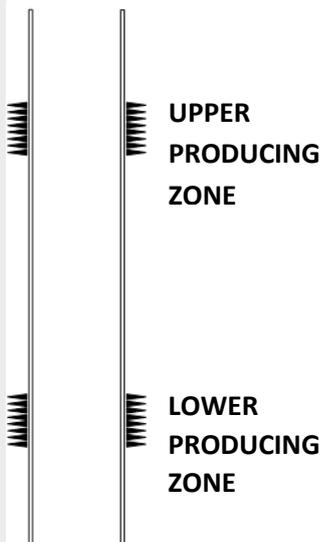


Dual Zone ESP Completions



UMS Flowell provide equipment and engineering solutions for dual zone completions. To efficiently produce a dual zone due to each zone having different productivity index (PI), each zone is produced with its own ESP. Using ESPs in this way can be a cheaper alternative to intelligent completions.

Some common dual zone completions include;

- Comingled discharge fluid with ESP Packer separating zones
- Comingled discharge fluid with Seal bore packer separating zones
- Independent production to surface with ESP Packer separating zones
- Independent production to surface with ESP Packer separating zones

A drawing of each completion is shown on the attached sheets.

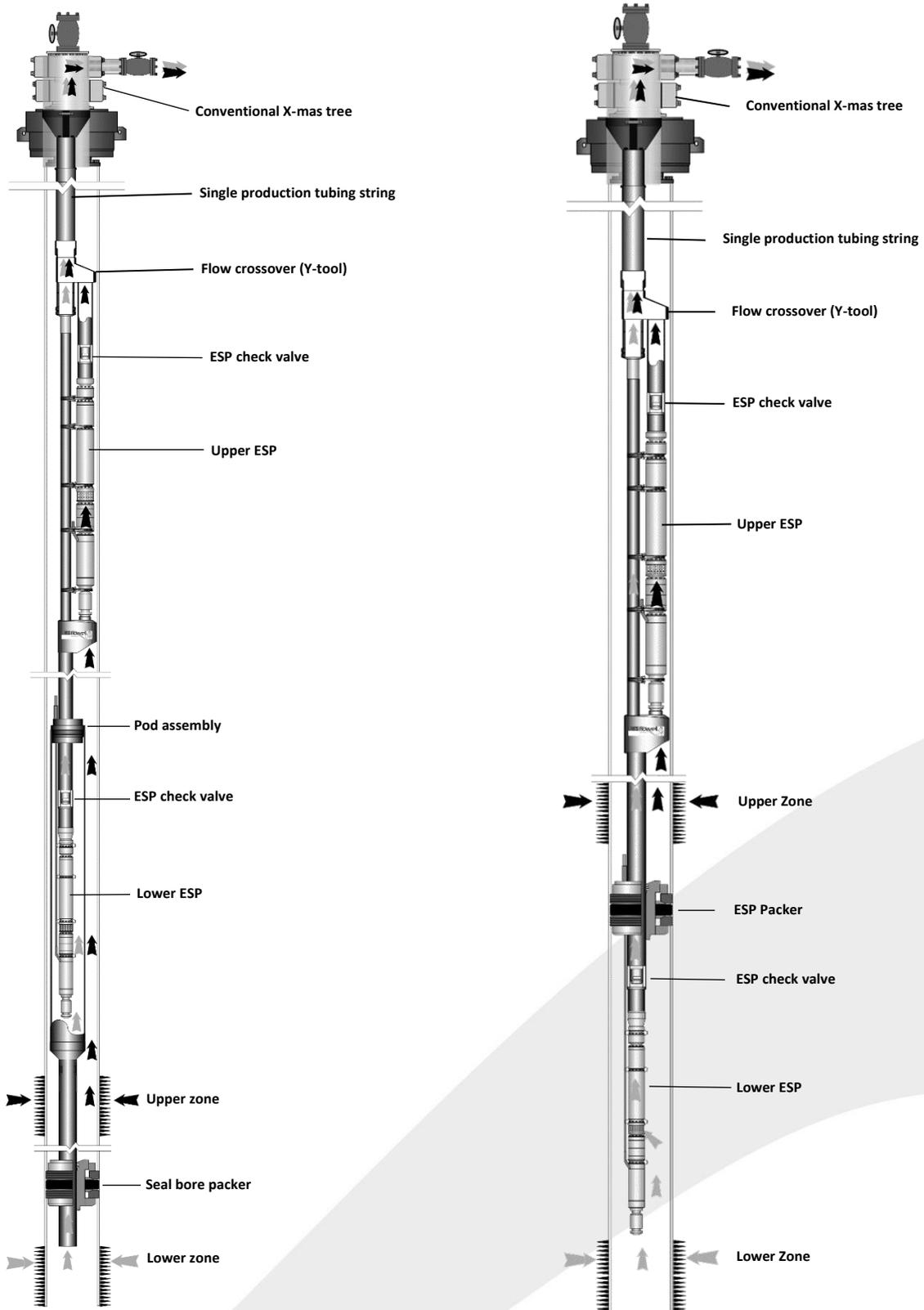
The Independent production to surface method is normally chosen when there is a fiscal metering requirement to measure what each zone produces. It can also be an advantage over the comingled system in that variable speed drives (VSD) are not a necessity. For comingled systems, VSDs are required to get the upper and lower ESP to equal their discharge pressure. Unequal pressure shall result in reverse flow. In the comingled system, ESP check valves are required to prevent recirculation in the event that only one of the ESPs is operational. A comingled system uses a conventional Christmas tree, however for an independent production to surface with dual concentric tubing strings, a purpose designed Christmas tree is required. Both comingled and independent production to surface can have either a seal bore packer or an ESP packer isolating the production zones. The seal bore packer has an advantage for providing a space saving solution when the zones are close together. In addition to this, the seal bore packer completion can be configured with a formation isolation device to prevent communication between both zones when the ESP completion is pulled.

With an ESP packer, tubing movement is eliminated by anchoring the tubing to the casing, however tubing stress analysis must be considered for both applications considering maximum differential pressure across the packer.

For both systems, the weak point in the system is determined by the bypass tubing for the upper ESP. Installation, operating, and pulling loads must be considered when designing the system to ensure that the bypass has adequate strength for the chosen completion design. Please refer to the bypass datasheet to review the bypass tubing sizes that fit alongside a specific ESP series for the given well casing size and weight.

Equipment Datasheet	
Document #	034
Revision	AA

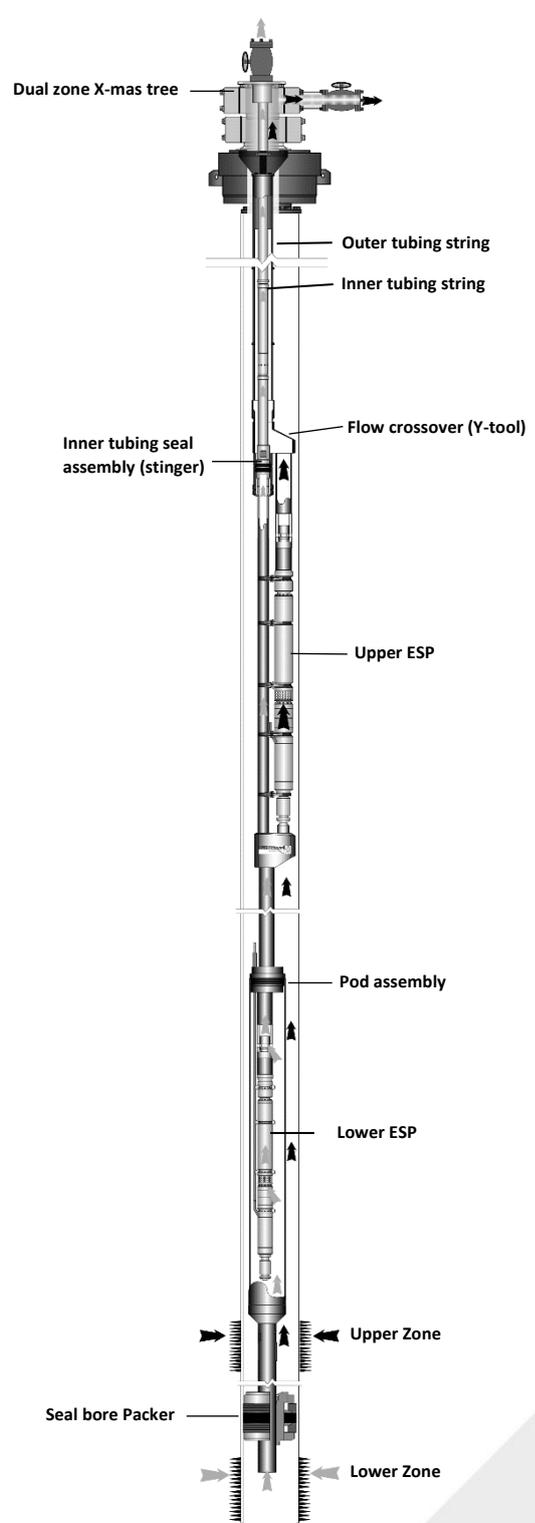
Dual Zone ESP Completions - Comingled



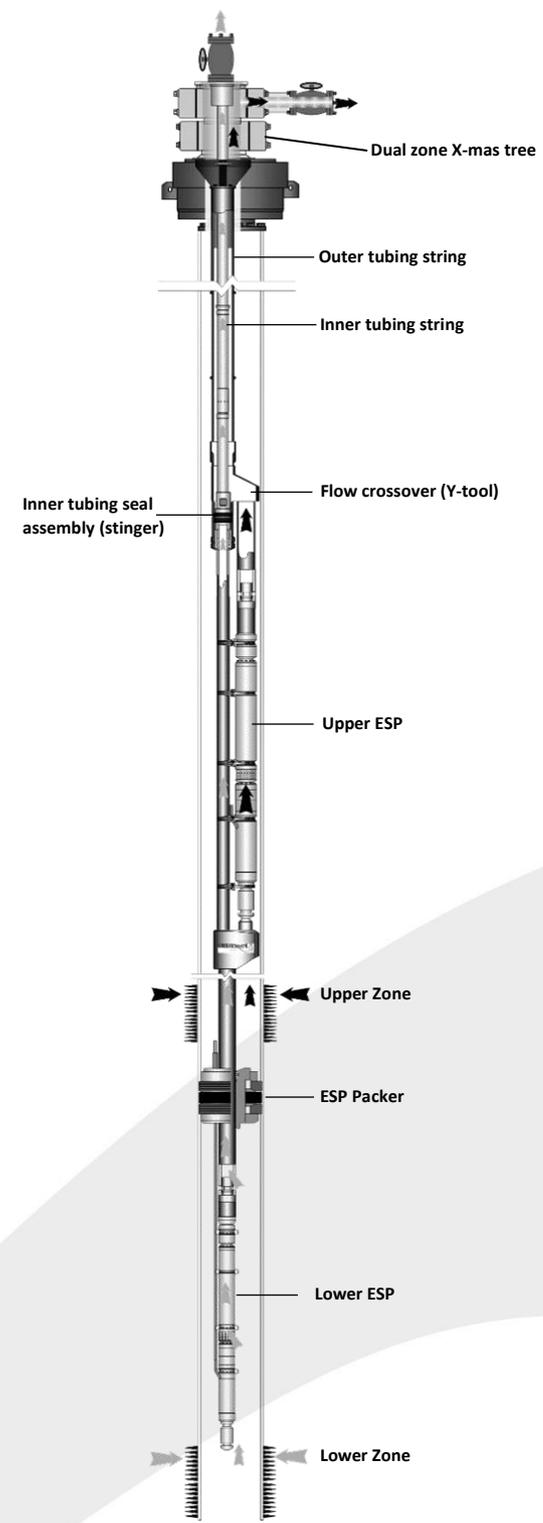
Turriff : +44 (0)1888 568771 East Kilbride: +44 (0)1355 222611 @ sales@umsflowell.com

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Document #	034
Revision	AA

Dual Zone ESP Completions – Independent production to surface



Independent production with seal bore packer



Independent production with ESP packer