

# ENGINEERING DATA



Smith &  
Loveless, Inc.®

14040 West Santa Fe Trail Drive  
Lenexa, Kansas 66215-1284

I-SERIES™ Immersible Pump  
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June, 2012  
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## I-SERIES™ IMMERSIBLE PUMP SUMMARY

### I-SERIES™ IMMERSIBLE PUMP

The I-SERIES™ Immersible Pump by Smith & Loveless, Inc. comes in both the flooded suction and vacuum primed pump models. This section specifically addresses the unique aspects of the I-SERIES™ Immersible Pump. For specific pump sizing information, please refer to either the Vacuum Pump Catalog Section or the Flooded Suction Pump Catalog Section of this catalog.

Spurred by concerns over the potential of pump station flooding – whether a dry-pit resides in a flood plain or experiences the ill effects of failed mechanical seals and valves – many cities, engineers and developers often specify submersible pumps for dry-pit environments. At first glance, the logic seems reasonable: a “submersible” should, theoretically, run in the rare event of a dry-pit flooding. Yet, submersible pumps are specifically designed for wet pits, hence their name. More than that, the surrounding wastewater keeps the submerged pump motor properly cooled in order to maintain reasonable performance. When submersibles operate in a dry-pit application, they require extra fixtures and retooling in order to compensate for the lack of cooling when not submerged – in this case nearly 99.9 percent of the time. This begs the question, **“why use a ‘submersible’ in a ‘dry’ application?”**

When submersibles are applied in dry-pits, the biggest problem becomes how to keep the submersible pump motor cooled. The popular method of cooling a dry-pit submersible is applying a cooling jacket. However, inherent problems in cooling jackets arise because some require circulating a small volume of the raw wastewater through the jacket. Sewage particles can periodically clog the passages in the jacket and prevent it from cooling the motor properly.

If not properly cooled, heat buildup can cause a variety of scenarios that may not provide the necessary protection from flooding. First, overheating can unknowingly and adversely affect the pump’s moisture detectors. The dry-pit submersible pump may not run when actually submerged in a flood – the moisture detectors could fault it out and the pump fails to operate.

Another heat buildup factor concerns the watertight grommets, located on top of the motor in many submersibles. In non-submerged conditions, the grommets may actually begin to dry rot, allowing the possibility of water to enter the motor and cause damage.

When the motor fails, the pumps will likely require a major overhaul because of the excessive wear. Not only is this costly, it also requires downtime while it is pulled out of service and sent to a service shop for rebuilding. Most service and maintenance procedures on submersibles cannot be performed in the field – especially with the exterior cooling jacket that is required for dry-pits.

Again, the question comes to mind, “why use a ‘submersible’ in a ‘dry’ application?” In reality, submersibles are not the most reliable or cost-effective option for protecting dry-pit applications from flooding events. Essentially, a dry-pit submersible runs in its optimal design conditions only 0.1 percent of the time – when it floods. And that is no guarantee either!

When considering flood protection for dry-pit applications, specifiers should also consider the life cycle costs associated with dry-pit submersibles. Dry-pit submersibles have regular and periodic premiums: service contracts, overhauls, foreign parts, typically shorter service life and lower pump efficiencies than other kinds of pumps. These out-of-pocket expenditures can prove to be very costly.

Smith & Loveless is pleased to present a sensible alternative, the Smith & Loveless I-SERIES™ Immersible Pump. Unlike a submersible, the I-SERIES™ Immersible Pump runs optimally 100 percent of the time in dry-pit applications while providing the base protection necessary for flood events. Incorporating the Smith & Loveless TEFC motor and specially designed end bell seals at the top and bottom of the motor housing, I-SERIES™ Pumps allow up to three (3) weeks of immersion in 30 feet of wastewater. Smith & Loveless’ design moves the grommet away from the top of the motor where the heat rises, allowing a fan to continuously cool the motor during operation. Additionally, the I-SERIES™ employs a special motor conduit box located on the side, eliminating expensive terminal boards typically located in submersibles.

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**I-SERIES™** Immersible Pump  
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**I-SERIES™** is the latest innovation in the venerable Smith & Loveless Pump line, which is renowned for long lifecycles, ease of maintenance, high pump efficiencies, fewer required parts and minimal maintenance procedures. Operators can easily perform service like changing the **DAMTITE®** mechanical seal themselves (the **DAMTITE®** Seal is also known for its impressive durability and low replacement cost).

Not only are **I-SERIES™** Pumps manufactured in the U.S., but so are its parts. This is unlike many foreign submersibles which may have lead times of many weeks or even months. Like other Smith & Loveless Pumps, flow and head increases for **I-SERIES™** Pumps can be easily accomplished with a mere impeller change.

Specifiers faced with concerns about floodplains and/or mechanical seal or valve failures should consider pumps engineered specifically for the task. Weigh the benefits gained with Smith & Loveless **I-SERIES™** Immersible Pumps versus the drawbacks of incorporating submersibles in dry-pit applications. Not only do **I-SERIES™** Immersible Pumps present superior lifecycle benefits, but they offer the base protection required in rare flood events.

Customers can count on the experience and excellence gained by Smith & Loveless in tens of thousands of pump installations and nearly 60 years of engineering and manufacturing.

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I-SERIES™ Immersible Pump  
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## I-SERIES™ IMMERSIBLE PUMP FLOODED SUCTION CUT VIEW

**I-Series™ Pumps** feature a compact pump design, which significantly reduces man-hours required for routine maintenance — like changing oil — associated with submersible pumps. *Other features include:*

TEFC cools motor under normal conditions and is watertight up to 30' for a period up to 3 weeks

Motor internally epoxy-treated — Class "F" insulation with class "B" temperature limit

Corrosion-proofed bolts and tapings

Oversize lower bearing (locked for no end play)

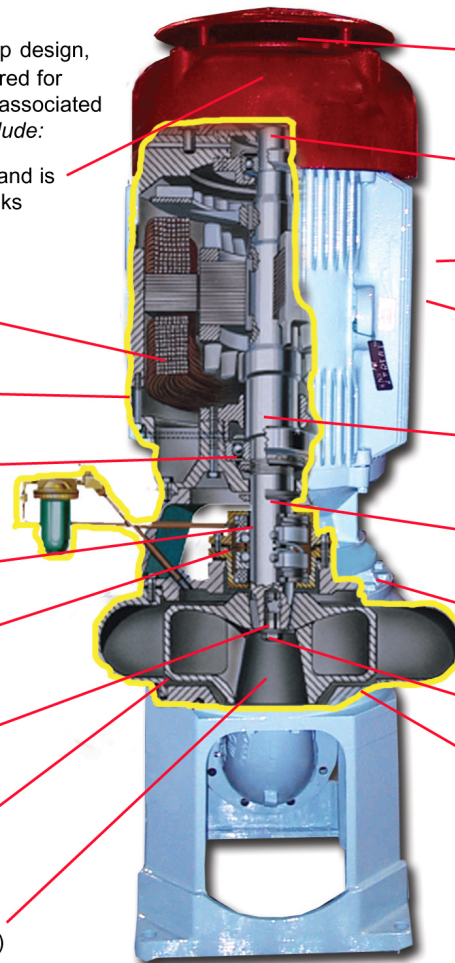
Stainless steel shaft through the mechanical seal

Bronze mechanical shaft seal cartridge with special heat dissipating design

Keyed and tapered shaft for positive lock and easy impeller removal

Heavy, cast iron balanced impeller

Streamlined impeller eye (passes 3" sphere)



External surface two-part epoxy coated for maximum corrosion protection

Upper shaft seal motor protection (*not shown*)

Cast conduit box with gasketed cover (*not shown by angle*)

Sealed and permanently indexed motor leads (*not shown by angle*)

Oversized severe duty motor and pump shaft

Lower shaft seal motor protection

Heavy cast iron pump casing

Stainless steel "nylock" self-locking impeller cap screw

Close tolerances prevent recirculation, increase efficiency and eliminate need for wear rings

### Testing Overview

Each immersible motor is factory tested prior to shipment. The test consists of creating a vacuum inside of the motor housing to a level of one atmosphere. The vacuum is held and monitored by a gauge. The motor is considered to pass the test if there is no change in the vacuum pressure.



## I-SERIES™ IMMERSIBLE PUMP FLOODED SUCTION NON-CLOG PUMPS PARTIAL INSTALLATION LIST

Kusan Air Base, Kusan, Korea – (4) 125 HP, 1760 RPM

Fox Lake, IL – (2) 15 HP, 1760 RPM

Carroll County, MD – (1) 150 HP, 1760 RPM

Petone, IL – (2) 5 HP, 1170 RPM

Aiken, SC – (3) 200 HP, 1760 RPM

Wheelersburg, OH – (2) 7-1/2 HP, 1170 RPM

Johnson, SC – (2) 50 HP, 1760 RPM

Canton, IL – (2) 7-1/2 HP, 1170 RPM

Bunn, NC – (2) 15 HP, 1760 RPM

Hutsonville, IL – (2) 5 HP, 875 RPM

Lynwood, IL – (2) 25 HP, 1170 RPM

Broken Bow, NE – (2) 7-1/2 HP, 1760 RPM

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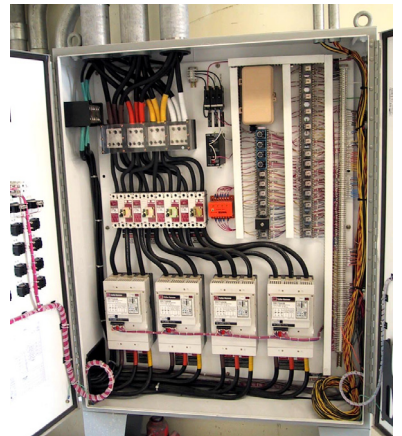
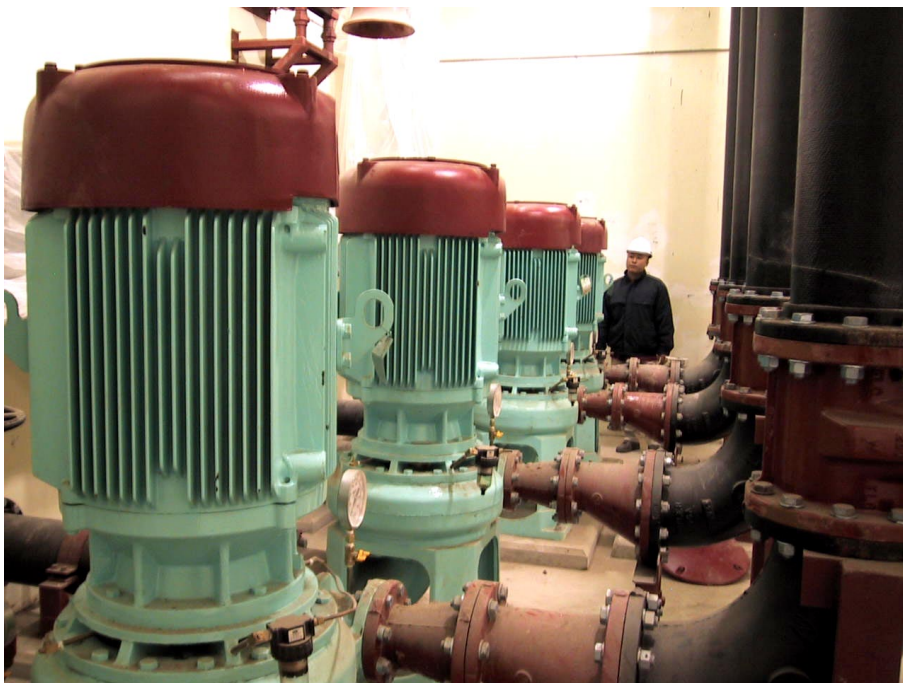
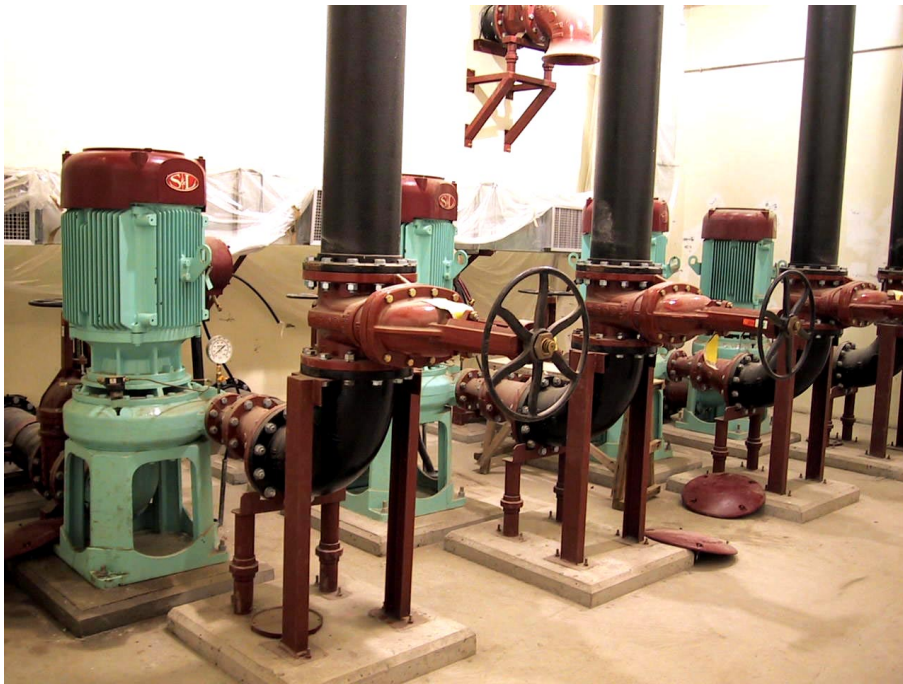


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## I-SERIES™ IMMERSIBLE PUMP FLOODED SUCTION NON-CLOG PUMPS INSTALLATION PHOTOS



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## SPECIFICATION FOR SMITH & LOVELESS FLOODED SUCTION IMMERSIBLE NON-CLOG PUMPS

### GENERAL

The contractor shall furnish and install \_\_\_\_\_ vertical, close-coupled, motor-driven, IMMERSIBLE, non-clog type pumps as manufactured by Smith & Loveless, Inc., Lenexa, Kansas.

### OPERATING CONDITIONS

Each pump shall be capable of delivering \_\_\_\_\_ GPM of raw water or wastewater against a total dynamic head of \_\_\_\_\_ feet. The minimum acceptable pump efficiency at this condition shall be \_\_\_\_\_. Due to the energy conservation requirements, the minimum efficiency will be enforced. The maximum allowable speed shall be \_\_\_\_\_ RPM. The minimum rated horsepower of each pump motor shall be \_\_\_\_\_.

All openings and passages shall be large enough to permit the passage of a sphere three inches (3") in diameter. The anticipated operating head range is from \_\_\_\_\_ feet minimum to \_\_\_\_\_ feet maximum.

### PUMPS

The pumps shall be \_\_\_\_\_ inches vertical, non-clog type of heavy cast-iron construction, especially designed for the use of mechanical seals. In order to minimize seal wear caused by linear movement of the shaft, the shaft bearing nearest the pump impeller shall be locked in place so that end play is limited to the clearance within the bearing. To minimize seal wear resulting from shaft deflection caused by the radial thrust of the pump, the shaft from the top of the impeller to the lower bearing supporting the impeller shall have a minimum diameter of 1-7/8" for motor frame sizes 213 through 286; 2-1/8" for motor frame sizes 324 and 326; and 3" for frame 364 and larger. The dimension from the lowest bearing to the top of the impeller shall not exceed six inches (6").

The bearing nearest the impeller shall be designed for the combined thrust and radial load. The upper bearing shall be free to move linearly with the thermal expansion of the shaft, and shall carry only radial loads.

The shaft shall be solid stainless steel through the mechanical seal to eliminate corrosion and abrasive rust particles. Removable shaft sleeves will not be acceptable if the shaft under the sleeve does not meet the specified minimum diameter.

### **[NOTE TO DESIGNER: SELECT ONE OF THE FOLLOWING PUMP TYPE PARAGRAPHS, A OR B, AND DELETE THE OTHER. CHECK PUMP CURVES FOR PROPER APPLICATION]**

#### **A. NON-CLOG TWO-PORT IMPELLER**

The pump impeller shall be of the enclosed two-port type made of close-grained cast iron, and shall be balanced. The eye of the impeller, as well as the ports, shall be large enough to permit the passage of a sphere three-inches (3") in diameter, in accordance with nationally recognized codes. The impeller shall be keyed with a stainless steel key and secured to the motor shaft by a stainless steel capscrew equipped with a Nylock or other suitable self-locking device. The impeller shall not be screwed or pinned to the motor pump shaft, and shall be readily removable without the use of special tools. To prevent the buildup of stringy materials, grit and other foreign particles around the pump shaft, all impellers less than full diameter shall be trimmed inside the impeller shrouds. The shrouds shall remain full diameter so that close minimum clearance from shrouds to volute is maintained. Both the end of the shaft and the bore of the impeller shall be tapered to permit easy removal of the impeller from the shaft.

#### **B. X-PELLER® SUPER CLOG-RESISTANT MONO-PORT IMPELLER (4" & 6" OPTION)**

The pump impeller shall be of the enclosed mono-port type made of close-grained cast iron, and shall be in dynamic balance when pumping wastewater. Two (2) port impellers are specifically disallowed. The dynamic balance shall be obtained without the use of balance weights or liquid-filled chambers. The impeller shall be designed to allow for the trimming of the impeller to meet design condition changes without altering the balance. The eye of the impeller, as well as the port, shall be large enough to permit the passage of a sphere three inches (3") in diameter, in accordance with nationally

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recognized codes. To further prevent clogging, the impeller port shall have a minimum area  $10.6 \text{ in}^2$ . The impeller shall be keyed with a stainless steel key and secured to the motor shaft by a stainless steel capscrew equipped with a Nylock or other suitable self-locking device. The impeller shall not be screwed or pinned to the motor pump shaft, and shall be readily removable without the use of special tools. To prevent the buildup of stringy materials, grit and other foreign particles around the pump shaft, all impellers less than full diameter shall be trimmed inside the impeller shrouds. The shrouds shall remain full diameter so that close minimum clearance from shrouds to volute is maintained. Both the end of the shaft and the bore of the impeller shall be tapered to permit easy removal of the impeller from the shaft.

The motor shall be attached to the pump volute by a one-piece cast iron adapter and backhead. The pump shall be arranged so that the rotating element may easily be removed from the volute without disconnecting the seal system or electrical wiring. The pump shall be arranged so that any foreign object may be removed from the pump or suction elbow without disassembling the motor, impeller or backhead. Volute or suction elbow clean-outs will not be an acceptable substitute.

The pump shaft shall be sealed against leakage by a double mechanical seal installed in a bronze seal housing constructed in two (2) sections with registered fit. The housing shall be recessed into the pump backhead and securely fastened thereto with stainless steel capscrews. The inside of the seal housing shall be tapered to facilitate the replacement of the seal parts. The seal shall be a double seal, with the mating surfaces lapped to a flatness tolerance of one light band. The rotating member shall be held in mating position with the stationary carbons by a stainless steel spring. The seal housing with assembled parts shall be so constructed as to be readily removable from the shaft as a unit, and shall be provided with tapped jackscrew openings to assist in removing it from the backhead.

The seal shall be pressurized and lubricated by water taken directly from the pump backhead. The water shall pass through a filter to the seal housing and be introduced between the upper and lower sealing surfaces. The filter shall be of corrosion-resistant materials, and shall screen out all solids larger than 50 microns. The seal system shall contain a brass valve connected near the top of the seal housing to permit the relief of any air trapped in the seal unit. A manually operated brass valve shall also be provided to vent the pump volute.

The pump volute shall be of heavy, cast iron construction, free from projections that might cause clogging or interfere with flow through the pump. The volute casing shall be (dual-curved) (double-volute) to reduce radial thrust.

The pump shall be supported by a heavy base with four (4) legs to provide maximum rigidity and balance. The height shall be sufficient to permit the use of an increasing suction elbow, which shall be provided when the nominal pump size is smaller than the suction line. The suction and discharge openings shall be flanged, faced and drilled 125-pound American Standard.

## MOTORS

The pump motors shall be vertical, solid shaft, NEMA P-base, squirrel-cage induction type, suitable for \_\_\_\_\_ phase, \_\_\_\_\_ cycle, \_\_\_\_\_ volt electric current. They shall have Class F insulation. The insulation temperature shall, however, be limited to Class B. The motors shall have normal starting torque and low-starting current, as specified by NEMA Design B characteristics.

The motors shall be immersible for up to three (3) weeks at a depth of thirty feet (30') of water without damage from leakage. After returning from an immersed state, the motor shall be capable of being restarted without any service to the motor. If the motor is operated in the immersed state, minor on-site repairs, consisting of replacing the cooling fan may have to be made prior to normal operation in air. The upper and lower shaft extensions shall be sealed with specially designed PTFE rotating lip seals and all casting-to-casting interfaces shall be sealed with Viton O-rings. Leads shall be terminated in a cast connection box, designed to exclude moisture, and all leads shall be clearly identified. Where required for sealing, all bolts shall be provided with Neoprene-backed washers. In addition, a slinger ring shall be provided on the lower shaft extension to further reduce the possibility of water entering the motor.

Each motor shall have at least one (1) normally closed, automatically resetting thermostat per phase, suitable for a 120 VAC 2-amp load.



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## MOTOR OPTIONS [DESIGNER: SELECT IF REQUIRED]

- Space Heater:** A 120 VAC space heater shall be provided in the motor enclosure to combat condensation. Leads shall be brought out through the conduit box.
- Moisture Sensor:** A moisture detector shall be provided at the low spot in the motor housing to sense the presence of liquid and close alarm contacts. Leads shall be brought out through the conduit box.

The motors shall have 1.15 service factor. The service factor shall be reserved for the owner's protection. The motors shall not be overloaded beyond their nameplate rating, at the design condition, or at any head in the operating range as specified under Operating Conditions.

The motor-pump shaft shall be centered, in relation to the motor base, within .005". The shaft run-out shall be limited to .003".

The motor shaft shall equal or exceed the diameter specified under "pumps", at all points from immediately below the top bearing to the top of the impeller hub.

A bearing cap shall be provided to hold the bottom motor bearing in a fixed position. Bearing housings shall be provided with plugged fittings for lubrication, as well as purging old lubricant.

The motors shall be fitted with heavy lifting eyes or lugs, each capable of supporting the entire weight of the pump and motor.

## SPARE PARTS

The manufacturer of the pump shall furnish a complete replacement pump shaft seal assembly, packaged in a suitable container with complete installation instructions.

A spare filter element for the seal filter shall be provided.

A spare volute gasket shall be provided.

A spare cooling fan shall be provided.

## WARRANTY

The manufacturer of the pumps shall warranty for one (1) year from the date of shipment that the pumps will be free from defects in design, material and workmanship.

Warranties by the suppliers of various components in lieu of a single source responsibility by the manufacturer will not be accepted. The manufacturer shall assume prime responsibility for the warranty of the complete pump-motor units.

In the event a component fails to perform as specified, or is proven defective in service during the warranty period, the manufacturer shall repair or replace, at his discretion, such defective part.

The replacement or repair of those items normally consumed in service such as seals, grease, etc., shall be considered as part of routine maintenance and upkeep.

It is not intended that the manufacturer of the pumps assume responsibility for contingent liabilities or consequential damages of any nature resulting from defects in design, material, workmanship or delays in delivery, replacement or otherwise.



## MANUFACTURER'S INSURANCE

ALL EQUIPMENT MANUFACTURERS, either direct or subcontractors to the general or mechanical contractors, SHALL HAVE in effect at TIME OF BID, CONTRACT AWARD, CONTRACT PERFORMANCE, and WARRANTY TERM, PRODUCT AND COMPREHENSIVE LIABILITY INSURANCE, INCLUDING SUDDEN AND ACCIDENTAL POLLUTION COVERAGE in the amount of FIVE MILLION DOLLARS, \$5,000,000, through an insurance company with a minimum rating of A+ (SUPERIOR) XV according to the BEST'S INSURANCE REPORTS. All policies must be written on an OCCURRENCE BASIS. Policies written on a CLAIMS MADE BASIS are not acceptable. A typical CERTIFICATE OF INSURANCE attesting to the specified coverage issued by the responsible carrier naming the ENGINEER OF RECORD and the OWNER as ADDITIONAL INSURED must be presented to the named additional insured prior to contract award. A FAILURE TO COMPLY with this requirement BY THE BIDDER will require DISQUALIFICATION of the BID and CONTRACT AWARD.

## MANUFACTURED EQUIPMENT

### OPTION 1 (STANDARDIZATION) [DELETE THIS LINE FROM FINAL SPEC TEXT]

The specifications and drawings detail Smith & Loveless equipment and represent the minimum standard of quality for both equipment and materials of construction. The contractor shall prepare his bid on the basis of the particular equipment and materials specified for the purpose of determining the low bid.

The owner has standardized on the named equipment in order to optimize their operation, facilitate maintenance and safety programs, provide for interchangeability of costly equipment items, reduce stocking levels required for necessary spare parts and provide increased flexibility in the utilization of their treatment equipment. Equipment substitutions, since incompatible with the district's standardizations program, will not be considered.

### OPTION 2 (BASE BID WITH BID SUBMITTAL) [DELETE THIS LINE FROM FINAL SPEC]

The specifications and drawings detail Smith & Loveless equipment and represent the minimum standard of quality for both equipment and materials of construction. The contractor shall prepare his bid on the basis of this equipment for the purpose of determining the low bid without consideration of a possible substitute. Substitution of other makes may be considered if the equipment proposed for substitution is superior or equal in quality and efficiency to the standards of quality named in the specifications and this is demonstrated to the satisfaction of the engineer. Contractors wishing to offer a deduct for substitute equipment shall include the following submittal information with their proposal.

## BID SUBMITTAL

This submittal shall include all necessary information for the proper determination of the acceptability of the proposed substitution and shall not necessarily be limited to the following.

- A. Complete description of the equipment, system, process, or function, including a list of system components and features, drawings, catalog information and cuts, manufacturer's specifications, including materials description.
- B. Performance data and curves, and horsepower requirements.
- C. Outside utility requirements, such as water power, air, etc.
- D. Functional description of any internal instrumentation and control supplied including list of parameters monitored, controlled, or alarmed.
- E. Addresses and phone numbers of nearest service centers and a listing of the manufacturer's or manufacturer's representatives' services available at these locations, including addresses and phone numbers of the nearest parts warehouses capable of providing full parts replacement and/or repair services.
- F. A list of five installations in the states where similar equipment by the manufacturer is currently in similar service; include contact name, telephone number, mailing address of the municipality or installation, engineer, owner, and installation contractor; if five installations do not exist, the list shall include all that do exist, if any.

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- G. Detailed information on site, architectural, structural, mechanical, plumbing, electrical, and control, and all other changes or modifications to the design and construction work necessary to adapt the equipment or systems to the arrangement shown and/or functions described on the drawings and in the technical specifications. This shall include plan view and section sketches illustrating any additional space requirements necessary to provide the minimum adequate clear space within and around the equipment for operation and maintenance, as shown on the drawings and specified.
- H. All differences between the specifications and the proposed substitute equipment shall be clearly stated in writing under a heading of "differences".
- I. Other specified submittal requirements listed in the detailed equipment and material specifications.
- J. A completed and signed copy of the "Flooded Suction Rotating Assembly Certification Affidavit" which follows.

## EVALUATION

Approval of the substitution to bid as an alternate shall in no way relieve the contractor from submitting the specified shop drawings for approval or complying fully with all provisions of the specifications and drawings.

If substituted equipment is accepted, the contractor shall, at his own expense, make any changes in the structures, piping, electrical, etc. necessary to accommodate the equipment. If engineering is required due to substitution of alternate equipment, the contractor shall pay for all engineering charges.

To receive final consideration, copies of the manufacturers' quotations for the equipment may be required to document the savings to the satisfaction of the engineer. It is the intent that the owner shall receive the full benefit of the savings in cost of equipment and the contractor's bid price shall be reduced by an amount equal to the savings. In all technical and other evaluations, the decision of the engineer is final.

## TYPICAL BID FORM

**(ADD TO BID FORM AS APPLICABLE TO ABOVE SELECTED OPTION]**

### OPTION 1

For reasons of standardization, bids shall be based on the named equipment. Alternate bids will not be allowed.

### OPTION 2

The bid shall be based on the named equipment. Alternate/substitute equipment may be offered as a deduct, provided all conditions of the "manufactured equipment" section are met.

Alternate/substitute manufacturer\_\_\_\_\_.

Deduct \$\_\_\_\_\_.

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## FLOODED NON-CLOG PUMP ASSEMBLY CERTIFICATION AFFIDAVIT

A submittal will be required to be submitted to the owner by manufacturers proposing alternate, unnamed pumps with their bid. Included in the submittal shall be full-size drawings and detailed specifications on the proposed pump. Copies of the engineer's plans and specifications will not be acceptable. Included in the bid submittal shall be the following filled-out checklist. It shall be signed by an officer of the Company.

	YES	NO
Close-coupled pump design - no motor to pump shaft coupling		
Pump shaft diameter of _____ minimum through seal		
Full diameter impeller shrouds		
Stainless steel pump shaft		
Tapered shaft to impeller fit		
Maximum pump shaft overhang of 6"- lower bearing to impeller		
Bronze seal housing		
Minimum pump efficiency at design point of _____ GPM of _____ %		
_____ % pump efficiency at best efficiency point for proposed impeller		
Class F motor insulation with Class B max motor temperature rise and 1.15 service factor		
Motor shaft run-out 0.003" max		
Motor shaft centered to motor base with 0.005"		
Locked lower bearing and floating upper bearing		
One-piece motor adapter/backhead		
Motor HP of _____ at _____ RPM		
Double mechanical seal with rotating ceramic elements and stationary carbon elements		
50 micron seal water filters		
Seal water taken from low pressure area of pump backhead		
Product liability insurance, \$5 million per specification		

The consulting engineer shall be the sole judge of whether the proposed equipment is acceptable. The manufacturer shall have the responsibility of submitting sufficient information in one submission. Incomplete or inaccurate submittal data shall be cause for rejection of the proposed equipment.

By an officer of the company signing this affidavit, he has stated 100% compliance with the plans and specifications and further states he will supply or pay for all deficiencies found in the job submittals or after the unit is installed. The consulting engineer shall be the sole judge regarding compliance with the plans and specifications and shall be sole judge on the amount of moneys required if any deficiencies are found. Generally, the amount of money shall be related to, but not limited to, a 20-year pump design life.

Corporate Seal  
(Notarized)

\_\_\_\_\_  
Signature of Company Officer

\_\_\_\_\_  
Title

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## I-SERIES™ IMMERSIBLE NON-CLOG PUMPS PUMP MOTOR SEALING DATA SHEET

TYPE	LOCATION DESCRIPTION	MATERIAL OF CONSTRUCTION
<b>Rotating Seals</b>	Upper & Lower Shaft Assemblies – Rotating End Bell Seals	PTFE
<b>Stationary Seals</b>	For all casting to casting interfaces	Viton O-Rings
	All bolt connections	Neoprene backed washers
<b>Connector Seals</b>	For all Power Cables	Buna-N
	For all Sensor Cables	Buna-N
<b>Power Cables</b>	Insulation	Ozone and Water-Resistant Synthetic Rubber (EPDM) UL-44
	Jacket	Extra-hard Usage, Oil-Resistant, Thermoset, TYRIN Jacket, UL-1581
<b>Sensor Cables</b>	Insulation	Oil and Water-Resistant Synthetic Rubber (EPDM) UL-62
	Jacket	Oil-Resistant, Thermoset, CPE UL-62

# ENGINEERING DATA



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I-SERIES™ Immersible Pump  
Pump Selection Reference  
June, 2012  
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## I-SERIES™ IMMERSIBLE NON-CLOG PUMPS PUMP SELECTION REFERENCE

**PLEASE NOTE:** Refer to Pump Curves in “Vacuum Primed Non-Clog Pumps” and “Non-Clog Pumps” Catalog Sections for Individual Pump Performance Curves.

# ENGINEERING DATA

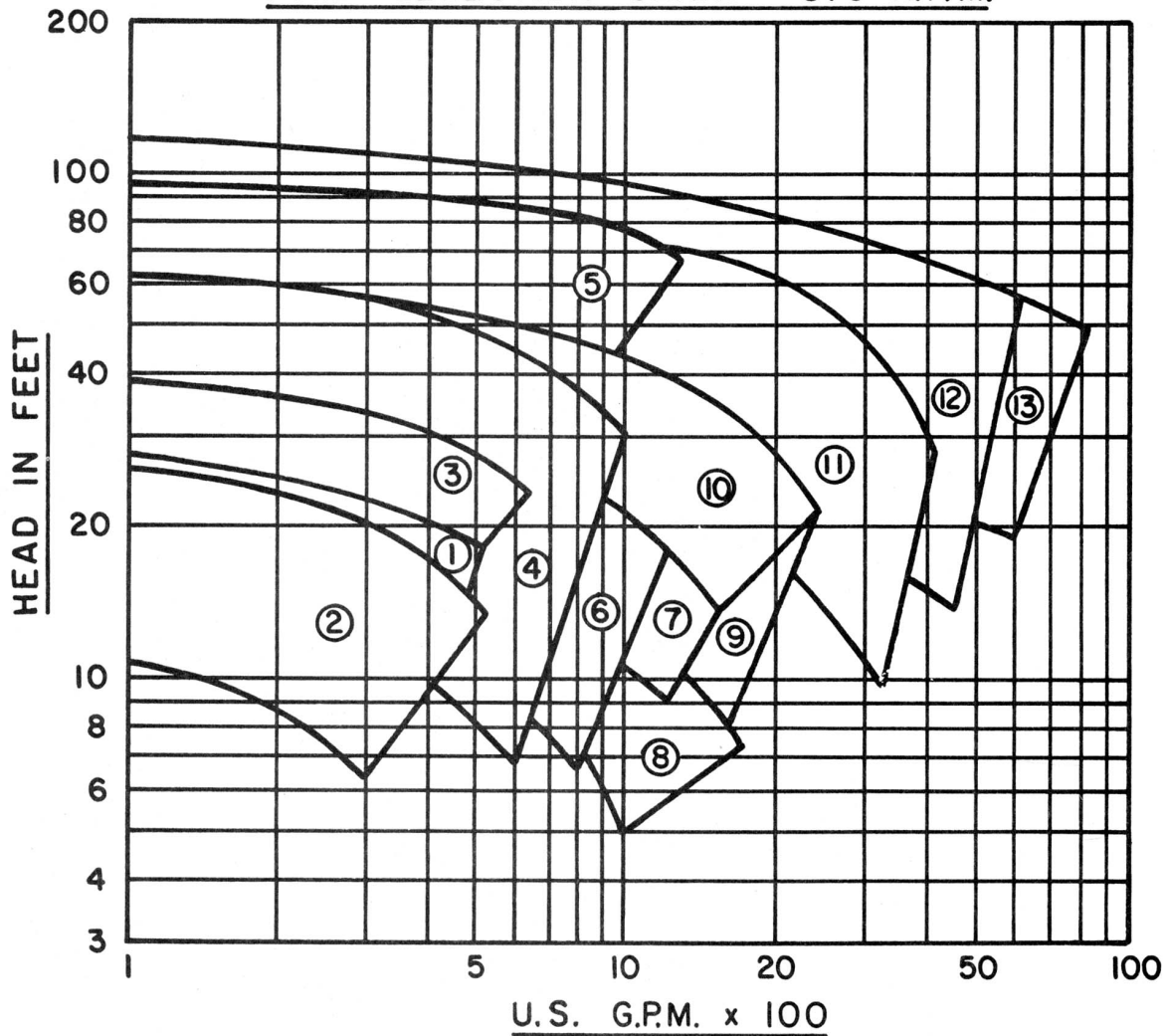


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I-SERIES™ Immersible Pump  
Pump Selection Chart  
Flooded Suction  
875 RPM  
June, 2012  
Page 1

## FLOODED SUCTION PUMP SELECTION CHART - 875 R.P.M.



<u>Key Number</u>	<u>Nominal Pump Size</u>	<u>Key Number</u>	<u>Nominal Pump Size</u>
1	4B2/4B2F	8	6D3C
2	4B2A/4B2G	9	6D4C/8D4C
3	4C3/4C3A	10	8D4A/8D4B
4	4D4A	11	8D5A/10D5A
5	4D5/6D5	12	10D6
6	6C3/6C3D	13	12D5
7	6D3A/6D3E		

# ENGINEERING DATA

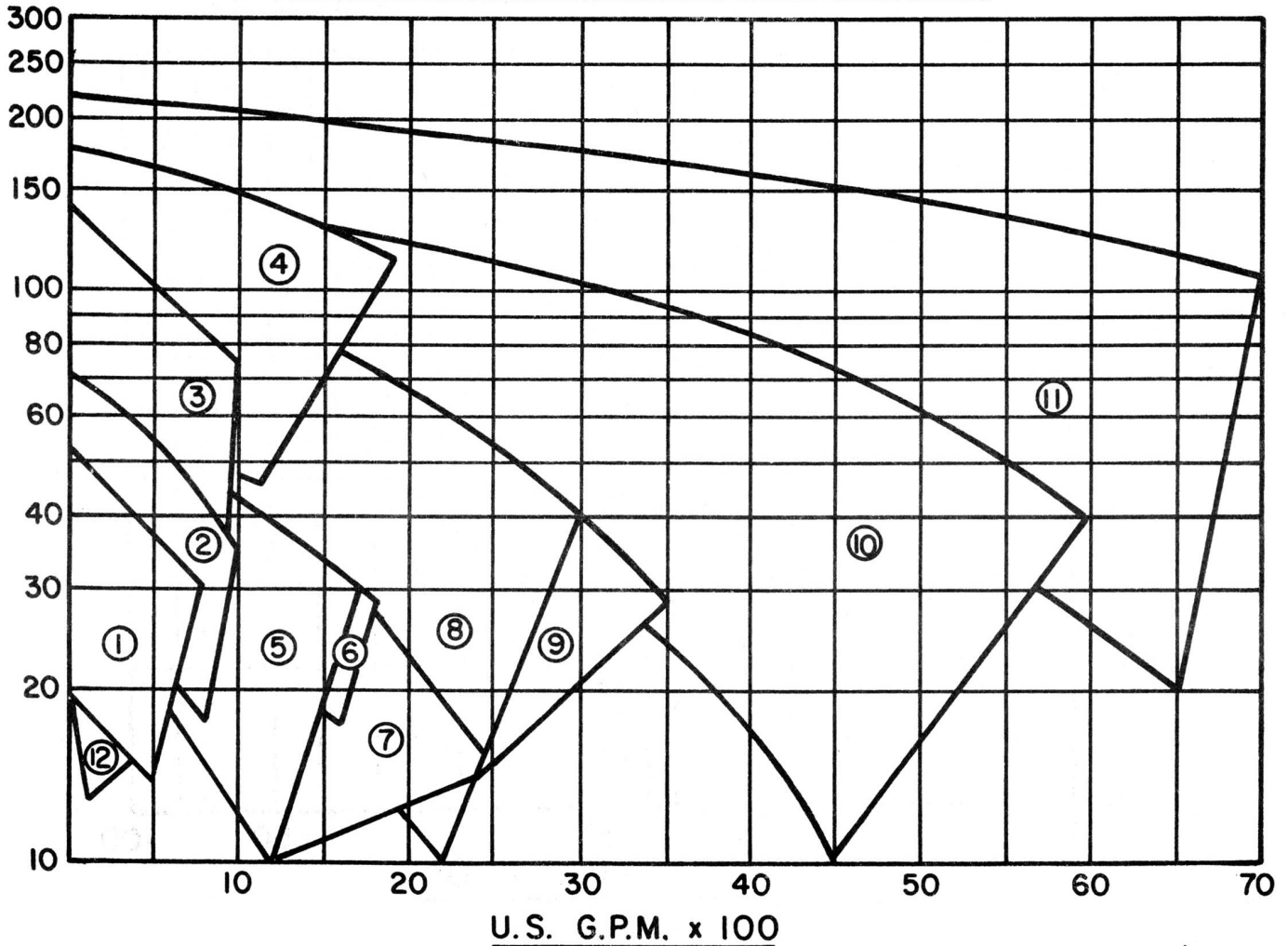


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I-SERIES™ Immersible Pump  
Pump Selection Chart  
Flooded Suction  
1170 RPM  
June, 2012  
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## FLOODED SUCTION PUMP SELECTION CHART - 1170 R.P.M.



<u>Key Number</u>	<u>Nominal Pump Size</u>	<u>Key Number</u>	<u>Nominal Pump Size</u>
1	4B2/4B2F/4B2A/4B2 G	7	6D3C
2	4C3/4C3A	8	6D4C/8D4C
3	4D4A	9	8D4A/8D4B
4	4D5/6D5	10	8D4A/10D5A
5	6C3/6C3D	11	8D5A/10D5A
6	6D3A/6D3E	12	4B2J TURBO



# ENGINEERING DATA

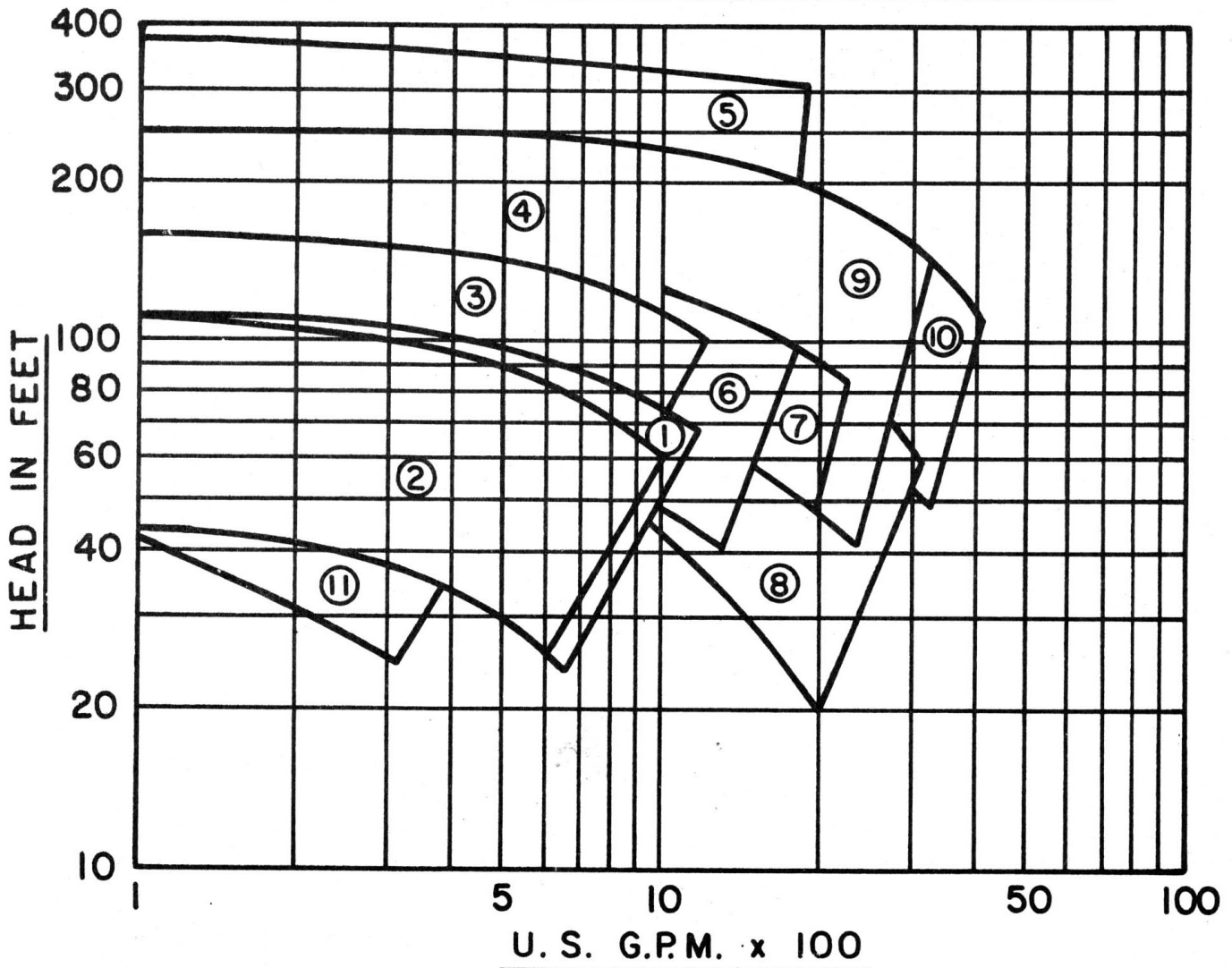


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I-SERIES™ Immersible Pump  
Pump Selection Chart  
Flooded Suction  
1760 RPM  
June, 2012  
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## FLOODED SUCTION PUMP SELECTION CHART – 1760 R.P.M.



Key Number	Nominal Pump Size	Key Number	Nominal Pump Size
1	4B2/4B2F	7	6D3A/6D3E
2	4B2A/4B2G	8	6D3C
3	4C3/4C3A	9	6D4C/8D4C
4	4D4A	10	8D4B
5	4D5/6D4	11	4B2J TURBO
6	6C3/6C3D		

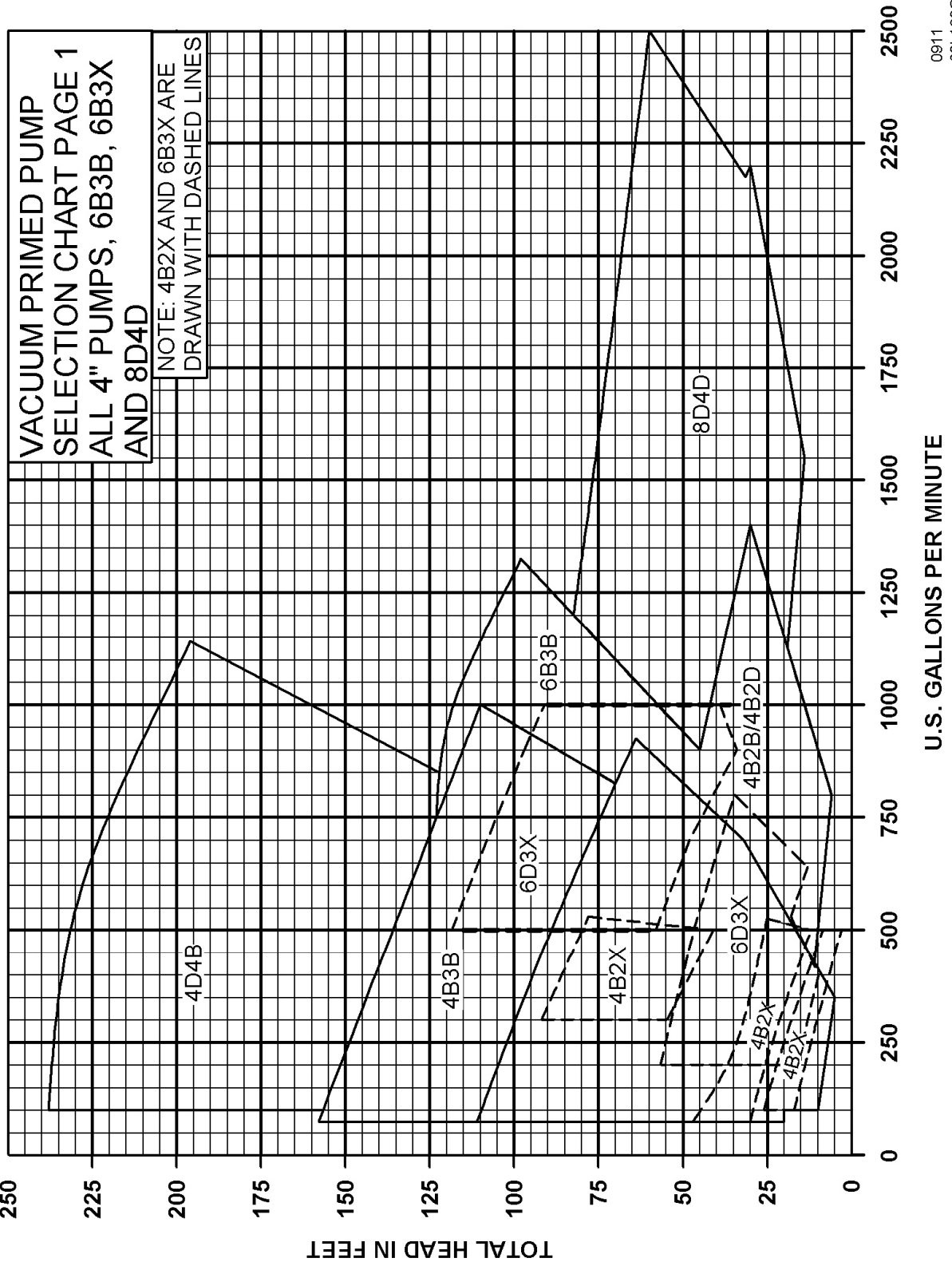
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Vacuum Primed Pump  
Selection Chart  
Drawing 62L189 – 4" Pumps  
6B3B / 6B3X / 8D4D  
June, 2012  
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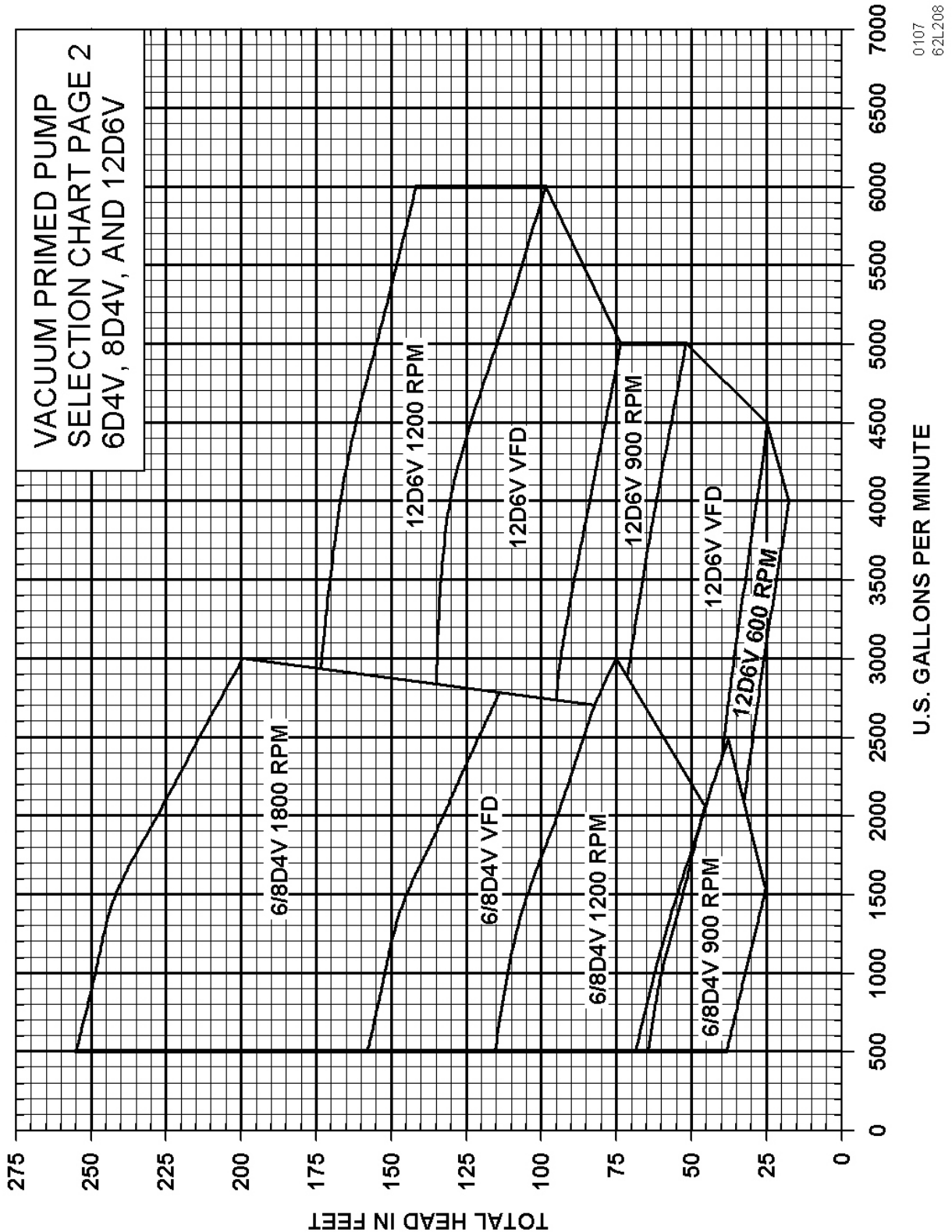
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Vacuum Primed Pump  
Selection Chart  
Drawing 62L208  
6D4V / 8D4V / 12D6V  
June, 2012  
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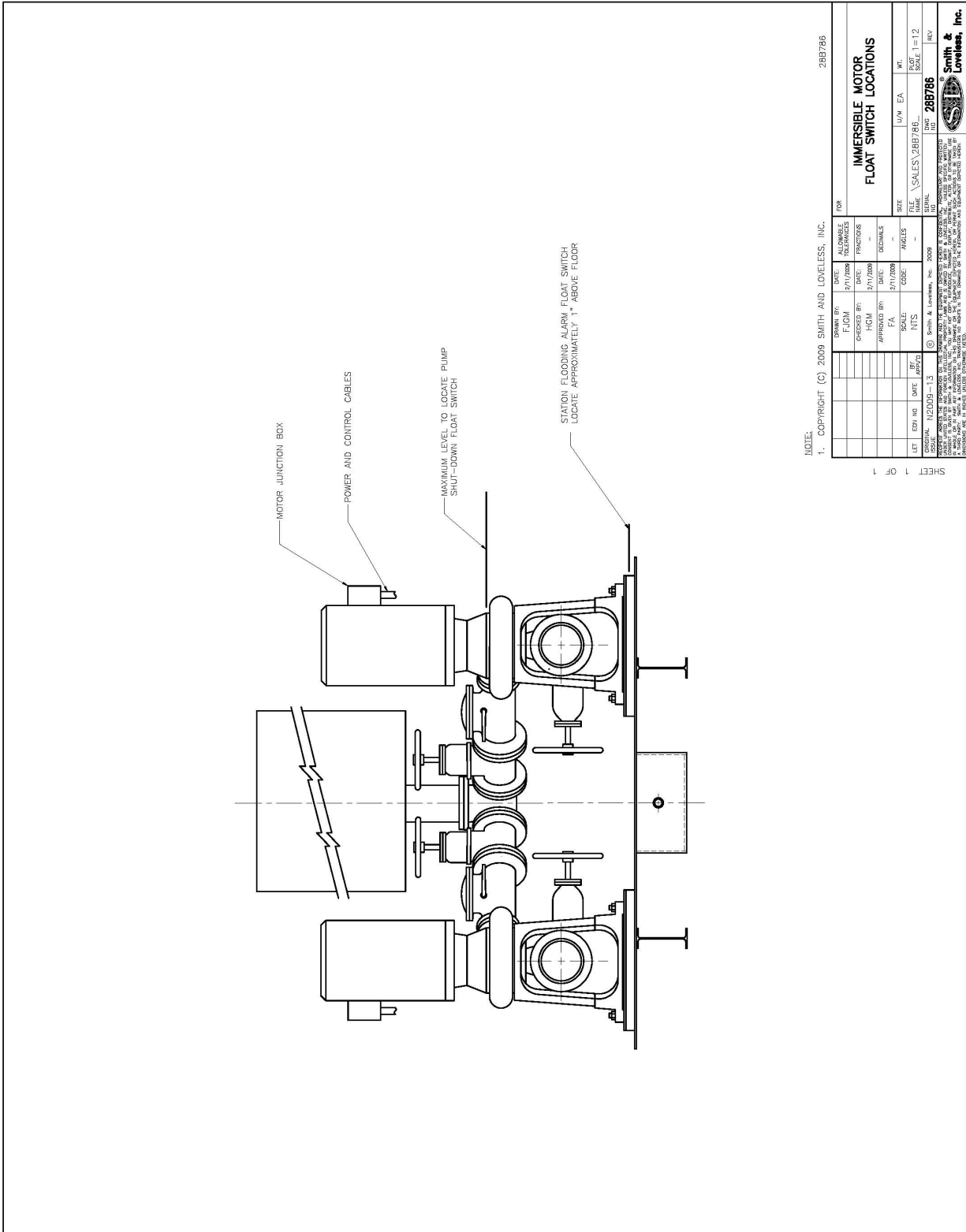
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I-SERIES™ Immersible Pump  
Immersible Motor Pretest  
Modification Float Switch  
Locations – Drawing 28B786  
June, 2012  
Page 1



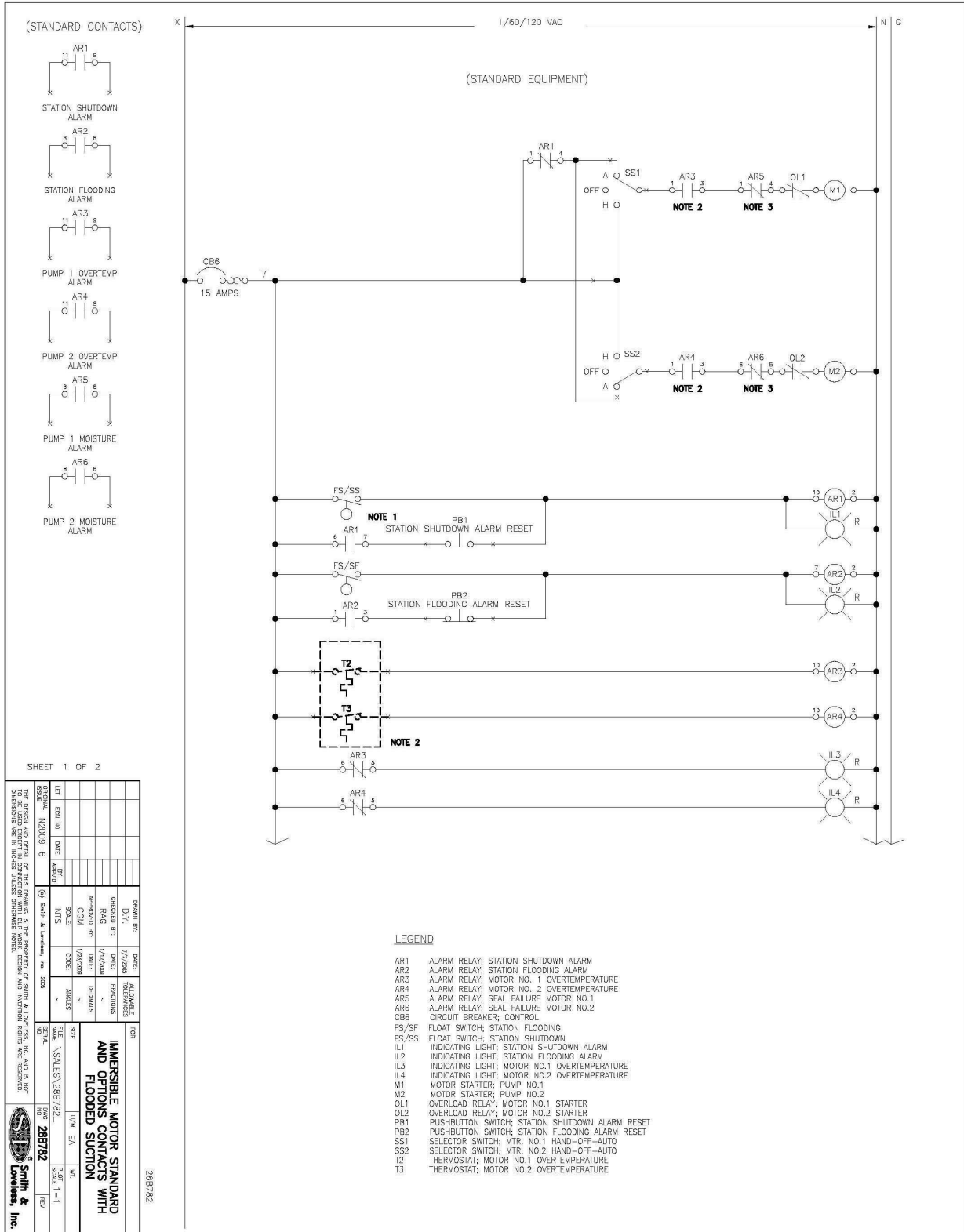
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I-SERIES™ Immersible Pump  
Immersible Motor Standard  
And Options Contacts  
With Flooded Suction  
June, 2012  
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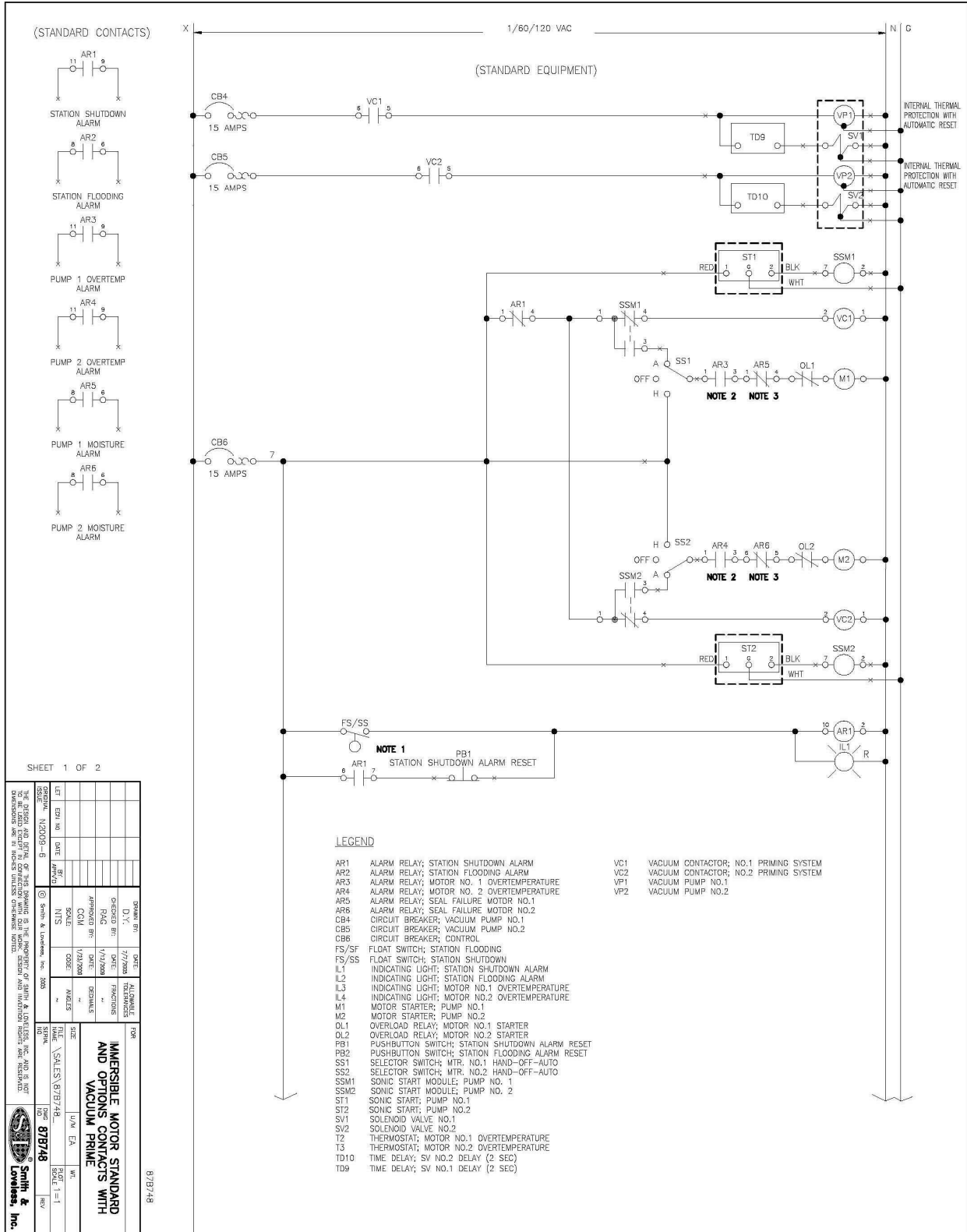
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I-SERIES™ Immersible Pump  
Immersible Motor Standard  
And Options Contacts  
With Vacuum Prime  
June, 2012  
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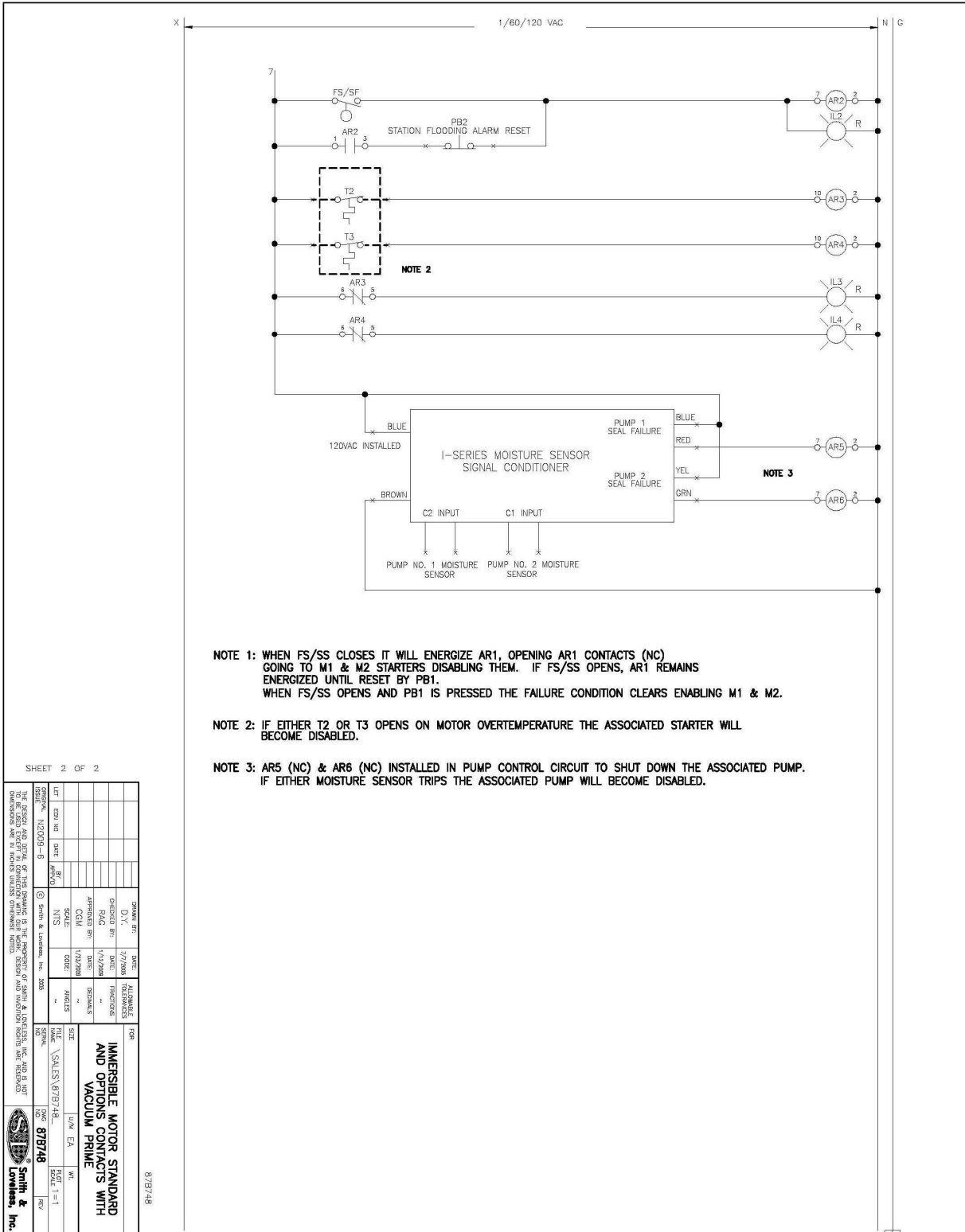
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I-SERIES™ Immersible Pump  
Immersible Motor Standard  
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## S&L I-SERIES™ Immersible Pump Warranty Certificate

SMITH & LOVELESS, INC., Lenexa, Kansas, manufacturer of the factory built S&L **I-SERIES™** Immersible Pump, warrants it to be free from defects in materials and workmanship for the periods as stated below commencing at the time the Immersible Pump is placed in operation by SMITH & LOVELESS-authorized personnel. This Warranty is contingent upon start-up of the equipment by SMITH & LOVELESS-authorized personnel, and THE WARRANTY WILL BE VOIDED IF START-UP IS PERFORMED BY ANYONE ELSE.

SMITH & LOVELESS will be the single source of responsibility to the owner for the Warranty of the Immersible Pump and all its components provided by SMITH & LOVELESS.

During the Warranty period, if any part is defective or fails to perform as specified when operating at design conditions and if the Immersible Pump has been environmentally and physically protected prior to start-up and has been installed and is being operated and maintained in accordance with the written instructions provided by SMITH & LOVELESS, SMITH & LOVELESS will repair or exchange at our discretion such defective part free of charge. Defective parts must be returned by the owner postage paid to SMITH & LOVELESS, if so requested.

Duration -

- 1) **I-SERIES™ Immersible Pump** - the following parts of the immersible pump shall be warranted for the earlier of either: a) 12 months from date of installation, or b) 18 months from shipment in accordance with S&L's standard equipment Warranty Certificate: motor and motor seals, impeller, adapter and volute and S&L mechanical pump seals.\*

\* Does not include double balanced seals or Tungsten carbide seals.

- 2) **Additional Equipment** - in the event additional equipment is supplied by S&L such as check valves, controls, etc, this additional equipment shall be warranted for the earlier of either a) 12 months from date of installation or b) 18 months from shipment in accordance with S&L's standard equipment Warranty Certificate.

SMITH & LOVELESS will provide, without cost to the owner, such labor as may be required to replace, repair or modify the following equipment for the **I-SERIES™** Immersible Pump, but no other, major components: motor, impeller, adapter and volute. Except for labor provided by SMITH & LOVELESS under the preceding sentence, the cost of labor and any other expenses resulting from replacement of any other defective parts including, but not limited to, such items as mechanical pump seals, check valves, controls, etc. furnished by S&L shall be borne by the owner.

The replacement or repair of parts normally consumed in service, such as oil, grease, packing, V-belts, etc. is considered part of routine maintenance and upkeep and such parts are not eligible for repair or exchange free of charge under this Warranty.

SMITH & LOVELESS will not assume responsibility for the cost of any repairs or alterations made to the pump structure or its components unless SMITH & LOVELESS has given specific written authority therefor.

This limited Warranty does not cover parts damaged by acts of vandalism, God or intentional misuse by the owner.

SMITH & LOVELESS makes no other Warranty expressed or implied and SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY AS TO THE MERCHANTABILITY OF THE IMMERSIBLE PUMP OR AS TO ITS FITNESS FOR ANY PARTICULAR PURPOSE. SMITH & LOVELESS is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defects in design, material, workmanship, or delays in delivery, replacements or repairs.

The waiver or abridgment of any single provision or group of provisions, either by ruling or agreement, shall not be construed to alter or void any other provisions of this Warranty.



Smith & Loveless, Inc.