

Submittal 038 4308205-1 through 4308205-3 Test Results Review

The pumps were to be tested to Hydraulic Institute (HI) 14.6-2011 Acceptance Grade 1U as outlined in Table 14.6.3.4. This requires the pumps to be 0 - 10% above the rating point in terms of flow and 0 - 6% above the rating point in terms of head. The intent of the spec is to make sure the performance of the pumps is at or above the rating point. So, your observation about the performance of pump #2 is accurate in that it does not meet this acceptance standard.

In this case, the performance of pump #2 is 1.6' low in terms of TDH. We have studied the curve of this pump (which parallels the other two) and reviewed the re-use pipeline as a system. We believe that the performance of pump #2 will not be detrimental to the performance of the overall re-use water system and that a variance to the acceptance standard is appropriate.

MKEC ENGINEERING, INC.

411 North Webb Road – Wichita, KS 67206

- Reviewed Reviewed As Noted
 Revise and Resubmit Rejected
 Not Required by the Contract Documents

Reviewed for conformance with the design concept of the project and compliance with the information given in the contract documents. Contractor is responsible for: dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication process or to techniques of construction; and coordination of work of all other trades. If "Resubmit" or "Rejected" are not checked resubmission is neither desired or required.

By: Mark Buckingham Date: 09/23/2016

Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
Project:

CO #: 4308205
Test Date: 9/20/2016

Performance Test Conditions

Pump #:	1	Specific Gravity:	1.00	Required Speed (rpm):	1770
Pump Type:	VIT-CF	Viscosity (ssu)	1.0	Required Capacity (gpm):	700
Bowl Model:	11CMC	Water Temp. (°F)	77	Discharge Flange TDH (ft):	334.0
Stages:	5	Test Driver:	Job Motor		
Impeller Material:	1203	Driver S/N:	X057646618-0002M0001	Pressure Trans.:	300psig (Q4021)
Bowl Material:	6911	Job Driver Power (hp):	100.0	Torque Meter:	Name Plate
1st Imp. Dia. (in):	8.00	1st Imp. Qty.:	5	Flow Meter:	8 in (Q3012)
2nd Imp. Dia. (in):		2nd Imp. Qty.:		Tested By:	Brandon Hopper

Readings During Test

POINTS	1	2	3	4	5	6	7
Disch. Pressure (psi)	176.5	169.7	162.4	157.5	146.3	115.8	69.8
Discharge Head (ft)	407.7	392.0	375.1	363.8	338.0	267.5	161.2
Gauge Elevation (ft)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Velocity Head (ft)	0.00	0.02	0.08	0.19	0.32	0.59	0.94
Input Voltage (V)*	486.2	486.0	486.5	485.3	484.6	485.0	485.0
Input Current (amp)*	58.9	62.4	68.6	81.3	92.2	99.0	102.0
Power Factor*	0.80	0.80	0.90	0.90	0.90	1.00	0.90
Input Elec. Power (kW)*	42.9	48.9	55.0	66.8	77.3	84.5	86.7
Motor Efficiency	94.50	94.50	94.50	94.50	94.50	94.50	94.50

* electrical power readings are for reference only.

Data Recorded at Running Speed

Speed (rpm)	1793	1792	1792	1790	1788	1787	1787
Capacity (gpm)	0	182	364	546	707	959	1212
Pump TDH (ft)	412.7	397.0	380.2	369.0	343.3	273.1	167.2
Pump Power (hp)	40.9	46.7	52.4	63.7	73.8	80.6	82.7
Pump Efficiency (%)	0.0	39.1	66.8	79.9	83.1	82.1	61.8

Data Converted to Customers Speed

Speed (rpm)	1770	1770	1770	1770	1770	1770	1770
Capacity (gpm)	0	180	360	540	700	950	1200
Pump TDH (ft)	402.2	387.3	371.0	360.8	336.4	267.9	164.0
Pump Power (hp)	39.3	45.0	50.5	61.6	71.6	78.3	80.4
Pump Efficiency (%)	0.0	39.1	66.8	79.9	83.1	82.1	61.8

Certified Test Results
By: 
Title: ENGINEER
Date: September 20, 2016

Witness
By: _____
Date: _____



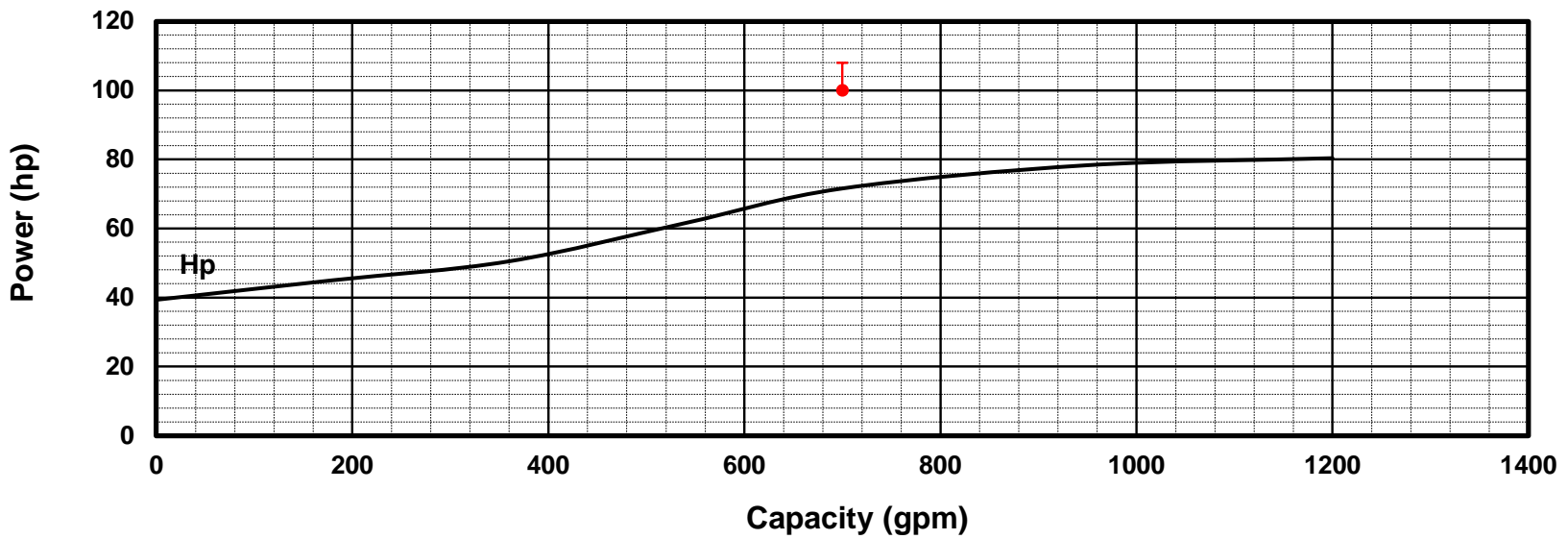
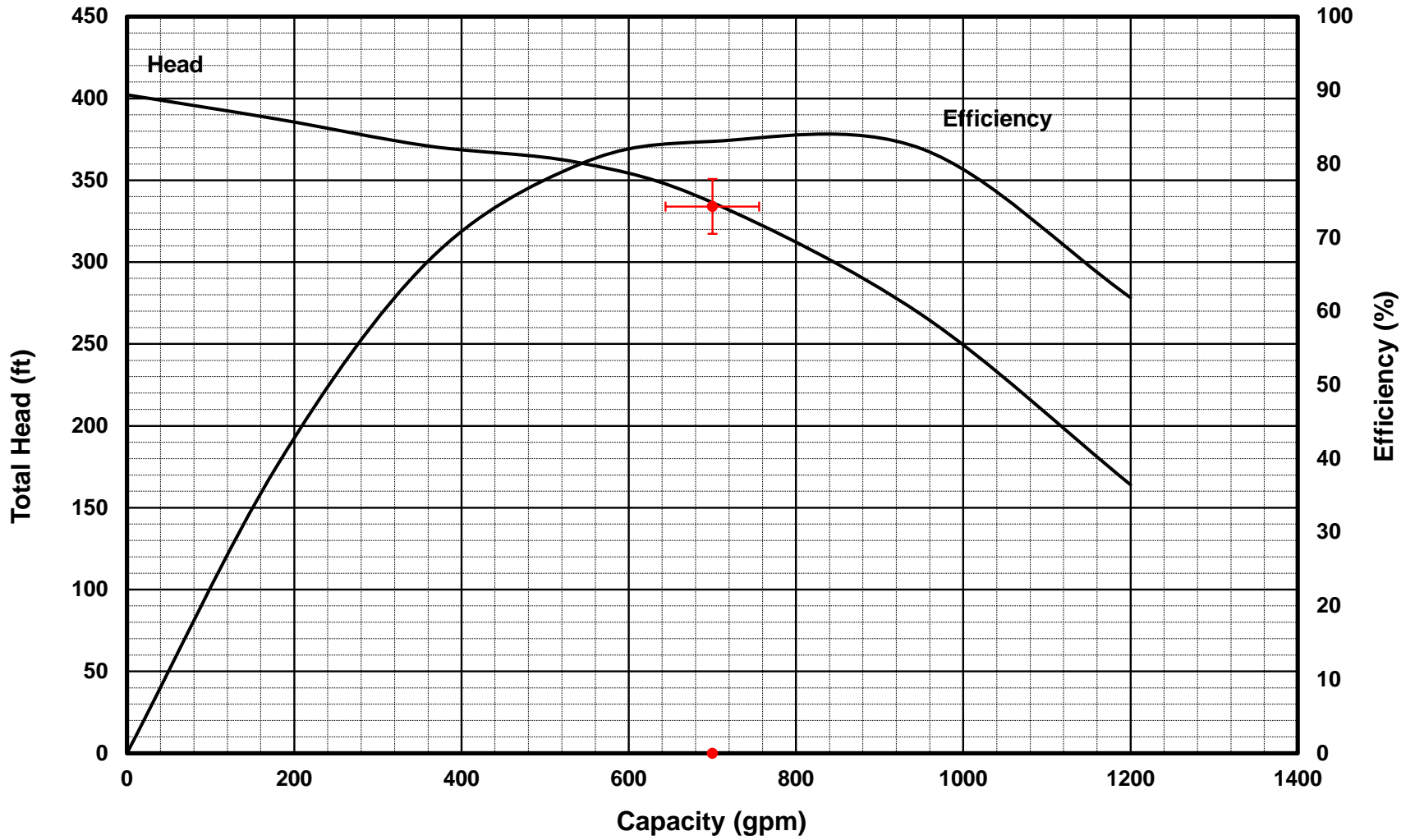
Xylem - Goulds Water Technology Pump Performance Curve



Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
Project: 0

CO #: 4308205
Test Date: 9/20/2016



Pump #: 1
Bowl Model: 11CMC
Stages: 5
1st Imp. Dia.: 8
2nd Imp. Dia.: 0

Required Speed (rpm): 1770
Required Capacity (gpm): 700
Required Bowl TDH (ft): 334

Certified Test Results
By: *Chris Huggins*
Title: ENGINEER
Date: 9/20/2016

Witness
By: _____
Date: _____



Xylem - Goulds Water Technology Hydrostatic Report



Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
PROJECT: 0

SO: 4308205
DATE: 9/20/2016

CONDITIONS

Pump #: 1
Pump Type: VIT-CF
Bowl Model: 11CMC
Stages: 5

Specific Gravity: 1.00
Shut-Off Head (ft): 402.2
Pressure Gauge: 2000psig (T18008)

Required Speed (rpm): 1770
Required Capacity (gpm): 700
Required Bowl TDH (ft): 334

Tested By: Brandon Hopper

Goulds Water Technology Texas Turbine Operations a division of Xylem Inc. certifies that the parts or assemblies listed below have been hydrostatically tested to the pressures and length of time indicated.

READINGS DURING TEST

Description	PART No	Material	Quantity	Pressure	Time
Top Bowl:	C03198B	6911	1	234.0 psi	10.0 Minutes
Intermediate Bowl:	C02834B01	6911	4	234.0 psi	10.0 Minutes

Certified Test Results
By: *Chris Hopper*
Title: ENGINEER
Date: September 20, 2016

Witness
By: _____
Date: _____



Xylem - Goulds Water Technology Pump Performance Data



Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
Project:

CO #: 4308205
Test Date: 9/20/2016

Performance Test Conditions

Pump #: 2	Specific Gravity: 1.00	Required Speed (rpm): 1770
Pump Type: VIT-CF	Viscosity (ssu): 1.0	Required Capacity (gpm): 700
Bowl Model: 11CMC	Water Temp. (°F): 77	Discharge Flange TDH (ft): 334.0
Stages: 5	Test Driver: Job Motor	
Impeller Material: 1203	Driver S/N: X057646618-0001M0001	Pressure Trans.: 300psig (Q4021)
Bowl Material: 6911	Job Driver Power (hp): 100.0	Torque Meter: Name Plate
1st Imp. Dia. (in): 8.00	1st Imp. Qty.: 5	Flow Meter: 8 in (Q3012)
2nd Imp. Dia. (in):	2nd Imp. Qty.:	Tested By: Brandon Hopper

Readings During Test

POINTS	1	2	3	4	5	6	7
Disch. Pressure (psi)	175.0	169.1	161.9	154.7	144.7	113.1	67.1
Discharge Head (ft)	404.3	390.6	374.0	357.4	334.3	261.3	155.0
Gauge Elevation (ft)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Velocity Head (ft)	0.00	0.02	0.08	0.19	0.32	0.59	0.94
Input Voltage (V)*	488.0	486.0	486.0	485.0	486.0	484.9	485.2
Input Current (amp)*	55.4	59.0	67.1	80.0	88.9	95.0	97.5
Power Factor*	0.80	0.80	0.80	0.90	0.90	0.90	0.90
Input Elec. Power (kW)*	40.5	46.2	53.2	65.1	72.7	81.8	80.6
Motor Efficiency	94.50	94.50	94.50	94.50	94.50	94.50	94.50

* electrical power readings are for reference only.

Data Recorded at Running Speed

Speed (rpm)	1793	1792	1792	1790	1789	1787	1787
Capacity (gpm)	0	182	364	546	708	959	1212
Pump TDH (ft)	409.3	395.6	379.1	362.5	339.6	266.8	160.9
Pump Power (hp)	38.6	44.1	50.8	62.2	69.3	78.0	76.9
Pump Efficiency (%)	0.0	41.3	68.7	80.4	87.5	82.9	64.0

Data Converted to Customers Speed

Speed (rpm)	1770	1770	1770	1770	1770	1770	1770
Capacity (gpm)	0	180	360	540	700	950	1200
Pump TDH (ft)	398.8	386.0	369.8	354.5	332.4	261.8	157.9
Pump Power (hp)	37.1	42.5	49.0	60.1	67.1	75.8	74.7
Pump Efficiency (%)	0.0	41.3	68.7	80.4	87.5	82.9	64.0

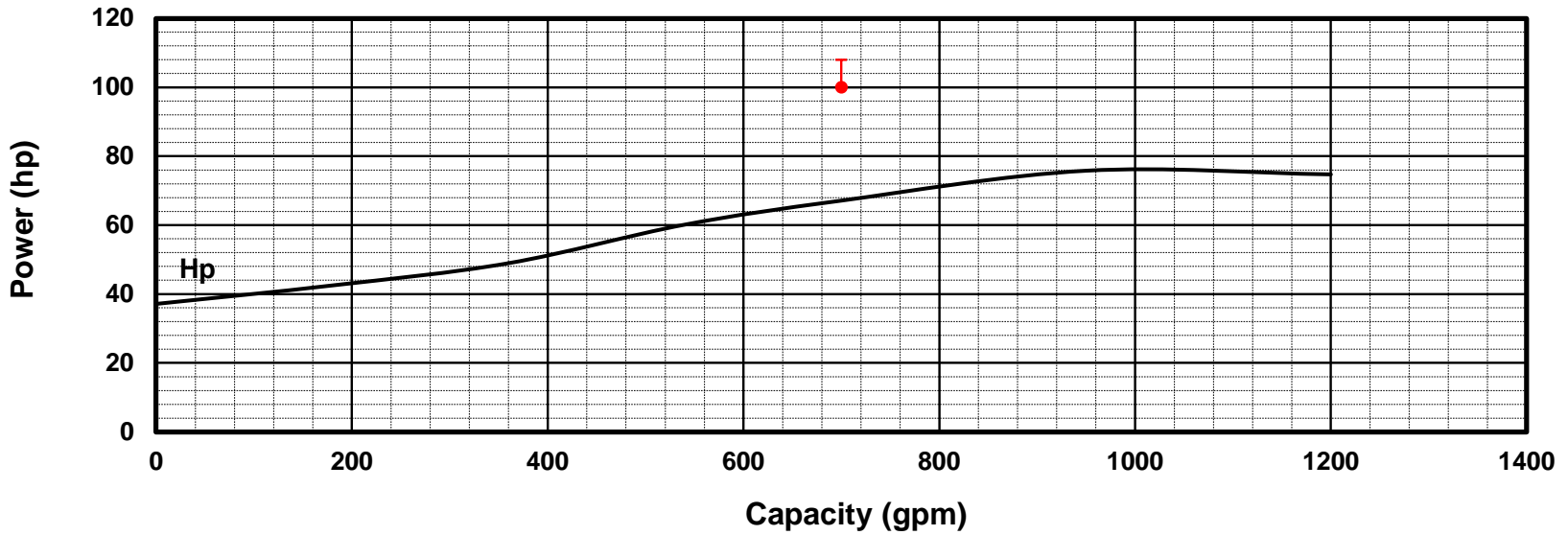
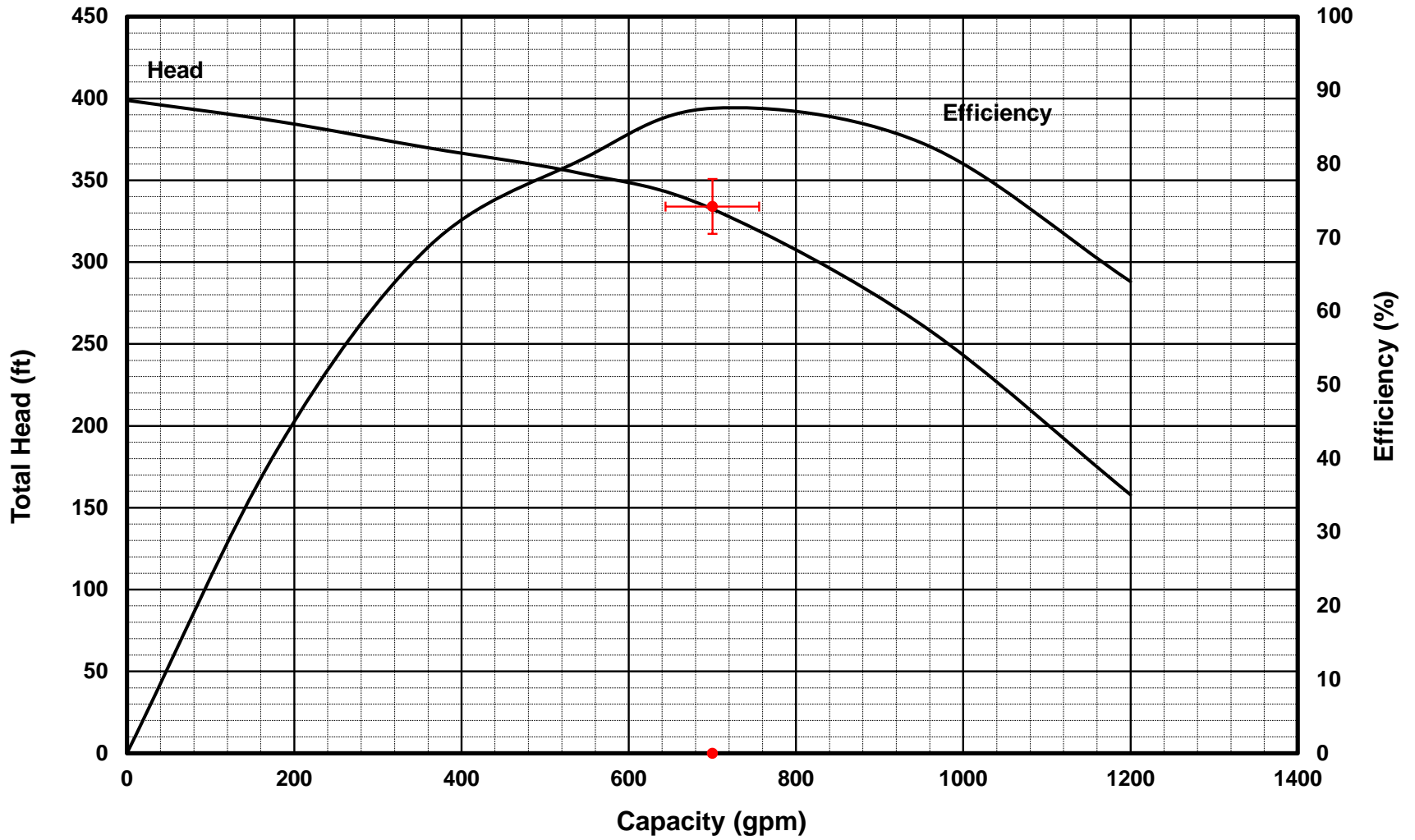
Certified Test Results
 By:
 Title: ENGINEER
 Date: September 20, 2016

Witness
 By: _____
 Date: _____

Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
Project: 0

CO #: 4308205
Test Date: 9/20/2016



Pump #: 2
Bowl Model: 11CMC
Stages: 5
1st Imp. Dia.: 8
2nd Imp. Dia.: 0

Required Speed (rpm): 1770
Required Capacity (gpm): 700
Required Bowl TDH (ft): 334

Certified Test Results
By: Chris Huggins
Title: ENGINEER
Date: 9/20/2016

Witness
By: _____
Date: _____



Xylem - Goulds Water Technology Hydrostatic Report



Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
PROJECT: 0

SO: 4308205
DATE: 9/20/2016

CONDITIONS

Pump #: 2	Specific Gravity: 1.00	Required Speed (rpm): 1770
Pump Type: VIT-CF	Shut-Off Head (ft): 398.8	Required Capacity (gpm): 700
Bowl Model: 11CMC	Pressure Guage: 2000psig (T18008)	Required Bowl TDH (ft): 334
Stages: 5		Tested By: Brandon Hopper

Goulds Water Technology Texas Turbine Operations a division of Xylem Inc. certifies that the parts or assemblies listed below have been hydrostatically tested to the pressures and length of time indicated.

READINGS DURING TEST

Description	PART No	Material	Quantity	Pressure	Time
Top Bowl:	C03198B	6911	1	234.0 psi	10.0 Minutes
Intermediate Bowl:	C02834B01	6911	4	234.0 psi	10.0 Minutes

Certified Test Results
 By: *Chris Hopper*
 Title: ENGINEER
 Date: September 20, 2016

Witness
 By: _____
 Date: _____

Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
Project:

CO #: 4308205
Test Date: 9/20/2016

Performance Test Conditions

Pump #:	3	Specific Gravity:	1.00	Required Speed (rpm):	1770
Pump Type:	VIT-CF	Viscosity (ssu)	1.0	Required Capacity (gpm):	700
Bowl Model:	11CMC	Water Temp. (°F)	77	Discharge Flange TDH (ft):	334.0
Stages:	5	Test Driver:	Job Motor		
Impeller Material:	1203	Driver S/N:	X057646618-0003M0002	Pressure Trans.:	300psig (Q4021)
Bowl Material:	6911	Job Driver Power (hp):	100.0	Torque Meter:	Name Plate
1st Imp. Dia. (in):	8.00	1st Imp. Qty.:	5	Flow Meter:	8 in (Q3012)
2nd Imp. Dia. (in):		2nd Imp. Qty.:		Tested By:	Brandon Hopper

Readings During Test

POINTS	1	2	3	4	5	6	7
Disch. Pressure (psi)	179.0	171.5	164.3	159.5	147.0	113.8	72.4
Discharge Head (ft)	413.5	396.2	379.5	368.4	339.6	262.9	167.2
Gauge Elevation (ft)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Velocity Head (ft)	0.00	0.02	0.08	0.19	0.32	0.59	0.94
Input Voltage (V)*	487.7	487.0	486.3	486.3	484.0	485.3	484.9
Input Current (amp)*	57.1	61.7	68.9	79.7	89.2	98.2	100.5
Power Factor*	0.80	0.80	0.90	0.90	0.88	0.90	0.90
Input Elec. Power (kW)*	43.0	47.9	51.6	64.6	55.2	84.2	83.6
Motor Efficiency	94.50	94.50	94.50	94.50	94.50	94.50	94.50

* electrical power readings are for reference only.

Data Recorded at Running Speed

Speed (rpm)	1793	1792	1791	1790	1788	1787	1787
Capacity (gpm)	0	182	364	546	707	959	1212
Pump TDH (ft)	418.5	401.2	384.6	373.6	344.9	268.5	173.2
Pump Power (hp)	41.1	45.7	49.2	61.6	70.6	80.3	79.8
Pump Efficiency (%)	0.0	40.4	71.9	83.6	87.2	81.0	66.4

Data Converted to Customers Speed

Speed (rpm)	1770	1770	1770	1770	1770	1770	1770
Capacity (gpm)	0	180	360	540	700	950	1200
Pump TDH (ft)	407.8	391.4	375.7	365.3	338.0	263.4	169.9
Pump Power (hp)	39.5	44.0	47.5	59.6	68.5	78.0	77.5
Pump Efficiency (%)	0.0	40.4	71.9	83.6	87.2	81.0	66.4

Certified Test Results
By: *Chris Hopper*
Title: ENGINEER
Date: September 20, 2016

Witness
By: _____
Date: _____



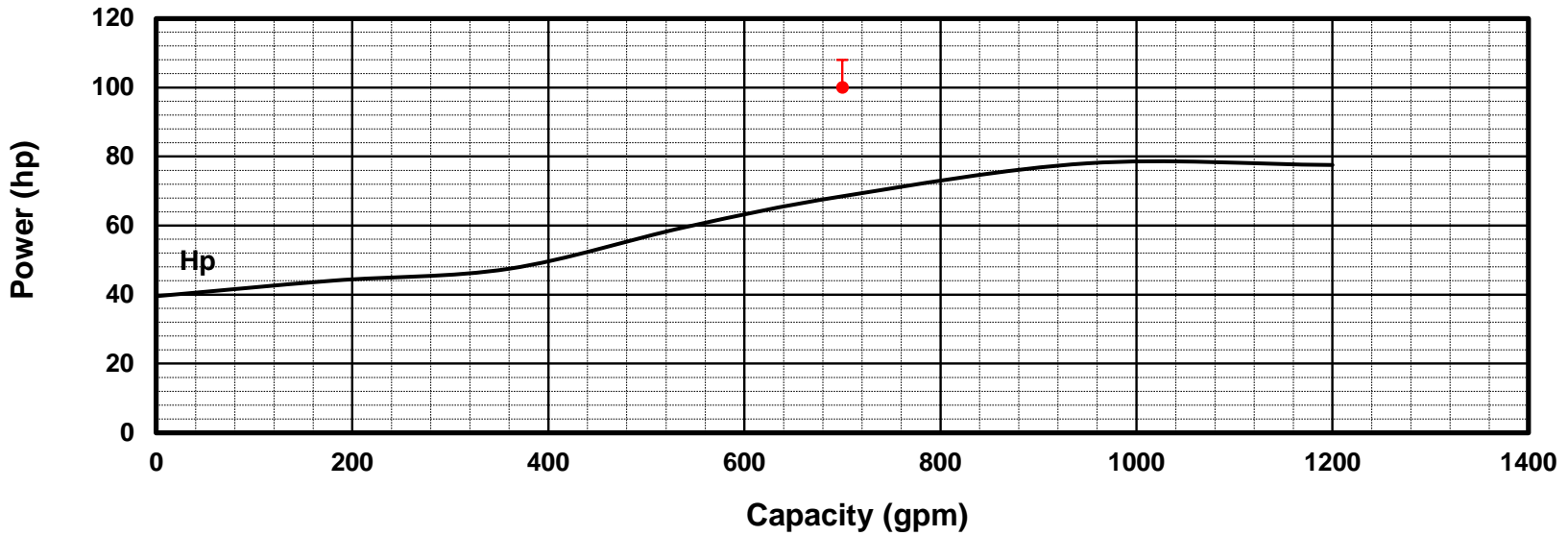
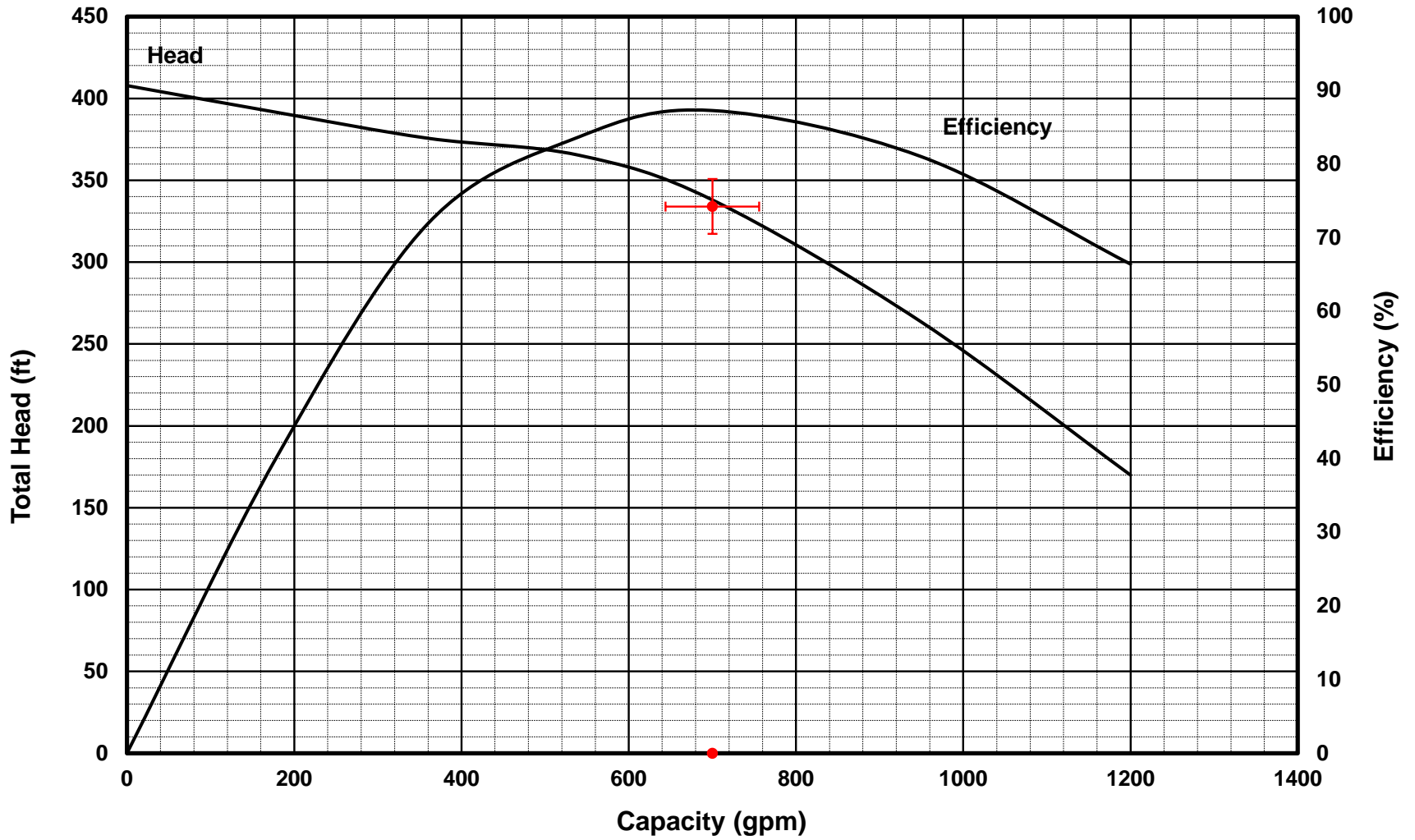
Xylem - Goulds Water Technology Pump Performance Curve



Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
Project: 0

CO #: 4308205
Test Date: 9/20/2016



Pump #: 3
 Bowl Model: 11CMC
 Stages: 5
 1st Imp. Dia.: 8
 2nd Imp. Dia.: 0

Required Speed (rpm): 1770
 Required Capacity (gpm): 700
 Required Bowl TDH (ft): 334

Certified Test Results
 By: Chris Huggins
 Title: ENGINEER
 Date: 9/20/2016

Witness
 By: _____
 Date: _____



Xylem - Goulds Water Technology Hydrostatic Report



Customer: LEE MATHEWS
PO #: 2198604

Acceptance Standard: HI 14.6-2B
PROJECT: 0

SO: 4308205
DATE: 9/20/2016

CONDITIONS

Pump #: 3
Pump Type: VIT-CF
Bowl Model: 11CMC
Stages: 5

Specific Gravity: 1.00
Shut-Off Head (ft): 407.8
Pressure Guage: 2000psig (T18008)

Required Speed (rpm): 1770
Required Capacity (gpm): 700
Required Bowl TDH (ft): 334

Tested By: Brandon Hopper

Goulds Water Technology Texas Turbine Operations a division of Xylem Inc. certifies that the parts or assemblies listed below have been hydrostatically tested to the pressures and length of time indicated.

READINGS DURING TEST

Description	PART No	Material	Quantity	Pressure	Time
Top Bowl:	C03198B	6911	1	234.0 psi	10.0 Minutes
Intermediate Bowl:	C02834B01	6911	4	234.0 psi	10.0 Minutes

Certified Test Results
By: *Chris Hopper*
Title: ENGINEER
Date: September 20, 2016

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By: _____
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