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GAS LIFT

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- Introduction
- Principle
- Procedures
- Basic Type of gas lift (CAMCO / Weatherford)

Gas lift introduction

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- Gas lift is an artificial lift system where gas is injected into a produced well casing to help lift liquids up to the surface through the production tubing.
- Common use worldwide as an efficient, cost-effective means to optimizing the production rate and enhancing the well economic
- When the formation pressure is insufficient to overcome the hydrostatic head of the fluid in tubing, the well will not flow. This can be in new well or existing well where bottom hole pressure (BHP) has decline while producing. Gas lift introduced to flow the well.

Principle Of Gas lift

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- Gas introduce into the oil as deep as possible. Usually from the Casing into the tubing.
- As gas mixed with the oil it will reduce the specific gravity of oil. Which means the gradient has been reduced.
- By reducing the gradient, the hydrostatic pressure is reduced to a point a point where the formation pressure is greater than the BHP.
- Provided the correct amount of gas is injected, it will remain in the solution until oil reach the surface.
- Too much gas, it will break the solution and return to surface without bringing any oil with it.

BASIC GAS LIFT VALVE TYPES

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- Why it's important to know your gaslift valve?
  - Correct GLV set in the SPM. If fail to set correct valve the well might not flow to its expectation or will not flow.
  - Long reach/short core pulling tool will not shear on bottom latch GLV. Accurate type of GLV need to capture on DOR.
  - Avoid additional run LIB @ Long core/short reach to confirm type of latch.

BASIC GASLIFT VALVE TYPES

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1. DUMMY VALVES

- Dummy valves are used to block off the ports in the SPM.

- The dummy valves remain in place until gaslift valves are required to be installed to enhance / optimize the production rate of the well.

- How to identify: No ports on GLV body.

BASIC GASLIFT VALVE TYPES

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2. Orifice Valves

- Installed in the SPM for continuous tubing flow gaslift applications, sometimes below a sequence of casing or tubing pressure sensitive valves
- How to identify: Ports in between the packing

BASIC GASLIFT VALVE TYPES

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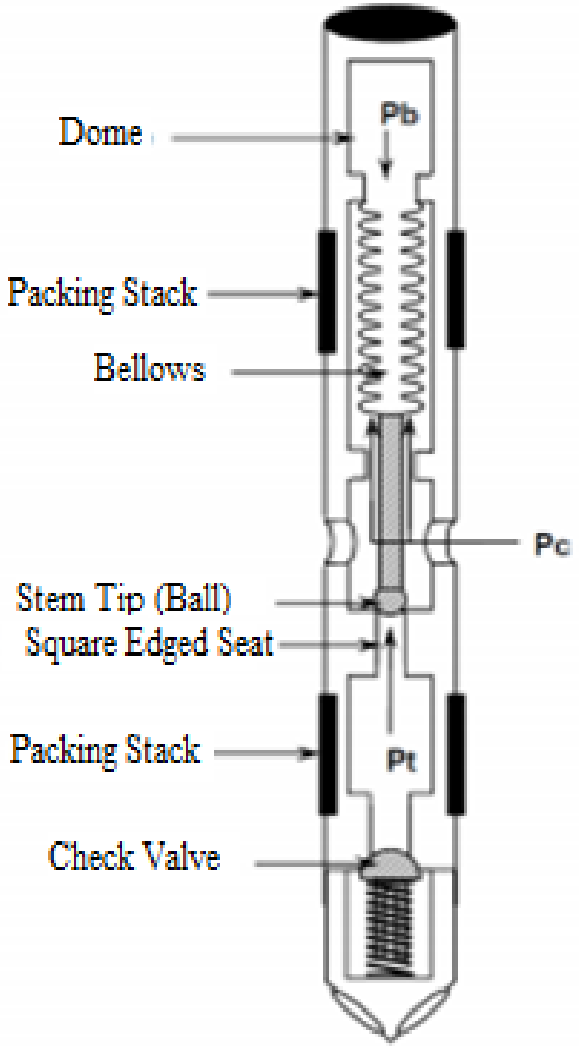
3. Injection Pressure Operated (IPO)

- Also called casing sensitive. Operated by casing gas pressure acting on a bellows against the force of the preset nitrogen pressure inside the valve.
- Closed when the casing pressure below the preset point.
- How to identify: Bellows Stem could be seen through the ports.



BASIC GASLIFT VALVE TYPES

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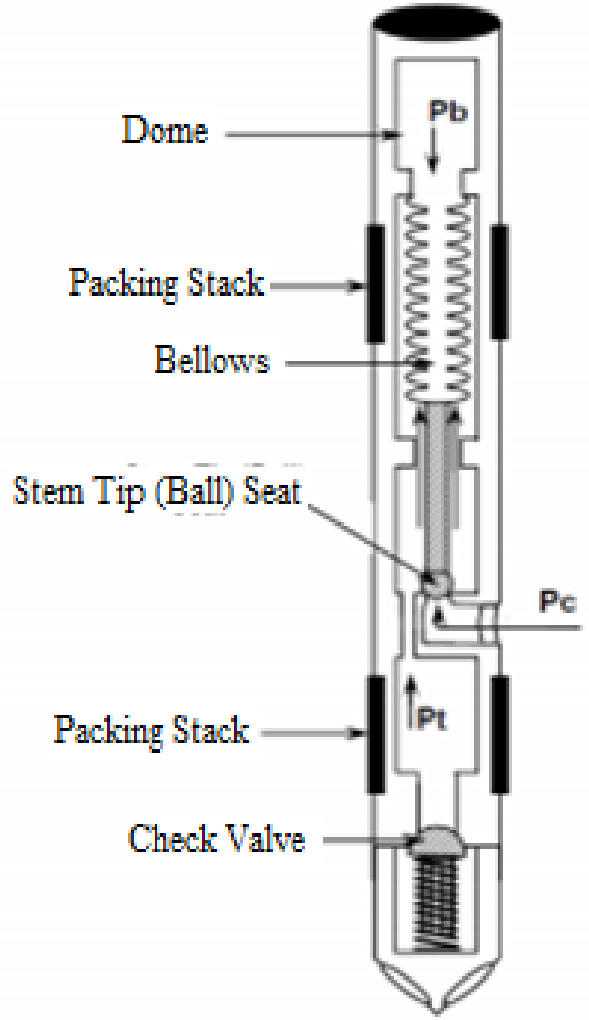
4. Production pressure Operated (PPO)

- Also called tubing sensitive. Operated by pressure in the tubing acting against the preset spring through a crossover seat. When the tubing pressure exceeds the spring force the opens and permits gas from the casing to enter the tubing.

- Casing pressure will not open these valve.

- Closed when the tubing pressure below the preset point.

- How to identify: Grub screw / allen screw seen on the body



BASIC GASLIFT VALVE TYPES

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Valve type		Camco	Weatherford	Pulling Tool	Running Tool
Dummy valve	Dummy top latch	JRD	RD-1	Short core/Long reach	JK
	Dummy bottom latch	DK-1	RD-1BL	Long core/short reach	GA2
Orifice Valve	Orifice top latch	BKO-3	RO-1	Short core/Long reach	JK
	Office bottom latch	DKO-2	RO-1BL	Long core/short reach	GA2

BASIC GASLIFT VALVE TYPES

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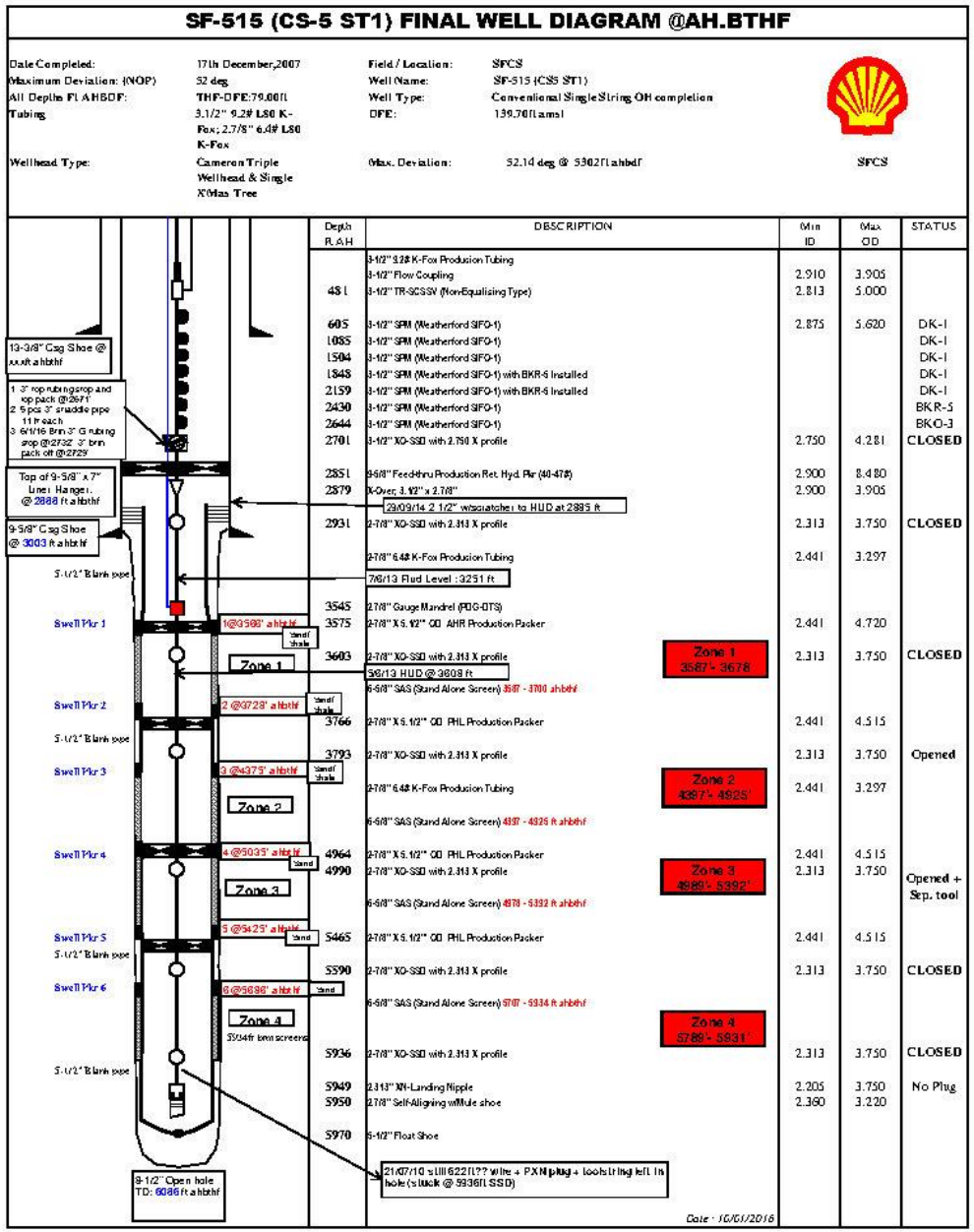
Valve Type		Camco	Weatherford	Pulling Tool	Running tool
Injection Pressure operated (IPO)	IPO Top latch	B1	R1	Short core/Long reach	JK
	IPO Bottom latch	BK1	R1BL	Short core/Long reach	GA2
Production Pressure Operated	PPO Top latch	BKF12	RF1	Short core/Long reach	JK
	PPO Bottom latch	BKR 5	RF-1BL	Short core/Long reach	GA2



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Well SF 515

Tubing Size	3.5”
Well Type	Oil Producer
Well background	SPM#05 require change out to dummy valve
Well Objective	SPM#05 GLVC

Tools and Equipment

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- Refer to well diagram/program/procedures and confirm tools sizes. Check all relevant tools and spares ready onsite
  - Kick over tools- OK6
  - pulling tools- JDC LR/SR @ PCE LR/SR
  - GL valve catcher- c/w X/ XN/ Slip lock

Tools and Equipment

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- LIB
- Running tools JK (top latch running tools, GA2 (bottom latch running tools)
- Gas lift valve spare onsite- Refer job program
- Injection @ bleeder hose
- Plug

Ensure all tools are in good condition and tested on surface.

Pulling GLV Procedures

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- Shut in well.
- Perform tubing clearance (drift/gauge ring) to XN nipple/HUD. Drift/gauge cutter. Tag F/Level depth.
- Set GL valve catcher anywhere except at the HUD ie: scale, sand
- Closed in gas lift supply.
- Pressure balancing.
  - Bleed down CHP.
  - Install plug and pump liquid
  - Open the SSD circulation device.
  - Retrieve GLVC from top to bottom

Pulling GLV Procedures

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- Record the CITHP and CHP. If the CHP is higher than the CITHP, proceed to
  - Pressure balancing – depend on well condition (as discussed above)
- Make up KOT c/with JDC pulling tools.
- RIH the KOT at moderate speed until about 30 feet above the depth of the side-pocket mandrel where the valve is to be pulled. Check pulling weight of the tool string.
- Lower down toolstring to below 5 ft or 10 ft, pull back to locate and trigger the KOT by applying over pull W/T of 200 lbs. Lower down and latch on GLV fish neck.

Pulling GLV Procedures

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- Light tap to latch on GLV might need if presence of wax, scale.
- More than 5 times attempt fail to latch on GLV, POOH. Investigate for any sign of miss run.
- Once confirm PT latch on GLV, proceed to jar up using mechanical/hydraulic jar. Record numbers of jarring. Note any changes of CITHP/CHP when the valve is free.
- Once KOT on surface, perform well exit procedures.
- Check and report condition of GLV that retrieved from the well.

Setting GLV Procedures

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- Make up KOT c/with running tool and new GLVC
- RIH the KOT at moderate speed until about 30 feet above the depth of the side-pocket mandrel where the valve is to be pulled. Check pulling weight of the tool string.
- Lower down toolstring to below 5 ft or 10 ft, pull back to locate and trigger the KOT by applying over pull W/T of 200 lbs.
- Lower down and locate GLV onto the valve pocket. Note the depth.
- Applied 70% jar (half jar) at least 20 times to work GLV into the pocket and lock it in place.

Setting GLV Procedures

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- When satisfied that the valve/dummy is locked in place
- Top latch GL- Continue to overpull to activate the hydraulic or upstroke jars to shear the release running tools.
- Bottom latch GLV- Running tools shear during jarring down. Check the GA-2 running tool tell-tales pin are sheared. Notes: Overpulled might seen as the locating finger is engaging the orienting sleeve. Jar up required to release.
- Conduct TIC

Note And Caution During Gas lift valve Operation

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- Never pull GLV in tubing under balance condition.
- CITHP-CHP equalization should be based on BHP, not surface pressure.
- Even though casing shows zero pressure there may be a hydrostatic pressure differential at the valve depth. Calculate the pressure inside and outside the tubing to determine the pressure.
- Do not proceed to retrieve the valve/dummy if time does not permit a complete and full replacement on any one SPM.
- Use minimum amount of stem in all operation. The use of minimum required jar force will reduce the chance of damaging the latch and GLV.

Note And Caution During Gas lift valve Operation

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- The exact amount jarring down is at the operator discretion but must be sufficient to properly set the GLV.
- Do not use quick connects on the bottom of the KOT as this will not allow the tool to kick over due to improper length.
- Never attempt to open the link jar fully during the jarring down process as it will shear the valve releasing pins in the running tool prematurely, and the valve/dummy not be properly set and locked in place. Moreover, the bottom of the running tool may not slip over the running head of the valve/dummy. Further jarring down will damage the running head and the bottom portion of the running.
- If required to change pulling tool from the JDC PT to PCE HDPT the lock ring must be check. If failed to do so PT will shear but might not release from the GLV.