Section Saturn Flotation Unit

Project:	Kadant Black Clawson LLC, Chesapeake, VA USA
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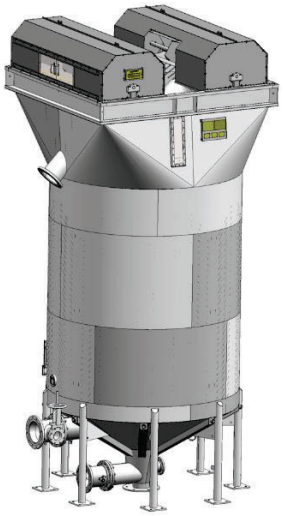
INSTALLATION, OPERATION & MAINTENANCE MANUAL

DISSOLVED AIR FLOTATION UNIT
SUEZ Treatment Solutions Canada LP, Poseidon® product line

SUEZ Poseidon® SATURN™ Flotation Unit Model S500TCE10-E

Serial Number: 7779-220713-S500TCE10E

P.O. Number: 787140



Installation: ***Kadant Black Clawson LLC***

Location: ***Chesapeake, VA, USA***

Date: ***November 2022***

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SATURN FLOTATION UNIT MODEL S500TCE10-E

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SECTION 1 - SAFETY GUIDE

OPERATIONS PERSONNEL RESPONSIBLE FOR THE OPERATION OF THE DAF UNIT(S) AND THE WASTEWATER TREATMENT PLANT MUST BE SUITABLY TRAINED AND CERTIFIED AS PER FACILITY AND NATIONAL REQUIREMENTS. THE DAF UNITS ARE PIECES OF EQUIPMENT WITH MANY COMPONENTS, REQUIRING SPECIFIC KNOWLEDGE AND SKILLS FOR PROPER OPERATION.

MAINTENANCE AND INSTALLATION PERSONNEL MUST HAVE THE APPROPRIATE TRAINING AND CERTIFICATION FOR THE TASK THAT IS REQUIRED.

Introduction

To assure your SUEZ Poseidon **SATURN**™ flotation unit works properly under normal operating conditions, please follow the recommendations contained in this guide. It contains important safety and maintenance information on the use of your SUEZ poseidon flotation unit.

All operators and maintenance people should read this guide prior to starting up or working on the unit. Although this equipment is equipped with safety devices, there are precautions to take in order to avoid accidents and damage to the unit. All operators should be familiar with the controls of this unit and those established by the customer.

Safety Instructions and Operating Precautions

SUEZ Poseidon's flotation unit uses state of the art technology and care must be taken when effecting repairs to the unit. **ONLY ORIGINAL SUEZ POSEIDON MANUFACTURED OR SPECIFIED SPARE PARTS CAN BE USED ON THIS UNIT**. The use of non-standard replacement parts could result in safety hazards to personnel and/or damage to the unit.

To avoid damage to the unit or electrocution of personnel, only qualified electricians are allowed to install the electrical connections of this unit.

When installing moving parts or doing maintenance on or near them, remember to shut off and lock the electric and/or the pneumatic feed to those parts. For example, the sludge scraping system and sludge skimmers or thickeners can cause serious injury. You need to pay attention when moving around the recirculation pump and around the pump shaft.

FOR PROPER SAFETY DO NOT…



- Start the unit up before it has been fully assembled, installed on site and that all safety devices have been put in place and are functional.



- Do any maintenance, repairs or any other kind of work on the unit without having completely shut off / locked out electrical power to the unit as well as any pneumatic feed.



- Let the unit run with damaged, missing or extremely worn parts.



- Modify or remove safety devices that are necessary for the safe operation of the unit.



- Touch any moving or rotating parts of the unit.

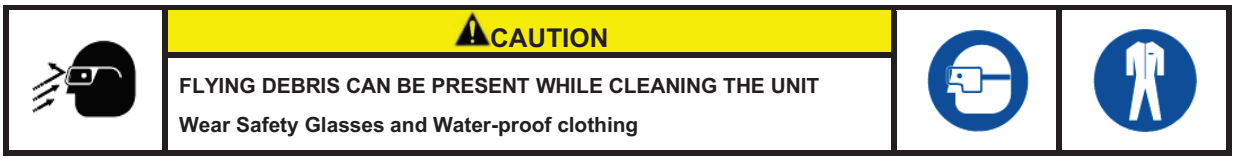


- Use any tools or other object between sludge scrapers, sludge skimmers or thickeners when they are moving.

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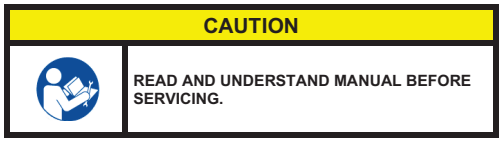
Cleaning of the unit

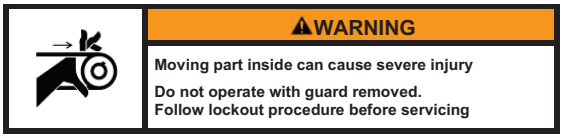
Cleaning procedures of the unit are clearly described in the verification and maintenance section of the manual (refer to **SECTION 9 – VERIFICATION AND MAINTENANCE**). It is important to wear safety glasses when washing the unit with a water hose as dirt can be projected into the air. Also due to numerous irregular shapes of the unit, splashing can occur. Therefore, it is suggested to wear waterproof clothing for this work.



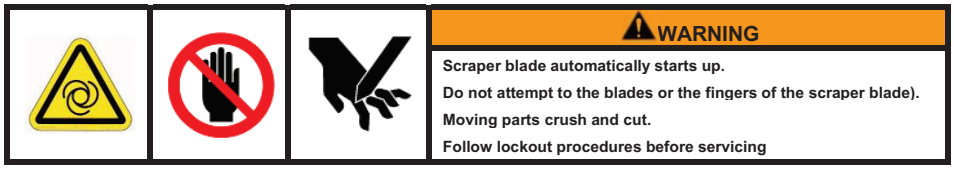
It is recommended to keep the safety tags clean so that they are visible to anyone working around the unit. The safety tags that can be found on the flotation unit are as shown below.











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Lockout Procedure

Lockout procedures are established to protect workers so that they can safely perform their maintenance duties on the **SUEZ POSEIDON** Flotation unit. The lockout procedure must be applied for:

- Internal Inspection.
- **Poseipump®** installation, assembly and disassembly maintenance procedures.
- Sludge removal system installation, assembly and disassembly maintenance procedures.



SAFETY INSTRUCTIONS

SUGGESTED LOCKOUT PROCEDURE

1. **Announce lockout to other personnel**
2. **Turn power OFF at main panel(s)**
3. **Lockout power in OFF position**
4. **Put key(s) in your pocket**
5. **Clear Unit of all Personnel**
6. **Test lockout by hitting the RUN button(s)**
7. **Begin work if all of the previous steps are satisfied**
8. **Clear unit of personnel before restarting**
9. **Announce unit will soon be ON to other personnel**
10. **Take key(s) form your pocket and unlock the lockout device(s).**
11. **Turn power ON at the main panel(s)**
12. **Announce unit is ON to other personnel.**

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Internal Inspection

Internal inspection requires a **CONFINED SPACE** and **LOCKOUT** procedures. A confined space is an area where accessibility is reduced and where air can be confined. The principal risks are oxygen deficiency, presence of toxic and explosive gases and physical injuries due to body falls, pinning of the body, restricted visibility, noise and temperature.

The flotation unit must be empty and should be clean for a better inspection (Refer to the **SECTION 9 Cleaning procedures**). **Please refer to the confined space and lockout procedures already established by the facility**.



DANGER

DO NOT ENTER

Confined Space
Please refer to CONFINED SPACE & LOCKOUT procedures already established by the facility before servicing



SAFETY INSTRUCTIONS

SUGGESTED CONFINED SPACE INSPECTION PROCEDURE

1. Obtain a work authorization or permit for confined space inspection.
2. Empty and clear the flotation unit as described in **SECTION 9.**
3. Close and lock all flotation unit inlet and outlet water valves (Manual & Automatic)
4. Follow lockout procedure for the supply pump, **Poseipump®**, sludge removal system, dosing pumps and the drain valve.
5. Prior to entering the unit, a continuous gas measurement can be performed with a calibrated gas detector if deficient oxygen or toxic/explosive gases are potentially present.
6. If the gas detector signals an alarm, an air blower system should be installed in order to change the air volume during adequate frequencies.
7. Supervisors must determine if special personnel protection is required such as respiratory protections and/or worker evacuation devices that can be operated outside of the unit.
8. Prior to entering the flotation unit, a supervisor should always remain outside of the unit during the work period in order to visually check and communicate with the worker(s) inside. The supervisor must be able to engage emergency procedures if needed.

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SECTION 2 - PROCESS DESCRIPTION

The **SATURN**™ flotation unit model S500TCE10-E was selected for the treatment of the stock screw press effluent.

Saturn Flotation Unit Specifications

Model	S500TCE-10
Poseipump® Model	403-PF
Maximum Capacity	1150 usgpm
Maximum Inlet suspended solids concentration	*3840* ppm

For a detailed description of the individual process steps, refer to the subsequent sections.

Flotation unit – SATURN™ series

The **SATURN**™ flotation unit is a closed-top circular unit, which extends vertically and uses air microbubbles for separation of suspended solids from the liquid phase.

The raw water is preferably coagulated (if coagulation is necessary) at the inlet of the feed pump to take advantage of the strong mixing action provided by the pump's impeller and to allow the longest contact time possible for the coagulant to react. The flocculation process normally occurs at the junction of the feed water line and the recirculated water line, located at the inlet of the unit, or a few feet before.

After chemical conditioning, the process water is mixed with a stream of recirculated water which is saturated with air by the POSEIPUMP®. This air is released from the recirculated stream as microbubbles ranging between 30-50 μm which will adhere to the suspended solids, allowing them to float to the surface of the water in the DAF unit. The process water enters at the bottom of the flotation unit, below the separation cones and is distributed throughout the unit with a diffusion baffle.

The clarified water collection piping is mounted around the perimeter of the unit and these collectors merge into one common pipe on the outside of the unit. The internals collectors are lined with the separation cones to improve performance for contaminant removal.

The air/particle conglomerates float to the surface of the flotation unit to form a sludge blanket, which is removed continuously by means of a sludge scraping system.

If any heavy particles are present, they will settle and accumulate in the heavy solids collection zone at the very bottom of the unit. This zone is equipped with dedicated drain piping and automatic drain valve.

Poseipump® Air Saturation System

A part of the treated water is recirculated through the recirculation pump, called the **POSEIPUMP®**, in order to produce proper air dissolution. Air is injected into the recirculation pump through the hollow shaft of the pump. The **POSEIPUMP®** recirculation pump is specifically designed to pressurize the air/water mixture.

The air is dissolved in the recirculation system by means of the mixing action of the **POSEIPUMP®**'s impeller**,** application of pressure via the pressure release valve and proper retention time within the air dissolution pipe.

The microbubbles are generated following the pressure drop that takes place right after the release valve, near the inlet of the flotation unit. It is this depressurization to atmospheric pressure that causes the dissolved air to be released as micrometer sized air bubbles within the range of 30-50 μm. These are ideally sized for the removal of fine particles.

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Poseidon Injector

The Poseidon injector is located slightly upstream of the inlet into the SUEZ Poseidon flotation unit and represents the junction between the process water feed line, the recirculated water line and, in most cases, the flocculant injection point. The feed water passes through the center section of the injector while the recirculated water and flocculant are brought to the outer ring. The recirculation line release valve used to increase pressure in the recirculation line will be located close to the injector. For convenience regarding the flocculant feed lines, there are also two (2) dedicated one (1) inch flocculant injection points located on either side of the injector. Only one of these two points needs to be used and though injection quills cannot be used, the design of the injector insures maximum mixing of the water and the flocculant.

Separation Cones

The principle of projected surface is applied by stacking inclined separation cones with a defined gap between them. This results in a better solids separation since the separation efficiency is directly proportional to the projected surface.

As particles rise to the surface of the unit they may be partially entrained towards the clarified water collectors however, as they do so they enter a zone where the principle of countercurrent separation can be applied. Due to the plate distance and fluid velocity, a laminar flow is maintained between the cones. This means that a fluid has “zero velocity” at the plate surface. Particles can travel uninterruptedly to the nearest plate. Once the particles reach the plates, they will start moving upward contrary the direction of the flow. This is due to the velocity distribution of a laminar flow pattern where flow velocity at the cone’s surface is zero. Traveling in an upward direction can therefore take place in a virtually unhindered way. Flocs will increase in size and adhere to microbubbles between the cones which will increase their buoyancy until they are sufficiently buoyant to rise to surface of the unit.

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SUEZ Poseidon DAF unit flotation accessories

The following are the auxiliary items and accessories that are included in the SUEZ Poseidon scope of supply for this project. This is not a complete list of all the necessary auxiliary equipment for the SUEZ Poseidon dissolved air flotation unit.

Air dissolution pipe
Pneumatic control box
POSEIPUMP®
Sludge removal system
Pressure gauge

Equipment Overview

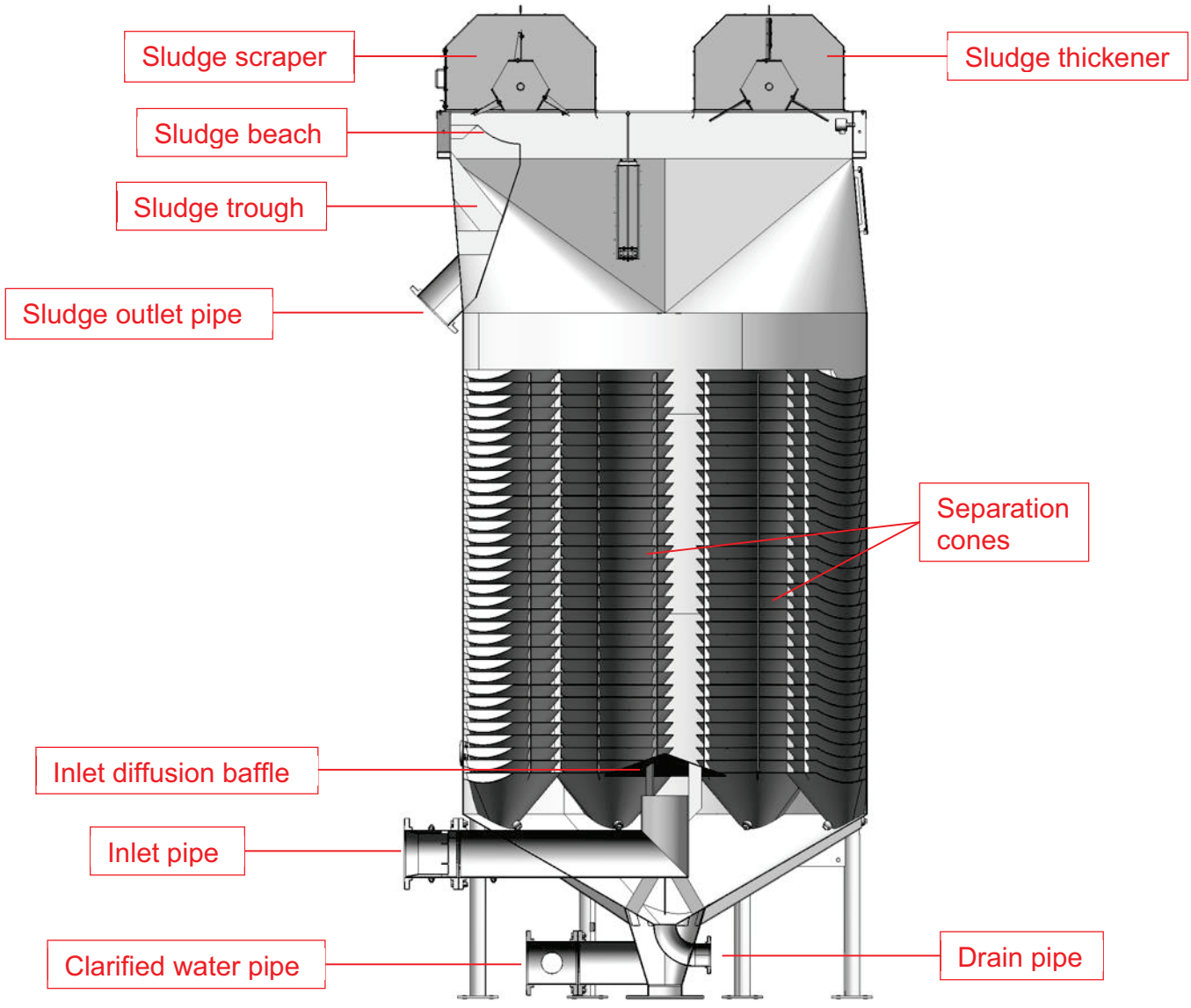


Figure 1 DAF unit internals

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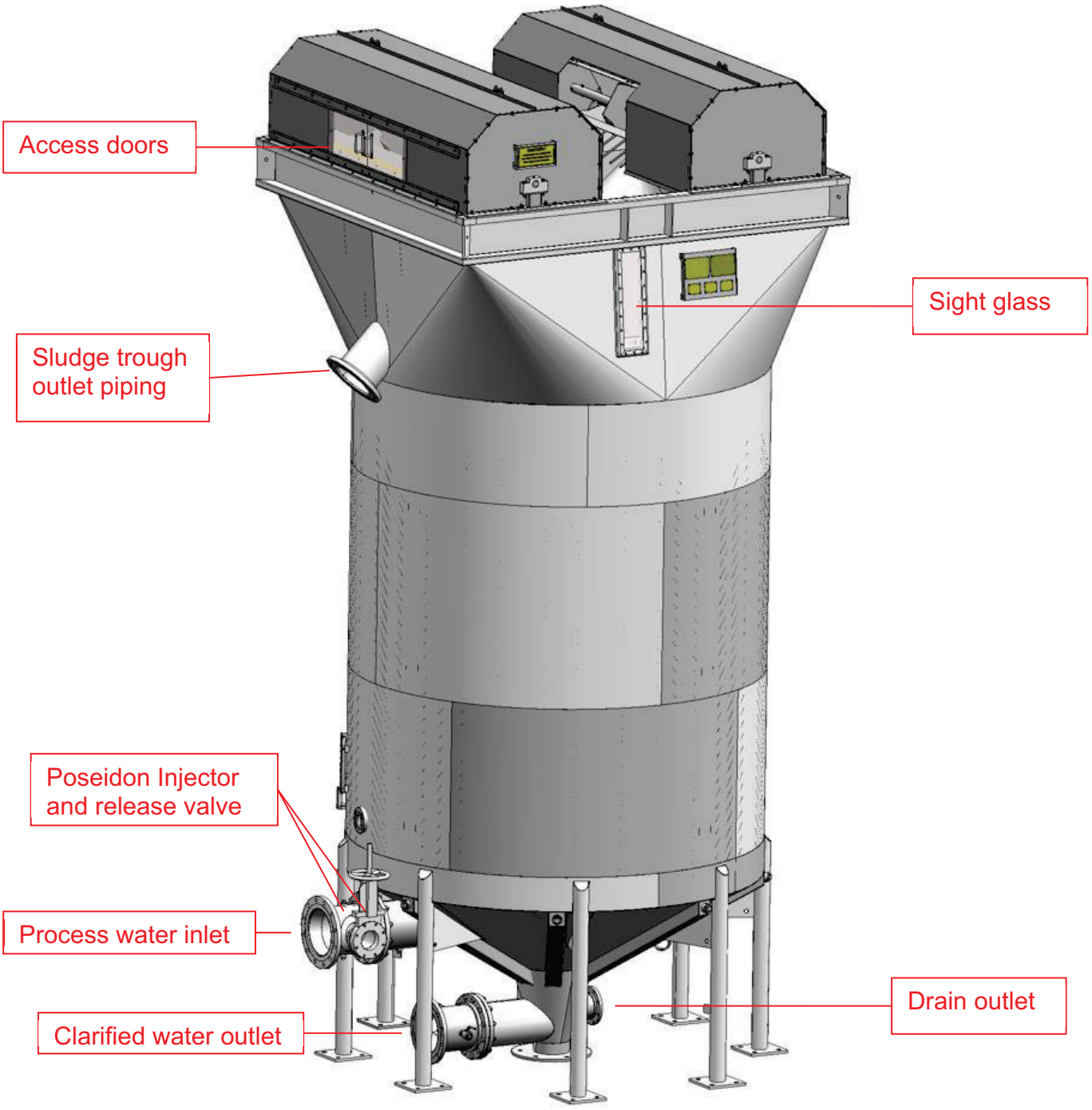


Figure 2 DAF unit externals

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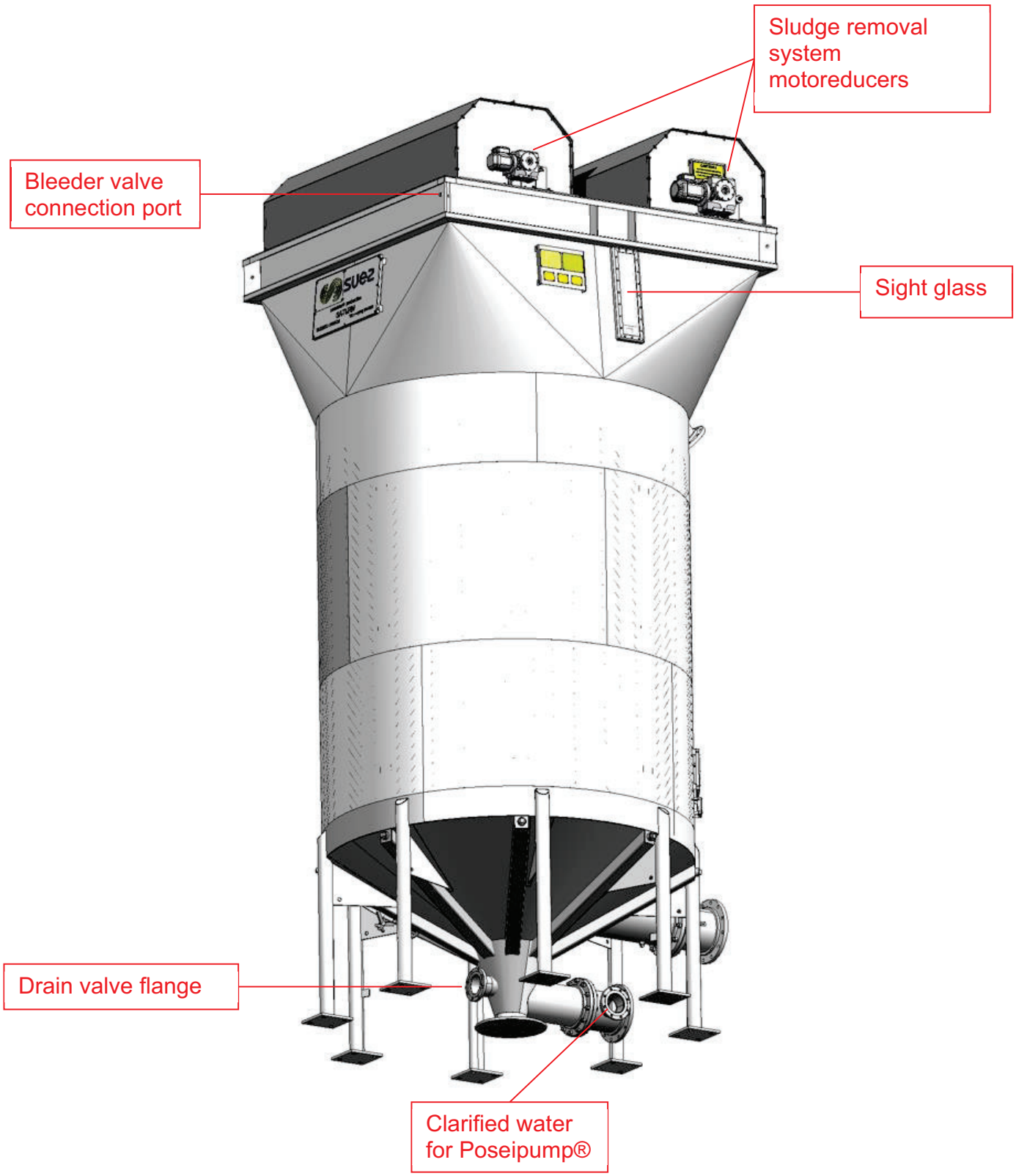


Figure 3 DAF unit externals

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SECTION 3 – SHIPPING & RECEIVING

Shipment

The Saturn Flotation unit is shipped along with the dissolution pipe, one crate containing the **Poseipump®** and one or more crate(s) containing all the parts necessary for completing SUEZ poseidon's supply. For specific details of equipment weights, please refer to the certified shipping drawings.

Receiving and Pre Start-up

When receiving the flotation unit …

- Effect a complete general inspection inside and outside the unit in order to verify if any damage occurred during shipping.
- If ready to install, remove all mechanical blocks and straps used in transporting the unit to prevent blockage of moving parts such as the scraper, pump shaft etc.
- Make sure that all moving parts move as intended
- Insure that there are no loose parts on the unit
- Verify the proper emplacement of safety devices and guards
- When the unit is ready for start-up, fill it with fresh water to avoid any risk of running the recirculation pump dry.

Lifting and Hoisting Procedures

IMPORTANT: Always refer to the certified drawing 7779.D.01.09.0060.1M. Information within this drawing supersedes any typical hoisting procedure presented below.

The equipment required for lifting and hoisting the Saturn flotation unit is two cranes, one forklift, one elevating work platform, cables or lifting belts and hooks.

The following hook-up instructions describe the hoisting procedures for setting the Saturn flotation unit on its feet.

Hook-up instructions for the Saturn flotation unit

- Hook up CRANE A to the lifting lugs on the top of the unit.

⚠WARNING

AVOID EQUIPMENT DAMAGE
Do not exceed maximum rated load.
Refer to the certified shipping drawings

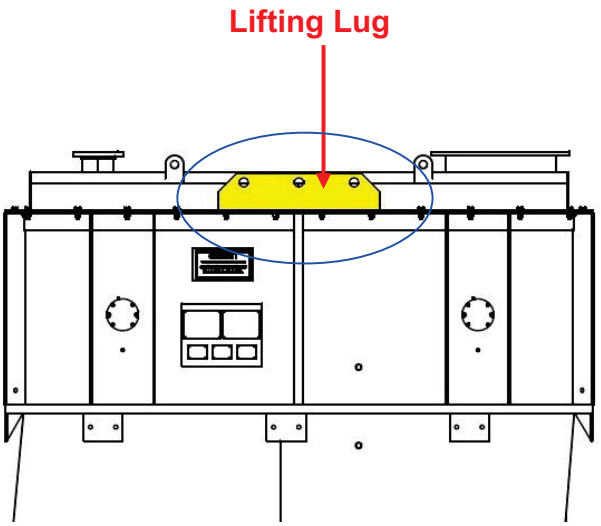


Figure 4 Hooking the top of the unit

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- Install one end of another lifting belt to CRANE B and the other end to a shackle and the top leg. The shackle must be hooked to the supporting hole located below the top leg as per Figure 5.

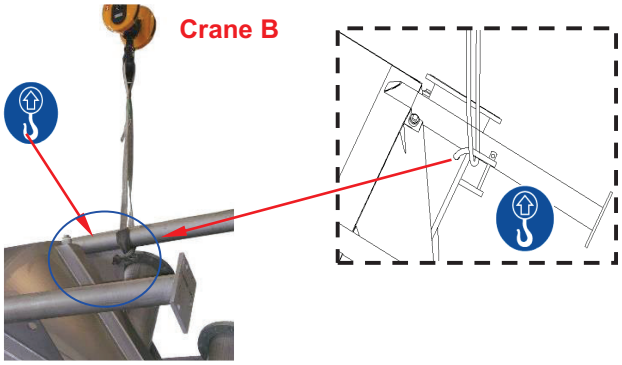


Figure 5 Hooking the leg of the unit

Lifting the Saturn flotation unit

- Lift the Saturn flotation unit with **CRANES A** and **B** from the ground. When the unit is in the horizontal position, start to lift the upper section of the unit with **CRANE A** while keeping **CRANE B** immobile. It is important that the legs do not touch the ground during the lifting procedure as it may cause damage to the legs.

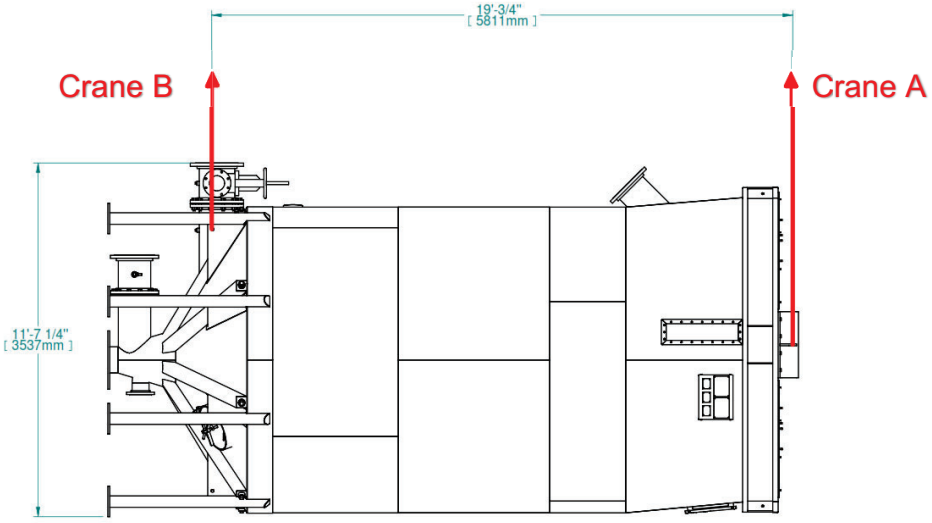


Figure 6 Lifting the unit

⚠WARNING

AVOID EQUIPMENT DAMAGE
Do not exceed maximum rated load.
Refer to the certified shipping drawings

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- Keep lifting the upper section until the unit reaches the vertical position as per Figure 7.

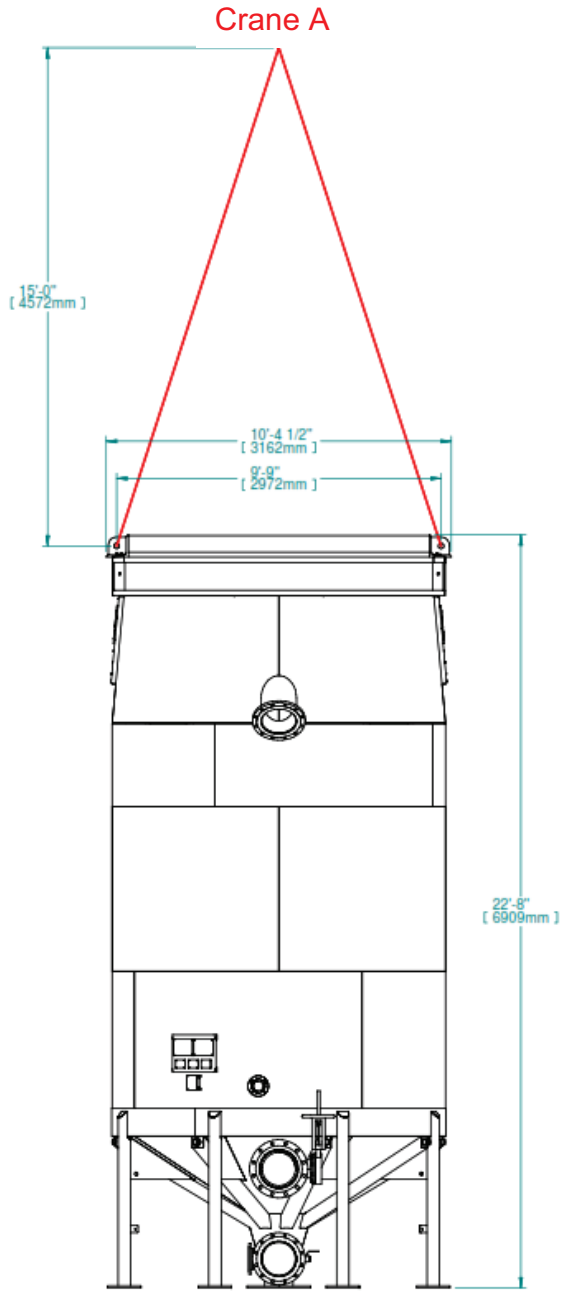


Figure 7 Vertical position

WARNING

AVOID EQUIPMENT DAMAGE
Do not exceed maximum rated load.
Refer to the certified shipping drawings

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Protection of Poseidon Flotation unit for Overseas and Winter Shipments

The following information concerns the corrosion protection solution applied to the SUEZ Poseidon **PPM™** Flotation unit that could be applied depending on the type of packaging and how this solution can be removed when the unit arrives at the facility.

Description of protective coating

In order to protect the SUEZ Poseidon **PPM™** Flotation unit during overseas and winter shipment and to preserve the original manufacturing quality, the surface of the unit has been treated with a rust inhibiting coating at SUEZ Poseidon's manufacturing plant. This special coating protects metal against rust, salt and corrosion. The following is a description of the composition and physical properties of the coating.

Composition of the protective coating

Ingredients:	
Asphalt	47%
Mineral Oil	22%
Extensive Wax and Oils	31%

Physical properties of the protective coating

Pure Material or Blend:	Blend
Physical State:	Liquid
Color:	Translucent Liquid
Relative Density (water = 1):	0.93 ± 0.2
Viscosity:	3200 cps at 25°C (77°F)
Solids per Volume:	33 ± 3%
Volatiles (% w/w):	48%
Solubility in water:	0.01%
Flash Point:	60°C (140°F) min.Open cupel ''Cleveland''
Consistency:	Thixotropic Fluid
Evaporation Rate:	0.16
Tension of Vapor (mm Hg):	0.4
Density of Vapor (air = 1):	4.7
Corrosion Resistance:	Salt Vaporization (1000 hrs) Dry thin layer of 2.5 mm

This material is flammable and contains solvents from petroleum products. It belongs to the bituminous compounds chemical family.

Removal of protective coating

The protective coating can be removed from the surface of the unit with a Solvent-based cleaner.

Suggested Removal Procedure:

1. Apply the solvent (or equivalent) on the surface of the unit with spraying equipment or otherwise.
2. Leave the solvent for approximately 10 minutes.
3. Wash the surface of the unit with high-pressure water.



⚠CAUTION

SPLASH HAZARD CAN BE PRESENT WHILE CLEANING THE UNIT

Wear Safety Glasses and Water proof clothing





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Composition of Bio-Progard – Permanent Anti-Rust Treatment

Ingredients:	
Quaternary Ammonium Compound with bentonite	5-10 %
Propylene carbonate	1-5 %

Physical properties of Bio-Progard – Permanent Anti-Rust Treatment

Pure Material or Blend:	Blend
Physical State:	Cream semi-liquid
Color:	Cream
Relative Density (water = 1):	0.9-1.0
Viscosity:	>1000 cSt @ 40°C
Solubility in water:	N/A
Flash Point:	~210°C
Evaporation Rate:	N/A

Refer to the Bio-Progard SDS for additional information on the product.

Removal of Plywood/Steel caps

For shipping purposes, all flanged outlets of the unit have been capped with plywood or steel caps. Please remove all these caps in order to start working with the piping.

Long Term Storage at Site Procedure

The flotation unit will arrive on-site along with the dissolution pipe and will be accompanied by one or more crates. The unit can be kept outside until you are ready to perform the installation. The unit should be placed on the ground with the same kind of supports that it came on during shipping. It should also be kept away from traffic where it will not be in the way. However, no special precautions need to be made in regards to maintenance. There may be a cross bar structure installed to make lifting the unit easier. This can be left there until all lifting procedures are complete just prior to start-up. The plywood caps on the flanges of the unit do not have to be removed until necessary. The crates must be moved indoors into a temperature and humidity-controlled warehouse for safe keeping.

If shipping occurs during the winter please follow **Protection of SUEZ poseidon Flotation unit for Overseas and Winter Shipments**.

Preservation Procedures During Construction, Start-Up and Commissioning Period

Not unlike the **Long Term Storage at site Procedure**, no special precautions need to be taken in regards to preservation during the Construction, Start-Up and Commissioning Period. Once in service, you can begin following a routine maintenance schedule including proper lubrication and cleaning of the unit.

In case of potential freezing risks, make sure there is no water accumulation in the unit.

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Miscellaneous equipment extended storage recommendations

When storing rotating equipment such as pumps or motors, it is important that special precautions are taken.

Poseipump:

- Always store the spare Poseipumps indoors in a clean, dry location. Avoid locations with large temperature swings that will result in condensation.
- Pumps cannot be stored around running equipment where resonance vibration can cause bearing damage.
- Regardless of the duration of storage, pumps should be rotated at least every six weeks, no less than five full revolutions.
- Pumps should be stored in a corrosion less environment.

Valves:

- Always store the valves indoors in a clean, dry location.
- Regardless of the duration of storage, valves should be manipulated (opening and closing them 4 to 5 times) every six months.

Motors:

- Always store the motors indoors in a clean, dry location. Avoid locations with large temperature swings that will result in condensation.
- Please note the reduced grease utilization period of the ball bearings after storage periods exceeding one year.
- Check whether the motor has absorbed moisture as a result of being stored for a long time. Measure the insulation resistance to do this.
- Motors must be covered to eliminate airborne dust and dirt.
- If the storage location exhibits high vibration, place isolation pads under motor to minimize damage to motor bearings.

Please read the manufacturer's Operating instructions manual for more information.

Gear units:

Gear units of the ''extended storage'' type have:

- An oil fill suitable for the mounting position so the unit is ready to run. You should still check the oil level before start-up;
- A higher oil level in some cases. Correct the oil level before start-up.

Comply with the storage conditions specified in the following table for extended storage:

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Climate zone	Packaging *	Storage location	Storage time
Temperate (Europe, USA, Canada, China and Russia, excluding tropical zones).	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap.	With roof, protected against rain and snow, no shock loads.	Up to three years with regular checks on the packaging and moisture indicator (relative atmospheric humidity <50%).
	Open	With roof, enclosed at a constant temperature and atmospheric humidity (5°C-60°C, <50% atmospheric humidity). No sudden temperature fluctuations and controlled ventilation with filter (free from dirt and dust). No aggressive vapors and no shock loads.	Two years or more, given regular inspections. Check for cleanliness and mechanical damage as part of the inspection. Check corrosion protection.
Tropical (Asia, Central and south America, Australia, New Zealand, excluding temperate zones).	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap. Protected against insect damage and mildew by chemical treatment.	With roof, protected against rain, no shock loads.	Up to three years with regular checks on the packaging and moisture indicator (relative atmospheric humidity <50%).
	Open	With roof, enclosed at a constant temperature and atmospheric humidity (5°C-60°C, <50% atmospheric humidity). No sudden temperature fluctuations and controlled ventilation with filter (free from dirt and dust). No aggressive vapors and no shock loads. Protection against insect damage.	Two years or more, given regular inspections. Check for cleanliness and mechanical damage as part of the inspection. Check corrosion protection.

*Packaging must be performed be an experienced company using the packing materials that have been expressly specified for the particular application.

Please read the manufacturer's Operating instructions manual for more information.

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SECTION 4 - INSTALLATION

Installation of the DAF unit tank

The DAF must be installed level. Permissible deviation will be maximum 1/32'' from left side to right side and maximum 1/32'' between front side and rear side.

Customers generally install the equipment on a concrete slab with approximately 1'' of clearance between the concrete and the baseplates. Shims are used in order to achieve a perfectly level installation and then grout is added between the concrete and the DAF equipment baseplates.

The unit should also be electrically grounded and details concerning the grounding lug(s) can be found on certified drawings 7779.D.01.09.0060.1A/B/G.

Installation of the Recirculation Pump (POSEIPUMP®)

Please refer to **SECTION 5 – POSEIPUMP®** for installation procedures of the Poseipump®.

Installation of the Recirculation Pneumatic box

It is recommended to install the recirculation pneumatic box near the **POSEIPUMP®** in order to facilitate an optimal operation. Refer to **SECTION 6 - Pneumatic Control Box**

Installation of the Sludge Removal System

Please refer to **SECTION 7 – SLUDGE REMOVAL SYSTEM** for installation procedures for the sludge removal system

Installation of miscellaneous equipment.

The general installation location of various equipment can be found on the SUEZ Poseidon flowsheet identified as certified drawing 7779.D.01.09.0060.1L. This can be a reference for the following equipment unless stated otherwise.

Drain Valve installation

Install the Automated and Isolation drain valves to the drain water flange of the flotation unit with the appropriate bolts. Please refer to the certified drawings for specific details.

Pressure gauges installation on the recirculation line

Install one pressure gauge (0-150 psig) just before the release valve (Figure 9) and another one at the **POSEIPUMP®** discharge. Please refer to the certified drawings for specific details.

Pressure Transmitter on the recirculation line

nstall a Pressure Transmitter on the recirculation line. This pressure transmitter must be relayed to the PLC. In specific cases, the pressure switch located in the recirculation system pneumatic box can be used as a replacement. Ask SUEZ Poseidon about this feature before doing any changes to your configuration. Please refer to the certified drawings for specific details.

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Level transmitter installation

Install a Level Transmitter on the tank. This level transmitter must be relayed to the PLC or DCS. Please refer to the certified drawings 7779.D.01.09.0060.1A/E/L for specific details.

Clarified water pipe

Install the clarified water pipe which must be bolted at the clarified water flange of the flotation unit. Please refer to the certified drawings 7779.D.01.09.0060.1A/C/D/E/L/N for specific details.

Recirculated water pipe

Install the recirculated water piping which includes the air dissolution pipe. Please refer to the certified drawings 7779.D.01.09.0060.1A/D/E/H/N/L for specific details.

Installation of the Dissolution Stand Pipe

The Dissolution Stand Pipe is shipped in the horizontal position during transport. It must be set on its feet before connecting the recirculation dissolution pipes.

Hoisting of the Dissolution Stand Pipe

1. Remove the steel structure at the feet of the Dissolution Stand Pipe.
2. Install a lifting belt around the Dissolution pipe near the head.
3. Hook the lifting belt to a crane or a fork of a forklift.
4. Carefully lift the Dissolution pipe until its set on its feet. Please refer to the certified drawings for weight
5. Remove all plywood or steel caps.

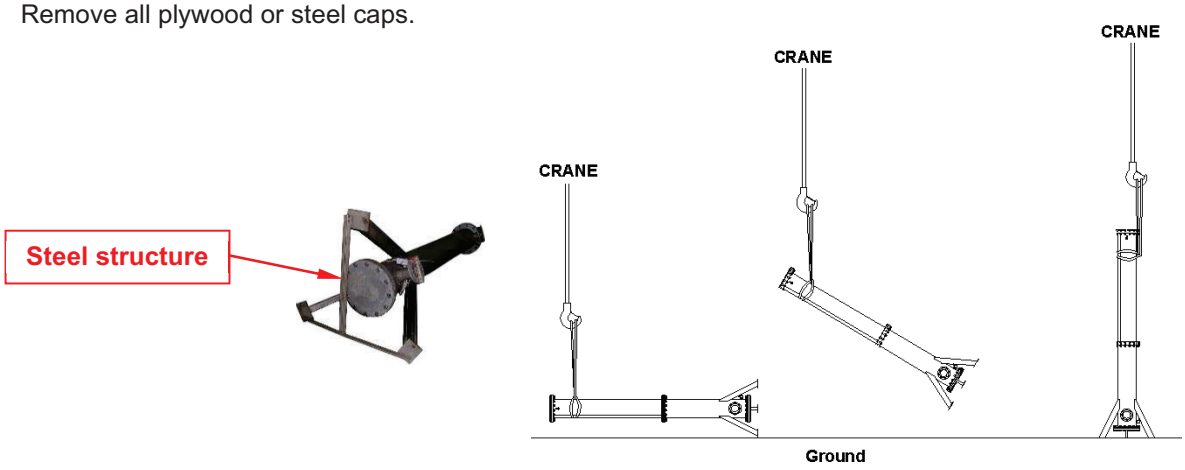


Figure 8 Lifting the Dissolution Pipe

Connection of the Dissolution Stand Pipe

1. The Dissolution Stand Pipe should be installed near the flotation unit and the **POSEIPUMP®**.

2. Install the recirculation pipe connected to the Dissolution Stand Pipe. Please refer to the certified drawings 7779.C.01.05.0202.1P for specific details.

3. A bleed line and a bleed valve should be installed. The bleed line runs from the top of the dissolution pipe up to the top of the flotation unit, where the bleed valve needs to be installed. Please refer to the certified drawings for specific details.

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Installation of the Recirculation Injector and the Chemical Products Injection Points

Recirculation Injector

The recirculation injector is shipped in one of the crates. Please refer to the certified drawings for specific details for the connection of the recirculation injector.

1. Install the recirculation injector to the raw inlet water flange of the flotation unit with the appropriate bolts.
2. Install the feed pipe to the main flange of the recirculation injector with the appropriate bolts
3. Install the release valve (Gate valve) on the side flange of the recirculation injector and connect the **POSEIPUMP®** discharge pipe to the other end of the release valve.
4. Connect the flocculant line to the recirculation injector dosing points. (Refer to **Figure 9**)

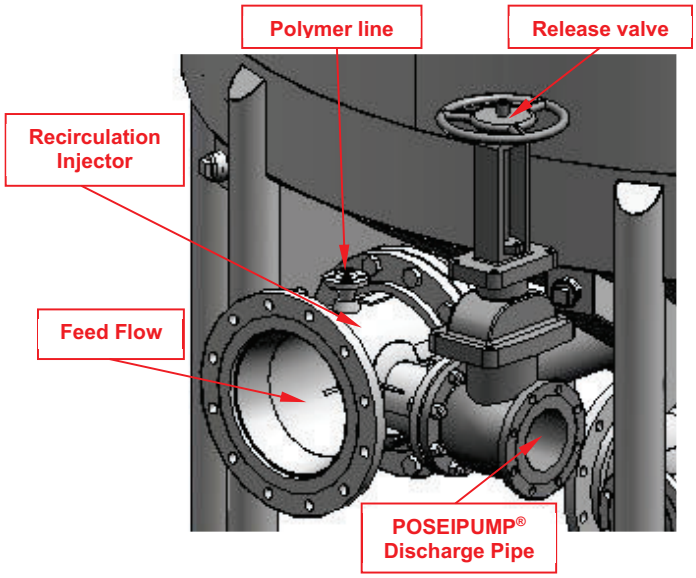


Figure 9 Recirculation Injector Installation

Flocculant injection Points

The flocculant injection points can be placed at one of several different locations on the flotation unit feed pipe or at one of a different predetermined locations on the tubular flocculator if one is installed. The location of the flocculant injection point depends on the speed of the floc formation, which is partly dependent on the water being treated. At start-up it is recommended to try different injection points for the flocculant and to evaluate their respective effectiveness by doing turbidity and/or TSS analyses.

In the majority of applications, the optimum injection points are located on the recirculation water injector of the unit.

A flocculant injection point located between the recirculation water injector and the unit inlet can be used for a very quick flocculation contact time. If a tubular flocculator is not used, it is recommended to install 3 additional alternative injection points located **10 feet (3m)** apart upstream of the recirculation water injector. Furthermore, each of these injectors should penetrate inside the feed pipe to a length equal to 1/3 the diameter of the feed pipe.

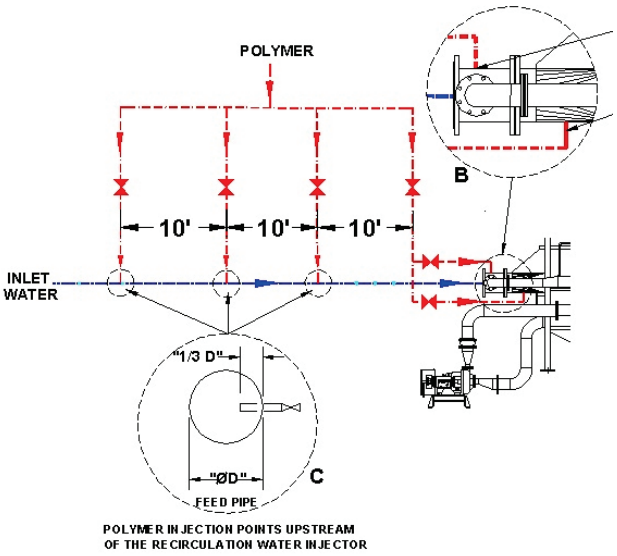


Figure 10 Flocculant Injection Points

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Coagulant Injection Point

Some water treatment programs require the addition of a coagulant for conditioning the water. The coagulant injection point should be placed as far as possible upstream of the flotation unit in order to optimize the contact time between the coagulant and the water. Prior to the start-up of the equipment, it is recommended to install the injection point, where possible, at the suction of the feed pump. Alternatively, it can be installed at a location encouraging quick mixing and an adequate contact time.

If a tubular flocculator is not used then the coagulant injection tube should penetrate the feed pipe to a length 1/3 the diameter of the feed pipe. This will permit an adequate dispersion of the coagulant.

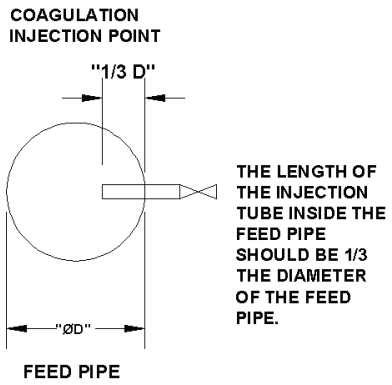


Figure 11 Coagulation Injection Point

pH Correction Injection Point (if applicable)

Depending on the nature of the raw water, a pH correction may be required downstream of the coagulant addition point. The pH correction injection point should be placed approximately halfway between the coagulant injection point and the flocculant injection point. Furthermore, the length of the pipe between the flocculant injection point and the pH correction injection point should be long enough in order to promote a quick mixing and an adequate contact time of the pH correction product. The injector should penetrate inside the feed pipe to a length equal to 1/3 the diameter of the feed pipe. A pH probe should be placed in the flocculation tank in order to control the required pH correction chemical product addition rate.

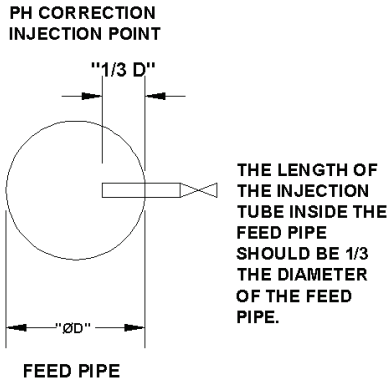


Figure 12 pH Correction Injection Point

⚠CAUTION

If a corrosive coagulant is used, such as Ferric sulfate or Ferric chloride, then the injection point should not be placed at the pump suction. In such a case, the injection point should be installed in a pre-determined position in a tubular flocculator made of an appropriate material.

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SECTION 5 – POSEIPUMP® 403-PF

INTRODUCTION AND OVERVIEW

The Poseipump® is a central component of the DAF flotation unit and provides the mean to create an appropriate air/water mixture to generate air microbubbles. Proper installation, operation and maintenance of this equipment is critical for the DAF flotation unit to perform as intended. Understanding operational principles and limits will help guide the operation of this device.

To ensure reliable operation of your Poseipump® in all circumstances it is essential for you to read and familiarize yourself with this section. It contains instructions to avoid accidents and damages to the pump before and during its operation. It also contains safety and maintenance tips.

All operators and maintenance personnel must be aware of the contents of this section and be aware of the precautions to take when doing work on or around the Poseipump®. The department supervisor must ensure that the staff understands and respects the rules of this guide and those established by the customer. Therefore, it is strongly recommended that this document be read by the user (s) of the pump before it is started for the first time. It is also desirable that the operator be familiar with the general operation of the dissolved air flotation unit.

Always refer to the design of the pump in order to proceed with the installation or replacement of any spare parts. Certified drawing 7779.C.01.40.0284.1G covers external details for the Poseipump®.

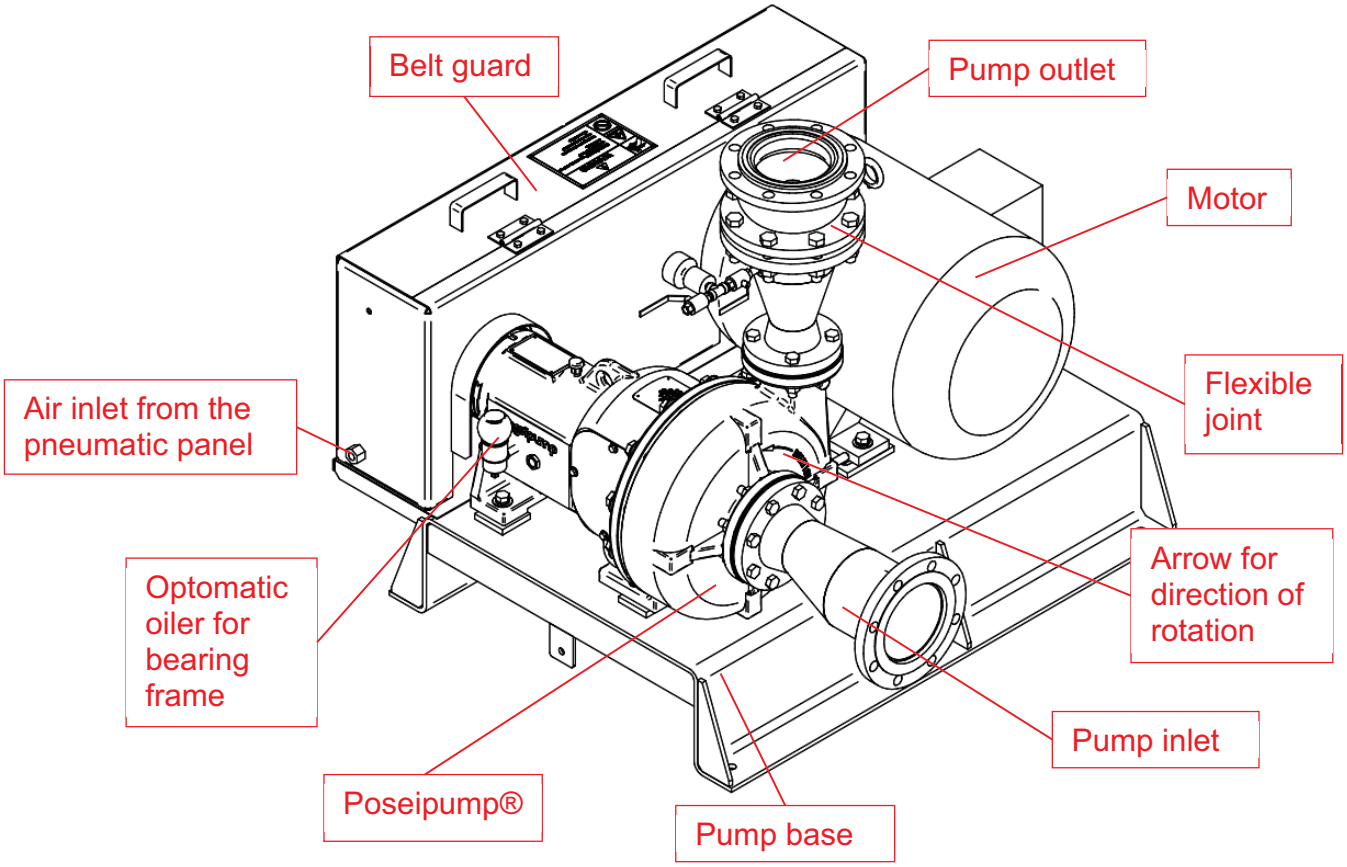


Figure 13 Poseipump® Overview

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GENERAL COMPONENTS

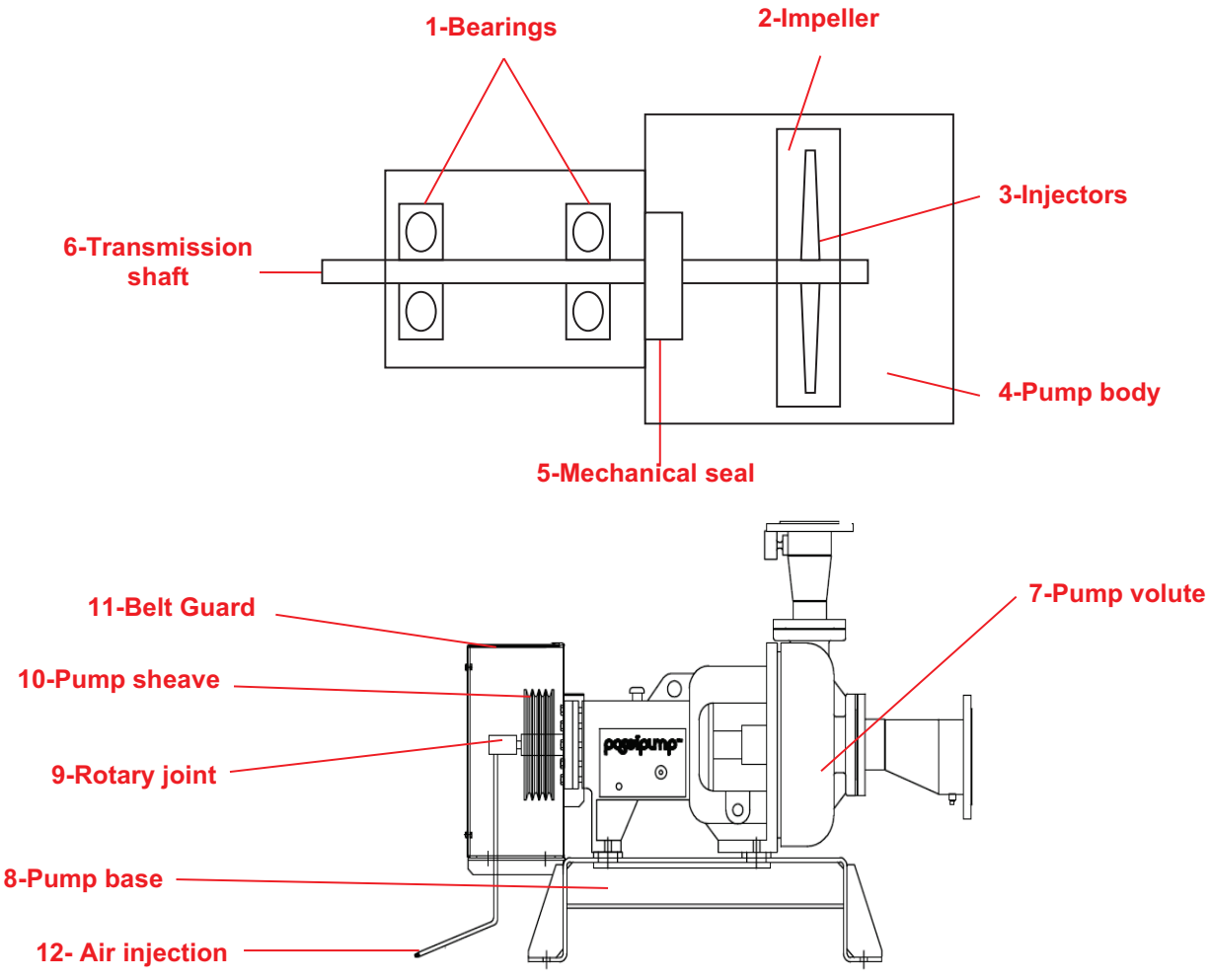


Figure 14 General components

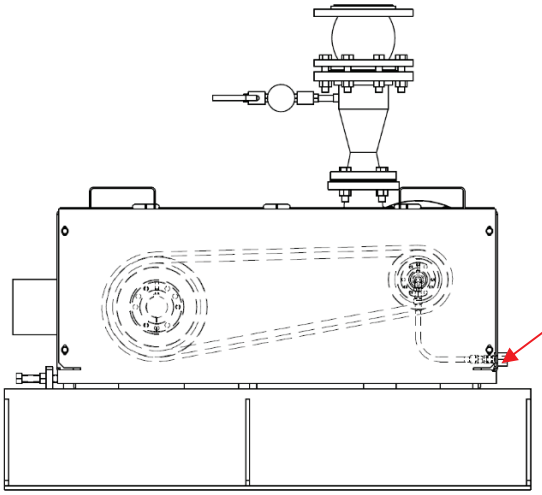


Figure 15 Air connection location

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RECEIVING THE PUMP

Upon receiving the pump:

- Proceed with a complete visual inspection to make sure there was no damage during transport;
- Remove all parts and locking fasteners that could have been used for transportation and make sure no object obstructs or blocks the rotation of the pump shaft;
- Observe if all moving parts have indeed free movement;
- Check the strength of all guards and safety devices because they must be strong to play their roles properly;
- When the flotation unit is ready to be started, fill the unit with water to avoid the risk of starting the recirculation pump dry.

Installation of the Poseipump®

The **POSEIPUMP®** is already mounted on its pump base when shipped. The installation requires a few steps prior to start up.

Location

The pump should be located as near to the liquid source as possible so that the suction line is both short and direct. The pump should be located below the level of the liquid to eliminate the necessity of priming.

Foundation

The foundation should be sufficiently rigid and substantial. A concrete foundation, poured on a solid footing of adequate thickness to support the pumping unit, provides the most satisfactory foundation. The base plate should be installed in a level position.

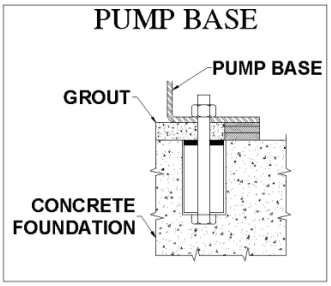


Figure 16 Pump Base

Grounding

The **POSEIPUMP®** must be electrically grounded and details for the grounding lug can be found on certified drawing 7779.C.01.40.0284.1G.

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Piping (general)

NOTE: Piping must not be connected to the pump until the grout has hardened and foundation bolts and pump hold-down bolts have been tightened.

Piping should be anchored independently of the pump and as near to it as possible. Pipe companion flanges should line up naturally with pump flanges**. DO NOT DRAW THE PIPE TO THE PUMP WITH FLANGE BOLTS.**

Piping (suction)

Properly selected and installed suction piping is extremely important to eliminate vibration and cavitation in the pump. Vibration and cavitation can cause packing problems, mechanical seal damage and/or undue bearing loads that will lead to premature failure.

- The suction line diameter should be equal to or larger than the pump suction.
- The suction line should be designed to eliminate any air pockets. In general, this will include piping that is gradually sloped upward from the source of supply to the pump. Suction elbows and other bends should also be minimized to improve suction head and reduce air pockets.
- The suction line should have a straight section into the pump of a length equivalent to at least 6 times the pump's inlet pipe diameter.

  A POSEIPUMP® SHOULD NEVER BE ADJUSTED BY THROTTLING THE SUCTION ISOLATION VALVE OR THE DISCHARGE ISOLATION VALVE.

  However, a positive shut-off valve should be installed on both the suction and discharge lines to permit the closing of the line so that the pump can be taken out of service for inspection and maintenance.

Piping (discharge)

- All piping should be independently supported and accurately aligned. **THE PUMP MUST NOT SUPPORT THE WEIGHT OF THE PIPE OR COMPENSATE FOR MISALIGNMENT.**

NOTE: With the POSEIPUMP®, flow in either direction through the pump is possible when the pump is turned off and the isolation valves are open.

- The flexible joint must be installed on the discharge pipe upstream of the isolation valve.

Initial Lubrication (Poseipump and rotary joint)

The **POSEIPUMP®** and the other oil reservoirs are shipped dry/empty. Before starting the equipment a SAE10W30 grade oil must be added to the bearing frame and the Opto-matic oiler reservoir. The appropriate oil level in the bearing frame is at 1/2 of the sight glass.

Oil fill up for the POSEIPUMP®

Attach the Automatic Glass Oiler to the bearing housing. Verify that the assembly is level and parallel with the desired oil level. Set the top arm of the oil level adjuster mechanism to the desired level (1/2 of the pump reservoir sight glass). Lock the top arm with the low arm. Fill the bottle with recommended grade SAE10W30. The correct volume for the oil level to be at the center of the sight glass is 2.2L and the oiler capacity is 100 ml. The required tool is a 7/16" key.

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Recommended SAE10W30 Grade Oil

American Oil Company	Amoco No. 31
Arco	Gascon S-315 or 68A
Continental Oil Company	Conoco Dectol Medium
Exxon Company	Forum 50
Mobil Oil	Flow Rex Extra Heavy
Shell Oil Company	Carnea 68
Texaco Inc.	URSA P68
Union Oil Company	Turmaco 315

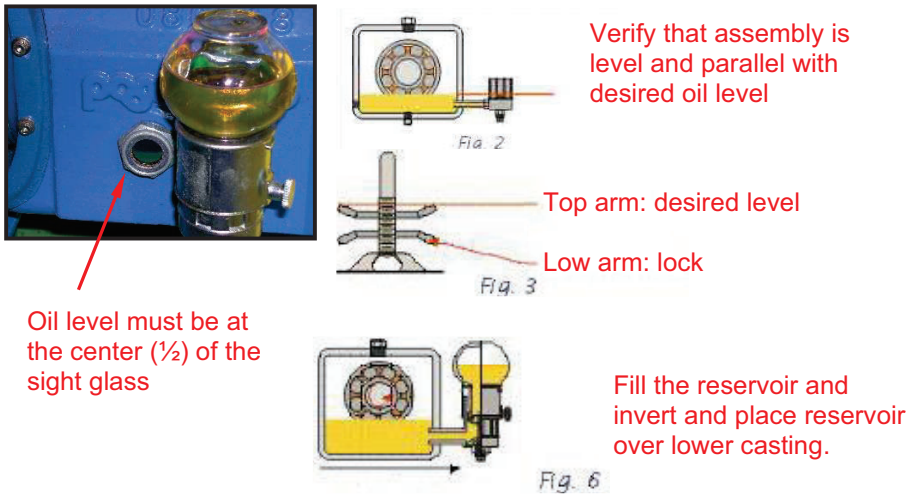


Figure 17 Oil Level & Oil Reservoir

Automatic Oiler

Opto-Matic® installation instructions

Installing:

1. Remove reservoir and level adjuster mechanism from lower casting.
2. Be sure that all connecting hardware is free from contaminants (burrs, chips, dirt, etc.) to prevent clogging or damage to the equipment to be lubricated.
3. Connect lower casting to bearing chamber through the side connection (Fig. 1). Use thread compound on all threaded areas, except supplied plug.
4. Verify that assembly is level and parallel with desired oil level. (Fig. 2) Make necessary adjustments if required.
5. Set oil level adjuster mechanism. Thread top adjuster arm to desired level, then thread lower adjuster arm together with top to lock into place.
6. Fill reservoir with oil. Back out set screw on reservoir casting to avoid interference with lower casting upon assembly.
7. Invert and place reservoir over lower casting.
8. Run equipment to check proper lubrication levels. If oil level is too low, remove reservoir and raise arms on level adjuster mechanism slightly, then repeat steps 6 and 7. Turn set screw to hold reservoir assembly in place.
9. **Adjustment tip**: Measure distance between bottle & casting edge (Fig. 4), replace bottle on adjustment arm in lower casting - mark dimension on outside of lower casting with temporary marker. (Fig. 5) This is the level setting.

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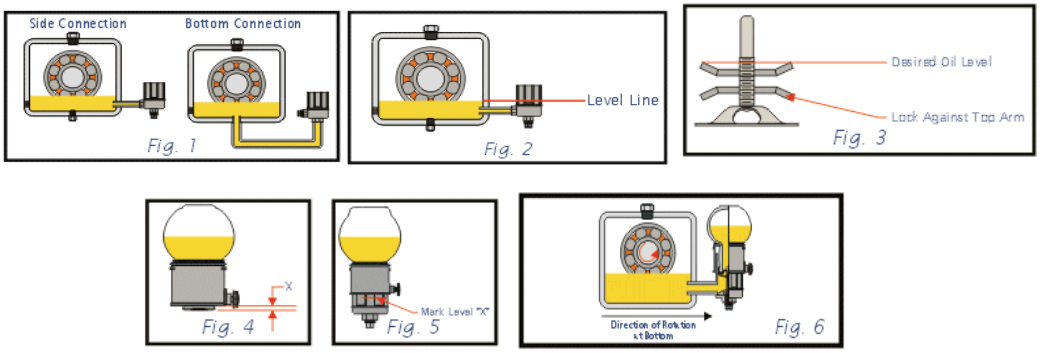


Figure 18 Opto-Matic Oiler

Operation:

1. Overfilling of equipment may occur due to repeated removal and replacement of reservoir. Add oil only when less than 1/3 of reservoir capacity remains to reduce filling frequency.

2. Oiler location with respect to bearing type, rotating speed of equipment, multiple start-ups, slinger rings, etc. may cause the oiler to misfeed. Check lubricant levels periodically to ensure proper application. Mount oiler facing direction of rotation at bottom of shaft. (Fig. 6)

3. When environmental conditions such as rain, steam, dust, etc. are a concern, closed system oilers will lessen the chance of lubricant contamination.

Installation and wiring of the electrical motor

Please refer to the Manufacturer's manual for the installation and the wiring of the motor.

Verification of the motor rotation

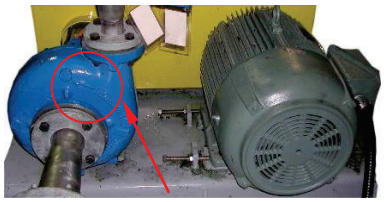
NOTE: It is important to perform the following steps when the pump is turned off and locked. Refer to the LOCKOUT PROCEDURE.

When verifying the pump motor rotation, make sure that the pump's **drive belt is disconnected** from the motor sheave. For safety measures it is suggested to put on and lock the belt guard before starting the verification. Please refer to the arrow on the pump casing to know the rotation of the pump.

Disconnected belt



Drive belt transmission



Refer to the arrow on the pump casing for the direction of rotation

Figure 19 Rotation check-out

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⚠ WARNING

Never rotate the recirculation pump in the opposite direction when the drive belt is connected to the pump.

Assembling the transmission system

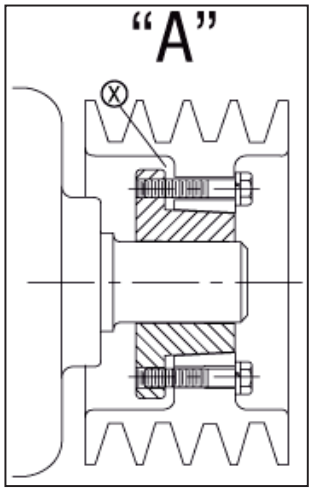


Figure 20 Hub and pulley

CAUTION: DO NOT USE LUBRICANT

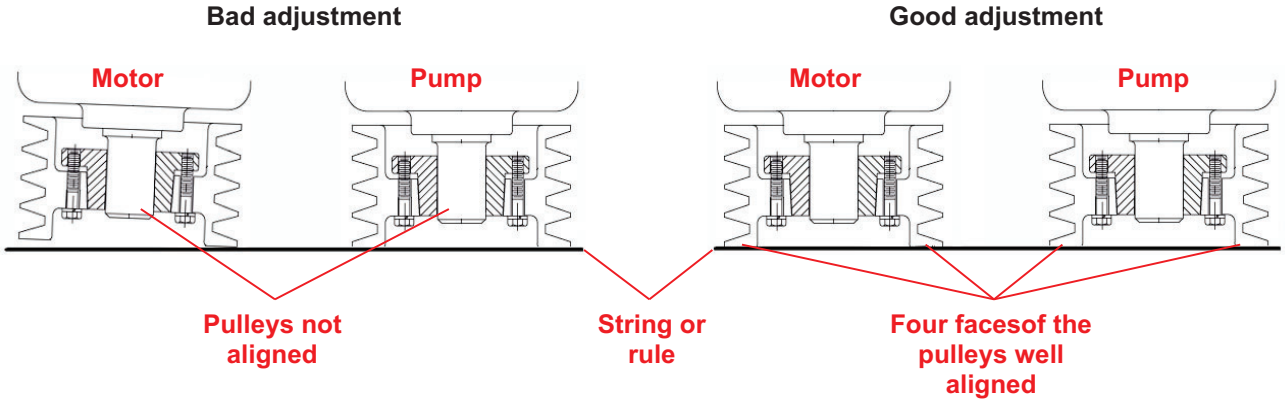
1. Assemble the bushing and pulley as shown in illustration "A". When the bolts are only slightly in, the hub slides freely on the shaft.
2. Set the key on the shaft and slide the pulley with its hub at the desired position by placing the top of the bolts on the outside.
3. Tighten the bolts gradually. There must be a space between the pulley's solid hub and the detachable hub flange.

TIGHTENING THE BOLTS - IMPORTANT

Tighten bolts evenly and progressively. The space between the pulley's solid hub and the detachable hub flange should not be less than 3.2 mm and not more than 6.4 mm. See the indication "X" in the illustration. If excessive force is applied, the hub of the pulley can break.

Pulley alignment

1. Install the belt on the pulleys. The engine must not be fixed to the base of the pump and should let the belt to be installed easily, without being too tight.
2. Tighten the belt by moving the motor in the direction opposite to the pump.
3. Check pulley alignment with a small diameter string or a ruler. The pump should be fixed solidly and should not move during the operation.
4. If the pulleys are not aligned, adjust the motor so that the string or the rule equally touches the four faces of the pulleys, while checking the belt tension. The belt tension should be 47 Hz for a new belt or 38 Hz for a used belt. Belt tension and static conductivity should be checked once every month.
5. When the pulleys are aligned, secure the motor in place.



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Figure 21 Pulley alignment

Belt Tension Adjustment

Belt tension adjustment values	New belt	Used belt
Frequency (Hz)	47.1	38.5
Deflection (lbs force and inch)	56.6 lbs, 0.44''	37.8 lbs, 0.44''

Disassembling the drive system

CAUTION: DO NOT USE LUBRICANT

1. Remove the bolts.
2. Insert the bolts into the other set of threaded holes on each pulley, tighten them equally and the hubs will be able to move free on the shafts.

Mechanical seal installation

Before starting the pump, refer to the seal manufacturer's specification and installation instructions. Refer to section "**Mechanical seal Replacement and/or Installation**''.

	WARNING
	Never start the POSEIPUMP® when the flotation unit is empty. POSEIPUMP® uses the process water for the lubrication of the mechanical seal

Rotary joint installation

No exterior bracing should be used to prevent the housing of a ball bearing type union from rotating. To compensate for any eccentricities occurring from installation, it is imperative that a flexible connection be used. **DO NOT PIPE SOLID**. Use a 45-degree elbow and pipe union on the riser, making certain there is a slight curve in these. Do not install hose taut. To install the rotary joint on the shaft, you need to screw it counter clockwise.

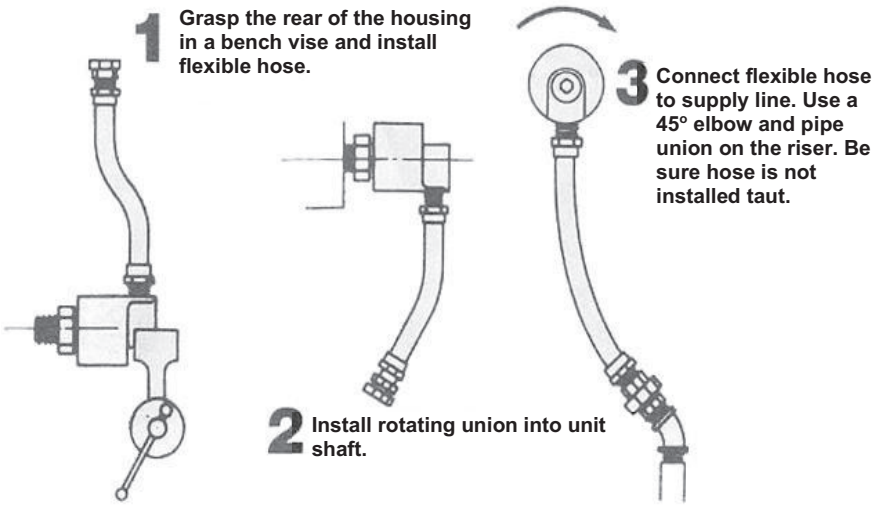


Figure 22 Rotary joint installation

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Rotary joint Lubrication

Rotating unions are shipped and delivered pre-lubricated with special grease for the internal components. Occasional lubrication is still necessary and there are two methods to apply oil to the rotary joint. An automatic oiler may be installed on the side of the belt guard, as shown in **Figure 13 Poseipump® Overview.** Additionally, the rotary joint's casing will have a small lubrication point next to the tap for the automatic oiler. In either case we recommend lubricating the rotary joint with the same SAE10W30 grade oil that is used for the pump's bearings. In a dry environment, the manufacturer recommends applying 3-5 drops a month, if the manual oiling method is used.

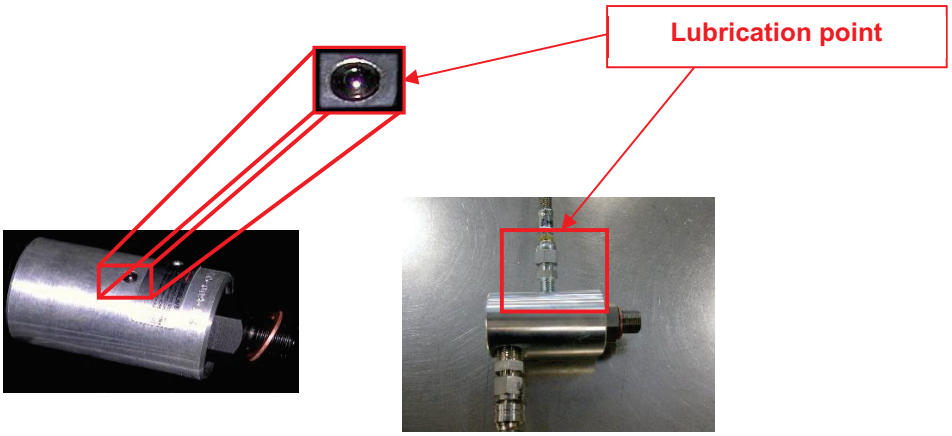


Figure 23 Rotary joint oil fitting

Operation

Priming

Vent air from suction line and fill with liquid. Make sure that the pump isolation valves (at the suction and the discharge) are fully open. Start the pump with the release valve slightly open. This valve is near the feed of the flotation unit. After discharge pressure stabilizes, gradually open the release valve to required position; with the Poseipump® model 403-PF, the pressure must be between 85 and 105 psig. If flow is lost, close the release valve and wait a few seconds for discharge pressure to build.

Continued flow difficulty indicates an improper selection of installation. Running the pump too long with improper prime may destroy the sealing faces of the mechanical seal. It may also cause mechanical damage from pulsation and interference between rotating and stationary components. Thermal shock may crack the ceramic stationary seat of a mechanical seal if temperature is raised to 180°F in less than 30 seconds.

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Start-up

Check the following items before starting the pump:

1. Pump rotates freely by hand.
2. Rotation direction: It is absolutely essential that the rotation of the motor be checked before connecting the belt. Incorrect rotation of the pump could cause damage to the pump. The pump shaft must turn according to the arrow indication.
3. Belt drive tension and alignment.
4. Oil level should be ½ of the sight glass
5. Suction and discharge valves fully open.
6. Pump and suction line full of fluid.
7. Release and bleed valve slightly open.



Preventive maintenance

Pump records

Maintain data cards or pumps records whenever possible. This will provide ready access to information for ordering spare parts, and for evaluating pump and mechanical seal performance.

Information to be included in these records should be:

- Pump size and serial number
- Pump model number and impeller diameter
- Fabrication material
- Mechanical seal manufacturer, type, code, and drawing number
- Motor horsepower and speed of operation
- Record of maintenance, including parts usage and general condition of pump
- Name and part numbers of replacement items.

Lubrication

The oil level for the Poseipump's bearings should be checked once a week and the oil level must be at the center (½) of the sight glass. Add oil in the Opto-Matic oiler if the level is too low. A full oil change should be done after the first 200 hours of operation and subsequent oil changes every 8000 hours (or annually) with a SAE10W30 grade oil. The same grade of oil can be used to lubricate the rotary joint, either with a manual application or by using the automatic oiler.

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Recommended SAE10W30 Grade Oil

American Oil Company	Amoco No. 31
Arco	Gascon S-315 or 68A
Continental Oil Company	Conoco Dectol Medium
Exxon Company	Forum 50
Mobil Oil	Flow Rex Extra Heavy
Shell Oil Company	Carnea 68
Texaco Inc.	URSA P68
Union Oil Company	Turmaco 315

Belt Tension Adjustment and Maintenance

Belt tension adjustment values	New belt	Used belt
Frequency (Hz)	47.1	38.5
Deflection (lbs force and inch)	56.6 lbs, 0.44''	37.8 lbs, 0.44''

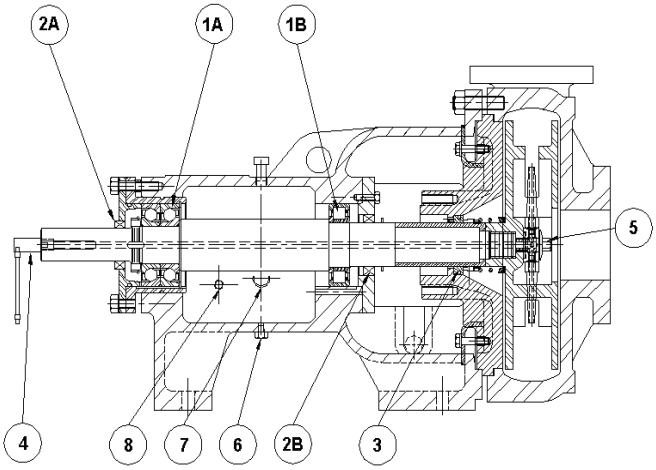
NOTE: These parameters should be validated on a monthly basis. It is important to perform these steps when the pump is turned off and locked out. Refer to LOCKOUT PROCEDURE in SECTION 1.

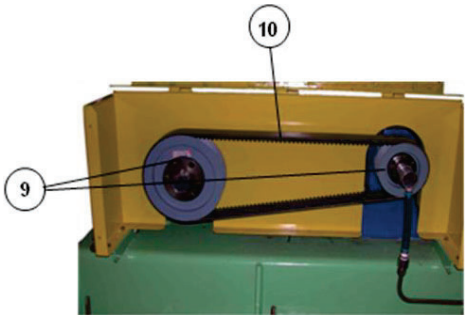
Long term storage

- Always store the pumps inside in a clean and dry area. Prevent the pumps from condensation.
- The pumps should be not exposed to excessive vibration; these could possibly cause damage to bearings.
- Regardless of the length of storage, at least five (5) complete manual rotations should be performed every six (6) weeks.
- Pumps should not be stored in an environment conducive to corrosion.

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POSEIPUMP® 403-PF PREVENTIVE MAINTENANCE & CHECK POINTS





No.	Cleaning	Inspection	Lubrication	Equipment Part	Description	Frequency	Lubricant Volume	Tool
1A/1B		X		Outboard/Inboard Bearings	Verify the state of the bearings	Annually		7/16" key
2A/2B		X		Outboard/Inboard Bearings Isolators	Verify the state of the bearings isolators	Annually		
3		X		Mechanical Seal	Verify the mechanical seal and replace if necessary	Annually		
4			X	Rotary Joint	Lubricate with a SAE10W30 oil	Monthly	3-5 drops/month	Nipple adaptor (manual or auto.)
		X			Inspect and replace if necessary	Bi-annually		
5		X		Injectors	Verify the state of the impeller's injectors	Annually		
6			X	Drain Plug	Change oil	200 hours / 8000 hours (or annually)[1]	2.2L	
7		X		Oil Level (sightglass)	Verify the oil level (oil level = ½ of sightglass)	Weekly		7/16" key
			X		Add oil if necessary			
	X				Keep the sight glass clean			
8			X	Automatic Oiler	Verify and add oil if necessary	Weekly	100 ml.	N/A
9		X		Pulleys	Verify the state of the pulleys (pump and motor)	Annually		
10		X		Belt	Verify the tension and state of the belt	Monthly		
		X			Change the belt	Annually		

Note 1: Perform the first oil change after 200 hours of operation. Subsequent oil changes can be performed every 8000 hours or once a year.

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Mechanical seal Replacement and/or Installation

John Crane Type 21 Mechanical seal

NEVER RUN THE POSEIPUMP® DRY! IT WOULD DAMAGE THE MECHANICAL SEAL. ALWAYS PRIME THE PUMP BEFORE STARTING. MECHANICAL SEAL FOR THE POSEIPUMP® USES PROCESS WATER AS A LUBRICANT.

NOTE: Protect precision lapped faces of new seal seat and seal ring from DAMAGE, DIRT and FINGERMARKS.

1. Disassemble pump housing to expose defective seal.
NOTE: Pay attention to how the old seal is assembled to be sure replacement seal is installed in identical manner.

2. Carefully move old seal head and seat, taking care not to scratch shaft of seal counterbore.

3. Clean shaft and counterbore surfaces using emery cloth or equivalent. Remove rust, burrs, and wipe clean. Avoid making flats spots or reducing shaft diameter.

4. Lubricate the shaft, elastomer inner diameter (I.D.) of the rotating seal head and elastomer outer diameter (O.D.) of the stationary seal seat with a light coating of water, soapy water or approved seal installation liquid. Seal faces (parts that touch when the seal rotates) should not be lubricated with any liquid.
NOTE: **NEVER** use grease or any type of oil as an installation lubricant. Any oil or grease on the seal faces may cause the seal to leak.

5. Press seal seat firmly into counterbore. This can be done by hand or with a rawhide mallet. During the pressing operation be sure that the seal faces are protected and that there are no direct blows with any metal object. Use a piece of plastic between the face and any driving force.

6. Check all seal surfaces to assure they are free of any foreign matter. Slide rotating seal head by hand pressure along shaft to a completely parallel contact with the stationary seat. Avoid extreme installation pressure or hammering of seal. Make sure spring correctly engages shoulder or shaft spring retainer.

7. Reassemble impeller and pump housing. (Refer to section POSEIPUMP® Reassembly).

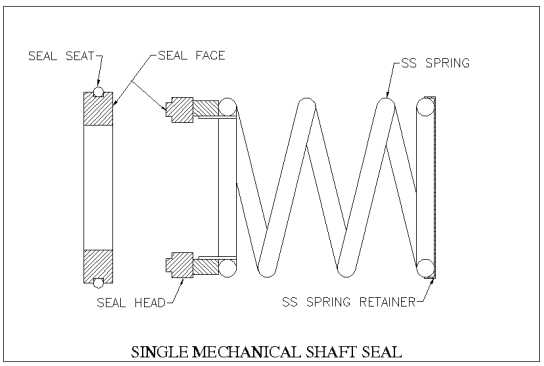


Figure 24 Mechanical Shaft Seal

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POSEIPUMP® Maintenance

POSEIPUMP® Disassembly

Remove case (1) and mechanical seal (31)

1. Remove all nuts (25).
2. Remove Pump Case (1).
3. Restrain Pump Case Shaft (5) at the coupling end (not the shaft) to prevent rotation while removing the Impeller (2). **TURN IMPELLER COUNTER-CLOCK-WISE AS VIEWED FROM SUCTION END**.
4. Remove Mechanical Seal Cover (3) from frame on the back side in the area where the box fits into the Frame (4). If the disassembly being performed does not require the replacement of the mechanical seal, the stationary seat must not be removed from the stuffing box.
5. Remove Shaft Sleeve (7) only if it is to be replaced. A wedge may be driven between end of sleeve and shoulder on shaft to free the sleeve. If the pump has a mechanical seal that does not need to be replaced, care must be taken to avoid damaging by dropping the rotary seal faces when removing the sleeve.

NOTE: If the disassembly is being performed to replace or install a mechanical seal and/or shaft sleeve only, no further disassembly is required. Refer to the Mechanical seal Replacement and/or Installation section.

Removal of pump/bearing

6. Remove Deflector/Slinger (16).
7. Remove the Inboard Bearing Cap (13).
8. Loosen the Outboard Bearing Retainer Bolts (27).
9. The complete shaft and bearing sub-assembly can now be pulled out of the bearing frame casting from the back (motor) side.
10. Remove Snap Ring (24) from outboard bearing retainer and remove Bearing Retainer (14) and Housing (15) from bearings.
11. Remove Lock Nut and Washer (11 & 12) from shaft. Then remove the Inboard Bearing (8) and both Outboard Bearings (9).

Removal of the impeller

1. Unscrew the bolt of the injector.
2. Unscrew the nozzles screwed on the injector.
3. Remove the rings of the injector.

Inspection of components

- **Shaft (5):**

  Check for run out to see that shaft has not been bent. If run out exceeds 0.0002 in., replace shaft. Bearing seats and oil seal area must be smooth and free of scratches or grooves. Shaft threads must be in good condition. Replace shaft if necessary.

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- **Shaft sleeve (7):**

  Sleeve surface must be smooth and free of grooves. If grooved, replace.

- **Mechanical seal (31):**

  Seal faces, gaskets, and shaft sealing members must be in perfect condition or excessive leakage may results. Replace worn or damaged parts.

- **Bearings (8, 9)**

  Replace if worn, loose or rough and noisy when rotated. New bearings should not be unwrapped until ready for use. Replacement bearings must be of proper size and type as supplied with original equipment.

- **Seals**

  It is recommended that all O-Rings (19, 21) and Gasket Seals (17) and Lip Seals (22, 23) be removed during disassembly and replaced. In those cases where new seals are not available, the old ones can be reused if they are not torn or otherwise damaged.

- **General**

  All parts should be clean before assembly. This is especially important at retaining ring and O-ring grooves, threads, gasket surfaces, and bearing lubricated areas. All burrs should be removed with crocus cloth. Keep water and moisture off the parts and assembly.

  NOTE: For motor problems, contact your local motor repair shop.

POSEIPUMP® Reassembly

Shaft and bearing subassembly:

NOTE: Installation of the bearings with a press is an acceptable substitute for the following method. **APPLY LOAD TO THE INNER FACE ONLY, PRESSING THE BEARINGS ONTO THE SHAFT**.

1. Heat bearing to 200-250°F.

   NOTE: One-half hour in an oven at 200-250°F will work nicely. Do not exceed 250°F, as this may damage bearing.

2. Remove from oven and slip the bearings into position and allow cooling. Thrust surface of bearing should be to shaft shoulder.

3. Pack bearings with grease (if not an oil-bearing application).

4. For assembly of shaft and power frame, reverse Steps of the **Disassembly** section, beginning with the Step 11 and working back to Step 1. Replace Lip Seals (22, 23).

Impeller assembly

1. Apply Loctite on the threads of the injector nozzles, insert the rings and screw the injector nozzles on the injector.

2. Apply Loctite 242 on the threads of the bolt and screw it on the injector.

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Power frame subassembly

1. Lubricate the inside of the frame where the stuffing box cover slips in with an anti-seize compound.

2. Lubricate Shaft (5) threads and face of Shaft Sleeve (7) followed by impeller O-Ring (19). Thread the Impeller (2) onto the shaft. Tighten to approximately 40 lb/ft.

3. Rotate the shaft. **THE IMPELLER SHOULD TURN FREELY WITHOUT RUBBING**. If necessary, adjust outboard Bearing Retainer Bolt (27) and Jack Screws (28) to provide clearance between impeller and case. For most pumps, this running clearance is 0.100 to 0.150 inches. If in doubt, contact the factory for each setting for your pump.

4. Install Casing Gasket (17). Hold it in place with grease if necessary.

5. Install Casing (1) on the frame using Studs (25) and Nuts (29). Put a small quantity of anti-seize lubricant on the threads on the nut-end of the studs. Tighten nuts to 35lb/ft using a criss-cross tightening pattern.

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Poseipump®: Problems and Possible Causes

		PROBLEMS					
		Noise or vibration	No flow	Insufficient Pressure	Excessive Power required	Intermittent Flow	Short Bearing Life
POSSIBLE CAUSES	Bearing worn	X			X		X
	Bent shaft	X			X		X
	Excessive discharge head		X				
	Oil level too low						X
	Improper foundation	X					
	Improper electric motor wiring or voltage				X		
	Misalignment of the pulleys	X			X		X
	Belt too tight				X		X
	Belt too loose	X				X	
	Plugged suction or discharge line	X	X	X		X	
	Impeller damage	X	X	X	X	X	X
	Impeller clogged		X	X		X	
	Impeller out of balance	X					X
	Rotating element bent	X			X		X
	Speed too low			X			
	Suction or discharge piping not anchored	X					
	Wrong direction of rotation	X	X	X	X	X	X

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PARTS LIST

#	Part #	Title	Qty.	Description	Material	Mass
1	C-100-403.par	Casing 403	1	Casing 403	ASTM A351 CF3M	157 lbm
2	D-200-403-14.0_01W.pwd	Impeller 403-13.5	1	Impeller 403-13.5	ASTM A351 CF3M	48 lbm
3	SB-300-403.par	Back Plate 403	1	Plate 1-1/2" x 15-1/64"dia.	SA240-316/316L	61 lbm
4	B-400-403.par	Bearing Frame 403	1	Bearing Frame 403	Ductile Iron - Painted	203 lbm
5	D-500-403.par	Drive Shaft 403	1	Round Bar 2-29/32" dia. x 28-19/32"	SA276/SA479-316/316L	35 lbm
6	D-501-403.par	Drive Shaft Key 403	1	Square Bar 1/2" x 3"	SA276/SA479-316/316L	0 lbm
7	S-600-403.par	Shaft Sleeve 403	1	Round Bar 2-1/2" dia. x 5-33/64"	SA276/SA479-316/316L	3 lbm
8	IB-002-403.par	Inboard Bearing 403	1	Bearing #NUP 213 ECP	Steel	2 lbm
9	OB-002-403.par	Outboard Bearing 403	2	Bearing #7311 BECBY	Steel	6 lbm
10	V-800.par	Vent Bearing Frame	1	Vent Alemite #313650	Steel - Galvanised	0 lbm
11	L-900-403.par	Bearing Locknut 403	1	Bearing Locknut - N11	Steel	0 lbm
12	L-901-403.psm	Locknut Lockwasher 403	1	Locknut Lockwasher - W11	Steel	0 lbm
13	C-1000-403.par	Inboard Bearing Cover 403	1	Round Bar 7 3/4" dia. x 1"	Steel 1018 - Painted	8 lbm
14	R-1100-403.par	Outboard Bearing Cover 403	1	Round Bar 7-3/4" dia. x 1-3/8"	Steel 1018 - Painted	6 lbm
15	H-1200-403.par	Outboard Bearing Housing 403	1	Round Bar 7-3/4"dia. x 3-5/8"	Steel 1018 - Painted	10 lbm
16	D-1300-403.par	Deflector 403	1	Plate 1/4" x 3-3/4" dia.	Neoprene	0 lbm
17	CG-1500-403.par	Casing Gasket 403	1	Gasket 1/16" x 14-15/16" dia.	Garlock 3000	0 lbm
18	CG-1501-403.par	Inboard Bearing Cover Gasket 403	1	Gasket 1/16" x 7-3/4" dia.	Garlock 3000	0 lbm
19	O-1600-403.par	O-Ring	1	O-Ring #223	Viton	0 lbm
20	O-1601-403.par	O-Ring	1	O-Ring #246	Nitrile	0 lbm
21	O-1602-403.par	O-Ring	1	O-Ring #251	Nitrile	0 lbm
22	LS-1700-403.par	Inboard Bearing Isolator 403	1	Inboard Bearing Isolator PI0000007	Brass	1 lbm
23	LS-1702-403.par	Outboard Bearing Isolator 403	1	Outboard Bearing Isolator PI0000018	Brass	1 lbm
24	SR-1800-403.par	Snap Ring	1	Snap Ring 5000-475	Steel	0 lbm
25	SC-1900-403.par	Stud	12	Threaded Rod 3/4"-10 x 3"	F593-316	5 lbm
26	B.01.02_B0100A_0.375_16_1.250.PAR	B0100A Hexagonal Bolt (in) 0.375_16_1.250	4	Hex. Bolt 3/8"-16 x 1-1/4"	F593-316	0 lbm
27	B.01.02_B0100A_0.500_13_1.000.PAR	B0100A Hexagonal Bolt (in) 0.500_13_1.000	5	Hex. Bolt 1/2"-13 x 1"	F593-316	1 lbm
28	B.01.02_B0100A_0.500_13_2.000.PAR	B0100A Hexagonal Bolt (in) 0.500_13_2.000	3	Hex. Bolt 1/2"-13 x 2"	F593-316	0 lbm

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PARTS LIST CONTINUED

#	Part #	Title	Qty.	Description	Material	Mass
29	B.01.02_E0100A_0.750_10.PAR	E0100A Hexagonal Nut (in) 0.750_10	12	Hex. Nut 3/4"-10	F594-316	1 lbm
30	B.01.02_B0100A_0.313_18_0.750.PAR	B0100A Hexagonal Bolt (in) 0.313_18_0.750	8	Hex. Bolt 5/16"-18 x 3/4"	F593-316	0 lbm
31	MS-001-403.par	Mechanical Seal 403	1	Mechanical Seal John Crane Type 21 2-1/2"	-	2 lbm
32	P-1115.par	Rotating Joint	1	Rotating Joint Deublin 1115-009-386 upgrade	Aluminum	1 lbm
33	B.01.02_R01A_0.313.PAR	R01A Flat Washer (in) 0.313	8	Flat Washer 5/16"	SA240-316/316L	0 lbm
34	GG-001.par	Glass Oil Level Gauge	1	Oil Level Gauge Oil Rite #A-2890-14	Steel - Galvanised	0 lbm
35	GO-001.par	Glass Oiler	1	Glass oiler Trico #30003	Steel - Galvanised	1 lbm
36	403PFE36.par	Outboard Bearing Cover Bushing 403	3	Pipe 3/8" c40 x 15/32"	SA312-316/316L	0 lbm
37	403PFE37.par	Injection Bolt 403	1	Round Bar 1-3/4" dia. x 2-3/16"	SA276/SA479-316/316L	0 lbm
38	403PFE38.par	Injector Distributor 403	1	Round Bar 2" dia. x 15/16"	SA276/SA479-316/316L	1 lbm
39	403PFE39.par	Injector 403	5	Hex. Bar 3/4" x 3-7/8"	SA276/SA479-316/316L	1 lbm
40	B.01.02_R01A_0.375.PAR	R01A Flat Washer (in) 0.375	4	Flat Washer 3/8"	SA240-316/316L	0 lbm
41	DP-001.par	Drain plug	1	Hex. Plug 3/8" NPT	SA182-316/316L	0 lbm
42	B.01.02_R01A_0.500.PAR	R01A Flat Washer (in) 0.500	10	Flat Washer 1/2"	SA240-316/316L	0 lbm
43	BB-4200-403.par	Backing Plate Bracket 403	2	Angle 3/16" x 3" x 3" x 1-1/4"	Steel - Painted	0 lbm
44	IO-4400-403.par	O-Ring	5	O-Ring #013	Viton	0 lbm
45	PW-4500-403.par	Shaft security guard 403	2	Plate 1/16" x 7-3/32" x 9-3/8"	Polycarbonate	0 lbm
46	B.01.02_B0100A_0.500_13_1.750.PAR	B0100A Hexagonal Bolt (in) 0.500_13_1.750	2	Hex. Bolt 1/2"-13 x 1-3/4"	F593-316	0 lbm
47	SB-310-403.par	Stuffing Box (single seal type 21)	1	Round Bar 7-13/16"dia. x 1-15/16"	F593-316	12 lbm
48	O-301-403.par	O-Ring	1	O-ring #257	Viton	0 lbm
49	B.01.02_R02A_0.500.PAR	R02A Lock Washer (in) 0.500	6	Lock Washer 1/2"	SA240-316/316L	0 lbm
50	B.01.02_B0100A_0.500_13_1.250.PAR	B0100A Hexagonal Bolt (in) 0.500_13_1.250	4	Hex. Bolt 1/2"-13 x 1-1/4"	F593-316	0 lbm
51	B.01.02_R01A_0.750.PAR	R01A Flat Washer (in) 0.750	12	Flat Washer 3/4"	SA240-316/316L	1 lbm
52	NAME PLATE.psm	Name Plate	1	Sheet 1/32" x 2-3/4" x 4-1/2"	SA240-316/316L	0 lbm
53	B.08.02_DriScr_SN.376807.par	Round U Drive Screw #2 x 1/4"	8	Drive Screw #2 (3/32") x 1/4"	F593-316	0 lbm
54	B.02.02_BouM_0.250V_150.PAR	Plug 0.250_V_150	1	Plug 1/4" NPT M 150#	SA182-316/316L	0 lbm
55	B.02.02_BouM_0.750V_150.PAR	Plug 0.750_V_150	1	Plug 3/4" NPT M 150#	SA182-316/316L	0 lbm
56	PW-4502-403.psm	Shaft security guard 403	1	Sheet 20G x 4" x 4"	SA240-316/316L	0 lbm

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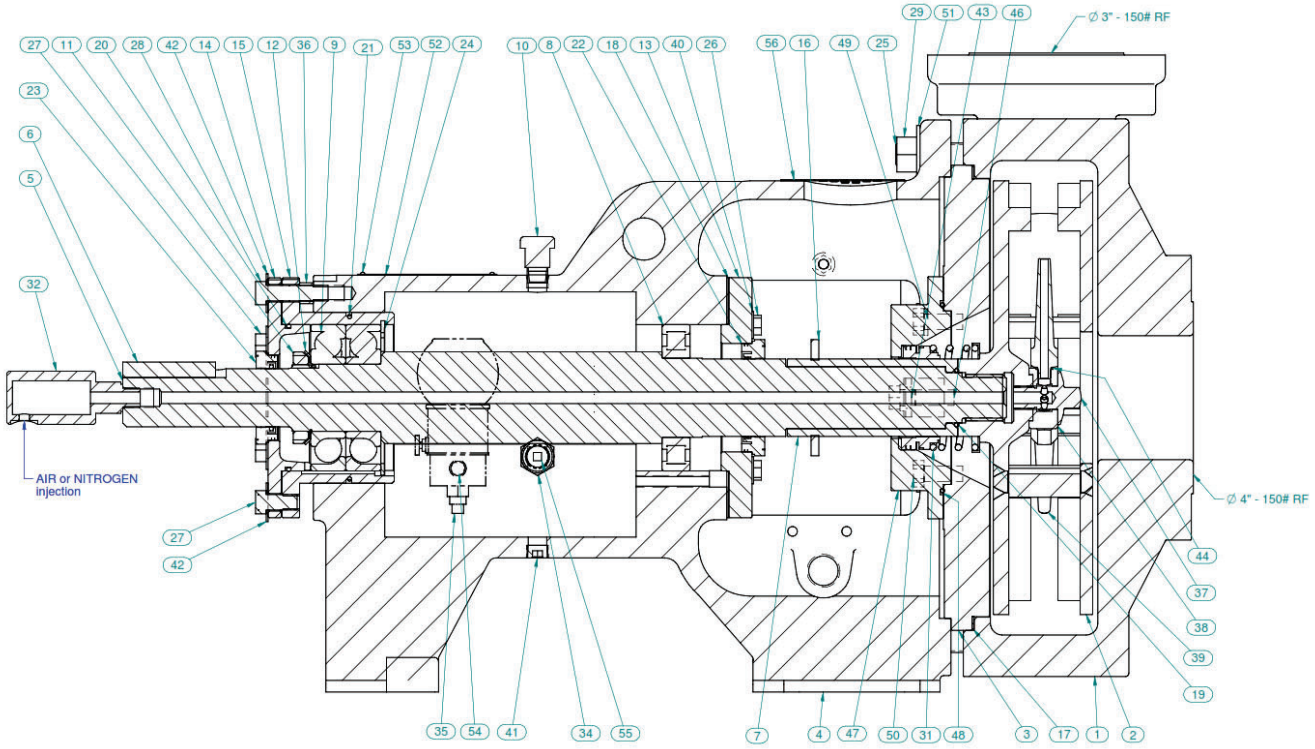


Figure 25 Poseipump® Internal View

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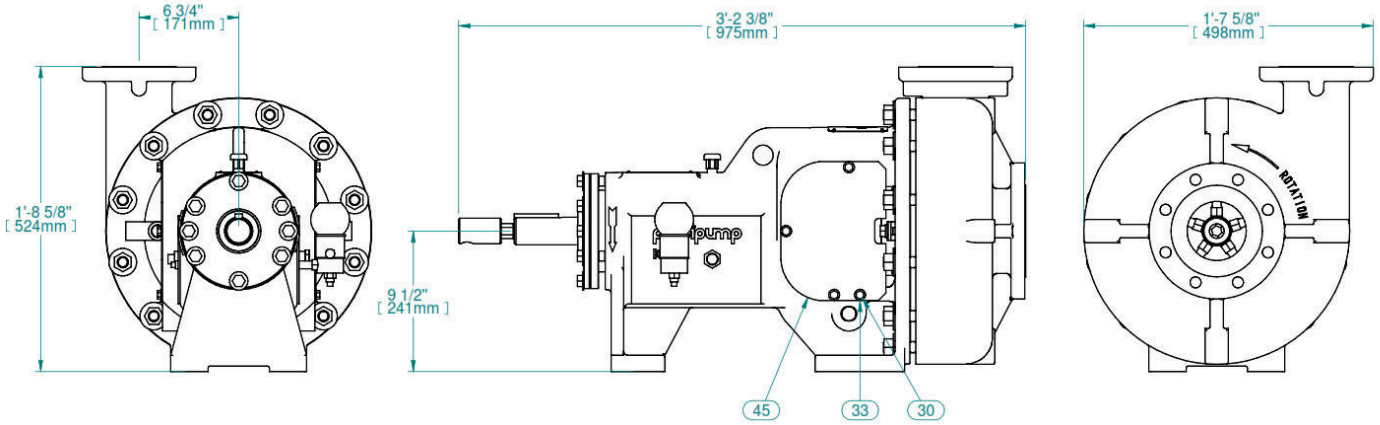


Figure 26 Poseipump® External View

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SECTION 6- PNEUMATIC CONTROL BOX

Description and installation

The recirculation pneumatic box houses the necessary equipment to control the flow and pressure of air that is injected into the **POSEIPUMP®** and as such it is integral to the proper operation of the flotation unit. The items inside the panel are preinstalled and only minor assembly is required to complete the panel. It is recommended to install the recirculation pneumatic box near the **POSEIPUMP®** in order to facilitate optimal operation.

The panel can be mounted on a support beam or wall. If installed outdoors the NEMA rated panel is adequate to protect the components from the elements but it should not be exposed to freezing temperatures.

Pneumatic Box Parts List

ITEM #	DESCRIPTION	PART NUMBER
1	Filter regulator unit	LFR-1/4-D-MINI-A
2	Pressure Gauge	STANDARD
3	Automatic drain	WA-2
4	Rotameter	FL4611-V
5	Electrical Terminal	STANDARD
6	Single solenoid valve	MFH-3-1/4-S
7	Pressure switch limit	PEV-1/4-B
8	Check valve	H-3/8-B
9	Back Pressure gauge	Standard
10	Back Pressure valve	BPG050-S
11	Check valve	SS-CHM8-10
12	Silencer	U-1/4

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Connection of the Pneumatic Box

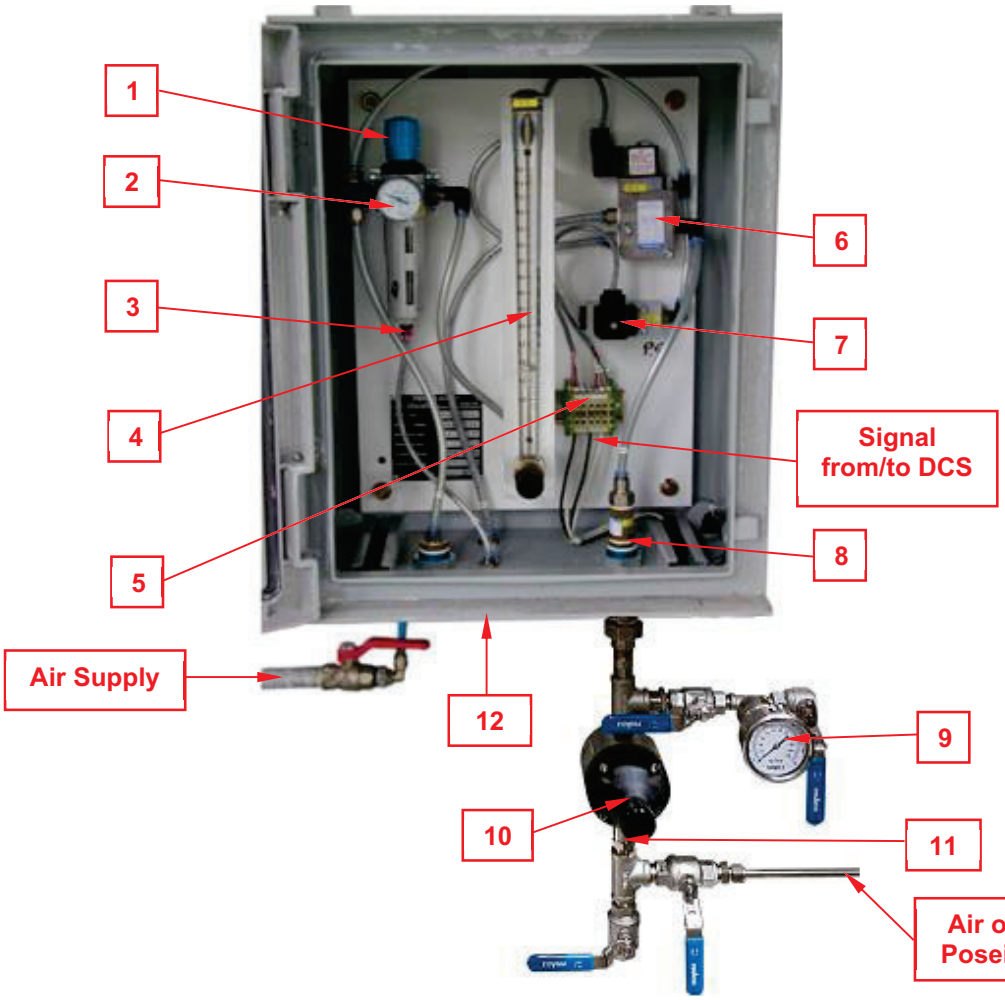


Figure 27 Pneumatic Box Overview

Adjustment Settings of the Pneumatic Box

1. Adjust the air regulator to 70 psig.
2. Adjust the air flow on the rotameter as recommended (1.6-1.9 scfm).
3. Assure that the manual switch of the solenoid valve is closed for automatic mode. In automatic mode the screw head is in the horizontal position.

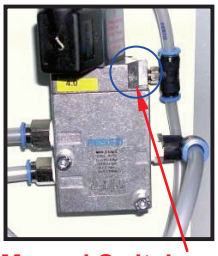


Figure 28 Solenoid valve

NOTE

The solenoid valve should be open and in automatic mode during normal operation. However, it can be operated manually, if necessary, by using the manual switch.

The back-pressure valve is normally pre-adjusted to 50 psig.

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SECTION 7 – SLUDGE REMOVAL SYSTEM

Description

The SUEZ Poseidon Flotation unit is equipped with a sludge removal system. This mechanical system is composed of a scraper driven by a motoreducer which evacuates the sludge into a trough and by thickener(s), driven by motoreducer(s), which help carry the sludge bed toward the sludge scraper. This system includes two or more motoreducers, transmission shafts, and a scraper with three blades and thickener(s) with fingers.

Sludge scraper and thickener installation

Location of specific components when receiving the flotation unit

All components for the installation are located inside a wooden crate.

Prior the installation (refer to the certified drawings)

CAUTION

PLEASE REFER TO THE CERTIFIED DRAWINGS BEFORE INSTALLATION.

DANGER

MOVING PARTS CAN CAUSE SEVERE INJURIES

Follow lockout procedure before servicing

Installation of the Scraper and the Thickener

1. Installation of scraper and thickener transmission shafts. The transmission shafts (**A**) and (**B**) for the scraper must be inserted in the scraper tube (**1**). The shaft (**A**) must be inserted on the side of the motoreducers (**7**) to be installed. The shaft (**B**) must be installed on the other side. To determine the side of the motoreducer, please refer to the certified drawings or to the holes on the flotation unit that are ready to receive the motoreducer bushings supports. Please note that bolts, washers and nuts must be removed from the scraper tube before installation of the shafts.

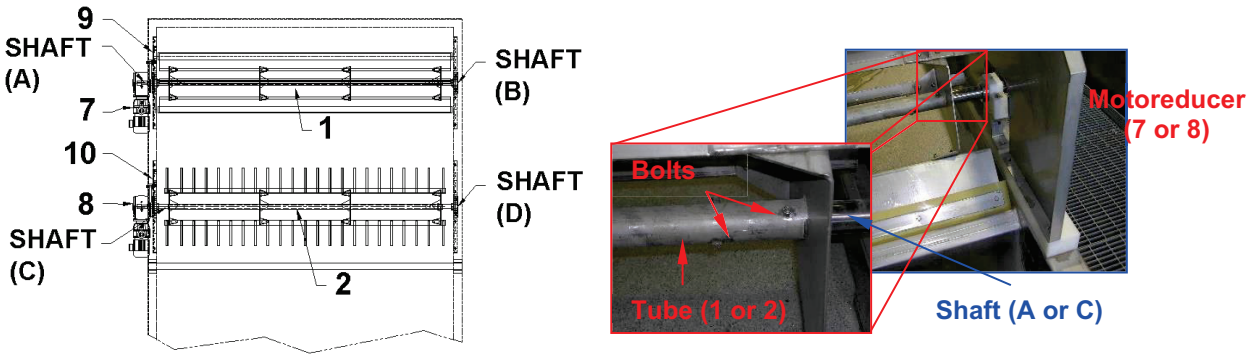


Figure 29 Installation of the transmission shaft

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2. The transmission shafts (**C**) and (**D**) for the thickener must be inserted in the thickener tube (**2**). The shaft (**C**) must be installed on the same side as the motoreducers and the shaft (**D**) must be installed on the other side. Please note that bolts, washers and nuts must be removed from the thickener tube before installation of the shafts. Please refer to **Figure 29**.

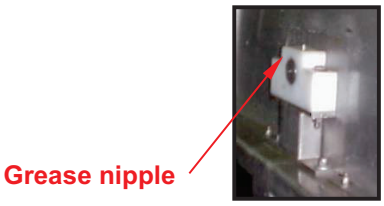


Figure 30 Bushing greasing

3. Installation of scraper and thickener bushings. The scraper bushings (**A**) and (**B**) must be installed on the transmission shafts before the scraper is positioned on the edge of the flotation unit. The thickener bushings (**C**) and (**D**) must be installed on the transmission shafts before the thickener is positioned on the edge of the flotation unit. Grease must be added to prevent premature wear of bushings.

4. Installation of scraper and thickener. Install the scraper and thickener and align the mark on the bushings with the marks (**3**) on the edge of the flotation unit. Fix bolts, washers and nuts on the unti (**4**). To verify if the scraper is correctly positioned, turn the scraper and check if the scraper runs efficiently. The blades (**5**) of the scraper must be aligned on the sludge discharge beach (**6**) in a manner to remove the sludge efficiently, starting from the bottom of the beach and pushing it upwards into the sludge outlet. Since the blades are slotted, this can be done easily by loosening the nuts on the blades and moving the blades accordingly.

Scraper and thickener rotation verification: In Figure 31 the thickener and scraper are supposed to be rotating clockwise.

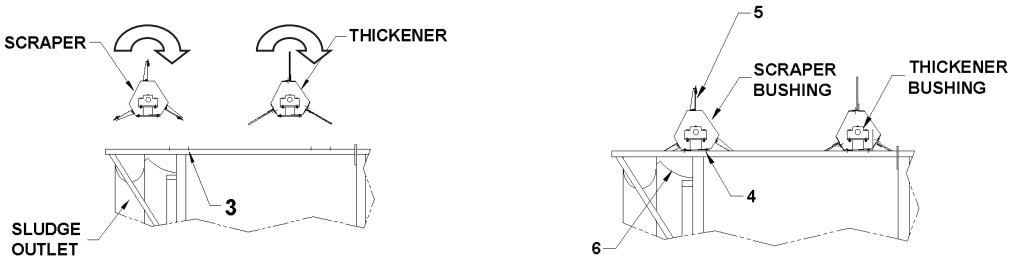


Figure 31 Installation of Scraper & Thickener

Installation of the Motoreducers

1. Refer to the motoreducer manufacturer manual for specific installation details of the torque arm supports and the motoreducers.

2. The torque arm supports of the motoreducers must be installed with bolts, washers and nuts supplied.

3. To install the motoreducers, the retaining key must be installed on the transmission shaft. Fix the motoreducers on the torque arm supports with bolts.

4. Check the oil level. The level may be low at time of shipping.

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Scraper blade adjustment

The distance between the urethane scraper blade and the beach of the sludge outlet must be adjusted prior to start-up. The scraper blade is held in place by a series of nuts and bolts. The distance can be increased or decreased by loosening these nuts and bolts and pulling or pushing the urethane strip, which is slotted to permit this movement. The scraper blade must contact the beach to provide for maximum evacuation of the sludge.

Note that the blade is a subject to wear and tear and must be replaced accordingly. Usually, this means replacing the blade on a yearly basis.

Procedure to reposition the scraper assembly

This procedure is required for when there is a defined and consistent gap between each of the scraper blades and the sludge beach/ramp. Large gaps will allow water and sludge to flow back into the unit, reducing the efficiency of the sludge evacuation process and possibly resulting in excessive sludge buildup. Different types of sludge will react differently to this issue, but we recommend adjusting the position of the scraper assembly if these gaps exceed 1/8″ across each of the blades.

1. Remove the motor and reducer assembly.
2. Remove the safety guards on both sides of the scraper assembly.
3. Mark the current position of the pillow block stands and torque arm on the DAF.
4. Loosen the bolts located under the pillow block stands. This must be done for the supports on either side of the assembly and these are identified as ″A″ on the drawings below.
5. Loosen the bolts located under the torque arm. These are identified as ″B″ on the drawings below and they are only present on the drive side.
6. By hand, gradually move the scraper assembly towards the sludge beach. If the assembly does not move by hand, hit the metal pillow block stands with a plastic/rubber mallet to move the scraper assembly.
7. Gently rotate the scraper by hand to evaluate the new position of the assembly. Make sure each blade makes good contact with the sludge beach/ramp. If the contact is too tight the added friction may increase the motor's current draw and cause accelerated wear on the scraper blades.
8. Once the adjustment is complete, make sure the arm is positioned straight. Tighten the bolts that were previously loosened (A & B), install the safety guards and install the motor reducer.

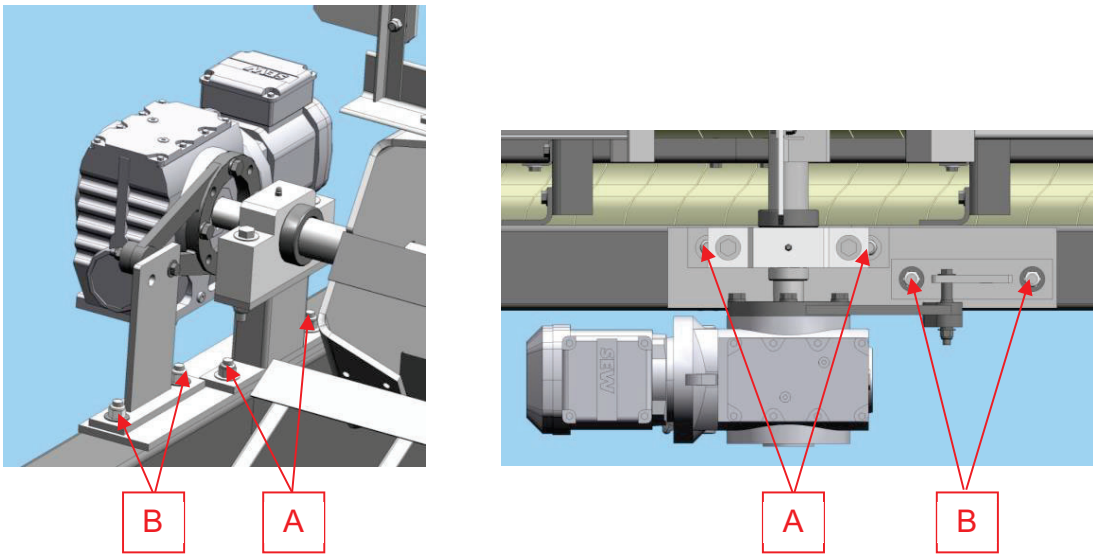


Figure 32 Repositioning the scraper assembly

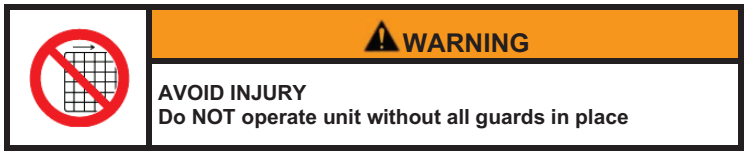
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Installation of the Safety Guards

The safety guards must be installed on each side of the scraper and thickener to prevent injuries when the scraper and thickener are in operation.



Figure 33 Installation of Safety Guards



Connection of electrical supply.

Connect the electrical supply to motoreducer. Please refer to the Manufacturer Operation and Maintenance Manual for specific details.



Recommended lubricants (grease)

We recommend using Shell Alvania RL3 or equivalent grease. This is a general purpose industrial grease with anti-wear and anti-rust additives.

Adjusting the Sludge Removal System

Make sure the blades are set in a position where they touch the beach on its entire length as described in the **Installation of the Scraper and the Thickener** section.

The rotation speed of the motoreducer is between 1.3 and 6.4 rotations per minute (RPM). The speed will usually be adjusted to between 1.4 and 1.8 rotations per minute, depending on the application and on the desired sludge level and consistency.

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Sludge removal System Maintenance

1. Keep the sludge removal system motoreducers, the scraper blades and the thickener fingers clean. Refer to the Cleaning Procedure for the cleaning frequencies.

2. Check the oil level of the sludge scraper gearbox semi-annually. Some manufacturers recommend an oil change every 3 years. Please refer to the Manufacturer Maintenance Manual for specific details

3. Regularly apply grease (standard bearing mineral grease, no graphite) to scraper and thickener plastic bushings to prevent premature wear.

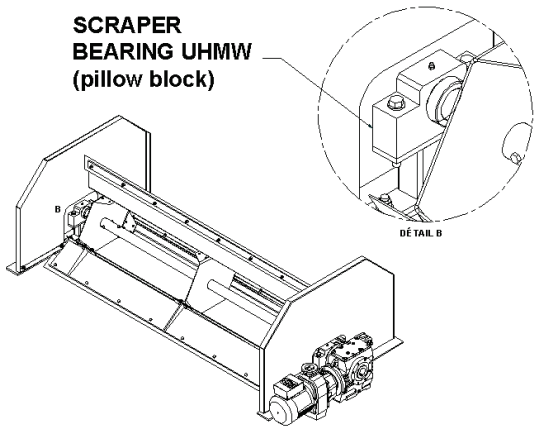
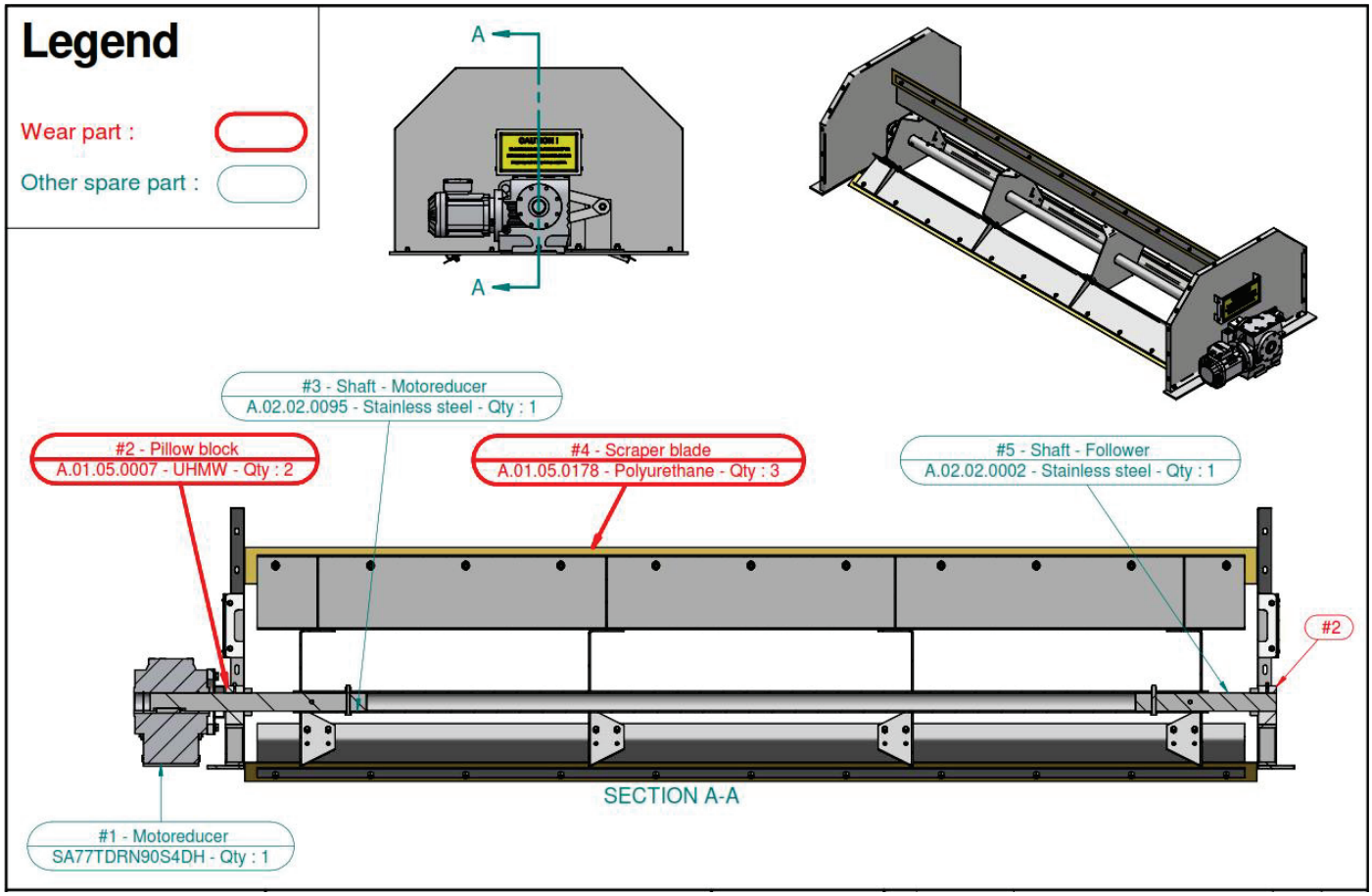


Figure 34 Scraper Gear Box



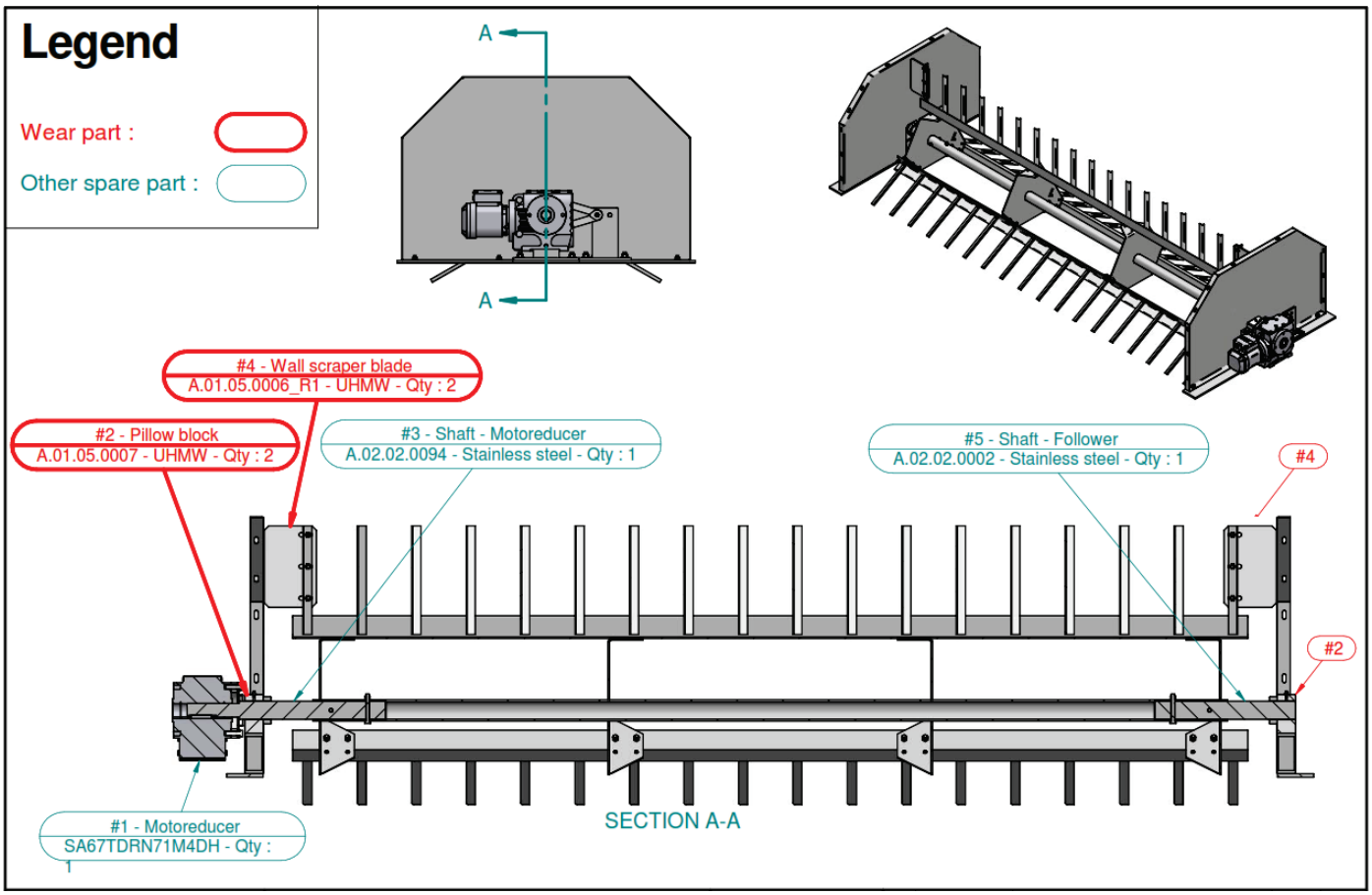
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Sludge Removal System Spare Parts - Scraper



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Sludge Removal System Spare Parts – Thickener



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SECTION 8 - OPERATION

Prior to Start-up

Flotation unit Settings

1. Fill the flotation unit with **fresh water** through the top or through the clarified water pipe or feed pipe, until the low low level set point is OFF (the low low level set point is 4 to 6'' below the bottom of the sludge ramp/beach).

2. Continue to fill the flotation unit with fresh water until the level reaches ½ below the scraper blade. This level will be the ''near-to'' operation set point.

3. The High level set point is determined when the water level overflows into the sludge trough.

4. Verify for water leaks on all pipe flanges.

Recirculation & Aeration Settings

5. The **POSEIPUMP®** can be started only once the rotation direction and the transmission have been previously verified, the oil level has been adjusted and the unit has been filled with fresh water above the separation cones. **Make sure that the POSEIPUMP® discharge and suction isolation valves are fully open so that the recirculation line is completely full of water.**

6. The recirculation rate normally corresponds to 15% of the total design flow treated by the flotation unit. Adjust the recirculation pump pressure with the release valve next to the feed pipe of the flotation unit. The pressure gauge reading should be between **85-105 psig** only when the **POSEIPUMP®** runs and the unit is full of water.

7. Adjust the air regulator in the pneumatic box to **70 psig**.

8. Adjust the air rotameter in the pneumatic box to get a flow of **1.6-1.9 scfm**. This flow should give an optimum separation of suspended particles. If not, it should be readjusted. The air rotameter should be adjusted to what has worked recently, generally close to the recommended setting.

   Do not exceed the recommended air flow because a higher air flow rate will cause the pump to lose its prime and possibly run dry for an undetermined amount of time; this could damage the mechanical seal inside the pump.



9. On the highest location of the vertical air dissolution pipe, a bleed line is installed, which runs to the bleed valve at the top of the unit. This valve shall always be partially open to allow excess air to escape. When the recirculation system is well adjusted, the recirculated water will appear milky white due to the presence of air microbubbles. If the quantity of excess air being bled off is excessive, the air flow must be reduced.

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Drainage of Heavy Solids Settings

10. Heavy solids must be drained with the automatic drain valve situated at the cone-shaped bottom of the unit. During start-up, it is recommended to increase the opening frequency of the automatic drain valve to avoid any heavy solids build-up at the bottom of the flotation unit. An automatic drain sequence should be 5-10 seconds purge by the drain valve, opening every 2 hours. The frequency of draining can be extended if there is little heavy material present.



Sludge Removal System Settings

11. Prior to start up, adjust the sludge removal system speed to the minimum rate in order to get the sludge drier while still maintaining a good sludge evacuation. Re-evaluate the speed during the start-up.

Calibration of the chemical dosing pump(s)

12. With the use of calibration cylinders, calibrate the chemical dosing pump(s) for different dosages when using the flotation unit's maximum inlet water flow. If the chemical products need to be diluted, determine the concentration of the make down system.

CHEMICAL SETTINGS						
	Coagulant			*Flocculant*		
	Dosage *(ppm)*	***Conc.*** *(%)*	***Flow*** *(ml/min)*	***Dosage*** *(ppm)*	***Conc.*** *(%)*	***Flow*** *(ml/min)*
Pump # 1						
Pump # 2						

AUTOMATIC FLOCCULANT MAKE-DOWN STATION			
Solution *(%)*	***Dosing screw*** *(g / L)*	***Dosing pump*** *(L / hr)*	***Water dilution*** *(L / hr)*

$$\text{Dosing Pump Flow} = \frac{\text{UNIT inlet flow (L/min)} \times \text{Optimum Dosage (ppm)}}{\text{Make down solution concentration (ppm)}} = \text{ml/min}$$

It is strongly recommended to automate the chemical dosage as a function of the flotation unit.

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Overall Operation Settings

No	Description	Settings
1	Air Regulator	70 psig
2	Air Rotameter	1.6-1.9 scfm
3	Recirculation Pressure	85-105 psig
4	High Level Alarm set point (HLA)	Overflow in the sludge trough
5	Low Level Alarm set point (LLA)	Approx. ½'' below the sludge ramp/beach
6	Low Low Level Alarm set point (LLLA)	Approx. 4 to 6'' below the sludge ramp/beach
7	Sludge Removal System	Minimum Speed
8	Bleed Off Valve	Fully open, Milky water
9	Drain Valve	5-10 seconds purge every 2 hours
10	Dosing pump	Optimum dosage

Start- up

Start-up the system as described in the automated start up sequence (**Refer to SECTION 11 – Logic Sequences & Diagrams - Start up sequence**). A group start can be programmed in order to start all the flotation unit components:

1. The level control valve of the flotation unit is closed if the unit level is controlled by a control valve.
2. The level in the flotation unit feed chest is reached.
3. The low level alarm of the flotation unit is off.
4. The recirculation pump starts.
5. When the discharge pressure of the **POSEIPUMP®** reaches 60 psig, 10 seconds later the recirculation pneumatic box solenoid valve is triggered and opens.
6. The sludge removal system starts at this point.
7. 15 seconds later the feed pump and the dosing pump start.
8. The level control valve of the flotation unit opens to maintain the level at the selected set point.
9. At the same time, the drain sequence begins with a 5-10 seconds purge through the drain valves, opening every two hours.

Flocculation and Sludge Layer Consistency

Once the system has started, verify the quality of the flocculation by looking through the sight glass. Large flocs and clear water are generally seen when the chemical system is adjusted properly. Jar tests can be performed once a month to evaluate the coagulant and/or flocculant dosages as well as their respective injection points.

The level in the flotation unit is important for the balance between sludge consistency and sludge removal by the sludge removal system.

In a properly adjusted system, variations in solids loading at the inlet can be handled easily by the high tolerance of the unit with respect to sludge layer thickness. Because of its vertical configuration, the flotation unit can operate with a sludge layer thickness in the range of 2-3 feet.

An increase in solids loading will result in an increase in the thickness of the sludge layer. An increase in the level in the unit will mean that the sludge removal system removes more sludge per rotation. If the level is too high, the sludge layer will be thin and water will be removed along with the sludge. The same effect will be observed if the sludge removal system speed is too fast.

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Lowering the level or the sludge removal system speed will result in smaller amounts of sludge being removed per rotation and at the same time, the consistency will increase since the sludge will have more time to thicken prior to final removal. If the level is too low or the sludge removal system speed is too slow, there will be a build-up of sludge, which could eventually lead to floc (solids) carry-over in the clarified water.

Combining proper level and proper sludge removal system speed adjustment will lead to an optimum sludge layer consistency.

Level Control

The **SATURN**™ flotation unit is equipped with a level control system composed of an actuated valve with positioner, level transmitter and controller. The level control system allows the maintaining of a constant level in the flotation unit, even during flow and solids loading variations of the raw water.

Automation

For all recommended logic sequences, please refer to the **SECTION 11 – Logic Sequences & Diagrams**

Starting sequence
Stopping sequence
High level alarm (flotation)
Low level alarm (flotation unit)
Low low Level alarm (flotation unit)
Low pressure alarm (recirculation pump)
Low pressure alarm (recirculation pneumatic box air supply)
Recirculation pump (motor) defective
Sludge removal system defective
Feed pump (motor) defective
Dosing pump (motor) defective
Drain frequency
Clarified water pump motor (defective)

Manual Control and Operation

All mentioned components should be able to start manually.

Manual start-up should be done only in case of extreme necessity.



⚠CAUTION

If the installation is working in manual mode, the securities and locks are no longer in service. Do not forget that the recirculation pump should never run dry.

Cold temperature operation

To avoid damage that can be caused by freezing conditions, make sure the piping and the equipment related to the operation of the unit are properly insulated and heat traced.

In case the unit is shut down while potential freezing risks are present, the unit and its related piping must be completely drained.

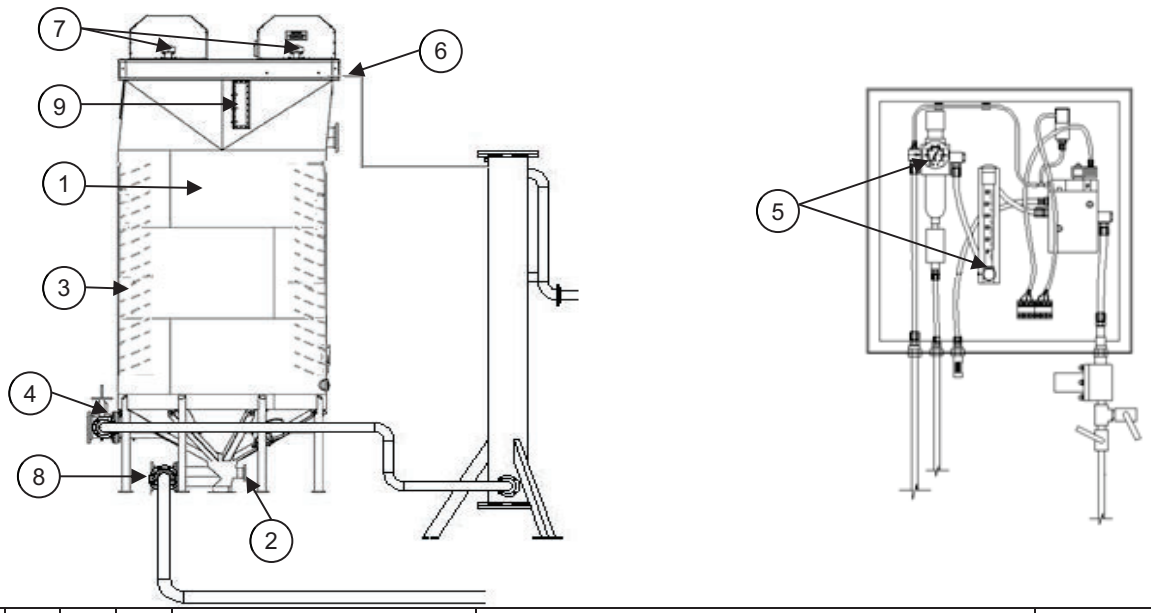
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SECTION 9 – VERIFICATION AND MAINTENANCE

Preventive Maintenance Schedule

The installation is designed so that maintenance is reduced to a minimum. Cleaning, inspecting and lubricating should be performed on different equipment parts. Please refer to the following tables for the detailed verification check points and frequencies.

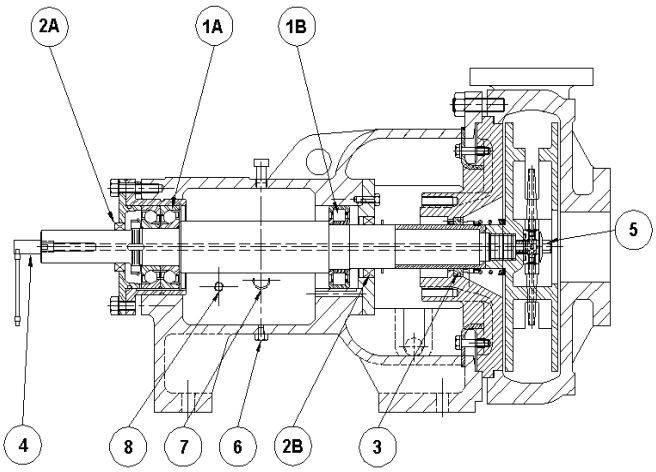
PREVENTIVE MAINTENANCE & CHECKPOINTS

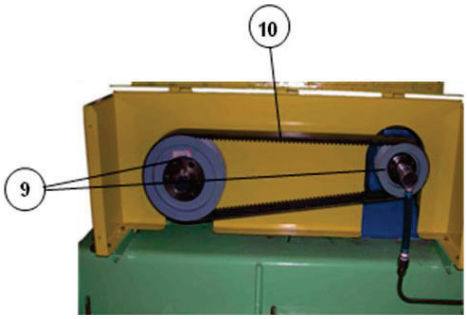


No.	Cleaning	Inspection	Lubrication	Equipment Part	Description	Recommended Frequency
1	X	X		Flotation unit	Inspect the inside of the flotation unit, clean if needed	Annually
2		X		Drain pipe	Verify the state of the drain pipe	Annually
3	X			Separation cones	Clean the separation cones if needed	Annually
		X			Verify the state of the separation cones	Annually
4		X		Poseipump®	Verify the recirculation pressure	Daily
5		X		Pneumatic box	Verify the air pressure	Daily
		X			Verify the air flow	Daily
6		X		Bleed valve	Make sure the valve is slightly open	Daily
	X				Clean the valve if clogged	Annually
7		X		Sludge removal system	Verify the speed of the sludge removal system	Daily
	X				Clean the sludge removal system if needed	Annually
		X			Verify the oil of the motoreducers	Semi-Annually
			X		Apply grease to shaft seal grease fittings	Monthly/2g
			X		Change the oil of the motoreducers	Every 3 years
8		X		Water outlet	Verify the water quality	Daily
9	X			Sight Glass	Clean the sight glass	Daily
		X			Verify the water level and the sludge layer	Daily

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POSEIPUMP® 403-PF PREVENTIVE MAINTENANCE & CHECK POINTS





No.	Cleaning	Inspection	Lubrication	Equipment Part	Description	Frequency	Lubricant Volume	Tool
1A/1B		X		Outboard/Inboard Bearings	Verify the state of the bearings	Annually		7/16” key
2A/2B		X		Outboard/Inboard Bearings Isolators	Verify the state of the bearings isolators	Annually		
3		X		Mechanical Seal	Verify the mechanical seal and replace if necessary	Annually		
4			X	Rotary Joint	Lubricate with a SAE10W30 oil	Monthly	3-5 drops/month	Nipple adaptor (manual or auto.)
		X			Inspect and replace if necessary	Bi-annually		
5		X		Injectors	Verify the state of the impeller’s injectors	Annually		
6			X	Drain Plug	Change oil	200 hours / 8000 hours (or annually)[1]	/ 2.2L	
7		X		Oil Level (sightglass)	Verify the oil level (oil level = ½ of sightglass)	Weekly		7/16” key
			X		Add oil if necessary			
	X				Keep the sight glass clean			
8			X	Automatic Oiler	Verify and add oil if necessary	Weekly	100 ml.	N/A
9		X		Pulleys	Verify the state of the pulleys (pump and motor)	Annually		
10		X		Belt	Verify the tension and state of the belt	Monthly		
		X			Change the belt	Annually		

Note 1: Perform the first oil change after 200 hours of operation. Subsequent oil changes can be performed every 8000 hours or once a year.

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Lubrication

The oil level for the Poseipump's bearings should be checked once a week and the oil level must be at the center (½) of the sight glass. Add oil in the Opto-Matic oiler if the level is too low. A full oil change should be done after the first 200 hours of operation and subsequent oil changes every 8000 hours (or annually) with a SAE10W30 grade oil. The same grade of oil can be used to lubricate the rotary joint, either with a manual application or by using the automatic oiler.

Recommended SAE30 Grade Oil

American Oil Company	Amoco No. 31
Arco	Gascon S-315 or 68A
Continental Oil Company	Conoco Dectol Medium
Exxon Company	Forum 50
Mobil Oil	Flow Rex Extra Heavy
Shell Oil Company	Carnea 68
Texaco Inc.	URSA P68
Union Oil Company	Turmaco 315

Gearbox motor:

Refer to the manufacturer's manual in SECTION 13 – Data Sheets of this manual for schedule, grease type and quantities to be used. If the manufacturer proposes a different lubrication schedule, the latter should be used in place of SUEZ poseidon's lubrication schedule.

Gearboxes:

We recommend verifying the oil level in the gearboxes every 6 months and changing it every 3 years. Refer to the manufacturer's manual in SECTION 13 – Data Sheets of this manual for oil types and quantities to be used. If the manufacturer proposes a different lubrication schedule, the latter should be used in place of SUEZ poseidon's lubrication schedule.

Bushings:

Using Shell Alvania RL3 or an equivalent type of grease, apply ≈2 grams (about 5 pumps from a grease gun) to scraper and thickener plastic bushings once a month to prevent premature wear. A normal quantity of standard bearing mineral grease is recommended. Do not use graphite-based grease.

Extended storage recommendations

When storing rotating equipment such as pumps or motors, it is important that special precautions are taken.

Poseipump®:

-Always store the spare Poseipump® indoors in a clean, dry location. Avoid locations with large temperature swings that will result in condensation.
-Pumps cannot be stored around running equipment where resonance vibration can cause bearing damage.
-Regardless of the duration of storage, pumps should be rotated at least every six weeks, no less than five full revolutions.
-Pumps should be stored in a corrosion less environment.

Valves:

- Always store the valves indoors in a clean, dry location.
- Regardless of the duration of storage, valves should be manipulated (opening and closing them 4 to 5 times) every six months.

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Motors:

- Always store the motors indoors in a clean, dry location. Avoid locations with large temperature swings that will result in condensation.
- Please note the reduced grease utilization period of the ball bearings after storage periods exceeding one year.
- Check whether the motor has absorbed moisture as a result of being stored for a long time. Measure the insulation resistance to do this.
- Motors must be covered to eliminate airborne dust and dirt.
- If the storage location exhibits high vibration, place isolation pads under motor to minimize damage to motor bearings.

Please read the manufacturer's Operating instructions manual for more information.

Gear units:

Gear units of the ''extended storage'' type have:

- An oil fill suitable for the mounting position so the unit is ready to run. You should still check the oil level before start-up;
- A higher oil level in some cases. Correct the oil level before start-up.

Comply with the storage conditions specified in the following table for extended storage:

Climate zone	Packaging *	Storage location	Storage time
Temperate (Europe, USA, Canada, China and Russia, excluding tropical zones).	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap.	With roof, protected against rain and snow, no shock loads.	Up to three years with regular checks on the packaging and moisture indicator (relative atmospheric humidity <50%).
	Open	With roof, enclosed at a constant temperature and atmospheric humidity (5°C-60°C, <50% atmospheric humidity). No sudden temperature fluctuations and controlled ventilation with filter (free from dirt and dust). No aggressive vapors and no shock loads.	Two years or more, given regular inspections. Check for cleanliness and mechanical damage as part of the inspection. Check corrosion protection.
Tropical (Asia, Central and south America, Australia, New Zealand, excluding temperate zones).	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap. Protected against insect damage and mildew by chemical treatment.	With roof, protected against rain, no shock loads.	Up to three years with regular checks on the packaging and moisture indicator (relative atmospheric humidity <50%).
	Open	With roof, enclosed at a constant temperature and atmospheric humidity (5°C-60°C, <50% atmospheric humidity). No sudden temperature fluctuations and controlled ventilation with filter (free from dirt and dust). No aggressive vapors and no shock loads. Protection against insect damage.	Two years or more, given regular inspections. Check for cleanliness and mechanical damage as part of the inspection. Check corrosion protection.

*Packaging must be performed be an experienced company using the packing materials that have been expressly specified for the particular application.

Please read the manufacturer's Operating instructions manual for more information.

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Cleaning procedure

When the flotation unit and the feed tank accumulate solids, they must be drained and cleaned out. An annual visual inspection of the inside of the unit will enable the facility to determine if the unit needs to be cleaned. The exact frequency will be determined by the facility once the installation is in operation. The cleaning must be done with respect to the following steps:

1. Increase and maintain the water level of the flotation unit to the maximum until the sludge layer is evacuated.

   The sludge layer must be removed with the sludge removal system before the unit is drained. This is to prevent any accumulation of sludge in the separation cones.

2. Initiate the Stop sequence. This should stop the feed pump, the chemical dosing pumps, the recirculation pump and the sludge removal system.

3. Open the drain valve in order to empty the flotation unit.

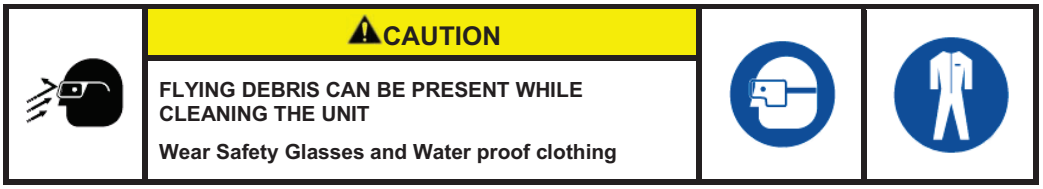
4. Clean the inside of the flotation unit with a water hose with a maximum water jet pressure of 100 kPa (15 psi) at 3 meters of distance. Do not use a high-pressure hose when cleaning the separation cones since this could damage them in the process.

5. In order to achieve the best cleaning possible we recommend removing the manhole located at the bottom of the unit in order to clean the bottom of the unit as well as the lowest separation cones.

6. Close the drain valve and the bottom manhole.

7. Fill the flotation unit with fresh water prior to introducing water to be treated

If the unit is filled with water and remains stopped while there is a danger of freezing, then the whole installation must be drained



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SECTION 10 - TROUBLESHOOTING

NOTE: Strong variations in the inlet water characteristics, like solid loading, pH, etc., could affect the overall performance of the flotation unit.

Problem	Possible Causes		Solution	
Deterioration of the clarified water: Unclear or colored water	**1**	Malfunction of the dosing station	**A**	Setting of the dosing pump(s) controller incorrect.
			B	Problems with dosing pump(s).
	2	Influent flow rate	**A**	Reduce the inlet flow if possible.
Clear water but excessive floc carry-over	**1**	Malfunction of the dosing station	**A**	Setting of the dosing pump(s) controller incorrect.
			B	Problems with dosing pump(s).
	2	Sludge layer too thick	**A**	Raise the water level.
			B	Increase the sludge removal system speed.
	3	Insufficient aeration	**A**	Check the recirculation system.
	4	Influent characteristics variations	**A**	Check flow and solids loading of the raw water.
			B	Re-evaluate the chemical program
	5	Accumulation of settled solids at the bottom of the unit	**A**	Verify the state of the draining system
			B	Verify the draining sequence
			C	Verify chemical dosages
			D	Verify recirculation system
Recirculation system does not function properly: Large air bubbles	**1**	Bleed valve blocked	**A**	Open the bleed valve completely to take away the blockage and readjust to allow a small flow though this valve.
	2	Release valve is not properly tuned	**A**	Verify the recirculation pressure. Adjust the valve to obtain a pressure between 85 to 105 psig.
	3	Excessive air supply	**A**	Reduce air flow on rotameter.
Recirculation system does not function properly: No milky liquid	**1**	Not enough/no air supply	**A**	Check the air rotameter reading.
			B	Check for air leaks on the feed line
	2	Insufficient recirculation pressure	**A**	Check pressure on manometer and throttle the release valve to increase the pressure.
	3	Excessive solid loading in influent water	**A**	Find causes in plan operation and determine next action.
	4	Depriming of the recirculation pump when air is injected	**A**	Verify the rotameter air flow.
			B	Verify the recirculation pressure at the release valve.
Low sludge consistency	**1**	Short retention time	**A**	Lower level in flotation unit and/or lower speed of the sludge removal system.
	2	Insufficient aeration	**A**	Study options to increase the rotameter air flow rate.
			B	Check if release valve is properly adjusted.
	3	Slow rising rate and/or poor floc formation	**A**	Check chemical dosage(s) and dosing points.
			B	Re-evaluate the chemical program

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FLOTATION UNIT: Problems and possible causes

		PROBLEMS				
		Deterioration of clarified water quality	Excessive floc carry-over in clarified water	Large air bubbles	Insufficient aeration – No milky liquid	Low sludge consistency
POSSIBLE CAUSES	Air flow in the Poseipump® too low or no air	X	X		X	X
	Air flow in the Poseipump® too high[1]			X		
	Bleed valve plugged or closed			X		
	Variations of influent water characteristics (pH[2], TSS, O&G, etc…)	X				
	Chemical dosage not adjusted	X	X			
	Dosing pump(s) defective or not adjusted	X	X			
	Draining sequence not adjusted		X			
	Sludge mat too thick		X			
	Influent flow rate too high	X	X			
	Chemical injection point(s) not optimal	X				
	Flocculant batch too old[2]	X				
	Flocculant concentration too low or high	X				
	No air supply pressure or too low	X	X		X	X
	Recirculation flow rate not adjusted		X	X		X
	Recirculation pressure not adjusted		X	X	X	
	Drain plugged		X			
	Water level in unit too low		X			
	Water level in the unit too high					X

[1] Do not exceed the maximum air flow rate sustained by the Poseipump®
[2] If the flocculant solution is too old or if the pH varies too much, the flocculant will lose its efficiency. Usually, flocculants gradually lose their efficiency after 24 hours after they are in aqueous solution.

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Poseipump®: Problems and Possible Causes

POSSIBLE CAUSES	PROBLEMS					
	Noise or vibration	No flow	Insufficient Pressure	Excessive Power required	Intermittent Flow	Short Bearing Life
Bearing worn	X			X		X
Bent shaft	X			X		X
Excessive discharge head		X				
Oil level too low						X
Improper foundation	X					
Improper electric motor wiring or voltage				X		
Misalignment of the pulleys	X			X		X
Belt too tight				X		X
Belt too loose	X				X	
Plugged suction or discharge line	X	X	X		X	
Impeller damage	X	X	X	X	X	X
Impeller clogged		X	X		X	
Impeller out of balance	X					X
Rotating element bent	X			X		X
Speed too low			X			
Suction or discharge piping not anchored	X					
Wrong direction of rotation	X	X	X	X	X	X

NOTE

If you have any problems with the mechanical seals, you should contact the manufacturer. Consult the factory if the problem persists

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SECTION 11 – LOGIC SEQUENCES & DIAGRAMS

These typical logic diagrams and logic descriptions are provided by SUEZ Poseidon and should serve only as an indication. Final detailed logics and control narratives shall be performed by others. Any request for additional modifications may be subject to extra costs.

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All the optional logic descriptions that refer to the optional equipment are written in blue.

Logic Sequences

Start Sequence A and B

Note: Prior to this start sequence, the flotation unit has already been filled with service water.

A- Start the flotation unit

The water level must always be higher than the low low level set point.

1. Start the recirculation pump # 1, recirculation pump # 2 pending.
2. If the discharge pressure of the recirculation pump is > 60psi for 10 seconds.
   Open the solenoid valve of the pneumatic air panel.
3. Start the sludge removal system.
4. Delay of 15 seconds is required before starting feeding the unit. (Start sequence B).

B- Start the feed of the flotation unit.

5. Start the influent feed pump.
6. Start the feed control valve and / or the clarified water pump.
7. Start the dosing pumps.
8. Start modulating the level control valve to achieve the level set point.
9. Initiate the Drainage sequence.

Stop Sequence A and B

A- Stop the feed of the flotation unit.

1. Stop the feed pump.
2. Stop the feed control valve and / or the clarified water pump.
3. Stop the dosing pumps.
4. Stop modulating and gradually close the level control valve.
5. Stop the Drainage sequence (store in memory the next drain valve to be opened).

B- Stop the flotation unit.

6. Close the solenoid valve of the pneumatic air panel.
7. Stop the recirculation pump.
8. Stop the sludge removal system.

Drainage sequence.

1. Open the drain valve.
2. Start the programmable drainage period timer (5 to 10 seconds).
3. After the drainage period timer expired, close the drain valve.
4. Start the programmable drainage frequency timer (2 to 8 hours).
5. After the drainage timer frequency expired, repeat steps (1 to 5).

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Start button

1. Initiate a Start sequence A and B.

Stop button

1. Initiate a Stop sequence A and B.

High level alarm (Level transmitter installed)

1. **The high-level set point is reached.**
2. **An alarm indicates a high level (overflows in the sludge hopper).**

Low level alarm (Level transmitter installed)

1. **The low-level set point is reached.**
2. **An alarm indicates a low level (the sludge removal system no longer removes sludge).**

Low low level alarm. (Level transmitter installed)

1. the level sensor detect a water low level **or the low low level set point is reached**.
2. An alarm indicates a low low level.
3. Initiate a Stop Sequence A and B.
4. After rectifying the water level.
5. Manual Reset of the fault is required for the Start sequence to be ready.

Low pressure alarm: recirculation pump (Pressure transmitter installed)

1. Recirculation pump pressure switch detects a pressure ≤60psi **or low pressure ≤60 psi is reached**.
2. An alarm indicates a recirculation pump pressure ≤60psi.
3. Immediately close the solenoid valve of the pneumatic air panel.
4. Initiate a Stop sequence A and B.
5. Manual Reset of the fault is required for the Start sequence to be ready.

Low pressure alarm: pneumatic air panel

1. Air pressure switch detects a low air supply pressure (≤60psi).
2. An alarm indicates air pressure ≤60psi.
3. If the situation is not corrected within five (5) minutes.
4. Initiate Stop sequence A.
5. If the situation is corrected initialize the Start Sequence B.
6. If the situation is not corrected within Thirty (30) minutes.
7. Initiate Stop Sequence B
8. Manual Reset of the fault is required for the Start sequence to be ready.

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All the optional logic descriptions that refer to the optional equipment are written in blue.

Recirculation pump: defective motor

1. Fault of recirculation pump motor detected.
2. An alarm indicates the fault detected
3. Initiate Stop Sequence A and B.
4. Manual Reset of the fault is required for the Start sequence to be ready.

Defective sludge removal system

1. Failure of the sludge removal system detected.
2. An alarm indicates the fault detected
3. Initiate Stop Sequence A.
4. Manual Reset of the fault is required for the Start sequence to be ready.

Feed system: defective

1. Failure of the feed pump and / or the feed control valve detected.
2. An alarm indicates the fault detected
3. Initiate Stop sequence A.
4. If the situation is not corrected within thirty (30) minutes.
5. Initiate Stop Sequence B
6. Manual Reset of the fault is required for the Start sequence to be ready.

Dosing pump: defective

1. No dosing pump detected.
2. An alarm indicates the fault detected
3. If the situation is not corrected within five (5) minutes.
4. Initiate Stop sequence A.
5. If the situation is corrected initialize the Start Sequence B
6. If the situation is not corrected within thirty (30) minutes.
7. Initiate Stop Sequence B
8. Manual Reset of the fault is required for the Start sequence to be ready.

Clarified water pump (motor): defective

1. Failure of clarified water pump detected.
2. An alarm indicates the fault detected
3. Initiate Stop sequence A.
4. If the situation is not corrected within thirty (30) minutes.
5. Initiate Stop Sequence B
6. Manual Reset of the fault is required for the Start sequence to be ready.

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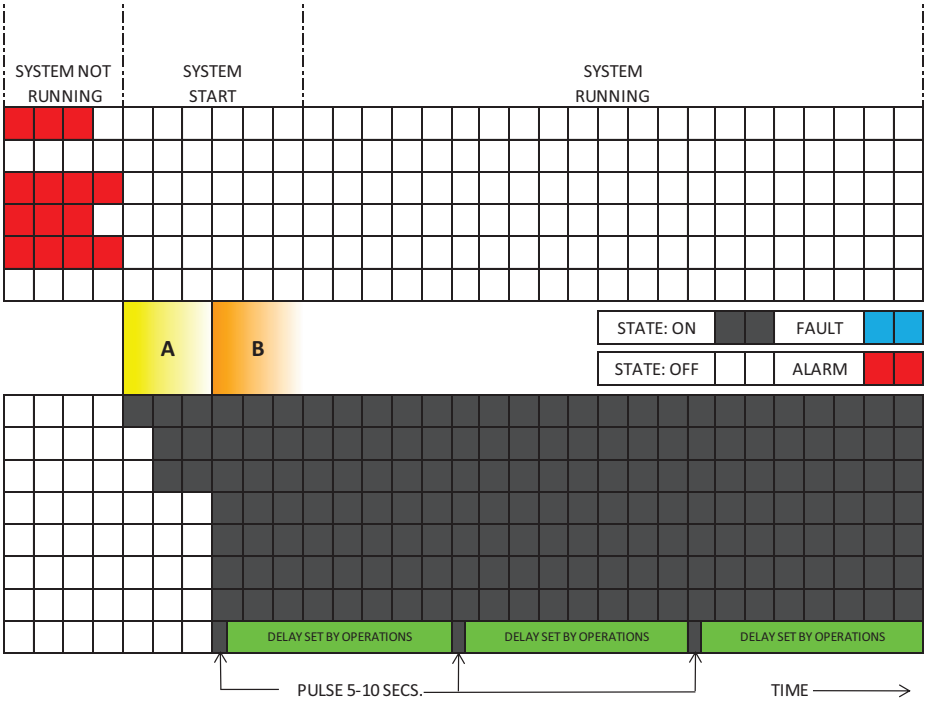
START SEQUENCE (A and B)

MEASURING INSTRUMENTS

- FEED CHEST LEVEL ALARM
- FLOTATION UNIT HIGH LEVEL ALARM
- FLOTATION UNIT LOW LEVEL ALARM
- FLOTATION UNIT LOW LOW LEVEL ALARM
- LOW PRESSURE ALARM (POSEÏPUMP)
- LOW AIR SUPPLY PRESSURE

PROCESS CONTROL

- POSEÏPUMP
- PNEUMATIC BOX SOLENOID VALVE
- SLUDGE REMOVAL SYSTEM
- LEVEL CONTROL VALVE
- FEED PUMP / FEED CONTROL VALVE
- DOSING PUMPS
- CLARIFIED WATER PUMP
- DRAIN VALVE



NOTE: *PNEUMATIC BOX SOLENOID VALVE IS NOT OPEN IF THERE IS NO OR LOW PRESSURE (≥60 PSI) AT THE DISCHARGE OF THE POSEIPUMP.

**SLUDGE REMOVAL SYSTEM INCLUDES THICKENER AND SCRAPER.

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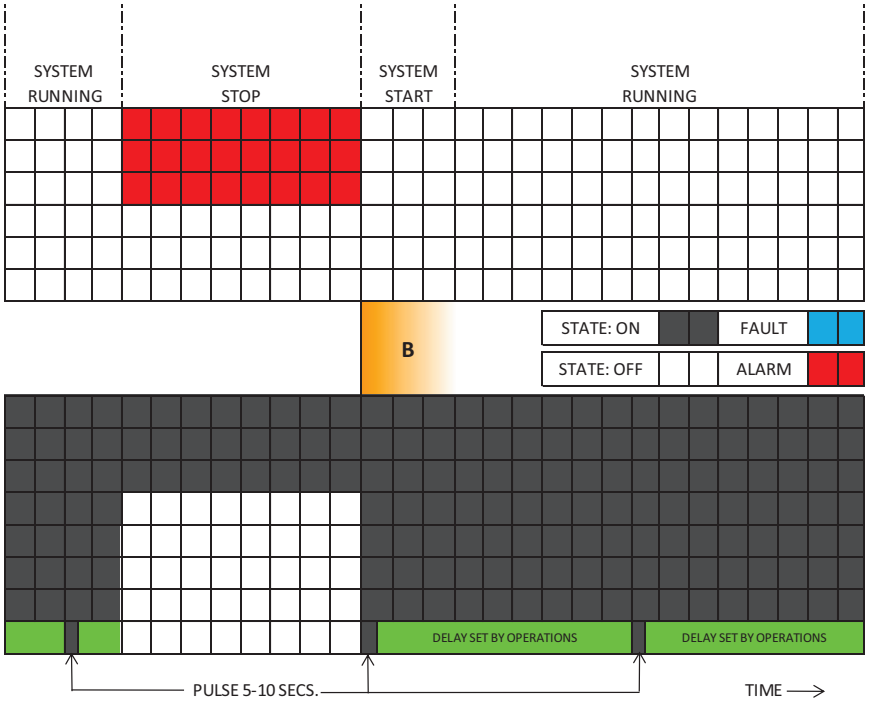
STOP SEQUENCE (A)

MEASURING INSTRUMENTS

- FEED CHEST LEVEL ALARM
- FLOTATION UNIT HIGH LEVEL ALARM
- FLOTATION UNIT LOW LEVEL ALARM
- FLOTATION UNIT LOW LOW LEVEL ALARM
- LOW PRESSURE ALARM (POSEÏPUMP)
- LOW AIR SUPPLY PRESSURE

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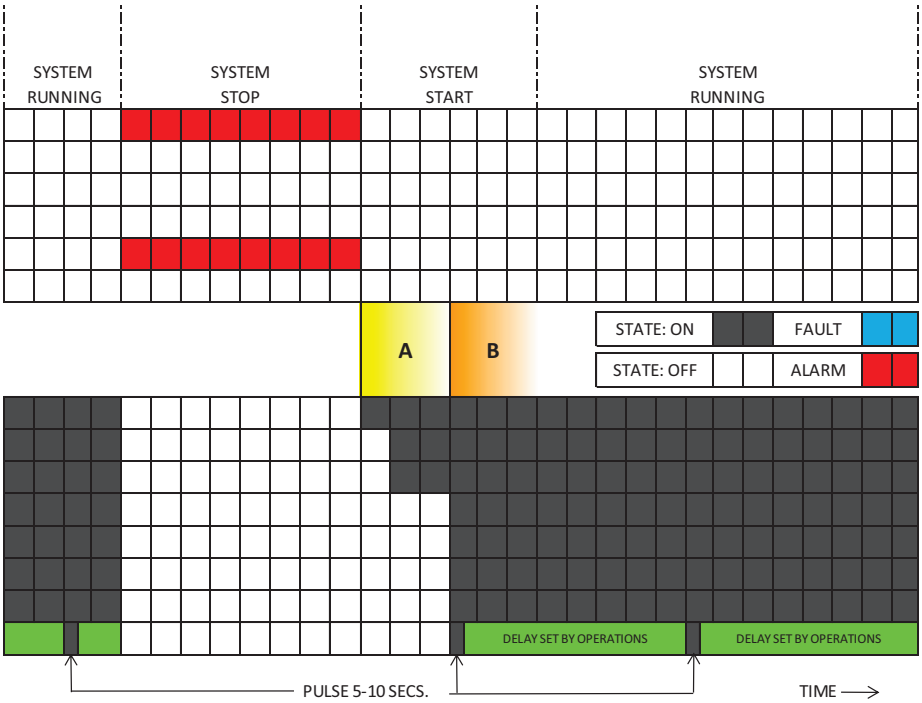
STOP SEQUENCE (B)

MEASURING INSTRUMENTS

- FEED CHEST LEVEL ALARM
- FLOTATION UNIT HIGH LEVEL ALARM
- FLOTATION UNIT LOW LEVEL ALARM
- FLOTATION UNIT LOW LOW LEVEL ALARM
- LOW PRESSURE ALARM (POSEÏPUMP)
- LOW AIR SUPPLY PRESSURE

PROCESS CONTROL

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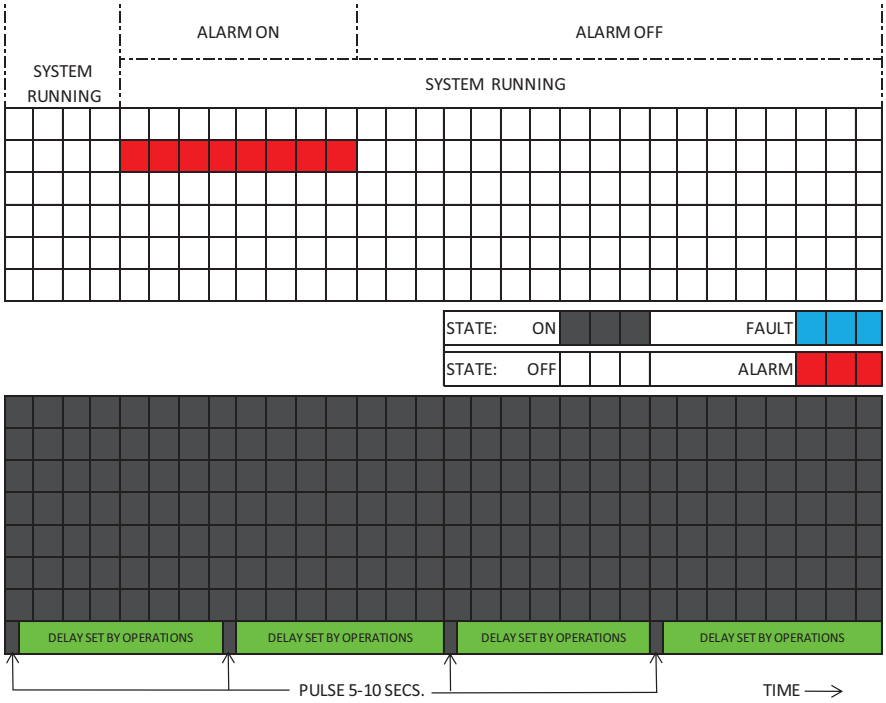
HIGH LEVEL ALARM FLOTATION UNIT

MEASURING INSTRUMENTS

FEED CHEST LEVEL ALARM
FLOTATION UNIT HIGH LEVEL ALARM
FLOTATION UNIT LOW LEVEL ALARM
FLOTATION UNIT LOW LOW LEVEL ALARM
LOW PRESSURE ALARM (POSEÏPUMP)
LOW AIR SUPPLY PRESSURE

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DRAIN VALVE



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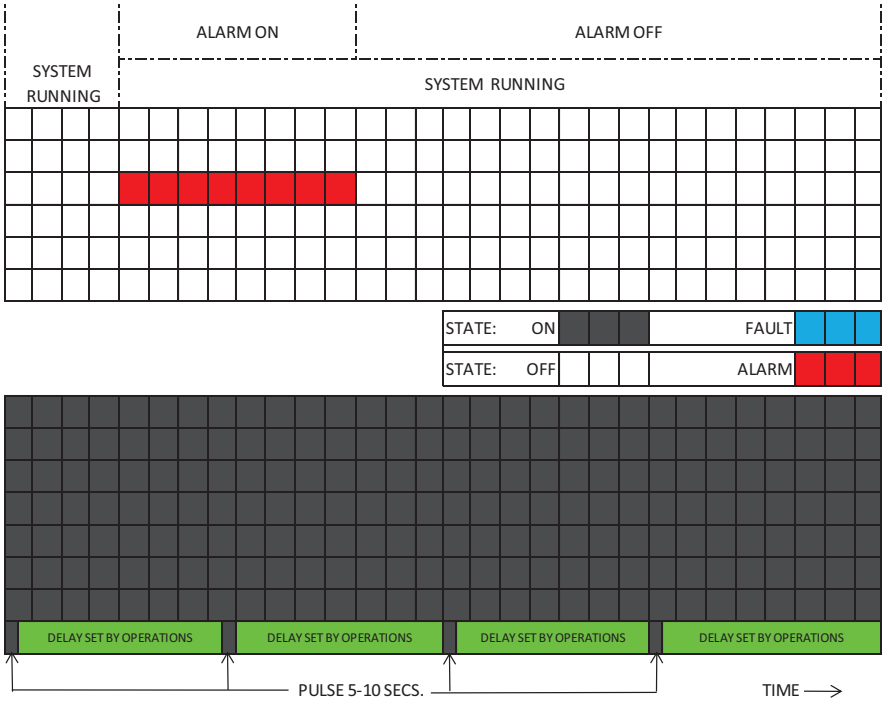
LOW LEVEL ALARM FLOTATION UNIT

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FLOTATION UNIT HIGH LEVEL ALARM
FLOTATION UNIT LOW LEVEL ALARM
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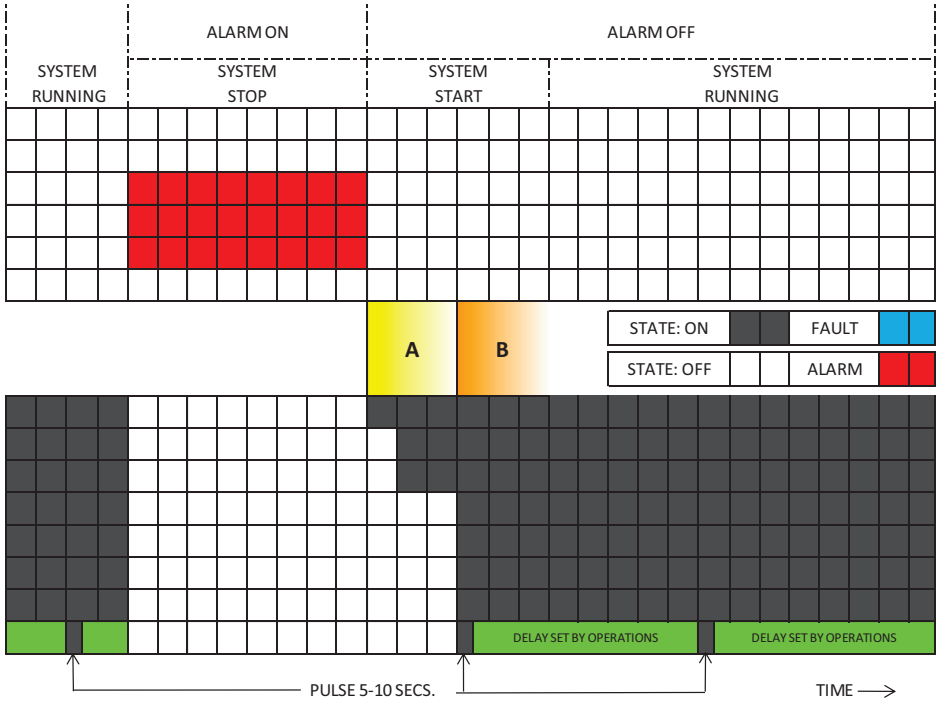
LOW LOW LEVEL ALARM FLOTATION UNIT

MEASURING INSTRUMENTS

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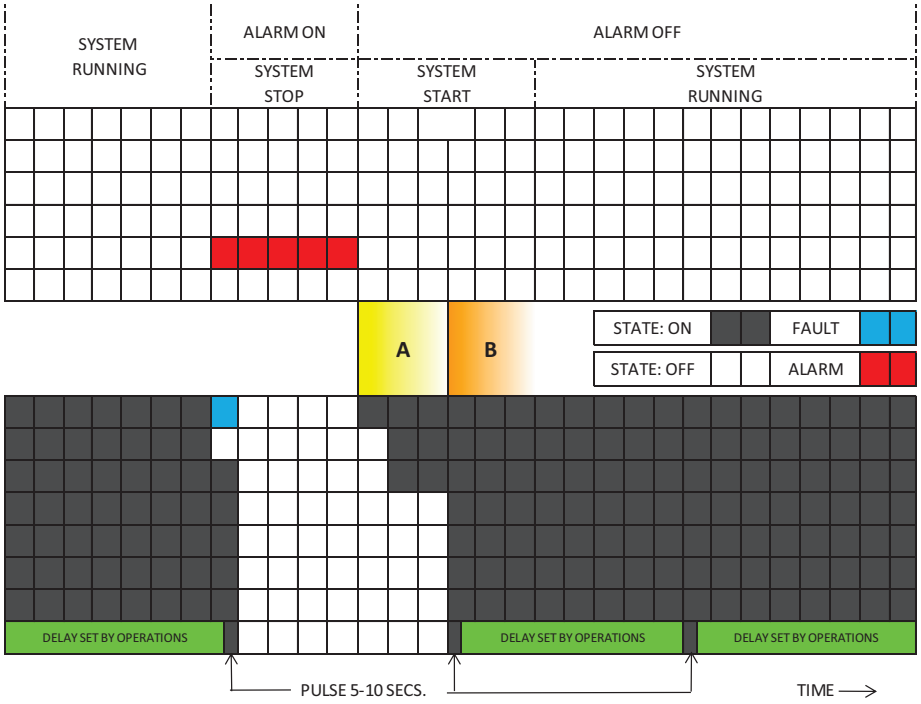
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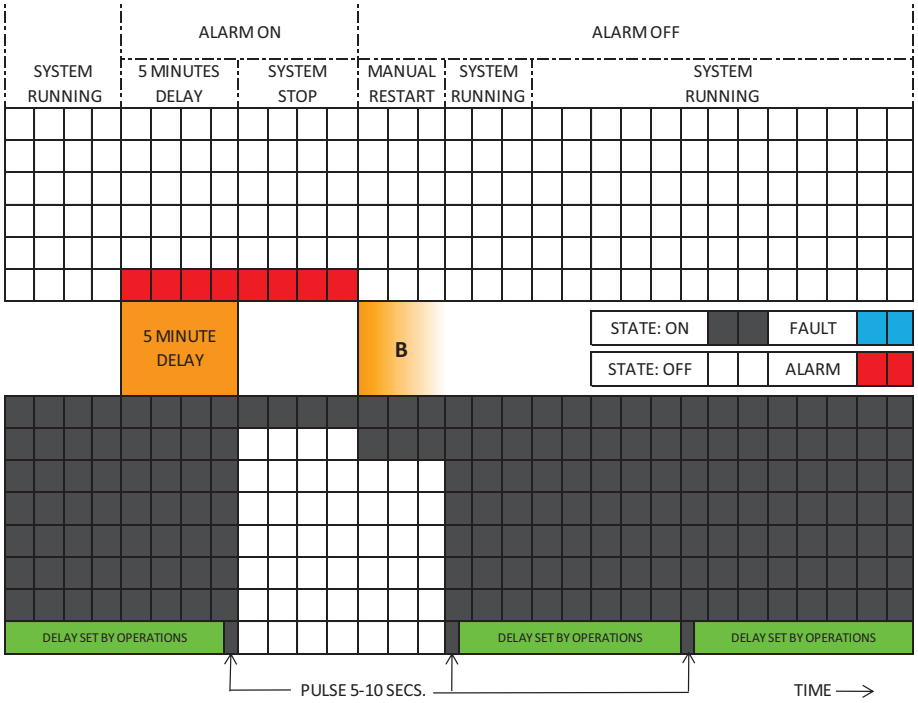
LOW PRESSURE ALARM (PNEUMATIC BOX AIR SUPPLY)

MEASURING INSTRUMENTS

- FEED CHEST LEVEL ALARM
- FLOTATION UNIT HIGH LEVEL ALARM
- FLOTATION UNIT LOW LEVEL ALARM
- FLOTATION UNIT LOW LOW LEVEL ALARM
- LOW PRESSURE ALARM (POSEÏPUMP)
- LOW AIR SUPPLY PRESSURE

PROCESS CONTROL

- POSEÏPUMP
- PNEUMATIC BOX SOLENOID VALVE
- SLUDGE REMOVAL SYSTEM
- LEVEL CONTROL VALVE
- FEED PUMP / FEED CONTROL VALVE
- DOSING PUMPS
- CLARIFIED WATER PUMP
- DRAIN VALVE



NOTE: *PNEUMATIC BOX SOLENOID VALVE IS NOT OPEN IF THERE IS NO OR LOW PRESSURE (≥60 PSI) AT THE DISCHARGE OF THE POSEIPUMP.

**SLUDGE REMOVAL SYSTEM INCLUDES THICKENER AND SCRAPER.

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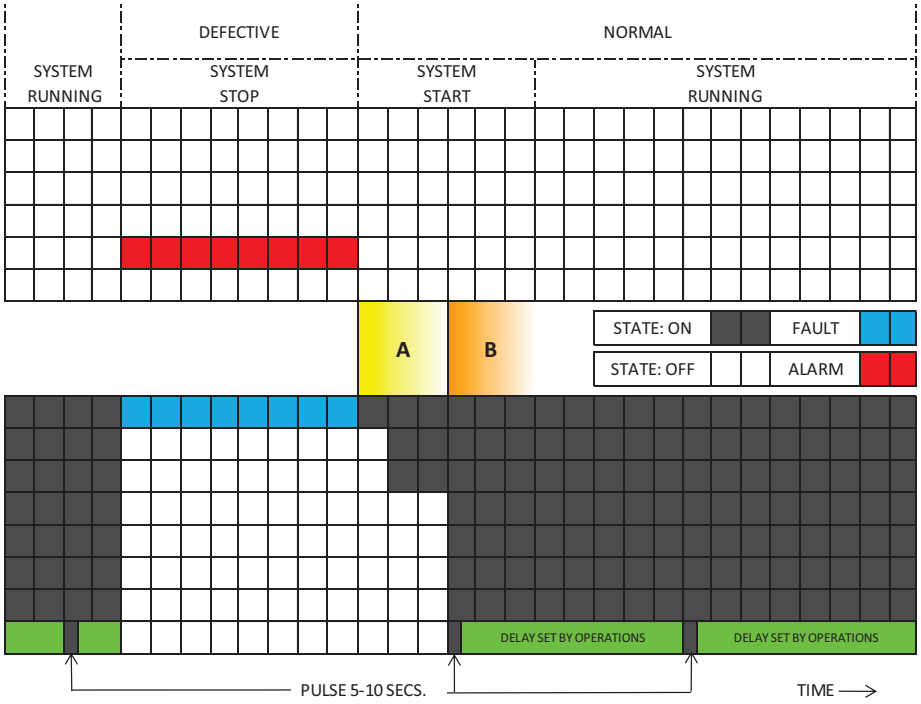
DEFECTIVE POSEIPUMP (MOTOR)

MEASURING INSTRUMENTS

FEED CHEST LEVEL ALARM
FLOTATION UNIT HIGH LEVEL ALARM
FLOTATION UNIT LOW LEVEL ALARM
FLOTATION UNIT LOW LOW LEVEL ALARM
LOW PRESSURE ALARM (POSEÏPUMP)
LOW AIR SUPPLY PRESSURE

PROCESS CONTROL

POSEÏPUMP
PNEUMATIC BOX SOLENOID VALVE
SLUDGE REMOVAL SYSTEM
LEVEL CONTROL VALVE
FEED PUMP / FEED CONTROL VALVE
DOSING PUMPS
CLARIFIED WATER PUMP
DRAIN VALVE



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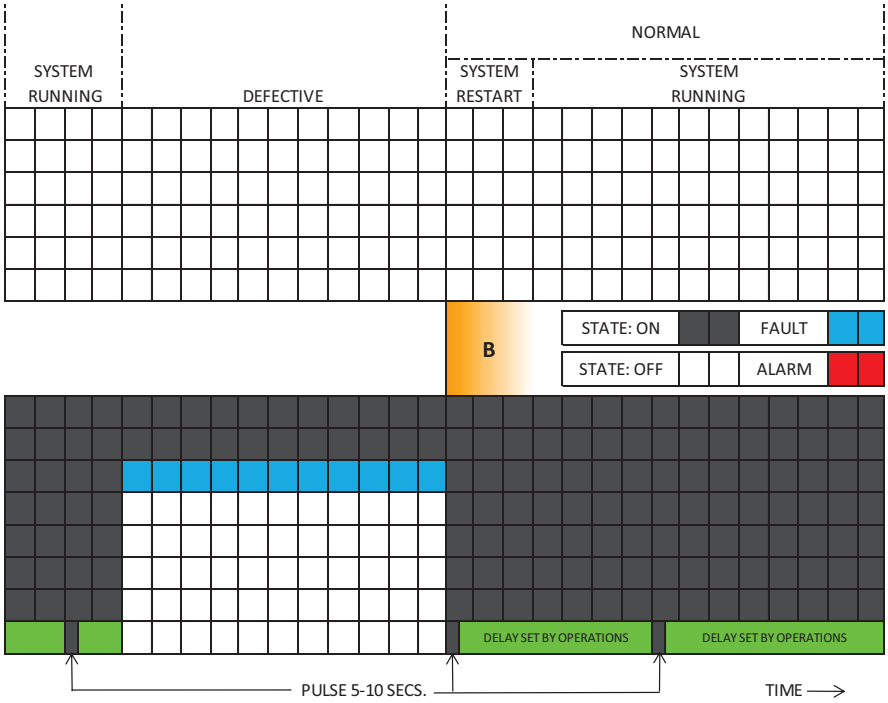
DEFECTIVE SLUDGE REMOVAL SYSTEM

MEASURING INSTRUMENTS

- FEED CHEST LEVEL ALARM
- FLOTATION UNIT HIGH LEVEL ALARM
- FLOTATION UNIT LOW LEVEL ALARM
- FLOTATION UNIT LOW LOW LEVEL ALARM
- LOW PRESSURE ALARM (POSEÏPUMP)
- LOW AIR SUPPLY PRESSURE

PROCESS CONTROL

- POSEÏPUMP
- PNEUMATIC BOX SOLENOID VALVE
- SLUDGE REMOVAL SYSTEM
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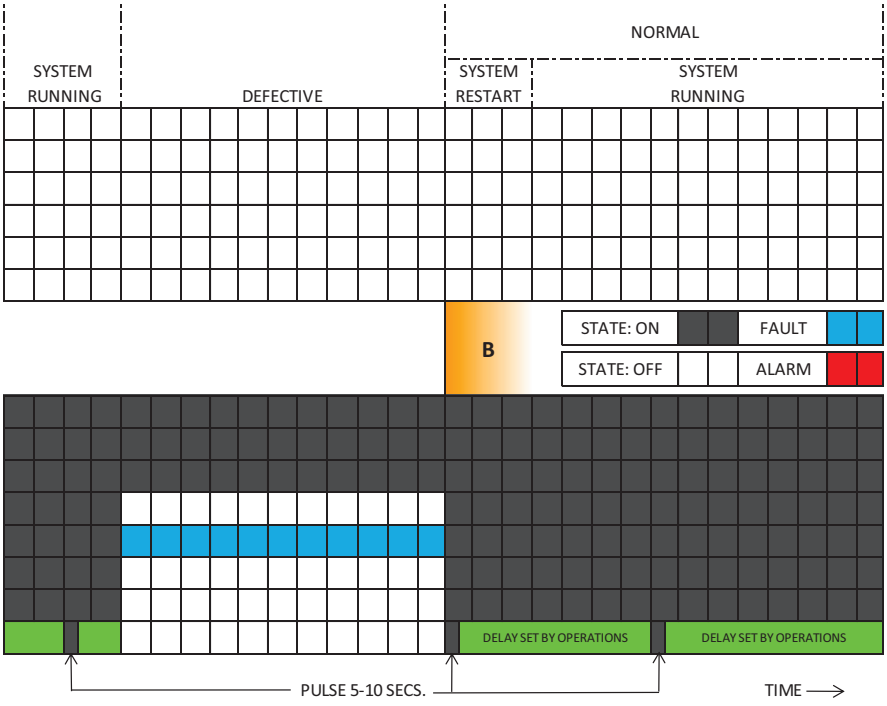
DEFECTIVE FEED PUMP (MOTOR) / FEED CONTROL VALVE

MEASURING INSTRUMENTS

FEED CHEST LEVEL ALARM
FLOTATION UNIT HIGH LEVEL ALARM
FLOTATION UNIT LOW LEVEL ALARM
FLOTATION UNIT LOW LOW LEVEL ALARM
LOW PRESSURE ALARM (POSEÏPUMP)
LOW AIR SUPPLY PRESSURE

PROCESS CONTROL

POSEÏPUMP
PNEUMATIC BOX SOLENOID VALVE
SLUDGE REMOVAL SYSTEM
LEVEL CONTROL VALVE
FEED PUMP / FEED CONTROL VALVE
DOSING PUMPS
CLARIFIED WATER PUMP
DRAIN VALVE



NOTE: *PNEUMATIC BOX SOLENOID VALVE IS NOT OPEN IF THERE IS NO OR LOW PRESSURE (≥60 PSI) AT THE DISCHARGE OF THE POSEIPUMP.

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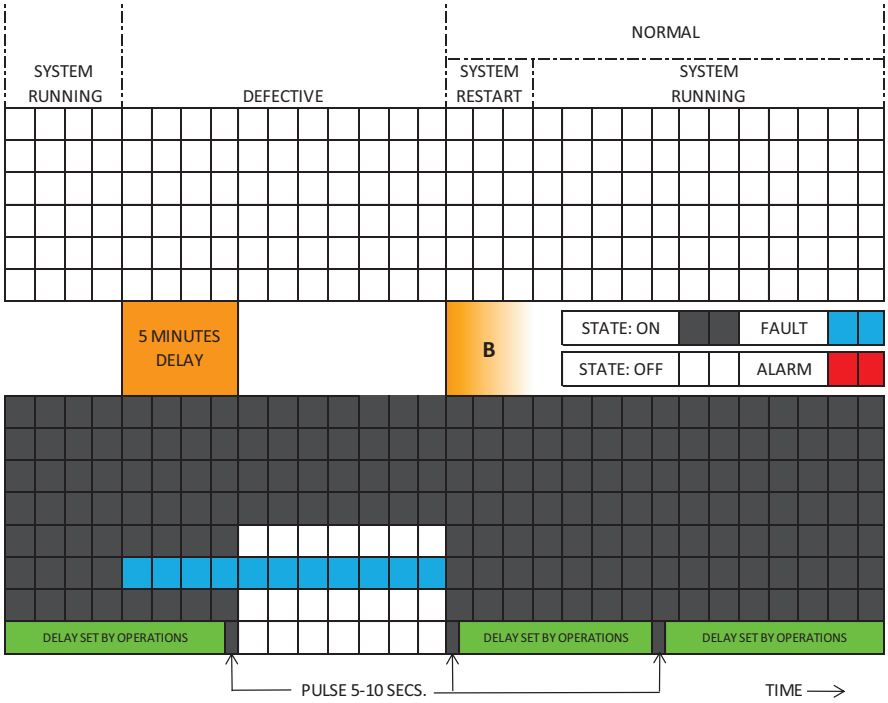
DEFECTIVE DOSING PUMP (MOTOR)

MEASURING INSTRUMENTS

- FEED CHEST LEVEL ALARM
- FLOTATION UNIT HIGH LEVEL ALARM
- FLOTATION UNIT LOW LEVEL ALARM
- FLOTATION UNIT LOW LOW LEVEL ALARM
- LOW PRESSURE ALARM (POSEÏPUMP)
- LOW AIR SUPPLY PRESSURE

PROCESS CONTROL

- POSEÏPUMP
- PNEUMATIC BOX SOLENOID VALVE
- SLUDGE REMOVAL SYSTEM
- LEVEL CONTROL VALVE
- FEED PUMP / FEED CONTROL VALVE
- DOSING PUMPS
- CLARIFIED WATER PUMP
- DRAIN VALVE



NOTE: *PNEUMATIC BOX SOLENOID VALVE IS NOT OPEN IF THERE IS NO OR LOW PRESSURE (≥60 PSI) AT THE DISCHARGE OF THE POSEIPUMP.

**SLUDGE REMOVAL SYSTEM INCLUDES THICKENER AND SCRAPER.

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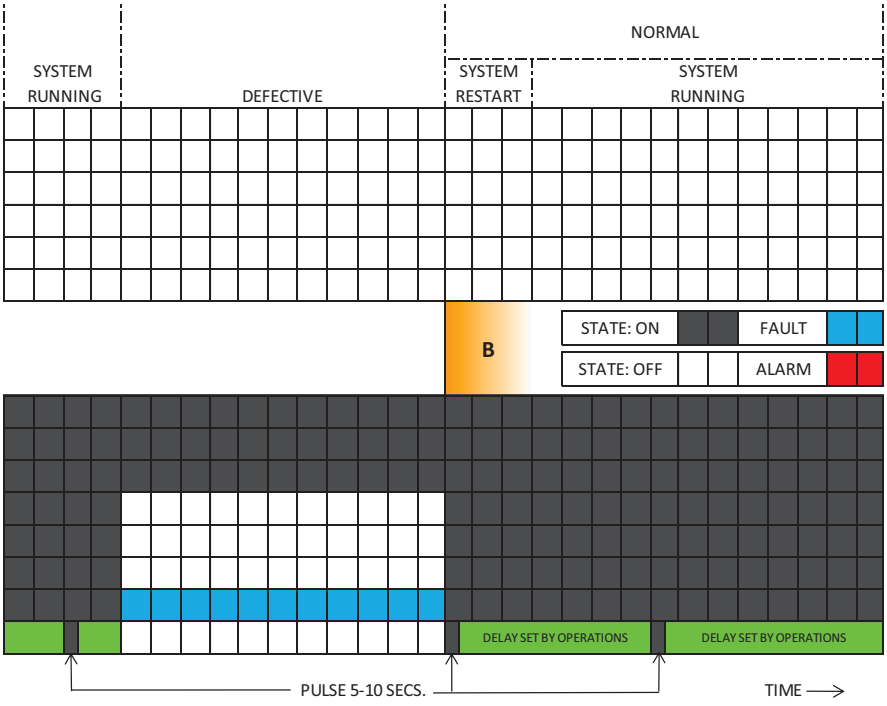
DEFECTIVE CLARIFIED WATER PUMP (MOTOR)

MEASURING INSTRUMENTS

FEED CHEST LEVEL ALARM
FLOTATION UNIT HIGH LEVEL ALARM
FLOTATION UNIT LOW LEVEL ALARM
FLOTATION UNIT LOW LOW LEVEL ALARM
LOW PRESSURE ALARM (POSEÏPUMP)
LOW AIR SUPPLY PRESSURE

PROCESS CONTROL

POSEÏPUMP
PNEUMATIC BOX SOLENOID VALVE
SLUDGE REMOVAL SYSTEM
LEVEL CONTROL VALVE
FEED PUMP / FEED CONTROL VALVE
DOSING PUMPS
CLARIFIED WATER PUMP
DRAIN VALVE



NOTE: *PNEUMATIC BOX SOLENOID VALVE IS NOT OPEN IF THERE IS NO OR LOW PRESSURE (≥60 PSI) AT THE DISCHARGE OF THE POSEIPUMP.

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SECTION 12 – START-UP PARAMETERS

Start-up parameters check list

SATURN™ Flotation Unit Model S500TCE10-E

PARAMETERS	SYSTEM	SETTINGS	COMMENTS
RECIRCULATION SYSTEM			
Recirculation pressure	Release valve	85-105 PSIG	Pressure under 80 PSIG may overload the pump's motor
Air flow	Rotameter	1.6-1.9 scfm	Do not exceed the recommended flow
Air pressure	Air regulator	70 PSIG	Do not exceed the recommended pressure
Bleed line	Bleed valve	Open	Small water flow should come out
Low air pressure	Air pressure switch	60 PSIG	Factory adjusted
Air counter pressure	Back pressure valve	50 PSIG	Factory adjusted
REMOVAL OF FLOATING AND SETTLING SOLIDS			
Sludge removal	Sludge removal system	Optimum speed to obtain a thick sludge mat	The speed is adjusted as function of the solid loading
Settling solids removal	Drain valve	Opens every 2 hours for 5-10 secs.	Solid build up can occur if the drain frequency is not appropriate
FLOTATION UNIT			
Level set point	Automatic control valve	Adjust water level to bottom of the sludge removal beach	Optimum level in order to obtain a thick sludge mat
Inlet flow	Flow meter	1150 usgpm (max)	The efficiency can be affected if the maximum capacity is exceeded
Inlet TSS concentration	Lab test	3840 ppm (max)	The efficiency can be affected if the maximum capacity is exceeded

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Section 13 – Data Sheets

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Project:	Kadant Black Clawson LLC, Chesapeake, VA USA
P.O. Number:	787140
SUEZ Project Number:	7779-22
Equipment:	Suez-Poseidon® S500TCE10E
Date:	July 21st, 2022
Revision #:	0
SUEZ Address:	1145 Jean-Marchand Lévis, Québec G6Y 9G5 (418) 833-7797

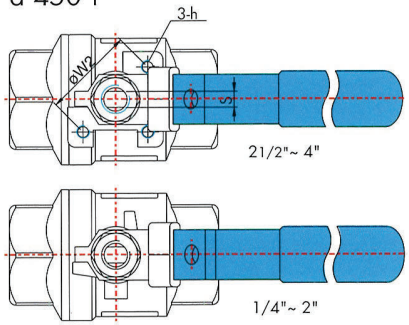
Equipment name	**Ball valve - Manual**
Application	Pressure Gauges Isolation (1/4") Recirculation Bleeder Isolation (1/2") Recirculation Pneumatic Box Isolation (1/2") Water sample (1")

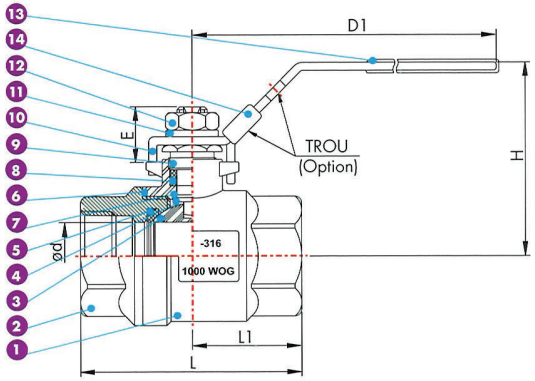
Description	**Specification**
Construction	
Manufacturers	Pinacle
Valve model	2 PC Full Port
Valve diameter	1/4" , 1/2" , 1"
Port	Full Port
Pressure class rating	1000 WOG
Flange connection	FNPT
Materials	
Body	CF8M (St/Stl. 316)
Ball	CF8M (St/Stl. 316)
Stem	Stainless Steel 316
Stem Seal	PTFE
Seat	PTFE
Operation	
Operation type	Manual, Lock Lever



CARACTÉRISTIQUES DU MODÈLE

- Tige insérée de l'intérieur et non-éjectable
- Indice de vapeur : 125 PSI WSP
- Gamme de température : -50°F à 450°F
- Dispositif de verrouillage
- Type fileté :
  ANSI B1.20.1 (NPT)

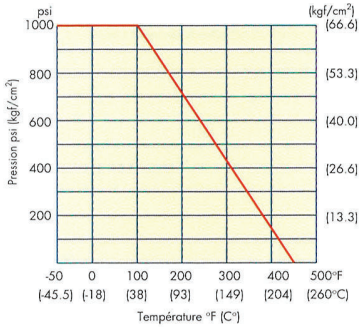




DIMENSIONS

CODES	Dimensions		d		E		L		L1		H		S		D1		h	Facteur	Poids
	pouce	mm	pouce	mm	pouce	mm	pouce	mm	pouce	mm	pouce	mm	pouce	mm	pouce	mm	(Option)	Cv	Livres
13TBV2025	1/4"	8	0.43	11.0	0.61	15.5	2.28	57.8	1.13	28.8	2.25	57.2	0.21	5.45	4.06	103		16	0.57
13TBV20375	3/8"	10	0.49	12.5	0.61	15.5	2.28	57.8	1.13	28.8	2.25	57.2	0.21	5.45	4.06	103		16	0.53
13TBV205	1/2"	15	0.59	15.0	0.57	14.5	2.43	61.7	1.21	30.7	2.33	59.1	0.21	5.45	4.06	103		26	0.66
13TBV2075	3/4"	20	0.79	20.0	0.83	21.0	2.76	70.1	1.38	35.0	2.46	62.6	0.21	5.45	4.06	103		55	0.93
13TBV21	1"	25	0.98	25.0	0.77	19.5	3.20	81.3	1.58	40.2	2.78	70.7	0.24	6.20	5.00	127		110	1.53
13TBV2125	11/4"	32	1.26	32.0	1.09	27.9	3.78	96.0	1.86	47.2	3.00	76.2	0.24	6.20	5.00	127		180	2.23
13TBV215	11/2"	40	1.50	38.0	1.50	27.5	4.43	112.5	2.19	55.6	3.51	89.1	0.37	9.40	6.02	153		270	4.10
13TBV22	2"	50	2.00	50.8	1.08	26.7	4.96	126.0	2.46	62.4	3.87	98.2	0.37	9.40	7.60	193		500	6.27
13TBV225	21/2"	65	2.56	65.0	1.02	26.0	6.63	168.5	3.35	85.0	4.35	110.6	0.37	9.40	7.60	193	M8xP1.25	800	13.77
13TBV23	3"	80	3.15	80.0	1.50	38.0	7.54	191.4	3.78	95.9	4.88	124.0	0.47	12.00	10.98	279	M10xP1.5	1150	22.03
13TBV24	4"	100	3.94	100.0	1.89	48.0	8.52	216.5	4.26	108.3	6.63	168.5	0.47	16.00	13.19	335	M10xP1.5	2120	37.89

RATIOS PRESSION/ TEMPÉRATURE (SIÈGES PTFE)



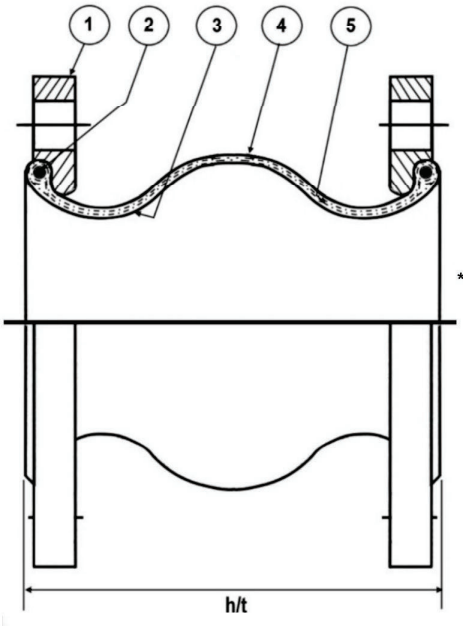
LISTE DES MATÉRIAUX

NO.	NOM DE LA PIÈCE	MATÉRIEL	QTÉ.
1	CORPS	ASTM A351 Gr. CF8M	1
2	CAPUCHON	ASTM A351 Gr. CF8M	1
3	BILLE	ASTM A351 Gr. CF8M	1
4	TIGE	ASTM A276 Gr. 316	1
5	SIÈGE	PTFE+15% G/F	2
6	JOINT D'ÉTANCHÉITÉ	PTFE	1
7	RONDELLE DE FRICTION	PTFE	1
8	GARNITURE D'ÉTANCHÉITÉ	PTFE	1
9	FOULOIR	SS304	1
10	POIGNÉE	SS304	1
11	RONDELLE À RESSORT	SS304	1
12	ÉCROU DE POIGNÉE	SS304	1
13	REVÊTEMENT DE POIGNÉE	VINYLE	1
14	GLISSIÈRE DE VERROUILLAGE*	SS304	1

* OPTION

**** LES DIMENSIONS SONT APPROXIMATIVES ET PEUVENT VARIER.***

Project:	Kadant Black Clawson LLC, Chesapeake, VA USA
P.O. Number:	787140
SUEZ Project Number:	7779-22
Equipment:	Suez-Poseidon® S500TCE10E
Date:	July 21st, 2022
Revision #:	0
SUEZ Address:	1145 Jean-Marchand Lévis, Québec G6Y 9G5 (418) 833-7797



**** Important notice****

Install control units at pressure over,

150 Psig / 1033Kpa 1" to 4"
135 Psig / 930 kpa 5" to 10"
90 Psig / 620 Kpa 12" to 14"
45 Psig / 310 Kpa 16" to 24"

Operating conditions

Size range	1-1/2" à 12"	14" à 24"
Operating pressure	225 psi	125 psi
Operating Temperature	-65 à 265 ^{0}F	-65 à 265 ^{0}F
Vacuum rating	26" Hg	26" Hg
Burst pressure	900 psi	500 psi

*WARNING: Operating pressures listed in the above table are for up to 125 deg. F. For elevated temperature service, please contact Hebdraulique sales for actual working pressure rating.

Expansion joint bodies available in Neoprene , EPDM, Butyl (Chlorobutyl), NBR (Nitril, Buna-N)

Flanges available in other drillings and materials upon request

Part	Qty	Part description	Material
1	2	Flanges drilling #150	Carbon Steel- Plated
2	2	Reinforcing Wire	Mild Steel
3	1	Tube	EPDM Synthetic Rubber
4	1	Cover	EPDM Synthetic Rubber
5	1	Reinforcing Cord	Synthetic Fiber

HEBDRAULIQUE PART #	SIZE	FACE to FACE DIMENSIONS	ALLOWABLE MOTION RATINGS				INSTALLATION TOLERANCES			
			Compression	Extension	Latéral	Angulaire	Compression	Extension	Latéral	Angulaire
HSEE-024	1-1/2"	6"	1/2"	3/8"	1/2"	15°	3/16"	1/8"	1/4"	5°
HSEE-032	2	6	1/2	3/8	1/2	15	3/16	1/8	1/4	5
HSEE-040	2-1/2	6	1/2	3/8	1/2	15	3/16	1/8	1/4	5
HSEE-048	3	6	1/2	3/8	1/2	15	3/16	1/8	1/4	5
HSEE-064	4	6	5/8	3/8	1/2	15	3/16	1/8	1/4	5
HSEE-080	5	6	5/8	3/8	1/2	15	3/16	1/8	1/4	5
HSEE-096	6	6	5/8	3/8	1/2	15	3/16	1/8	1/4	5
HSEE-128	8	6	5/8	3/8	1/2	15	3/16	1/8	1/4	5
HSEE-160	10	8	3/4	1/2	3/4	15	3/16	1/8	1/4	5
HSEE-192	12	8	3/4	1/2	3/4	15	3/16	1/8	1/4	5
HSEE-224	14	8	3/4	1/2	3/4	15	3/16	1/8	1/4	5
HSEE-256	16	8	3/4	1/2	3/4	15	3/16	1/8	1/4	5
HSEE-288	18	8	3/4	1/2	3/4	15	3/16	1/8	1/4	5
HSEE-320	20	8	3/4	1/2	3/4	15	3/16	1/8	1/4	5
HSEE-384	24	10	3/4	1/2	3/4	15	3/16	1/8	1/4	5

WARNING: Do not elongate rubber expansion joints when installing for suction service.

** - Non concurrent ratings.

Customer Poseidon inc.

Project

Purchase Order or Request

Drawn by	EP	Date	09-11	Checked by	JFP	Date	09-11	Scale	N/A

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HEBDRAULIQUE®
WWW.HEBDRAULIQUE.CA
flexible@hebdraulique.ca
Toll free: 1-800-461-5966

Description

Single arch EPDM rubber joint with carbon steel 150# floating flanges

No. dessin	HSEE	Rev.	2

Project:	Kadant Black Clawson LLC, Chesapeake, VA USA
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No.: 8020 416726284_rev1 Date: 02.09.2020 Page 1 / 5

Pos.	Quantity	Part No.	-	-
01	1 PC		-	-
	Helical-worm gearmotor SA67/T DRN71M4/DH	for Sludge Thickener system		



Remark:
Colour and technical specifications may vary from the picture shown. The technical specification is according to the following data.

Links to documentation:

Speed [r/min]	: 1730 / 8.0
Total ratio [i]	: 217,41 / infinite
Ma max [Nm]	: 520
Output torque [Nm]	: 300
Service factor SEW-FB	: 1,70
Mounting position	: M1A
Term.box.pos.[°] / cable entry	: 270 (T) / position 3
Lubricant / -volume [l]	: CLP HC 460 Synth.Oil / 1,00
Oil manufacturer designation	: Mobil SHC 634
Condensation drain hole	: DH - drain hole
Corrosion protection	: Yes
Special measure	: Contour recesses injected with rubber.
Surface protection	: OS4 to technical data sheet 01802__94
Paint coat	: Top coat RAL7031 (blue gray)
Hollow shaft	: 1.500 inch
Design	: Hollow shaft
Safety cover	: None

No.: 8020 416726284_rev1 Date: 02.09.2020

Pos.	Quantity	Part No.	-	-

General access. feature	: T with torque arm
Documentation no. A	: 25803530
	29151457
Parts list	: 282561496
Motor power [kW]	: 0.37
Motor power [HP]	: 0.50
Motor frequency [Hz]	: 60
Cyclic duration factor S1-S10	: S1
Motor voltage [V] / conn. type	: 230/460 double star/star
Rated current [A]	: 1,83 / 0,91
cos phi	: 0,62
Wiring diagram	: R76 / 680430506
Connection set at factory	: Star
Thermal cl.[°C]/Enclosure[IP]	: 155(F) / 55
Service factor motor	: 1.15
International efficiency class	: IE3
Efficiency	
at 50/75/100% Pn [%]	: 74,3 / 77,7 / 78,5
CE mark	: Yes
Design specification	: USA (UR) /Canada (CSA)
EISA identification	: Yes, conform to EISA
K.V.A.code	: K
Fan guard	: Metal fan guard
Terminal box	: Terminal box lower part made of aluminum with tapped hole 2xNPT 1/2"
CT speed range	: 300-1800rpm
Documentation no. A	: 25957074
Nameplate	: English
Nameplate position	: 180°
Opera.instr. A lang./quantity	: English
Parts list/language/quantity	: English / 0
Commodity code	: 85015100

net weight [KG] : approx. 36/PC 36/Pos.

HEAD OFFICE: SIEGE SOCIAL:
SEW-EURODRIVE COMPANY OF CANADA LTD.
SOCIÉTÉ SEW-EURODRIVE DU CANADA LTÉE.
210 Walker Dr.
Bramalea, ON L6T 3W1
Tel: (905) 791-1553
Fax: (905 791-2999

Eastern Plant: Usine de l'est:
SEW-EURODRIVE COMPANY OF CANADA LTD.
SOCIÉTÉ SEW-EURODRIVE DU CANADA LTÉE.
2001 Rue de l'Aviation
Dorval, QC H9P 2X6
Tel: (514) 367-1124
Fax: (514) 367-3677

Western Plant: Usine de l'ouest:
SEW-EURODRIVE COMPANY OF CANADA LTD.
SOCIÉTÉ SEW-EURODRIVE DU CANADA LTÉE.
7188 Honeyman Street
Tilbury Industrial Park
Delta, BC V4G 1G1
Tel: (604) 946-5535
Fax: (604) 946-2513

GST VENDOR: R104809033
QST VENDOR: 1001084841

PROVINCIAL SALES TAX:
QC - M-10-0108-4841-001
BC - 1014-7503

Certified System ISO 9001

SEW EURODRIVE

No.: 8020 416726284_rev1 Date: 02.09.2020

Pos.	Quantity	Part No.	-	-
02	1 PC		-	-

Helical-worm gearmotor
SA77/T DRN90S4/DH

for Sludge Scraper system



Remark:
Colour and technical specifications may vary from the picture shown. The technical specification is according to the following data.

Links to documentation:

Speed [r/min]	: 1762 / 6.9
Total ratio [i]	: 256,47 / infinite
Ma max [Nm]	: 1270
Output torque [Nm]	: 1110
Service factor SEW-FB	: 1,15
Mounting position	: M1A
Term.box.pos.[°] / cable entry	: 270 (T) / position 3
Lubricant / -volume [l]	: CLP HC 460 Synth.Oil / 1,80
Oil manufacturer designation	: Mobil SHC 634
Condensation drain hole	: DH - drain hole
Corrosion protection	: Yes
Special measure	: Contour recesses injected with rubber.
Surface protection	: OS4 to technical data sheet 01802__94
Paint coat	: Top coat RAL7031 (blue gray)
Hollow shaft	: 2.000 inch
Design	: Hollow shaft
Safety cover	: None

No.: 8020 416726284_rev1 Date: 02.09.2020 Page 4 / 5

Pos.	Quantity	Part No.	-	-

General access. feature	: T with torque arm
Documentation no. A	: 25803530
	29151457
Parts list	: 282571496
Motor power [kW]	: 1.1
Motor power [HP]	: 1.5
Motor frequency [Hz]	: 60
Cyclic duration factor S1-S10	: S1
Motor voltage [V] / conn. type	: 230/460 double star/star
Rated current [A]	: 4,60 / 2,30
cos phi	: 0,69
Wiring diagram	: R76 / 680430506
Connection set at factory	: Star
Thermal cl.[°C]/Enclosure[IP]	: 155(F) / 55
Service factor motor	: 1.15
International efficiency class	: IE3
Efficiency	
at 50/75/100% Pn [%]	: 83,5 / 86,1 / 86,5
CE mark	: Yes
Design specification	: USA (UR) /Canada (CSA)
EISA identification	: Yes, conform to EISA
K.V.A.code	: M
Design	: NEMA C
Fan guard	: Metal fan guard
Terminal box	: Terminal box lower part made of aluminum with tapped hole 2xNPT 1/2"
CT speed range	: 300-1800rpm
Documentation no. A	: 25957074
Nameplate	: English
Nameplate position	: 180°
Opera.instr. A lang./quantity	: English
Parts list/language/quantity	: English / 0
Commodity code	: 85015220

net weight [KG] : approx. 68/PC 68/Pos.

HEAD OFFICE: SIEGE SOCIAL:
SEW-EURODRIVE COMPANY OF CANADA LTD.
SOCIÉTÉ SEW-EURODRIVE DU CANADA LTÉE.
210 Walker Dr.
Bramalea, ON L6T 3W1
Tel: (905) 791-1553
Fax: (905 791-2999

Eastern Plant: Usine de l'est:
SEW-EURODRIVE COMPANY OF CANADA LTD.
SOCIÉTÉ SEW-EURODRIVE DU CANADA LTÉE.
2001 Rue de l'Aviation
Dorval, QC H9P 2X6
Tel: (514) 367-1124
Fax: (514) 367-3677

Western Plant: Usine de l'ouest:
SEW-EURODRIVE COMPANY OF CANADA LTD.
SOCIÉTÉ SEW-EURODRIVE DU CANADA LTÉE.
7188 Honeyman Street
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Certified System
ISO 9001

No.: 8020 416726284_rev1 Date: 02.09.2020 Page 5 / 5

Do you require additional information regarding your quotation?
The transaction overview offers you a compact overview of all your current quotations after initial activation:
https://www.sew-eurodrive.ca/os/c/main.do?viewset=OVERVIEW&type=quotation&language=EN_US&utm_source=output
It also contains CAD data, documentations, or technical product data for the relevant products.

Links to dimension sheets:
Item 01
- https://www.drivegate.biz/docu/mb/024ed3cb-f951-4556-b5be-2254b54a8ffe
- https://www.drivegate.biz/docu/mb/f7632984-2fc6-47d0-bdac-e973664d9984

Item 02
- https://www.drivegate.biz/docu/mb/2f00bc98-024d-4686-8084-7aef56581d2c
- https://www.drivegate.biz/docu/mb/36a1068e-7ade-4ce4-811a-ce7f5142d731

For and on behalf of SEW-EURODRIVE Canada

This document has been computer generated and is valid with or without signature.
Our terms and conditions apply exclusively to this order and are available online at http://www.sew-eurodrive.ca

Please provide our document number 416726284 with each correspondence.

HEAD OFFICE: SIEGE SOCIAL:
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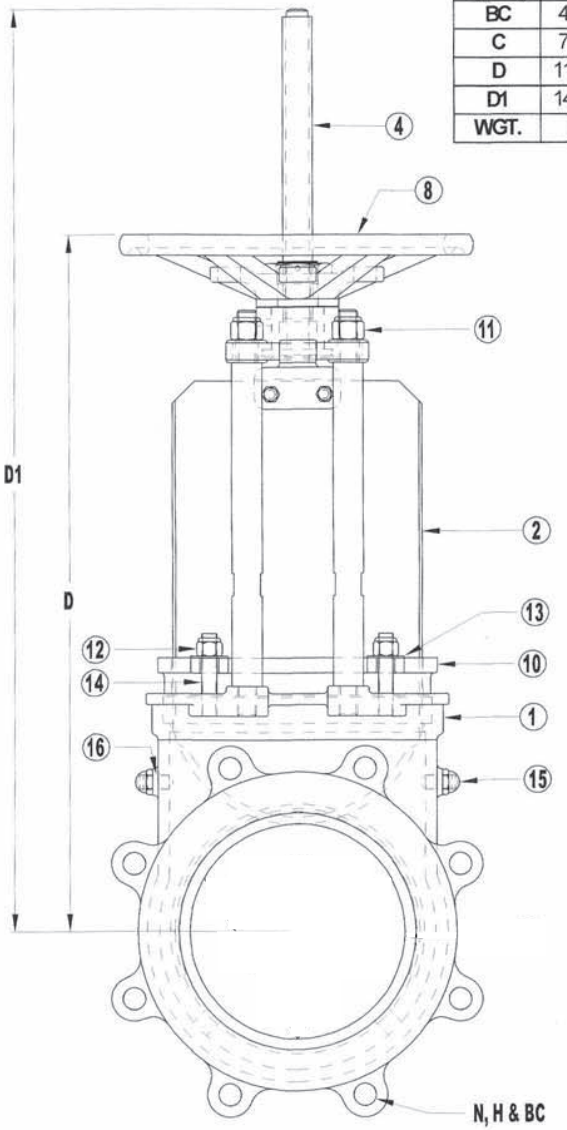
Certified System ISO 9001

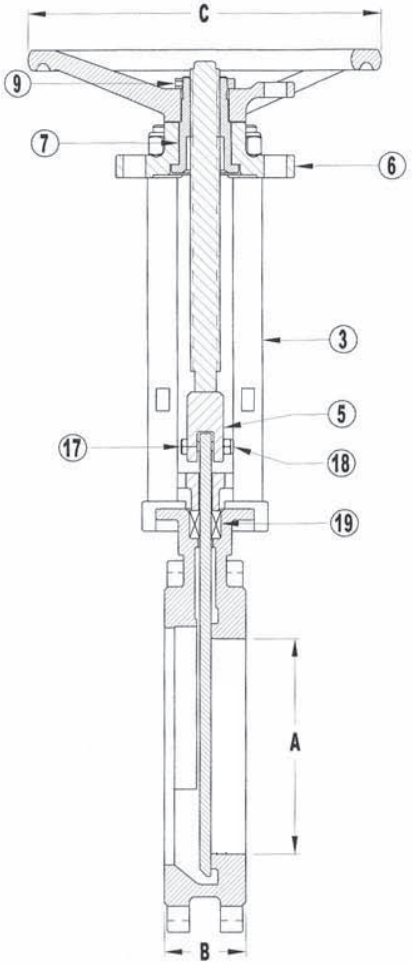
Project:	Kadant Black Clawson LLC, Chesapeake, VA USA
P.O. Number:	787140
SUEZ Project Number:	7779-22
Equipment:	Suez-Poseidon® S500TCE10E
Date:	August 22nd, 2022
Revision #:	1
SUEZ Address:	1145 Jean-Marchand Lévis, Québec G6Y 9G5 (418) 833-7797

Equipment name	Knife Gate valve - Manual
Application	Recirculation Control

Description	Specification	rev.
Construction		
Manufacturers	North Port Valve	
Valve model #	N437C	
Valve diameter	6"	
Pressure class rating	150#	
Flange connection	Match Flange ANSI B16.5 RF	
Valve design	Rising Stem	1
Body style	Lug	
Flow	Full Port, Unidirectional Flow	
Seat	Metal	
Materials		
Body	CG8M (Stainless Steel 317)	
Knife Gate	Stainless Steel 316L	
Packing	Teflon	
Operation		
Operation type	Manual, handweel	
Handwheel diameter	9"	

	2"	3"	4"	5"	6"	8"	10"	12"	14"	16"
A	2"	3"	3 3/4"	4 7/8"	5 3/4"	7 5/8"	9 1/2"	11 1/8"	13 3/16"	15 35/64"
B	1 7/8"	2"	2"	2 1/4"	2 1/4"	2 3/4"	2 3/4"	3"	3"	3 1/2"
N(HOLES)	4	4	8	8	8	8	12	12	12	16
H(TAP)	5/8" - 11	5/8" - 11	5/8" - 11	3/4" - 10	3/4" - 10	3/4" - 10	7/8" - 9	7/8" - 9	1" - 8	1" - 8
BC	4 3/4"	6"	7 1/2"	8 1/2"	9 1/2"	11 3/4"	14 1/4"	17"	18 3/4"	21 1/4"
C	7 1/2"	7 1/2"	7 1/2"	9"	9"	11 3/4"	11 3/4"	15 3/4"	15 3/4"	15 3/4"
D	11 5/8"	13 1/2"	15"	17"	18 1/4"	23"	28"	31 7/8"	36 7/8"	44 1/2"
D1	14 3/4"	17 1/8"	19"	22 3/8"	23 1/2"	30 5/8"	37 1/2"	43 7/8"	50 5/8"	60 1/2"
WGT.	21	27	32	38	48	86	120	164	228	390



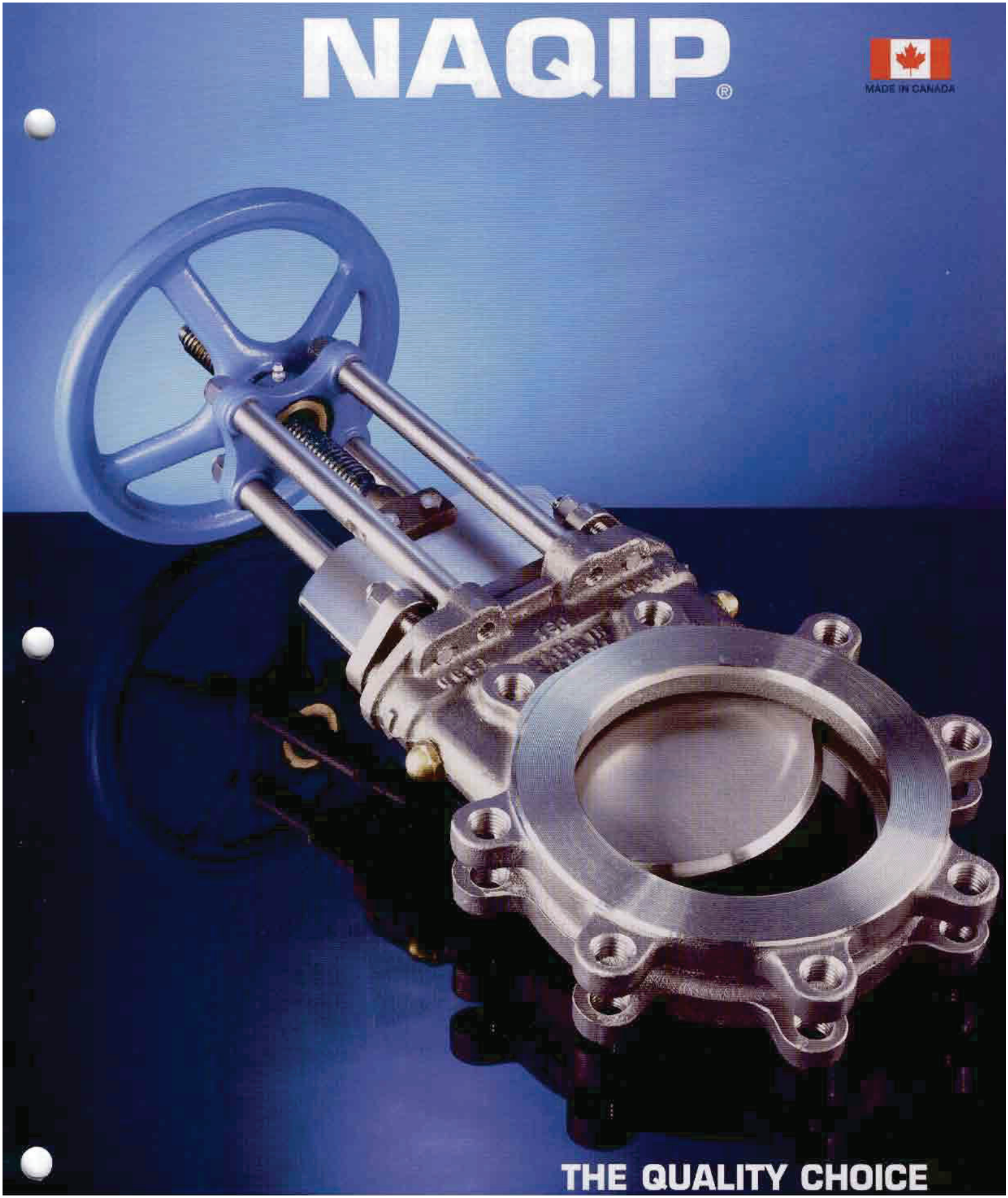


#	PART NAME	MATERIAL
1	BODY	CG8M (317 S.S.)
2	GATE	316L S.S.
3	STANCHION	303 S.S.
4	STEM	303 S.S.
5	COUPLING	CG8M (317 S.S.)
6	BRIDGE	ALUMINUM 356
7	YOKE SLEEVE	660 BRONZE
8	HANDWHEEL	ALUMINUN
9	HANDWHEEL NUT	NAVY BRASS
10	GLAND	CG8M (317 S.S.)
11	BRIDGE NYLOCK NUT	18.8 S.S.
12	GLAND NYLOCK NUT	18.8 S.S.
13	GLAND WASHER	18.8 S.S.
14	GLAND STUD	18.8 S.S.
15	ACORN NUT	BRASS
16	ALIGNMENT STUD	18.8 S.S.
17	COUPLING BOLT	18.8 S.S.
18	COUPLING NYLOCK NUT	18.8 S.S.
19	PACKING	TEFLON

NAQIP

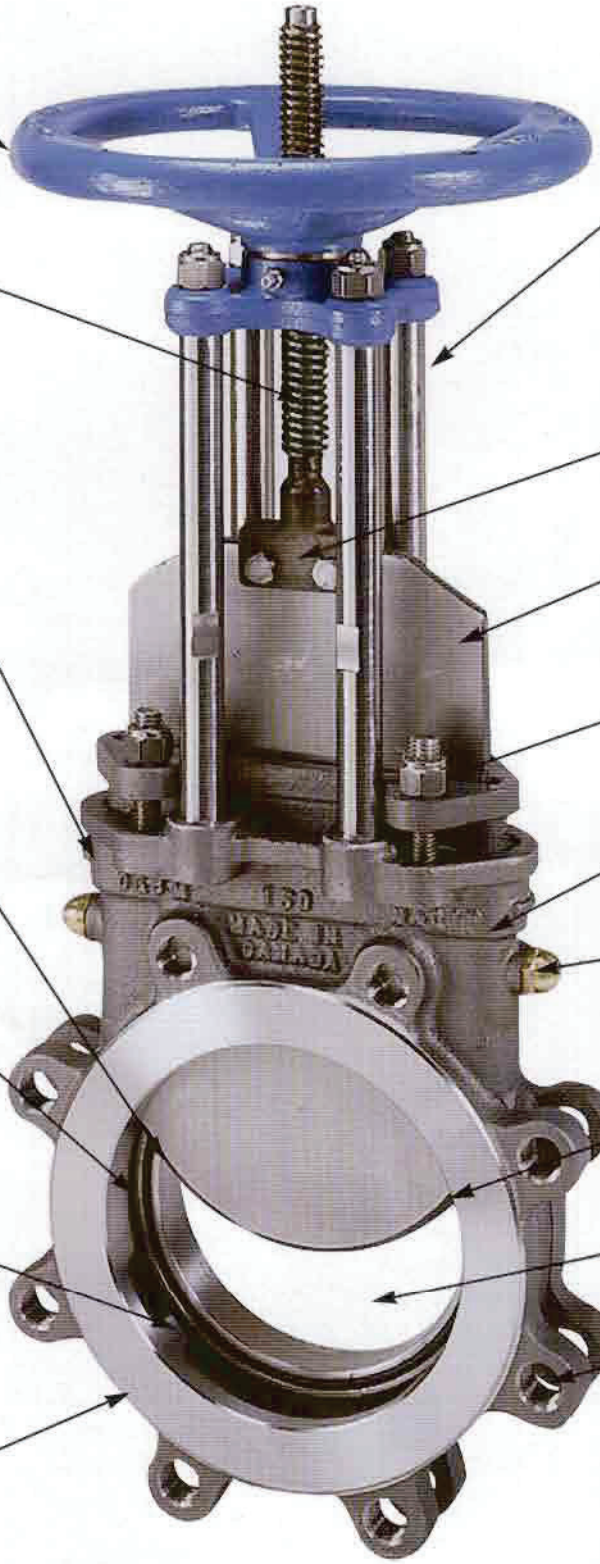
Knife Gate Valve # N437C
Uni-directional Metal Seat

SIZE	DATE	DWG NO.	REV
	12/2011	N437-C	
SCALE		SHEET	


NAQIP®
MADE IN CANADA
THE QUALITY CHOICE

N437C

NAQIP® KNIFE GATE VALVE FEATURES



CONCAVED DUCTILE IRON HANDWHEEL FOR EASE OF OPERATION

DURABLE LARGE DIAMETER STEM ASTM A303 STAINLESS STEEL

LARGE PACKING BOX AREA FOR ADDITIONAL LEAKAGE PROTECTION ASBESTOS FREE PACKING SUITABLE UP TO 500°F AS STANDARD

PRECISION MACHINED SEAT AND LAPPED GATE FOR THE TIGHTEST SHUT OFF COMBINATION

INTEGRAL CAST GUIDES UP TO 75% OR 270° OF TRAVEL FOR BACK PRESSURE SUPPORT

GATE "LOCK UPS" ENSURE PROPER SEALING IN FINAL CLOSING STAGE

RUGGED ONE PIECE BODY CAST TO ASTM A351 CG8M STAINLESS STEEL 317

303 STAINLESS STEEL STANCHIONS DESIGNED FOR DURABILITY AND EASY FIELD MOUNTING OF POWER ASSISTED OPERATORS

HORIZONTAL AXIS GATE COUPLING

316 STAINLESS STEEL GATE 317 AVAILABLE UPON REQUEST

LARGE GLAND AND STUD BOLTS WITH NYLON LOCK NUTS

FLOW PATTERN INDICATOR CAST IN BODY

NAQIP® EXCLUSIVE PATENTED DESIGN GATE GUIDES ON VALVES 3" AND UP

BEVELLED GATE TO CUT THROUGH SOLIDS

LARGE PORT OPENING

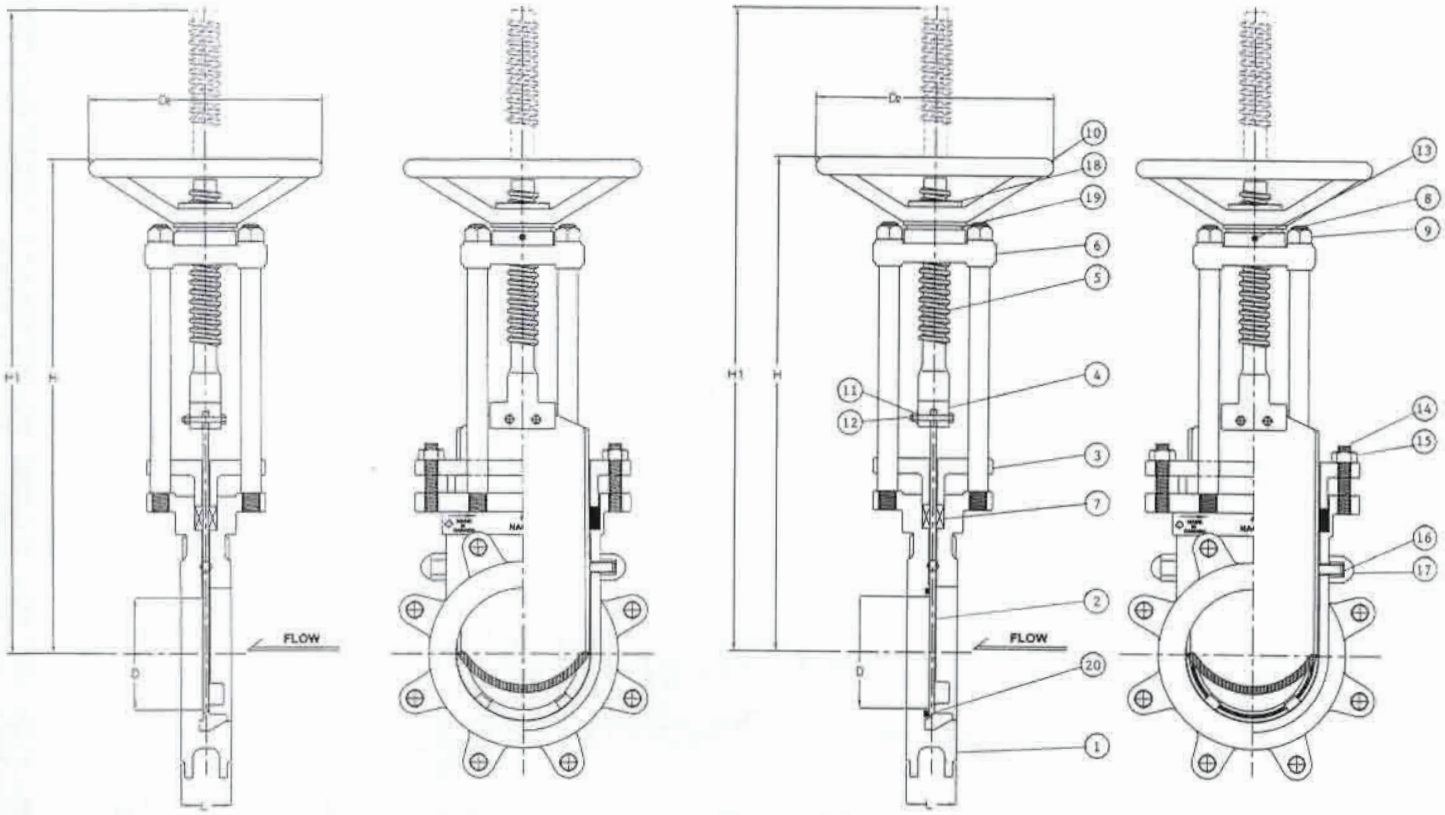
FULL TAPPED AND LUGGED DESIGN SUITABLE TO ANSI B16.5 CLASS 150

AVAILABLE IN METAL TO METAL OR RESILIENT SEATS. RESILIENT SEATS HAVE A VITON O'RING SUITABLE TO MAX. OF 400°F

ALL **NAQIP®** KNIFE GATE VALVES ARE STAINLESS STEEL CAST ASTM A351 GR CG8M AND CONFORM TO THE FOLLOWING STANDARDS TAPPI TIS 0420-04, MSS SP81, ANSI B16.5.

NAQIP® FIG. N437C NAQIP® FIG. N437CR

METAL X METAL SEAT — RESILIENT SEAT



DIMENSIONS AND WEIGHTS

	M - Seat D		R - Seat D		Face to Face L		Bolt Circle		Flange Holes		D2		H		H1		WEIGHTS	
Size	mm	in	mm	in	mm	in	mm	in	NO	TAP NC	mm	in	mm	in	mm	in	kg	lbs
2	51	2.000	46	1.800	48	1.88	121	4.75	4	5/8 11	191	7.50	295	11.62	375	14.75	10	21
2.5	54	2.125	46	1.800	48	1.88	140	5.50	4	5/8 11	191	7.50	321	12.62	387	15.25	11	24
3	79	3.125	71	2.800	51	2.00	152	6.00	4	5/8 11	191	7.50	343	13.50	435	17.12	12	27
4	95	3.750	90	3.550	51	2.00	191	7.50	8	5/8 11	191	7.50	381	15.00	483	19.00	15	32
5	124	4.875	90	3.550	57	2.25	216	8.50	8	3/4 10	241	9.50	432	17.00	568	22.38	17	38
6	145	5.750	138	5.450	57	2.25	241	9.50	8	3/4 10	241	9.50	464	18.25	597	23.50	22	48
8	194	7.625	181	7.125	70	2.75	298	11.75	8	3/4 10	298	11.75	584	23.00	778	30.62	39	86
10	241	9.500	233	9.180	70	2.75	362	14.25	12	7/8 9	298	11.75	711	28.00	953	37.50	54	120
12	283	11.125	274	10.800	76	3.00	432	17.00	12	7/8 9	400	15.75	810	31.88	1114	43.88	74	164
14	335	13.180	316	12.437	76	3.00	476	18.75	12	1 8	400	15.75	937	36.88	1286	50.62	103	228
16	395	15.550	380	14.950	89	3.50	540	21.25	16	1 8	400	15.75	1130	44.50	1537	60.50	177	390
18	443	17.450	428	16.850	89	3.50	578	22.75	16	11/8 7	508	20.00	1226	48.25	1676	66.00	200	438
20	491	19.350	476	18.750	114	4.50	635	25.00	20	11/8 7	508	20.00	1369	53.88	1870	73.62	286	630
24	584	23.000	565	22.250	114	4.50	749	29.50	20	11/4 7	600	23.62	1549	61.00	2153	84.75	436	960
30	719	28.300	591	27.200	114	4.50	914	36.00	28	11/4 7	679	26.75	1842	72.50	2692	106.00	634	1390
36	838	33.500	762	30.000	127	5.00	1086	42.75	32	11/2 7	800	31.50	2286	90.00	3277	129.00	830	1820
42	AVAILABLE UPON REQUEST																	
44	AVAILABLE UPON REQUEST																	

BILL OF MATERIAL

No.	Name	Material
1	BODY	ASTM A351 GR CG8M
2	GATE	ASTM A240 GR 316
3	GLAND	ASTM A351 GR CG8M
4	COUPLER	ASTM A351 GR CG8M
5	STEM	ASTM A581 GR 303
6	BRIDGE	DUCTILE IRON
7	PACKING	TEFLON
8	STANCHION	ASTM A581 GR 303
9	LOCKNUT	ASTM A479 GR 304 NYLON
10	HANDWHEEL	DUCTILE IRON
11	NUT	ASTM A479 GR 304
12	CAP SCREW	ASTM A479 GR 304
13	GREASE NIPPLE	STEEL
14	STUD	ASTM A479 GR 304
15	LOCKNUT	ASTM A479 GR 304 NYLON
16	SET SCREW	STEEL
17	CAP	BRASS
18	HANDWHEEL NUT	STEEL (UNI-CHROME)
19	YOKE SLEEVE	ALUMINIUM BRONZE
20	O' RING	VITON

* FACTORY ADJUSTED SET SCREW

MILL TEST CERTIFICATES AND MATERIAL CHEMICAL ANALYSIS ARE AVAILABLE UPON REQUEST

AVAILABLE IN MATERIALS:

ASTM A351 GR CF8M
ASTM A351 GR CG8M
ASTM A126 CAST IRON
254 SMO (COPYRIGHT)
TITANIUM

DESIGN AND CONSTRUCTION DETAIL SUBJECT TO CHANGE WITHOUT NOTICE © 1997 QIP EQUIPMENT LTD.

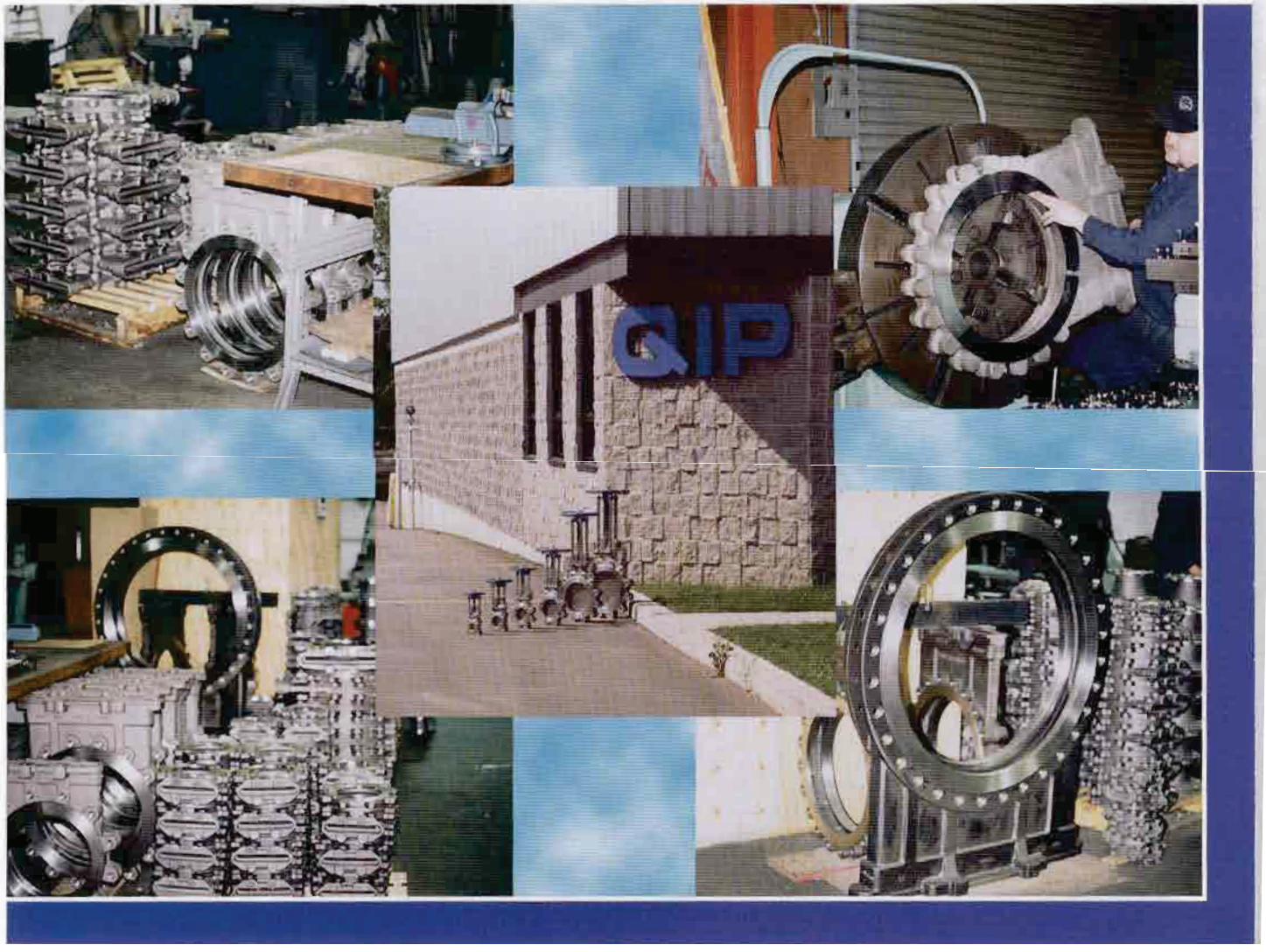
NAQIP® KNIFE GATE VALVE ORDERING CODE SYSTEM

N437C

SIZE	SERIES	SEATS	GATE MATERIAL	BODY MATERIAL	PACKING	VALVE OPERATION	OPTION
2" THRU 48"	**N437C**	**M - METAL** R - RESILIENT SEAT VITON D -DOUBLE SEAT METAL X R.S. X - SPECIFY	1 - 304 ST. ST. **2 - 316 ST. ST.** 3 - 317 ST. ST. 4 - HEAT TREATED 0 - SPECIFY	I - CAST IRON B - 316 ST. ST. **C - 317 ST. ST** S - 254 SMO X - SPECIFY	**T - TEFLON** H - HIGH TEMP X - SPECIFY	**1 - HANDWHEEL** 2 - BEVEL GEAR 3 - PNEUMATIC ACTUATOR 4 - QUICK LEVER OPERATION 5 - RATCHET 6 - ELECTRIC ACTUATOR 7 - AIR CYLINDER 8 - BABBIT CHAINWHEEL 0 - SPECIFY	D - DEFLECTOR CONE V - V-PORT S - SQUARE PORT P - STEM PROTECTOR L - LOCKING DEVICE X - SPECIFY

STANDARD OFFERING **N437C-M-2-C-T-1**

COLOUR CODE	
-----	= METAL SEAT
GREEN	= RESILIENT SEAT
YELLOW	= 317 ST. ST. GATE
RED	= 254 SMO BODY
BLUE	= DOUBLE SEAT



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MADE IN CANADA

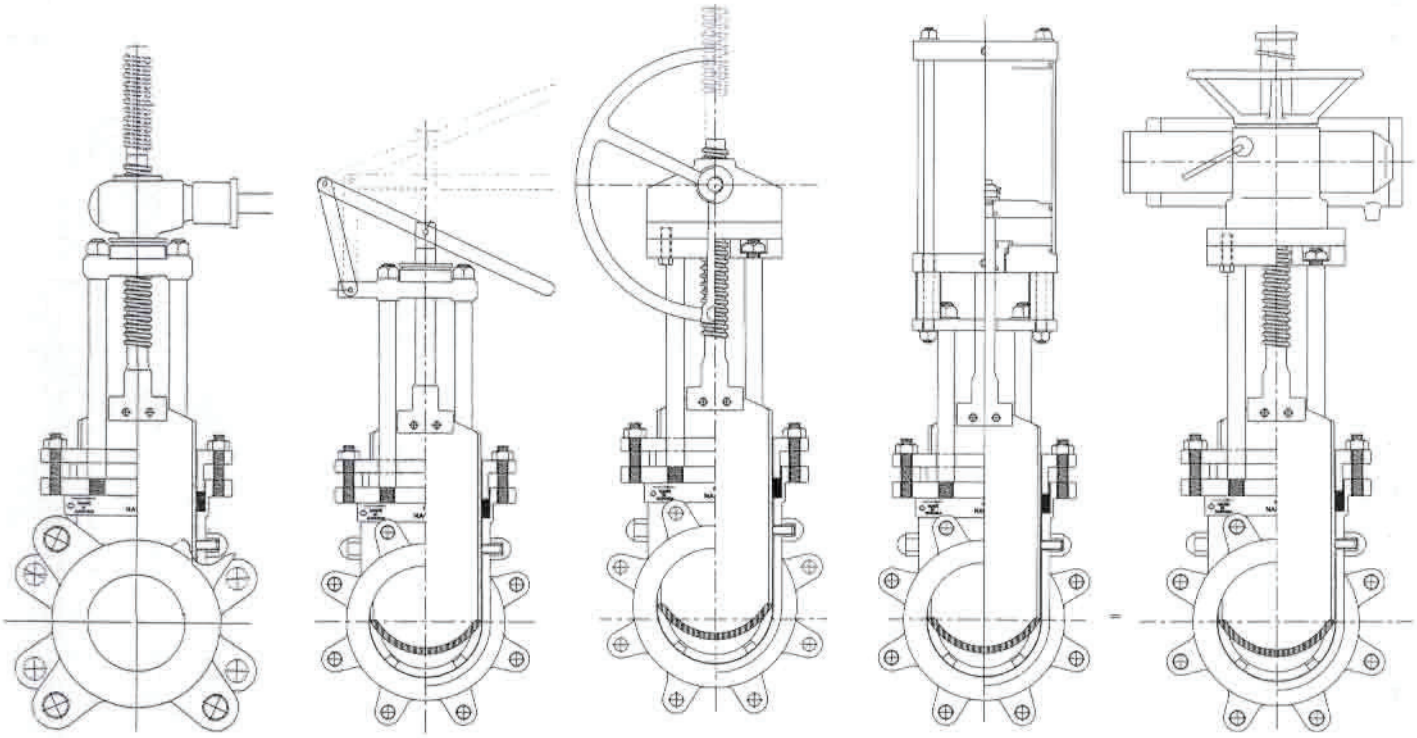
RATCHET OPERATION

QUICK LEVER OPERATION

GEAR OPERATION

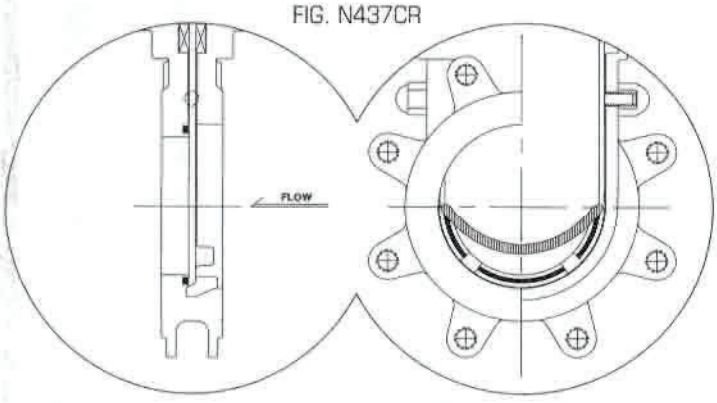
AIR CYLINDER OPERATION

ELECTRIC MOTOR OPERATION



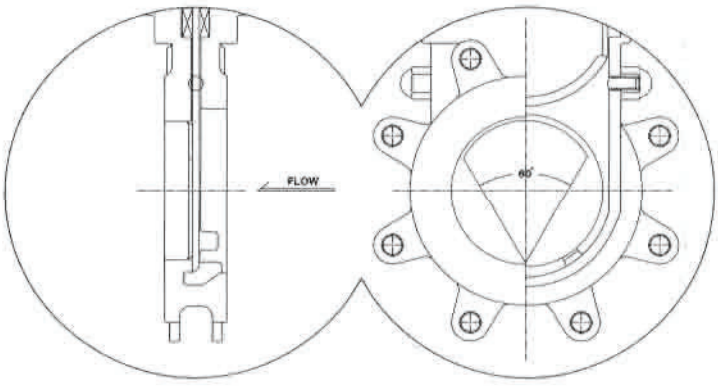
RESILIENT SEAT KNIFE GATE VALVE FOR ONE-WAY SHUT OFF

FIG. N437CR



V-PORT KNIFE GATE VALVE

FIG. N437CV



QIP

ÉQUIPEMENT **QIP** EQUIPMENT LTÉE/LTD

193 BRUNSWICK BLVD.
POINTE CLAIRE, QUÉBEC H9R 5N2
Tél.: (514) 630-6820
Fax: (514) 630-6834

DISTRIBUTED BY

Project:	Kadant Black Clawson LLC, Chesapeake, VA USA
P.O. Number:	787140
SUEZ Project Number:	7779-22
Equipment:	Suez-Poseidon® S500TCE10E
Date:	July 21st, 2022
Revision #:	0
SUEZ Address:	1145 Jean-Marchand Lévis, Québec G6Y 9G5 (418) 833-7797

Equipment	Poseipump (centrifugal pump)
Application	DAF Recirculation Pump System

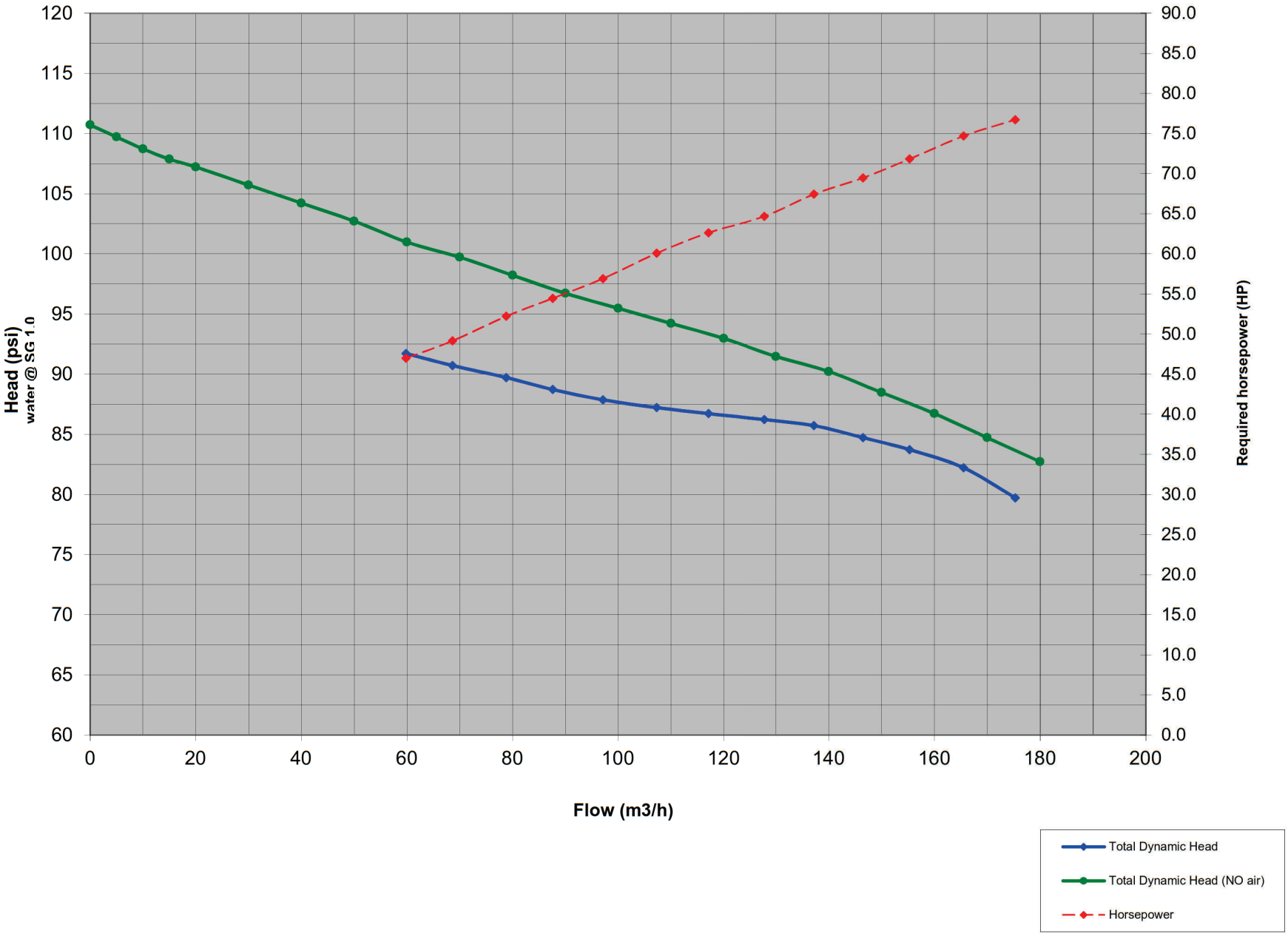
Description	Specification	REV
Design		
Manufacturers	Poseidon	
Model #	403-PF-13.5-2CV	
Pump type	Centrifugal Belt Driven, with gas injection feature	
Flange diameter, Inlet / Outlet	4" / 3"	
Impeller diameter	13.5"	
Flange connection	ANSI B16.5 150# RF	
Pump seal	Mechanical seal, John Crane single Type 21 2.5"	
Seal flush plan	Plan 03	
Bearings, Qty. Inboard / Outboard	1x 6213 / 2x 7311	
Bearing Isolators	Labyrinth Seal	
Gas injection Flexible Tube connection	3/8"NPT	
Pump Rotation	Clockwise - 2050 rpm	
Pump Drive Shaft diameter / key size	1-7/8" / 1/2"x3"	
Pump Weight	525 lbs	
Materials		
Bearing frame	Cast iron	
Casing	ASTM A351 CF3M	
Impeller	ASTM A351 CF3M	
Impeller Back Plate	SA240-316/316L	
Drive Shaft	SA276/SA479-316/316L	
Shaft Sleeve	SA276/SA479-316/316L	
Gas injection Flexible Tube	stainless Steel 316	
Rotary Joint Housing	Aluminum	
Bearing Isolators	Bronze	
Pump paint	Epoxy coating	
Oil Type / Quantity (liter)	10W30 / 2.2L	

Mechanical Drivers		
Motor power installed	75 HP - 1780 rpm	
Driver pulley (motor)	Dodge 4GR5V 11.3", cast iron - epoxy painted	
Driven pulley (pump)	Dodge 4GR5V 9.75", cast iron - epoxy painted	
Motor bushing	E-2 3/8", cast iron - epoxy painted	
Pump bushing	E-1 7/8", cast iron - epoxy painted	
Belt type	Continental HY-T Wedge 4GR5VX900 (cogged)	
Speed ratio - Pump/Motor	1,154	
Operating Data		
Fluid SG (estimated)	1,0	
Pump Operating Temperature Range	-29 to 60°C / -20 to 140°F (note 1)	
Sound Pressure @ 3 ft	85 dBA (note 2)	
Maximum Shutoff Head	112 psig	
Operating Flow	90 m^3/h / 396 usgpm	
Operating Pressure (with air injected)	89 psig	
Pump inlet pressure required	9 ft wc. min.	

NOTES:

1. Pump bearing frame MDMT is -20oF. Pump must be winterized for material temperature and to avoid any freezing if pump is stopped.
2. With proper winterization insulation
3. Pump will always operate at same flow and pressure.

Poseipump 403, Impeller 13.5", 2050 rpm, *Curve 403-13.5-2050-R2*



MaximizerPro™ Drive Selection Analysis Program

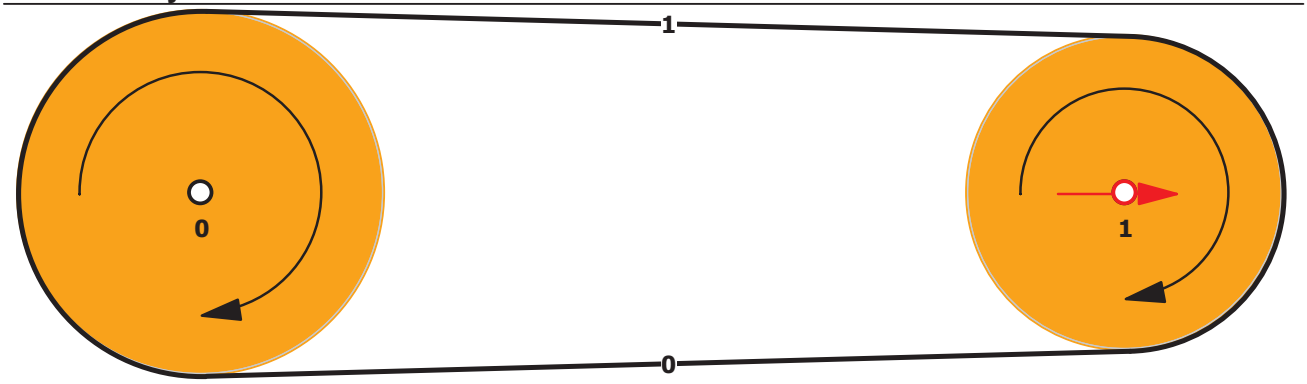
DRIVE DETAILS

Belt

Torque Team

Belt part number: 4/5VX900
Belt speed; Mass: 5251 ft/min; 0.217 kg/m
Belt power rating: 141.7 Hp
Center Distance: 28.46 Inch
Belt width: 2.75 Inch
Belt noise: N/A dB(A)
Required; Actual service factor: 1.3; 1.9
Annual Energy Used ($); Energy Costs: 33262; 0.062 $/kWh

Belt drive layout



Pulley

Pulley	X [Inch]	Y [Inch]	Teeth	Datum Diameter [Inch]	Outside Diameter [Inch]	Speed [revs/min]	Width [Inch]	Weight [Lbs]
0	0.00	0.00	/	11.30	11.30	1775.0	3.16	33.1
1	28.46	0.00	/	9.75	9.75	2047.7	3.16	29.2

Pulley	Sprocket part number & bushing	Shaft size [Inch]/[Inch]	Absorbed power [Hp]	Required service factor	Side	Type
0	5V11.3-4 -E	N/A	75.0	N/A	Inside	Fixed
1	5V9.75-4 -E	N/A	75.0	1.3	Inside	Fixed

Hub loads & tensioning

Span	Operating hub load (used) [Lbs]	Installation hub load (new; used) [Lbs]	Deflection force (new; used) [Lbs]	Deflection [Inch]	Span length [Inch]	Frequency (new;used) [Hz]
0	929.5	1810.3; 1206.9	56.6; 37.8	0.44	28.45	47.1; 38.5
1	929.5	1810.3; 1206.9	56.6; 37.8	0.44	28.45	47.1; 38.5

Installation strand tension

Installation strand tension (new, used): 905.5 Lbs 603.7 Lbs

Comments

Recommended center distance movement for installation and take up: -2.09 Inch 1.57 Inch
Speed-up drive!
Check shaft lengths!
Ensure Driver and Driven bearings can handle hub load!
Drive must be properly aligned to give intended service life!

Project:	Kadant Black Clawson LLC, Chesapeake, VA USA
P.O. Number:	787140
SUEZ Project Number:	7779-22
Equipment:	Suez-Poseidon® S500TCE10E
Date:	August 22nd, 2022
Revision #:	1
SUEZ Address:	1145 Jean-Marchand Lévis, Québec G6Y 9G5 (418) 833-7797

Equipment name	**Dial Pressure Gauges**
Application	Recirculation (Poseipump)

Description	Specification
Recirculation pressure	**Pressure gauge & Diaphragm**
Pressure Gauge Manufacturer	Trerice
Model #	D80
Pressure range (measure)	0-160 psig (center kPa)
Gauge type	2-1/2", liquid filled
Dial type	White background, black marking
Connection - location, material	1/4" MNPT, back, brass
Material - Case	Stainless steel 304
Material - Bourdon & Socket	bronze tube / brass socket
Diaphragm Manufacturer	Trerice
Model #	205
Material	Stainless steel 316
Connection - location, material	1/4" FNPT, back, Stainless steel 316
Fluid	DC200 silicone oil

D80 Series

Liquid Filled • Stainless Steel Case

UTILITY GAUGES



D82LFB shown

- **2", 2½", 4" Dial Sizes**
- **±1.6% Accuracy**
- **Stainless Steel Case**
- **Glycerine Fill Standard**

The Trerice **D80 Series** Utility Gauge is designed for rugged performance requirements at an economical cost. This liquid filled gauge is furnished with a stainless steel case and crimped ring. Wetted parts are either bronze tube with brass socket or stainless steel.

- Optional features and case style variations available: Please consult the Options & Accessories Section for details.
- For correct use and application of all pressure gauges, please refer to: Pressure Gauge Standard ASME B40.100.

Specifications

Models		Wetted Parts
D82LFB	(liquid filled)	Bronze tube, brass socket
D83LFSS	(liquid filled)	316 Stainless steel tube & socket

Dial Sizes	2", 2½", 4"
Fill	Glycerine, other fills available See Optional Features Section
Movement	**D82LFB**: Brass **D83LFSS**: 316 Stainless steel
Connection	Lower male or center back male, ¼ NPT
Case	304 stainless steel, stem-mounted flangeless
Ring	Crimped 304 stainless steel
Window	Acrylic
Pointer	Plain, black finished
Dial Face	Aluminum, white background with black graduations and markings
Accuracy	±1.6% Full Scale
Maximum Temperature	**150°F (65°C)**
Approximate Shipping Weight	2" Dial Size: 0.4 lbs [0.18 kg] 2½" Dial Size: 0.5 lbs [0.23 kg] 4" Dial Size: 1.0 lbs [0.45 kg]

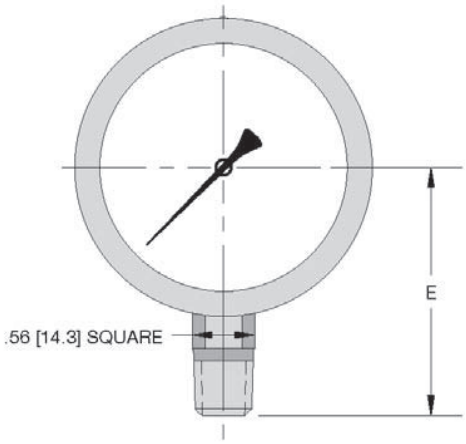
HOW TO ORDER

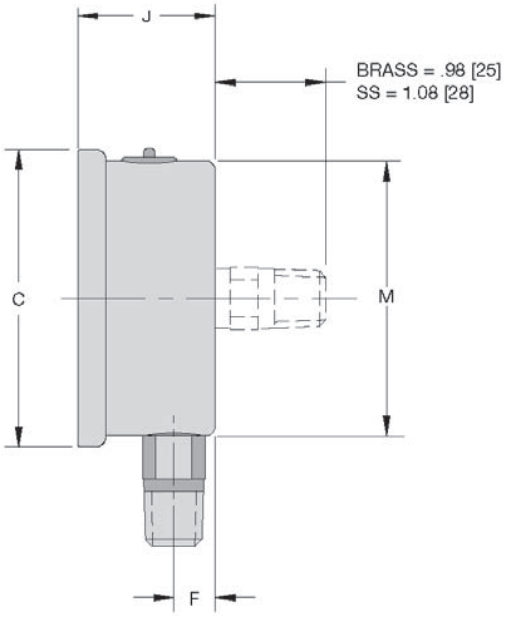
Sample Order Number: **D82LFB 25 02 L A 110**

Model	Dial Size	Connection Size	Connection Location	Units of Measure	Range Code
D82LFB **D83LFSS**	**20** 2" **25** 2½" **40** 4½"	**02** ¼ NPT	**L** Lower **B** Back	**A** psi **D** psi/kPa	See Standard Ranges

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All dimensions are nominal. Dimensions in [ ] are in millimeters.





Standard Ranges

psi Ranges (A)			
Range Code	**Specific Range (psi)**	**Figure Intervals**	**Minor Divisions**
010	30" Hg to 0	5	0.5
020	30" Hg to 15 psi	10/5	1/0.5
030	30" Hg to 30 psi	10/10	2/1
040	30" Hg to 60 psi	30/20	2/2
050	30" Hg to 100 psi	30/20	5/2
060	30" Hg to 150 psi	30/20	10/5
070	30" Hg to 300 psi	30/30	5/10
080	0 to 15 psi	3	0.2
090	0 to 30 psi	5	0.5
100	0 to 60 psi	10	1
110	0 to 100 psi	20	2
120	0 to 160 psi	20	2
130	0 to 200 psi	50	5
140	0 to 300 psi	50	5
150	0 to 400 psi	100	10
160	0 to 600 psi	100	10
180	0 to 1000 psi	200	20
190	0 to 1500 psi	300	20
200	0 to 2000 psi	500	50
210	0 to 3000 psi	500	50
220	0 to 5000 psi	1000	100
	Ranges over 5000 psi are not available in D82LFB.		
230	0 to 10,000 psi	2000	200
240	0 to 15,000 psi	3000	200

*For dual scale ranges specify the appropriate **Units of Measure: D** (psi/kPa) followed by the corresponding **A** (psi) **Range Code**.*

Dial Size	C	E	F	J	M
2"	2.09 [53.1]	1.91 [48.5]	0.43 [11.0]	1.10 [28.0]	1.94 [49.3]
2½"	2.67 [67.8]	2.22 [56.5]	0.37 [9.5]	1.20 [30.5]	2.47 [62.7]
4" Brass	4.18 [106.1]	2.85 [72.3]	0.48 [12.2]	1.32 [33.5]	3.93 [99.7]
4" SS	4.18 [106.1]	3.07 [78]	0.46 [11.8]	1.31 [33.5]	3.93 [99.7]

Mini & Compact
Diaphragm Seals

DIAPHRAGM SEALS



W205 shown

Trerice **Mini & Compact Diaphragm Seals** provide an economical way to isolate and protect pressure instruments from corrosion and clogging.

Style 205 Diaphragm Seals are designed for use with pressure ranges of 100 psi or greater and can be mounted to pressure gauges of 3 1/2" dial size or smaller.

Style 305 Diaphragm Seals are designed for use with pressure ranges of 60 psi or greater and can be mounted to pressure gauges of 4 1/2" dial size or smaller.

Style 306 Diaphragm Seals include all features found on the 305 with the addition of a 1/4 NPT flushing connection.

- **All-Welded Design No Gaskets or Bolts**
- **1/4 NPT or 1/2 NPT Process Connections**
- **316L Stainless Steel Construction**

Selection of the proper diaphragm seal is the sole responsibility of the user. Temperature and pressure limitations must be considered. Please refer to the Diaphragm Seal Design & Operation Section of this catalog. Improper application may cause failure of the seal, resulting in possible personal injury or property damage.

For correct use and application of all diaphragm seals, please refer to Diaphragm Seal Standard ASME B40.2.

SPECIFICATIONS

Style	Diaphragm Type	Diaphragm Size	Minimum Pressure Range	Process Connection	Clean-out Design	1/4 NPT Flushing Connection
205	Welded Metal	Mini	0 to 100 psi when mounted to 3 1/2" gauge	Threaded	No	No
305	Welded Metal	Compact	0 to 60 psi when mounted to 4 1/2" gauge	Threaded	No	No
306	Welded Metal	Compact	0 to 60 psi when mounted to 4 1/2" gauge	Threaded	No	Yes

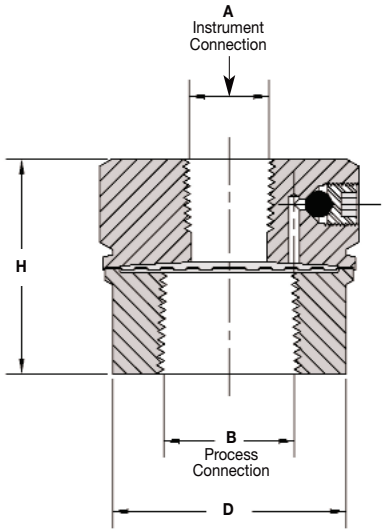
HOW TO ORDER

Sample Order Number: **W 2 05 01 S S S**

Diaphragm Type	Diaphragm Size	Style	Connection Size	Diaphragm Material	Process Housing Material	Instrument Housing Material
W Welded	**2** Mini **3** Compact	**05** Non Clean-out, Welded Body **06** Flushing, Welded Body	See Connection Sizes Table	**S** 316 SS	**S** 316 SS	**S** 316 SS

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All dimensions are nominal. Dimensions in [ ] are in millimeters.



Style	A	B	H	D
205	1/4 NPT	1/4, 1/2 NPT as specified	1.24 [31]	1.35 [34]
305	1/4, 1/2 NPT as specified	1/4, 1/2 NPT as specified	1.75 [44]	2.25 [57]
306	1/4, 1/2 NPT as specified	1/4, 1/2 NPT as specified	1.50 [38]	1.89 [48]

Sizes

Connection Sizes

Code	Instrument Connection (NPT)	Process Connection (NPT)
01	1/4	1/4
02*	1/2	1/4
03	1/4	1/2
04*	1/2	1/2

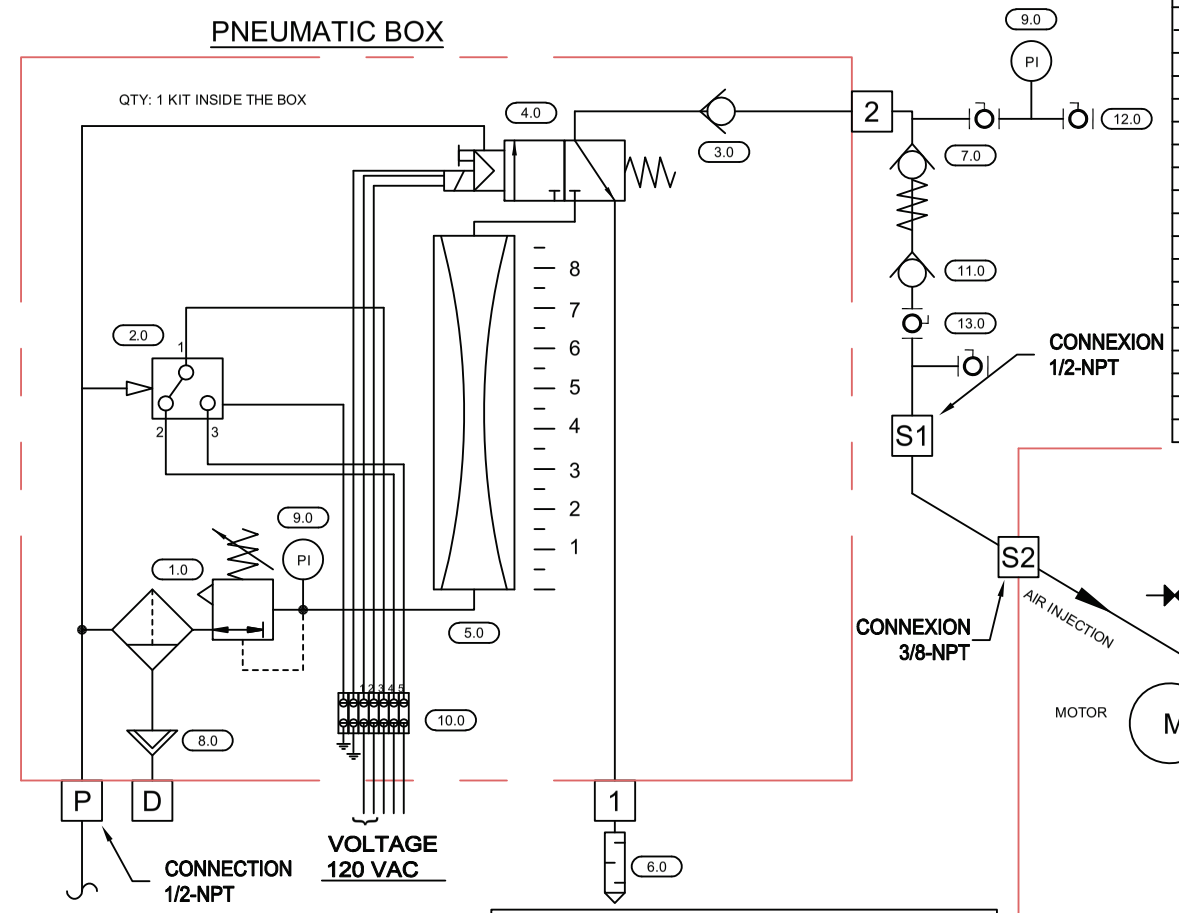
* Not available on style 205.

Section 14 – Drawings

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PNEUMATIC BOX

QTY: 1 KIT INSIDE THE BOX



BILL OF MATERIAL

NO	POSEIDON PART	QTY	DESCRIPTION	SUP. BY
1	----	1	FILTER REGULATOR UNIT	SUEZ POSEIDON
			FESTO # LFR-1/4-D-MINI-A	
2	----	1	PRESSURE SWITCH	SUEZ POSEIDON
			FESTO # PEV-1/4-B	
3	----	1	CHECK VALVE	SUEZ POSEIDON
			FESTO H-3/8-B	
4	----	1	SINGLE SOLENOID VALVE	SUEZ POSEIDON
			FESTO # MFH-3-1/4-S	
5	----	1	ROTAMETER, OMEGA # FL4611-V	SUEZ POSEIDON
6	----	1	SILENCER	SUEZ POSEIDON
			FESTO # U-1/4	
7	----	1	BACK PRESSURE VALVE 1/2"Ø	SUEZ POSEIDON
			GRIFFCO # BPG050-S	
8	----	1	AUTOMATIC CONDENSATE DRAIN	SUEZ POSEIDON
			FESTO # WA-2	
9	----	2	PRESSURE GAUGE	SUEZ POSEIDON
			FESTO 0 A 150 LBS	
10	----	1	ELECTRICAL TERMINAL, FESTO	SUEZ POSEIDON
11	----	1	CHECK VALVE 1/2"	SUEZ POSEIDON
			SWAGELOK # SS-CHM8-10	
12	----	2	BALL VALVE PINACLE 1/4" 1000 WOG	SUEZ POSEIDON
13	----	2	BALL VALVE PINACLE 1/2" 1000 WOG	SUEZ POSEIDON

CERTIFIED DRAWING

By: H. Lessard

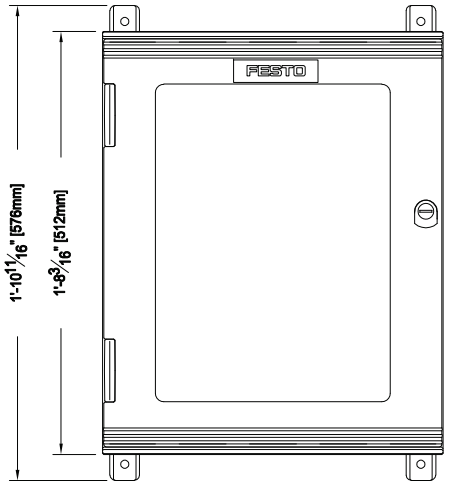
Date: August 23th, 2022

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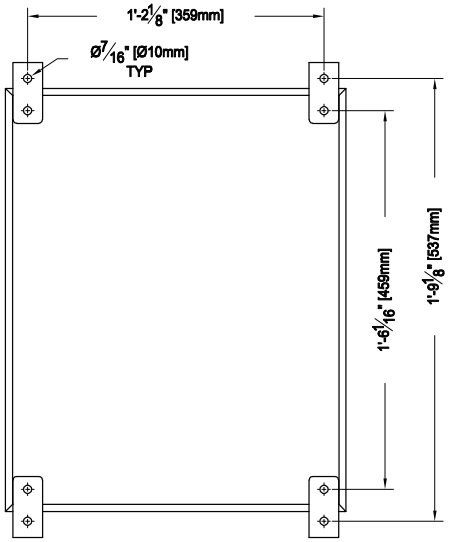
CLIENT: CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ: PROJ. NO.: 7779-22	0	2022-07-20	FOR APPROVAL		N.C.	H.L.
TITRE: TITLE: Recirculation Pneumatic box	DATE: 2022-07-20	NO	DATE	REVISION		DESS.	VER.
	DESS. PAR: DRAWN. BY: N. Chartier	ECH.: SCALE: N.T.S.		DESSIN NO.: DRAWING NO.: 404-03-991006			
	VER. PAR: VER. BY: H. Lessard	FORMAT: A					

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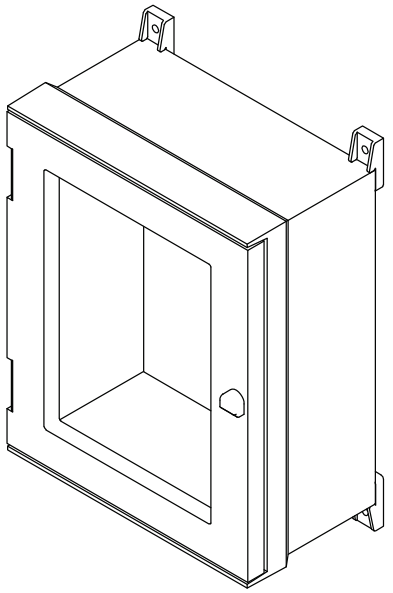
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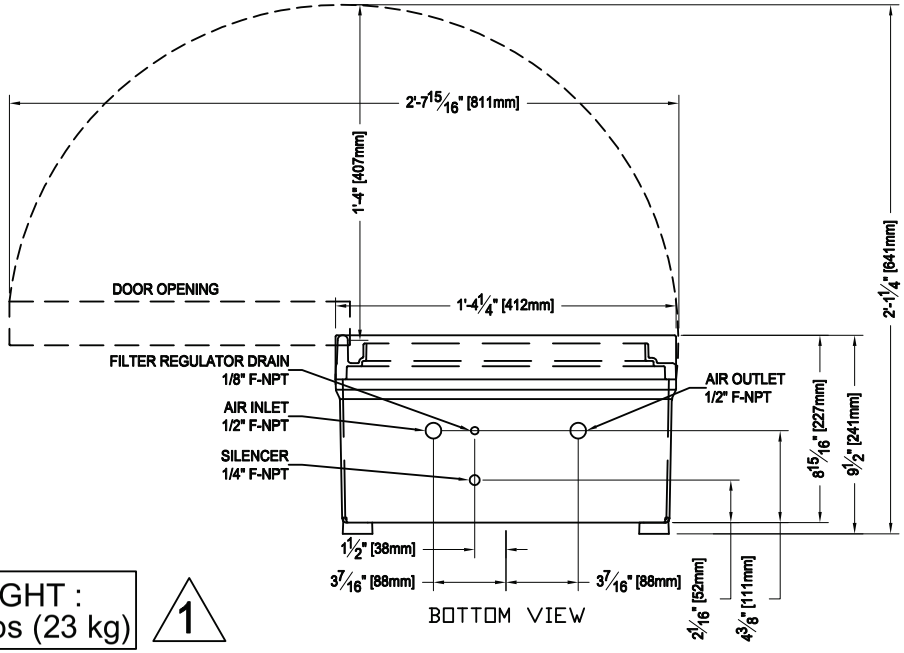


FRONT VIEW



REAR VIEW





BOTTOM VIEW

WEIGHT :
50 lbs (23 kg)

1

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

1	2022-08-23	WEIGHT	N.C.	H.L.
0	2022-07-20	FOR APPROVAL	N.C.	H.L.
NO	DATE	REVISION	DESS.	VER.

CLIENT: CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA

TITRE: TITLE: Recirculation Pneumatic Box Dimensions

NO. PROJ: PROJ. NO.: 7779-22

DATE: 2022-07-20

DESS. PAR: DRAWN. BY: N. Chartier

VER. PAR: VER. BY: H. Lessard

ECH.: SCALE: N.T.S.

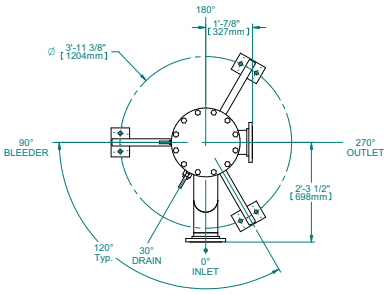
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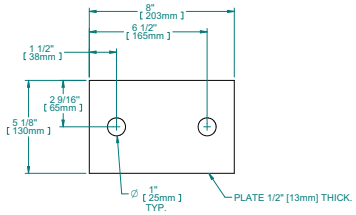
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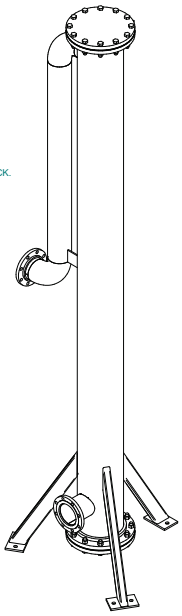
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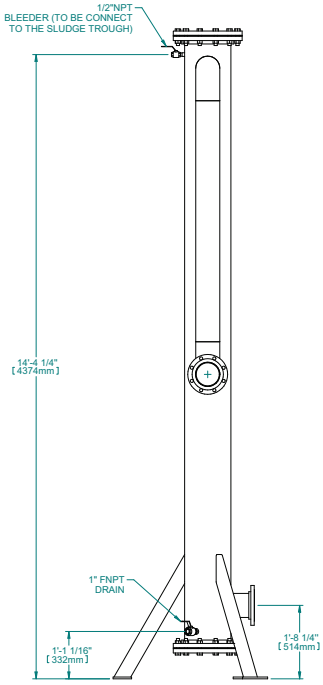
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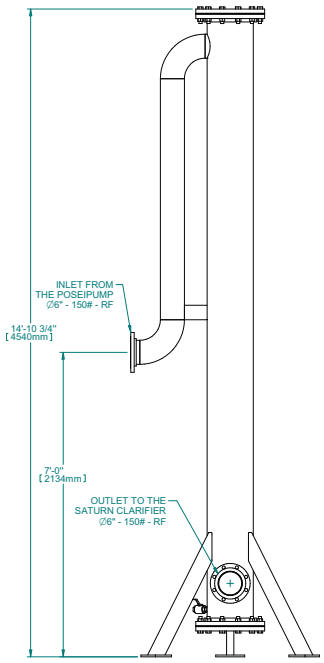




LEGS DETAIL
I.4







NOTES:
1. Wetted parts are in stainless steel 304/304L
2. All flanges are slip-on B16.5

WEIGHT OF THE DISSOLUTION PIPE:

EMPTY : 1 000 Lbs (454 Kg
FULL : 1 800 Lbs (816 Kg)

POSEIDON'S PATENT NUMBERS:

5,385,443	0,972,136	5,662,804	ZL96192773.9
0,723,476	ZL98803624	2,172,336	3331218
5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

FINAL PRODUCT TOLERANCES

Angle tolerances:
- 0 ° < length ≤ 12" = +1/8" -1/8"
- 12" < length ≤ 120" = +1/4" -1/4"
- 120" < length ≤ 240" = +3/8" -1/2"
- 240" < length ≤ 720" = +1/2" -3/4"

General parts tolerances:
- Flange face alignment = within 1/16" /ft
- Flange bolt holes alignment = 1/8" maximum offset

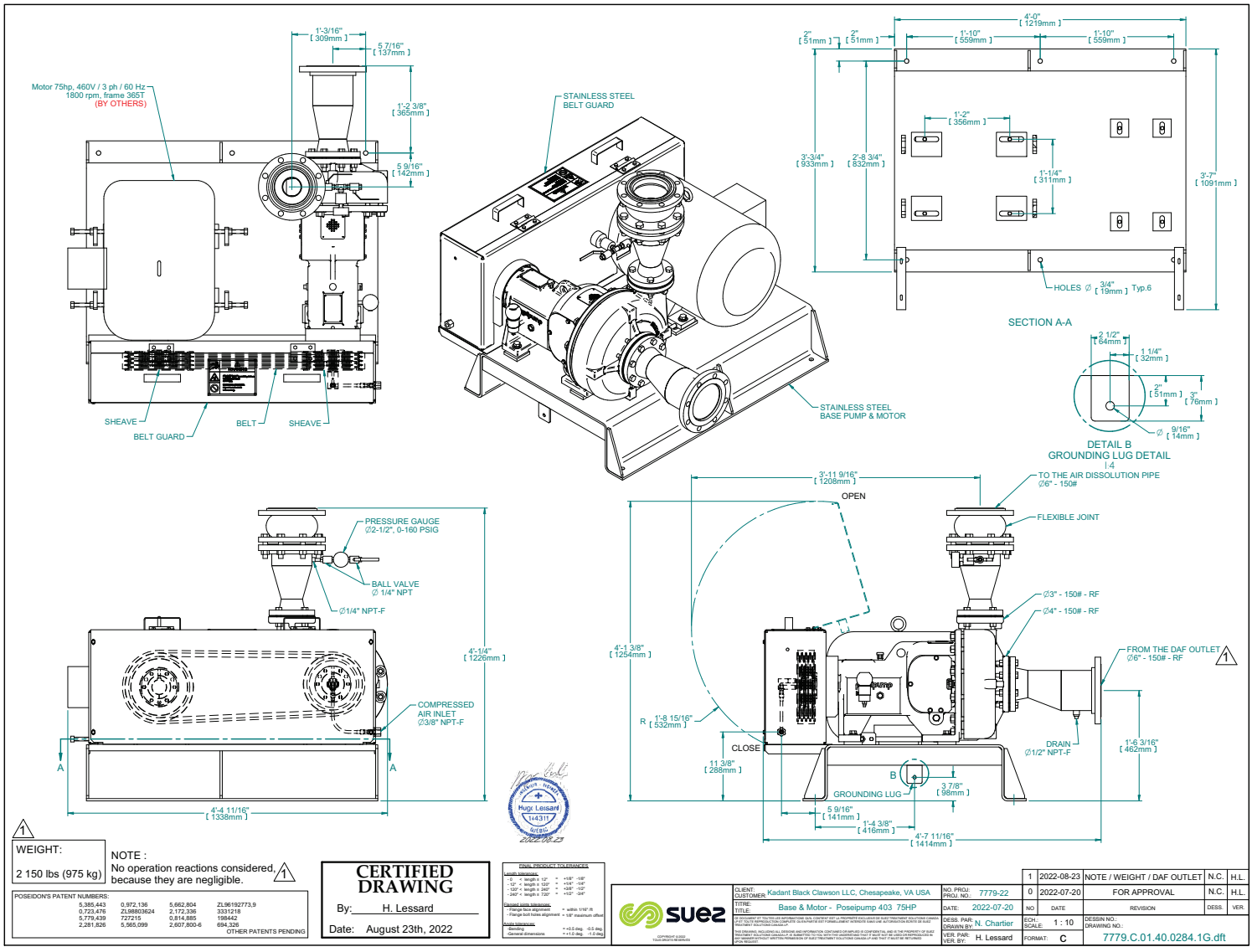
Angle tolerances:
- Bending = +0.5 deg. -0.5 deg.
- General dimensions = +1.0 deg. -1.0 deg.

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CLIENT: CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ: PROJ. NO.: 7779-22	0	2022-07-20	FOR APPROVAL	N.C. H.L.
TITRE: TITLE: Dissolution pipe - Ø12"	DATE: 2022-07-20	NO.	DATE	REVISION	DESS. VER.
	DESS. PAR: DRAWN BY: N. Chartier	ECH.: SCALE: 1 : 20		DESSIN NO.: DRAWING NO.:	
	VER. PAR: VER. BY: H. Lessard	FORMAT: C		7779.C.01.05.0202.1P.dft	

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1

WEIGHT:

2 150 lbs (975 kg)

NOTE :
No operation reactions considered, because they are negligible. 1

POSEIDON'S PATENT NUMBERS:

5,385,443	0,972,136	5,662,804	ZL96192773,9
0,723,476	ZL98803624	2,172,336	3331218
5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

FINAL PRODUCT TOLERANCES

Linear dimensions:

0 " < length ≤ 12"	=	+1/8" -1/8"
12" < length ≤ 120"	=	+1/4" -1/4"
120" < length ≤ 240"	=	+3/8" -1/2"
240" < length ≤ 720"	=	+1/2" -3/4"

Flanged joint tolerances:
- Flange face alignment = within 1/16"/ft
- Flange bolt holes alignment = 1/8" maximum offset

Angle tolerances:

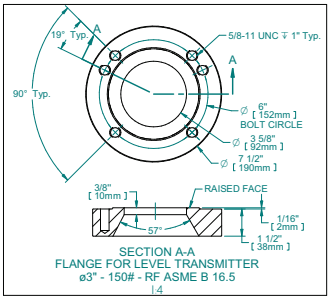
Bending	=	+0.5 deg. -0.5 deg.
General dimensions	=	+1.0 deg. -1.0 deg.

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CLIENT: CUSTOMER:	Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ. PROJ. NO.:	7779-22	1	2022-08-23	NOTE / WEIGHT / DAF OUTLET	N.C.	H.L.
TITRE: TITLE:	Base & Motor - Poseipump 403 75HP	DATE:	2022-07-20	0	2022-07-20	FOR APPROVAL	N.C.	H.L.
		NO	DATE	REVISION		DESS.	VER.
DESS. PAR: DRAWN BY:	N. Chartier	ECH.: SCALE:	1 : 10	DESSIN NO.: DRAWING NO.:			
VER. PAR: VER. BY:	H. Lessard	FORMAT:	C	7779.C.01.40.0284.1G.dft			

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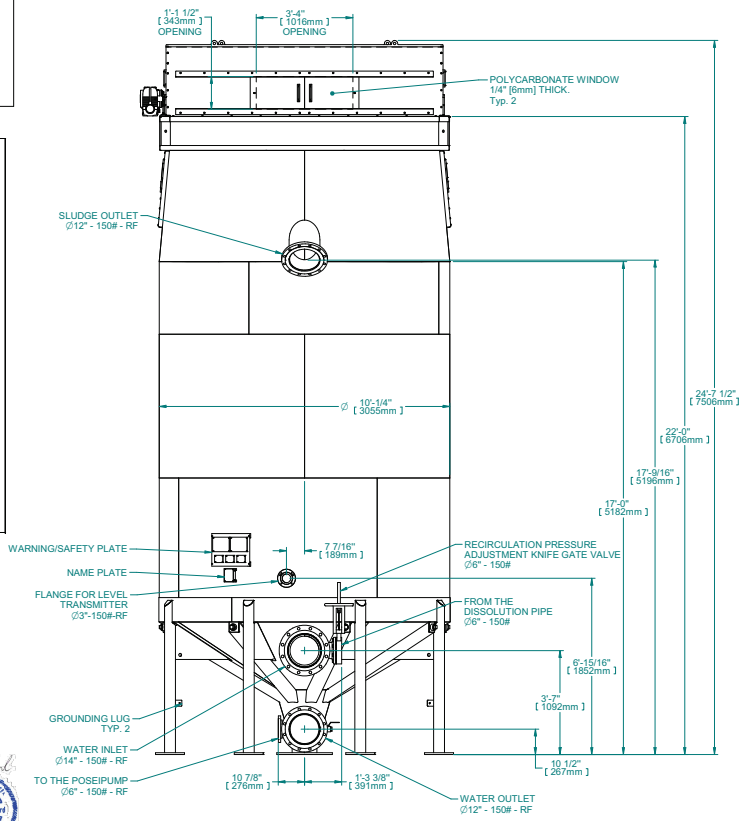


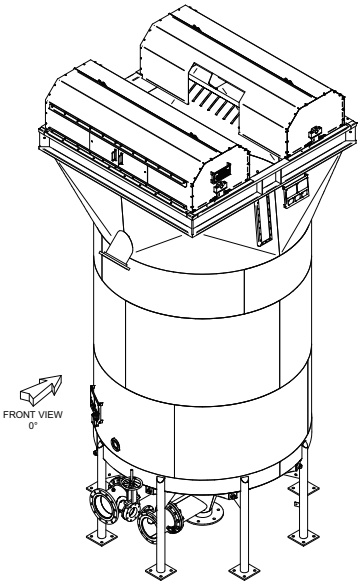
SECTION A-A
FLANGE FOR LEVEL TRANSMITTER
ø3" - 150# - RF ASME B 16.5

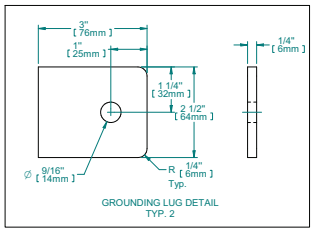
SUEZ Treatment Solutions Canada LP	
poseidon® product line	
EQUIPMENT / TAG #:	
EQUIPMENT NAME:	DAF Clarifier
MODEL:	S500TCE10E
SERIAL NUMBER:	7779-220713-S500TCE10E
CLIENT:	Kadant Black Clawson LLC Chesapeake, VA USA
P.O. NUMBER:	787140
WEIGHT EMPTY:	12 000 lb / 5 443 kg
CAPACITY OPERATING:	11 500 gal / 43.5 m3
DESIGN SPECIFIC GRAVITY:	1.0
HYDROSTATIC TEST PRESSURE:	Design liquid level
DESIGN PRESSURE:	Atmospheric
DESIGN LIQUID LEVEL:	21'-4" WC / 6502mm WC
DESIGN TEMPERATURE:	140°F / 60°C
MDMT:	-20°F / -28.9°C
MATERIAL - WETTED:	Stainless steel 304/304L
CORROSION ALLOWANCE:	1/64" / 0.397 mm
YEAR BUILT:	2022

1145 JEAN-MARCHAND
LEVIS, QUEBEC, CANADA, G6Y 9G5
TEL: (418) 833-7797 FAX: (418) 833-7466

NAME PLATE
4-1/4" x 5-1/4" STAINLESS STEEL 304







GROUNDING LUG DETAIL
TYP. 2

Hugo Lessard
14311
Québec

CERTIFIED DRAWING
By: H. Lessard
Date: August 23th, 2022

FINAL PRODUCT TOLERANCES
Angle tolerances:
- 0 < length ≤ 12" = +1/8" -1/8"
- 12" < length ≤ 120" = +1/4" -1/4"
- 120" < length ≤ 240" = +3/8" -1/2"
- 240" < length ≤ 720" = +1/2" -3/4"

Grooved joints tolerances:
- Flange face alignment = within 1/16" /ft
- Flange bolt holes alignment = 1/8" maximum offset

Angle tolerances:
- Bending = +0.5 deg. -0.5 deg.
- General dimensions = +1.0 deg. -1.0 deg.

FRONT VIEW

POSEIDON'S PATENT NUMBERS:

5,385,443	0,972,136	5,662,804	ZL96192773,9
0,723,476	ZL98803624	2,172,336	3331218
5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

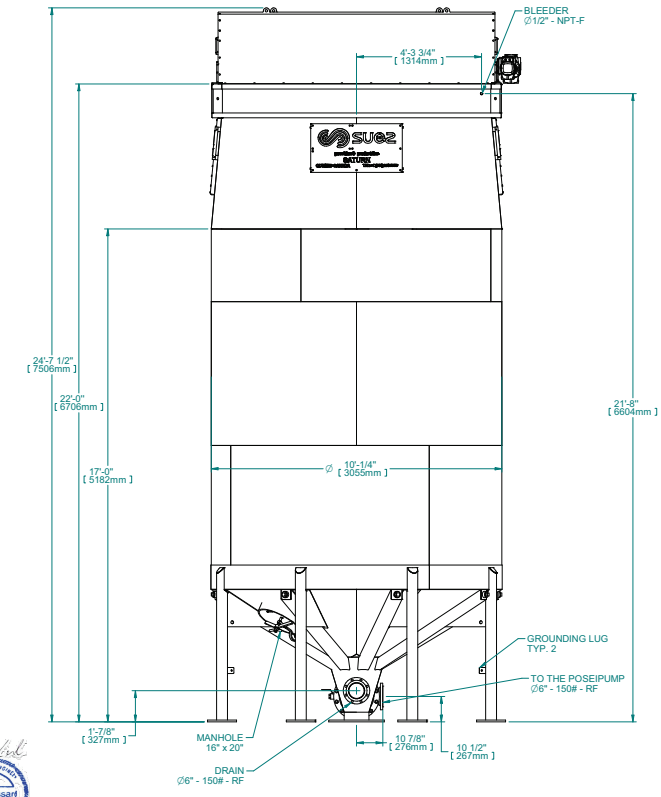
suez

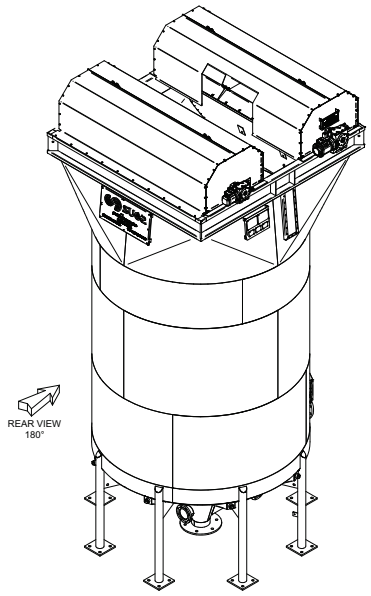
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CLIENT: CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ: PROJ. NO.: 7779-22	0	2022-07-20	FOR APPROVAL	N.C.	H.L.
TITRE: TITLE: Saturn S500TCE10E	DATE: 2022-07-14	NO	DATE	REVISION	DESS.	VER.
	DESS. PAR: DRAWN BY: n.chartier	ECH.: SCALE: 1 : 30		DESSIN NO.: DRAWING NO.: 7779.D.01.09.0060.1A.dft		
	VER. PAR: VER. BY: H. Lessard	FORMAT: C				

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Hugo Lessard
11431
turaC

POSEIDON'S PATENT NUMBERS:

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0,723,476	ZL98803624	2,172,336	3331218
5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

FINAL PRODUCT TOLERANCES

Linear dimensions:

0 < length ≤ 12"	=	+1/8"	-1/8"
12" < length ≤ 120"	=	+1/4"	-1/4"
120" < length ≤ 240"	=	+3/8"	-1/2"
240" < length ≤ 720"	=	+1/2"	-3/4"

Flanged joint tolerances:

- Flange face alignment	= within 1/16"/ft
- Flange bolt holes alignment	= 1/8" maximum offset

Angle tolerances:

- Bending	= +0.5 deg.	-0.5 deg.
- General dimensions	= +1.0 deg.	-1.0 deg.

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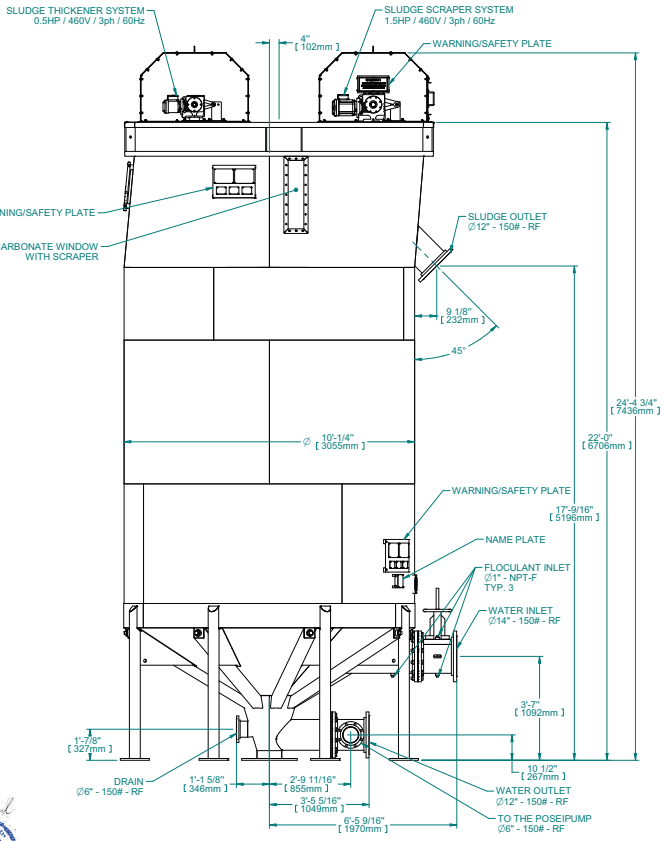
REAR VIEW

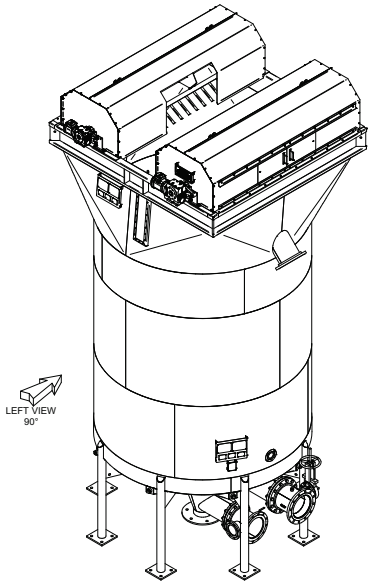
suez

CLIENT: CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ. PROJ. NO.: 7779-22	0	2022-07-20	FOR APPROVAL	N.C. H.L.
TITRE: TITLE: Saturn S500TCE10E	DATE: 2022-07-14	NO	DATE	REVISION	DESS. VER.
	DESS. PAR: DRAWN BY: n.chartier	ECH.: SCALE: 1 : 30		DESSIN NO.: DRAWING NO.:	
	VER. PAR: VER. BY: H. Lessard	FORMAT: C		7779.D.01.09.0060.1B.dft	

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5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

FINAL PRODUCT TOLERANCES

Angle tolerances:
- 0 < length ≤ 12" = +1/8" -1/8"
- 12" < length ≤ 120" = +1/4" -1/4"
- 120" < length ≤ 240" = +3/8" -1/2"
- 240" < length ≤ 720" = +1/2" -3/4"

Diameter plate tolerances:
- Flange face alignment = within 1/16" /ft
- Flange bolt holes alignment = 1/8" maximum offset

Angle tolerances:
- Bending = +0.5 deg. -0.5 deg.
- General dimensions = +1.0 deg. -1.0 deg.

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LEFT VIEW

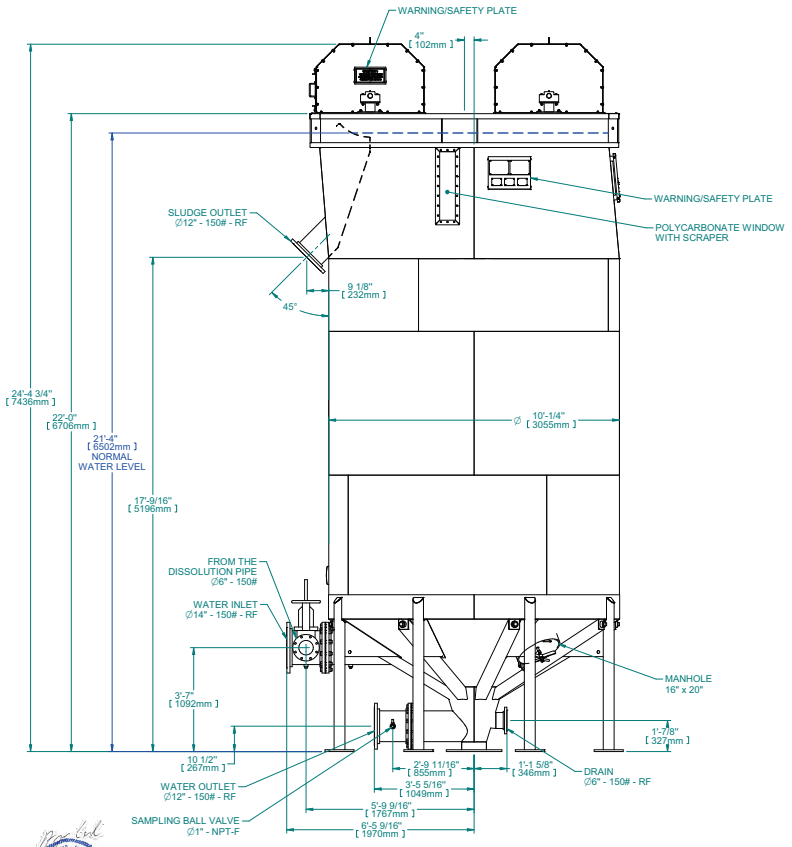
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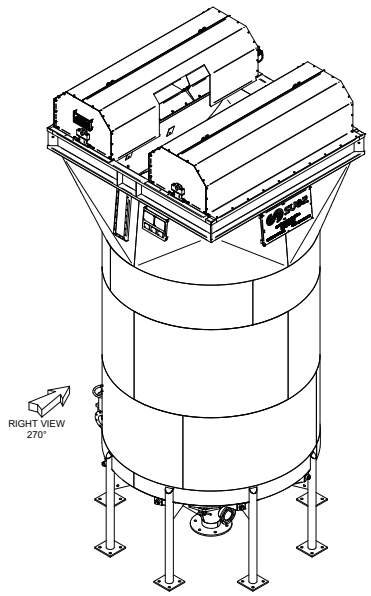
CLIENT: Kadant Black Clawson LLC, Chesapeake, VA USA
CUSTOMER:
TITRE: Saturn S500TCE10E
TITLE:

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DATE:	2022-07-14	NO	DATE	REVISION	DESS.	VER.
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VER. PAR: / VER. BY:	H. Lessard	FORMAT:	C	7779.D.01.09.0060.1C.dft		





POSEIDON'S PATENT NUMBERS:

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5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

FINAL PRODUCT TOLERANCES

Length tolerances:

0 ' < length ≤ 12 '	=	+1/8" -1/8"
12 ' < length ≤ 120 '	=	+1/4" -1/4"
120" < length ≤ 240"	=	+3/8" -1/2"
240" < length ≤ 720"	=	+1/2" -3/4"

Flanged joint tolerances:

- Flange face alignment	= within 1/16" /ft
- Flange bolt holes alignment	= 1/8" maximum offset

Angle tolerances:

- Bending	= +0.5 deg.	-0.5 deg.
- General dimensions	= +1.0 deg.	-1.0 deg.

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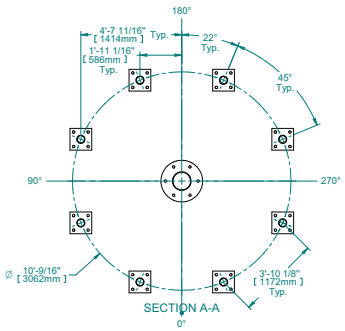
RIGHT VIEW

SUEZ

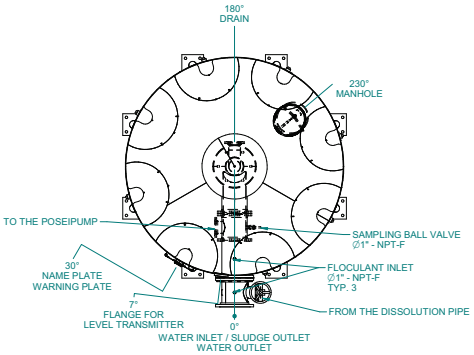
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TITRE: TITLE: Saturn S500TCE10E	DATE: 2022-07-14	NO	DATE	REVISION	DESS. VER.
	DESS. PAR: DRAWN BY: n.chartier	ECH.: SCALE: 1 : 30		DESSIN NO.: DRAWING NO.:	
	VER. PAR: VER. BY: H. Lessard	FORMAT: C		7779.D.01.09.0060.1D.dft	

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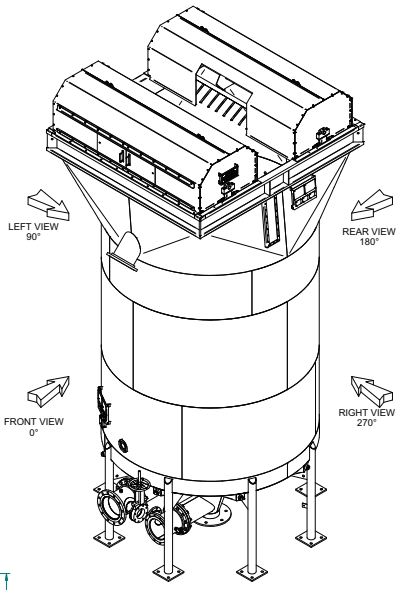
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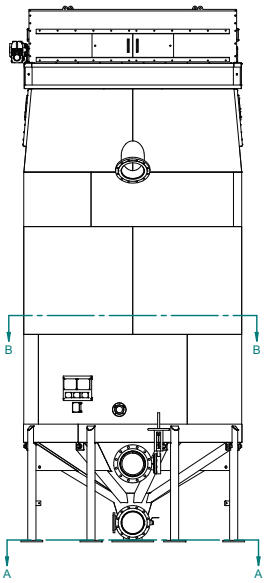


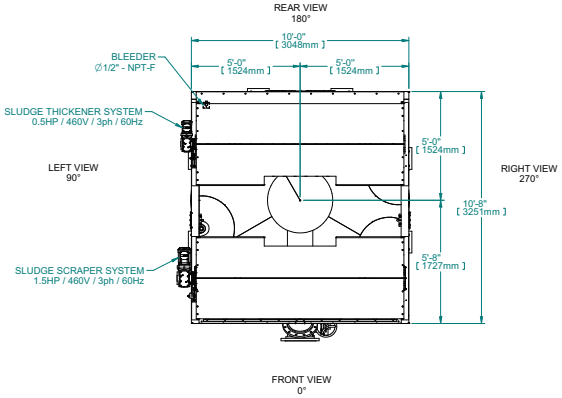
SECTION A-A



SECTION B-B







POSEIDON'S PATENT NUMBERS:

5,385,443	0,972,136	5,662,804	ZL96192773.9
0,723,476	ZL98803624	2,172,336	3331218
5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

FINAL PRODUCT TOLERANCES

Angular tolerances:

0 ° < length ≤ 12"	=	+1/8° -1/8°
12" < length ≤ 120"	=	+1/4° -1/4°
120" < length ≤ 240"	=	+3/8° -1/2°
240" < length ≤ 720"	=	+1/2° -3/4°

General joints tolerances:

- Flange face alignment	= within 1/16" /ft
- Flange bolt holes alignment	= 1/8" maximum offset

Axial tolerances:

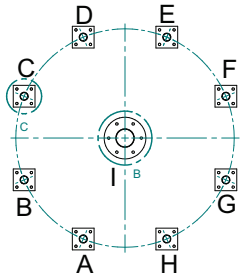
- Bending	= +0.5 deg. -0.5 deg.
- General dimensions	= +1.0 deg. -1.0 deg.

TOP VIEW

suez

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CLIENT: / CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ: / PROJ. NO.: 7779-22	0	2022-07-20	FOR APPROVAL	N.C. / H.L.
TITRE: / TITLE: Saturn S500TCE10E	DATE: 2022-07-14	NO	DATE	REVISION	DESS. / VER.
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SECTION A-A

BASEPLATES REACTIONS CALCULATIONS, Location: Chesapeake, VA USA

Earthquake Load: Negligible according to AWWA D-100

	Value	Unit	reference	Note
Risk Category/Seismic Use Group			ASCE 7-10/AWWA D-100	
Seismic importance factor Ie			AWWA D-100	ASCE refer to AWWA D-100 (05) for seismic data
Short Period Acceleration (SS)	8.50%	%g	ASCE 7-10/AWWA D-100	
1-Sec Period Acceleration (S1)	4.00%	%g	ASCE 7-10/AWWA D-100	
Site Class				
Design Spectral response (Sds)				ASCE refer to AWWA D-100 (05) for seismic data
Design Spectral response (Sd1)				ASCE refer to AWWA D-100 (05) for seismic data
Seismic Design Category				
Response modification factors R			AWWA D-100	ASCE refer to AWWA D-100 (05) for seismic data
Analysis Procedure Used				

Note: ASCE refere to AWWA D-100 to our non building structure

Wind Load: Not applicable, inside

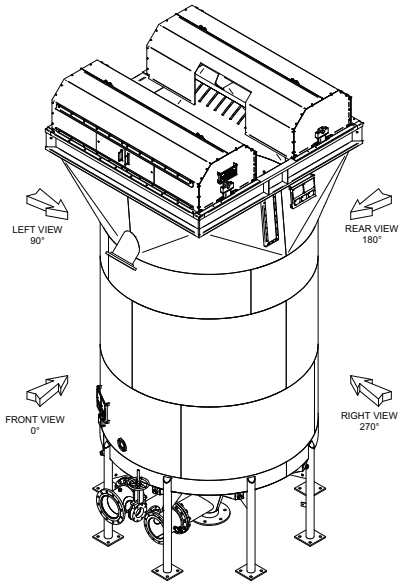
	Value	Unit	reference	Note

Live and Live Roof Load: (no roof)

	Value	Unit	reference	Note

Snow Load: (Not applicable, inside)

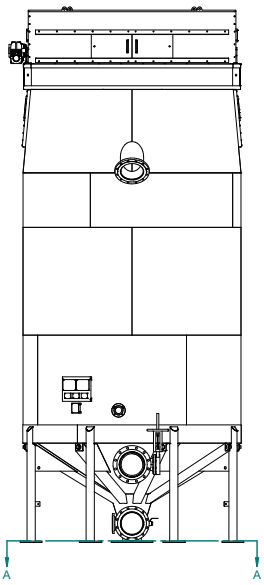
	Value	Unit	reference	Note

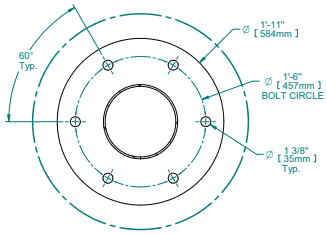


	Dead Load			Fluid Load (water)		
Support #	x	y	z	x	y	z
A	10	54	1 513	208	367	7 172
B	19	32	1 404	241	100	8 895
C	11	14	803	123	-190	1 376
D	14	17	862	295	-197	8 862
E	1	16	848	-238	-171	8 494
F	1	7	736	-65	-195	-102
G	-14	20	1 325	-96	35	7 455
H	-16	54	1 520	-195	366	6 580
I	-26	-215	2 990	-247	-1 777	61 267
Total:	0	0	12 000	25	-1 661	110 000

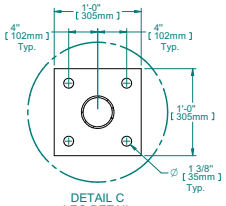
NOTES:

1. *All weights in pounds (lbs)*
2. *Positive value along z axis means compression*
3. *Negative value along z means uplift*
4. *Seismic and Wind could occur in any direction.*
   Each support should withstand the maximum reaction and any combinations according to the local building code.
5. *Loads are unfactored and not combined.*





DETAIL B
CENTRAL LEG DETAIL
3/4" PLATE
THICKNESS



DETAIL C
LEG DETAIL
3/4" PLATE
THICKNESS



POSEIDON'S PATENT NUMBERS:

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5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

FINAL PRODUCT TOLERANCES

Length tolerances:

0 ° < length ≤ 12°	=	+1/8" -1/8"
12° < length ≤ 120°	=	+1/4" -1/4"
120° < length ≤ 240°	=	+3/8" -1/2"
240° < length ≤ 720°	=	+1/2" -3/4"

Flanged joint tolerances:

- Flange face alignment	= within 1/16"/ft
- Flange bolt holes alignment	= 1/8" maximum offset

Angle tolerances:

-Bending	= +0.5 deg.	-0.5 deg.
-General dimensions	= +1.0 deg.	-1.0 deg.

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TOUS DROITS RÉSERVÉS

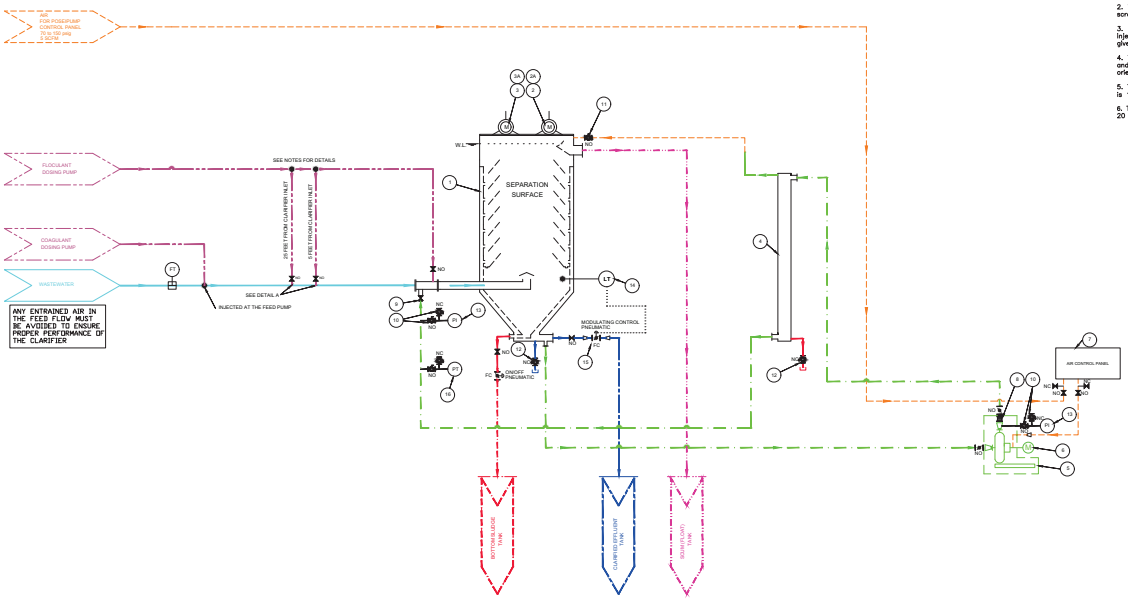
FOUNDATION LAYOUT AND REACTIONS

suez

CLIENT: CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ. PROJ. NO.: 7779-22	0	2022-07-21	FOR APPROVAL	N.C. H.L.
TITRE: TITLE: Saturn S500TCE10E	DATE: 2022-07-14	NO.	DATE	REVISION	DESS. VER.
	DESS. PAR: DRAWN BY: n.chartier	ECH.: SCALE: 1 : 40		DESSIN NO.: DRAWING NO.:	
	VER. PAR: VER. BY: H. Lessard	FORMAT: C		7779.D.01.09.0060.1H.dft	

CE DOCUMENT ET TOUTES LES INFORMATIONS QUIL CONTIENT SONT LA PROPRIETE EXCLUSIVE DE SUEZ TREATMENT SOLUTIONS CANADA LP ET TOUTE REPRODUCTION COMPLETE OU PARTIELLE EST FORMELLEMENT INTERDITE SANS UNE AUTORISATION ECRITE DE SUEZ TREATMENT SOLUTIONS CANADA LP.

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THE INJECTION POINTS

DETAIL A

SYMBOLS OF USED FORMULA

LEGEND

BLUE = CLARIFIED WATER
RED = BOTTOM SLUDGE/DRAINAGE
CYAN = WASTEWATER
BROWN = POLYMER
GREEN = RECIRCULATION
MAGENTA = SCUM (FLOAT)
ORANGE = GAS
WHITE = ELECTRICAL

Motors voltage : 460V / 3PH / 60Hz

LISTE DE PIECES / PARTS LIST

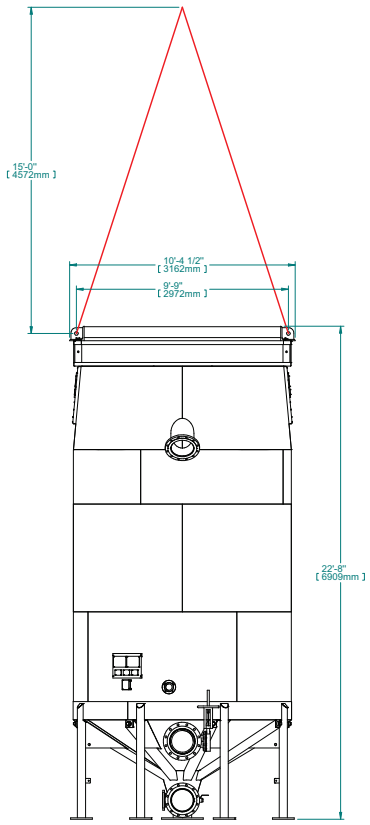
NO.	SUEZ NO.	QTY	DESCRIPTION	POWER/WEIGHT	SUPPLIED BY
1	—	1	DAF CLARIFIER		SUEZ POSEIDON
2	—	1	SCRAPER GEARMOTOR 1.5 Hp		SUEZ POSEIDON
2A	—	1	VARIABLE FREQUENCY DRIVE		CUSTOMER
3	—	1	THICKENER GEARMOTOR 0.5 Hp		SUEZ POSEIDON
3A	—	1	VARIABLE FREQUENCY DRIVE		CUSTOMER
4	—	1	DISSOLUTION PIPE		SUEZ POSEIDON
5	—	1	POSE/PUMP ASSY c/w BASE (pump/motor)		SUEZ POSEIDON
6	—	1	POSE/PUMP MOTOR 75 Hp		CUSTOMER
7	—	1	AIR CONTROL PANEL		SUEZ POSEIDON
8	—	1	FLEXIBLE JOINT		SUEZ POSEIDON
9	—	1	GATE VALVE 6" MANUAL		SUEZ POSEIDON
10	—	6	BALL VALVE 1/4" MANUAL		SUEZ POSEIDON
11	—	1	BALL VALVE 1/2" MANUAL		SUEZ POSEIDON
12	—	2	BALL VALVE 1" MANUAL		SUEZ POSEIDON
13	—	2	PRESSURE GAUGE 0-160 psi w/ Diaphragm		SUEZ POSEIDON
14	—	1	LEVEL TRANSMITTER 3"-150#		CUSTOMER
15	—	1	LEVEL CONTROL VALVE		CUSTOMER
16	—	1	PRESSURE TRANSMITTER		CUSTOMER

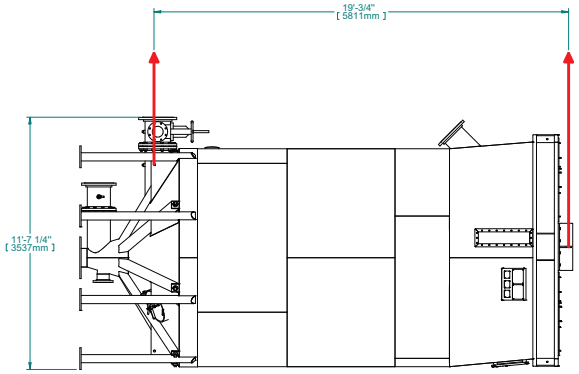
NOTES:

1. This Process Flow Diagram represents the typical requirement for the Clarifier Process. Isolation valves, Instrumentation and other equipment that don't affect the Clarifier Process can be installed by the customer.
2. Variable frequency drive (VFD) are required for thickener and scraper motors. Supplied by other.
3. Usually only one flocculant injection point is needed. Multiple injection points are needed to test and determine the point that give the best results.
4. This drawing is a schematic representation of the equipments and others auxiliaries. For the exact representation or orientations please refer to the outline drawings.
5. The minimum recommended velocity in the Bottom Drain line is 10 ft/s.
6. The minimum recommended slope in the Sludge Float line is 20 degree.

CERTIFIED DRAWING
By: H. Lessard
Date: August 23th, 2022

CLIENT / CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ. / PROJ. NO.: 7779-22	0	2022-07-20	FOR APPROVAL	N.C. H.L.
TITRE: Process Flow Diagram (PFD)	DATE: 2022-07-20	NO.	DATE	REVISION	DESS. VER.
DESSINÉ PAR / DRAWN BY: N. Chartier	ECHELLE / SCALE: N.T.S.	DESSIN NO. / DRAWING NO.: 7779.D.01.09.0060.1L			
VÉRIFIÉ PAR / VER. BY: H. Lessard	FORMAT: D				





CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

POSEIDON'S PATENT NUMBERS:

5,385,443	0,972,136	5,662,804	ZL96192773,9
0,723,476	ZL98803624	2,172,336	3331218
5,779,439	727215	0,814,885	198442
2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

WEIGHT

EMPTY: 10 800 lbs
4 899 kg

FINAL PRODUCT TOLERANCES

Length tolerances:

- 0 ' < length ≤ 12 '	=	+1/8" -1/8"
- 12 ' < length ≤ 120 '	=	+1/4" -1/4"
- 120" < length ≤ 240"	=	+3/8" -1/2"
- 240" < length ≤ 720"	=	+1/2" -3/4"

Flanged joint tolerances:
- Flange face alignment = within 1/16" /ft
- Flange bolt holes alignment = 1/8" maximum offset

Angle tolerances:
- Bending = +0.5 deg. -0.5 deg.
- General dimensions = +1.0 deg. -1.0 deg.

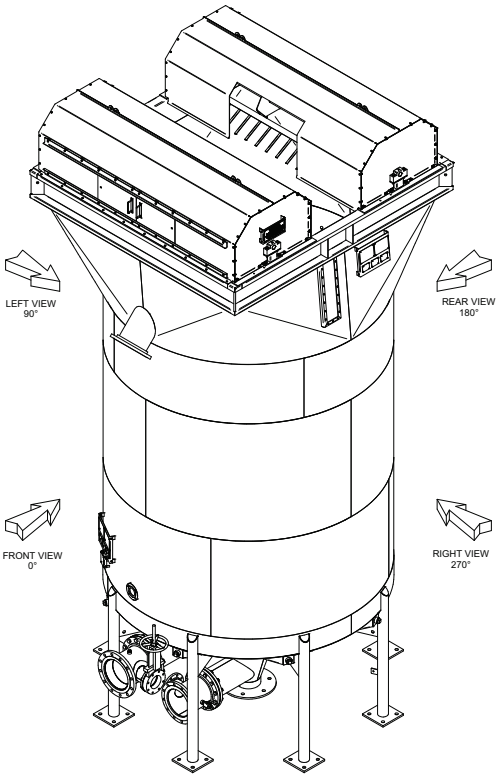
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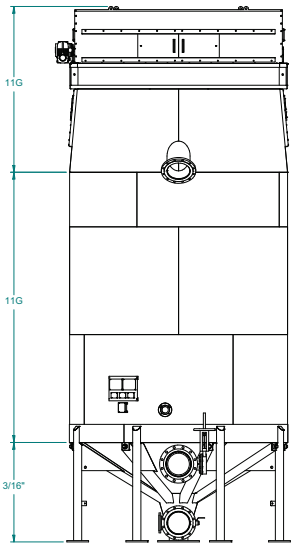
LIFTING VIEW

CLIENT: CUSTOMER: Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ: PROJ. NO.: 7779-22	0	2022-07-20	FOR APPROVAL	N.C.	H.L.
TITRE: TITLE: Saturn S500TCE10E	DATE: 2022-07-14	NO	DATE	REVISION	DESS.	VER.
	DESS. PAR: DRAWN BY: n.chartier	ECH.: SCALE: 1 : 40		DESSIN NO.: DRAWING NO.: 7779.D.01.09.0060.1M.dft		
	VER. PAR: VER. BY: H. Lessard	FORMAT: C				

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Hugo Lessard
11431
Québec
2022-08-23

CERTIFIED DRAWING

By: H. Lessard

Date: August 23th, 2022

FINAL PRODUCT TOLERANCES

Angular tolerances:

0 °	< length ≤ 12"	=	+1/8" -1/8"
12"	< length ≤ 120"	=	+1/4" -1/4"
120"	< length ≤ 240"	=	+3/8" -1/2"
240"	< length ≤ 720"	=	+1/2" -3/4"

Diagonal plane tolerances:

- Flange face alignment = within 1/16" /ft
- Flange bolt holes alignment = 1/8" maximum offset

Angle tolerances:

- Bending = +0.5 deg. -0.5 deg.
- General dimensions = +1.0 deg. -1.0 deg.

ISOMETRIC VIEW

POSEIDON'S PATENT NUMBERS:

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0,723,476	ZL98803624	2,172,336	3331218
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2,281,826	5,565,099	2,607,800-6	694,326

OTHER PATENTS PENDING

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CLIENT: CUSTOMER:	Kadant Black Clawson LLC, Chesapeake, VA USA	NO. PROJ: PROJ. NO.:	7779-22	0	2022-07-20	FOR APPROVAL	N.C.	H.L.
TITRE: TITLE:	Saturn S500TCE10E	DATE:	2022-07-20	NO	DATE	REVISION	DESS.	VER.
		DESS. PAR: DRAWN BY:	N. Chartier	ECH.: SCALE:	1 : 20	DESSIN NO.: DRAWING NO.:		
		VER. PAR: VER. BY:	H. Lessard	FORMAT:	C	7779.D.01.09.0060.1N.dft		

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