3/22/2016

Re: Submittal data for Aurora End Suction Pumps

1. Provide motor with 1.15 service factor. Submit motor information
2. Provide warranty in compliance with Specification Section 43 21 13, 1.06
3. Confirm that spare parts will be provided per Specification Section 43 21 13, 1.07
4. Confirm that the base has suitable lifting lugs
5. Provide at least 1 quart of the finish coat material per Specification Section 43 21 13, 2.08
6. Confirm training time
**Job:** New Brighton WTP #1  
**Service:** Temporary Low Zone Booster Pumps  
**Engineer:** Barr Engineering  
**Contractor:** TBD  
**Sold To:** Barr Engineering  
**Reference:** Section 43 21 13 Temporary Centrifugal Pumps  
**NO. OF PRINTS**  
- For Approval  
- Final  

### PUMP

<table>
<thead>
<tr>
<th>No. of Units</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Aurora 3804</td>
</tr>
<tr>
<td>Size</td>
<td>8x10x13.5</td>
</tr>
<tr>
<td>GPM</td>
<td>2083</td>
</tr>
<tr>
<td>TDH</td>
<td>43'</td>
</tr>
<tr>
<td>RPM</td>
<td>1200</td>
</tr>
<tr>
<td>Rotation</td>
<td>RH □ LH □</td>
</tr>
<tr>
<td>Connections</td>
<td>Flanged □ Threaded □</td>
</tr>
<tr>
<td></td>
<td>125# □ 250# □</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Grease □ Oil □</td>
</tr>
<tr>
<td>Stuffing Box</td>
<td>Mechanica Seal □</td>
</tr>
<tr>
<td></td>
<td>Packing □ Lantern Ring □</td>
</tr>
<tr>
<td>Construction</td>
<td>Standard Fitted □ Bronze Fitted</td>
</tr>
<tr>
<td>Case</td>
<td>Cast Iron</td>
</tr>
<tr>
<td>Impeller</td>
<td>SS</td>
</tr>
<tr>
<td>Shaft</td>
<td>Steel</td>
</tr>
<tr>
<td>Sleeve</td>
<td>SS</td>
</tr>
<tr>
<td>Case Ring</td>
<td>n/a</td>
</tr>
<tr>
<td>Impeller Ring</td>
<td>n/a</td>
</tr>
<tr>
<td>Channel Ring</td>
<td>n/a</td>
</tr>
<tr>
<td>Spacer</td>
<td>n/a</td>
</tr>
</tbody>
</table>

By: Bryan Goehring  
Date: 03/21/2016  

### MOTOR

| HP           | 40 |
| Phase        | 3  |
| Hertz        | 60 |
| Volts        | 460 |
| RPM          | 1200 |
| Frame        | 364 |
| Enclosure    | ODP □ TEFC □ XProof □ |
|             | Vertical □ Horizontal □  |
|             | Part Winding □ High Efficiency □  |
|             | Aurora to Furnish □ Others to Furnish □  |
|             | Factory Choice □  |
| Mfg          | Marathon |

By: Bryan Goehring  
Date: 03/21/2016  

### OPTIONS

<table>
<thead>
<tr>
<th>Base</th>
<th>included</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Steel Drip □</td>
</tr>
<tr>
<td></td>
<td>Steel Form □</td>
</tr>
<tr>
<td></td>
<td>Fabricated Steel □</td>
</tr>
<tr>
<td></td>
<td>Cast Iron Ring Type □</td>
</tr>
<tr>
<td></td>
<td>Fab. Steel Ring Type □</td>
</tr>
<tr>
<td></td>
<td>Close Coupled Unit □</td>
</tr>
<tr>
<td></td>
<td>Pedestal Unit □</td>
</tr>
<tr>
<td>Coupling</td>
<td>Flex □</td>
</tr>
<tr>
<td>Mfg</td>
<td>Marathon</td>
</tr>
</tbody>
</table>

By: Bryan Goehring  
Date: 03/21/2016  

### SPECIAL REQUIREMENTS:

- NSF/ANSI 372 Certified
AURORA® 3800 SERIES
SINGLE STAGE END SUCTION PUMPS

MODEL 3804

WWW.AURORAPUMP.COM
AURORA® 3800 SERIES
Single Stage End Suction Pumps

Capacities to 4200 gpm (954 m³/hr)
Heads to 520 feet (158 meters)
Temperatures to 300°F (149°C)

Setting New Standards of Efficiency

Liquid handling requirements are much more involved than they were years ago. The variety of liquids being handled has increased along with temperatures and pressures. Today’s installations demand quiet, smooth running pumps with long life. Aurora’s 90 years of experience with design, sales and manufacturing of centrifugal pumps has led to the 3800 Series. These modern pumps with a clean, straightforward design were developed with maximum interchangeability in mind. Aurora’s highly reliable 3800 pumps offer an economical solution to your liquid handling problems.

Standard Features

• Offered in two models:
  - 3801 Close coupled
  - 3804 Flexible coupled-frame mounted
• 316 SST impeller
• 316 SST shaft sleeve
• Double volute on 4” discharge and larger to reduce bearing loads
• Gauge taps on suction and discharge on flanged models
• 4 Power frame sizes
• Casing feet for easy back pullout
• Regreaseable bearings (3804 only)
• Coupling guard (flex coupled design)
• Formed steel base (flex coupled design)

Optional Features

• 316 SST shaft
• Drip rim base
• Drip pan (3804 only)
• Flush lines
• Epoxy coating
• Several mechanical seal options (required for temperatures over 225°F)
• Oil/lube bearings (flex coupled only)
• Case wear ring
<table>
<thead>
<tr>
<th>Item number</th>
<th>Service</th>
<th>Quantity</th>
<th>Quote number</th>
<th>Size</th>
<th>Stages</th>
<th>Based on curve number</th>
<th>Date last saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Water</td>
<td>2</td>
<td></td>
<td>3800</td>
<td>8x10x13.5</td>
<td>HB3-6x10x13.5-1150 Rev 0</td>
<td>21 Mar 2016 3:09 PM</td>
</tr>
</tbody>
</table>

### Operating Conditions

- **Flow, rated**: 2,083.0 USgpm
- **Differential head / pressure, rated (requested)**: 43.00 ft
- **Differential head / pressure, rated (actual)**: 43.45 ft
- **Suction pressure, rated / max**: 0.00 / 0.00 psi.g
- **NPSH available, rated**: Amp
e
### Performance

- **Speed, rated**: 1150 rpm
- **Impeller diameter, rated**: 11.44 in
- **Impeller diameter, maximum**: 13.50 in
- **Impeller diameter, minimum**: 9.50 in
- **Efficiency**: 72.58%
- **NPSH required / margin required**: 9.05 / 0.00 ft
- **q (imp. eye flow) / S (imp. eye flow)**: 42 / 205 Metric units
- **Minimum Continuous Stable Flow**: 546.7 USgpm
- **Head, maximum, rated diameter**: 68.30 ft
- **Head rise to shutoff**: 36.99 %
- **Flow, best eff. point**: 1,776.5 USgpm
- **Flow ratio, rated / BEP**: 117.25%
- **Diameter ratio (rated / max)**: 84.72 %
- **Head ratio (rated dia / max dia)**: 57.62%
- **Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]**: 1.00 / 1.00 / 1.00 / 1.00
- **Selection status**: Acceptable

### Liquid

- **Type**: Water
- **Pressure Data**
  - **Maximum working pressure**: 25.49 psi.g
  - **Maximum allowable working pressure**: 175.0 psi.g
  - **Maximum allowable suction pressure**: 175.0 psi.g
  - **Hydrostatic test pressure**: 125.0 psi.g

- **Material**
  - **Material selected**: Standard

- **Pressure Data**
  - **Driver & Power Data**
    - **Driver sizing specification**: Max Power
    - **Margin over specification**: 0.00 %
    - **Service factor**: 1.00
    - **Power, hydraulic**: 22.61 hp
    - **Power, rated**: 31.16 hp
    - **Power, maximum, rated diameter**: 32.06 hp
    - **Minimum recommended motor rating**: 40.00 hp / 29.83 kW

---

**Graphs:**
- **Power vs. Flow**: Power curve with marked points.
- **Head vs. Flow**: Graph showing different operating points.
- **NPSH vs. Flow**: Graph showing NPSH ranges.

---

**Contact:**
- **AURORA PUMP**
  - 800 AIRPORT ROAD · NORTH
  - AURORA, ILLINOIS 60542
  - WWW.AURORAPUMP.COM
  - PHONE: +1-630-859-7000 · FAX:
## Pump

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Series 3800 - 8x10x13.5</td>
</tr>
</tbody>
</table>

**Pump Information**

- **Parameters**
  - Impeller Diameter Selection Criteria: Impeller diameter calculated from 2083 USgpm and 43 Ft
  - Flow: 2083.00 USgpm
  - Head: 43.00 Ft
  - Impeller diameter: 11.4375 inches - based on curve data
  - Power: 40.00 Hp
  - Speed: 1150 RPM
  - Suction Pressure (max): 175.00 psi
  - Pump model: Model 3804, Horizontal flex-coupled pumps
  - Rotation: Right
  - Paint: Standard blue paint

**Driver**

- Shaft Grounding Ring: Not Specified

**Materials of Construction**

- Pump: 8 X 10 X 13.5 - End Suction, Model 3804, Frame range - 286-447TS, Power frame - 21A, Stainless Steel Fitted
- Casing: Cast iron, ASTM A48
- Impeller: Stainless steel, 316
- Shaft: Steel, AISI C1045
- Case wear ring: None
- Motor bracket: Cast iron, ASTM A48
- Power frame: Cast iron, ASTM A48
- Sealing: Mechanical seal, John Crane, Type 21, hot water 225°F max
- Sleeve: Stainless steel, AISI 316

**Pump options**

- Base: Steel Base 364T Frame
- Coupling: Factory Choice Coupling, 364T Frame
- Drip pan: No
- Bearing lubrication: Grease
- Flushing lines: None
- Coating: No

## Motor

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Pump Information**

- **Driver**
  - Motor Frame: 364T
  - Motor: 40hp @ 1200 RPM, 3 Ph, 230/460 Volts, 364T Frame, ODP Enclosure, premium efficiency, Marathon

**Selected Motor Parameters**

- Power: 40hp
- Phase: 3
- Frequency: 60 Hz
- Voltage: 230/460V
- Enclosure: ODP
### Performance Data

<table>
<thead>
<tr>
<th>Item number</th>
<th>Service</th>
<th>Quantity</th>
<th>Quote number</th>
<th>Size</th>
<th>Stages</th>
<th>Speed, rated</th>
<th>Frame size</th>
<th>Date last saved</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Flow, maximum diameter, rated flow</th>
<th>Head, maximum diameter, rated flow</th>
<th>Efficiency adjustment factor, total</th>
<th>Power adjustment, total</th>
<th>Head adjustment factor, total</th>
<th>Flow adjustment factor, total</th>
<th>NPSHR adjustment factor, total</th>
<th>NPSH margin dictated by pump supplier</th>
<th>NPSH margin used (added to 'required' values)</th>
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<tbody>
<tr>
<td></td>
<td>74.63 ft</td>
<td>11.15 ft</td>
<td>1</td>
<td>0.00 hp</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00 ft</td>
<td>0.00 ft</td>
</tr>
<tr>
<td></td>
<td>58.90 ft</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### Mechanical Limits

<table>
<thead>
<tr>
<th>Torque, rated power, rated speed</th>
<th>Torque, maximum power, rated speed</th>
<th>Torque, driver power, full load speed</th>
<th>Torque, driver power, rated speed</th>
<th>Torque, pump shaft limit</th>
<th>Radial load, worst case</th>
<th>Radial load limit</th>
<th>Impeller peripheral speed, rated</th>
<th>Impeller peripheral speed limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.71 hp/100 rpm</td>
<td>2.79 hp/100 rpm</td>
<td>3.39 hp/100 rpm</td>
<td>3.48 hp/100 rpm</td>
<td>1,000 hp/100 rpm</td>
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</table>

### Various Performance Data

<table>
<thead>
<tr>
<th>Flow (USgpm)</th>
<th>Head (ft)</th>
<th>Efficiency (%)</th>
<th>NPSH (ft)</th>
<th>Power (hp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>58.90</td>
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<td></td>
<td>16.14</td>
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<tr>
<td>0.00</td>
<td>86.33</td>
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<td>20.98</td>
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### System differential pressure

<table>
<thead>
<tr>
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<th>@ Density, rated</th>
<th>@ Density, max</th>
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</thead>
<tbody>
<tr>
<td>3800 Series, 16.14 %</td>
<td>18.61</td>
<td>18.61</td>
</tr>
<tr>
<td>Differential pressure, shutoff, rated diameter (psi)</td>
<td>25.49</td>
<td>25.49</td>
</tr>
<tr>
<td>Differential pressure, shutoff, maximum diameter (psi)</td>
<td>37.36</td>
<td>37.36</td>
</tr>
</tbody>
</table>

### discharge pressure

<table>
<thead>
<tr>
<th>Discharge pressure, rated flow, rated diameter (psi.g)</th>
<th>@ Suction pressure, rated</th>
<th>@ Suction pressure, max</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.61</td>
<td>18.61</td>
<td>18.61</td>
</tr>
<tr>
<td>Discharge pressure, shutoff, rated diameter (psi.g)</td>
<td>25.49</td>
<td>25.49</td>
</tr>
<tr>
<td>Discharge pressure, shutoff, maximum diameter (psi.g)</td>
<td>37.36</td>
<td>37.36</td>
</tr>
</tbody>
</table>

### Ratios

<table>
<thead>
<tr>
<th>Maximum flow / rated flow, rated diameter</th>
<th>Head rated diameter / head minimum diameter, rated flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>110.69 %</td>
<td>385.51 %</td>
</tr>
</tbody>
</table>
General Arrangement Drawing

Pump Data

- **Series**: 3800
- **Discharge Size**: 8.00 in
- **Model**: 3804
- **Suction Size**: 10.00 in
- **Size**: 8x10x13.5
- **Casing Size**: 0.00 in
- **Flow**: 2,083.0 USgpm
- **Temperature Rating**: 68.00 deg F
- **Head**: 43.00 ft
- **RPM**: 1150 RPM
- **Pressure Rating**: 175.0 psi
- **Rotation**: Right
- **Base Type**: Steel Base
- **Pump Paint**: Standard blue paint
- **Coupling Type**: Flex Type
- **Liquid Type**: Water

Motor Data

- **Power**: 40.00 hp
- **Efficiency (%)**: 94.10%
- **Phase**: 3
- **Frequency**: 60 Hz
- **Volts**: 230/460
- **Efficiency Rating**: premium
- **Connection**: Suction/Discharge Flanged 125#/125#
- **Type**:
- **Base**: Steel Base
- **Motor Bracket**: Cast iron, ASTM A48
- **Seal Material**: Carbon Ceramic
- **Shaft**: Steel, AISI C1045
- **Shaft Sleeve**: Stainless steel, AISI 316
- **Seal Plate**: Cast iron ASTM A48
- **Shaft Sleeve**: Stainless steel, AISI 316

Pump Materials of Construction

- **Pump Material**: Stainless steel
- **Casing**: Cast iron, ASTM A48
- **Impeller**: Stainless steel, 316
- **Seal Plate**: Cast iron ASTM A48
- **Shaft Sleeve**: Stainless steel, AISI 316
- **Motor Bracket**: Cast iron, ASTM A48

Estimated Weights

- **Pump**: 804.0 lb
- **Driver**: 875.0 lb
- **Total**: 2,024.0 lb

Additional Options

- **Bearing Lubrication**: Grease

Quote Information

- **Customer Quote #**: -1
- **Job Name**: -
- **Market**: -
- **Quote Item #**: Default
- **Quote Date**: -
SERIES 3800
HORIZONTAL FRAME MOUNTED END SUCTION CENTRIFUGAL PUMPS

PART I – GENERAL

1.01 DESCRIPTION

The Contractor shall furnish materials, equipment and labor to furnish, install and test the pumping system complete with the pumps, motors, mounting bases, piping, valves and appurtenances, as indicated on the contract drawings and as herein specified.

1.02 INSTALLATION

The Contractor shall insure that the pumps and motors are properly installed with no pipe strain transmitted to the pump casing.

1.03 RESPONSIBILITY

To assure a properly integrated and compatible system, all equipment described in this section shall be furnished by the Pump Manufacturer, who shall assume full responsibility for the proper operation of the pumps and associated equipment.

1.04 SUPERVISION

The Contractor shall arrange for the Pump Manufacturer to provide a factory-trained representative as required for the purpose of supervising installation, start-up, final field acceptance testing, and providing instruction to the owner's operating personnel in the proper operation and maintenance of the equipment in this section.

1.05 REFERENCE STANDARDS

The work in this section is subject to the requirements of applicable portions of the following standards:
Hydraulic Institute Standards
IEEE Standards
NEMA Standards
OSHA Rules and Regulations

PART II - PRODUCTS

2.01 GENERAL DESCRIPTION

The pump shall be a centrifugal horizontal flexible-coupled end suction pump, Aurora Model 3804 or pre-approved equal. Pre-approval must be obtained a minimum of ten days before bid date.

2.02 MATERIALS OF CONSTRUCTION

Casing................. Cast Iron (ASTM A48)
Impeller.................. 316 Stainless Steel (ASTM A276)
Shaft..................... Steel (AISI C1045)
Shaft Sleeve............. Bronze (ASTM B62) Stainless Steel

2.03 CASING

The casing will be of the end suction design with tangential discharge outlet. For suction piping diameters of 2" or less and discharge piping diameters of 1.5" or less, the suction and discharge connections shall be NPT threaded. For suction piping diameters of 2" or greater, the suction inlet and the discharge outlet...
shall be a bolt through flange connection, and tapped for pressure gages. Flange connections shall be ANSI 125# rated. The casing shall have tapped and plugged holes for priming and draining. The casing bore shall be large enough to allow "back pullout" of the impeller without disturbing the casing or suction and discharge piping. The casing shall have integral cast feet.

2.04 IMPELLER

The impeller shall be of the enclosed type, and investment cast. It shall be finished all over, the exterior being turned and the interior being finished smooth and cleaned of all burrs, trimmings, and irregularities. The impeller shall be dynamically balanced. The impeller will be keyed to the shaft, and fastened with a washer, gasket and capscrew.

2.05 MOTOR BRACKET AND SEAL PLATE

The seal plate and motor bracket shall be of a two piece design, and shall provide an adequate area for internal recirculation of the pumped fluid around the sealing medium.

2.06 MECHANICAL SEAL

Shaft sealing shall be accomplished by means of a mechanical seal with a Ceramic seat, carbon washer, Buna-N elastomers, and stainless steel metal parts.

2.07 SHAFT

The impeller shall be direct-coupled to the motor shaft. The motor shaft shall be machined to provide a keyway, and drilled and tapped to accept the impeller fastener. Stub shafts are not acceptable. The outboard shaft extension shall be machined with a keyway to accept a coupling to the driving unit. Lip seals shall be furnished on both the inboard and outboard shaft extensions, and a water slinger shall be furnished on the inboard shaft extension closest to the mechanical seal.

2.08 SHAFT SLEEVE

The pump shaft shall be fitted with a shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an O-ring, and shall be positively driven by a pin to the keyway. The use of adhesive compounds to fasten the sleeve to the shaft shall not be accepted.

2.09 POWER FRAME

The power frame shall house a single-row outboard regreaseable thrust bearing. Both bearings shall be selected for a 3 year minimum life at maximum load. The outboard bearing shall be locked in place by a retaining ring. The inboard bearing shall not be locked in order to accommodate thermal expansion of the shaft. Lubrication fittings shall be provided in convenient location. A bearing cartridge end cap shall be provided on the outboard side of the power frame to allow inspection of the thrust bearing without the need for disassembling the power frame housing.

2.10 FOOT SUPPORTS

The pump unit shall be supported from feet cast into the casing and a bracket mounted to the power frame.

2.11 BASEPLATE

The pump and motor shall be mounted on a groutable formed steel baseplate or a drip-rim baseplate with integral drip channels incorporated on each side. Each channel shall include an NPT drain connection and plug. The base shall be sufficiently rigid to support the pump and the motor without the use of additional supports or members.
2.12 COUPLING

A flexible coupling shall be provided to connect the pump shaft to the motor shaft. The coupling shall be of an all metal type with a flexible rubber insert. The entire rotating coupling assembly shall be enclosed by a coupling guard.

2.13 MOTOR

The motor shall be a NEMA configuration in accordance with the latest NEMA Standards, and shall have the following characteristics:

- Enclosure: Open Drip Proof
- Number of Phases: Three
- Cycles: 60 Hz.
- Voltages: 250/460 Volt
- Speed: 3600 RPM
- Horsepower: 40 hp

Each motor shall have a sufficient horsepower rating to operate the pump at any point within the manufacturer's recommended operating range on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor. The motor shall have a service factor of at least 1.15. The service factor is reserved for variations in voltage and frequency.

PART III - PERFORMANCE

3.01 CONDITIONS OF SERVICE

The following conditions of service shall be strictly adhered to:

- Number of Units: 12
- Type of Drive: Variable or Constant
- Discharge Size: 8 in, minimum
- Suction Size: 4.5 in, minimum
- Design Capacity: 2083 US gpm
- Design Head: 12 ft
- Efficiency at Design: 12%
- Rotative Speed: 3600 RPM, maximum
- Shut-off Head: 58.9 ft, minimum
- Driver Horsepower: 40 hp, minimum
- NPSHR at Design: 9.05 ft, maximum

3.02 INSPECTION AND FACTORY TESTS

Each centrifugal pump furnished under these specifications shall be tested at the factory to verify individual performance (VIP). Certified copies of all test reports shall be submitted to the Engineer for approval prior to shipment. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards.

3.03 INSTALLATION AND ACCEPTANCE TESTS

A. The pumping units shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings by the Contractor.

B. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.

Additional information is available from any Pentair Aurora authorized distributor.
MODELS 3801 AND 3804
END SUCTION PUMPS
INSTRUCTION, INSTALLATION, MAINTENANCE
AND REPAIR MANUAL

NOTE! To the installer: Please make sure you provide this manual to the owner of the equipment or to the responsible party who maintains the system.
IMPORTANT NOTE TO INSTALLER:

This manual contains important information about the installation, operation and safe use of this product. This information should be given to the owner/operator of this equipment.

APPLICATIONS:

The 3800 Series pumps are frame mounted or close coupled. They feature high efficiency, rugged construction, foot mounted volutes with back pullout power frames, center drop out spacer coupling (optional) and regreaseable ball bearings. The pump's stainless steel fitted construction is suitable for unheated domestic and fresh water, condensate, boiler feed water, pressure boosting and hydronic coiling and/or heating.

ATTENTION: SAFETY WARNINGS:

Read and understand all safety warnings before installation or servicing pump.

OPERATIONAL LIMITS:

- Maximum Operating Pressure: 175 psi at Temperatures to 150°F (65.6°C)
- Maximum Operating Temperature: 225°F (107°C)

*See ASTM A126/ANSI B16.1 for pressure/temperature ratings of flanges.

ELECTRICAL SAFETY:

- **Warning: Electrical Shock Hazard**
  All electrical connections are to be made by a qualified electrician in accordance with all codes and ordinances. Failure to follow these instructions could result in serious personal injury, death or property damage.

- **Warning: Electrical Overload Hazard**
  Ensure all motors have properly sized overload protection. Failure to follow these instructions could result in serious personal injury, death or property damage.

- **Warning: Sudden Start-Up Hazard**
  Disconnect and lock out power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

HIGH TEMPERATURE SAFETY:

- **Warning: Hot Surface Hazard**
  If pumping hot water, ensure guards or proper insulation is installed to protect against skin contact with hot piping or pump components. Failure to follow these instructions could result in serious personal injury, death or property damage.

- **Warning: Spraying Water Hazard**
  When servicing pump replace all gaskets and seals. Do not reuse old gaskets or seals. Failure to follow these instructions could result in serious personal injury, death or property damage.

- **Warning: High Pressure Hazard**
  The pump is rated at a maximum of 175 psi at 150°F. Do not exceed this pressure. Install properly sized pressure relief valves in system. Failure to follow these instructions could result in serious personal injury, death or property damage.

- **Warning: Expansion Hazard**
  Water expands when heated. Install properly sized thermal expansion tanks and relief valves. Failure to follow these instructions could result in serious personal injury, death or property damage.

HIGH PRESSURE SAFETY:

INSTALLATION

Read and understand all safety warnings at the beginning of the manual before beginning installation or any repair work.

PUMP LOCATION. You probably have spent considerable time planning where your pump will be located. However, you may have overlooked some factor that may affect pump operation or efficiency. The pump should be located as close to the liquid source as possible so that the suction line can be short and direct. It should be located in a clean, open area, where it is easily accessible for inspection, disassembly and repair. Pumps

- **Warning: California proposition 65 warning**
  This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.
installed in dark, dirty areas or in cramped locations are often neglected, which can result in premature failure of both the pump and the driver.

The Aurora® pump must be installed horizontally. Install isolating valves on each side of pump so pump maintenance can be performed without draining the system. Special mounting requirements may be required if the pump is to be mounted near a noise or vibration sensitive area.

The installation must be evaluated to ensure that the net positive suction head available (NPSHA) meets or exceeds the net positive suction head required (NPSHR), as stated by the pump performance curve.

FOUNDATION. The foundation for your pump must be sufficiently rigid to absorb any vibration and stress encountered during pump operation. A raised foundation of concrete is preferable for most floor mounted pumps. The raised foundation assures a satisfactory base, protects against flooding, simplifies moisture drainage, and facilitates keeping the area clean.

Your pump should be firmly bolted to the foundation, whether it is a raised concrete base, steelwork wall, or structural member. The mounting bolts or lag screws should be accurately located per the applicable Aurora dimension sheet. Refer to Fig. 1.

LEVELING THE PUMP. Leveling the pump will require enough shims to support the base plate near the foundation bolts and at any points of the base plate carrying a substantial weight load. The shims should be large enough to allow a gap of 3/4" to 1-1/2" between the base plate and foundation for grouting.

IMPORTANT: The pump base must be set level to avoid any mechanical difficulties with the pump or motor. The 3800 pump was properly aligned, if supplied with a motor, at the factory. However, since the pump base is flexible, it may spring and twist during shipment. Realign the base after piping is completed and after the pump is grouted in and bolted down. NOTE: It may be necessary to readjust the alignment from time to time while the unit and foundation are new. Realignment will prevent premature bearing failure, excessive vibration or shaft failure.

Ensure that proper hydronic accessories such as pressure relief valves, thermal expansion tanks and flow/pressure control devices are installed in the system. Consult the responsible party for your system to ensure these devices are installed and of the proper size.

GROUTING THE INSTALLATION. Grouting the base plate prevents lateral movement of the base plate, and improves the vibration absorbing characteristics of the foundation by increasing its mass. A wooden dam should be constructed around the base plate to contain the grout while it is being poured. The dam can be built tight against the base plate, or slightly removed from it as desired. Refer to Fig. 2. The entire base plate should be completely filled with non-shrinkable type grout. The grout should be puddled frequently to remove any air bubbles from the grout.

ROTATION. Pump rotation is clockwise when viewed from the back of the motor. An arrow is also located on the pump to show the direction of rotation.
Warning: Sudden Start-Up Hazard

Disconnect and lock out power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

INITIAL ALIGNMENT OF THE FLEXIBLE COUPLING.
The pump and driver were accurately aligned at the factory. However, it is impossible to maintain this alignment during shipping and handling. Therefore it will be necessary for you to realign the pump and driver. Flexible couplings are not universal joints. They should not be used to compensate for misalignment of the pump and motor shafts. Their function is to transmit power from the driver to the pump while compensating for thermal expansion and shaft end movement. The coupling faces should be far enough apart so that they do not make contact when the motor shaft is forced to the limit of the bearing clearance toward the pump shaft.

In order to properly align the coupling, you will need a taper gauge or set of feeler gauges, and a straight edge.

There are two types of misalignment encountered with flexible couplings: angular misalignment, in which the shafts are not parallel, and parallel misalignment where the shafts are parallel but not on the same axis.

To check angular alignment, insert a feeler gauge or taper gauge at any four places 90° apart around the coupling halves. Insert shims under the driver feet until the same reading is obtained at all four check points. The pump and driver will then be in angular alignment.

To check parallel alignment, a straight edge should be held against the edges of the coupling halves at any four places 90° apart around the coupling. The straight edge should be parallel to the pump and driver shafts at all times. Insert shims until the straight edge lies flat against both coupling halves at all four checkpoints. The pump and driver will then be in proper parallel alignment. Refer to Fig. 3.

For fine alignment, 3500 RPM operation, for all other coupler types.

A dial indicator should be used when greater alignment accuracy is required. Use the following alignment tolerances unless specified otherwise by the coupling manufacturer. On sleeve type couplings make sure there is at least 1/8" end clearance between the sleeve and the two coupling halves.

To check angular misalignments, mount the dial indicator base to the coupling half, and position the dial indicator button on the front or rear face of the opposite coupling half. Set the dial to zero, rotate both coupling halves together, making sure the indicator button always indicates off the same spot. Misalignment values within 0.004 inches TIR per inch of coupler radius is permissible.

To check parallel misalignment, mount the dial indicator base to one coupling half, or shaft and position the dial indicator button on the outside diameter of the opposite coupling half. Set the dial to zero. Rotate both coupling halves together, making sure the indicator button always indicates off the same spot. Misalignment within 0.004 inches TIR is permissible.

PIPING:

SUCTION PIPING. The suction piping should be short, but no less than ten pipe diameters in length, and direct with as few elbows and fittings as possible to keep head loss, from friction, at a minimum. However, the suction pipe should provide a minimum uninterrupted length, equal to ten pipe diameters, to the pump suction flange. A horizontal suction line should have a gradual rise to the pump, and pass under any interfering piping.

The suction pipe diameter should be at least the same diameter as the suction nozzle on the pump, and preferably larger. Use of a smaller diameter pipe will result in loss of head due to friction. All joints must be tight to maintain prime on the pump.

REDUCERS. Eccentric reducers should be installed directly at the suction nozzle, with the taper at the bottom to prevent air pockets from forming. Straight taper reducers should never be used in a horizontal suction line because of the air pocket that is formed at the leg of the reducer and the pipe. Refer to Fig. 4.

DISCHARGE PIPING. Discharge piping should also be short and direct as possible, with few elbows and fittings, to reduce head loss from friction.

PIPE. The discharge pipe diameter should be the same as, or larger than, the discharge nozzle diameter.

DISCHARGE VALVES. The discharge piping should include a check valve and a gate valve. The check valve should be located between the gate valve and the pump. If an increaser is used in the discharge piping, the increaser should be installed between...
the pump nozzle and the check valve. The check valve protects against a reverse flow of the liquid if the driver fails. Refer to Fig. 5.

The gate valve is used in the priming operation, as a throttling valve to control pump volume, and to shut down the pump for inspection and maintenance.

LUBRICATION:

In dry locations, each bearing will need lubrication at least after every 4,000 hours of running time or 6 to 12 months, whichever is more frequent. In wet locations (exposed to dripping water, to the weather or to heavy condensation found in unheated or poorly ventilated underground locations) every 2,000 hours or every 3 to 6 months, whichever is more frequent.

Use Chevron SRI, NLGI2.

Lubricate motor per motor manufacturer’s instructions.

GENERAL INSTRUCTIONS:

1. Keep this pump and motor properly lubricated.
2. When there is a danger of freezing, drain the pump.
3. Inspect the pump regularly for leaky seals and loose or damaged components. Replace or repair as required.

ELECTRICAL WIRING. Normally, your pump will be supplied with an attached drive motor. The motor should be wired in accordance with the wiring diagram found on the motor nameplate. Be sure the voltage, frequency, and phase of your power supply corresponds with the nameplate data. It is advisable to provide a separate switch and overload protection for your pump motor to protect against power failure in some other area. Conversely, if the pump motor develops electrical problems, it will be isolated from other equipment.

PRESTARTING INSTRUCTION. The coupling halves should be connected. Prior to connection, however, the drive motor should be started to make sure the direction of rotation is the same as the direction indicated by the arrow on the pump casing.

PUMP DISASSEMBLY: For frame mounted pumps, model 3804.

Warning: Hot Surface Hazard

Disconnect and lock out power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

Warning: High Pressure Hazard

The pump is rated at a maximum of 175 psi at 150°F. Do not exceed this pressure. Install properly sized pressure relief valves in system. Failure to follow these instructions could result in serious personal injury, death or property damage.

Warning: Spraying Water Hazard

When servicing pump replace all gaskets and seals. Do not reuse old gaskets or seals. Failure to follow these instructions could result in serious personal injury, death or property damage.

Warning: High Pressure Hazard

Make certain that the internal pressure of the pump is relieved before continuing. Failure to follow the instructions could result in serious personal injury, death, or property damage.

1. Ensure the electrical power is locked out, the system pressure has been lowered to 0 psi and temperature of the unit is at a safe level before beginning any disassembly of the pump.

2. Isolate the pump from the system by closing the valves that should be located on both the suction and discharge of the pump. Loosen the drain plug at the bottom of the casing and drain the pump.

Inspect removed parts at disassembly to determine if they can be reused. Ball bearings that turn roughly or show wear should be replaced. Cracked castings should never be reused. Scored or worn pump shafts should be replaced. Gaskets should be replaced at reassembly simply as a matter of economy. They are much less expensive to replace routinely than to replace singly as the need arises.

5. Remove the two foot support capscrews. Loosen, but do not remove the volute capscrews (5). Use capscrew in the jack screw holes to loosen the pump assembly from the volute.

6. Now remove the volute capscrews (5) and remove the pump assembly from the volute.

7. Remove the impeller capscrew (9), lockwasher (9A) and impeller washer gasket (9B). Remove impeller (11).

8. Remove impeller key (12).

9. Remove the O-ring (10).

10. Remove the rotating portion of the mechanical seal (head). Refer to Fig. 6.

11. Remove the stationary portion of seal insert along with the insert gasket and retainer (if used).
PUMP REASSEMBLY:

1. Thoroughly clean the shaft sleeve and seal plate seal cavity. Replace the shaft sleeve (25) or seal plate (35A) if there is evidence of surface damage like pitting, corrosion, nicks or scratches.

2. Lubricate the shaft sleeve and seal plate with soap and water or P-80 rubber emulsion. Do not use petroleum lubricant. Install a new insert gasket and a new seal insert down into the seal plate.

3. Slide a new rotating seal assembly (27) on to the shaft sleeve. With a screwdriver, push the top of the compression ring until the seal is tight against the seal insert. Install seal spring.

CAUTION

The mechanical seal (see Figure 6) (27) is a precision product and must be treated as such. During installation, great care must be taken to avoid dropping any part of the seal. Take particular care not to scratch the lapped faces on the washer or the sealing seat.

4. Install O-ring (10).

5. Install a new impeller key (12).

6. Install impeller, impeller washer (9A), new impeller washer gasket (9B), lock washer (9C), and capscrew (9). Tighten capscrew per torque chart (see Table 1).

7. Install new casing gasket (8). Then install the pump assembly into the volute.

8. Tighten volute capscrews (5) per torque chart (see Table 1).

9. For 3804 pumps, install foot support capscrews (62) and tighten per torque chart (see Table 1).

10. For 3804 pumps, install coupling and align.

11. Install drain plugs, close drain valve.

12. For 3804 pumps, reinstall the coupling guard.

WARNING: Sudden Start-Up Hazard

Disconnect and lock out power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

13. Open isolation valves and inspect pump for leaks.

14. Return pump to service.

POWER FRAME OR PUMP SHAFT DISASSEMBLY/REPLACEMENT:

Read and understand all safety warnings at the beginning of the manual before beginning installation or any repair work.

Follow steps 1–11 from main pump disassembly procedure.

12. Remove the Seal Plate (35A) capscrews (5B) from the bracket (35B).

13. Remove the power frame capscrews (5) and washers (5A) from the bracket (35B). If the power frame assembly is being replaced, skip to reassembly step 5 after replacement. If replacing the shaft (55), continue to step 14.

14. Remove the grease fittings (43) from the power frame.

15. Unscrew capscrews (48) and remove bearing cap (49). Remove O-ring (oil lubed only) and retainer ring (52).

16. Slide out shaft (55) and bearings (53 and 54). Since bearings (53 and 54) are press fitted on the shaft, they will have to be pulled or pressed off the shaft. Remove grease seals (51) from frame (57) and bearing cap (49).

17. Thoroughly clean the shaft (55), removing any oil or dirt.

POWER FRAME REASSEMBLY:

Reassembly will generally be in reverse order of disassembly. If disassembly was not complete, use only those steps related to your particular repair program.

1. Press grease seals (51/51A) into frame (57) and bearing cap (49).

2. Press bearings (53 and 54) onto shaft (55). Snap retainer ring (52) into place.

3. Slide shaft (55) and bearings (53 and 54) into frame (57).

4. Fasten bearing cap (49) in position with capscrews (48). Position slingers (47) on the shaft.
5. Position the bracket (35B) on the frame (57) and secure with capscrews (5) and washers (5A). Tighten screws evenly to assure proper alignment.

6. Position the Seal Plate (35A) on the bracket (35B) and secure with capscrews (5B). Tighten screws evenly to assure proper alignment.

Follow steps 1 through 14 from Pump Reassemble procedure to complete pump assembly.

Do not start pump until all air and vapor has been bled and until making sure that there is liquid in the pump to provide the necessary lubrication for the packing.

NOTE: WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL. ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR OR THE FACTORY AT NORTH AURORA, ILLINOIS.
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