HaloFrac™

FRAC OPTIMIZED CHARGE

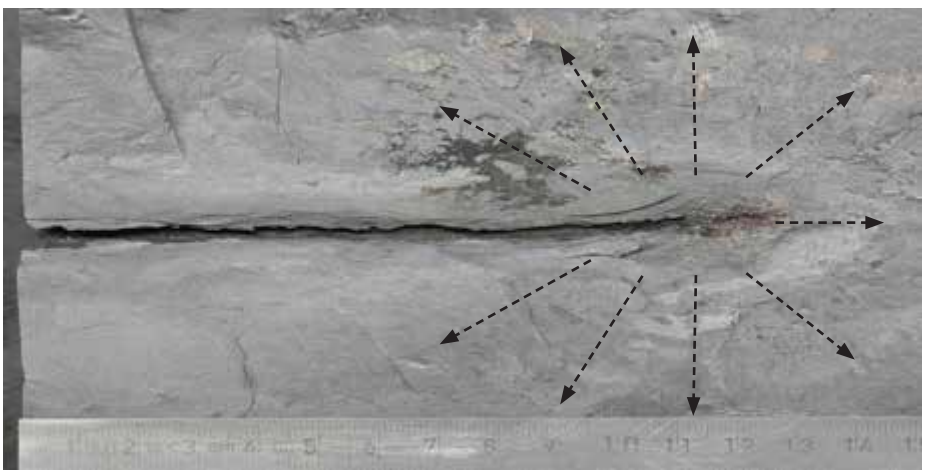
HaloFrac charges are designed and qualified to create an ideal perforation for hydraulic fracture stimulation in conventional and unconventional reservoirs. The proprietary technologies in HaloFrac incorporate DynaEnergetics' latest advances in liner materials and shaped charge geometry. Extensive modeling and testing has been conducted on a variety of low and high permeability rock samples in our Section IV laboratory. This iterative process has resulted in a shaped charge with superior frac performance across a wide range of formations.

Halofrac charges create a clean and open tunnel and provide clear access to tunnel tip fractures. Liner material (light colored material around the tunnel tip in the rock section image below, creating the appearance of a halo) penetrates into the shale core, initiating fractures that lower frac breakdown pressures. This improves the operating efficiency of hydraulic fracturing services.

Highly symmetrical and uniform fractures are generated around the wellbore casing and within the target reservoir when perforating with HaloFrac. The well is connected to more reservoir and total estimated ultimate recovery is maximized.

22.7G HALOFRAC™ CHARGE

Frac Optimized Charge



HALOFRAC PERFORATION TUNNEL IN SHALE

INCREASE TOTAL EUR

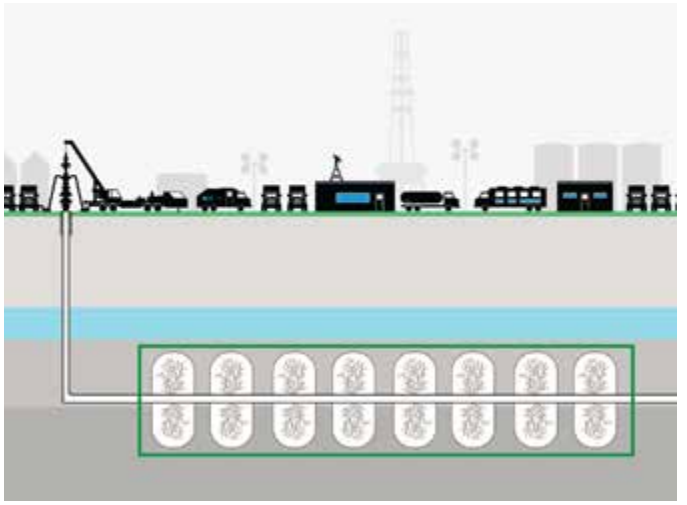
connect with more reservoir AND REDUCE WELL TCO

OPTIMAL WELL PRODUCTIVITY AND FRAC PERFORMANCE IN UNCONVENTIONAL RESERVOIRS

- Higher initial production
- Higher productivity ratios
- Lower breakdown pressures result from tunnel tip fractures
- Reduced treating pressures and increased treating rate
- Reduced bridging and screenouts during fracture treatment
- Uniform proppant placement across the perforations
- Uniform distribution of treating fluid and pressure across the perforations
- Faster ramp up to treating pressure

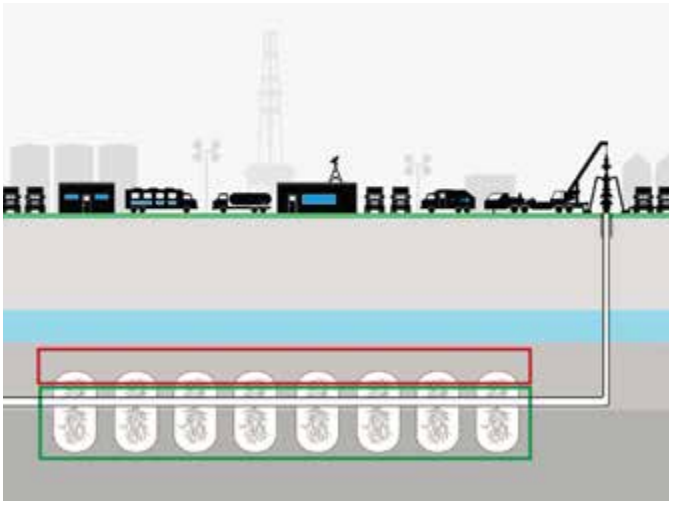
HALOFRAC™ SHAPED CHARGE

Uniform reservoir contact made around the wellbore covering the pay zone.



STANDARD DP SHAPED CHARGE

Reservoir contact predominantly made in the lower portion of the pay zone.



With conventional shaped charge technology (diagram upper right) casing entry hole size variation leads to non-uniform frac clusters. This frequently results in inadequate access to the upper portion of the pay zone and reduced production potential.

HaloFrac shaped charges lower the risk of non-productive clusters and stages. Uniform casing entry holes ensure the designed treatment pressure, fluid flow and proppant density is achieved at each perforation within the stage. This creates the greatest certainty that frac clusters will form as designed and well production is optimized.

HaloFrac charges deliver "better", more uniform fracs, require less "horsepower" and achieve higher fracture stimulation efficiencies. Every perforation contributes to production and delivers higher initial production and sustains those levels for longer. HaloFrac shaped charges enable optimum EUR at the lowest possible total cost of completion.

HALOFRAC™ PERFORMANCE SUMMARY

CHARGE TYPE	GUN OD	EXPLOSIVES TYPE	EXPLOSIVES WEIGHT	EHD (in.)	TTP (in.)	CASING SPEC	EHD VARIATION
HaloFrac	2-3/4"	HMX	15g	0.36	optimized for shale penetration	4-1/2", 11.6#, L-80	6.1%
HaloFrac	2-3/4"	HMX	15g	0.33	optimized for shale penetration	4-1/2", 13.5#, P-110	5.8%
HaloFrac	3-1/8"	HMX	22.7g	0.40	optimized for shale penetration	4-1/2", 13.5#, P-110	2.3%
HaloFrac	3-1/8"	HMX	22.7g	0.39	optimized for shale penetration	5-1/2", 23#, P-110	3.5%
Compatible with DynaStage and Conventional gun systems. Qualified with industry standard casing sizes, weight and grades.							