



Artificial Lift Services

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WhaleShark™ Dual Intake Gas Separator

USE IN WELLS WITH

- excessive pump gas interference: SRP PCP ESP
- inconsistent pump fillage
- low pump reliability
- high rate or high viscosity oil pumping
- sluggish flow conditions
- vertical or high inclination pump placements

VALUE FEATURES

- See **SPE Paper MS-209755**; a simple patented design, which achieves the highest possible downhole gas separation efficiency
- No packer or cup seals reduces operational risk
- Efficiently separates free gas from produced fluids up to 90° inclination
- Maximizes pump fillage and consistency to protect pump and rods from damaging erratic stress loadings
- Separation is not governed or limited by gas bubble rise velocity, as its unique and proprietary eccentric separation region and upward facing intake is governed by considerably more efficient liquid fallback
- Short but large internal diameter (ID) oval pump intake tubes minimize pressure loss
- Intake tubes are engineered to resist debris plugging

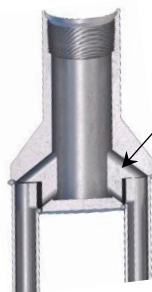


Separator Specifications

Series Model Name	45 DI	55 DI	60 DI
Outside Diameter, in [mm]	4.5 [114.3]	5.5 [139.7]	6.0 [152.4]
Length, feet [m]	18.0 [5.5]	18.0 [5.5]	18.0 [5.5]
Top Connection (box)	2-7/8" EUE	3-1/2" EUE	3-1/2" EUE
Bottom Connection (pin)	3-1/2" EUE	3-1/2" EUE	3-1/2" EUE
Tensile Rating, klbs _f [kdaN]	60 [26]	60 [26]	60 [26]
Torque Rating, ftlbs [Nm]	500 [678]	500 [678]	500 [678]
Maximum Capacities (intake gas volume fractions >20% and non-foamy fluids)			
liquid bbl/day [m ³ /day]	3,000 [477]	4,000 [636]	5,000 [795]
gas mscf/day [e ³ m ³ /day]	3,000 [85]	4,000 [113]	5,000 [141]
Separator Material	4130 alloy / 1026 DOM (Rockwell C < 22)		
Optional coatings	Electroless Nickel ENC (corrosion & scale)		

Dual Oval Pump Intake Tubes

Eccentric dual pump intake dip tubes maximize rate capacity



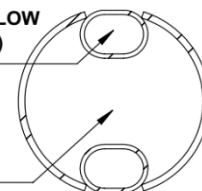
Engineered flow path to minimize pressure loss

Large ID Oval Pump Intake Tubes

Minimize pressure loss at high rates and high viscosities (55 DI shown below)

INTAKE TUBE FLOW AREA (PER TUBE)
= 1.67 IN²

HOUSING FLOW AREA AT SECTION
= 16.32 IN²



WhaleShark™ Packerless Dual Intake Gas Separator is the highest performing downhole gas separator. It improves downhole pump performance for high rate, high viscosity, and high inclination pumping. It is compatible with sucker rod pumps (SRP's), progressive cavity pumps (PCP's), and electrical submersible pumps (ESP's). It offers low downhole operational risk with no packer or cup seals required. It avoids limitations of legacy poor-boy and packer-style separators.

Liquid Fallback Gas Separation Technology – the separator uses an upward facing “no annulus, large open-mouth” collector intake that takes advantage of multiphase fluid flow liquid reversals or liquid fallback, common in the slug and churn flow regimes. The gas separation region above the collector body intake has eccentric (i.e., positioned to the side) dual pump intake dip tubes that are designed to slow fluid velocities down and maximize liquid fallback downward into the collector body. This unique engineered design has greatly improved gas separation efficiency, capacity, and slug flow tolerance for sustaining consistent high pump fillage under all downhole flow conditions. This is the only downhole separator not governed and limited by gas bubble rise velocity.

Multiphase Flow Liquid Fallback – occurs at high frequency all the way to 90 degrees inclinations, even at high fluid viscosities. This means the separator has high gas separation efficiency at all inclinations.