STATE OF ALASKA
ALASKA CLEAN/DRINKING WATER FUND
GREEN PROJECT ASSESSMENT FORM

As applicable under the EPA annual capitalization grants provided to the Alaska Clean Water Fund (ACWF) and Alaska Drinking Water Fund (ADWF) loan programs, a portion of funds appropriated shall be for projects to address green infrastructure, water or energy efficiency improvements or other environmentally innovative activities." To meet this condition under the federal grant for administering these funds, this assessment form is provided to document this eligibility or what is termed a "Categorical" or "Business Case" justification, which will be reviewed by DEC for provisional compliance. For more information on green infrastructure development, please review the following EPA web site:

http://cfpub.epa.gov/npdes/home.cfm?program_id=298

For those projects requiring a "Business Case," Part 2 will require completion to qualify a "traditional project" as green; justification is broken down into two parts, technical and financial. The technical part should use information from a variety of sources such as maintenance or operation records, engineering studies, project plans or other applicable documentation to identify problems (including any data on water and/or energy inefficiencies) in the existing facility, and that clarifies the technical benefits from the project in water and/or energy efficiency terms. Financial justification needs to show estimated savings to a project based on the technical benefits, and demonstrate that the green component of the project provides a substantial savings and environmental benefit.

For more information and assistance in completing this assessment form, please contact the Municipal Matching Grants & Loans program in Anchorage at 907-269-7673, or in Juneau at 907-465-5300.

GENERAL INFORMATION

Name of Community Petersburg Borough

Address P.O. Box 329
Petersburg, AK 99833

Contact Name Chris Cotta Title Asst. Public Works Dir. Telephone (907) 772-4430

PROJECT INFORMATION

Project Name Pump Station 1 Force Main Upgrade Location Petersburg, AK

Project Type: ____ New Construction __X__ Upgrades

____ Stormwater Infrastructure __X__ Energy Efficiency Project

____ Water Efficiency Project ____ Innovative Environmental Project

Green Project Description: Replace aging ductile iron force main located under beach, with a new force main located under S. Nordic Drive. Pump Stations 1+2 will be upgraded to handle the changes in flow. Current pumps are worn out with parts no longer available. New, more efficient pumps will be installed, with VFD operation and controls optimized for energy efficiency.

PART 1 – GREEN PROJECT CATEGORY & COSTS

Identify the most appropriate "Green" Clean Water or Drinking Water category project type. Note, any selection with (BC) at the end will require a Business Case demonstration.

ENERGY EFFICIENCY – the use of improved technologies and practices to reduce the energy consumption of water quality projects.

_____ Wastewater/water utility energy audits _____ Clean power for public owned facilities

_____ Leak detection equipment __X__ Retrofits/upgrades to pumps & treatment processes (BC)

_____ Replace/rehabilitation of distribution (BC) _____ Other:_____(BC)

WATER EFFICIENCY – the use of improved technologies and practices to deliver equal or better services with less water.

_____ Water meters _____ Fixture Retrofit _____ Landscape/Irrigation

_____ Graywater or other water recycling _____ Replace/rehabilitation of distribution (BC)

_____ Leak detection equipment _____ OTHER: _____ (BC)

GREEN INFRASTRUCTURE – Practices that manage and treat stormwater and that maintain and restore natural hydrology by infiltrating, evapotranspiring and capturing and using stormwater.

_____ Green Streets _____ Water harvesting and reuse

_____ Porous pavement, bioretention, trees, green roofs, water gardens, constructed wetlands

_____ Hydromodification for riparian buffers, floodplains, and wetlands

_____ Downspout disconnection to remove stormwater from combined sewers and storm sewers

_____ OTHER: _____ (BC)

ENVIRONMENTALLY INNOVATIVE PROJECTS – Demonstrate new/innovative approaches to managing water resources in a more sustainable way. This may include projects that achieve pollution prevention or pollutant removal with reduced costs and projects that foster adaptation of water protection programs and practices to climate change.

_____ Wetland restoration _____ Decentralized wastewater treatment solutions

_____ Water reuse _____ Green stormwater infrastructure _____ Water balance approaches

_____ Adaptation to climate change _____ Integrated water resource management

_____ OTHER: _____ (BC)

PROJECT & GREEN COMPONENT COSTS

	TOTAL PROJECT COSTS	TOTAL "GREEN" COMPONENT COSTS
Administration	$ 66,940	$
Legal	$	$
Preliminary Studies/Reports	$	$
Engineering Design	$ 209,625	$
Inspection/Surveying/Construction Management	$	$
Construction	$ 1,397,500	$ 340,000
Equipment	$	$
Contingencies	$ 419,250	$
Other _____	$	$
Total Costs	$ 2,093,315	$ 340,000

PART 2 – PROJECT "BUSINESS CASE" TECHNICAL/FINANCIAL ASSESSMENT

TECHNICAL ANALYSIS OF BENEFITS*

In addition to this form, a supporting technical and financial analysis is required to verify energy and water saving efficiencies for any green component of the project. For green infrastructure and innovative environmental type projects, the analysis should include any applicable efficiency and environmental benefits. For assisting MGL in evaluating "Business Case" assessments of water main, meter, and pump facility replacement type projects, the attached form titled "ADWF - Water/Energy Efficiency Determination - Water Main Replacement/Meter/Pump Facility" is required to be completed. Once the form is complete along with any supporting documentation, please submit documentation to the MGL program for review and concurrence. Note, only water/energy efficiencies that achieve a 20% or greater increase in efficiency will categorically qualify as a Green project.

CERTIFICATION STATEMENT:

I certify the above information is current and accurate.

Chris Cotta
Name

Asst. Public Works Dir.
Title

Chris Cotta
Signature

9/2/14
Date

Submit Completed Form to:

Alaska Department of Environmental Conservation
Municipal Matching Grants & Loans
555 Cordova Street
Anchorage, AK 99501-2617

Green Project Business Case

Petersburg Borough – Pump Station 1 Force Main Upgrade

Business Case Summary

The Pump Station 1 Force Main Upgrade project is a key piece of Petersburg's overall wastewater capital project plan. Among the primary goals of the project are pollution prevention and energy efficiency. One major goal is to relocate the aging ductile iron force main that runs under the beach between Pump Stations 1 & 2. Although both pump stations are located upland, most of the force main is located below grade along the beach line, with exposed portions in two locations. The force main has leaked in the past and is heavily corroded, raising concerns that a future failure will cause sewage to be released into Petersburg's harbors and nearby marine waters (Wrangell Narrows and Frederick Sound). Petersburg Borough plans to relocate the force main into the South Nordic Drive ROW as part of DOT's upcoming South Nordic Drive Rehabilitation project. This will greatly reduce the chance of a pollution event due to force main failure.

A second major goal of the project is to increase energy efficiency of the pumping systems at Pump Stations 1 and 2. These pump stations are both nearly 40 years old and the pumping systems are well past their useful lives. Pumps at both stations use "across the line" starters, with no control over pump speed once the pump is energized. Efficiencies of the worn out pumps are only 29% at Pump Station 1 and 27% at Pump Station 2. Planned pump station upgrades include complete replacement of the pumping systems at both pump stations, with the new systems featuring high efficiency pumps and variable frequency drives.

Existing pumps at Pump Station 1 are 10 hp Allis Chalmers 400 series. These will be replaced with 7.5 hp Flygt 3127 pumps with model 439 impellers. Pump Station 2 has Crane Deming 7370 pumps rated at 5 hp. These will be replaced with 5 hp Flygt 3102 pumps with model 422 impellers. Pump curves for the new pumps are attached for reference.

Technical and Financial Analysis

At both pump stations 1 and 2, the pumping systems are so worn that the original pump curves are of little use in calculating flow rates and pump efficiencies. Public Works has calculated pump efficiencies using observed flow data (gathered through draw down testing) and the electrical cost to operate the pumps. Summaries of electrical costs for the two pump stations are attached. Following are the efficiency numbers for existing pumps:

Pump Station 1

Operating Cost = $110.08/month (calendar year 2013)
Flow = 100,000 gals per day
Total Dynamic Head = 32.55 ft
System Horsepower Requirements = (32.55 ft of TDH*310 gpm)/3960 = 2.55 hp
Existing HP usage = (33.06 kw/day)/(5.1 hours/day runtime)/(.746 kw/hp)=8.7 hp
Existing Efficiency = 2.55 hp required/8.7 hp used = 29%

Pump Station 2

Operating Cost = $35.34/month (calendar year 2013)
Flow = 30,000 gals per day
Total Dynamic Head = 10 ft
System HP Requirements = (10 ft of TDH*425 gpm)/3960 = 1.1 hp
Existing HP Usage = (10.61kw/day)/(3.5 hours/day runtime)/(.746 kw/hp)=4.06 hp
Existing Efficiency = 1.1 hp required/4.06 hp used = 27%

Upgrades to the pump stations should result in much higher pump efficiencies. Power usage for the new pumping systems is estimated as follows:

Pump Station 1 (same flow as before project)

New Total Dynamic Head = 31.8 ft
New HP Requirement = (31.8 ft*500 gpm)/3960 = 4.0 hp
New HP Usage = 4.0 hp required/70% efficiency for new pumps = 5.7 hp
New KW = 5.7 hp*.746 kw/hp = 4.3 kw
New Electric Usage = (100,000 gpd/500 gpm)/60 min/hr = 3.3 hrs/day runtime
New Operating Cost = 4.3 kw*3.3 hr/day*30 day/month*.111 per kwh = $47.25/month

Pump Station 2 (new sewer main alignment results in a flow increase as noted)

New Flow = 130,000 gals per day
New TDH = 16 ft
New HP Requirement (16 ft*750 gpm)/3960 = 3.0 hp
New HP Usage = 3.0 hp required/63% efficiency for new pumps = 4.8 hp
New KW = 4.8 hp*.746 kw/hp = 3.6 kw
New Electric Usage = (130,000 gpd/750 gpm)/60 min/hr = 2.9 hrs runtime
New Operating Cost = 3.6 kw*2.9 hr/day*30 days/mo*$0.111 per kwh = $34.77/month

To summarize the above calculations:

Pump Station 1
- Present electrical cost $110.08/month
- Anticipated post-construction electric cost $47.25/month
- Difference: Decrease of $62.83/month

Pump Station 2
- Present electrical cost $35.34/month
- Anticipated post-construction electric cost $34.77/month
- Difference: Decrease of $0.57/month

Combined Pump Stations 1 & 2

Present electric cost $145.42

Anticipated post-construction electric cost $82.02

Difference: Decrease of $63.40 or 44% overall

As the preceding analysis illustrates, the Borough expects overall power usage to decrease sharply as a result of the pumping system upgrades at Pump Stations 1 & 2. This decrease comes primarily from significant efficiency gains at Pump Station 1. The decrease in power cost for Pump Station 2 is anticipated to be minor, however it should be noted that flow through Pump Station 2 is expected to quadruple due to the new sewage main alignment. This flow increase will be offset by the large increase in pump efficiency of the new pumping system at Pump Station 2.

Attachments: Power usage history for Pump Stations 1 & 2 (2 pages total)
Pump Station 1 pump curve data (4 pages)
Pump Station 2 pump curve data (6 pages)

PETERSBURG BOROUGH

Account 37158

910 S NORDIC DRIVE Pump Station 1

ELEC

	Metered Usage	Billed Usage		Charge
Jul-12	0.00	0.00		0.00
Aug-12	980.00	980.00		108.78
Sep-12	1,370.00	1,370.00		152.07
Oct-12	1,280.00	1,280.00		142.08
Nov-12	1,200.00	1,200.00		133.20
Dec-12	750.00	750.00		83.25
Jan-13	1,060.00	1,060.00		117.66
Feb-13	1,140.00	1,140.00		126.54
Mar-13	850.00	850.00		94.35
Apr-13	670.00	670.00		74.37
May-13	990.00	990.00		109.89
Jun-13	680.00	680.00		75.48
Jul-13	760.00	760.00		84.36
Aug-13	730.00	730.00		81.03
Sep-13	950.00	950.00		105.45
Oct-13	1,290.00	1,290.00		143.19
Nov-13	1,390.00	1,390.00		154.29
Dec-13	1,390.00	1,390.00		154.29
Jan-14	1,320.00	1,320.00		146.52
Feb-14	780.00	780.00		86.58
Mar-14	930.00	930.00		103.23
Apr-14	1,180.00	1,180.00		130.98
May-14	970.00	970.00		107.67
Jun-14	970.00	970.00		107.67
Maximum:	1,390	1,390	$	154.29
Minimum:	0	0	$	0.00
Monthly Average:	985	985		109.29
Avg Cost/Usage:				0.1110

2013 total electric cost $1320.90
Monthly Avg $110.08
2013 total electric use 11,900 kwh
Cost per kwh $.111

Usage History

PETERSBURG BOROUGH

Account 37158

27 S SINGLEE ALLEY Pump Station 2

ELEC

	Metered Usage	Billed Usage		Charge
Jul-12	0.00	0.00		0.00
Aug-12	310.00	310.00		34.41
Sep-12	400.00	400.00		44.40
Oct-12	350.00	350.00		38.85
Nov-12	610.00	610.00		67.71
Dec-12	430.00	430.00		47.73
Jan-13	530.00	530.00		58.83
Feb-13	460.00	460.00		51.06
Mar-13	380.00	380.00		42.18
Apr-13	400.00	400.00		44.40
May-13	390.00	390.00		43.29
Jun-13	230.00	230.00		25.53
Jul-13	130.00	130.00		14.43
Aug-13	100.00	100.00		11.10
Sep-13	130.00	130.00		14.43
Oct-13	310.00	310.00		34.41
Nov-13	290.00	290.00		32.19
Dec-13	470.00	470.00		52.17
Jan-14	440.00	440.00		48.84
Feb-14	300.00	300.00		33.30
Mar-14	370.00	370.00		41.07
Apr-14	360.00	360.00		39.96
May-14	170.00	170.00		18.87
Jun-14	180.00	180.00		19.98
Maximum:	610	610	$	67.71
Minimum:	0	0	$	0.00
Monthly Average:	323	323		35.80
Avg Cost/Usage:				0.1110

2013 total electric cost $424.02
Monthly avg $ 35.34
2013 total electric use 3820 kwh
Cost per kwh $.111

Pump Station 1

xylem
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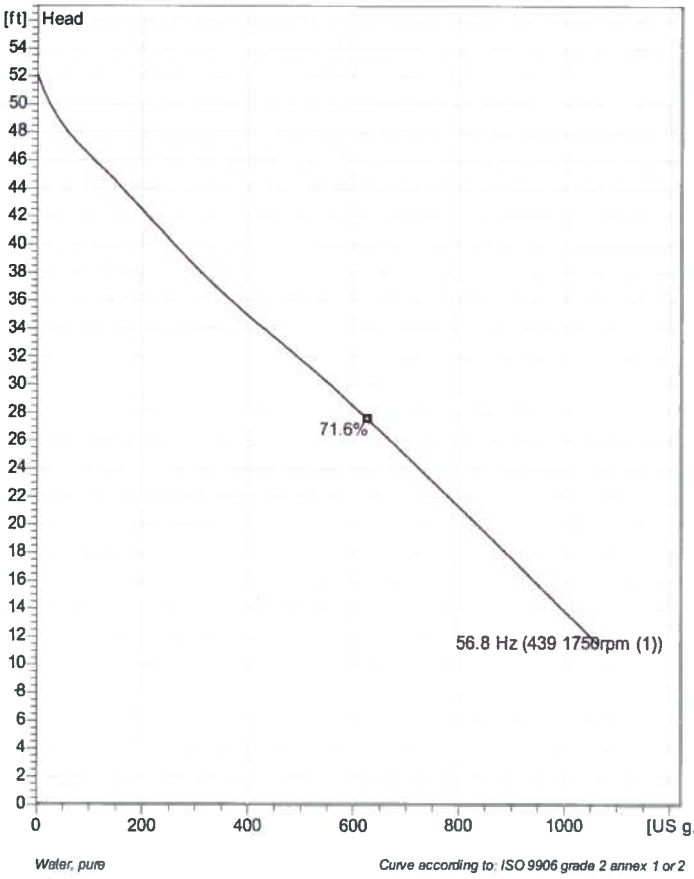
NP 3127 MT 3~ SmartRun 439

Technical specification

FLYGT



Water, pure

Curve according to: ISO 9906 grade 2 annex 1 or 2

Note: Picture might not correspond to the current configuration.

General

Patented self cleaning semi opened channel impeller, ideal for pumping in wastewater applications. Modular based design with high adaptation grade. Equipped with a user-friendly intelligent control unit, pre-programmed for wastewater pumping used for pumping station with one or two pumps.

Impeller

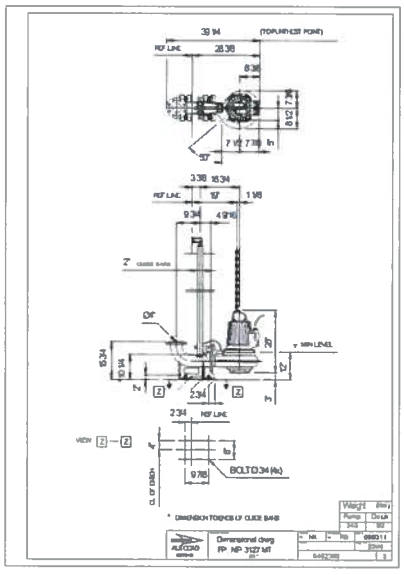
Impeller material	Grey cast iron
Discharge Flange Diameter	3 15/16 inch
Suction Flange Diameter	100 mm
Impeller diameter	188 mm
Number of blades	2

Motor

Motor #	N3127.160 21-10-4AL-W 7.5hp
Stator variant	34
Frequency	60 Hz
Rated voltage	460 V
Number of poles	4
Phases	3~
Rated power	7.5 hp
Rated current	9.8 A
Starting current	60 A
Rated speed	1750 rpm
Power factor	
1/1 Load	0.85
3/4 Load	0.81
1/2 Load	0.72
Efficiency	
1/1 Load	84.0 %
3/4 Load	84.0 %
1/2 Load	82.0 %

Configuration

Installation: P - Semi permanent, Wet



Project	Project ID	Created by	Created on	Last update
			2014-09-11	

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NP 3127 MT 3~ SmartRun 439

FLYGT

Performance curve

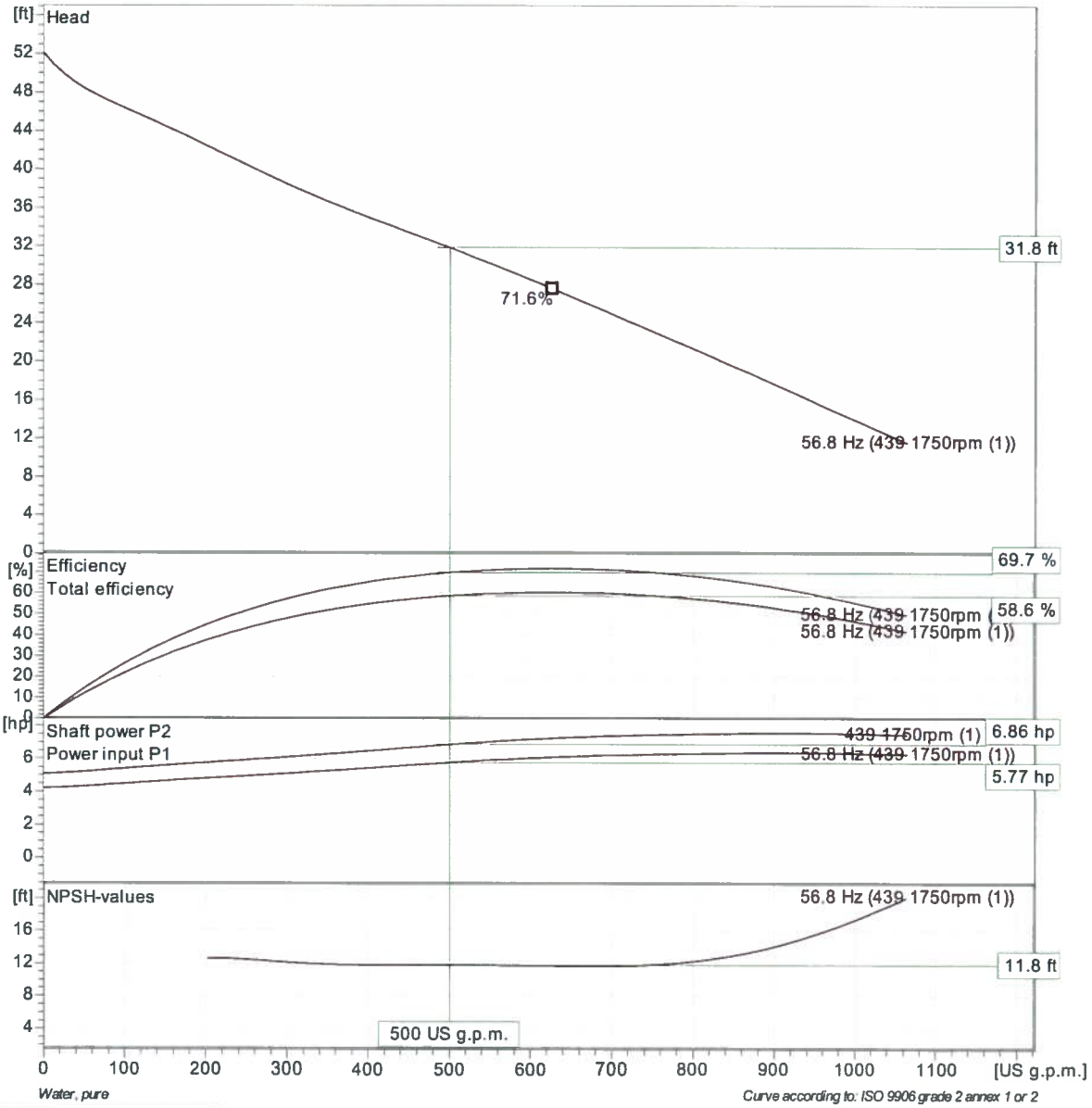
Pump

Discharge Flange Diameter	3 15/16 inch
Suction Flange Diameter	100 mm
Impeller diameter	7 3/8"
Number of blades	2

Motor

Motor #	N3127.160 21-10-4AL-W 7.5hp
Stator variant	34
Frequency	60 Hz
Rated voltage	460 V
Number of poles	4
Phases	3~
Rated power	7.5 hp
Rated current	9.8 A
Starting current	60 A
Rated speed	1750 rpm

Power factor	
1/1 Load	0.85
3/4 Load	0.81
1/2 Load	0.72
Efficiency	
1/1 Load	84.0 %
3/4 Load	84.0 %
1/2 Load	82.0 %



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			2014-09-11	

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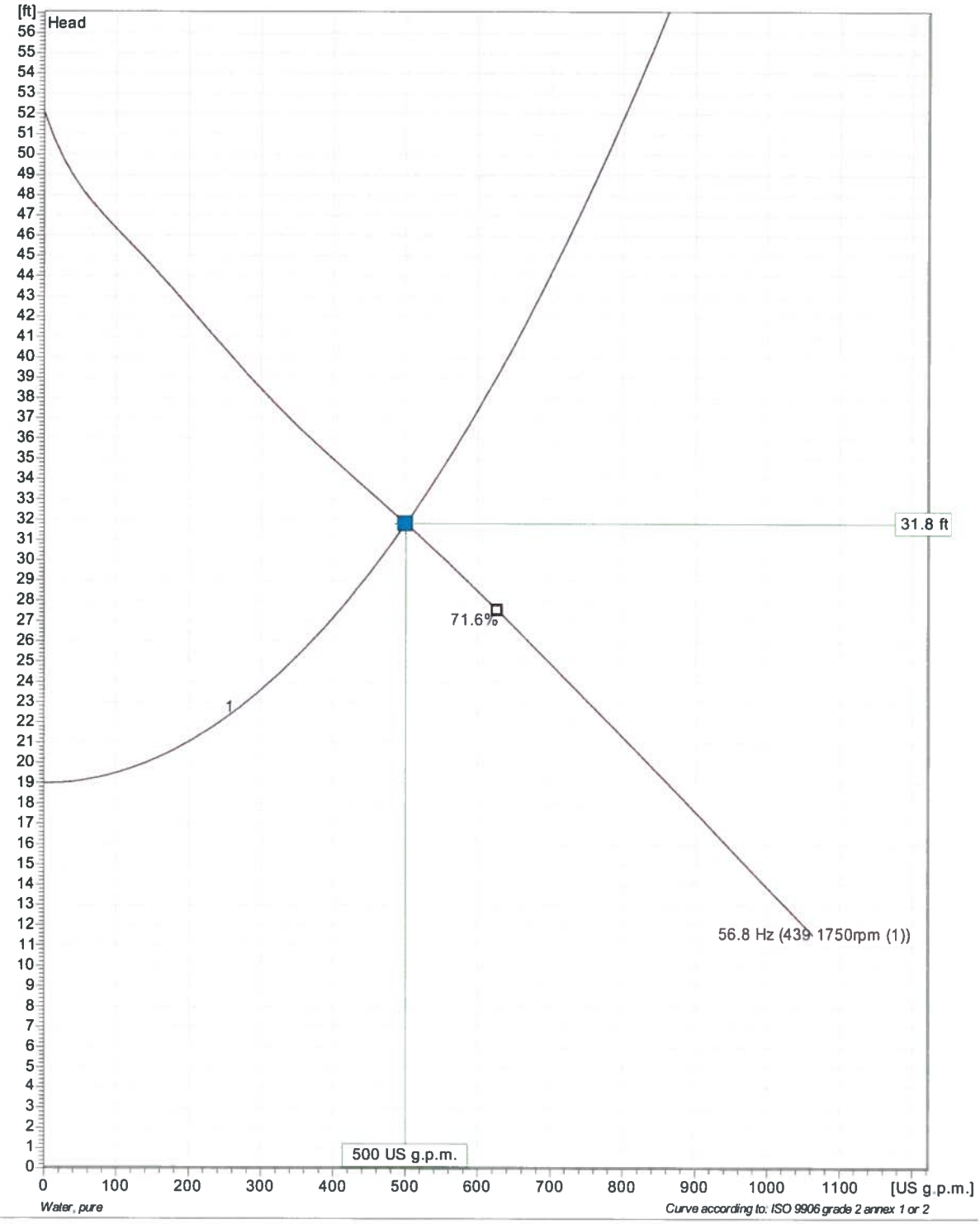
NP 3127 MT 3~ SmartRun 439

FLYGT

Duty Analysis



Pumps running /System	Individual pump Flow	Head	Shaft power	Total Flow	Head	Shaft power	Hyd eff.	Specific energy	NPSHre
1	500 US g.p.m.	31.8 ft	5.77 hp	500 US g.p.m.	31.8 ft	5.77 hp	69.7 %	170 kWh/US MG	11.8 ft

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			2014-09-11	

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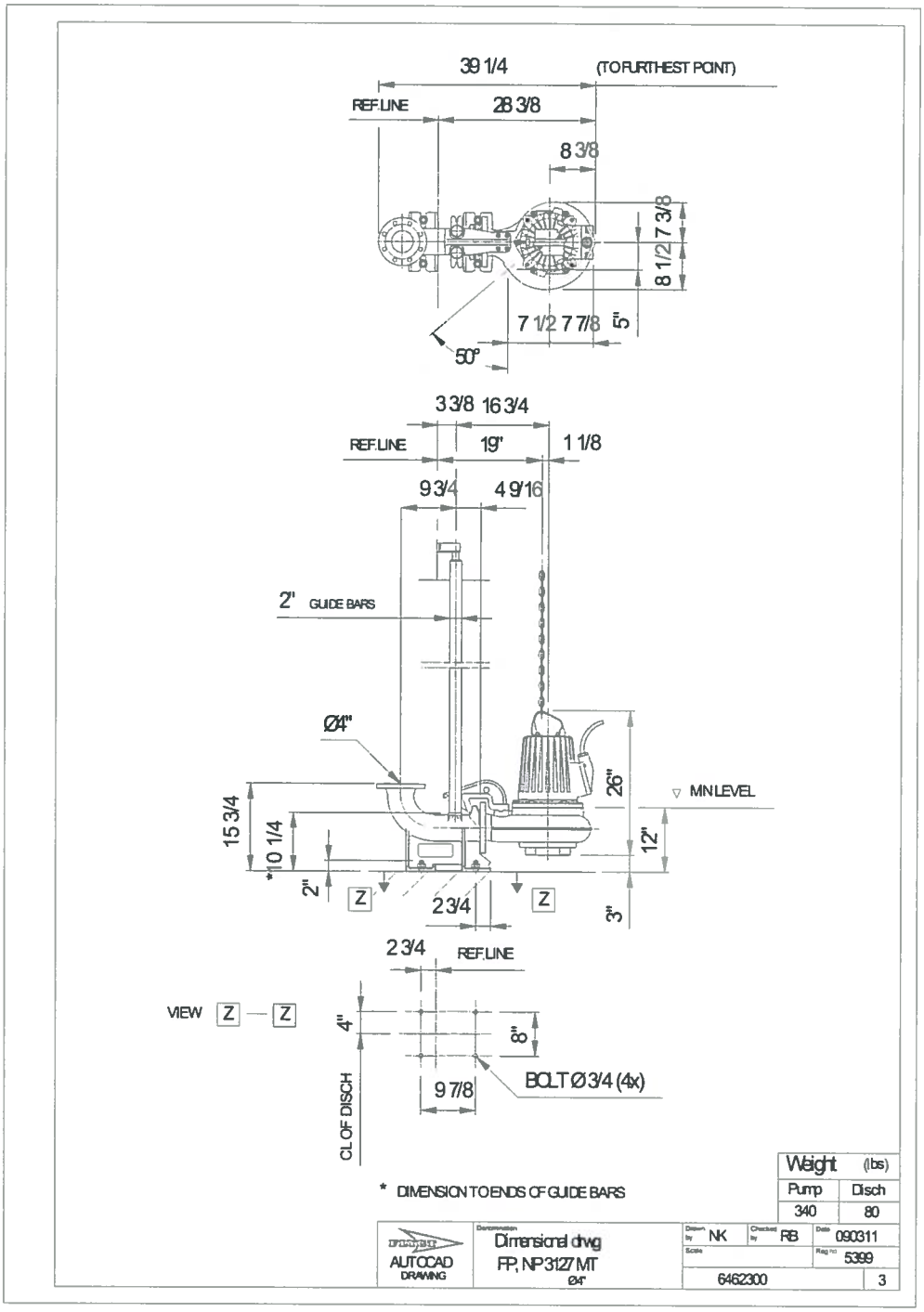
NP 3127 MT 3~ SmartRun 439

Dimensional drawing

FLYGT



Project	Project ID	Created by	Created on	Last update
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Pump Station 2

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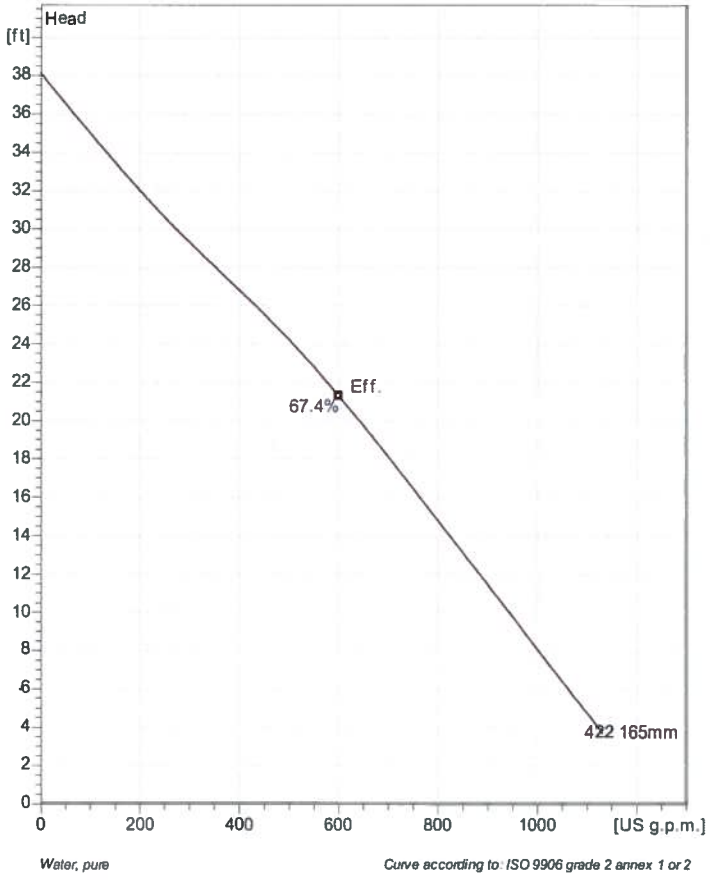
NP 3102 LT 3~ Adaptive 422

Technical specification

FLYGT

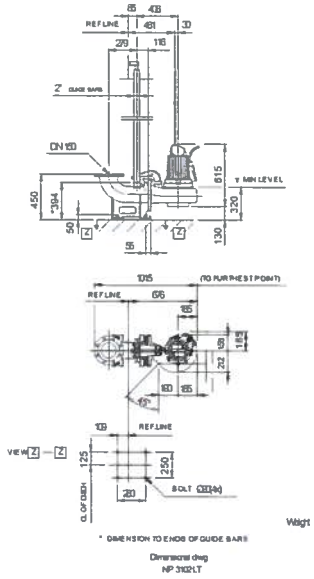


Water, pure

Curve according to: ISO 9906 grade 2 annex 1 or 2

Note: Picture might not correspond to the current configuration.

Installation: P - Semi permanent, Wet



General

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

Impeller material	Grey cast iron
Discharge Flange Diameter	150 mm
Suction Flange Diameter	150 mm
Impeller diameter	165 mm
Number of blades	2

Motor

Motor #	N3102.160 18-11-4AL-W 5hp
Stator variant	61
Frequency	60 Hz
Rated voltage	460 V
Number of poles	4
Phases	3~
Rated power	5 hp
Rated current	6.7 A
Starting current	41 A
Rated speed	1745 1/min
Power factor	
1/1 Load	0.81
3/4 Load	0.75
1/2 Load	0.64
Efficiency	
1/1 Load	85.0 %
3/4 Load	85.5 %
1/2 Load	84.0 %

Configuration

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			2014-08-22	

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NP 3102 LT 3~ Adaptive 422

FLYGT

Performance curve

Pump

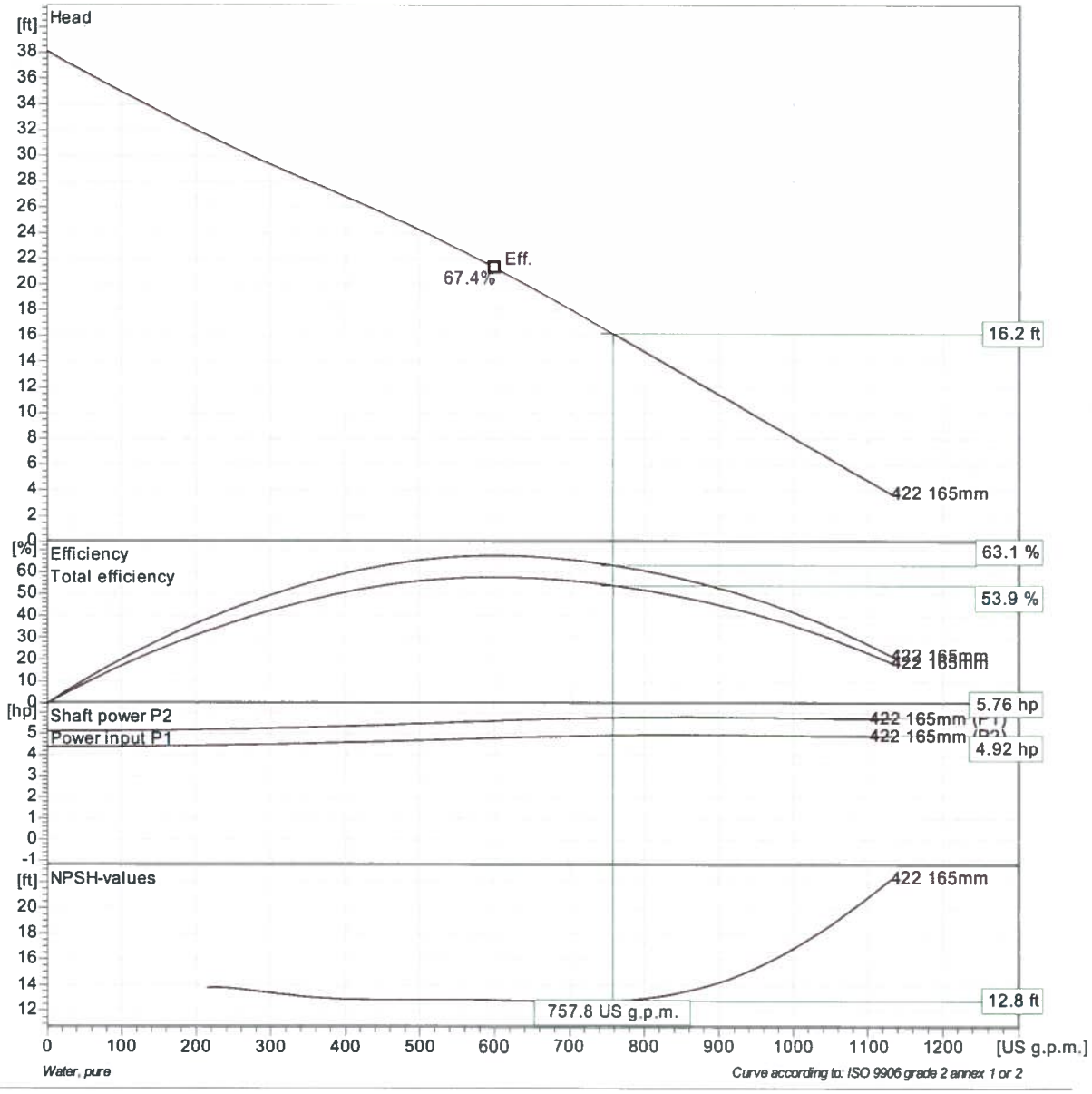
Discharge Flange Diameter	150 mm
Suction Flange Diameter	150 mm
Impeller diameter	165 mm
Number of blades	2

Motor

Motor #	N3102.160 18-11-4AL-W 5hp
Stator variant	61
Frequency	60 Hz
Rated voltage	460 V
Number of poles	4
Phases	3~
Rated power	5 hp
Rated current	6.7 A
Starting current	41 A
Rated speed	1745 1/min

Power factor	
1/1 Load	0.81
3/4 Load	0.75
1/2 Load	0.64

Efficiency	
1/1 Load	85.0 %
3/4 Load	85.5 %
1/2 Load	84.0 %



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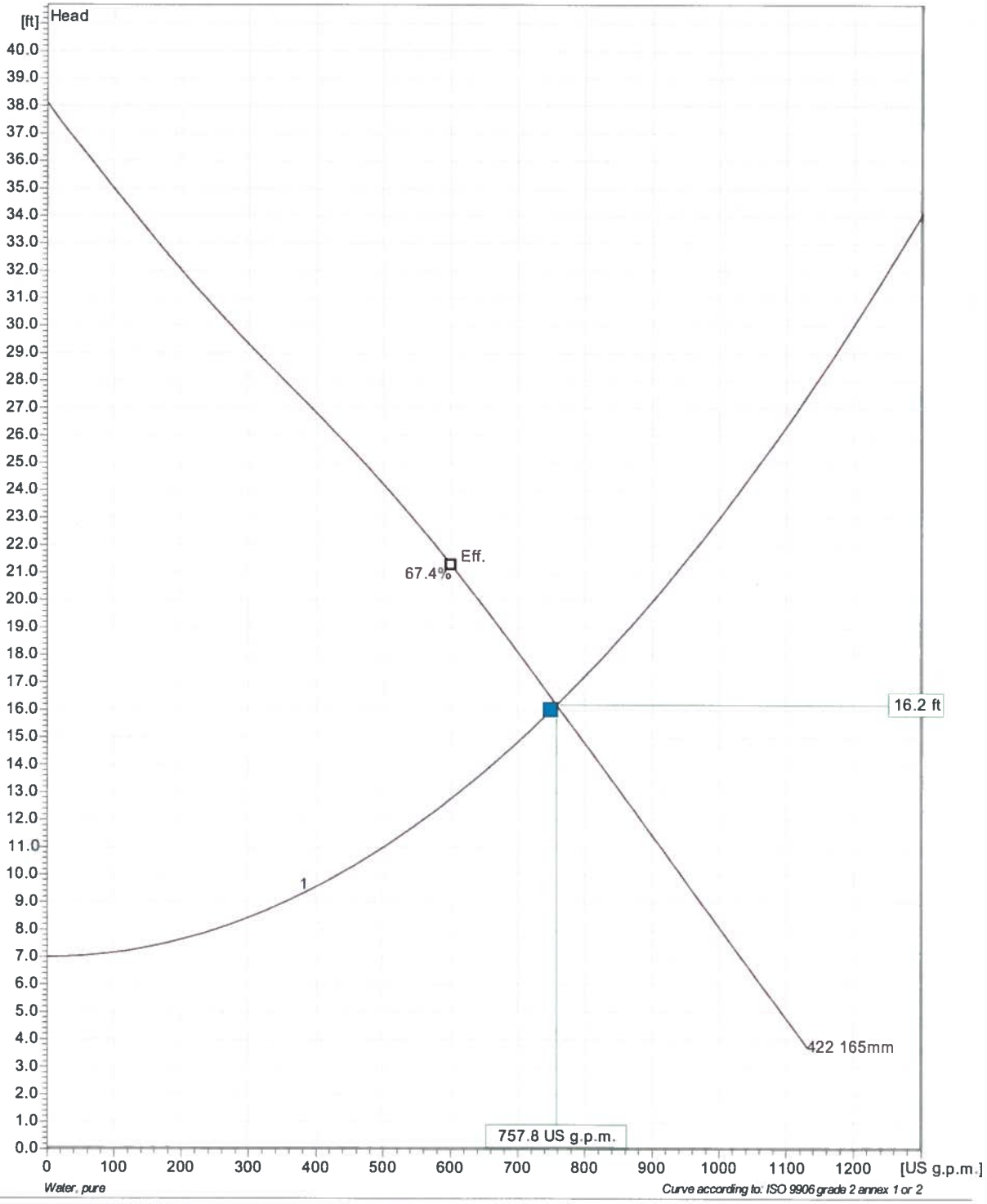
NP 3102 LT 3~ Adaptive 422

FLYGT

Duty Analysis



Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd eff.	Specific energy	NPSHre
1	758 US g.p.m.	16.2 ft	4.92 hp	758 US g.p.m.	16.2 ft	4.92 hp	63.1 %	94.5 kWh/US MG	12.8 ft

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			2014-08-22	

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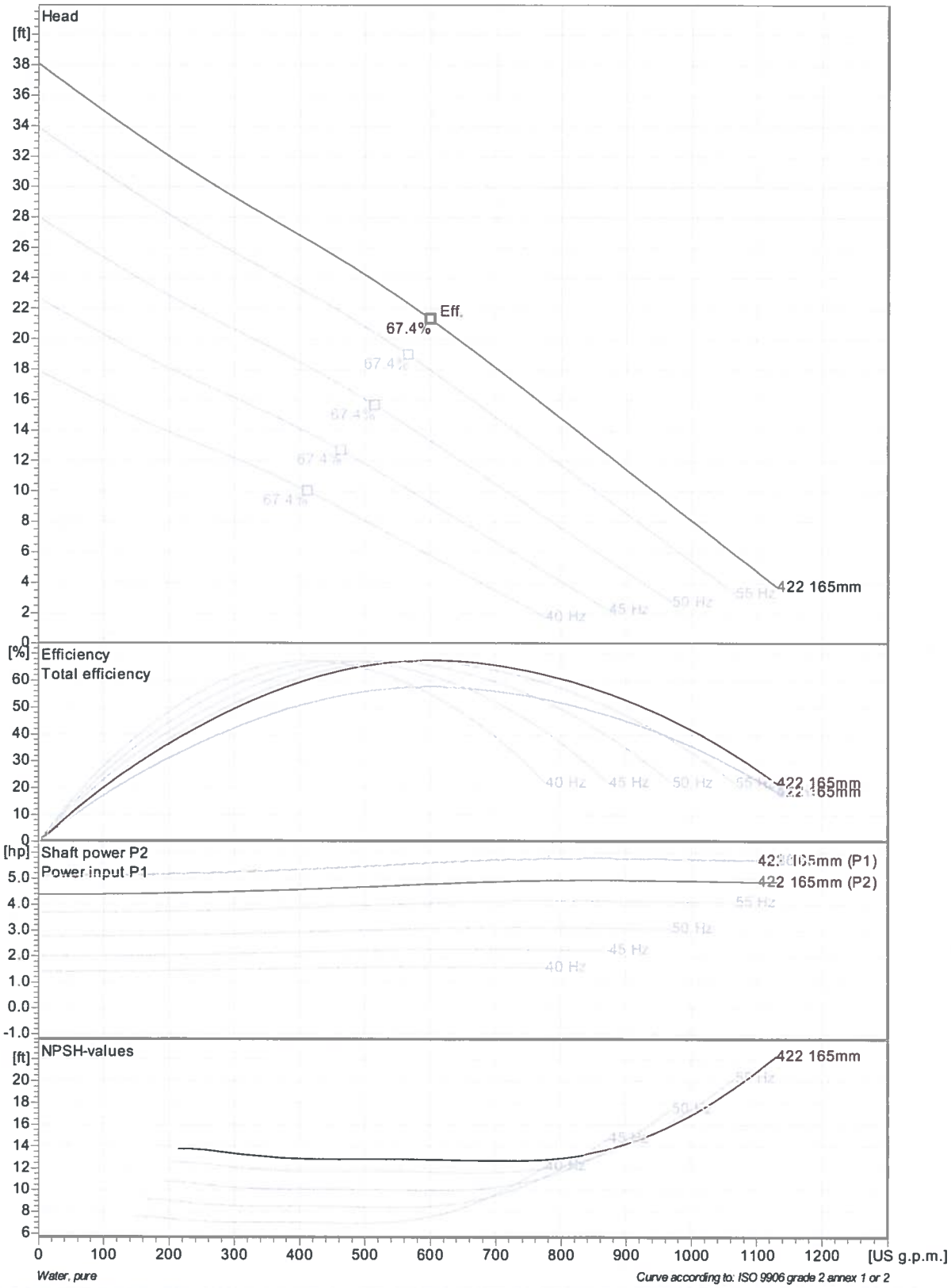
NP 3102 LT 3~ Adaptive 422

VFD Curve

FLYGT



Project	Project ID	Created by	Created on	Last update
			2014-08-22	

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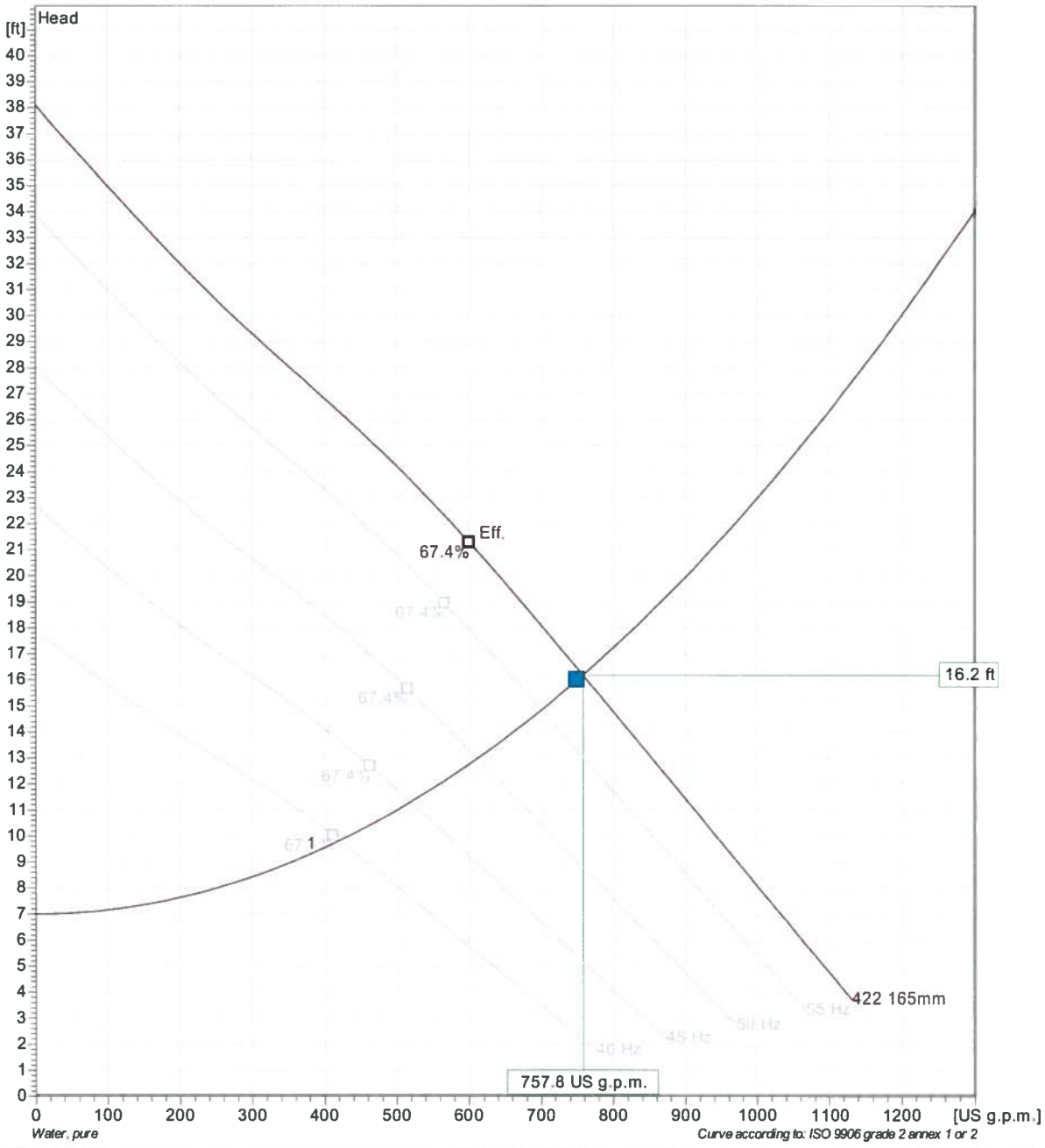
NP 3102 LT 3~ Adaptive 422

FLYGT

VFD Analysis



Pumps running /System	Individual pump Frequency	Flow	Head	Shaft power	Total Flow	Head	Shaft power	Hyd eff.	Specific energy	NPSHre
1	60 Hz	758 US g.p.m.	16.2 ft	4.92 hp	758 US g.p.m.	16.2 ft	4.92 hp	63.1 %	94.5 kWh/US MG	12.8 ft
1	55 Hz	701 US g.p.m.	14.9 ft	4.13 hp	701 US g.p.m.	14.9 ft	4.13 hp	63.8 %	101 kWh/US MG	11.6 ft
1	50 Hz	612 US g.p.m.	13 ft	3.09 hp	612 US g.p.m.	13 ft	3.09 hp	65.1 %	114 kWh/US MG	9.93 ft
1	45 Hz	519 US g.p.m.	11.3 ft	2.24 hp	519 US g.p.m.	11.3 ft	2.24 hp	66.4 %	132 kWh/US MG	8.41 ft
1	40 Hz	421 US g.p.m.	9.83 ft	1.55 hp	421 US g.p.m.	9.83 ft	1.55 hp	67.4 %	159 kWh/US MG	7.01 ft

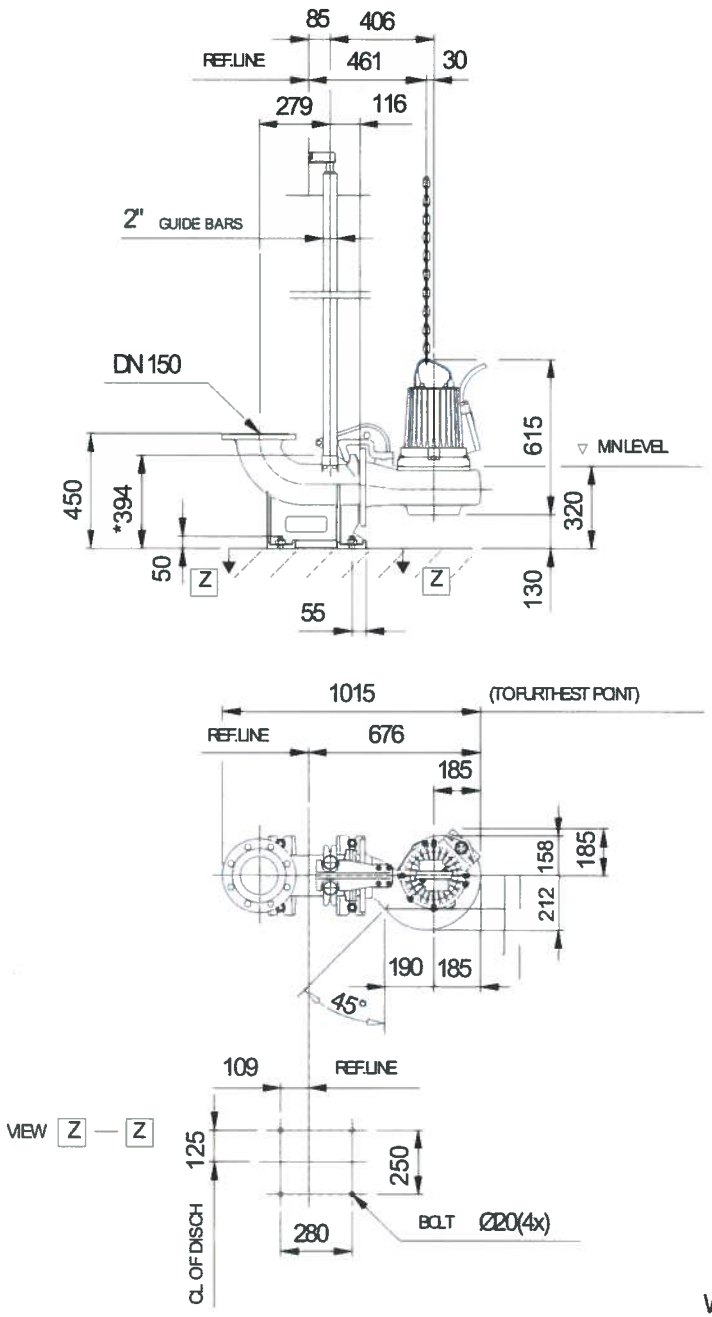
Project	Project ID	Created by	Created on	Last update
			2014-08-22	

xylem
Let's Solve Water

NP 3102 LT 3~ Adaptive 422

Dimensional drawing

FLYGT



Weight

* DIMENSION TO ENDS OF GUIDE BARS

Dimensional drwg
NP3102LT

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