WELLTEC® COMPLETIONS PRODUCTS

- THE FLEX-WELL® CONCEPT

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CONTENT

1. INTRODUCTION TO WELLTEC WELL COMPLETIONS
2. FLEX-WELL® PRODUCT OVERVIEW
   • Welltec® Annular Barrier (WAB®)
   • Welltec® Data Monitoring (WDM™)
   • Welltec® Flow Valve (WFV™)
3. WLIT FOR JUNCTION-LESS LATERAL INTERVENTIONS
Welltec Transformation Centre Esbjerg

- Build year: 2014
- 6000m² Manufacturing
- 1250m² Office
- Heliport: 5.4 km
- Port: 7.8 km
- Kastrup Airport: 294 km
- Billund Airport: 56.7 km
- Esbjerg Airport: 5.4 km
FLEX-WELL® COMPONENTS

1. WAB® ZI (Welltec Annular Barrier) – for zonal isolation
2. WAB® WI (Welltec Annular Barrier) – for well integrity
3. WAB® LH (Welltec Annular Barrier) – for liner hanger
4. WFV™ (Welltec Flow Valve) – for flow control
5. WDM™ (Welltec Data Monitoring)
6. WDR™ (Welltec Data Receiver)
7. WSC (Welltec Sand Control)
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WAB® - How does it Operate

Standard Configuration

- Pressure is applied to the well bore, well fluid flows through the expansion port in the base pipe (casing or liner)
- The applied hydraulic pressure elastically expands, yields and then plastically expands the expansion sleeve to conform to the open hole
- This plastic expansion process and multiple seal elements accommodates for hole irregularity or ovality
- WAB to formation sealing is achieved via HNBR, Aflas or for extreme HT applications, all metal seals
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**WAB® - How does it Operate**

**Expansion via a Valve Block**

- Pressure is applied to the well bore, fluid flows through a screen filter and expands the WAB
- The valve delivers a number of benefits
  1. Enables lower expansion pressures with high Delta P capabilities
  2. Isolates the expansion port on reaching the final expansion pressure to retain casing burst and collapse integrity
  3. Enable pressure balance from within the expanded WAB to either annulus above or below the WAB. This removes any collapse pressure on the expanded sleeve.
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5” Slim OD WAB® with High Anchor Capabilities
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WELLTEC® DATA MONITORING (WDM™)

Ultrasonic Transducer
Pressure / Temp Gauge and electronics
Battery supply

WDM Housing
- Press & Temp sensor
- Electronics, Power
- Wireless Telemetry

Deployment Protectors
Base Pipe
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WELLTEC® FLOW VALVE (WFV™)
412WFV SINGLE SLEEVE FIXED CHoke (FC)

**Single sleeve**
- Fully open or fully closed fixed choke valve
- Selectable choke inserts changeable at the well site
- Full bore ID as per 4 ½” liner, OD 5.57” for deployment in 8 ½” or 6” ID holes
- Burst 8,000 psi, collapse rating 4,000 psi
- Robust seal design for 1500psi unloading P at high flow rate
- Sleeve manipulated by Welltec Tractor/ Well Stroker/ Well Key.
- Multi-Lateral identification and entry using WLIT Tool
- Key slots for locking sleeve in open or closed position
- Flush profile on OD of valve
WELLTEC® FLOW VALVE (WFV™)
EXAMPLE OF A 412WFV VC DUAL SLEEVE, TWO CHOKE POSITIONS WITH SCREEN INTERFACE ONE END

Dual sleeve

- This solution delivering a fixed choke for production, a large flow port for stimulation and a fully closed position
- Tractor drive by or stroker operated sleeves
- Unique sleeve shifting sequence based on the shifting profiles
- Sand control has been integrated from on the production flow port only
WELLTEC® FLOW VALVE (WFV™)
EXAMPLE OF A 412WFV™ VARIABLE CHOKE
WITH CHOKE FOUR POSITIONS

- The example shown opposite has five flow positions (Off + four Chokes)
- The choke sizes can be configured to meet flow or Delta P needs
- To operate the Well Stroker is modified to deliver equal movements of four Inches
- Each shift delivers a four inch stroke and gives two clear indications in the current readout due to the locking collet requiring approximately 1,500lbs to shift
WELLTEC® FLOW VALVE (WFV™) 412WFV8:4

- Three back to Back WFV’s within the gas zone configured for SI (no flow), choke flow 0.049 sqins, 0.7 sqins, full flow equal to 7.2 sqins (cross section of the 4 ½” production tubing) or a combination. This option enabling the gas zone to be choked back to provide gas lift to the oil zone as needed.
- One WFV within the oil zone flow area equal to 7.2 sq ins ensuring no Delta P loss across the WFV.
- A high rate propant frac was completed through this valve:
  - 300bbl, Xlinked fluid @ 20bpm @ 4000psi followed by propant @ 1ppg and 2ppg stages.
  - When 3ppg propant stages reached perforations, screen out occurred reaching the maximum allowable surface pressure of 7100psi
  - Total slurry pumped 723bbls
  - Total propant pumped 37.5klbs.
  - Total propant reached the formation 19.1klbs.
- Once deployed, the WFV’s are manipulated using the Well Tractor, high lift Key and Stroker to adjust the valve positions.
  - Large cost savings v’s CT operated systems.
  - Valve position confirmed via the Hardware Scanner (WHS)
FLEX-WELL® COMPONENTS
ILLUSTRATING A CASED HOLE SIDE TRACK, TAML LEVEL 4 JUNCTION

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**Components and Specifications**

- **OD**: 2 1/8"
- **Length (w/o 3rd pty or WT)**: 32 feet
- **Weight in air**: 220 lbs
- **Maximum Pressure**: 20,000 psi *
- **Maximum Temperature**: 257 deg F
- **Tensile Strength**: 36,000 lbs
- **Compressive Strength**: 30,000 lbs
- **Well Fluid**: oil/water/gas *
- **Min. deviation at junction**: 30°
- **Max. ID at junction**: 8.5” CH or OH
- **3rd party tool requirements**: Mono conductor

*WUS has lower P rating and ineffective in gas environment*
QUESTIONS?

..AND THANK YOU FOR YOUR TIME