

Pumping Plant Performance Test



Diesel

Owner		Date	
Location		Person Conducting Test	YOU
County		Irrigation Method	Flood

ENGINE

Make	Cummins	Configuration	Inline 6	Standard Thermal Eff. (%)	35%
Model	8.3	Turbo Charger	<input checked="" type="checkbox"/> Yes		

Diesel Fuel Consumption

Test	Volume of Fuel		Elapsed Time		Flow	Input HP
	Gallons	Minutes	Seconds	Gal./hr.		
1	0.2000	1	23	8.67	460.6	
2	0.3000	2	2	8.85	470.1	
3	0.4000	2	42	8.89	472.0	
Average	0.30	1.67	22.33	8.81	1 467.56	

PUMP

Make		Size		Labelled GH Ratio	11:10
Well Depth (ft.)		Pump Set Depth (ft.)	160	Calculated GH Ratio	11/10
Static Depth (ft.)	75	Pumping Depth (ft.)	100	GH Efficiency	95%
				Standard Pump and Well Eff.	75%
				Well Column Diameter (in.)	10
				Column Fric. Fact. (ft./100 ft)	2.38
				Column Loss (ft)	3.808

Test	Discharge GPM	Pump RPM	Engine RPM	PSI	TDH (ft)	Water HP
1	1023	1800	1980	5	115.4	29.8
2					---	---
3					---	---
Average	1023	1800	1980	5	115.4	29.8

Overall Efficiency	6.4%	% of Standard Eff.	25.6%
Calculated Pump Efficiency	19.2%	Potential Reduction	74.4%
		Standard Eff.	25%

Fuel Cost (\$/Gal)	\$ 2.00
Total Acres Irrigated	
Seasonal Application Depth (inches)	
Seasonal RunTime (hours)	2,000

	Current Costs		Potential Costs		Potential Cost Reduction	
	Unit	Seasonal	Unit	Seasonal	Unit	Seasonal
\$ /Acre-In	\$ 7.75	\$ -	\$ 1.98	\$ -	\$ 5.77	\$ -
\$ / Hour	\$ 17.61	\$ 35.221	\$ 4.50	\$ 9.002	\$ 13.11	\$ 26,219

Pumping Plant Evaluation

Efficiency = POWER IN/POWER OUT

POWER IN= Gal. diesel/hr X (53.072) hp-hr/gallon
= 8.81 X 53.072 = 467.56

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Test	Discharge GPM	Pump RPM	Engine RPM	PSI	TDH (ft)	Water HP
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Average	2 1023	1800	1980	5	3 115.4	4 29.8

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Pumping Plant Evaluation

POWER OUT = Water Horsepower =
(Discharge GPM X TDH)/3960

= [1032 ft (2) X 115.4 ft (3)] /3960

= 29.8 HP (4)

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Pumping Plant Evaluation

POWER OUT /POWER IN =

Water HP (4)/Input HP (1) = Overall Efficiency (5)
= 29.8 HP/467.56 = 6.4%

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Pumping Plant Evaluation

Calculated Pump Efficiency (6) =

Overall Efficiency/(Engine efficiency)(gear head efficiency) = $6.4\% / (35\%)(95\%) = 19.2\%$

Standard Efficiency = 25% (Nebraska Standard)

% of Standard Efficiency = $6.4\% / 25\% = 25.6\%$

GOAL = 100%+

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Pumping Plant Evaluation

Potential Causes:

Inefficient motor

Inefficient pump

Mismatched pump and motor

Mismatched pump and system

Poor maintenance

Defective parts

Other?