1. INFORMATION & RECOMMENDATIONS

The Type 506 Float Shoe and Type 505 Float Collar with spring loaded valves are designed to ensure positive sealing in vertical, horizontal and all deviated wells. All valve parts are aluminum and can be drilled with either conventional rotary tri-cone bit or PDC bit.

The Type 506 float shoe is attached to the bottom of the casing string to guide the casing safely past minor obstructions as it is lowered to cementing depth. The Type 505 float collar is then installed in the casing string above the float shoe. Circulation can be performed at anytime during the running of casing to total depth.

Because of the high pressure applications (10,000 psi) these valves are designed for, it is highly recommended that a Type 506 float shoe be run together with a Type 505 float collar.

If high content of solids (LCM) is to be circulated in the well, it is recommended that a latch down plug be added to string due to the possibility that solids can clog the valve(s) in the collar and shoe.

All float equipment should be stored and shielded from UV light as well as extreme temperature and humidity, all of which can degrade the performance of the float valve. Optimal storage conditions are 5-25 deg C with a relative humidity of 70-75%. The shelf life for properly stored float equipment is 5 years.
Performance Features

- Valve is rated to 10,000 psi bump and back pressure, and tested to 24 hours of flow @ 10 bpm.
- Available in 4-1/2" to 5-1/2" casing sizes.
- The valve parts are aluminum, Rubber and PEEK in construction.
- Features an over molded HNBR seal for temperature capabilities up to 400°F.
- Float shoe comes standard with an aluminum eccentric nose with integral downjets.
- PDC and Tri-Cone drillable.

Plugs

Natural Rubber Cement Plugs have a shelf life of 5 years if stored at 5-25 deg C with a relative humidity of 70-75% and not exposed UV light. Extreme temperature and humidity should be avoided as it will degrade the shelf life of the product. Moisture due to rain, seawater or condensation water must be strictly avoided, as it can lead to rot or mold which will affect the performance of the plug.

2. INSTALLATION – FLOAT EQUIPMENT

The following instructions should be referenced for the installation of all threaded Top-Co float and cementing equipment.

IMPORTANT:

When picking up casing equipment to install onto casing NEVER insert any lifting device inside the body of the float equipment as the device may damage the float valve or box threads.

It is important to apply Thread Lok only to the PIN END of casing or float equipment when used in the process of positioning float equipment on the casing string. NEVER apply Thread Lok to the box end. If applied to the box end, Thread Lok can travel into the float equipment and impede the operation of the float valve.

2.1 PRE-USE FIELD INSPECTION

1. Obtain the piece of equipment to be inspected. Note the markings on the outside of boxing material to ensure the correct size, weight and threads have been obtained.
2. Remove packing materials. Save any written instructions that may be stored inside the box end of the float equipment.
3. Verify the markings on the float equipment, checking the size, weight, thread and type markings.
4. Inspect float equipment for damage to the cement surfaces of the piece (chips, flaking, cracks).
5. Check float equipment shell for 6 digit stamped MD# and record this number.
6. Remove any thread protectors.
7. Inspect threads for damage and unusual markings.
8. Lay the float equipment on its side, obtain a wooden stick with a diameter between 12MM (1/2") and 32 MM (1 1/4") and of 300MM (12") length.
9. Insert the wooden stick in the box end of the float equipment and push it into the orifice above the valve making contact with the plunger. Push the plunger in and release several times observing the bottom shaft of the plunger moving back and forth. Ensure that the plunger returns to the seated position upon releasing pressure against the plunger.
10. If no deficiencies are identified during field inspection proceed to section 3.3.2 for instructions on proper installation of the float equipment on the casing string.

In the event that a deficiency is identified during the field inspection do not position the deficient piece on the casing string. Contact your supplier for immediate delivery of replacement equipment.
2.2 POSITION FLOAT ON CASING STRING

1. Ensure that field inspection of float equipment has been completed see section 3.3.1.
2. Remove thread protectors from the casing threads.
3. Obtain thread lok and mix according to manufacturer’s instructions.
4. Apply thread lok to the casing pin thread and install shoe by aligning the shoe box end and starting the thread by hand. Ensure the alignment is correct to prevent cross threading. Thread lok should ONLY be applied to the pin end of casing and Top-Co float equipment.
5. Thread box end of float shoe on to pin end of first casing joint.
6. Rotate the shoe as far as possible onto the casing pin by hand.
7. Make up thread per torque specifications.
8. Install float collar at desired location in casing string. The float collar serves as a back-up valve should the shoe valve fail.
9. Apply thread lok to the pin thread of collar and install collar by aligning the collar pin end with the casing box end and starting the thread by hand. Ensure the alignment is correct to prevent cross threading. Thread Lok should ONLY be applied to the pin end of casing and Top-Co float equipment.
10. Rotate the collar as far as possible into the casing box end by hand.
11. Apply thread lok to the pin thread of the next length of casing in string.
12. Stab casing pin into box end of float collar.
13. Make up thread per torque specifications.

3. RUNNING OF FLOAT EQUIPMENT

During running in of the casing the following procedures should be followed:

1. Maintain fluid level inside the casing to a level that does not compromise the collapse pressure rating of the casing or the differential pressure rating of the float equipment. The differential pressure rating of the float equipment is provided on the float equipment specification sheet and is a static differential pressure rating. When casing is run into the well dynamic pressure is created, relative to the annular clearance and speed of running the casing. The smaller the annular clearance, the slower the casing should be run. Erratic or high rates of acceleration and de-acceleration of the casing is not recommended as the dynamic pressure will significantly increase.

2. Ensure that all foreign materials are removed from inside the casing and no foreign materials are dropped inside the casing. Proper procedures for complete removal and disposal of thread protectors need to be ensured.

3. Observation of the weight indicator needs to be maintained. This is useful to determine if the float valves are functioning in the correct manner. For auto fill equipment fluid levels refer to the operational procedures for the specific type of filling float equipment.

4. If circulation is preformed during running operations, observation of the fluid volume required to fill the casing should be observed and pressure required to break circulation should be noted. Pump rates should be in accordance to valve design criteria as noted on the specific equipment specification sheets for the type of equipment being run. Prolonged circulation will cause erosion of the float valves, refer to the equipment specification sheets for valves ratings with respect to circulation rates.

5. If downward movement of the casing is impaired, circulation and rotation can be implemented to assist movement of the casing. Picking up and dropping of the casing is not recommended as damage to the shoe will occur to the point that materials forced into the bottom of the shoe may make the valve dysfunctional. The use of specialty noses and shoes designed for reaming, hole finding, and material removal should be considered for wells where difficulties in running the casing are expected*
3.1 CIRCULATION UPON LANDING THE CASING

1. Circulation to clean the hole is generally performed upon running the casing to depth. Pump rates should be at a level that is within the limitations of the valves design and specifications. Refer to specific equipment specifications sheets.

2. To condition the hole prior to cementing it is recommended that, at minimum, the volume of the casing capacity plus 3.2 to 4.8 cu. meters (20 to 30 barrels) of fluid be circulated. This volume of fluid should pass through the shale shaker screen and inspected to ensure return fluid is free of cuttings and debris which could cause fouling or bridging of the back pressure valves. A circulation rate to attain a fluid annular velocity of higher than 80 meters / 265 feet per minute is recommended to properly clean the hole.

Pre-flush fluid circulated prior to cementing should be a volume that is equivalent to 300 meters /1000 feet length of the nominal annulus. Reciprocation of the casing during circulation and cement placement is also highly recommended in order to properly clean the hole of cuttings and achieve good bonding conditions for the cement. A stroke length of 3 to 5 meters / 10 to 15 feet is recommended. Centralization of the casing through all zones of interest, as well as the bottom joints of the casing, is recommended. Centralization in these areas should be to a minimum of 67% to 75% standoff to achieve good cement placement.

3. Observe and record fluid volumes and circulation pressures during circulation operations.

3.2 CEMENT PUMPING AND DISPLACEMENT

1. Plug(s) should be inspected prior to loading into the cementing head. Should a plug condition be unacceptable obtain a plug in usable condition and return the plug deemed unusable to Top-Co for credit.

2. Identification of the bottom and top plugs needs to be ensured. Colour coding is generally used to identify top and bottom plugs with the top plug being black and the bottom plug being orange or red in colour.***Exception: All HNBR Cementing plugs (top and bottom) are black in color. In addition to checking the colour, markings and labels should be read to ensure proper identification. If still unsure of the type of plug (label is not present) a bottom plug can also be identified by a thin diaphragm located on the plug that is located in the hollow center section of the plug. The top plug will either be a solid or have a thick center section.

3. If a bottom cementing plug is being used, ensure it is placed in the cementing head with double verification that it is the lower plug loaded into the cementing head.

4. The bottom plug will normally be released prior to the pumping of the cement. If a spacer is used between the bottom plug and the lead slurry, and the spacer contains lost circulation materials do not stop pumping until all the cement has been pumped and displaced. As the bottom plug is released ensure that it has left the cementing head and has moved down the casing.

5. Pump cement. Once the tail slurry has been displaced release the top cementing plug. Ensure the plug has been released from the head and the plug has moved down the casing. Cement lines should be pumped out placing a small amount of cement behind and on top of the closing plug. This will enhance the ability to drill out the plugs.

6. As the top plug approaches the bottom plug (or float collar), for the last 5 barrels slow the pump rate to 2 barrels (.32 cu. Meter) per minute for casing size 10 ¾"/173mm and higher, and to 1 barrel (.16 cu. Meter) per minute for casing size 9 5/8" and smaller. Monitor pressure and check for bumping of the plug.

7. Once the top plug has bumped, pressure to 500psi (3.45 Mpa) above circulation pressure and hold for 5 minutes.

8. Check for flow back by recording the amount of fluid bled back to the pumping unit.

Note: Due to casing expansion, a certain amount of back flow is expected when pressure is released. Back flow will stop after 1-3 bbls have flowed back (depending on casing size and bump pressure)
9. If flow back occurs continuously and does not stop, solids may be caught in the valve(s), preventing positive sealing. Allow fluid volume equal to 3 feet (1 meter) of casing volume to flow back then apply pressure again and re-bump the plug. Re-bumping the plug will allow flushing of the valve to move the solids and allow the valves to reseat.

Note: An indication of pressure over and above the displacement pressure to land the plug may not be an indication that the valves are not holding. Pump and fluid conditions exist whereby air entrapment in the displacement fluid has occurred. Should this condition exist, hold pressure for several minutes and allow the air to migrate to the top of the fluid column, release pressure and check if the valves are holding.

4. DRILL OUT PROCEDURES – FLOAT EQUIPMENT AND PLUGS

The following instructions should be referenced for the drill-out of all threaded Top-Co float and cementing equipment.

4.1 PREPARATION

1. Apply thread lok during placement of float shoe and collar on casing string to prevent unthreading in drill-out procedure.
2. Spot some cement slurry on top of the top cement plug to prevent the plugs from rotating during drill out. THIS IS VERY IMPORTANT FOR QUICK DRILLOUT OPERATIONS.
3. Use of a three-cone, long-milled tooth rotary bit is preferred. The bit should be designed for medium to soft formations and should be as large as possible. PDC bits and mills can be used, but have lower penetration rates.
4. Do not drill in an automatic mode, but maintain manual control at all times.
5. Use a junk basket to catch drilled particles and/or a casing scraper if drilling production casing.
6. Reamers and stabilizers installed close to the bit help keep the bin on target.

4.2 DRILL OUT PROCEDURES – ROTARY TRI CONE BIT

1. Drill at least 40-60 RPM. CAUTION: NEVER EXCEED 100 RPM.
2. Apply 2000-3000 lbs. of drilling weight per inch of bit diameter. (A six inch bit would require 12,000 – 18,000 lbs. of drilling weight). DO NOT SPUD TARGET.
3. Use a pump rate that will circulate cutting without decreasing bit weight on the target. (A pump rate of 40 gal/min per inch of bit diameter is a good starting point). DO NOT USE EXCESSIVE PUMPING RATES.
4. Maintain at least 2.0 hhp (hydraulic horsepower) per square inch of bit surface.
5. Pick up off bottom occasionally while pumping and squeak the weight back on to clear cuttings. Work the pipe the full length of the kelly 4 or 5 times.
6. Run returns over the shaker and check what they look like. It should be readily apparent from measurement, penetration rate, and the nature of returns when you are through the plugs, float collar, cement and shoe...