DSI

AN SBO COMPANY

Geothermal solutions

Multiple Activation Bypass System

Geothermal PBL® Multiple Activation Bypass System for Geothermal Drilling Applications

The DSI Geothermal PBL® Multiple Activation Bypass System was developed specifically for Geothermal drilling operations. The Tool includes the design simplicity, reliability, robustness, and solid track record of the world-renowned DSI PBL® Multiple Activation Bypass System, while incorporating high-temperature rated elastomer and lubricant technologies.

The tool is currently available for multiple temperature categories:

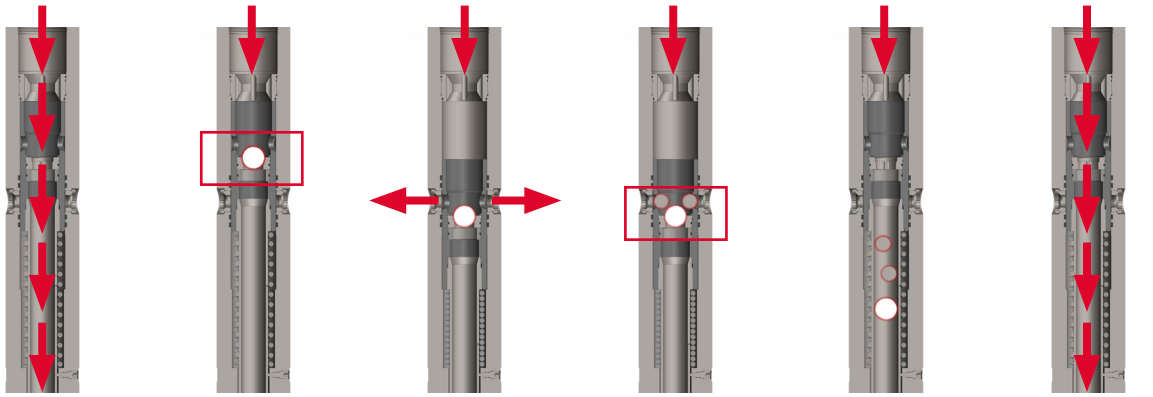
- Standard Temperature applications (up to 420°F/215°C)
- High Temperature applications (up to 572°F/300°C)
- The tool can be further enhanced for specific clients' drilling applications, whereby the operating temperature is expected to exceed 572°F/300°C

DSI Geothermal PBL® offers the most effective and efficient way to pump aggressive LCM or cement, boost circulation, or achieve optimized split-flow, all during a single run, whether drilling, backreaming, or simply spot hole cleaning.

The Geothermal PBL® is available in a full range of standard sizes from 4¾ to 9½ inches, however smaller or larger sizes can be made available upon request.

FEATURES AND BENEFITS

- High Pressure/High Temperature steam capabilities
- Ball or Dart Activation capabilities
- 100% bypass and split-flow capabilities
- Activate or deactivate at any angle
- Re-establish circulation at low circulation
- Different size activation medium with same size tool
- Ability to drop the gyro
- Can be run in conjunction with third-party ball-activated devices
- Full five cycles as standard; extended cycle tools available on request



Drilling Mode FLOW to BIT

Vinyl Activation ball Seated

Open Position FLOW THRU PORTS

Steel De-Activation balls dropped and pumped down PRESSURE UP

Activation ball sheared thru seat De-Activation balls follow, Tool Reset

Drilling Mode FLOW to BIT

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TECHNICAL SPECIFICATIONS

Tool Sizes (in.)	4 ¾	5 ¼	6 ¼	6 ½	6 ¾ [8]	7	8	8 ¼ [9]	9 ½	9 ½ HF	12
Number of ports	2	2	2	2	2	2	2	2	2	2	2
Minimum tool ID (in.) When no balls are in tool [1]	1.27 to1.40	1.27 to1.40	1.27 to 1.80	1.27 to 1.80	1.27 to 1.80	1.27 to 1.80	1.50 to 2.27	1.50 to 2.27	1.50 to 2.27	1.50 to 2.65	1.50 to 2.27
EHD (in.)	1.46	1.46	1.93	1.93	1.93	1.93	2.42	2.42	2.42	2.73	2.42
Drift ID (in.) When balls are in tool	NO DRIFT	NO DRIFT	NO DRIFT	NO DRIFT	NO DRIFT	NO DRIFT	NO DRIFT	NO DRIFT	NO DRIFT	NO DRIFT	NO DRIFT
Maximum OD (in.)	4.75	5.25	6.25	6.5	6.75	7	8	8.25	9.5	9.5	12
PBL® tool end connections (Box x Pin) [2]	NC 38 (3 ½"IF)	XT 39	4 ½ XH	NC 50 (4 ½"IF) NC 46 (4 ½"XH)	NC 50 (4 ½"IF)	XT57/ XTM57	6 ⅝ REG	6 ⅝ REG	7 ⅝ REG	7 ⅝ REG	8 ⅝ REG
PBL® tool mid connection [3]	NC 38 (3 ½"IF)	XT 43	4 ½ XH	NC 40 (4 ½"IF)	NC 50 (4 ½"IF)	XT57	6 ⅝ REG	6 ⅝ REG	7 ⅝ REG	7 ⅝ REG	8 ⅝ REG
Activation ball size (in.)	1 ½	1 ½	2	2	2	2	2 ½	2 ½	2 ½	2 ¾	2 ½
Locking ball size (in.)	1 ⅛	1 ⅛	1 ⅛	1 ⅛	1 ⅛	1 ⅛	1 ⅜	1 ⅜	1 ⅜	1 ⅜	1 ⅜
Steel Deactivation ball size (in.)	1 ⅜	1 ⅜	1 ⅜	1 ⅜	1 ⅜	1 ⅜	1 ¾	1 ¾	1 ¾	1 ¾	1 ¾
No. of Balls needed to activate the tool	1	1	1	1	1	1	1	1	1	1	1
No. of Balls needed to deactivate the tool	2	2	2	2	2	2	2	2	2	2	2
Number of cycles [4]	5	4	5	5	5	5	5	5	5	5	5
Number of Cycles remaining w/ Fast Dart in tool	3	2	3	3	3	3	3	3	3	3	4
Flow area through tool (in.^{2})	1.67	1.67	2.92	2.92	2.92	2.92	4.6	4.6	4.6	5.85	4.6
Port diameter (in.) [5]	1.1	1.1	1.1	1.1	1.1	1.1	1.35	1.35	1.35	1.35	1.35
TFA when tool is open (in.^{2})	1.901	1.901	1.901	1.901	1.901	1.901	2.863	2.863	2.863	2.863	2.863
Weight (lb)	380	380	800	880	880	900	1000	1525	1800	1800	2750
Length (ft) [6]	10	9	10	10	10	10	10	10	10	10	10
Tensile strength main body (lb)	1,000,000	667,600	1,900,000	2,500,000	3,100,100	1,208,700	3,500,000	3,700,000	6,000,000	6,000,000	10,450,000
Torsional strength main body (ft-lb)	49,500	37,300	130,000	166,000	190,000	94,800	295,000	335,000	565	565	1,550,000
Make-up torque rig ends (ft-lb)	11,500	22,400	26,710	34,190	34,840	56,900	41,800	46,450	81,290	81,290	135,500
Make-up torque mid connection (ft-lb) [3]	11,500	19,200	26,710	34,190	34,840	56,900	41,800	46,450	81,290	81,290	135,500

[1] Standard ID listed, larger IDs are available to accommodate coring balls, reamer balls, and wireline accessories. Minimum tool ID could vary if Activation ball or Dart is used

[2] Alternative PBL® tool end connections may be available on request

[3] Between main body and ball catcher sub

[4] Extended length cages may be available on request

[5] Larger port diameter available on request

[6] The length could vary slightly according to any connection network

[7] 4 ¾ tool with smaller activation ball size (1 ¼ in.) available on request

[8] 6 ¾ tool with smaller activation ball size (1 7⁄16 in.) available on request

[9] 8 ¼ HF tool with larger ID (2.65 in.) available on request

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Contact your local DSI Geothermal Specialist for more information on how we can maximize efficiency and reduce risks on your next operation.

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