4.75" (5.25") DUAL PORTED PBL BYPASS SYSTEM

Receiving PBL at Rigsite

1. On receipt of PBL Tools at Rigsite, the tools should be checked for the following:
    - PBL Serial Numbers located on ID band below ports on main body
    - Confirm rig end connections are as required
    - Confirm ball box matches tool size and number. Operating Instructions are included ball box
    - Shearing pressures for ball seat (Deactivation Pressure) and ports (Unlocking Pressure) are marked on tool and also on Tech Sheet included in packet
    - Confirm PBL activation ball will drift through drill string above PBL Tool
    - Confirm PBL No-Go will allow passage of required third party activation balls.
    - It is recommended to drift third party ball thru PBL prior to inclusion in BHA
    - Remove tape covering PBL ports prior to RIH

2. If surface test is required, please contact your BICO Representative for instructions

3. If lock open will be required, please see PBL Auto-Lock Instructions in ball box or on website

Activation Procedure

1. **Prior to activating the tool, Record Pump Pressure _____ Pump Strokes _____.** This will be used as a reference to confirm de-activation of the tool

2. Calculate the fluid displacement **volume and time** in the drillstring to estimate when the activation ball will reach the Bypass Tool. Break drillstring at floor and drop one (1) **1.5"** vinyl activation ball. It is recommended to fill the drill string with fluid prior to dropping the activation ball

3. It is recommended to maintain normal drilling pump rates, keeping the pressure 1000 psi below the ball shearing pressure as indicated on the Tool Order. Displace 70% of the volume inside the drillstring, and then reduce the pump rate to 25% (Max. 200 GPM) until the ball lands on the seat. The vinyl ball will often seat sooner than the calculated pump strokes. The vinyl activation ball has an equivalent density of 11.2 PPG drilling fluid. **NOTE: Care should be taken when pumping the vinyl ball down. Pumping the activation ball on seat at high fluid rates or pressures may cause the activation ball to blow through the seat.** In the event the ball does get blown through the seat, as indicated by pump pressure/strokes the same as step one, follow De-Activation Procedure below to ensure the vinyl activation ball has gone through the seat. **This step must be done prior to dropping another vinyl ball.** Return to the normal tool activation process to open the tool

4. When the activation ball lands on-seat, the inner mandrel will shift to its open position against the spring. **NOTE: IT TAKES LESS THAN 250 PSI TO ACTIVATE /OPEN THE TOOL.** Fluid will now be diverted through the side ports. As long as pumping is continuous, fluid will be diverted through the ports. If pumping is halted, the sliding sleeve will shift to the closed position. When pumping resumes, the sleeve will shift open again allowing fluid diversion through the ports of the PBL Tool. It is recommended a constant, high pump rate be maintained while the tool is in the open position. **If low flow rates, low differential pressures between drill pipe and annulus, bullheading, squeezing or similar low flow operations are required, it is recommended to deactivate the PBL Tool before commencing such operations**

- Surface indication of the tool being in the open position is a pressure drop. **Compare pump pressure/strokes to rates and pressures recorded in step one.** Once the tool is open, pump rates can be increased to the desired rate above the ball deactivation shearing pressure**.** High pump rates/PSI will not push the ball through the seat and deactivate the tool. The deactivation pressure, marked on the tool, only applies after the steel balls have been dropped to deactivate the tool

- Rotating and reciprocating the drillstring is good practice while activating the PBL Tool

De-Activation Procedure

1. Break the drillstring at rig floor and drop 2 steel **1 3/8"** de-activation balls

2. After dropping the steel de-activation balls, pump at 50% of the normal flow rates and watch for a pressure increase. When the steel balls reach the PBL Tool, they will restrict flow through the ports creating an immediate pressure increase. Bring the pressure up as quickly as possible. A pressure decrease is an indication the vinyl activation ball has blown through the seat and into the ball catcher. The steel balls will follow into the ball catcher. **The vinyl ball should blow through the seat at +/- 10% of stated shear pressure depending upon down hole conditions**

3. After the vinyl ball shears through the seat, the sleeve will move to the closed position. Circulation will now be through the BHA

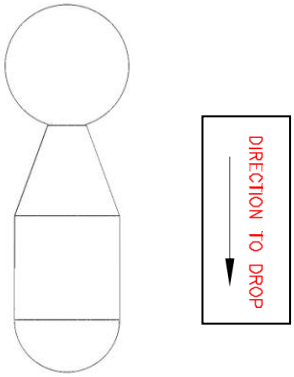
4. When pumping is resumed, check that the pressure and strokes are the same as they were prior to activating the PBL Tool (See data recorded in step one, above)

NOTE: After tripping out of the hole, the balls must be removed from the ball catcher sub before RIH again. It is not recommended to TIH with balls in cage. If required, ensure float valve is in BHA below PBL or finger trap has been installed in cage to prevent movement of balls. Consult BICO if situation arises. **The used vinyl activation balls should be immediately discarded and NEVER RE-RUN. If the PBL sub is to be rerun after being activated, it is strongly recommended to deactivate the tool prior to tripping out of the hole**

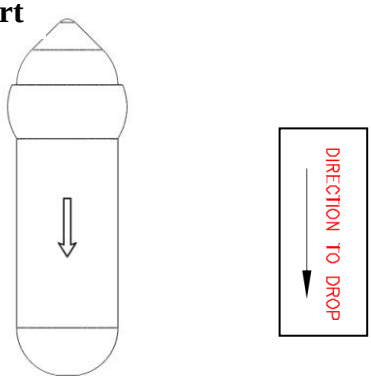
Emergency Weighted Darts with Vinyl Balls or Hollow Darts

A Weighted Dart inserted in a **1.5"** vinyl ball or a **1.5"** Hollow Dart is supplied as part of the package of operating balls. **These Darts are to be utilized only in cases where it is not possible to pump down the Vinyl Ball.** These ball/darts weigh approximately 1 – 1 ¾ pounds to facilitate activation of the PBL sub when limited or no circulation is possible. **These ball/darts MUST be dropped in direction indicated below down the drillstring when activating the tool.** It is not recommended to utilize the ball/dart in well bores with angles greater than 55º

Weighted Ball/Dart



Hollow Dart



If Hollow Dart is utilized in conditions when circulation is possible, the maximum flow rate is 100 GPM when pumping down Dart. If deactivation is required, use same procedure as above. Each activation by Hollow Dart reduces the total available cycles by one

Should there be any questions regarding the operational procedures of the PBL Tool please contact BICO Drilling Tools or visit our website at: **www.bicodrilling.com**

Contacts: **BICO Drilling Tools, Inc** Phone: 405-677-5877 Fax: 405-677-5218

Corporate Headquarters and Service Center - Houston, Texas
1604 Greens Road
Houston, TX 77032
Phone: 281-590-6966, 877-779-2426
Fax: 281-590-2280
e-mail: sales@bicodrilling.com

Southeast Service Center
Broussard, Louisiana
303 Ida Road
Broussard, LA 70518
Phone: 337-839-1133 Fax: 337-839-1143

Mid-Continent Service Center
Oklahoma City, Oklahoma
1901 S.E. 22nd Street
Oklahoma City, OK 73129

Rocky Mountains Service Center
Casper, Wyoming
1849 Pyrite
Casper, WY 82604
Phone: 307-237-1420, 888-437-1420
Fax: 307-237-1419

Permian Basin Service Center
Midland, Texas
3707 S. County Rd. 1210
Midland, TX 79706
Phone: 432-563-3500 Fax: 432-563-1300

Northeast Service Center
Buckhannon, West Virginia
271 Weatherford Blvd.

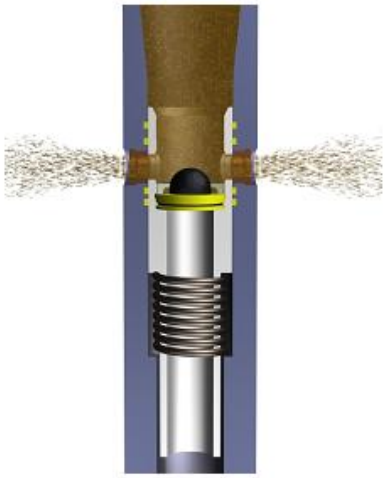
Buckhannon, WV 26201 Phone: 304-460-7304 Fax: 304-460-7307

PBL OPERATIONAL SEQUENCE

PBL ACTIVATION

Drilling Mode
FLOW to BIT

Activation Ball
Seated



Open Position
FLOW THRU PORT

PBL DEACTIVATION

De-Activation
Balls Dropped
PRESSURE UP

Balls Sheared Thru
Seat Tool Reset

Drilling Mode
FLOW to BIT