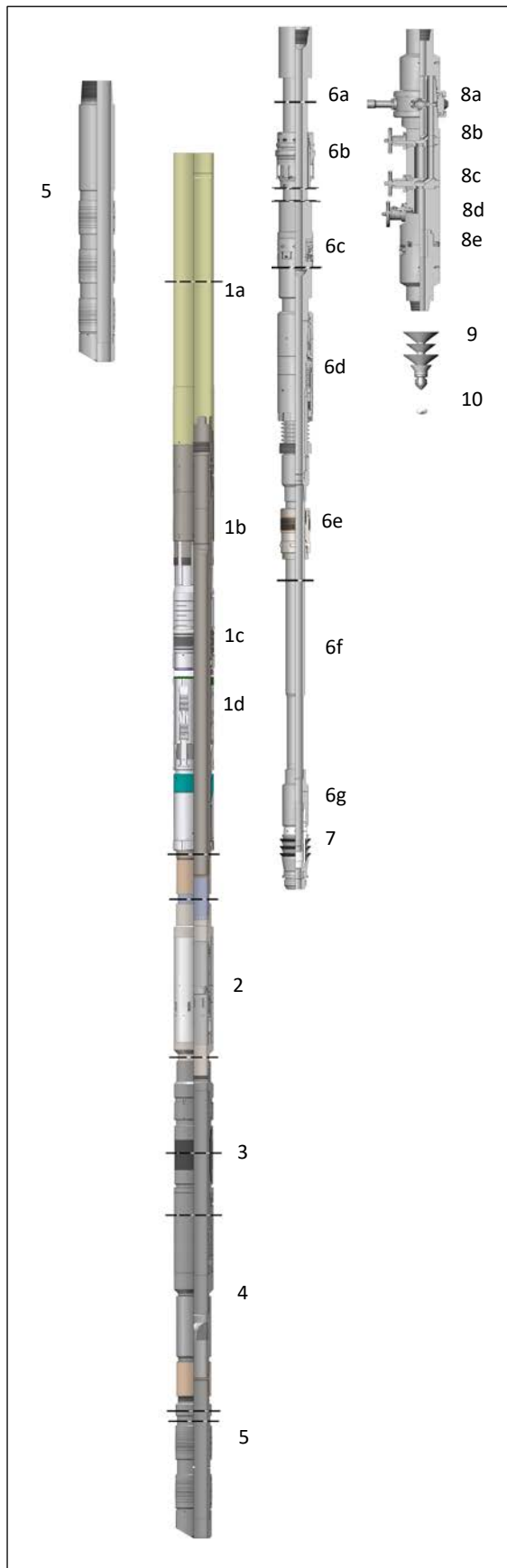


## 1. Cemented Liner System

1. Liner Hanger System (105)
  - a. Polished Bore Receptacle
  - b. Pack-off Nipple
  - c. Liner Top Packer
  - d. Bearing Assembly
  - e. Liner Hanger
2. Landing Collar (108)
3. Float Collar (130)
4. Float Shoe (132)
5. Tie-Back Seal Assembly (120)
6. Running Tool System (150)
  - a. Lift Nipple
  - b. Junk Cover
  - c. Setting Dog Sub
  - d. Hydraulic Release Running Tool
  - e. Retrievable Pack off – Bushing
  - f. Stinger
  - g. Pick-Up Sub
7. Liner Wiper Plug with Ball Seat (160)
8. Top Drive Cementing Head (166)
  - a. Swivel
  - b. Upper Dart Launcher
  - c. Lower Dart Launcher
  - d. Ball Drop Sub
  - e. Flag Sub
9. Drill Pipe Dart (163)
10. Setting Ball

### Features and Benefits

- Single Body with no internal connections
- High Torque Ream Down Capability
- Anti-preset Systems / PBR lock for ream-down
- Up to 10,000 psi – 375°F V0 Capable Element
- Rotate while Cementing if required
- Ball Seat in LWP to minimize pressure surge
- High hanging weight (same as liner connection)

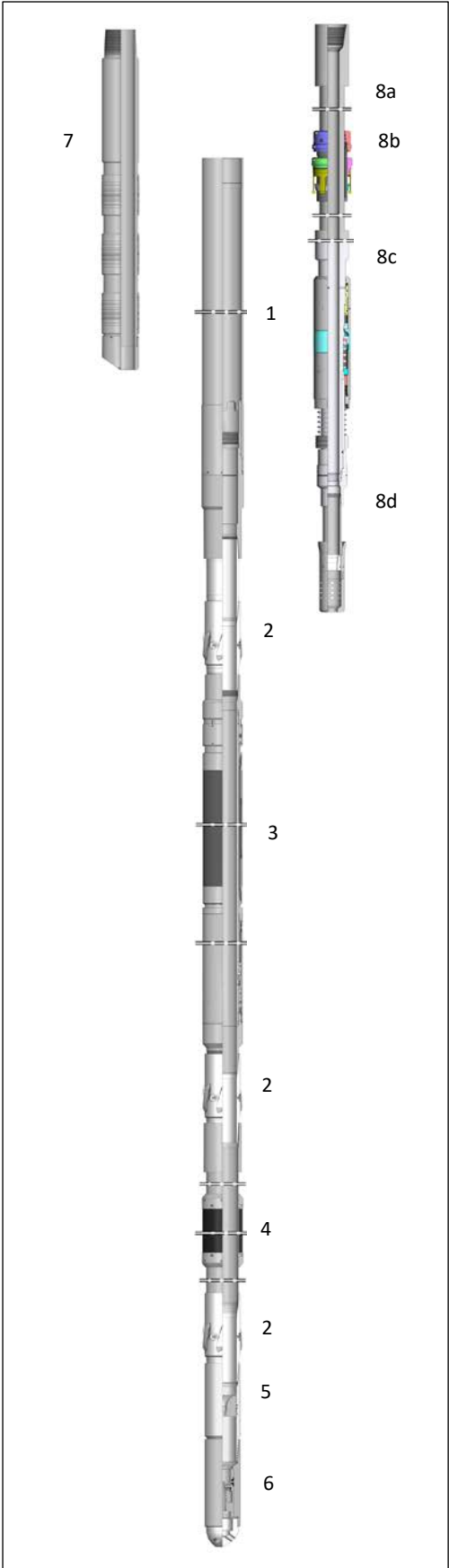


## 2. Off-Bottom Cementing System

1. Liner Hanger System (105)
  - a. Polished Bore Receptacle
  - b. Pack-off Nipple
  - c. Liner Top Packer
  - d. Liner Hanger
2. Hydraulic Cementing Valve (107)
3. Full Bore Mech. Open Hole Packer (280)
4. Solid Ball Seat (Drillable) (110)
5. Tie-Back Seal Assembly (120)
6. Running Tool System (150)
  - a. Lift Nipple
  - b. Junk Cover
  - c. Setting Dog Sub
  - d. Hydraulic Release Running Tool
  - e. Retrievable Pack off – Bushing
  - f. Stinger
  - g. Pick-Up Sub
7. Liner Wiper Plug for Cement Valve (161)
8. Top Drive Cementing Head (166)
  - a. Swivel
  - b. Upper Dart Launcher
  - c. Lower Dart Launcher
  - d. Ball Drop Sub
  - e. Flag Sub
9. Drill Pipe Dart (163)
10. Setting Ball

### Features and Benefits

- Single Body with no internal connections
- High Torque Ream Down Capability
- Anti-preset Systems / PBR lock for ream-down
- Up to 10,000 psi – 375°F V0 Capable Element
- High hanging weight (same as liner connection)
- Full Bore High Expansion Open Hole Packer
- Ball Seat Sub with Dual Seal and Ball Lock

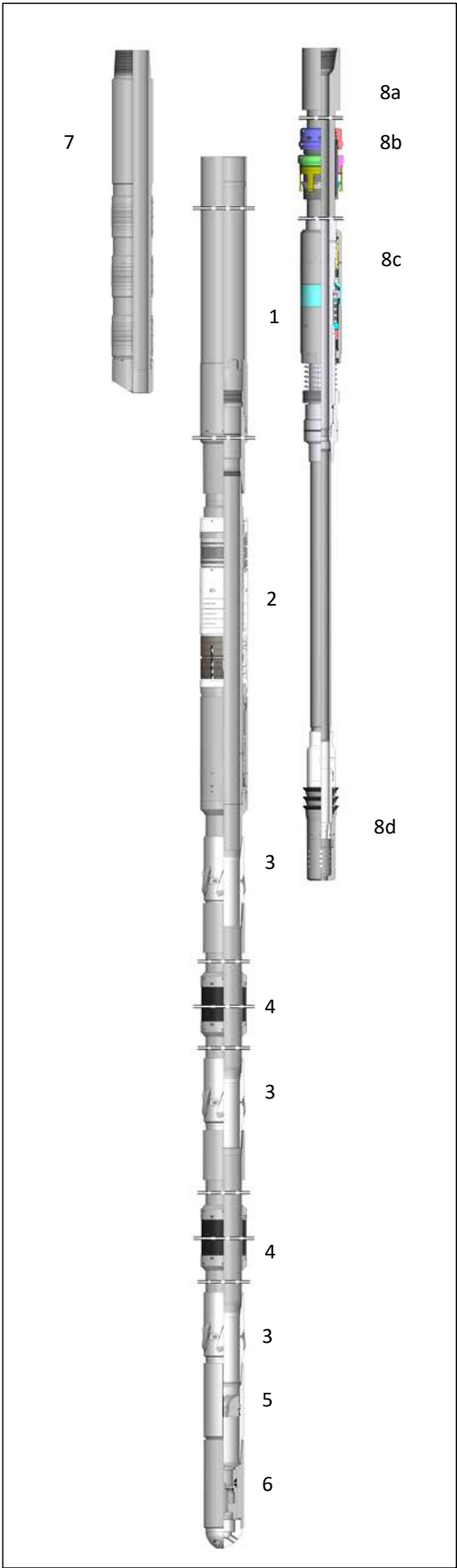


3. Drop-off Open Hole ICD Liner

- |                                       |       |
|---------------------------------------|-------|
| 1. Polished Bore Receptacle / Adapter | (111) |
| 2. Inflow Control Valve               | (312) |
| 3. Mechanical Open Hole Packer        | (280) |
| 4. Swell Packer                       | (300) |
| 5. Ball Seat Sub (Drillable)          | (110) |
| 6. Float Shoe for Long Life           | (130) |
| 7. Tie-Back Seal Assembly             | (120) |
| 8. Running Tool System consisting of: | (150) |
| a. Lift Nipple                        |       |
| b. Junk Cover                         |       |
| c. Hydraulic Release Running Tool     |       |
| d. Ball Seat / Catcher                |       |

Features and Benefits

- PBR lock and High Torque Ream Down Capability
- Full Bore High Expansion Open Hole Packer
- Cost effective Swell Packers and Swell Sleeves
- Wide selection of Washpipe-free ICD valves
  - avoids losses during cement drill-out
  - allows well to stand full during tripping
- DrillCheck ICD Valve
- Ball Seat Sub with Dual Seal and Ball Lock
- Float Shoe for long life



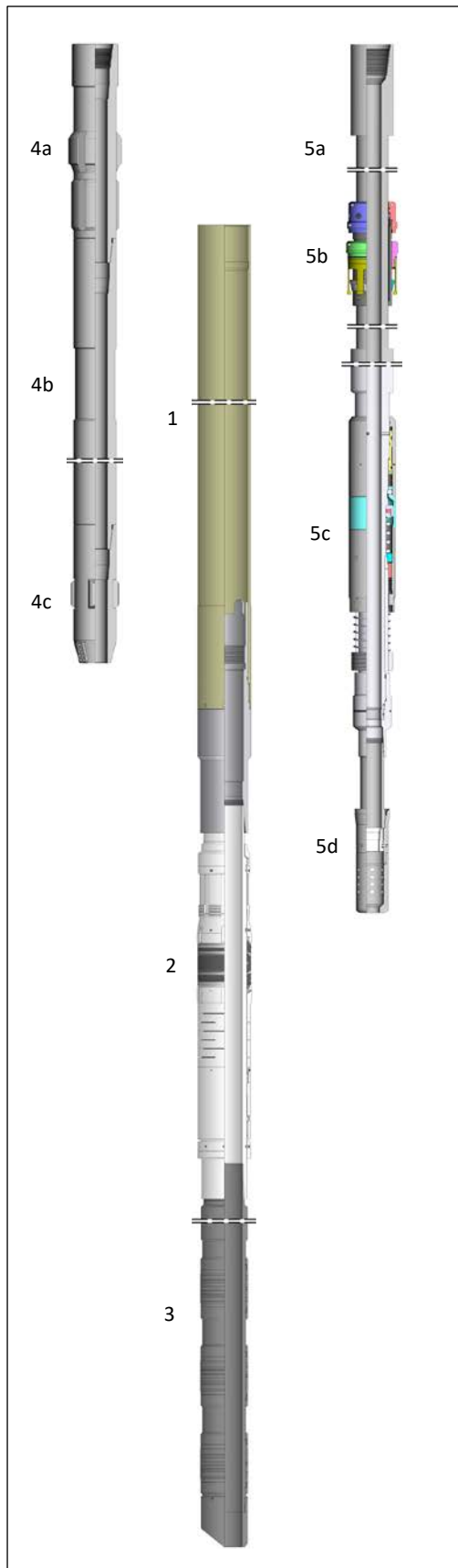
4. Stand-alone Inflow Control Liner

- |                                       |       |
|---------------------------------------|-------|
| 1. Polished Bore Receptacle / Adapter | (111) |
| 2. Hydraulic Set Liner Packer         | (113) |
| 3. Inflow Control Valve               | (312) |
| 4. Swell Packer                       | (300) |
| 5. Ball Seat Sub (Drillable)          | (110) |
| 6. Float Shoe for Long Life           | (130) |
| 7. Tie-Back Seal Assembly             | (120) |
| 8. Running Tool System consisting of: | (150) |
| a. Lift Nipple                        | (151) |
| b. Junk Cover                         | (152) |
| c. Hydraulic Release Running Tool     | (154) |
| d. Cup Tool Ball Seat / Catcher       | (158) |

Features and Benefits

- PBR lock and High Torque Ream Down Capability
- Anchor, pack-off and test without drill string movement
- Full Bore High Expansion Open Hole Packer
- Cost Effective Swell Packers and Swell Sleeves
- Wide selection of Washpipe-free ICD valves
- Ball Seat Sub with Dual Seal and Ball Lock
- Float Shoe for long life

Note: Adaptation of the open hole frac liner system for the unconventional shale plays. There are benefits in anchoring and packing off at the same time as it is easier to manage for field personnel as well as saving rig time.



## 5. Scab Liner System

In the unlikely event the liner top gets compromised due to PBR damage, Liner Top Packer leak or a Scab-Liner is required, the Scab Liner System allows for a sealed tie-back.

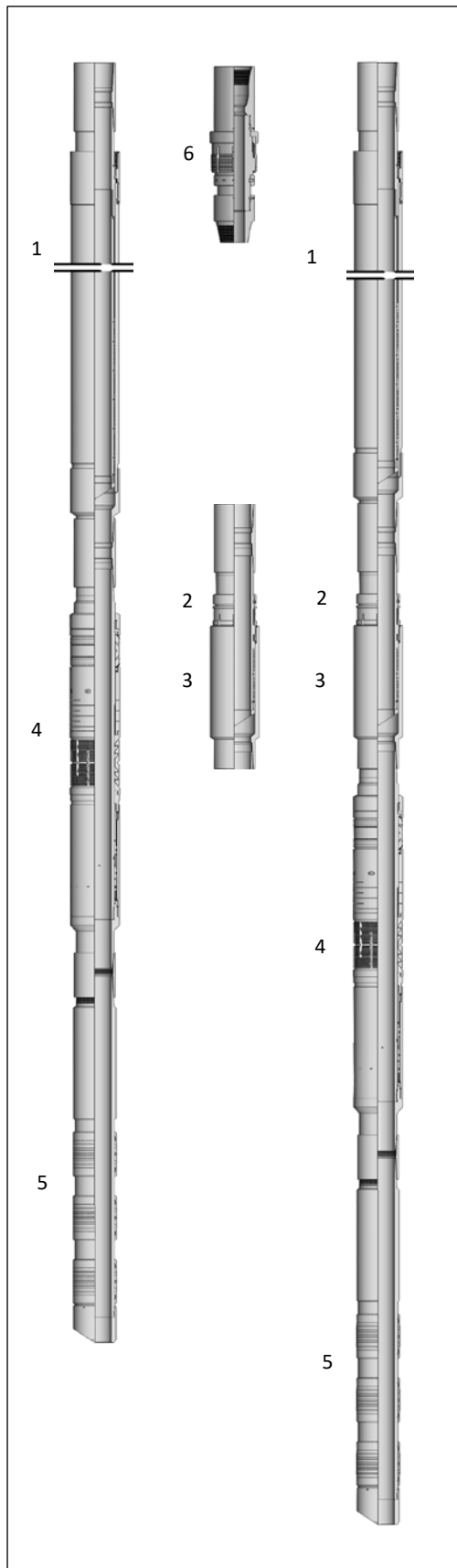
Process:

- Condition old liner top with the Polish Mill System
- Run PBR – Tie-back Packer – Tubing and Tie-back Stem
- Pressure Test and pull service tools

- |                                       |       |
|---------------------------------------|-------|
| 1. Polished Bore Receptacle / Adapter | (111) |
| 2. Tie-back Packer                    | (121) |
| 3. Tie-Back Seal Assembly             | (120) |
| 4. Polish Mill System consisting of:  | (169) |
| a. Top Dress Mill                     |       |
| b. Spacer Joint                       |       |
| c. Polish Mill                        |       |
| 5. Running Tool System consisting of: | (150) |
| a. Lift Nipple                        | (151) |
| b. Junk Cover                         | (152) |
| c. Hydraulic Release Running Tool     | (154) |
| d. Ball Seat / Catcher                | (158) |

Features and Benefits

- PBR lock and High Torque Ream Down Capability
- Anchor, pack-off and test with drill string slack-off



## 6. Mono-Bore Completion System

A mono bore completion system may be desirable for full bore intervention and ease of plug back.

- Production packer location far above liner packer depth
- Scab liner requirement
- High pressure rating or tubing alloy requirements
- Barrier and annular fluid requirements

1. Completion PBR	(203)
2. Anchor Latch Seal Assembly	(202)
3. Anchor Receptacle	(201)
4. Hydraulic Set Full Bore Completion Packer	(113)
5. Tie-Back Seal Assembly or Re-entry Guide	(120)
6. PBR Retrieving Tool	(204)

### Features and Benefits

- Up to 10,000 psi – 375°F V0 Capable Element
- Cut to release Big Bore Production Packer
- Completion PBR with premium seal system (Viton-Teflon-PEEK) as standard
- Shear Ring instead of Shear Screws (70,000 lbs standard)
- Can be run with or without anchor latch / receptacle