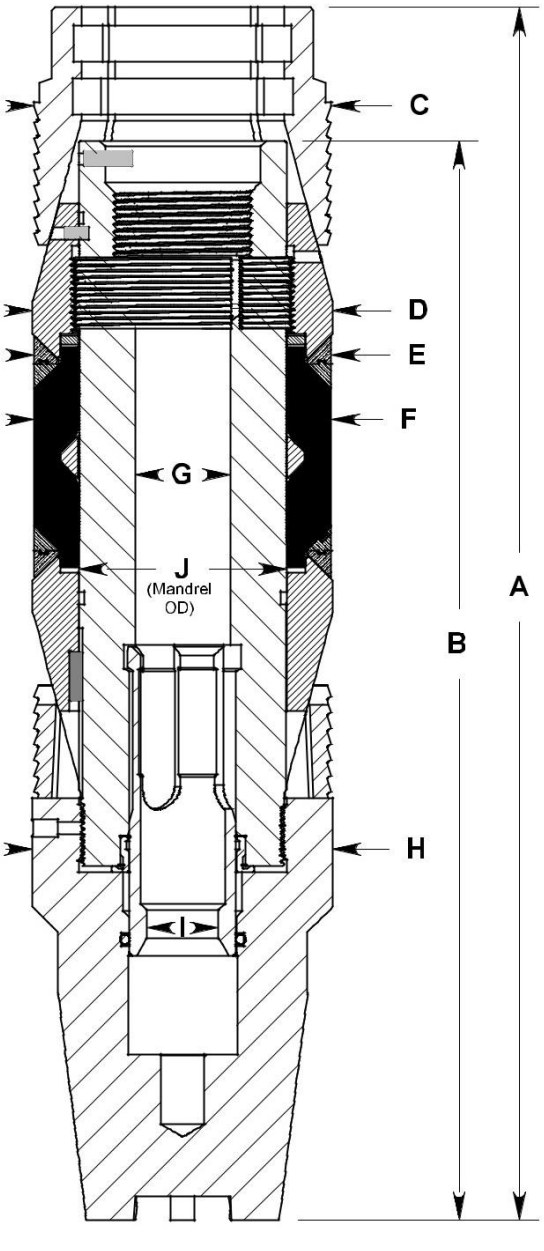

4 1/2” - 7 5/8” CEMENT RETAINER LENGTH & DIAMETERS

	4 ½”	5”	5 ½”	7”	7 5/8”
	Mech/ Wire	Mech/ Wire	Mech/ Wire	Mech/ Wire	Mech/ Wire
A	22.93 / 21.61	22.93 / 21.61	22.29 / 20.94	24.30 / 23.34	25.50 / 23.22
B	21.15	21.15	20.50	22.78	22.70
C	3.49	3.88	4.30	5.63	6.25
D	3.61	3.93	4.31	5.69	6.31
E	3.57	3.89	4.31	5.64	6.26
F	3.52	3.90	4.25	5.62	6.26
G	1.35	1.35	1.35	2.01	2.01
H	3.59	3.86	4.31	5.69	6.32
I	1.00	1.00	1.00	1.51	1.51
J	2.495	2.495	2.615	3.745	4.370

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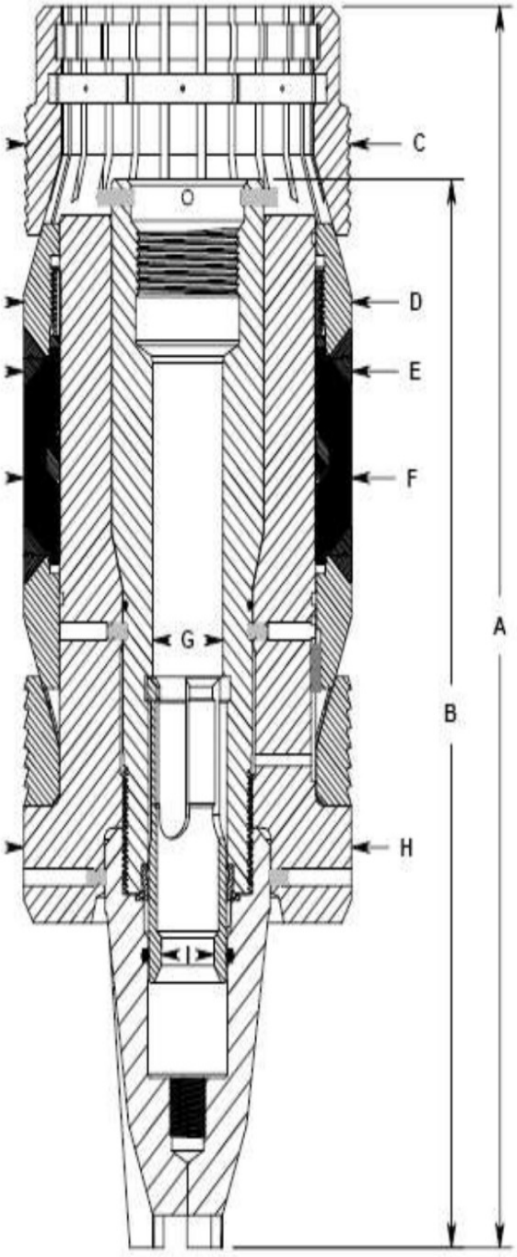

8 5/8” - 13 3/8” CEMENT RETAINERS LENGTH & DIAMETERS

SIZE	MEASURMENT								
	A	B	C	D	E	F	G	H	I
8-5/8 219.1	26.55	22.87	7.07	7.13	7.11	7.13	2.01	7.13	1.51
9-5/8 244.5	26.11	22.85	8.07	8.13	8.12	8.12	2.01	8.13	1.51
10-3/4 273.1	26.48	22.79	9.38	9.44	9.44	9.42	2.01	9.44	1.51
11-3/4 298.45	25.84	22.85	10.37	11.99	10.43	11.92	2.02	10.43	1.51
13-3/8 339.8	26.44	22.87	11.96	11.99	12.00	11.92	2.02	11.99	1.51

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CASING				TOOL
OD	ID MAX.	ID MIN.	Weight	OD
Inches mm	Inches mm	Inches mm	Lb/Ft Kg/m	Inches mm
4-1/2 114.3	4.09 103.9	3.82 97.18	9.5 – 15.1 14.1 – 22.5	3.61 91.7
5 127	4.56 115.8	4.27 108.5	11.5 -18 17.1 – 26.8	3.93 99.8
5-1/2 139.7	5.04 128.1	4.67 118.6	13 – 23 19.5 – 34.2	4.31 109.5
5-3/4 146.1	5.19 131.8	4.86 123.4	17 – 22.5 25.3 – 33.5	4.5 114.3
6-5/8 168.3	6.13 409.82	5.58 141.73	17 – 34.5 25.3 – 51.3	5.38 136.7
7 177.8	6.53 166.1	6.00 152.4	17 – 35 25.3 – 52.1	5.69 144.5
7-3/4 196.9	6.56 166.7	6.25 158.7	46.1 – 52.5 68.7 – 78.2	6.00 152.4
7-5/8 193.7	7.25 181.0	6.62 168.1	20 – 39* 29.76 – 58	6.31 160.3
8-5/8 219.1	8.09 205.66	7.43 188.72	24 – 52 35.7 – 77.4	7.12 180.9
9-5/8 244.5	9.06 230.2	8.37 212.6	29.3 – 61.1 43.6 – 90.9	8.12 212.1
10-3/4 273.1	10.192 258.9	9.66 245.36	32.7 – 60.7 48.7 – 90.3	9.44 239.7
11-3/4 298.5	11.15 283.2	10.772 273.61	38 – 60 56.6 – 89.29	10.432 265.0
13-3/8 339.8	12.715 323.0	12.559 319.0	48 – 72 71.4 – 107.2	11.995 304.7

Features/Benefits

- Composite cones, guide, and unique non-metal back up rings.
- Simple surface control valve.
- Allows pressure testing before squeeze.
- Reliable sliding valve automatically closes when the stinger is removed, locking in the squeeze pressure.
- Valve protects sensitive zones in the low fluid wells.
- Mechanical or wireline set.
- Easily drilled