

Inverse Gas Lift System

Facilitates gas lift installation in wells not previously configured for such systems

Applications

- Extending the economic life of wells
- Installing gas lift when annular integrity issues prevent gas injection via casing
- Providing gas injection below the production packer

Features and Benefits

- The inverse gas lift system (IGLS) is run on industry standard tools.
- Tree replacement is not necessary, and the system imposes only minimal topside modification.
- A calibrated pump-out plug facilitates pressure testing of potential leak paths in the upper completion.
- A shearable centralizer on the seal stinger provides positive space-out verification.
- The dual flow hanger features a low-stress slip system, which is suited to mature well bores.
- Metal-to-metal seals on the dual flow safety valve are qualified to API 14A standards.

Tool Description

The inverse gas lift system uses an insert string for gas injection, while production is routed through the annulus between the insert string and the existing completion. The IGLS installation does not rely on annular integrity, and the gas can be injected at any depth in the well. The system can be supplied in several configurations, materials and sizes to suit different applications. It is installed using traditional intervention techniques and does not require a rig or



The IGLS system is separated into upper and lower completion components. The upper completion has an Intermediate spool and concentric hanger at the wellhead, along with jointed tubing, and a seal stinger with pumpout plug. The lower completion includes a dual flow hanger / suspension hanger, a dual-flow safety valve, and injection valve.

workover, making it a cost-effective option to other interventions.

As part of the upper completion, the intermediate spool houses a no-go restriction to land the concentric hanger, which directs lift gas from the injection line into an insert string. Produced fluids pass through the concentric hanger and into the existing tree and flow line. A seal stinger engages the polished bore receptacle (PBR) of the dual flow hanger or suspension hanger, thereby connecting the gas injection conduit of the upper and lower completions. Once landed, the upper completion may be pressure tested against a pumpout plug incorporated in the stinger. The dual flow hanger (DFH) is set in the existing locking profile of the surface safety valve (SSV), and all loading is taken by the key profile.

A suspension hanger is offered as an alternative to the DFH if the existing well SSV profile cannot be used. The suspension hanger is set in the flow coupling or tubing to support the weight of the lower insert string.

The dual flow safety valve (DFS) is run as part of the lower completion to facilitate injection of gas through the insert string and production via the new annulus. It is set in the existing tubing-retrievable safety valve or safety-valve landing nipple seal bores, and is functioned via the original control line. Upon closure of the valve, the production and injection paths are fully isolated.



Inverse Gas Lift System

Specifications

Injection Flow Areas

Size (tubing x nipple)	4-1/2 × 3.813 in. (114.3 × 96.850 mm)	5-1/2 × 4.313 in. (139.7 × 109.550 mm)	5-1/2 × 4.562 in. (139.7 × 115.874 mm)	7 × 5.750 in. (177.8 × 146.05 mm)	7 × 5.950 in. (177.8 × 151.13 mm)
Spool injection port			1.350 in. ² 879.966 mm ²		
Concentric hanger			1.350 in. ² 879.966 mm ²		
Seal stinger			1.343 in. ² 866.449 mm ²		
Anchor latch			1.343 in. ² 866.449 mm ²		
Suspension hanger ID			1.343 in. ² 866.449 mm ²		
DFSV ID			1.326 in. ² 855.482 mm ²		

Production Flow Areas*

Size (tubing x nipple)	4-1/2 × 3.813 in. (114.3 × 96.850 mm)	5-1/2 × 4.313 in. (139.7 × 109.550 mm)	5-1/2 × 4.562 in. (139.7 × 115.874 mm)	7 × 5.750 in. (177.8 × 146.05 mm)	7 × 5.950 in. (177.8 × 151.13 mm)
DFSV – outer flow tube	2.625 in. ² (1693.545 mm ²)	2.946 in. ² (1900.641 mm ²)	3.693 in. ² (2382.576 mm ²)	7.700 in. ² (4967.73 mm ²)	7.762 in. ² (5007.732 mm ²)
DFSV – seal sub	1.750 in. ² (1129.03 mm ²) (11 ports)	2.856 in. ² (1842.577 mm ²) (11 ports)	2.856 in. ² (1842.577 mm ²) (11 ports)	6.22 in. ² (4012.895 mm ²) (9 ports)	6.020 in. ² (3883.863 mm ²) (9 ports)
Suspension hanger slips	1.027 in. ² (662.579 mm ²) (length <8 in.)	2.012 in. ² (1298.062 mm ²) (length <8 in.)	2.350 in. ² (1516.126 mm ²) (length <8 in.)	3.500 in. ² (2258.06 mm ²) (length <7 in.)	3.512 in. ² (2265.802 mm ²) (length <7 in.)
Suspension hanger body	2.110 in. ² (1361.288 mm ²)	3.707 in. ² (2391.608 mm ²)	3.877 in. ² (2501.285 mm ²)	6.27 in. ² (4045.153 mm ²)	6.276 in. ² (4049.024 mm ²)
PBR centralizers	2.170 in. ² (1399.997 mm ²)	4.169 in. ² (2689.672 mm ²)	4.236 in. ² (2732.898 mm ²)	8.61 in. ² (5554.828 mm ²)	7.046 in. ² (4545.797 mm ²)
Concentric hanger	2.138 in. ² (1379.352 mm ²) (9 ports)	5.107 in. ² (3294.832 mm ²) (9 ports)	5.107 in. ² (3294.832 mm ²) (9 ports)	5.595 in. ² (3609.670 mm ²) (10 ports)	5.595 in. ² (3609.670 mm ²) (10 ports)

*Above flow areas apply to specific tool sections rather than entire tool lengths.

