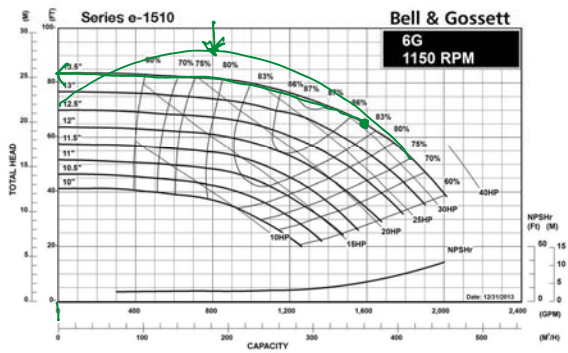


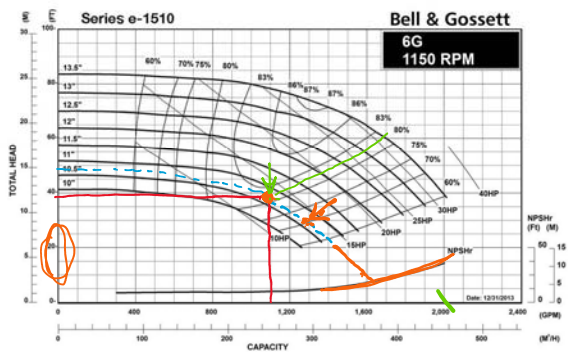
Pumps Class

Thursday, April 29, 2021 8:42 AM

SERIES e-1510 1200 RPM SYNCHRONOUS SPEED



SERIES e-1510 1200 RPM SYNCHRONOUS SPEED



$$(175/100) \times 1.86 = 3.25$$

$$(175/100) \times 4 = 7$$

Pump Head Estimate

	Low	High		
	Ft.w.c.	Ft	ft.w.c. per 100 ft of pipe	
Chiller	9.76	9.76		
Piping run	3.2	7	175	1.86
Fitting, valves, etc.	1.6	7		Rule of thumb 50% - 100% of the pipe loss
TOTAL	9.76+3.2+1.6=14.56			
	9.76+14=23.76			

HOA Switch savings estimate

Operators say the could be off for 2,000 hours a year if it was in Auto
 Eyeball estimate of bhp 13 bhp from pump curve
 Remember that 7.46 kW per hp
 $13 \times 7.46 = 9.698$
 $9.7 \times 2000 = 19400$ kWh
 Electric rate - \$.18/kWh =
 $19400 \times .18 = 3492.0$

Throttled to 40 ft.w.c., only need 24 ft.w.c.
 $40 - 24 = 16$ ft. pressure drop in the valve

$$Bhp = (\text{flow} \times \text{head}) / (3960 \times \text{pump efficiency} \times \text{motor efficiency})$$

Bhp
 Flow = 1100 (assume throttled to design)
 Head = 24 ft.w.c. (our estimate)
 Pump efficiency - 81.5% (from pump curve)
 Motor efficiency - 89.3%

$$(1100 \times 24) / (3960 \times .815 \times .893) = 9.1601 \text{ hp}$$

$$.746 \times 9.16 = 6.8334 \text{ kW}$$

$$.18 \times 6.83 \times (8760 - 2000) = 8310.744$$

Payback Summary for Optimizing the Impeller Trim

Simple Payback Comparison								
Location	San Francisco, CA		Sacramento, CA		Honolulu, HI		St. Louis, MO	
	Annual Savings	Simple Payback - Years	Annual Savings	Simple Payback - Years	Annual Savings	Simple Payback - Years	Annual Savings	Simple Payback - Years
Throttling	\$661	No Cost	\$468	No Cost	\$1,512	No Cost	\$174	No Cost
Impeller Trim	\$3,291	0.89	\$2,330	1.52	\$7,531	0.31	\$866	2.52
Impeller Trim via New Impeller	\$3,291	1.29	\$2,330	1.05	\$7,531	0.44	\$866	3.65
Variable Speed Drive - Reuse existing motor	\$3,251	5.17	\$2,302	6.09	\$7,441	1.77	\$855	14.60
Variable Speed Drive - New VSD Rated Motor	\$3,251	6.12	\$2,302	7.21	\$7,441	2.09	\$855	17.29
VSD - Reuse Motor - Owner Installed Controls	\$3,251	2.77	\$2,302	1.07	\$7,441	0.95	\$855	7.83
Redundant Right Sized Pump	\$4,672	18.28	\$3,309	21.53	\$10,693	6.24	\$1,229	51.60
Replace Pump with Right Sized Pump	\$4,672	6.48	\$3,309	7.63	\$10,693	2.21	\$1,229	18.30
Redundant Right Sized Pump - All Ready In Budget	\$4,672	0.20	\$3,309	0.24	\$10,693	0.07	\$1,229	0.58

Payback Summary - HOA Switch

Throttled kWh (assumes 24/7 operation when above the trigger temperature)					
Temperature below which chilled water is not required -		52°F. Follow the link to set the value			
Location	San Francisco, CA	Sacramento, CA	Honolulu, HI	St. Louis, MO	
Hours when Chilled Water is Not Required	1,572	2,819	0	3,617	
kW savings	10.9	10.9	10.9	10.9	
Annual kWh Savings	20,347	30,640	0	39,314	
Electric Rate (2014 Basis)	\$0.1621	\$0.1331	\$0.2917	\$0.0571	
Annual \$ Savings	\$3,298	\$4,078	\$0	\$2,245	