

Cormorant Engineering Retriever Pump System

Operating Performance and Specifications

Tubing and Pump Sizes

The Retriever Pump is designed to be deployed in Coiled or Jointed Tubing Wells. The following Table indicates the Production Tubing Size, Deployment Tubing Size and the Pump Diameters

Table 1

Production Tubing Size	Coiled/ Jointed Tubing	Pump Diameter
2 3/8	1.75 Coiled Tubing	1.45 in
2 7/8	2.0 Coiled Tubing / 2.06 Jointed Tubing	1.65 in
3 1/2	2 3/8 Coiled or Jointed Tubing	1.88 in

Retriever Pump Liquid Production Rates

The production capacities of the Retriever pumps are shown below. These rates are the net production fluid lifted from the well.

2 3/8 Pump

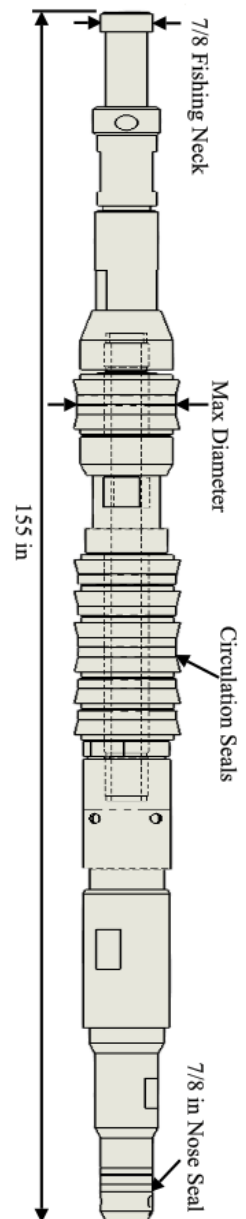
Table 2

Stroke Rate	Power Fluid Rate	Produced Fluid - BPD				Max HP at 3500 psi	Fluid Ratio			
		Plunger Dia - in					Plunger Dia - in			
SPM	BPD	3/4	7/8	1	1 1/8	3.9	2.9	2.2	1.7	
20	158	41	55	72	91					9
25	197	51	69	90	114					12
30	237	61	83	108	137					14
35	276	71	97	126	160					16
40	316	81	111	145	183					19

2 7/8 Pump

Table 3

Stroke Rate	Power Fluid Rate	Produced Fluid - BPD				Max HP At 3500 psi	Fluid Ratio			
		Plunger Dia - in					Plunger Dia - in			
SPM	BPD	7/8	1	1 1/8	1 1/4	5.5	4.0	3.1	2.4	
20	224	41	55	72	91					13
25	280	51	69	90	114					17
30	336	61	83	108	137					20
35	391	71	97	126	160					23
40	447	81	111	145	183					27



3 ½ Pump

Table 4

Stroke Rate	Power Fluid Rate	Produced Fluid - BPD				Max HP @3500 psi	Fluid Ratio			
		Plunger Dia					Plunger Dia			
SPM	BPD	1	1/8	1/4	1/2	hp	1	1/8	1/4	1/2
20	300	72	91	113	163	18	4.2	3.3	2.7	1.8
25	375	90	114	141	203	22				
30	450	108	137	169	244	27				
35	525	126	160	198	285	31				
40	600	145	183	226	325	36				

Plunger Diameter Selection and Sizing

The plunger diameter for a Retriever pump is selected based on the well characteristics and desired fluid production rates. As the wells get deeper, a smaller plunger is selected to keep the surface systems at a relatively low pressure. The following chart indicates the appropriate plunger for a retriever pump.

The *Net Well Column Pressure* is the pressure the pump must overcome to lift fluid to the surface. The Hydrostatic pressure is calculated based on the depth and specific gravity of the fluid, then adjusted by the *Bottom Hole Pressure* and the *Well Head Pressure*:

$$\text{Net Well Column Pressure} = \text{Well Hydrostatic Pressure} + \text{Well Head Pressure} - \text{Bottom Hole Pressure}$$

The resulting Pressure is used to select the Retriever Pump Plunger Diameter from Table 4 below.

Table 5

Net Well Column Pressure	Water Plunger Dia - inch		
	2 3/8 Pump	2 7/8 Pump	3 1/2 Pump
1000	1.125	1.25	1.5
2000	1	1.25	1.5
3000	0.75	1.125	1.25
4000	0.75	0.875	1.125
5000	0.75	0.875	1
6000	0.75	0.875	1

Pump Specifications

Pump Size	Piston Size	Stroke Length	Pump OD	Max Stroke Rate	Max Temperature	Pump Length
2 3/8 in.	1 1/8 in Diameter	31 in.	1.45 in.	40 strokes per min	300°F	
2 7/8 in.	1 5/16 in. Diameter		1.65 in.		300°F	152 in.
3 ½ in.	1 ½ in.		1.875 in.		300°F	