BAKER HUGHES

Centrilift

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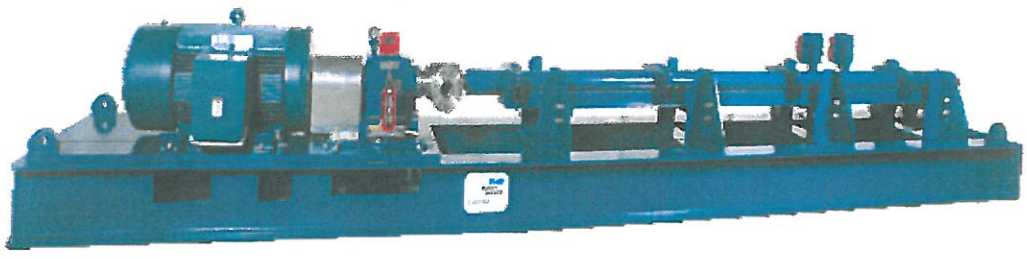
HPump
HORIZONTAL SURFACE PUMPING SYSTEM

Quote #: 09H1586 rev 1 15-Dec-09

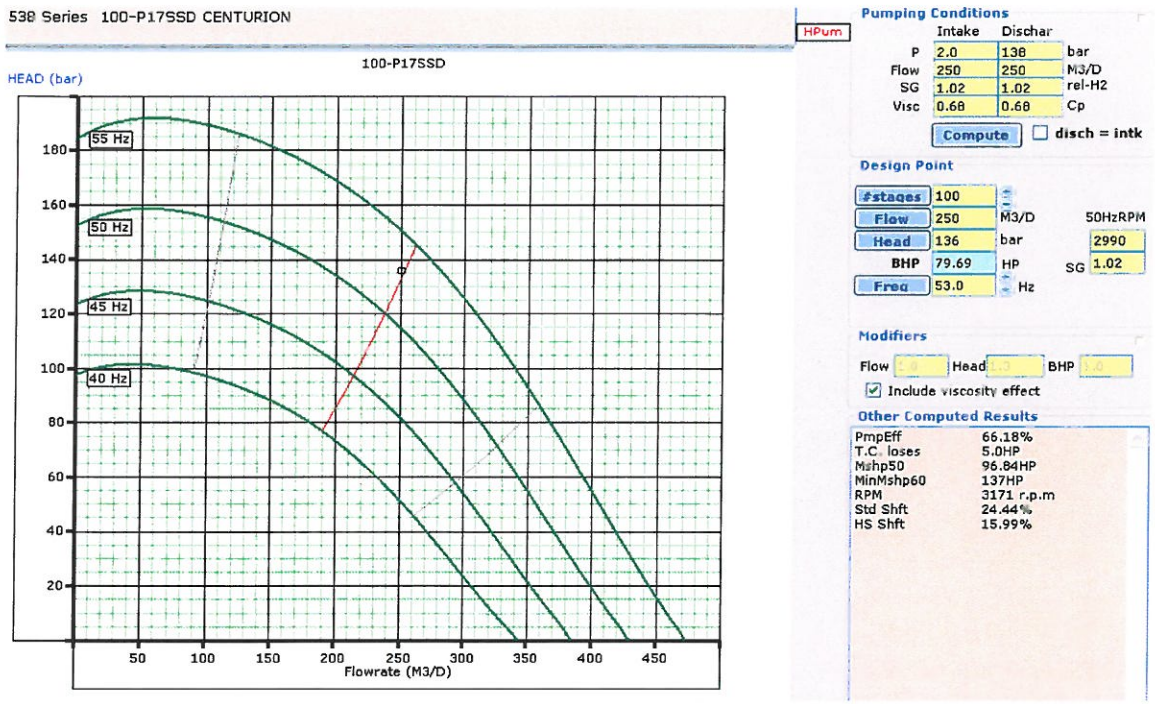
HORIZONTAL SURFACE PUMPING SYSTEM EQUIPMENT LIST

Item #	Component	Features										QTY
		# Stgs	Series	Stg	AR	HD/Base	Stg Mat.	Hsg #	Hsg Mat.	Shft Mat.	Coating	
1.00	**Pump # 1**	100	538P	P17	SSD	316SS	CL167	9	CS	MNL	None	1
2.00	Pump Stub	8.00" CRES										1
3.00	**Discharge**	4" - 1500# - RF - 513/538P - 316SS										1
4.00	**Intake**	4" - 150# - RF - 513/538P - 316SS										1
5.00	**HTC**	1.XE / 316SST / TYPE 2 / 1.188-6T										1
6.00	Seal Flush Kit	Plan 11 Std.										1
7.00	HTC Bracket	11 inch centerline - 1.XE										1
8.00	HTC Brkt HDW	1.XE / 1.XT / 875 - SS										1
9.00	**Motor**	Siemens CE										1
10.00	MTR CPLG Kit	1070T10 - 2 X 2.375										1
11.00	CPLG Guard	11 inch centerline - 1.XE										1
12.00	MTR Adj. Kit	Adjustment Bracket Kit - Regular Motor Width										1
13.00	MTR Mounting Hdw	0.75" SS										1
14.00	**Main Skid**	S1 - L3 25'										1
15.00	Skid Label Kit	Suitable for use with 3000 Series skids										1
16.00	**Main Cradle**	L3 (13' - 4")										1
17.00	**Intk. Press. Gauge**	0-60 psi Murphy Switchgage, Std										1
18.00	**Dish. Press. Gauge**	0-3,000 psi Murphy Switchgage, Std										1
19.00	Gauge Mount Kit	Std										1
20.00	**Vibration Switch**	STD Murphy Switch										1
21.00	**HTC Oil Level Ga.**	STD Murphy Switchgauge										1
22.00	**Start-Up Kit**	Miscellaneous parts for 538 Pump and 1.XE HTC										1
23.00	**Misc.**	Labor for Shop Assembly and Engineering										N/A
24.00	**Motor Controller**	Variable frequency controller, ESPD 3, 4GCS CSW 6P HTR 115V SDN RUN										1



Operating Conditions:

1. Operating window 200-300 m3/d, design point 250 m3/d
2. normal intake pressure of 29 psig (2 bar);
3. normal discharge pressure of 2000 psig (137 bar) @ 250 M3/D;
4. expected Specific Gravity of the medium of 1.02 kg/m³



Centrilift Horizontal Pump systems have the following benefits comparing with plunger pumps;

1. Constant Pressure development typical for centrifugal pump. Horizontal pump has no pulsing pressure injection as typical for plunger pump. Pulsing pressure can cause fracturing of the reservoir or damage to downhole completions.

2. Centrifugal pumps demands less maintenance than plunger pumps. Simple change out of parts, no overall revision required. Injection pump is same as downhole ESP pump, so low maintenance on pump. Benefit: Lower OPEX investment

3. Centrilift HP systems are designed for operation and location flexibility. Pumps can easily be exchanged. No re-alignment required for pump change. The skid is self supporting, so it can easily be moved around (simple foundation required). Benefits: Highly flexible

4. Centrifugal pump has wide operating range and can handle wide range of injection pressure compared with plunger pump. Centrilift HP injection system is frequency controlled. Benefits: flexible to changing injection conditions, interchangeable with other locations/wells.

5. Knowledge and experience within local European operation, several horizontal pump systems already in use in Europe.

6. Very Robust, Oil field proven technology.

7. High efficiency high pressure pump systems.

8. System requires no extern oil cooler or other components.

9. Low noise level (Below 72 dBA for total system), low vibrations

10. Patented Tungsten Carbide flanged sleeve and pedestal in every stage decreases rotational wear. Centrilift pump is considerable more resistant to sand and solids with a significant increase of run life compared with plunger pump. Modules designs with application of particle swirl suppression technology reduce sand cutting damage.

11. Reduced load on the pump shaft and Trust bearing HTC with this floater construction, resulting in extending pump run life.

12. Provide local engineering support for designing H-pump, problem analyses and operational recommendations and is able to support the products and deliver the spares locally and can supply repairs with local technicians.

13. Local H-pump design with Autograph PC™ software.

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Centrilift Variable frequency controller (VSC)

Main Design Features and Benefits

- Supplies soft start and stop for the horizontal injection pump
- Digital and analogue inputs and outputs
- Serial Modbus communication (SCADA).
- Most stringent component reliability test in the industry. 100% factory acceptance testing to 150% of component rated load virtually eliminates infant component failures
- PWM output: The surface motors are specified for use on VSC with PWM output waveforms
- NEMA 4 (IP54 protection) enclosure is suitable for outdoor industrial installations in non-hazardous locations
- 3-phase, 400 V, 50 Hz input power supply.