Mechanical/Hydraulic Anchor Comparison Sheet

Anchors are used in down hole applications to secure the tubing to the casing. Anchoring the tubing in tension reduces tubing, sucker rod and casing wear as well as increasing bottom hole plunger travel resulting in increased production. A tubing anchor also assists in minimizing the frequency and number of tubing thread leaks. The two major categories of tubing anchors are mechanical and hydraulic anchors. It’s very important to employ the correct style of anchor in each well application. Below is information on these anchors:

**Mechanical “B” Anchor** - mechanical anchors are manipulated at surface by a twisting action. The mechanical tubing anchor/catcher uses pure mechanical operation, setting with either left or right-hand rotation (depending on type of mechanical anchor) and releasing with the opposite action. There are two set of teeth, one facing up and one facing down on each slip. This double gripping allows the anchor to be set for both anchoring and catching at the same time.
The anchor is activated by rotating the tubing string, typically about 6 turns. It’s also customary to pull on the tubing string to make sure the anchor has seated against the casing. To release the gripping action the tubing string must be rotated until the anchor moves freely (in opposite direction that was used to set the anchor).

If the anchor/catcher cannot be retrieved normally, the anchor may be released by an emergency straight upward pull. The mechanical anchor can be set above or below the pump. Setting below the pump eliminates the chance of experiencing rod cut.

**Hydraulic “R” Anchor** - the hydraulic tubing anchor is a completely automatic tool utilizing the weight of the fluid column in the tubing string to power the piston in the anchor. The load reversal from the pump is the force that moves the hydraulic tubing anchor into tension. When the differential pressure in the tubing string is greater than the pressure in the casing annulus, the anchor piston will be hydraulically activated and press the Live Slip against the casing. Only 70 PSI of pressure is needed to activate the piston. The anchor’s holding power is designed to resist upward movement against the normal forces encountered in the pumping operation, but will yield to forces beyond normal that would over-stress the tubing string. Fixed slips are designed to span recesses and built with a 43 degree top tooth angle and 15 degree bottom tooth angle which allows the anchor to move down the hole into proper tension position, but restricts upwards movement.
Simple to install, simple to extract, the ease of operation is a strong advantage of the hydraulic tubing anchor. As mentioned, unlike a mechanical anchor, there is no need for surface manipulation to set a hydraulic anchor. The hydraulic anchor will be activated when the insert or tubing pump is set and the pressure in the tubing string is greater than the pressure in the casing annulus. To retrieve the anchor, simply unseat the pump, the pressure will be equalized and the anchor will no longer be in tension. If the pump is stuck, a drain can be run to empty the tubing string of fluid and allow for easy extraction of the anchor.

**Choosing the correct anchor**

**Mechanical anchor**- A mechanical anchor is best suited for shallow, straight wells. As noted, the two sets of teeth (one facing up and one facing down) on each slip allow for the tool to be set for both anchoring and catching at the same time. When set at the proper tension, the Type “B” Anchor catcher will prevent the tubing and rods from falling if the tubing should part.

**Hydraulic anchor**- A hydraulic anchor is also often used in deep, deviated wells that are not conducive to using a mechanical anchor. Information needed for the hydraulic anchor selection process include: approximate fluid level, casing size, casing weight, tubing size, pump bore size, pump depth, anchor depth and well temperature. The casing size, casing weight and tubing size are the measurements needed for correct sizing of the hydraulic anchor and the pump bore size, pump depth and anchor depth are needed to run the Load/Thrust calculation to determine if the selected single anchor has the necessary holding power to prevent tubing movement. Please see Black Gold Hydraulic “R” Anchor spec sheet for further details.

Please contact your Black Gold representative with any questions or needed clarification on the information provided.