

**LIFT STATION
PUMP CALIBRATION**

Pump Calibration Procedure

Materials Required:

1. Tape measure (25-ft. to 50-ft. long by 3/4-inch wide) or some other suitable measuring device.
2. Stop watch or wristwatch able to be read to the nearest second.

Persons Required:

1. Three persons should be present to perform a pump calibration for a wet-well/dry-well lift station.
2. Two people can calibrate a submersible lift station.

Procedure:

1. Determine who will turn the pumps on and off, who will keep track of the water depth, and who will record the time.
2. For circular shaped wet-wells, determine the diameter of the well. For square or rectangular shaped wet wells, determine the length and width of the well. Then calculate the cross sectional area of the wet well.
3. To begin the calibration procedure, turn both pumps over to manual operation. Measure down from the lip of the wet-well to the water level (Pump On Depth). Next, turn on the pump and record the Pump On Time. Continue to monitor the falling water level in the wet-well. As soon as you have pumped for a certain amount of time (1 minute) or a certain change in water level (6 inches), turn the pump off and record the new water level (Pump Off Depth) and the Pump Off Time. This will complete the first drawdown.

4. As soon as the drawdown ends, the fill up begins. Allow the water level to return to the original height and record the time.
5. Two trials should be performed for each pump and averaged together to come up with the gallons per minute (gpm) for each pump. If the two trials differ by a large amount, a third trial should be performed. An average of the two trials with the best agreement should be used to obtain the gal/min for the pump. The other trial should still be recorded, but not considered when determining the gpm.

Switch both pumps back to the automatic mode after completing the calibration procedure.

Pump Calibration Example

The wet well at the Main Lift Station is 72 inches in diameter.

We took our starting measurement at a depth to water of 109 inches. Pump No. 1 was turned on and ran for one minute. The wristwatch used as a timer was started and allowed to run throughout the calibration. After one minute, the measured depth to water was 129 inches. Pump No. 1 was then turned off and the wet well filled to the starting depth of 109 inches. The recorded time was 6 minutes and 32 seconds.

Pump No. 1 was turned on again and ran until the measured depth to water was 129 inches. The pump was turned off at 7 minutes and 35 seconds. The wet well filled to the starting depth of 109 inches at 13 minutes and 38 seconds.

Pump No. 2 was turned on at 13 minutes and 38 seconds and ran until the depth was 129 inches. The time was 14 minutes 32 seconds. The wet well filled to the starting depth of 109 inches at 19 minutes and 50 seconds.

Pump No. 2 was turned on again and at 20 minutes and 45 seconds, the pump was turned off. The measured depth was 129 inches. The wet well filled to the starting depth of 109 inches at 26 minutes 14 seconds. The field-test for the Main Lift Station was now complete.

The inches of depth were converted to feet and the seconds converted to minutes as shown on the following page.

The Pump Calibration Forms were used to organize the data and calculate the average pumping rate of each pump in gallons per minute (gpm).

Depth to Water, inches		= Depth to Water, feet
109	÷ 12	9.08

Depth to Water, inches		= Depth to Water, feet
129	÷ 12	10.75

Recorded Time, minute portion		+ Recorded Time, second portion	= Time in seconds	= Time in minutes
0	× 60	0	0	0

1	× 60	0	60	÷ 60	1
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6	× 60	32	392	÷ 60	6.53
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7	× 60	35	455	÷ 60	7.58
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13	× 60	38	818	÷ 60	13.63
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14	× 60	32	872	÷ 60	14.53
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19	× 60	50	1190	÷ 60	19.83
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Depth to Water, inches

= Depth to Water, feet

	÷ 12	
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Depth to Water, inches

= Depth to Water, feet

	÷ 12	
--	------	--

Recorded Time,
minute portion

+ Recorded Time,
second portion

= Time in seconds

= Time in minutes

20	× 60	45	1245	÷ 60	20.75
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26	× 60	14	1574	÷ 60	26.23
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	× 60			÷ 60	
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	× 60			÷ 60	
--	------	--	--	------	--

	× 60			÷ 60	
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	× 60			÷ 60	
--	------	--	--	------	--

	× 60			÷ 60	
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PUMP CALIBRATION FORM: WET WELL AREA OF LIFT STATION

Main

If Wet Well is a Circle, Measure the Diameter in inches Diameter = 72 inches

Diameter, inches		= Diameter, feet
72	÷ 12	6

Diameter	× Diameter		= Wet Well Area
6 ft	6 ft	× 0.785	28.26 ft ²

PUMP CALIBRATION FORM: PUMP LIFT STATION

Pump On Time 1	Pump Off Time 1	TOFF1 - TON1	
0.00	1.00	1.00	Drawdown One (D1)

Pump On Depth 1	Pump Off Depth 1	DOFF1 - DON1	× Area	÷ (TOFF1 - TON1)	= GPMD1
9.08	10.75	1.67	28.26 × 7.48	1.00	353.01

Pump Off Time 1	Pump On Time 2	TON2 - TOFF1	
1.00	6.53	5.53	Fill One (F1)

Pump Off Depth 1	Pump On Depth 2	DOFF1 - DON2	× Area	÷ (TON2 - TOFF1)	= GPMD1
10.75	9.08	1.67	28.26 × 7.48	5.53	63.84

Pump On Time 2	Pump Off Time 2	TOFF2 - TON2	
6.53	7.58	1.05	Drawdown Two (D2)

Pump On Depth 2	Pump Off Depth 2	DOFF2 - DON2	× Area	÷ (TOFF2 - TON2)	= GPMD2
9.08	10.75	1.67	28.26 × 7.48	1.05	336.20

Pump Off Time 2	End Time	TEND - TOFF2	
7.58	13.63	6.05	Fill Two (F2)

Pump Off Depth 2	End Depth	DOFF2 - DEND	× Area	÷ (TEND - TOFF2)	= GPMD2
10.75	9.08	1.67	28.26 × 7.48	6.05	58.35

PUMP CALIBRATION FORM: PUMP

LIFT STATION

Pump On Time 1	Pump Off Time 1	TOFF1 - TON1	
13.63	14.53	0.90	Drawdown One (D1)

Pump On Depth 1	Pump Off Depth 1	DOFF1 - DON1	× Area	÷ (TOFF1 - TON1)	= GPMD1
9.08	10.75	1.67	28.26 × 7.48	0.90	392.23

Pump Off Time 1	Pump On Time 2	TON2 - TOFF1	
14.53	19.83	5.30	Fill One (F1)

Pump Off Depth 1	Pump On Depth 2	DOFF1 - DON2	× Area	÷ (TON2 - TOFF1)	= GPMF1
10.75	9.08	1.67	28.26 × 7.48	5.30	66.61

Pump On Time 2	Pump Off Time 2	TOFF2 - TON2	
19.83	20.75	0.92	Drawdown Two (D2)

Pump On Depth 2	Pump Off Depth 2	DOFF2 - DON2	× Area	÷ (TOFF2 - TON2)	= GPMD2
9.08	10.75	1.67	28.26 × 7.48	0.92	383.71

Pump Off Time 2	End Time	TEND - TOFF2	
20.75	26.23	5.48	Fill Two (F2)

Pump Off Depth 2	End Depth	DOFF2 - DEND	× Area	÷ (TEND - TOFF2)	= GPMF2
10.75	9.08	1.67	28.26 × 7.48	5.48	64.41

PUMP CALIBRATION FORM: AVERAGE GPM OF LIFT STATION

Main

PUMP 1

<i>GPM D1</i>	<i>+ GPM F1</i>	<i>= GPM RUN 1</i>
353.01	63.84	416.85

<i>GPM D2</i>	<i>+ GPM F2</i>	<i>= GPM RUN 2</i>
336.20	58.35	394.55

<i>GPM RUN 1</i>	<i>+ GPM RUN 2</i>	<i>= TOTAL GPM</i>		<i>= AVERAGE GPM</i>
416.85	394.55	811.40	÷ 2	405.70

PUMP 1

PUMP 2

<i>GPM D1</i>	<i>+ GPM F1</i>	<i>= GPM RUN 1</i>
392.23	66.61	458.84

<i>GPM D2</i>	<i>+ GPM F2</i>	<i>= GPM RUN 2</i>
383.71	64.41	448.12

<i>GPM RUN 1</i>	<i>+ GPM RUN 2</i>	<i>= TOTAL GPM</i>		<i>= AVERAGE GPM</i>
458.84	448.12	906.96	÷ 2	453.48

PUMP 2