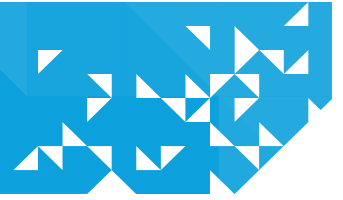


Stage Cementing Collar: 2-Stage Hydraulic



The 510 Hydraulic Stage Collar allows for cementing casing in multiple stages at any inclination with a hydraulically opened sleeve system. Incorporating state-of-the-art design provides for a robust tool that ensures optimal performance in even the harshest environments. Years of experience have enabled Antelope engineers to develop a tool that takes into account every possible variable that may affect the performance of the tool.

510 - HYDRAULIC STAGE COLLAR:

This hydraulic stage collar allows for cementing to be completed in long casing strings and highly inclined wells, where low cement displacement pressure is required due to weak formations.

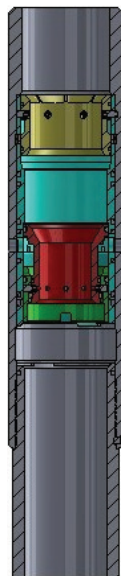
- Setting annulus casing packers in conjunction with stage collars
- Stage collar may be opened immediately after first stage shut-off plug is landed
- Minimal moving parts reduces chances of failures
- Reduces risk of first stage cement setting above tool before opening
- Large pump through diameters allows for wiper plugs and drop balls to pass through without affecting tool operation.
- Opening pressure setting is field adjustable
- High burst and collapse pressures after closure of tool (see datasheet for values)
- Robust dual snap ring locking mechanism ensures the tool does not open after closure and is able to withstand 100,000 lb. minimum upward force
- Well protected components ensure the tool is able to withstand drill out without damage or leakage
- Multiple high pressure seals engaged around ports after closure ensures against pressure leakage
- Standard stage collar materials are suitable for sour service applications
- Suitable for operating at temperatures up to 300°F.
- All internal components within casing drift are PDC and Tri-cone bit drillable
- Stage Collar - Patent Pending



OPTIONS:

- Available in 3-stage configuration
- High temperature version rated to 400°F
- Optional opening cone may be used to open stage collar

Box and Pin threads match casing threads. Opening seat and inner sleeve seals provide pressure integrity across the circulation ports.



After the first stage shut off plug has landed, pressure applied from the surface shears the hydraulic opening sleeve shear screws. The hydraulic opening sleeve shifts down, landing on the anti-rotation taper angles and exposing the circulation ports. Circulation can now be established through the stage collar ports.



After the closing plug has landed, pressure applied from the surface shears the closing seat shear screws. The closing seat lands on anti-rotation taper angles, allowing the lugs to cam into the grooves in the closing seat. The inner sleeve then shifts down engaging dual high pressure seals above and below the body ports to provide pressure integrity. Dual snap-rings engage to ensure the inner sleeve remains retained in the closed position. Anti-rotation tabs prevent rotation of the inner sleeve during drill-out.

