Gas Lift

• Gas lift is a means of artificial lift whereby high pressure gas is introduced to fluid column to reduce density.

• It’s introduction requires mandrels and gas lift valves to unload the well and provide a location for continuous injection.
Threats to Wellbore Integrity through GL Equipment

- Wellbore fluids can entering into casing annulus
  - Through damaged gas lift valves
  - Through empty pockets
  - Through damaged valve pocket seal bores or packing failure

- Damage to Gas Lift Valves
  - High Pressure Single Point Injection
Traditional Side Pocket Mandrel

Side-Pocket Mandrel

SIFO-1 Side-Pocket Mandrel, Oval-Body, Forged Pocket
A New Approach to High Reliability Gas-Lift Equipment

Exterior Check Mandrel
External Check Mandrel
External Mounted Check Valve
Solid Body Round Mandrels with External Checks
Enhances gas lift completion integrity

• Prevents well bore fluids from entering into casing annulus
  ─ Through damaged gas lift valves
  ─ Through empty pockets
  ─ Through damaged valve pocket seal bores or packing failure
Features and Benefits
External Check Valves

Enhances gas lift completion integrity
Positive spring loaded check
- **DOES NOT** depend on velocity

Eliminates redundant unloading of casing after valve changes
- Bring well back on line quicker after change out
- Prevent damaging new valve due to unloading
- Prevents corrosive well fluids from entering annulus
High Volume Check Valves

- Large streamlined flow area
- Erosion tested to meet highest standard
- Available in a large variety of materials and elastomeric combinations
- Available in many high pressure thread end connections
- Welded option available to eliminate all component thread seals
- Flow tested to 2MMscfpd

Valve minimum flow area corresponds to ID=0.6” which is

\[ A = \frac{0.6 \times 0.6 \times 3.14}{4} = 0.282 \text{ sq in.} \]
High Volume Check Valves

- Large streamlined flow area - reduced pressure drop and erosion
- Dual sealing design - elastomeric and metal to metal
- Minimal pressure restriction
- Available in a large variety of materials and elastomeric combinations
- Available in many high pressure metal to metal thread connections
- Welded option available to eliminate all component thread seals
Solid body design- “No Longitudinal Welds”

New Solid Body “Grooved” mandrels provide minimal running clearance for multiple umbilical (DHG’s, chemical injection, etc)

Improved umbilical protection

Maintains internal and external pressure rating

Highly customized designs available

Available in premium alloy materials
PBP-Gas Lift Valve

- Maximum bellows travel stop increases the cycle life of bellows.
- "PBP" - Positive Hydraulic Bellows Protection minimizes bellows distortion at high Hydrostatic pressures.
- Three Ply Monel Bellows – Support rings available.
- Improved vibration dampening fluid system insures better valve performance in dynamic conditions.
- Optional "Dual" reverse flow check assembly (R-2DBC).
Commonly Used Bellows Protection for IPO Valves

- Fluid Filled Bellows
- Reduces Vibration Only
- Does not protect against pressure differential
Old Design - No Bellows Protection
NEW POSITIVE BELLOWS PROTECTION (PBP) for IPO Valves

- Fluid Filled Bellows
- Reduces Vibration
- Positive Hydrostatic Bellow Protection
- Eliminates excess operating differential
RH-2 IPO Valve for High Injection Pressure Applications

- Maximum dome charge 3500 PSI
- Positive Hydraulic Bellows Protection
- Inverted Bellows Design
- Three Ply Monel Bellows – support rings available
- Welded Bellows
- Welded Pressure containing joints
- High Pressure valve core
- High Flow back check design
Questions/Comments
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