xylem

Xylem Water Solutions USA, Inc.
Flygt Products

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September 9, 2013

MILWAUKEE COUNTY
DEPARTMENT OF ADMINISTRATIVE SERVICES

Quote # 2013-PEW-0292
Alternate 1, Version 2

Re: PROJECT V025-13807 RAWSON AVE. LIFT STATION

Xylem Water Solutions USA, Inc. is pleased to provide a quote for the following Flygt equipment per the contract documents.

Section 11312 Submersible Non-clog Pumps

Qty	Description
2	Flygt model NP3356/605, 870 impeller with 425mm trim. Motor will be 70 HP, explosion proof and inverter duty rated with one 50 ft. power cord and one 50 ft. pilot cord. Motor will include junction box leakage sensor, stator thermal switches (one per phase wired in series), stator analog thermal sensor (one phase), stator leakage sensor and load bearing analog thermal sensor. Pump includes standard coating and guide rail slide bracket (3").
2	CONNECTION,DISCH 14X14" CI
2	BRACKET,GUIDE BAR U. 3" 316SS
60	CHAIN, 5/8 HI-TEST GALVANIZED
2	KIT,CHAIN FITTINGS FSWL 7150#
1	START UP CHARGE FLYGT
1	Freight Pumps & pump accessories

Instrumentation & Control System

Qty	Description
1	Flygt control system in NEMA 12 painted steel enclosure including vents, dead front door, three point latch, solid state motor starters, UTS contactors, main breaker, control breaker, motor breakers, receptacle breaker, alarm horn with silence button, alarm light, power supply, elapsed time meters, ground fault receptacle, heater with thermostat, intrinsic relays, NEMA 4 HOA switches, NEMA 4 LED push to test pilot lights (pump fail, run, level), motor starter overload reset buttons, surge arrestor, thermal terminals, uninterruptable power supply (UPS), time delay relays, control transformer, trouble light and UL rating.
2	BASE UNIT/PANEL ASSEMBLY MAS
2	TRANSFORMER,CURRENT 150:1
1	APP 721, US

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Qty	Description
6	Anchor Scientific SS float, NO with 60 ft. of cable and clamps for attaching to anchor kit.
1	Anchor Scientific anchor kit with 40 ft. of plastic coated wire rope.
1	Freight - Controls and accessories

Air Freight Adder

Qty	Description
1	Adder for air freight to meet 9/2/2013 delivery.

Incoterm: 1 FCA - Free Carrier **Named Placed:** 01 - Factory
Incoterms 2010 clarify responsibility for costs, risks, & tasks associated with the shipment of goods to the named place.
Time of delivery: Per contract documents.
Validity: This Quote is valid for thirty (30) days.
Terms of payment: 90%N30 10%N90 from invoice date

Thank you for the opportunity to provide this quotation. Please contact us if there are any questions.

Sincerely,

James Johnson

Sales Engineer

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Cell: 608/235-2989

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Specifications

NP3356/605 - 870

Each pump shall be equipped with a close coupled 70 HP, submersible electric motor connected for operation on 460 volts, 3 phase, 60 hertz, 4 wire service with 50 linear feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards. Also, 50 linear feet of multi-conductor submersible cable (SUBCAB) will be used to convey pump monitoring device signals.

The pump shall be supplied with a mating cast iron 14 inch discharge connection and be capable of delivering 5200 GPM at 37 FT. TDH. An additional point on the same curve shall be 7000 GPM at 22 feet total head. Shut off head shall be 68 feet (minimum). The pump(s) shall be automatically and firmly connected to the discharge connection, guided by no less than two guide bars extending from the top of the station to the discharge connection. There shall be no need for personnel to enter the wet-well. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact. The entire weight of the pump/motor unit shall be borne by the pump discharge elbow. No portion of the pump shall bear directly on the sump floor. Each pump shall be fitted with 30 feet of galvanized lifting chain. The working load of the lifting system shall be 50% greater than the pump unit weight.

Major pump components shall be of gray cast iron, ASTM A 48, Class 35B, with smooth surfaces devoid of blow holes or other casting irregularities. All exposed nuts or bolts shall be AISI type 316 stainless steel. All metal surfaces coming into contact with the pumped media, other than stainless steel, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

Sealing design shall incorporate metal to metal contact between machined surfaces. Pump/Motor unit mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or optional Viton rubber O rings. Joint sealing will be the result of controlled compression of rubber O rings in two planes and O ring contact of four sides without the requirement of a specific bolt torque limit. Rectangular cross sectioned rubber, paper or synthetic gaskets that require specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O rings, grease or other devices shall be used.

Each pump/motor unit shall be provided with an integral, self-supplying cooling system. The motor water jacket shall encircle the stator housing and shall be of cast iron, ASTM A 48, Class 35B. The water jacket shall thus provide heat dissipation for the motor regardless of whether the motor unit is submerged in the pumped media or surrounded by air. After passing through a classifying labyrinth, the impeller back vanes shall provide the necessary circulation of the cooling liquid, a portion of the filtered pump media, through the cooling system. Two cooling liquid supply pipes, one discharging low and one discharging high within the jacket, shall supply the cooling liquid to the jacket. An air evacuation tube shall be provided to facilitate air removal from within the jacket. Any piping internal to the cooling system shall be shielded from the cooling media flow allowing for unobstructed circular flow within the

jacket about the stator housing. Two cooling liquid return ports shall be provided. The internals to the cooling system shall be non-clogging by virtue of their dimensions. Drilled and threaded provisions for external cooling and, seal flushing or air relief are to be provided. The cooling jacket shall be equipped with two flanged, gasketed and bolted inspection ports of not less than 4"Ø located 180° apart. The cooling system shall provide for continuous submerged or completely non-submerged pump operation in liquid or in air having a temperature of up to 40°C (104°F), in accordance with NEMA standards. Restrictions limiting the ambient or liquid temperatures at levels less than 40°C are not acceptable.

The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of dual cylindrical elastomer grommets, flanked by washers, all having a close tolerance fit against the cable outside diameter and the cable entry inside diameter. The grommets shall be compressed by the cable entry unit, thus providing a strain relief function. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be specifically designed for submersible pump usage and designed for continuous duty pumping media of up to 40°C (104°F) with an 80°C temperature rise and capable of at least 15 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum.

Thermal switches shall be embedded in the stator end coils to monitor the temperature of each phase winding. One PT-100 type temperature sensor shall be installed in the stator winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. A mechanical float switch (FLS) shall be mounted in the junction chamber to signal if there is water intrusion. A pump memory module shall be provided and mounted in the junction chamber to record pump run time, number of starts as well as contain the motor unit performance and manufacturing data and service history. The use of wire nuts or crimp-type connectors is not acceptable. The motor and the pump shall be produced by the same manufacturer.

The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40°C (104°F) ambient and with a temperature rise not to exceed 80°C. A

performance chart shall be provided upon request showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no load characteristics.

The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut off through run out.

The pilot cable shall be designed specifically for use with submersible pumps and shall be type SUBCAB (SUBmersible CABle). The cable shall be multi-conductor type with stainless steel braided shielding, a chlorinated polyethylene rubber outer jacket and tinned copper conductors insulated with ethylene-propylene rubber. The conductors shall be arranged in twisted pairs. The cable shall be rated for 600 Volts and 90°C (194°F) with a 40°C (104°F) ambient temperature and shall be approved by Factory Mutual (FM). The cable length shall be adequate to reach the junction box without the need for splices.

The pump shaft shall rotate on at least three grease-lubricated bearings. The upper bearing, provided for radial forces, shall be a single roller bearing. The lower bearings shall consist of at least one roller bearing for radial forces and one or two angular contact ball bearings for axial thrust.

The minimum L10 bearing life shall be 100,000 hours at any point along the usable portion of the pump curve at maximum product speed.

The lower bearing housing shall include an independent thermal sensor to monitor the bearing temperature. If a high temperature occurs, the sensor shall activate an alarm and shut the pump down.

Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The lower seal shall be independent of the impeller hub. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide seal ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall be a leakage-free seal. The upper seal shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide seal ring. The rotating seal ring shall have small back-swept grooves laser inscribed upon its face to act as a pump as it rotates, returning any fluid that should enter the dry motor chamber back into the lubricant chamber. The Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal.

Should both seals fail and allow fluid to enter the stator housing, a port shall be provided to direct that fluid immediately to the stator float switch to shut down the pump and activate an alarm. Any intrusion

of fluid shall not come into contact with the lower bearings. No system requiring a pressure differential to offset pressure and to effect sealing shall be used.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication.

The motor shall be able to operate continuously while non-submerged without damage while pumping under load.

Seal lubricant shall be FDA Approved, nontoxic.

Pump and motor shaft shall be a solid continuous shaft. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The pump shaft shall be of AISI 431 stainless steel.

The impeller shall be of gray cast iron, Class 35B, dynamically balanced, semi-open, multi-vane, back-swept, non-clog design. The impeller vane leading edges shall be mechanically self-cleaned upon each rotation as they pass across (a) spiral groove(s) located on the volute suction which shall keep them clear of debris, maintaining an unobstructed impeller leading edge and sustaining a high level of hydraulic efficiency. The impeller vanes shall have screw-shaped leading edges that are hardened to Rc 45 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater. The screw shape of the impeller vanes shall provide an inducing effect for the handling of sludge and rag-laden wastewater. Impellers shall be locked to the shaft, held by an impeller bolt and treated with a corrosion inhibitor.

The pump volute shall be of A48 Class 35B gray cast iron and shall have (an) integral spiral shaped cast groove(s) at the suction of the volute. The internal volute insert ring shall provide effective sealing between the pump volute and the multi-vane, semi-open impeller. The sharp spiral groove(s) shall provide a release pathway as well as shearing edges for trash and stringy materials to maintain clear impeller leading edges. The clearance between the internal volute bottom and the impeller leading edges shall be adjustable.

All stators shall incorporate three thermal switches, connected in series, to provide over temperature protection of the motor winding. Should high temperature occur, the thermal switches shall open, stop the motor and activate an alarm. The stator shall also include one PT-100 type temperature probe to provide for monitoring of the stator temperature

A lower bearing temperature sensor shall be provided. The sensor shall directly contact the outer race of the thrust bearing providing for accurate temperature monitoring.

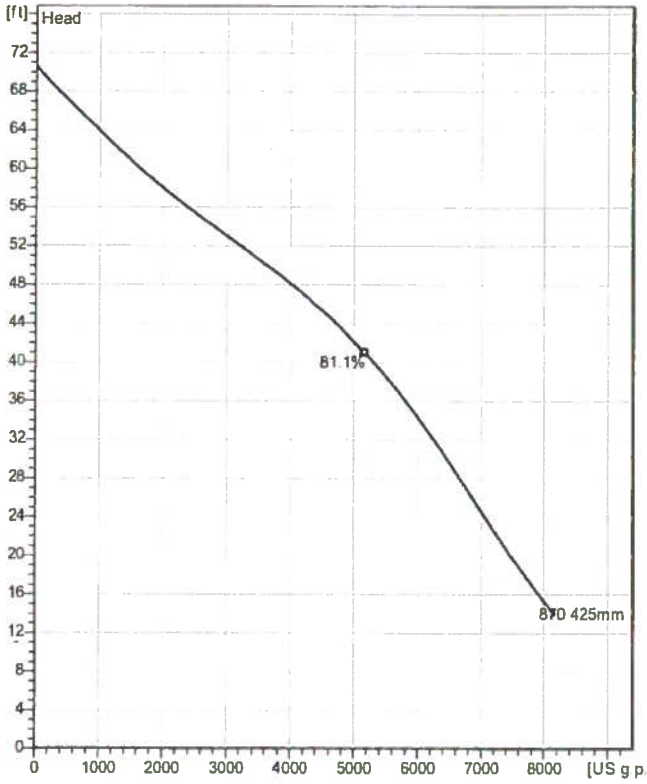
Two leakage sensors shall be provided to detect water intrusion into the stator chamber and junction chamber. A Float Leakage Sensor (FLS), a small float switch, shall be used to detect the presence of water in either the stator chamber or junction chamber. When activated, the FLS will stop the motor and activate an alarm.

The solid-state pump memory unit, three thermal switches, two FLS switches, PT-100 stator temperature monitor and the lower bearing PT-100 temperature monitor shall all be connected to a MAS (Monitoring and Status) monitoring unit. The MAS shall be designed to be mounted in the control panel and shall come with an Operator Panel that is dead-front panel mounted. The Operator Panel shall have soft-touch operator keys and provide local indication of the status of the alarms within the connected pump unit by means of an LCD screen read-out. Local MAS system change shall be made by use of the soft-touch keypad or local connection by means of a laptop computer. Remote indication of pump unit status shall be possible with connection to customer PLC or via LAN.

Option 2

NP 3356/605 3~ 870

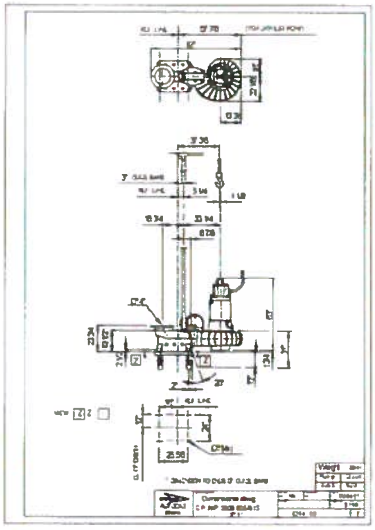
Technical specification



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. Modular based design with high adaptation grade.

Impeller

Impeller material	Grey cast iron
Outlet width	13 3/4 inch
Inlet diameter	350 mm
Impeller diameter	425 mm
Number of blades	3
	0 inch

Motor

Motor #	N0605.000 35-29-8AA-W 70hp
Stator variant	1
Frequency	60 Hz
Rated voltage	480 V
Number of poles	8
Phases	3~
Rated power	70 hp
Rated current	91 A
Starting current	465 A
Rated speed	880 rpm
Power factor	
1/1 Load	0.76
3/4 Load	0.71
1/2 Load	0.61
Efficiency	
1/1 Load	90.0 %
3/4 Load	91.0 %
1/2 Load	90.5 %

Configuration

Project	Project ID	Created by	Created on	Last update
Rawson Ave. PS	2013 Rawson AVE PS	JAMES JOHNSON	2013-08-01	2013-08-01

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Option 2

NP 3356/605 3~ 870

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Performance curve

Pump

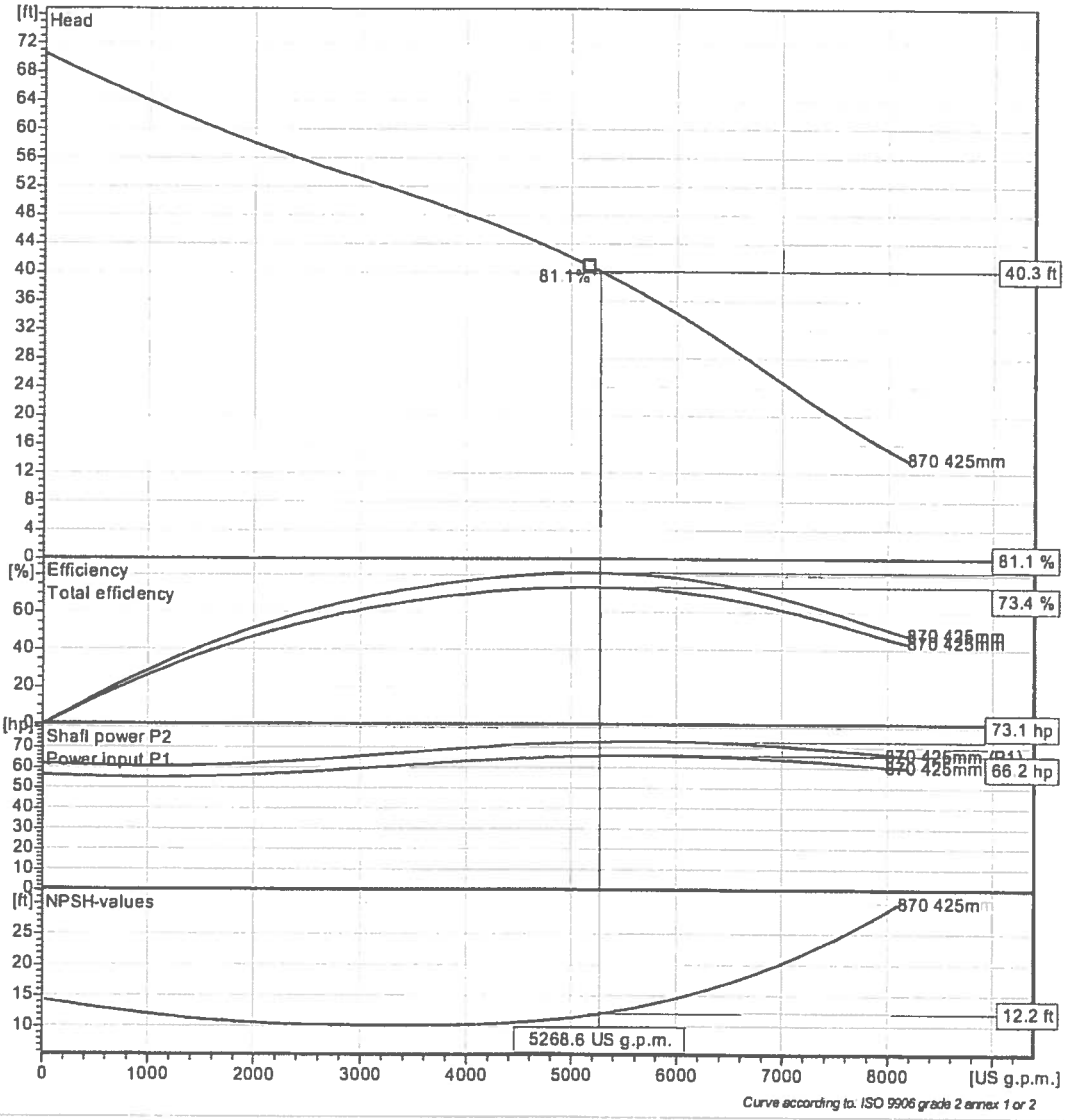
Outlet width	13 3/4 inch
Inlet diameter	350 mm
Impeller diameter	16¾"
Number of blades	3
	0 inch

Motor

Motor #	N0605.000 35-29-8AA-W 70hp
Stator variant	1
Frequency	60 Hz
Rated voltage	480 V
Number of poles	8
Phases	3~
Rated power	70 hp
Rated current	91 A
Starting current	465 A
Rated speed	880 rpm

Power factor	
1/1 Load	0.76
3/4 Load	0.71
1/2 Load	0.61

Efficiency	
1/1 Load	90.0 %
3/4 Load	91.0 %
1/2 Load	90.5 %



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

Duty point					Guarantee
Flow	Head	Shaft power	NPSHre	Hyd eff.	DIN_1944_Class_1
5200 US g p m.	40 ft	<67.7 hp	12 5 ft	81 %	Yes

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Rawson Ave. PS	2013 Rawson AVE PS	JAMES JOHNSON	2013-08-01	2013-08-01

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Option 2

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Duty Analysis

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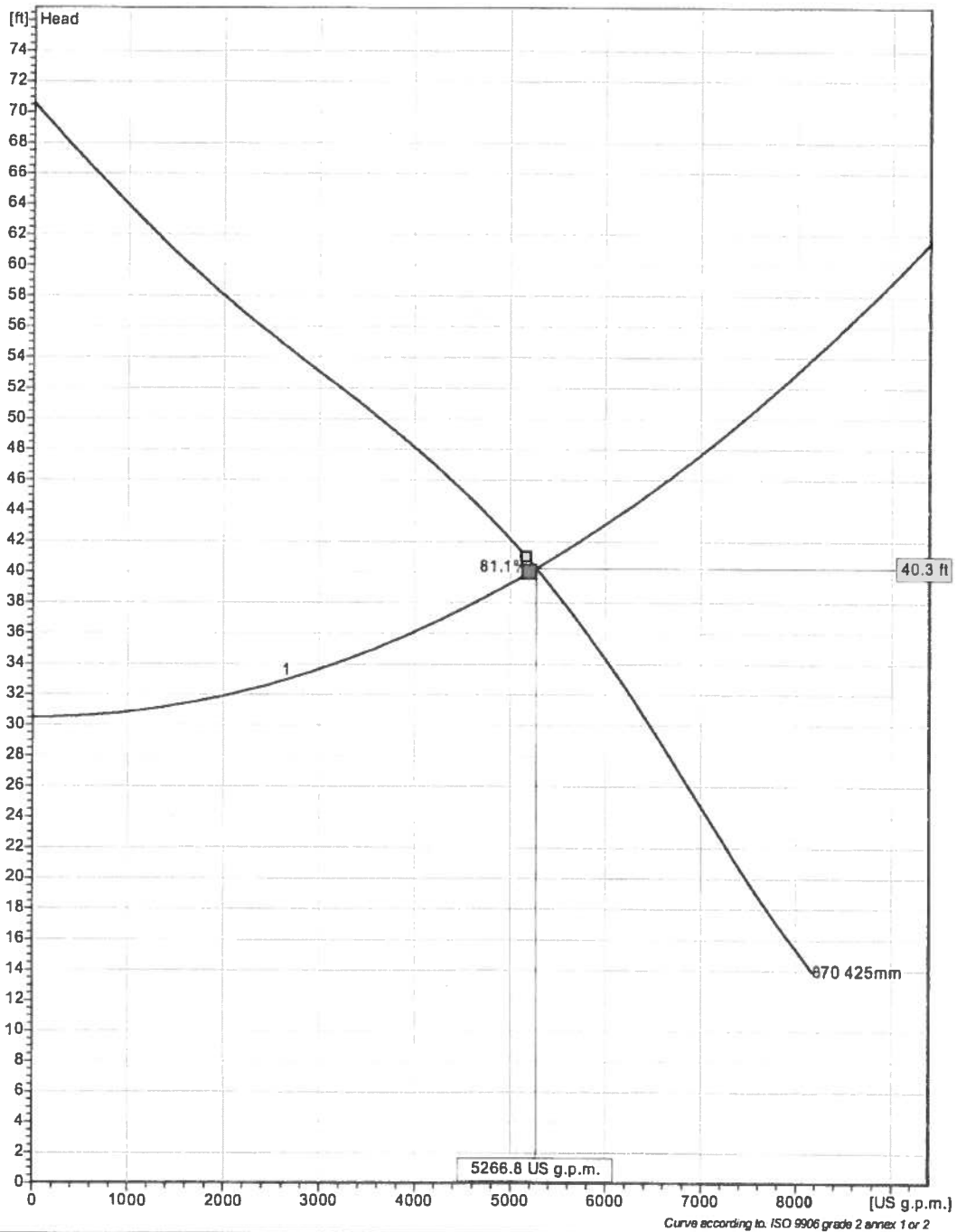

Curve according to. ISO 9906 grade 2 annex 1 or 2

Pumps running /System	Individual pump Flow	Head	Shaft power	Total Flow	Head	Shaft power	Hyd eff.	Specific energy	NPSHre
1	5270 US g.p.m.	40.3 ft	66.2 hp	5270 US g.p.m.	40.3 ft	66.2 hp	81.1 %	172 kWh/US MG	12.2 ft

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Rawson Ave. PS	2013 Rawson AVE PS	JAMES JOHNSON	2013-08-01	2013-08-01

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NP 3356/605 3~ 870
Dimensional drawing

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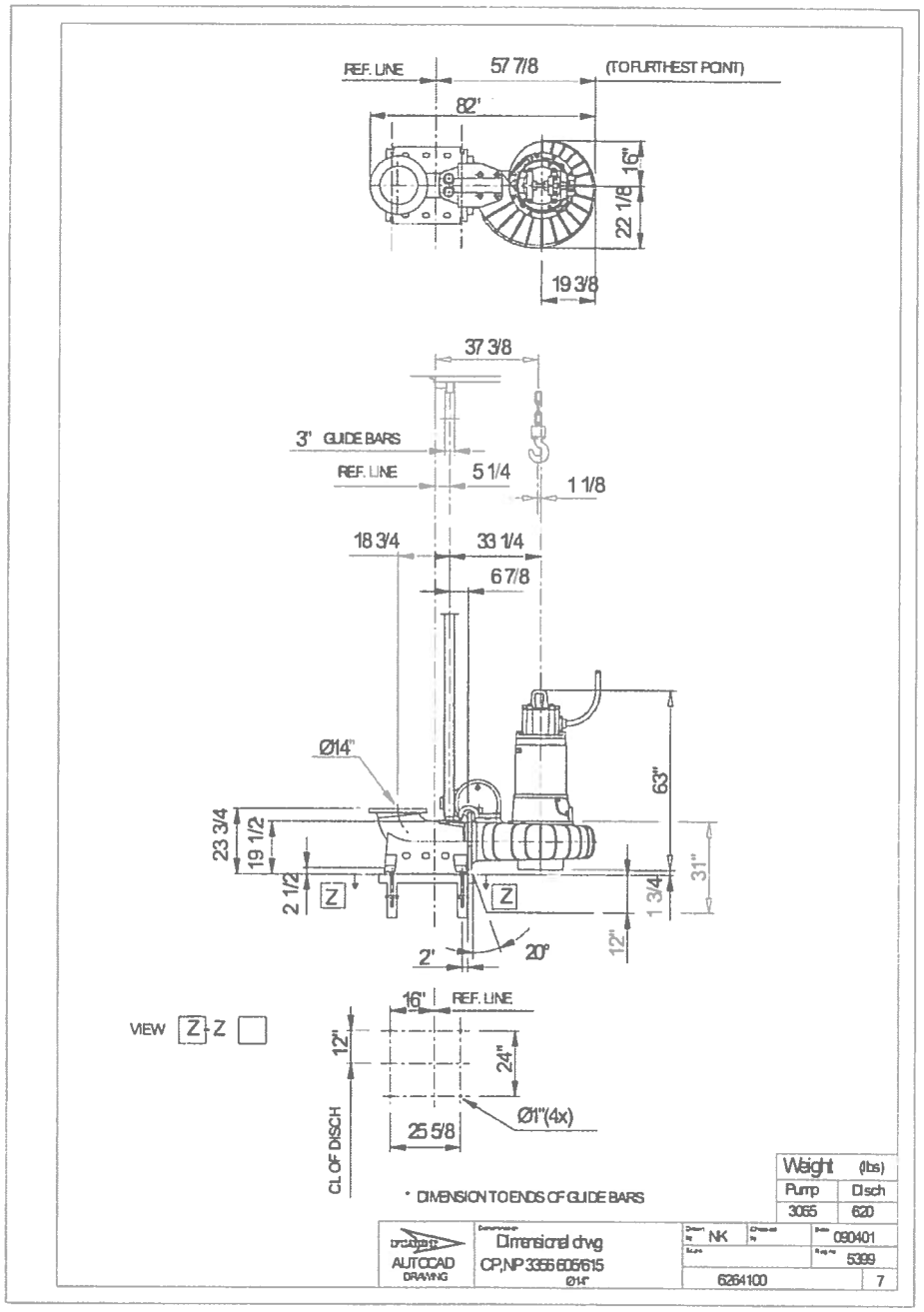

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