



Frequently Asked Questions

1. What is the maximum angle that your pump can be set at?

- HARP™ (High Angle Reciprocating Pump) can be set at any angle. The ideal angle to place this pump is between 80° to 90°, this is where the pump intake is able to pick up good quality fluids.
- HARP™ has been landed at inclinations up to 94°.

2. If I set a pump at a higher angle, will this cause additional wear on my tubing and rods, how do I manage that?

- Higher pump fillage and efficiency, this allows for reliable valve activation on every stroke. The valves work differently than a conventional pump, the springs ensure that the pump valves close reliably with the pump landed at any inclination.
- Wells sent in for review will have a rod design created to reduce or eliminate buckling, determine side loads and gearbox loading. Additional recommendations may include boronized rod and tubing couplings which may be utilized in cases of severe dog leg severity.
- High pump fillage results in high quality fluid being discharged into the tubing string annulus with the rod string. A Baird valve installed on surface will keep solution gas from reaching bubble point and maintain a high-quality fluid throughout the length of the tubing, resulting in higher lubricity and less wear between rods and tubing.

3. What are the main differences between your pump and a conventional pump?

- Conventional pumps require a ball & seat + gravity to complete the seal. Once a pump is set at greater than 45° gravity becomes less effective and subsequently results in a drop of pump efficiency. Conventional cages with springs or other anti-gas locking devices such as a side-kick, hart breaker, etc. have also proven to be less effective at higher angles.
- There are articulated joints each one allows for up to 5° articulation, this reduces friction and barrel wear caused by side loading when the pump has to be placed at high angle and the barrel may become deflected.
- The HARP™ is equipped with the following hardware which allows for efficient performance at high angles:
 - i. Articulating Rod Joint - Rod centralization, prevents premature wear of barrel.
 - ii. Bushed Barrel Assembly - Centralization of valve rod; prevents high wear of valve rod guide.
 - iii. Articulated Plunger - Eliminates pump placement restrictions and reduces friction. Permits efficient plunger tracking inside pump bore. Note: Varied seals & configurations available upon request.
 - iv. Spring loaded Valves - Tested to over 3 million cycles. Increased pump efficiency, guaranteed valve reseal each stroke.
 - v. Valve Assemblies - Travelling valve stem and standing valve trip bar combine to open the travelling valve every stroke which results in preventing gas locking.



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4. How do I identify an ideal candidate?

- Typically, we are looking for wells that have an increased GLR over time, symptoms include; gas locking, low pump fillage or pump efficiency. In addition to the above mentioned we also look for an opportunity to lower the production string which allows for;
 - The pump intake to access high quality fluids.
 - Reduce hydrostatic pressure on the formation resulting in an increased inflow.
 - In cases of high DLS a flow tube extension may be used to lower the pump intake to the desired depth. We have installed flow tube extensions of up to 65m, they are designed to mitigate friction losses depending on tubing size.

5. I have a lot of wells in my field that are gas locked, I have heard that your pump can handle more gas, what is the maximum GOR that your pump can handle?

- The Raise HARP™ pumps have been successful in up to 15,000 scf/bbl.

6. How many High Angle pumps have been installed?

- As of September 1st 2019, over a 100 High angle pumps have been installed.

7. What formations have your pumps been installed in?

- **Canada:** Slave Point, Viking, Lloydminster, Glauconite, Basal Quartz, Cardium, Mannville, Sparky, Midale & Torquay.
- **USA:** Eagleford, Delaware Basin, Granite Wash, New Mexico and Permian.
- **International:** Romania.