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Frac-Point™ Open-Hole Fracture Completion System

Frac-Point: Proven technology for open-hole completions

BAKER HUGHES

Baker Oil Tools

Frac-Point Targets Frac Placement to Reduce Cost, Increase Productivity and Accelerate Return on Investment

Quick and to the Point

Producing gas in tight shale formations often requires major pumping investments. Traditionally, operators' choices were limited when fracturing a tight reservoir. One option was to simply pump frac fluid into the open hole and hope for the best, which resulted in frac fluid flowing mainly to the area of least resistance, reducing production along the rest of the wellbore.

Another choice was to isolate each zone along a horizontal wellbore by repeatedly cementing, plugging, perforating, and fracturing. That meant multiple trips downhole, the expense and risk of perforating, and the cost of having pumping trucks on standby for days at a time.

Baker Oil Tools has developed a better option. The Baker Oil Tools Frac-Point Open-Hole Fracture Completion System allows you to pinpoint fracture placements without cementing. That means improved initial productivity, accelerated reservoir drainage, and a faster return on your investment.

Baker Oil Tools sets the standard for innovation, performance and reliability in completion technology. With the Frac-Point Open-Hole Completion System, Baker Oil Tools delivers a solution that can improve production in tight shale reservoirs and turn otherwise unprofitable projects into money-makers.

Frac-Point Open-Hole Frac System

The Frac-Point system uses specially designed short-radius open-hole packers and frac sleeves to isolate intervals of a horizontal section for targeted fracture treatment placement. The result is greater control of the frac treatment and a greater chance of fracturing the entire length of the lateral and increasing production.

Frac-Point delivers three distinct advantages:

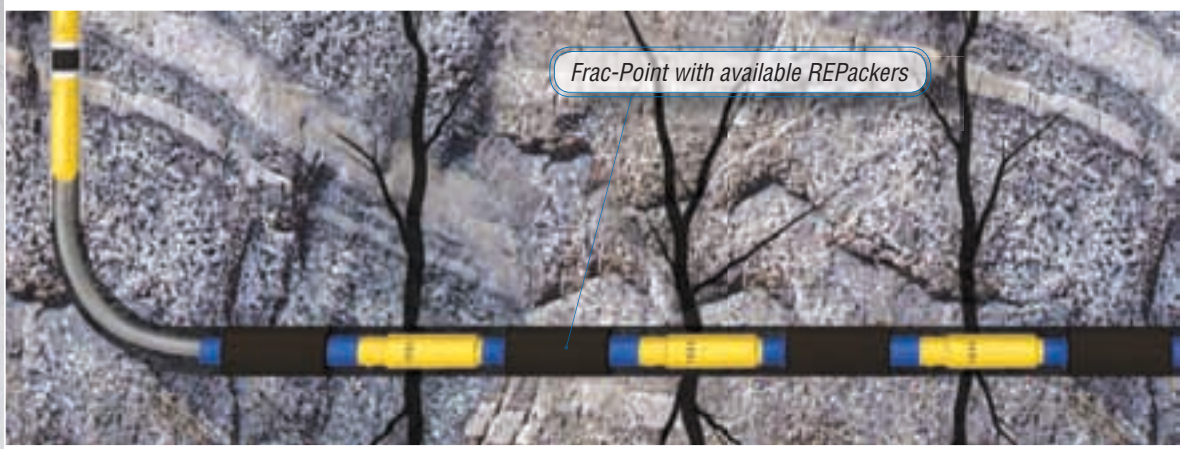
- **No cementing.** Open-hole packers provide isolation along the length of the liner. This eliminates the need to cement the liner in the lateral section and increases formation interface.
- **No perforating.** The sleeves provide access to the zone of completion for both fracturing and production.
- **No wasted time.** Frac-Point is a one-trip system, so fracture treatments for each section can be pumped on the same day—eliminating the expense of mobilization and demobilization of pumping equipment.

Getting Through the Tight Spots

One major challenge in completing high-angle wells in open hole is simply getting the tools through doglegs and other restrictions to total depth. Baker Oil Tools uses its design expertise and operational excellence to meet this challenge. Because Frac-Point packers are shorter than competing tools, they can navigate better through tight spots. Baker Oil Tools' proprietary torque and drag software estimates the probability of reaching total depth and helps eliminate wasted trips and wasted money.

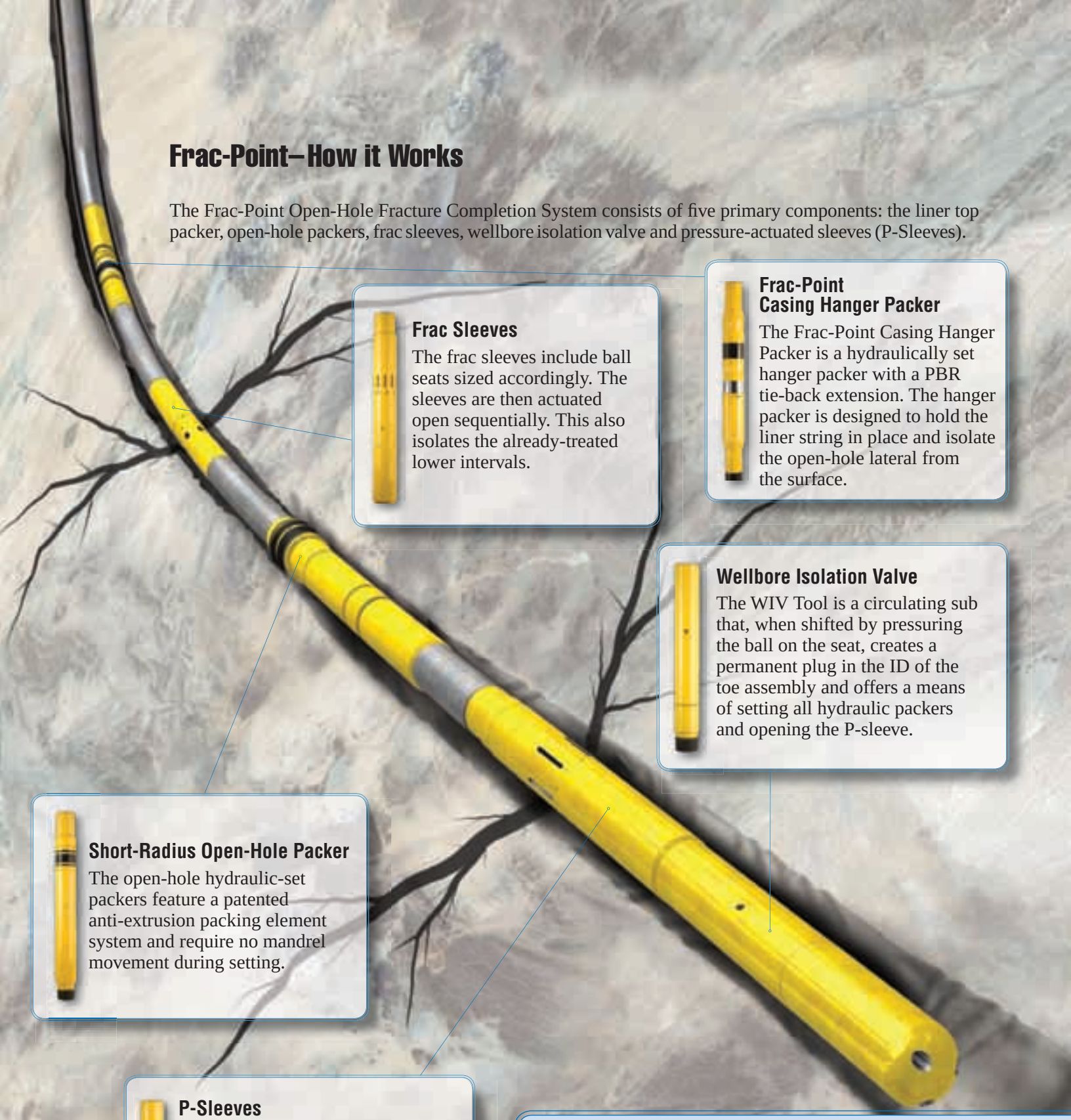
Reactive Element (RE) Packers

The REPacker™ can be run as an alternative to the short-radius open-hole packer. The REPacker is a self-energizing swelling elastomer packer that will eliminate annular flow. The activation methods for annular sealing are the swelling properties of the rubber element reacting with wellbore fluids, including either oil- or water-based environments. The REPacker can be built on virtually any OD pipe with lengths from 3 ft – 30 ft *(0.9 m – 9.1 m)*.



Frac-Point–How it Works

The Frac-Point Open-Hole Fracture Completion System consists of five primary components: the liner top packer, open-hole packers, frac sleeves, wellbore isolation valve and pressure-actuated sleeves (P-Sleeves).



Frac Sleeves

The frac sleeves include ball seats sized accordingly. The sleeves are then actuated open sequentially. This also isolates the already-treated lower intervals.

Frac-Point Casing Hanger Packer

The Frac-Point Casing Hanger Packer is a hydraulically set hanger packer with a PBR tie-back extension. The hanger packer is designed to hold the liner string in place and isolate the open-hole lateral from the surface.

Wellbore Isolation Valve

The WIV Tool is a circulating sub that, when shifted by pressuring the ball on the seat, creates a permanent plug in the ID of the toe assembly and offers a means of setting all hydraulic packers and opening the P-sleeve.

Short-Radius Open-Hole Packer

The open-hole hydraulic-set packers feature a patented anti-extrusion packing element system and require no mandrel movement during setting.

P-Sleeves

The pressure-actuated sleeve is similar to the frac sleeve, but does not contain a ball seat. The operator may choose to open the P-Sleeve at installation or have it remain closed until the frac crew is on site and rigged up.

Key Frac-Point Advantages

- Eliminates perforating and liner cementing operations
- One-trip installation saves rig time
- Better fracture extension control than nonselective hydraulic fracturing
- Reduces fracturing costs with smaller, selective treatments
- Treats up to eleven intervals/stages

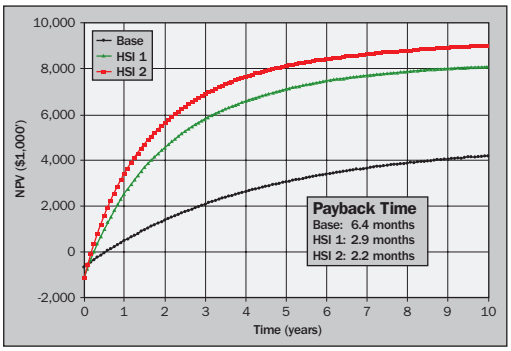
See the Effect of Frac-Point on the Value of Your Well

The cases below model two tight gas wells in Texas, one in a charged reservoir and another in a depleted reservoir. In each case, three scenarios were modeled:

1) Base Scenario: Completed as a vertical well and fractured

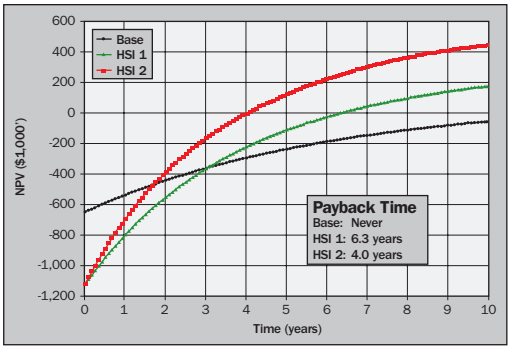
2) Frac-Point Scenario A: Completed as a horizontal well (1,500 ft) *(457.2 m)* and fractured in three zones using Frac-Point

3) Frac-Point Scenario B: Completed as a horizontal well and fractured in four zones using Frac-Point



Model Well #1: Frac-Point Supercharges Returns

This reservoir has a drainage area of 2,109 ft *(643 m)*, an average permeability of 0.3 md, an average reservoir thickness of 38 ft *(11.58 m)*, and an initial pressure of 1,500 psi *(103.42 bar)*, and 3,032 MMscf gas in place. In this scenario, the operator could shave four months off the payback time by using a four-zone Frac-Point completion.



Model Well #2: Frac-Point Squeezes Out Profits

In depleted reservoirs, the effect of Frac-Point can be even more dramatic. In this scenario, a reservoir with an initial pressure of just 600 psi *(41.37 bar)* and 800 MMscf gas in place, an operator would never break even using a traditional vertical, hydraulically fractured completion. The four-zone Frac-Point completion could pay for itself in four years.

For more information on Frac-Point and other Baker Oil Tools completion services, visit us at *www.fracpoint.com*

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Baker Oil Tools 6023 Navigation Blvd. (77011-1136) • P.O. Box 3048 (77253-3048) • Houston, Texas • Tel (713) 923-5198
Headquarters 9100 Emmott Road (77040-3514) • P.O. Box 40129 (77240-0129) • Houston, Texas • Tel (713) 466-1322